Us and Them

Economic Consequences of Ethno-confessional Diversity

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Economic Consequences of Ethno-confessional Diversity

Luka Miladinović

LUND UNIVERSITY

DOCTORAL DISSERTATION

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Abstract

An increasing number of countries are accepting individuals with diverse religious and ethnic backgrounds within their borders – a trend that can be traced to the end of WWII. Theoretically, a society can experience both economic benefits and costs from ethno-confessional diversity. As economies become more open and interconnected, it is vital to have an adequate answer to the question of how ethno-confessional heterogeneity impacts different dimensions of national economies. Through four empirical research papers, this thesis provides relevant insights into the nuanced interplay between ethno-confessional diversity and economic activity and performance. The results obtained indicate that the dynamic ethnic diversity has a negative impact on the economic growth on a country-level. However, this impact is probably indirect, meaning that ethnic diversity influences economic growth by affecting some other determinants of the economic performance. The thesis also finds that the increase in ethnic diversity is related to the increase in inequality before redistribution. Interestingly, when the dynamic measures of ethnic diversity are used, the results do not show statistically significant effect of ethnic heterogeneity on inequality after redistribution. Lastly, ethnic strife in both pre- and post-WWII Yugoslavia has impeded economic activity and performance. Preliminary evidence suggest that top-down policies and practices intended to prevent an ethnic conflict were unable to remove the negative impact of ethno-confessional diversity on trade and economic growth.

Key words: Economic growth, Inequality, Ethnic Diversity, Yugoslavia

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Corresponding author: luka.miladinovic@ekh.lu.se

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MADE IN SWEDEN

To my mother, father, and brother

Content

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List of papers

I. Miladinović, Luka (2022). *Economic Growth and Dynamic Ethnic Diversity: Evidence from the second part of the XX century* [Unpublished manuscript]. Department of Economic History, Lund University.

II. Miladinović, Luka (2022a). *Diversity and Inequality: The empirical assessment of the relationship between the dynamic ethnic diversity and income inequality before the redistribution in a panel of countries* [Unpublished manuscript]. Department of Economic History, Lund University.

III. Miladinović, Luka. (2020) *Trade and nationalism: market integration in interwar Yugoslavia.* European Review of Economic History 24, no. 2 (2020): 288-313.

IV. Miladinović, Luka (2022b). *Brotherhood and Unity: Ethnic Diversity and Economic Performance in Socialist Yugoslavia* [Unpublished manuscript]. Department of Economic History, Lund University.

PART 1:
Kappa

Chapter 1:
Introduction

From the 1850s to the beginning of WWI, more than 25 million people from Italy, Norway, Sweden, Ireland, and other European countries moved to the United States (Hatton & Williamson, 1992). In the long run, the USA economically benefited from the expansion of the variety of experience, knowledge, and abilities that came with European migrants who had different ethnic and religious backgrounds. The variety can, for example, stimulate innovations and, in doing so, promote economic activity. By allowing scientists with unique knowledge bases, perspectives, and sets of abilities, such as Nikola Tesla, to come and work in the USA, that country was able to be the first to employ their inventions and enjoy benefits from the technological improvements stemming from their creations.

This is only one side of the story where the USA's context is intentionally overlooked to demonstrate how diversity can benefit society. In reality, the United States was not ethnically inclusive at the end of the XIX century. Even today, racial and ethnic backgrounds are almost equated in the US. Because Nikola Tesla, staying within the example of innovations, and many other scientists who came to America from Europe at that period were White, they could pursue opportunities by following their abilities without facing the barriers that Black people had to overcome at the dawn of the slavery abolishment.[1] Lewis Howard Latimer was a Black inventor who perfected a lightbulb, among other numerous contributions. To allow him to express his innovativeness in the USA, Latimer's parents had to escape slavery, and he had to overcome seemingly insurmountable obstacles (Young, 2009).

Not only did the USA miss out on the potential gains of variety because of the discrimination, but society was facing actual costs due to racism. Because of the limited opportunities, Black people could not efficiently allocate their already limited resources. Without proper allocation of resources, economic development is impeded. On top of that, limited opportunities for discriminated individuals led to an artificial – not the consequence of the market processes – increase in inequality.

The example of the USA illustrates that, although ethnic and religious diversity may improve economic activity and performance through variety, they can also represent a barrier to economic progress and increase inequality in an ethnocentric, chauvinistic, and racist environment. But the complexity of the relationship between diversity and economic performance does not stop there. Namely, ethnic and

[1] People coming to settle in America frequently had to face some discrimination at their arrival as they were migrants. The discrimination against migrants and underrepresented groups is difficult to compare if it is comparable at all.

religious heterogeneity may be a significant source of conflict detrimental to economic performance. The region where Nikola Tesla was born, for example, suffered immensely due to ethnic conflicts in the XX century. The origins of the ethnic conflict in Tesla's birthplace can be traced to the XIV century, yet traces of these conflicts are observable to this day. At the moment of writing of this, the highest officials from Croatia and Serbia are engaged in a futile debate about whether Nikola Tesla was "one of us" or "one of them".

A complex relationship between ethno-confessional diversity and economic activity and outcomes is a primary topic of this thesis. As countries are becoming more open and interconnected and, therefore, more diverse, it is vital to have an adequate answer to how ethno-confessional heterogeneity impacts different dimensions of national economies. Policies developed to eliminate the costs and maximize the benefits of diversity will be effective if they are based on a proper understanding of the mechanisms behind the impact of ethno-confessional diversity on economic outcomes.

The thesis presents four research papers that advance our understanding of the economic consequences of ethno-confessional diversity. The first two papers are built on a foundation laid down by existing empirical cross-country studies. These studies improve upon the existing studies by asking more nuanced questions, using more robust methodological approaches, expanding the observational field, and adding the time component to the ethnic heterogeneity, which is usually omitted in studies of the economic consequences of diversity. The second two papers use the peculiarity of the historical context of the Yugoslavia – Kingdom of Yugoslavia in the interwar period and the socialist Yugoslavia after WWII. The properties of the "Yugoslavian context" make this region fruitful for analyzing the topics of interest.

Three research papers – the first, the second, and the fourth – focus on ethnic diversity, while one – the third paper – deals with the concept of religious diversity. The paper where religious diversity is observed is set in a context where religious and ethnic belonging can be almost equated.[2]

To avoid ambiguities, making a couple of notes early in the thesis regarding the terminology is necessary. When presenting the overarching theme of the dissertation, the syntagma "ethno-confessional diversity" is used with an intent to capture the diversity concepts that apply to all papers. In this context, the "ethno-confessional" diversity does not equate the religious and ethnic heterogeneity, but it is intended to capture both. When a particular paper is being discussed, the precise diversity term is used – "ethnic diversity" for papers one, two, and four, and "religious" or "ethno-confessional diversity" for the third paper. Only for the third

[2] Religious and ethnic diversity are different concepts. The contextual background where the religious affiliation is a major trait of the ethnic belonging will be presented throughout Kappa and the third paper.

paper, the "ethno-confessional diversity" links ethnic and religious heterogeneity of individuals. The terms "diversity" and "heterogeneity" are used interchangeably.

The dissertation is divided into two major parts: Kappa and Research Papers. Each research paper can be read independently, but the overarching theme, shown in part titled Kappa, pervades all four papers.

Kappa consists of the four Chapters. The opening chapter of the thesis, the Introduction, sets the platform for further elaboration of research endeavours conducted in the four papers. Chapter 2 depicts the previous studies of the topic of interest and expands on the position of each research paper in the economic, historical, and scientific context. An overview of the methodological approaches and data utilized in the four papers is presented in Chapter 3. The fourth chapter is reserved for the concise summaries of each research paper and the presentation of the main results obtained. Using the information presented in Chapters 1-4, Chapter 5 summarizes the most important conclusions, expounds on the papers' contributions to the expansion of knowledge concerning the overarching theme, and recommends paths for further research.

The second part of the thesis is reserved for research papers. The papers are ordered as a "funnel", going from the global to the local level of analysis. The first two papers conduct a state-level panel analysis, while the second two focus on the Yugoslavian region before and after WWII. The order of the papers and their respective titles are as follows:

Paper 1: Economic Growth and Dynamic Ethnic Diversity: Evidence from the second part of the XX century

Paper 2: Diversity and Inequality: The empirical assessment of the relationship between the dynamic ethnic diversity and income inequality before the redistribution in a panel of countries

Paper 3: Trade and nationalism: Market integration in Interwar Yugoslavia

Paper 4: Brotherhood and Unity: Ethnic Diversity and Economic Performance in Socialist Yugoslavia

The following segments of the Introduction formally depict the importance and urgency of the proper understanding of the economic consequence of ethno-confessional diversity. On top of that, the Introduction will provide a concise overview of research topics for each of the four research papers comprising the dissertation, time and geographic scopes for each study, and definitions of concepts used in the analyses.

Motivation and Aim

Ethnic diversity has been increasing in the last half a century. An illustration of this trend is presented in Figure 1.1. From 1960 to 2015, the average probability (averaged over 103 countries for which data is available for the entirety of this

period) that two randomly chosen individuals belong to a different ethnic group has increased by seven percentage points.[3]

At first glance, an increase of 7 percentage points in 55 years may not seem noteworthy. However, when additional contextual information is added to this quantification, such an increase suggests non-negligible changes in a social structure worldwide.

First, the probability scale is not linear as it has the upper and lower bounds meaning that an increase cannot be expected to be drastic as the probability approaches its upper limit equal to 1. Despite having the upper limit, the observed probability grows at an increasing rate. The increase in the growth rate of ethnic diversity over the years is subtle but exists. In the first three decades, the probability rose by three percentage points, and in the last decade alone by two percentage points.

Second, an increase by seven percentage points equals the increase in probability by more than 20 percent from 1960 to 2015. Because of the scaling, expressing the change in percentage points may hide the information about the actual change in the probability.

Third, regardless of the magnitude of an increase, the trend is unequivocally showing that diversity has grown continuously at the global level for more than five decades. Such a steady and long-term trend in changes in the social fabric should not be neglected.

Fourth, the observed increase in the probability that two randomly chosen individuals are from different ethnic groups can translate into changes in ethnic structure affected by a large number of people, depending on the size of the country. From 1945 to 2013, this probability has changed by 10 percentage points in China. For illustration purposes, we can imagine that after the Second World War, China was wholly homogenous and that during the period from 1950 to 2013, there was no population growth. In that case, almost 25 million people would have had a different ethnic background in 2013 compared to 1950. Since China was not entirely homogenous after the Second World War and its population grew over the observed period, the number of people needed to achieve the aforementioned growth of diversity must be much higher.

Fifth, the increase in ethnic diversity can be sufficient to affect political decisions and processes. Ethnic backgrounds of individuals play an important role in their political choices (Adida et al., 2017; Ahlerup & Olsson, 2012; Teney et al., 2010; Wolfinger, 1965). The relative importance of ethnicity in political life depends on

[3] A probability that two randomly chosen individuals belong to different ethnic groups is the most frequently used measure of ethnic diversity in literature – ethnic fractionalization index. Different measurements of diversity will be presented in more detail later in the thesis, in Chapter 3. Evolution of ethnic diversity measured by other indices than ethnic fractionalization index, are, to best of my knowledge, not available for the large sets of countries over long period.

the temporal and geographical context (Dunning & Harrison, 2010). Still, the observed changes in ethnic structures have very likely impacted the political aspects of social life and, with politics, all other spheres of social life in many countries (Houle, 2018).

One of the reasons for the steady and non-negligible increase in ethnic diversity is the reduction of the cost to benefit ratio of migrations and mobility. The formation of multinational entities, such as the European Union, and the rise in a number of multi and bilateral treaties between nation-states reduced the restrictions on the mobility of labour and, hence, contributed to the decrease in mobility costs. The other reasons for the rise in ethnic diversity are recent migration waves, especially prominent in the last two decades (World Migration Report, 2020). People are voting with their feet or are being displaced due to civil wars and domestic conflicts.

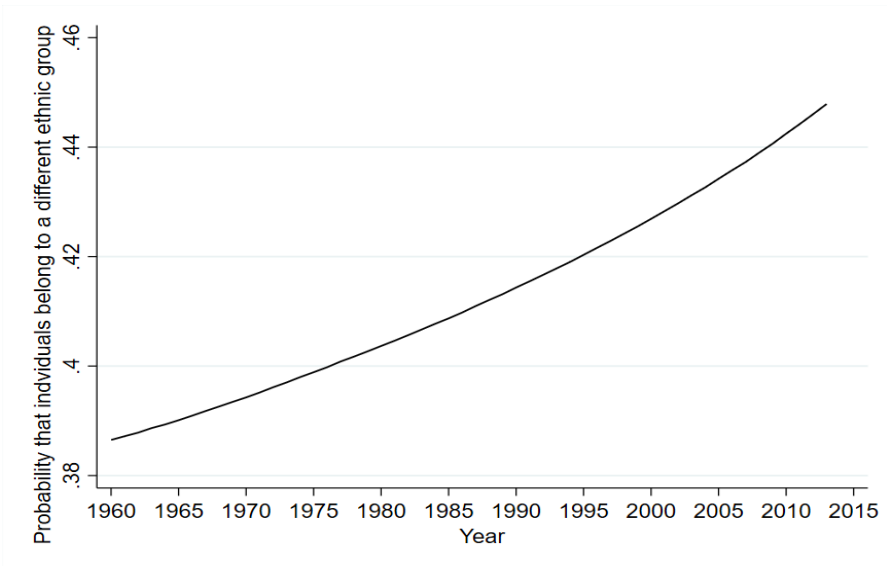


Figure 1.1: An increasing trend of ethnic diversity (global average). *Source:* Dražanová (2020)

Whether ethno-confessional heterogeneity benefits economic performance and activity or causes negative disturbances in societies experiencing increased diversity cannot be determined *a priory*. The theoretical framework developed by Alesina and La Ferrara (2005)[4] suggests the existence of positive and negative economic outcomes of ethno-confessional diversity. More heterogenous societies may

[4] Detailed presentation of theoretical and empirical studies of the topic of the relationship between ethno-confessional diversity and economic activity and performance is laid out in the next Chapter of this thesis.

experience economic benefits from a variety of experiences, skills, and cultures. A variety of individual competencies due to their different ethno-confessional backgrounds could enhance productivity and competition and boost innovations. At the same time, more diverse societies are at a greater risk of ethno-confessional conflicts that are devastating to economic activity and performance. These conflicts can be major – resulting in civil wars and destruction of economic capacities – but they can also be minor and still generate inefficiencies embodied in disagreements and quarrels that result in an inadequate economic environment for economic activity and performance improvements. This theoretical framework cannot predict which one of these effects will prevail without additional contextual information.

Most of the findings from large and expanding empirical literature where states are observational units (to mention some from the last 25 years: Alesina & Ferrara, 2005; Bluedorn, 2001; Collier, 2000; Easterly & Levine, 1997; La Porta et al., 1999; Mauro, 1995; Montalvo & Reynal-Querol, 2005a; Patsiurko et al., 2013; and many others) suggest a negative relationship between ethno-confessional diversity and economic performance. However, the number of studies finding a positive relationship between ethnic diversity and economic growth is rising. A paper by Ashraf and Galor (2011) is one of the examples where empirical findings have supported the possibility of the positive impact of ethnic – in this case, cultural – diversity on growth. Empirical studies in which observation units are areas smaller than a state also document how ethnic diversity may be conducive to local economic growth (Lee, 2011, 2015; Ottaviano & Peri, 2005, 2006; Sparber, 2010). A recent paper by Montalvo and Reynal-Querol (2021) is designed to allow inspection of the relationship between ethnic homogeneity and economic growth on different spatial scales: from the grid-country cell expanding to the state level. They conclude that ethnic diversity has a strong and positive effect on the economic performance of smaller geographical areas. This effect declines when the size of the observed space increases. The positive impact of ethnic diversity on growth disappears on the largest observation scale – the state level.

Evolving ethno-confessional structure of societies is bringing changes to all aspects of social life. Economic activity and economic outcomes are not exceptions. This rise of ethno-confessional diversity presents a challenge for contemporary societies. Putnam (2007) even contends that it may be one of the biggest challenges of the contemporary world. In this sense, the challenge is how to adequately respond to the growing diversity, avoid the costs, and promote the benefits.

In a growing number of multiethnic societies, an adequate understanding of the relationship between economic activity and outcomes, on the one side and, on the other side, ethno-confessional heterogeneity is vital. Policies and practices developed to eliminate the potential costs and maximize the benefits of diversity will be ineffective if there is no proper grasp of the mechanism behind the economic consequences of ethno-confessional diversity. Theoretical and empirical research endeavours do not provide an unequivocal answer to whether ethno-confessional

diversity is beneficial for or detrimental to economic activity and outcomes nor to how to reap the benefits and avoid the costs of diversity. Although the four research papers from this dissertation focus on the economic consequences of ethno-confessional diversity rather than on policies, they provide important insights that should not be neglected when future policies are crafted. Nevertheless, the last two papers provide historical examples where top-down policies were unable to eliminate the costs of ethnic diversity.

The thesis aims to enhance our understanding of the relationship between ethno-confessional diversities on the one side and economic outcomes and activity on the other side. The four interrelated papers that comprise the thesis are intended to provide novel empirical insights that bring us a step closer to comprehending this relationship while reducing theoretical and empirical ambiguities surrounding the economic consequences of ethno-confessional diversity. Evidence provided in studies could also be beneficial for creating and implementing policies that are intended to reduce the costs of diversity and encourage the positive impact of diversity on economies. In other words, through positive empirical analysis, the goal is to derive conclusions that would provide practical insights into appropriate responses to challenges posed by ethno-confessional diversity to economic activity and outcomes.

Different aspects of social life are interconnected. Therefore, a "proper" response to rising diversity and its effect on economic activity and outcomes may improve other aspects of social interaction. For example, creating an economic environment where diversity benefits members of different ethnic and religious groups may reduce the chances of future conflict between these groups. The conflict would be more costly if individuals benefit from the diversity and interaction with members of different ethno-confessional backgrounds (parallel argumentation can be found in McDonald, 2004).

Definitions of fundamental concepts and limitations

Before the depiction of the four studies that comprise this dissertation, it is necessary to establish the operational field of the research by defining the principal concepts used in the studies and identifying their limitations. It is essential to clarify concepts of ethno-confessional diversity and economic activity and outcomes to make these notions tangible and establish a terminological navigation map.

Ethno-confessional diversity

Since religious diversity is used only in the third research paper of this thesis as a principal determinant of ethnic background, it is sufficient to define what is meant by ethnic diversity. In the papers comprising this thesis, the ethnically homogenous society is a society consisting of individuals whom all have the same ethnic identity.

Ethnic diversity, or heterogeneity, represents the level of deviation from ethnic homogeneity.

Defining the ethnic identity is a challenging task, going above and beyond the research scopes of this thesis. An in-depth analysis of the concept of ethnic identity would lead us astray from the primary subject matter of the thesis. Nevertheless, if the concept is left open for interpretation, the conclusions from studies would not be as potent since every claim could potentially be justified by *ad hoc* changes in the interpretation of ethnic identity. Moreover, only when ethnic identity is adequately defined it is possible to uncover limitations inherent to data regarding diversity.

The studies in the thesis rely on Phinney's (1996) definition, which characterizes ethnic identity as: […] a complex construct including a commitment and sense of belonging to one's ethnic group, positive evaluation of the group, and involvement in activities and traditions of the group" (page 145). This definition implies that ethnic identity is a subjective, dynamic, and multidimensional construct. A more contemporary definition presented in Newman & Newman (2020) does not differ substantially from Phinney's (1996) understanding of the ethnic identity, at least not in manners that would be relevant for research papers that comprise this thesis.

An example of the determination of Nikola Tesla's ethnic identity may illustrate how difficult or impossible it may be to determine one's identity objectively. Tesla was born in Smiljane, a village under the control of the Austro-Hungarian empire. This village is a part of modern-day Croatia. His father was an orthodox priest, a specific characteristic of ethnic Serbs that may demarcate ethnic Serbs from ethnic Croats. During the second half of his life which he spent in the USA, Serbia and Croatia were unified into one country named the Kingdom of Yugoslavia. Since Tesla was born in the Austro-Hungarian empire, his ethnic identity may be Austro-Hungarian. By analogy, he could also be Croatian, but he had inherited some ethnic traits characteristic of an ethnic Serb from his mother and father. Tesla spent his life in the USA, so could he simply be White American? Perhaps, Tesla is a Yugoslav. Without Tesla's account of his ethnic origin, it is impossible to deduce what was his ethnicity unequivocally. In practice, his ethnic identity and the ethnic identity of any other person would be determined based on the norms defined by the data gathering process. In the Kingdom of Yugoslavia after 1929, for instance, Tesla would not be able to declare his ethnic identity in the census, only his religious affiliation. In Yugoslavia after WWII, Nikola Tesla, if he were alive, would be able to declare his ethnicity relatively freely. During his life in the United States, Tesla would fall into the "White non-Hispanic" ethnic category.

Because of the difficulties in objectively assessing one's ethnic identity, the thesis relies upon subjective determination of ethnic identity. It uses data based on the subjective evaluation of one's ethno-confessional background whenever the data availability allows (in the research paper 4).

Data about an individual's ethnicity is usually collected via censuses and sometimes through surveys (Clots-Figueras, & Masella, 2013). Concerning the definition above of ethnic identity, it is crucial to lay out a couple of limitations that should be considered when research results are being assessed.

The first limitation stems from the fact that individuals are rarely free to express their subjective feeling of ethnic belonging. Usually, the census questionaries regarding ethnicity have pre-defined ethnic categories. Individuals do not have to feel a sense of belonging to the pre-defined categories, or they can belong to several of them simultaneously. This limitation may not be as problematic if it is assumed that individuals choose the ethnic category that most closely resembles the ethnic group to which they subjectively belong. The extent of the problem will depend on the level of detail in the definition of categories. It is important to mention that this limitation is prevalent even in the most developed countries globally. For example, only since the year 2000 individuals who feel belonging to multiple ethnic groups in the United States of America can self-identify (Lee et al., 2017).

The more severe problem is when identifying as a member of a particular ethnic group is impossible because it is prohibited or bears severe consequences and social stigma. In that case, it would be incorrect to assume that individuals are choosing the ethnic category that most closely resembles their feelings of belonging. Again, this is not only the problem of the developing world. Since the 1990s, individuals from Romani communities in Europe have been engaging in efforts to be perceived as non-Romani (Cahn, 2007).

A similar problem arises when the interviewers fill in the questionnaires based on how they have perceived the ethnicity of the respondent – particularly problematic when ethnic groups have distinct markers such as skin colour. It is also crucial to note the contextual problems when socio-political events cause distortions in data gathering. An example of such a problem is a boycott of the census in Kosovo in 1991.

Following the definition of ethnic identity provided, individuals can change their ethnic group over their lifespan. However, it is assumed that the number of people who change ethnicity over time is negligible.[5] Moreover, even if the change happens, the thesis expects that these changes will, in most cases, be reflected at least to some extent in dynamic datasets. Data availability allows the usage of time-changing measures of ethnic diversity in research papers 1 and 2 of this dissertation. Time-invariant measures of ethnic diversity will not be able to capture these changes.

Finally, the subjectivity of the ethnic identity implies various degrees of the sense of belonging to an ethnic group among different individuals. The severity of this issue

[5] Whether or not a person can be “trans-ethnic” or “trans-racial” is not a debate that this paper will cover. This is simply an acknowledgment of a possibility which is logically consistent with the operational definition of the ethnic identity.

is also dependent on the precision in defining ethnic categories. Too broad categories, such as "Asian" in USA censuses, will underestimate the actual diversity levels.

Therefore, the census and survey data usage does not provide an actual state of diversity but rather an approximation of the ethno-confessional heterogeneity. The fact that these are only approximations of the actual state of ethno-confessional diversities should not present an insurmountable barrier to deriving credible and, as argued earlier, necessary insights based on these data. Nevertheless, the conclusions' reliability should be downsized because the ethno-confessional diversity is approximated and most likely underestimated. Regardless, deviations from the actual state of the diversity would probably not affect the overall inferences, especially when it is taken into account that each study comprising this dissertation lessens the problems mentioned above with respect to the available information.

Ethnic diversity may lead to ethnic tensions, which can sometimes result in the rise of nationalism. As is the case with ethnic identity, nationalism is difficult to define. Depending on the observer's position, the social construct of nationalism can be described in dramatically different ways (Haas, 1986).

The third study of this thesis is concerned with nationalism. As will be shown, the context in which the first study is settled is such that ethnic, religious, and national identity can almost be equated. In that context, it is sufficient to treat nationalism as a set of characteristic beliefs of a specific ethnic (national) group that result in actions that favour that group over the other. Whether these beliefs stem from emotional loyalty to the group – primordial understanding of nationalism; interest of individuals – situationalist conception of nationalism; or ideology – constructivist perception of nationalism – does not change the main conclusions from paper 1 (Brown, 2003).[6]

Economic activity and outcomes

In the realm of economic outcomes and activity, the focus of studies comprising this thesis is on trade integration, economic performance, and economic inequality. Trade interaction is an economic activity, while economic performance and inequality are economic outcomes. These outcomes are chosen due to their importance for social development.

In papers of this thesis, when the term "economic performance" is used, it refers to levels of output measured via real Gross Domestic Product (GDP) per capita or the closest approximation to real GDP per capita available. Income inequality represents the extent of unequal distribution of income between individuals. Although there are numerous measures of inequality, in the thesis, the GINI coefficient is used. The choice of the GINI coefficient is made due to its frequency of usage in the literature regarding inequality and diversity. This choice is also data-

[6] For an in-depth analysis of modern nationalism reader is referred to Brown (2003).

driven, which will be further elaborated on in paper 2. Paper 3 deals with trade integration, the amount of trade between the two markets.

Real GDP per capita is just one of the pillars of economic development. The individuals' well-being depends, among other things, not only on the size of the GDP per capita but also on the distribution of the wealth created. By analyzing inequality and its relationship with ethnic diversity, the dissertation adds another vital aspect to social development. Investigation of the potential connection between other aspects of the development, such as sustainability of the output growth, is left for future studies.

Research papers: Topics and Contexts

The overarching theme of the thesis is the relationship between ethno-confessional diversity on the one side and economic activity and outcomes on the other side.

The first paper adds a temporal dimension of ethnic diversity in analysis in a global context to observe how the evolving ethnic heterogeneity impacts economic performance. This study questions the frequent assumption present in the literature regarding the persistent ethnic structure in a society, by adding time-varying measures of ethnic diversity in an analysis of 76 countries over four decades. Furthermore, the paper exploits the time-varying ethnic diversity. It employs panel-based methodological approaches that can provide a more detailed picture of the association between ethno-confessional heterogeneity and economic performance. Arguably, these methodological approaches also enhance the credibility of the obtained results as they are more robust than methods used in the existing studies.

The second paper analyzes the long-run association between ethnic diversity and income inequality before redistribution. All previous empirical studies on the connection between inequality and ethnic diversity have focused on inequality after redistribution. However, the second paper of this thesis argues that the relationship between ethnic heterogeneity and inequality before redistribution can exist and its existence can alter our perception regarding policy decisions intended to reduce inequality. The paper's time scope is set between 1965 and 2015, covering the evolution of inequality before redistribution for a half-century.

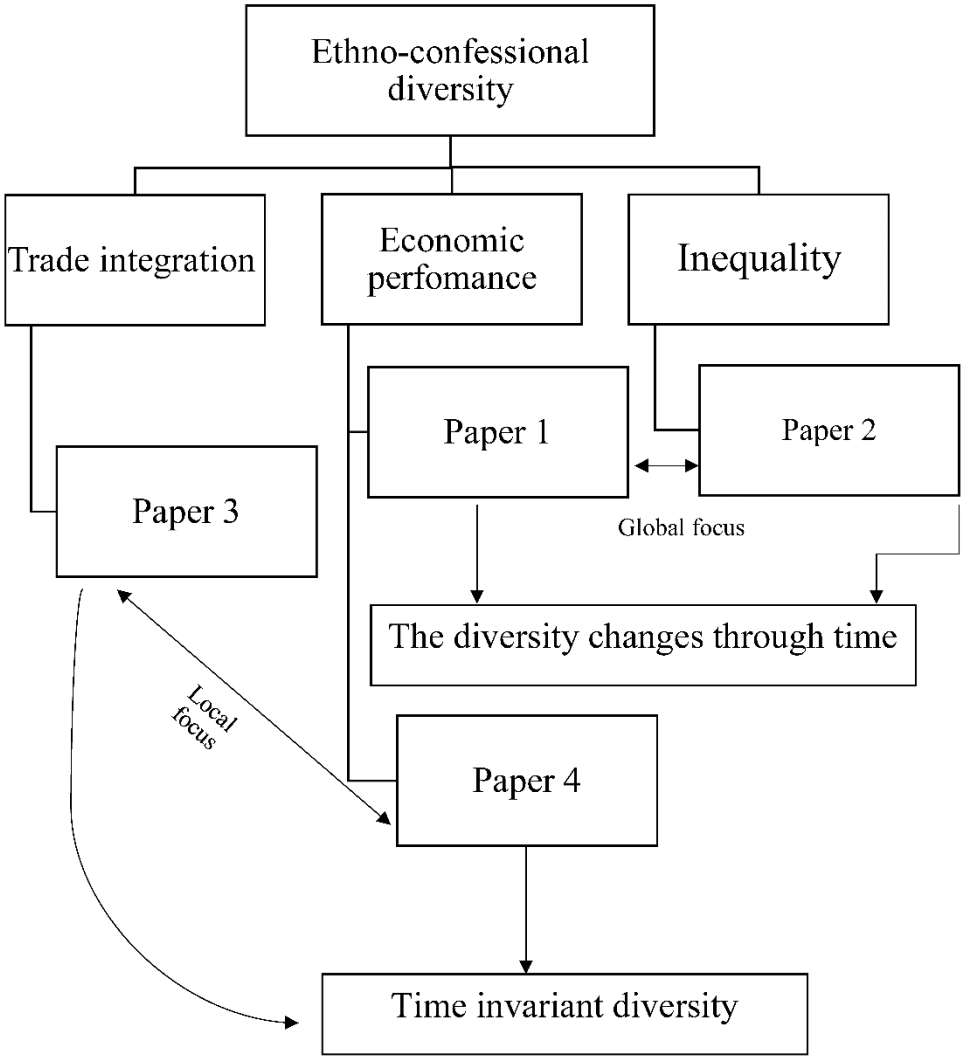
Afterwards, the thesis changes the perspective from global to local. While valuable insights regarding the topic of interest can be drawn from the cross-country analysis, there are numerous advantages of also studying the economic activity and performance in regions, cities, and municipalities of a single multiethnic country. For example, differences in the formal institutional configurations between countries have to be taken into account in a cross-country analysis. At the same time, there is no need to be concerned about this in a single-country study where the observation units operate under the same institutions. In order to contribute to the scientific field focused on the economic consequences of ethno-confessional

diversity, the subsequent two papers in the thesis provide evidence from historical contexts that can provide exciting and relevant insights regarding the topics of interest.

The third paper of this dissertation is concerned with how ethno-confessional tensions impacted trade integration among religiously diverse regions in the Kingdom of Yugoslavia during the period between the First and the Second World Wars. The fourth paper questions the impact of ethnic diversity on economic performance in the same region from the Second World War until 1990. Apart from providing empirical insights into the consequences of ethno-confessional diversity on trade and economic performance, these two papers contribute with their unique perspective to the growing field of study of the economic history of the Balkans (Chilosi & Nikolić, 2021; Kukić, 2018, 2020; Nikolić, 2018).

Scheme 1.1 sketches the topics and contexts of the papers comprising this dissertation.

The introduction has briefly presented the main topic of the thesis, the importance of the research, the terminology, general limitations of studies, particular questions research papers are dealing with, and contexts in which analyses are conducted. The next chapter will expand on the introductory section by presenting the previous research. Moreover, Chapter 2 will show how papers from this thesis complement existing findings and where they are positioned in history and research practice.



Scheme 1.1: Organization, topics, and context of the dissertation papers

Chapter 2:
Positioning in literature and history

This chapter expands on the motivation, briefly presented in the introduction, for four research papers that constitute this thesis. It presents the main theoretical and empirical findings of previous research on the economic consequences of ethno-confessional diversity and elaborates how papers from this dissertation contribute to the existing knowledge base.

A proper depiction of how dissertation papers contribute to the existing literature also requires a presentation of historical contexts in which each study is settled, especially studies in papers 3 and 4. These contexts allow approaches to the topic of interest from different perspectives, utilization of novel datasets and methods, and gathering evidence from new environments. For that reason, the chapter will also depict certain historical peculiarities that allow the derivation of conclusions that complement and expand our understanding of the relationship between ethno-confessional diversity and economic outcomes (and activities).

Literature review

Ethnic diversity and economic performance

The contemporary theoretical considerations about the economic consequences of ethnic diversity came chronologically after empirical studies have suggested an association between ethnic diversity and economic performance. That is why the presentation of the previous studies in the field of interest commences with the most influential empirical studies that have sparked the scientific community's interest in the last two and a half decades in the effect of ethno-confessional diversity on economic performance.

History does not lack examples showing how the mere contact between different ethnic and religious groups can be beneficial and devastating for economic activity and outcomes. If Europeans had not interacted with the Arab world in the X century, the costs of accounting practices with Roman numerals would not have significantly decreased. The other side of the story is the Crusades that caused immeasurable economic damage to much of the known world at the time.

Another example is the development of the music industry in the USA. Different ethnic groups developed the music that has been, and is, reflecting their different experiences. This has created a variety of beautiful genres people could enjoy. Rock music has its roots in the genres developed by Blacks, such as jazz and blues. The development of rock music has also been shaped by country music, dominated by Whites (Wade, 2012). However, developments in the music industry were followed by the costly racism mentioned in the introduction of this thesis.

A substantial increase in the scientific attention to the analysis of the interplay between ethno-confessional diversity and economic performance has been occurring in the last two and a half decades. The contemporary analysis of the interplay between ethno-confessional diversity and economic performance started with Easterly and Levine's (1997) and Mauro's (1995) studies. While ethnic and linguistic heterogeneity was used to show the stability of the connection between corruption and economic growth in Mauro's (1995) study, Easterly and Levine's (1997) work has directly observed how ethnic diversity negatively impacts economic growth performance through public policies in Africa.

Easterly and Levine (1997) have proposed that poor choices of economic policies in Africa could be explained by conflicts arising from ethnic diversity. They have conducted a series of statistical evaluations to show how ethnic diversity in African countries directly impacts growth determinants such as schooling, development of financial systems and foreign exchange markets, political stability, infrastructure, and government spending. Easterly and Levine (1997) argue that ethnic diversity impacts growth through these channels. The variable used to measure ethnic diversity in Easterly and Levine (1997) was the probability that two randomly chosen individuals belong to different ethnic groups. The measurement was based on the data from Miklukho-Maklai Ethnological Institute at the Department of Geodesy and Cartography of the State Geological Committee of the Soviet Union publication *Atlas Narodov Mira* (1964).

Studies on the topic that followed expanded upon Easterly and Levine's (1997) work and mostly supported their initial hypothesis. Ogbu and Simons (1998) re-affirmed that ethnic heterogeneity may impact human capital through the provision of education by the government. La Porta et al. (1999) analysis has substantiated findings by Easterly and Levine (1997) about the importance of ethnic fractionalization for the "good government" – improving Easterly and Levine's (1997) findings by extending the analysis to other continents and by using a more detailed approach to the quality of government.

Collier's (2000, 2001) studies have provided additional insights into the relationship between ethnic diversity, economic performance, and channels through which ethnic fractionalization impacts economic activity by suggesting that the type of governance, democratic or dictatorial, is crucial for the economic consequences of ethnic diversity. In Collier (2000), the first theoretical consideration concerning the relationship observed was presented. This study constructs a simple model where the government is faced with a trade-off between growth and redistribution. One of the assumptions of Collier's (2000) model, important for the fourth paper in this dissertation, is that dictators draw political and military power from a base of individuals who share the dictator's ethnicity. In both works, from 2000 and 2001, Collier derives the same conclusion: the growth rate of economic activity will not be systematically affected by the level of ethnic diversity in democratic societies. In

a dictatorship: "…*the extent of ethnic diversity will systematically reduce the growth rate"* (Collier, 2000, p. 231).

An interesting development in the field happened because Easterly and Levine, in their paper from 1997, have used one word – *polarization*. Reynal-Querol (2001) noticed that, although Easterly and Levine's (1997) work had an intention to show how polarization affects economic performance, they were not using the concept of polarization in assessing the diversity but rather the concept of ethnic fractionalization. The concept of fractionalization captures the ethnic atomization of society. Polarization emphasises the relationship between the two largest ethnic groups. Ethnic polarization is focused on an ethnic group's dominance and its opposition in terms of the relative sizes of ethnic groups; conflict is more likely to happen when an ethnic majority and sizeable ethnic minority comprise society (Horowitz, 1985). Since fragmentation and polarization are conceptually different, their measurement is different, which will be discussed in detail in the next chapter of this thesis.

A series of works that ensued (Montalvo & Reynal-Querol, 2002, 2003, 2005a, 2005b; Reynal-Querol, 2002) popularized the usage of the polarization concept in assessing the relationship between the diversity and economic performance. These studies, along with Reynal-Querol (2001), have shown how polarization impacts the probability of civil wars that are detrimental to economic performance. Moreover, these studies have not neglected the importance of ethnic fragmentation but provided evidence that the economic consequences of ethno-confessional diversity are more nuanced than previously thought. The contribution of these studies is also reflected in the improvement of the datasets used to measure diversity. Instead of *Atlas Narodov Mira* (1964), for the estimations of ethno-confessional fragmentation and polarization, they have used, arguably, more reliable sources such as *World Christian Encyclopedia (1982), L'Etat Des Religions Dans Le Monde (1987)*, and *The Statesman's Yearbook (1987)*.

Another impactful study, Alesina et al. (2003), has improved upon data from *Atlas Narodov Mira*. Apart from simply providing new sources for the cross-country measurements of ethnic diversity, this study has also presented the disaggregated measure of ethnic diversity that distinguishes ethnic from linguistic diversity, an impossible task using *Atlas Narodov Mira*.

It was mentioned on several occasions that ethnic diversity might be beneficial for economic activity. Alesina and La Ferrara's (2005) paper establishes a model that captures both benefits and costs of high ethnic fractionalization. Costs from high fractionalization stem from ethnic conflict, conflict of preferences, prejudices, and racism. Benefits from ethnic diversity are channelled through a potential higher likelihood of innovation and higher productivity due to a variety of experiences, abilities and cultures. Some of these costs and benefits, such as prejudices, are persistent and difficult, if not impossible, to measure.

Most of the mentioned studies that have observed the relationship between ethnic diversity and economic performance have empirically found that ethnic fractionalization has either direct or indirect negative impact on economic growth. The empirical finding that ethnic fractionalization inhibits economic growth holds both when the cross-section of countries is observed (for instance Patsiurko et al., 2013) or when a single country is at the focus of the study (for example, Dincer & Wang, 2011, for the case of China). However, the number of studies finding a positive relationship between ethnic diversity and economic growth is rising. A paper by Ashraf and Galor (2011) is one of the examples where empirical findings have supported the possibility of the existence of a positive impact of diversity on growth.

Empirical studies in which the unit of observation are geographical localities smaller than a state also document how ethnic diversity may be conducive to local economic growth (Lee, 2011, 2015; Ottaviano & Peri, 2005, 2006; Sparber, 2010). A recent paper by Montalvo and Reynal-Querol (2021) is designed to allow inspection of the relationship between ethnic homogeneity and economic growth on different spatial scales: from the grid-country cell expanding to the state level. They conclude that ethnic diversity has a strong and positive effect on the economic performance of smaller geographical areas. This effect declines when the size of the observed space is increasing – the positive impact of ethnic diversity on growth fades away on the largest scale of observation – the state level.

In the last two and a half decades of intensive scientific work on the topic, scholars have identified various transmission channels through which ethno-confessional diversity may affect economic activity. Most of them were already mentioned when influential studies from the field were presented. Ethnic heterogeneity may impact human capital through the provision of education by the government (Ogbu & Simons, 1998), and human capital is an essential determinant of economic performance (Easterly & Levine, 1997). Government policies are affected by ethnic diversity (La Porta et al., 1999). Therefore, government consumption may also act as a transmission channel in the observed relationship. Other transmission channels include the level of investments due to misallocated resources in the rent-seeking behaviour of the ethnic group in power (Collier, 2001); the presence of the civil war (Reynal-Querol, 2002); political order and stability (Collier, 2001; La Porta et al., 1999); level of trade openness because of the existence of international connections via ethnic lines (Alesina & Spolaore, 1997; Gören, 2014); fertility via differences in female labour participation along ethnic and cultural lines (Fernandez & Fogli, 2009); and market distortions (Easterly & Levine, 1997; La Porta et al., 1999).

Gören's (2014) paper has separated indirect from direct effects of ethnic diversity on economic growth. Results from Gören's (2014) work suggest the existence of a strong direct impact of ethnic fractionalization on economic growth and that some

transmission channels (such as trade openness) send positive feedback from ethnic diversity to economic performance.

A vast majority of the aforementioned studies that contributed to the topic have operated under the same assumption: ethno-confessional diversity is time-invariant. This assumption about ethno-confessional diversity may not seem very strict; changes in the ethno-confessional fabric of society happen slowly. The number of people involved in the change of ethno-confessional structure necessary for the meaningful change in ethno-confessional diversity can sometimes be staggering.

Suppose ethno-confessional constellations are changing with time. In that case, we are not just missing out on insights that the inclusion of the time component could provide. Some conclusions made with the assumption of absolute persistence of ethno-confessional heterogeneity may be less credible. For that matter, paper 1 of this dissertation includes the dynamic ethno-confessional diversity in an analysis of the relationship between ethnic diversity and economic performance. By including the historical development of ethnic diversity, paper 1 of this thesis observes the relationship in question from an additional angle. It provides evidence that complement our knowledge base concerning ethnic diversity and economic performance.

The analysis conducted in paper 1 of this thesis is not the first attempt to draw attention to the importance of the time component in analysing the relationship between economic performance and ethnic diversity. Namely, studies by Campos and Kuzeyev (2007) and Campos et al. (2011) have explored the impact of evolving ethnic diversity on economic performance in a sample of former centrally planned economies (former the Soviet Union and Central European countries) from 1989 to 2002. Their findings coincide with most of the cross-country studies in the field: ethnic diversity harms economic growth. The relatively short observation period in these studies and historical similarities between the countries included in the analysis prevent the extension of conclusions to other regions and periods. The first paper of this dissertation seeks to fill the gap in the literature by expanding the short timespan from these studies as well as the number of observed countries and, therefore, improve the robustness of conclusions laid out in these series of papers. Further elaboration on the data and methodology used in paper 1 is reserved for the next chapter of the dissertation.

Ethnic diversity and inequality

While paper 1 from this thesis provides an additional angle and improves upon the studies of the relationship between ethnic diversity and economic performance, paper 2 opens a question that was never analyzed[7] in studies concerned with the association of ethnic diversity and income inequality. Specifically, paper 2 analyzes

[7] To best of my knowledge.

the impact of ethnic heterogeneity on income inequality before redistribution. This part of the dissertation presents existing theoretical and empirical evidence of the impact of ethnic diversity on income inequality. Nevertheless, it is necessary to present considerations beyond theoretical and empirical studies of the association between income inequality and ethno-confessional heterogeneity to justify the reasoning for the hypothesis stating that there is the effect of ethnic heterogeneity on inequality prior to redistribution.

The theoretical framework developed by Caselli and Coleman (2013) provides one way of thinking that can justify the existence of a connection between ethnic diversity and inequality before redistribution. This framework asserts that the conflict along ethnic lines is one of the manners to secure resource control. The resource control would bring rents to the group in the position of control. On the flip side, a group controlling resources is at persistent risk of enlargement, leading to watering down of rents. In a heterogeneous society, "leakages" from a group that does not control the resources to the group that controls resources will be lower than in ethnically homogenous societies, especially when ethnic groups have distinct markers. This theory implies that ethnically diverse societies have a higher likelihood that one segment of the population, ethnically defined, will control resources and collect rents at the expense of other ethnic groups: more heterogenous societies may experience higher levels of inequality.

The model developed by Caselli and Coleman (2013) does not impose how the ethnic group that controls natural resources distributes rents to its members. But the model implies the existence of limitations for ethnic groups that are not in control of resources. Namely, groups that are not in power cannot benefit from the natural resources. Since groups that are not in charge of the natural resources have limited opportunities for earning, it would not be surprising to see the higher income inequality before redistribution in countries with higher ethnic heterogeneity.

A similar rationale can be applied if the phenomena are observed from a political perspective. In an ethnically fragmented society, the political elites that do not necessarily have direct control over natural resources may use ethnic divisiveness to acquire and accumulate political power (Collier, 2000, 2001). When political power is established, it can be used to alter market outcomes – through institutional manipulations –to benefit constituents of the same ethnic background. The reasoning presented is analogous (if not the same) to the existing theories that emphasize the importance of the social position of the "elites"[8] for the long-run wealth creation (Acemoglu et al., 2005; Sokoloff & Engerman, 2000).

The political power holders can choose to create an environment in which the members of their ethnic group would economically thrive. At the same time, opportunities for members of other ethnic groups would be limited. In that case,

[8] If the "elites" are defined based on their ethnic lineage.

ethnic diversity would be related to the inequality before redistribution. Of course, political elites may choose to use only redistributive mechanisms in order to benefit the individuals belonging to their ethnic group. Yet, the changes in the "rules of the game" – institutions (North, 1995) – would enable a more stable political and economic power preservation. After all, as Glaeser and Saks (2006) argue, in a multiethnic society, the voters will continue to support the politician who is a member of their ethnic group when that politician allocates resources toward that ethnic group, even if that politician is corrupt.

Implications from the political perspective are essentially the same as in the model developed by Caselli and Coleman (2013): income inequality is likely to be higher in a more ethnically heterogeneous society. Neither of the two presented perspectives does not command that the distribution of wealth within the ethnic group must be done via redistribution. On the contrary, pre-transfer income inequality would be more affected by ethnic diversity than inequality after redistribution if it is assumed that the ethnic group in power prefers to preserve the political power or control over resources.

At the centre of the presented theoretical considerations is a power struggle. However, for the existence of the impact of ethnic diversity on income inequality, the conflict for power is not necessary.

A staggering amount of studies, from psychology to economics, have shown that members of a particular group have more empathy towards members of their group than toward members of other groups (Becker, 1957; Bobo & Kluegel, 1993; Cikara et al., 2011 to name a few studies from different scientific fields). This phenomenon is accompanied by differences in preferences between groups (Alesina & Glaeser, 2004). An ethnic group in a position to affect the economic environment may create institutions and policies that favour members of that group without the explicit conflict over political or economic power with other ethnic groups that comprise the society. An extreme case of the described situation is the formation of racist and ethnocentric institutions and policies that limit or completely eradicate opportunities for wealth creation for ethnic groups that are not in power.

The empirical relationship between ethnic heterogeneity and inequality is relatively understudied. Previous empirical studies can be divided into two groups: first, studying the direct effect of ethnic diversity on inequality, and second, exploring the impact of the diversity on redistribution – indirect analysis. Because of the data scarcity, empirical studies from the first group have frequently focused on the impact of ethno-confessional diversities only on income inequality after redistribution (or they have used whichever inequality measure is available – regardless of whether the measure is derived before or after the redistribution).

Existing literature from the first group unequivocally suggests a positive relationship between ethnic and religious diversity and income inequality. By reviewing "facts" about inequality, Glaeser (2005) finds that ethnic heterogeneity and inequality are highly and positively correlated because of reduced redistribution

or differences in educational levels along ethnic lines. In his analysis of inequality in Africa, Milanovic (2003) concludes that there is a strong and positive effect of ethnic fractionalization on inequality and emphasizes the importance of finding the channels through which ethnic diversity impacts inequality.

Expanding Milanovic's (2003) study on more countries than focusing solely on ones settled in Africa, Dincer and Hotard's (2011) empirical study finds an inverse U-shaped relationship between ethnic and religious fractionalization and income inequality and increasing income inequality when ethnic and religious polarization increases. Similar conclusions can be derived from the empirical study by Fum and Hodler (2010). They hypothesize that rent-seeking is more prevalent in ethnically polarized societies. Empirical evidence Fum and Hodler (2010) present implies that income inequality after redistribution is higher in more ethnically polarized societies.

The second strand in the literature consists of studies focused on the relationship between ethnic and religious diversity and redistribution. Earlier findings of a negative relationship between redistribution (and preferences for redistribution) and diversity (Alesina et al., 1999; Luttmer, 2001; Okten & Osili, 2004; to name a few) coincide with more recent findings. Empirical research by Desmet et al. (2009) confirms a negative relationship between ethnic diversity and redistribution. This study suggests that linguistic distance between different ethnicities has a vital role in this relationship. Sturm and De Haan's (2015) study concludes that "capitalist" countries with low ethnolinguistic fractionalization have higher levels of income redistribution than countries with a more considerable degree of ethnic fractionalization. These conclusions about the interplay between redistribution and ethnic diversity are also drawn in the panel study by Van Velthoven et al. (2019).

In some of the studies focused on the association between ethnic, religious, and linguistic heterogeneity and economic growth, sometimes inequality is of great importance (for example, Baldwin & Huber, 2010; Casey & Owen, 2014). The insights from paper 2 will, therefore, contribute to the relatively understudied field and have the potential to improve the understanding of the interplay between ethnic diversity, inequality, and growth, thus being connected with paper 1.

The peculiar history of Yugoslavia(s)

Papers one and two fill the gaps in understanding, add novel angles to the analysis, and improve upon the existing empirical studies on ethnic diversity and economic outcomes. Papers three and four provide evidence from historical contexts that are fruitful for studying the economic consequences of ethno-confessional diversities. This segment of the thesis briefly presents the history of Yugoslavia between WWI and WWII and after the Second World War; it depicts historical occurrences in the region relevant for the third and the fourth paper.

The interwar period

In the aftermath of WWI, several ethnic, national, and religious groups in the Balkans agreed to form and unite under one country. On July 20, 1917, the committee for the representatives of the Croatian, Slovenian and Serbian politicians and elites in exile[9] signed the Corfu Declaration[10], agreeing to create the Kingdom of Serbs, Croats, and Slovenes, which would join the territories and peoples of the former South-Slav territories occupied by the Austro-Hungarian Empire. The newly formed Kingdom was proclaimed on December 1, 1918, as a constitutional parliamentary monarchy led by the Serbian Karađorđević dynasty. The Kingdom of Serbs, Croats, and Slovenes, which would later change its name to the Kingdom of Yugoslavia, incorporated the present-day territories of the Republic of Serbia, Republic of Montenegro, Croatia, Slovenia, Bosnia and Herzegovina, North Macedonia, and Kosovo*[11]. In addition to the three dominant ethnic groups – Serbs, Croats, and Slovenes, as the name implies – the Kingdom of Serbs, Croats, and Slovenes included a sizable number of other ethnic groups. Map 2.1 shows the geographical positioning of the Kingdom in South-East Europe and the administrative division of the Kingdom.

Analyzing a unified but ethnically diverse entity, as was the Kingdom of Yugoslavia, is attractive concerning this dissertation's general topics. When historiography of the region is added, the potential of obtaining valuable insights increases substantially. Presentation of certain states and occurrences in the Kingdom of Yugoslavia during its existence will support the claim that there is much to learn from the Yugoslav experience. This historiographical presentation will also justify certain decisions made in paper 3 of the thesis in which the Kingdom was studied.

The ethnic and national identity can almost be equated in the Kingdom of Yugoslavia (Bardos, 2013). Moreover, it can be said that religious identity is, for some ethnic groups comprising the Kingdom, one of the defining characteristics of ethnic identity. While ethnic, national, and confessional identities can almost be equated, linguistic characteristics and skin colour cannot be taken as the defining factors of an ethnic group in the Kingdom of Yugoslavia. Skin colour cannot be identifying factor since all ethnic groups comprising Kingdom Yugoslavia were white. In other words, no minority was uniquely distinguished by skin colour. Languages in the Kingdom of Yugoslavia, except maybe for Slovenian, are not sufficiently dissimilar (Brozović & Ivić, 1988; Lencek, 1976). In censuses, the

[9] Sometimes in literature mentioned as the *Yugoslav committee*.

[10] Further information about these negotiations and the Corfu Declaration can be found in the original documents of the time published by Petranović &Zečević (1985, p.65-75).

[11]*This designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

language of individuals was not even recorded. Therefore, even if an individual wanted to use language to express her belonging to a certain ethnic group, that was impossible. Using religious diversity as an approximation for ethnic diversity is probably sufficient in the context of the Kingdom of Yugoslavia. Map 2.2 depicts various religious groups in the Kingdom and how these groups were positioned in the Kingdom.

Ethnic strife embodied in nationalism has existed since the inception of the Kingdom. The question of why nationalism existed in the Kingdom of Yugoslavia is exceptionally complex; it can be traced to the Middle Ages and is beyond the scope of this dissertation. It could be mentioned, however, that some general variables impacted the popularity of nationalism in this region during the observed period between the two world wars: history of the regions constituting the Kingdom, ascendancy of nationalism in Europe, unequal distribution of war reparations (Yugoslavian archive, collection 65, folders 1-3), and Serbian dominance in political decision making.

As ethnic strife worsened, king Aleksandar Karađorđević introduced top-down, formal and informal measures to stop nationalistic tendencies and dampen ethnic tensions. Between 1920 and 1928, ethnic tensions between the Serbs and Croats escalated (Glenny, 2012) to the point where Croatia wanted to leave the Kingdom after their representatives were shot in the National Assembly in 1928. The threat of Croatian secession resulted in the constitutional and parliamentary crisis, which political parties could not resolve (Dobrivojević, 2008). On January 6, 1929, King Aleksandar Karađorđevic suspended the parliament and the Constitution and established a dictatorship.[12] The name of the Kingdom of Serbs, Croatians and Slovenes was changed to the Kingdom of Yugoslavia. The king formally eliminated territorial borders between the "member states", eliminated the existing 33 regions (*oblasts*), and divided the country into nine provinces *(banovine)*. Banovine are depicted in Map 2.1. None of the new provinces was large enough to be economically self-sufficient.[13] To preserve the unity of the Kingdom and suppress nationalism, the king also outlawed all political parties based on ethnic, national, or religious affiliation. His goal was to replace the old parochial ethnic sentiments with a new, unified Yugoslav national sentiment. King's policies were crafted to create a "melting-pot" wherein his constituents would begin to feel like Yugoslavs rather than Serbs, Croats, Slovenes, etc.

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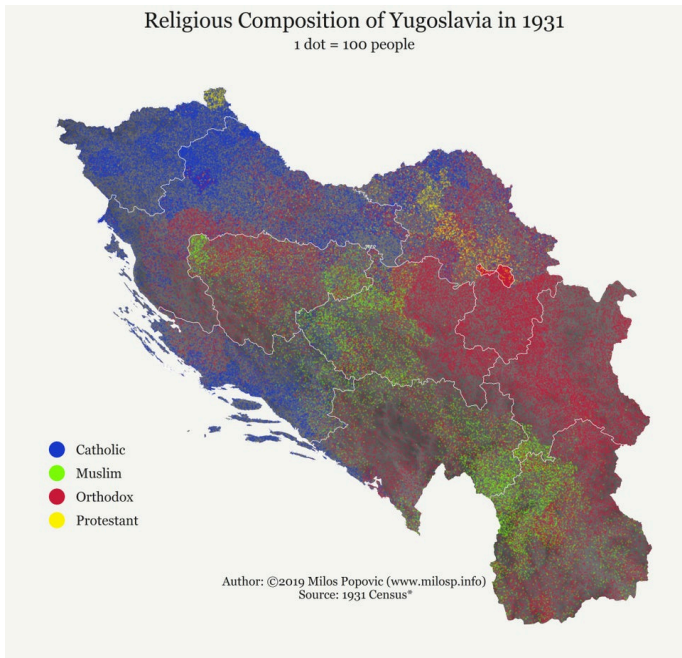
[12] Since almost all political power was now in hands of the King, scholars use the term the "King's dictatorship" in order to refer to political state of affairs from 1929 to 1934.For an in-depth discussion of the dictatorship, see Dobrivojević (2008).

[13] The King thought that a division of the country making regions economically "self-sufficient" would promote nationalism and provide support for potential secession. Smaller regions, economically dependent upon one another would have higher incentives to stay within the same borders (Kovačević, 2015).

Map 2.1: Position and administrative division of the Kingdom of Yugoslavia in 1930. *Source:* Map created by Milan Šenoa, Croatian Museum of History. Each *banovina* is in a different colour.



Map 2.2: Religious diversity in the Kingdom of Yugoslavia in 1931. Source: Map created by Milos Popovic, based on 1931 Census (www.milosp.info)

Above and beyond these policies, King Aleksandar advocated the ideology of "integrated Yugoslavenism"[14]. Integrated Yugoslavenism included language unification (Petrović, 2009) and the inclusion of the Yugoslav national idea in the standardized system of education (Troch, 2010), legal system, and national holidays. Since the constitution was suspended and the freedom of the press was no longer guaranteed, the government heavily controlled and censored the press to promote a sense of national unity. Cultural life was also managed to promote the ideology of Yugoslavenism (Dobrivojević, 2005).[15]

At the same time, there were significant forces at play that fostered the economic activity, specifically trade, within the Kingdom of Yugoslavia. Since the creation of the Kingdom, serious efforts were made to remove the trade barriers that have existed before the establishment of a new country. In an attempt to promote free trade, the government issued two official Trade Liberalization Acts, on March 18, 1919, and on November 5, 1919, in which free trade within the country was officially proclaimed. These acts were introduced because the government believed that free trade would enable the uninterrupted supply of goods and services to all regions in the Kingdom; the goal of these acts was to legally eliminate existing trade barriers on national and provincial levels (Miletić, 2003). On June 28, 1921, the Kingdom of Serbs, Croats and Slovenes established its first constitution. The constitution achieved some institutional stability that impacted the economy. This was manifested in the influx of foreign capital immediately after the constitution was adopted (Petranović & Zečević, 1985, p. 400). Furthermore, the constitution legitimized priorly issued Trade Liberalization Acts. After 1921, when the constitution was adopted, all major official forms of trade impediments were removed.

Removing the institutional barriers to free trade in the Kingdom was accompanied by improvements in the sector of transportation. During the interwar period, the most important mode of commercial transportation in the Kingdom of Yugoslavia was rail transportation (Latifić, 1997). Over 90 percent of the goods were transported via railways. Documents from Yugoslavian archive collection (especially collection numbered 65, which contains documents of the Yugoslav Ministry of Trade and Industry) show that, even in the early period of the Kingdom's existence, the importance of reconstruction of transportation infrastructure, destroyed in the WWI was recognized. Ruling elites have also recognized investments into new infrastructure as crucial to the trade and overall development of the Kingdom. These documents further provide information about the significant

[14] The official name for the ideology which promoted a unified Yugoslav ethnic sentiment.

[15] For example, articles published in the newly established magazine "The Yugoslav" portrayed the principles of the politically acceptable ethnic identity within the limits of integrated Yugoslavenism (Petrović, 2009).

efforts made in the period 1918-1926 for the reparation of the destroyed transportation infrastructure.

The final years of the Kingdom of Yugoslavia were marked by failed attempts to reconcile the national quarrels that have survived measures introduced by the king. On October 9, 1934, King Aleksandar Karađorđević was assassinated in Marseilles. The assassination was organized by the pro-Bulgarian Internal Macedonian Revolutionary Organization[16] in alliance with the Ustashe, the extreme right-wing Croatian nationalist secessionist movement. The assassination of the King marked the end of the royal dictatorship and the end of the policies intended to create a unified Yugoslavian national sentiment.

An entire decade after the creation of the Kingdom of Yugoslavia, the decrees and policies of King Aleksandar's January 6 Dictatorship singularly failed to stimulate widespread enthusiasm for the national unification of the South Slavs (Petrović, 2009). In the aftermath of Aleksandar's assassination, it was evident that there could be no return to the dictatorship and the decrees/policies of Yugoslavenism. The establishment of the *Banovina Hrvatska*[17] provided Croatia's political elite with a sense of greater autonomy within the Kingdom. It appeared to be a good compromise that could potentially end ethnic conflicts. The status of Croatia within the Kingdom of Yugoslavia seemed to have been resolved, and the ill-founded belief amongst the ruling elite that it would be possible to preserve the Kingdom of Yugoslavia lasted until 1939.

On April 10, 1941, Yugoslavia was occupied by the Axis powers, and the Independent State of Croatia, an Axis puppet state, was founded. Serbia has joined the Allies. Thus, different parts of the Kingdom found themselves on the opposing sides of WWII.[18]

Between the conclusion of WWI and the beginning of WWII, government-sponsored endorsement of free trade in the Kingdom of Yugoslavia went hand in hand with ethnic quarrels. While removal of the trade barriers ought to enhance economic activity, ethnocentrism could inhibit the creation of trade networks among ethnically different markets and prevent the potential commercial cost reductions.

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[16]IMRO or VMRO, as they are referred in the literature. This organization fought for the secession of Vardar Macedonia from Yugoslavia.

[17] An autonomous province consisting of the regions with a majority Croat population.

[18] Certain regions, such as today's Serbia, formally joined the allies and were occupied by the Axis forces. Others, such as Croatia formally joined the Axis. Although it could be argued that Croatia was just a puppet state of the Axis, and that there were resistance movements in Croatia, formally Croatia stayed independent during the war while Serbia was formally occupied. In general, statement that these regions which constituted the Kingdom ended up on opposing warring sides is vague, since it ignores the detailed depiction of the historical role of given regions during the war. However, although vague historical interpretation, statement that certain regions were on opposing warring sides is correct and it should not affect the main results of the analysis conducted.

Theoretically, the formation of trade networks reduces trading costs. (Greif, 1993; Rauch & Trindade, 2002). Networks could present potential "supply centres" of market information.

On top of that, commercial networks could create mechanisms for community administration and enforcement of penalties for the traders who disregard the established rules of the community. Because trade networks tend to evolve along socio-cultural and ethnic lines (Greif, 1993), two markets characterized by modest or absent ethnolinguistic similarities, or, in this case, ethno-confessional similarities,[19] are, *ceteris paribus*, less likely to trade more with each other than the markets with larger ethno-confessional similarities. These theoretical considerations were empirically observed in some recent studies in the field (such as Schulze & Wolf, 2012 for the case of the Austro-Hungarian Empire).

If ethnocentrism were a significant obstacle to economic integration, the royal policy of creating an artificial Yugoslav "melting-pot" would have been important. Had Aleksandar's policies successfully altered dominant ethnocentric ideologies and suppressed ethnocentrism, they would have positively affected regional economic integration in the Kingdom of Yugoslavia. Dividing a country into regions which were not self-sufficient could also be thought of as an intra-trade enhancing policy. However, it might be the case that royal policies were counterproductive. Although most public activities that encouraged nationalism were forbidden, "undetected" or "informal" ethnocentrism could have remained alive in commercial activities. For instance, one could always decline to trade with a member of a different ethnic group without explicitly showing that the refusal to participate was ethnically based. Individuals who were legally prevented from expressing their strong ethnic beliefs could have continued to participate covertly in ethnically motivated decision making. In this case, even if their hidden attitude may have been obvious, the authorities could not label them as nationalistic. Moreover, forceful suppression of ethnocentrism could backfire and produce a higher degree of nationalism, i.e., the reaction to the king's self-rule could have been stronger nationalism which would adversely impact the economic integration. The possibility of rising nationalism due to King's dictatorship is historically documented (Čulinović, 1968).

Taking into account the discussion about the context of the Kingdom of Yugoslavia in the interwar period, paper 3 in this dissertation examines how ethnic (more precisely, religious) tensions impacted trade among ethnically diverse regions in the Kingdom of Yugoslavia during the period between the First and the Second World War. On top of that, the history of the Kingdom allows observing whether

[19] The methods of how ethnic similarities are measured, as well as the reasons religious similarity is used instead of, for instance, language, to account for the ethnic differences are described in the third part of this study.

strict top-down policies – intended to encourage ethnic unity and prevent nationalism – were able to annul the negative impact of ethnocentrism on the trade, or they have only made matters worse by pushing individuals to express their nationalistic ideology covertly, through trade. Finally, two regions of the same Kingdom ended up on opposing warring sides. Although it would not be explicitly analyzed, it is interesting to think if these regions would "hold together" if their trade was uninterrupted by ideology reactive to ethno-confessional differences.

Yugoslavia 2.0: From the Second World War to the 1990s

> "…I want the future to foster brotherhood and unity, which needs to steadily become stronger and to be consolidated. I want especially you, the younger generation that follows the sport, to become the first soldiers to protect us against every nationalist assault…You must be united; you should cherish and strengthen the brotherhood and unity of our nation. That is our socialist way." Josip Broz Tito, 1972 (from: Škoro, 1982, p. 6)

After WWII, regions on opposing warring sides were united one more time. However, this time under different socioeconomic order. As in the Kingdom, multiple ethnic groups were, once again, living in the same country and history once more provides a rich context for research of topics of interest for this thesis. There are many other similarities between the Kingdom of Yugoslavia and Yugoslavia after WWII[20]. Lampe's (2000) sub-title poetically describes these similarities: "*Twice there was a country"*. The historical context of "new" Yugoslavia is as interesting, if not even more interesting, for the analysis as is the Kingdom.

In 1945, the Federal People's Republic of Yugoslavia was established as a federation of six states: the Federal States of Bosnia and Herzegovina, Montenegro, Macedonia, Croatia, Serbia, and Slovenia (Lampe, 2000). Monarchy was abolished, and the Croatian-born leader of the communist resistance movement, *Partizani,* Josip Broz Tito, became the first prime minister and lifelong president of socialist Yugoslavia. He kept the presidential position until he died in 1980. Socialist Yugoslavia was settled on the same territory as the Kingdom of Yugoslavia, with minor differences in borders on the western part of the country previously belonging to Italy. The geographical position of Socialist Yugoslavia is presented on Map 2.3.

[20] For Yugoslavia between 1945 and 1990, the paper uses the generic term "socialist Yugoslavia". When necessary, the official name of the country will be explicitly stated, in order to avoid unnecessary confusion since the country changed its name a couple of times without significantly changing its borders. First, in 1945 upon its formation and the establishment of its constitution, the initial name of Democratic Federative Yugoslavia was changed to the Federative People's Republic of Yugoslavia. Afterwards, in 1963, the name of the country was changed to the Socialist Federative Republic of Yugoslavia.

Socialist Yugoslavia was politically organized as a one-party state. In the early days of its existence, socialist Yugoslavia followed the Soviet centralized model of governance. Following the Soviet footsteps in economic planning and political affairs was, however, short-lived. Political frictions between Tito and Stalin peaked in 1948 when Yugoslavia was removed from the Communist Information Bureau (Granville, 1998; Perović, 2007), shifting the Yugoslav socio-economic and political path away from the Soviet model. The Yugoslav version of socialism was born and developed through the 1950s and 1960s. The new economic model envisioned enterprises run by workers' collectives instead of state administration and bureaucrats. The law granted greater autonomy to self-governing collectives and the economy began to be somewhat more open.[21] The post-war period until the 1960s was not only turbulent in economic terms, and political uncertainties also characterized this period. Frequent changes in the economic system combined with political turbulence were reflected in unstable economic performance.

Apart from political and economic affairs in socialist Yugoslavia, it is necessary to address the question of the state of ethnic cohesion (or lack of it) in the country. The thesis has already depicted the attempts made by the monarchy to counteract ethnic tensions. After the Second World War, the communist regime did not want to pursue the same course. Even ignoring its inefficiency, communists would still reject *Integrated Yugoslavism* because within this set of policies one proclamation banned the Communist Party from the Kingdom[22] (Jović, 2009).

Immediately after the end of the Second World War, the communist regime adopted a law that forbade the provocation of national, racial, and religious hatred and strife – *Zakon o zabrani izazivanja nacionalne, rasne i verske mržnje i razdora od 24. maja 1945. Law No.322, Sl. List DFJ, I, 36 (May 29, 1945), p 298*. This law was accompanied by an ideology crafted during WWII and known by its slogan *Brotherhood and Unity*. The law and the ubiquitous ideology imposed by the ruling party in socialist Yugoslavia called for "inclusive"[23] behaviour with regard to ethnicity (Roksandić, 2011; Singleton, 1983).

In contrast to the King's policies, political elites in socialist Yugoslavia allowed the existence of ethnicities. However, they were openly against any oppression or segregation based on an individual's ethnic background. Although it was not forbidden to self-identify as a member of a particular ethnic group, it was necessary to suppress any activity that even resembled nationalism, especially because certain

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[21] For a detailed description of the Yugoslav version of socialism and its development, readers are referred to Horvat's (1971) historical account.

[22] As a national party, the communist party was seen by the monarchy as an enemy of the Kingdom.

[23] Inclusive only for the ethni cities which comprised socialist Yugoslavia; it is debatable, and not within the scope of this paper, how inclusive this ideology was towards people from ethnic backgrounds which were beyond those of socialist Yugoslavia.

parts of the country were on opposing sides in WWII. The similarity to the King's policies concerned only the political elites' attitude to language. From 1954 until the dissolution of socialist Yugoslavia, the ruling party tried to impose Serbo-Croat or Croat-Serbian as a hybrid language for all the ethnic groups comprising the Federation (Lewis, 2009).

Map 2.3: Position and administrative division of Socialist Yugoslavia**.** Source: Statistički godišnjak Jugoslavije 1971

The ideology embodied in the phrase *brotherhood and unity* was not static (see Jović, 2009). However, the political elites embraced some of its main principles, at least until Tito's death in 1980. Nationalism was overtly despised, and ethnic cohesion was widely promoted.

At the beginning of the 1970s, traces of ethnic tensions[24] became perceptible in socialist Yugoslavia. The *Croatian Spring*, a notable event in 1971, where a Croatian movement called MASPOK demanded, among other things, the declaration of Croatia as the national state of the Croatian people, called for immediate action on the part of the political elites (Trbovich, 2008). Tito stripped

[24] Ethnic and national identity are highly correlated and almost identical for the observed context, as it was the case in the Kingdom (Layton, 1995).

the leaders of the movement of their political privileges and soon quelled the movement, showing that nationalistic tendencies were unacceptable in socialist Yugoslavia. However, the stance of the political leaders of the time was that more should be done to prevent the further spread of nationalism present in all constituent states. In light of these events, a new Constitution was crafted and enacted in 1974. The Constitution gave greater political and economic autonomy to the constituent states of the Federation (Curtis, 1992). After Tito died in 1980, nationalism grew slowly but steadily in all parts of Yugoslavia. In the first half of the 1990s, Yugoslavia split apart after a bloody civil war.

Any assessment of Tito's dictatorship still awaits consensus. For this thesis, it is sufficient to state the fact that Tito was a dictator – as most historians agree (Andjelic, 2003; Boeckh, 2006; Djilas, 1995; Pavlowitch, 1992; Shapiro & Shapiro, 2004; West, 2012). Tito's rule had all the common traits of a dictatorship: almost absolute political power, no viable political opposition, purges and the demonization of political and ideological opponents, the cult and glorification of personality, media control, etc. Nonetheless, Tito did not draw his political power from the pool of individuals with his ethnic background. Moreover, individuals with different ethnic backgrounds took the highest political and military positions below his. For instance, the Minister of the Interior of Yugoslavia from 1946 to 1953 was Aleksandar Ranković, who was born and raised in Serbia; the Deputy Prime Minister of Yugoslavia from 1946 to 1963 was the Slovenian-born politician Edvard Kardelj; the President of the Council of Peoples of the Federal Assembly from 1969-1974 was a Croat, Mika Špiljak. Similarly, the highest-ranking military personnel were drawn from different ethnic backgrounds.

As described above, following Collier's (2000) model, the theoretical expectation would be that ethnic diversity would have a high and adverse effect on economic performance in socialist Yugoslavia. In this sense, an empirical analysis of the relationship in question in this country could contribute to the literature by providing additional historical evidence that would deepen our understanding of the relationship. Nevertheless, the Yugoslav dictator did not draw political and military power from individuals of the exact ethnic origin like himself, as Collier (2000) assumes. In other words, the study of Yugoslavia is not intended to strengthen the validity of Collier's (2000) model. This endeavour would require different types of testing. Instead, studying the relationship between ethnic diversity and economic growth in socialist Yugoslavia can show whether or not Collier's (2000) predictions hold if this assumption is violated. To be more precise, the results of paper 4 in this thesis may suggest the existence of other factors besides the political and military power to be gleaned from a dictator's ethnic background that would cause dictatorships to suffer higher costs of ethnic diversity than non-dictatorships pay.

Brotherhood and unity is an additional reason why it may be interesting to observe how ethnic diversity and economic performance are related in socialist Yugoslavia. The ethically inclusive attitudes of Yugoslav political leaders,

including Tito, could foster the benefits that ethnic diversity confers on growth (as predicted in the model of Alesina & La Ferrara, 2005). If inclusive laws, attitudes, policies, and ideology have successfully eliminated ethnic strife, then it is theoretically possible to observe the positive impact of ethnic diversity on economic performance. It may also be the case that Collier's (2000) predictions are valid even when one of its assumptions is violated, but that *brotherhood and unity* reduced the harmful effects of ethnic diversity on economic performance in dictator-led Yugoslavia.

This chapter has positioned the four papers comprising the dissertation in literature and history, thus providing the motivation and background for the phenomena papers are analyzing. While the first two papers are more oriented toward expanding the existing knowledge by analyzing new angles and dimensions of the topics explored, the last two utilize evidence from fruitful historical contexts. The next chapter depicts the methods and data used in this dissertation's papers.

Chapter 3:
Methodology and data

Methodology and data used in the four papers comprising this thesis had to be presented side by side since specific approaches to topics of interest are only possible because of the existence of novel datasets.

The dissertation is conducting a positive analysis, in contrast to normative analysis. Papers are trying to unveil the nature of certain relationships rather than prescribing what should be done or what ought to be done if the particular historical context is the object of the study. The positive analysis does not mean that policies and their effectiveness in achieving certain goals are not evaluated. On the contrary, all papers have something to add in the spheres of policy creation and implementation depending on the policy's goal. Focus on the positive analysis does not define that goal *a priory*. High and persistent economic growth rates, for instance, can be a desirable goal from a social standpoint. However, this dissertation does not define or assume the desirability of this or any other social goal.

In each paper comprising the dissertation, there is a tendency to use a mix of quantitative and qualitative evidence to derive sound conclusions. Nevertheless, it should be recognised that there is a slight "favouritism" towards quantitative methods since results stemming from quantitative methods are given more significance when conclusions are being made. This favouritism exists because every paper introduces a novel dataset, either created by the author or datasets not used in previous literature. The analysis would be incomplete if these datasets were merely described without an application of any in-depth quantitative exploration. At the same time, analyses would be inadequate without some qualitative assessment.

The first two papers, where historical changes and evolution of observed phenomena are analyzed, do not neglect the existing narratives and literature but, from a methodological standpoint, are probably more leaning towards quantitative tools for the derivation of conclusions. Irrespective of the level of bias towards quantitative methods, an effort was made to provide qualitative support in each paper. The last two papers use historical narratives as well as quantitative methods when conclusions are being derived. In these papers, the usage of quantitative and qualitative methods is probably more balanced since, in these papers, history provides the context for the analysis.

Models applied to data are rooted in historical context and previous literature. Existing models from the literature are either altered to fit the context in which is being analyzed or, if data allowed, improved in a manner that should provide more sound conclusions. What was actually done is contingent on the focus of the specific paper.

The next section of this Chapter presents how ethno-confessional diversity is measured.

Measuring ethno-confessional diversity/similarity and data for assessing the diversity

Desmet et al. (2009) provide comprehensive a general measurement of the diversity/similarity – *A-index* – that will be used as a starting point for the derivation of measurements of ethnic diversity in this paper. From the *A-index* it is possible to derive all measures of ethnic diversity/similarity used in this paper:

$$A(\beta,\tau)=\sum_{j=1}^{K}\sum_{k=1}^{K}s_k s_j^{1+\beta}\tau_{jk}$$

The equation presented is a total level of the antagonism between all pairs of social groups. Desmet et al. (2009) point out that *A-index* measures the level of *social effective antagonism*. It consists of two parameters (β and τ) and relative sizes of social groups (s_k and s_j).

The relative size of a group *j*, s_j, is equal to *Nj/N*, where *N* is the total number of individuals in society and *Nj* is the number of individuals comprising the group *j*. The sum of all relative sizes of different groups comprising society is equal to 1.

Parameter β, as defined in Esteban and Ray (1994), is a positive number representing the degree of identification of an individual with the group. The size of the group determines the extent of identification, s_j^{β}. For the purposes of this dissertation, the parameter β is equal to either 0 – identification does not depend on the size of the group – or 1 in which case the size of the group matters for identification.

Distances between groups are given by matrix *T* comprised of elements τ_{jk} which represents the distance between groups *j* and *k*. Elements τ_{jk} are on a domain between 0 and 1. When possible, a distance matrix is defined such that measures of diversity can more effectively capture the complex relationship between groups (such as the cultural similarity index in Fearon, 2003). Measures used in this dissertation all use distance matrix *T* where $\tau_{jk}=1,\forall\, j\neq k$, meaning that alienation does not depend on the distance between two groups.

This dissertation's ethno-confessional diversity measures are religious similarity, ethnic fractionalization index, and polarization index.

The religious similarity is calibrated ($\beta=0$) by:[25]

[25] Notation in papers may differ but equations are the same. Here, I am using the same notation throughout the chapter for consistency.

$$religion_{ij,t} = \sum_{k=1}^{n} (s_{i,t}^{k} * s_{m,t}^{k})$$

where $s_{i,t}^{k}$ is the percentage share of religion *k* in locality *i* at time *t,* and *n* is the total number of religious groups. This measure varies between 0 (no similarities between markets *i* and *m*) and 1 (no differences). The measure for religious similarity in a given locality is used in the third paper of this dissertation.

The ethnic fractionalization index (sometimes referred to as ethnolinguistic fractionalization in literature) is calibrated by:

$$EFI = 1 - \sum_{j}^{n} {s_j}^2$$

where s_j is the portion of group *j* in the population ($\beta = 0$).

The fractionalization index is probably the most commonly used measure for the level of ethnic heterogeneity. This index was implicitly mentioned and used in the previous chapters of this thesis. It represents the likelihood that two randomly drawn individuals from a given society belong to different ethnic groups. EFI takes the values on a domain from 0 to 1 – 0 representing total ethnic homogeneity and 1 representing the hypothetical case where each individual from a given society is from a different ethnic background. The ethnic fractionalization index is used as a measure of diversity in the first, second, and fourth paper of this dissertation.

The previous chapter described polarization as a concept, but it was not presented how polarization is measured. With the assumption that $\beta = 1$, polarization index (POL) is calculated following the next equation:

$$POL = \sum_{j=1}^{K} {s_j}^2 (1 - s_j)$$

where s_j is the portion of group *j* in the population.

With some rearrangement, the polarization index can be presented in, perhaps, a more intuitive manner:

$$POL = 1 - \sum_{i=1}^{N} (\frac{\frac{1}{2} - s_j}{\frac{1}{2}})^2 s_j$$

The index of polarization captures the distance of the ethnic groups from bipolar distribution – the highest level of polarization (Montalvo & Reynal-Querol, 2005a). The index is equal to 1 – its maximum – when two groups of the same size comprise a society. The further society is from the "50:50" participation of the two major ethnic groups, the lower is the polarization index. In contrast to the fractionalization index, where weights of the probability that two individuals are from the different groups are the same for all groups, the polarization index puts weights relative to each group's size on that probability.

Both EFI and POL are functions of relative participation of ethnic groups that comprise society. From how they are measured, it can be derived that at low levels of EFI, polarization and fractionalization indices are positively correlated. At higher levels of EFI, the correlation between EFI and POL is negative. While EFI is an increasing function of a number of groups that comprise society, POL reaches the maximum when two groups are of the same size and decreases with the number of groups – when there are more than two groups (Dincer & Hotard, 2011).

For clarity purposes, it is helpful to note that the ethnic polarization index does not measure the polarization of preferences. The index measures how far is the society from the point in which the two largest ethnic groups have the same number of people.

Data about ethno-confessional structures

Inspection of the impact of evolving ethnic diversity on economic growth and inequality before redistribution in the first and second papers of this thesis, respectively, was made possible by using a new dataset compiled by Dražanová (2020). This dataset provides information on the annual changes in ethnic diversity, measured with the ethnic fractionalization index, from 1945 to 2013 for 162 countries.

Data concerning the Kingdom of Yugoslavia and socialist Yugoslavia were not readily available. These had to be transcribed and digitized before any analysis could be conducted. Census data from 1921 and 1931 provided by the Statistical Office of the Republic of Serbia are used to create the dataset on which the measure of religious similarity will be applied for the Kingdom of Yugoslavia. Data from the 1921 census were used to create the measure of religious similarity between all locality pairs during the period between 1926 and 1931. The 1931 census data were used to generate religious similarity measures for all locality pairs during the period between 1931 and 1939. The religious categories used in these censuses are as

follows: Orthodox-Christian, Catholic-Christian, Evangelical Christian, and Muslim.[26]

Data concerning the municipal ethnic composition of socialist Yugoslavia were obtained from censuses in 1961 and 1971: *Popis stanovništva, domaćinstava i stanova u 1961. godini* and *Popis stanovništva, domaćinstava i stanova u 1971. godini*. Both censuses report ten major ethnic groups: Montenegrins, Croats, Muslims (as ethnic affiliation), Slovenians, Serbs, Macedonians, Albanians, Hungarians, Yugoslavs, and Roma people. The eleventh group is reserved for people who did not identify as members of any mentioned ethnic groups. In these two censuses, it is safe to state that individuals could freely – there was no systematic coercion – express their ethnic affiliations.

Measurement of economic activity, inequality, and economic performance

This part of the paper provides information about measurements and data used to construct the variables for different economic activities and outcomes.

The first paper uses GDP estimations directly from Penn World Tables 7.1 (PWT: Heston et al., 2012). To be more precise, it uses the ten-year average growth rates based on PPP converted GDP per capita (Chain Series) at 2005 constant prices. There are two reasons for using data from Penn World Tables 7.1 instead of data provided in more recent instances of PWT (Feenstra et al., 2015). First, the PWT 7.1 is the last instance in which data points for some countries (such as Afghanistan) are available. But, more importantly, in PWT 7.1, certain variables of interest have the same definition as used in the previous works on the topic, which allows the comparability of the results.[27]

In the second paper of this dissertation, income inequality is measured via the GINI coefficient. This coefficient can be defined in various ways (Sen, 1997). The primary data source used in the second paper defines GINI as an *"[…]average difference in income between all pairs in a population, divided by twice the average income in the population"* (Solt, 2020, p. 2). The GINI can also be interpreted as *"[…]a rank-order-weighted sum of different persons' income shares"* (Sen, 1997 p. 33).

Income inequality before redistribution, market inequality, is inequality that occurs purely due to market processes – before any deductions imposed by the

[26] Besides official religions, there are two more categories: other and unknown. These were also included in the estimations because it can be considered that they also provide some information about the ethno-confessional structure of the population.

[27] For instance, investment share of GDP is not available at constant, but rather in current PPPs in newer versions of PWT.

government. Income inequality after redistribution – disposable income inequality – represents inequality after taxation and other types of duties individuals have paid.

As the second study of this thesis specifically analyzes the impact of ethnic diversity on inequality before redistribution, it was necessary to use a dataset that can provide information regarding the pre-redistribution levels of inequality. Inequality data, used in the second paper of this thesis, is obtained from *The Standardized World Income Inequality Database* (SWIID), version 9, compiled by Solt (2020). This dataset provides GINI coefficients before and after the redistribution from 1960 to 2020 for 198 countries. Solt's (2020) database is probably the most comprehensive dataset on inequality in existence that can provide pre-transfer and post-transfer inequality measures. SWIID treats data from *The Luxemburg Income Surveys* (LIS) as a starting point for a prediction of inequality for countries and periods that LIS does not cover. The predictions of country-year levels of GINI, not available in LIS, are based on other data sources – OECD Income Distribution Database, CEDLAS and the World Bank data, Eurostat, and many others, 384 sources in total (Solt, 2020). Bayesian approach and *k-fold* cross-validation procedure[28] are used to predict and evaluate predictions of country-year levels of inequality before and after redistribution.

The measure for trade integration used in the third paper is rooted in *The Law of One Price*, as in Engel and Rogers (1994), Trenkler and Wolf (2005), Federico (2007), and Schulze and Wolf (2012). Systematic and non-random deviations from this law will be used as indicators of the total cost of trade, as in Schulze and Wolf's (2012). The extent to which two markets (*i* and *j*) are integrated is measured via the logarithm of the relative difference in the prices of a given good (*P*), $\log\left(\frac{P_{i,t}}{P_{j,t}}\right)$[29]. If there are no trade costs, the prices of a given good in these two markets will be equal. Higher trade costs will lead to higher discrepancies in prices between these two markets.

The third paper of the thesis follows Schulze and Wolf (2012) approach, where the total cost of trade which determines economic integration is assumed to be composed of three elements: transportation costs which are entirely, or at least to a great extent, dependent on the distance between markets; trade costs that depend on networks and related trade creating factors; and market-specific trade costs, specific to a particular market but not specific to any pair of markets.

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[28] Simplified, the *k-fold* cross validation is a machine-learning procedure that divides the known observations into *training* and *testing* sets. The training set is generating the model that predicts its own values. Parameters gained from the model based on data points from training set are applied to predict the values of the testing set. Since the observations from testing set are also known, it is possible to evaluate the precision of the predictions. Reader is referred to Solt (2020) for further explanations.

[29] Detailed derivation of the measure for trade integration is provided in the first paper of the thesis. Here, only the intuition behind it is presented.

Data concerning product prices necessary for the analysis conducted in the third paper were, as mentioned, not readily available. Prices of products of interest, homogenous and tradable products, had to be assembled from statistical yearbooks and then digitalized before any analysis could be conducted.

The analysis conducted in the third paper also requires transportation costs between two markets (cities). The railway distance between different cities – an approximation of transportation costs – was also not directly available; even the indirect sources were not specific. The distance between cities was calibrated using various sources: observations in previous studies and historical documentation. In some instances, the distance had to be measured indirectly. If the data concerning the railway distance from city A to city B is not available, but there is the data about the distance between cities A and C, and B and C, the distance between markets A and B was calibrated indirectly. The paper also uses an alternative variable as an approximation of trade costs – the "as the crow flies" distance between cities that also had to be collected and digitalized to account for potential errors in measurements of the railway distance.

The last paper deals with economic performance on the municipal level in socialist Yugoslavia. Since the GDP data is not available in official historical records – which is discussed in-depth in this paper – it was necessary to estimate municipal economic performance in this country. Estimation was done by using Kukić's (2017) methodology that allocates the federal levels of GDP to regional levels. The second paper of this dissertation allocates Kukić's (2017) estimations of regional levels of GDP to municipal levels.

The calibration of municipal GDP, in this case, is provided in the specification below:

$$GDP_{j,t} = GDP_{i,a,t} * SE_{j,a,t} + GDP_{i,na,t} * SE_{j,na,t}$$

where $GDP_{j,t}$ is the estimated level of the economic performance of municipality j from the region i in time period t; $GDP_{i,a,t}$ is the agricultural GDP in a region i estimated by Kukić (2017); $SE_{j,a,t}$ is the share of agricultural employment of a municipality j from region i in the total agricultural employment in the region i; $GDP_{i,na,t}$ is the non-agricultural GDP in a region i estimated by Kukić (2017); and $SE_{j,na,t}$ is the share of non-agricultural employment of a municipality j from region i in the total non-agricultural employment in region i. All state-level GDP figures are expressed in 1990 Geary-Khamis international dollars.

Although this measure is referred to as "municipal GDP", it should be noted that this measure is only an approximation of municipal economic performance and not an exact GDP figure, which is explained in more detail in paper 4. The main reason why this figure cannot be an exact GDP measure is due to data deficiency. Namely, because of data scarcity, an assumption had to be made that agricultural and industrial workers are equally productive across municipalities. Further studies of

the topic will show how strict this assumption is and to what extent it has impacted the derivation of conclusions.

The municipal employment and population data, necessary for estimating the economic performance of municipalities in socialist Yugoslavia, also had to be compiled from different statistical yearbooks and census data. Similarly, data about average years of schooling had to be collected and recorded since the digital availability of these data is non-existent.

To make data comparable in the analysis of socialist Yugoslavia, it had to be territorially adjusted. Namely, the area occupied by municipalities was changing through time and, to allow comparability, data points had to be adjusted such that they "cover" the same area regardless of the changes in municipal space coverage. This was done by setting 1971 areal coverage of municipalities as a standard, and data for other years were adjusted as if in all observed years the municipalities were covering the same area as in 1971. The process is further explained in Appendix 1 of paper 4.

When variables depicting economic performance and activity are defined and variables for ethno-confessional diversity, it is possible to present the specific methods applied in each of the papers comprising this dissertation. Although all papers are concerned with the economic consequences of ethno-confessional diversity, each paper, as mentioned, has a particular contextual and analytical focus and, therefore, different methods aimed at deriving credible conclusions. The next part of the dissertation briefly depicts the methods used in each paper.

Specific (quantitative) methods applied in dissertation papers

The country-level analysis conducted in the first paper introduces the time-variant measure of ethnic diversity compiled by Dražanová (2020) and its relationship with economic performance. Decade average GDP per capita growth[30] is regressed on ethnic fractionalization and a series of controls that are consisted mainly of the growth determinants and channels identified in previous studies on the topic, through which ethnic diversity impacts economic performance. Results are obtained by exploiting the variance of ethnic diversity through time which enables the usage of panel data estimators. But before applying panel data estimators, the paper estimates the relationship between ethnic fractionalization and economic growth by using the seemingly unrelated regressions approach (SUR). This approach is widely used in studies examining the interplay between economic growth and ethnic diversity on a state level when ethnic diversity is assumed to be stagnant over time.

[30] The reasons why logarithm of decade average GDP per capita growth is used as an outcome variable is explained in the paper. Here, it is sufficient to say that annual analysis was impossible due to sluggish changes in ethnic fractionalization index over the years.

In simplest terms, an equation is estimated for each decade in the SUR model, assuming that the error terms between four (the total number of decades) equations can be correlated (Zellner, 1962). SUR enables a comparison of the results obtained in this paper and results from previous studies on the topic. Apart from SUR, this paper also uses an instrumental variable approach for comparison purposes, where ethnic diversity is instrumented with the first lag of ethnic diversity and latitude of a country observed.

Due to the complex interplay between ethnic diversity and economic growth, the first paper must consider the possibility of the reverse causality – that ethnic composition in a certain period is shaped by economic growth in the previous period. In addition, because of the time-varying ethnic fractionalization index, it is possible to control for the time-invariant, country-specific effects. The Arellano-Bond (Arellano & Bond, 1991) approach that uses the generalized method of moments (GMM) to estimate the differenced equation could be an adequate choice. However, I have opted for a similar approach but estimated via maximum likelihood estimators (ML) instead of GMM estimators. This approach applies ML estimators on structural equation models (SEM) but uses the same rationale as the Arellano-Bond approach. The choice of ML-SEM instead of GMM is led by the recent wave of studies (such as Allison et al., 2017; Moral-Benito et al., 2019), showing that ML-SEM is more efficient in small samples.

Estimating the impact of ethnic diversity on inequality after redistribution is made possible by a dataset compiled by Solt (2020). The dependent variable – GINI before redistribution – is regressed on the ethnic fractionalization index. Choice of control variables is made by following the previous studies in the field, for example, corruption variable, and controls necessary due to the context of this study, for instance, variable for the political system. The regressions were estimated via fixed effects models but also with System GMM estimators. Here it was not necessary to use ML-SEM since the sample is sufficiently large.

To analyze the impact of nationalism on network formation and, by extent, trade integration, the third paper uses a regression model – pooled OLS estimators and fixed effects estimators – where price differences between markets in different cities are explained by transportation costs, city-specific costs and variable for religious similarity that is intended to capture the trade costs that depend on networks. The estimated coefficient for the variable for the religious similarity is intended to provide us with an approximation of the impact of nationalism on the formation of trade networks and on trade integration.

The last paper analyzes the impact of ethnic diversity on municipal economic performance in socialist Yugoslavia. The economic growth of the municipal economic performance is regressed on the municipal ethnic fractionalization index and standard control variables from the literature. Regression is estimated via OLS estimators, spatial autoregressive modles, and SUR. Additional robustness checks are conducted using the IV approach, where ethnic diversity is instrumented with

its past value and the proportion of people who are not identified as members of any major ethnic group in Yugoslavia. A detailed description of the control variables is provided in paper 4 and some of them are already mentioned in the section depicting data: average years of schooling, for instance.

Chapter 4:
The Summary and Results of Research Papers

This chapter of the dissertation summarizes information presented until now and presents the main results obtained in each paper comprising the dissertation

Economic Growth and Dynamic Ethnic Diversity: Evidence from the second part of the XX century

The first research paper of this thesis examines the relationship between the dynamic ethnic diversity – ethnic homogeneity changing over time – and economic growth by conducting a country-level analysis on a sample of 76 countries observed over four decades – from 1960 to 1999. Most existing studies focused on the impact of ethnic diversity on growth assume that there is no significant change in the ethnic composition of a country over time (Alesina et al., 2003; Collier, 2000; Easterly & Levine, 1997; Gören, 2014; La Porta et al., 1999, to name a few). What can be concluded about the relationship between ethnic diversity and economic growth if this assumption is violated? A proper understanding of the interplay between ethnic diversity and growth is essential for policy creation as ethnic diversity increases in the contemporary world.

A couple of previous empirical studies on the topic attempted to include measures of ethnic diversity that are changing over time (Campos & Kuzeyev, 2007; Campos et al., 2011; Patsiurko et al., 2013). However, due to data limitations, these studies have usually observed a small number of relatively similar countries over the shorter periods. The first paper of this thesis expands on both the number of countries observed and the timeframe compared to the existing empirical work, expanding the external validity of conclusions. On top of that, besides methodological approaches standard in literature (such as the usage of seemingly unrelated regressions), the paper applies dynamic panel estimators, specifically the maximum likelihood estimation of structural equation models.

The application of dynamic panel estimators provides additional credibility to the obtained results. Namely, it allows control for immeasurable, time-invariant, country-specific characteristics that simultaneously affect ethnic diversity and economic growth, such as persistent prejudices. This approach further accounts for the reverse causality – changes in ethnic heterogeneity due to changes in economic performance. The dynamic panel approach provides crucial insights into the nuanced mechanism behind the interaction between ethnic diversity and economic performance.

Measures of time-dynamic ethnic fractionalization indices are obtained from the *Historical Index of Ethnic Fractionalization* database compiled by Dražanová

(2020). The paper finds that ethnic diversity changes over time by analysing this data. This change is gradual but exists to the extent that it makes it reasonable to consider the temporal dynamics of ethnic heterogeneity when assessing its relationship with economic performance. The validity of the standard assumption of time-invariant ethnic diversity when the long-run relationship between ethnic heterogeneity and economic activity is analyzed is contingent on the country observed, the moment when it is observed, and the main channels through which the diversity impacts economic performance. In some of the observed countries, the ethnic diversity did not change during the observed period, while in others, it was changing quickly and significantly. Nevertheless, even when the changes in ethnic composition are non-negligible, it may be the case that the state of ethnic composition is important, while changes in ethnic structure are irrelevant for policies and practices that affect growth. In other words, it is not possible to objectively define what a meaningful change in ethnic diversity is concerning its impact on economic performance. Whether the change in ethnic diversity is sufficient to impact the economic performance will depend on the context.

Results from this paper suggest a negative relationship between dynamic ethnic diversity and state-level economic growth. Furthermore, the analysis implies that ethnic diversity is either affecting economic performance through its impact on the known determinants of economic growth or approximating some factor of economic performance that is not yet recognized. Because of the quantity and quality of scientific endeavours dedicated to discovering the determinants of economic growth, the former explanation seems more likely.

The conclusion regarding the negative impact of ethnic diversity on growth at a country level aligns with previous studies on the topic. However, the implications of this paper are based on, arguably, more robust results obtained without an assumption of constant ethnic diversity. More importantly, the analysis provides additional insights into the mechanism behind the observed relationship. Lastly, the paper illustrates why the results are not necessarily in conflict with frequent findings in studies focused on smaller territorial units than states that suggest the existence of the positive impact of ethnic diversity on growth. The channels through which ethnic diversity impacts economic growth are different on a state level compared to the smaller territorial units.

Diversity and Inequality: The empirical assessment of the relationship between the dynamic ethnic diversity and income inequality before the redistribution in a panel of countries

There is a growing concern that the increasing ethnic heterogeneity will cause a rise in income inequality (Meisenberg, 2007). Yet, compared to the number of studies focused on the relationship between ethnic diversity and growth, the impact of ethnic heterogeneity on inequality is understudied. Existing studies inspecting the relationship between ethnic diversity and inequality are, due to data limitations, only focused on the impact of ethnic homogeneity on inequality after redistribution. These studies usually find higher levels of post-redistribution inequality in more ethnically diverse societies. However, previous works in the field cannot provide us with the answer to the question regarding the extent of the impact of ethnic diversity on inequality before redistribution. An adequate answer to this question is crucial, not only for understanding the nature of the relationship between inequality and ethnic diversity but also for policy purposes. Policymakers should be aware of the reasons for the increase in inequality. Further redistribution may be a sub-optimal solution to counteract the potential increase in inequality due to increased ethnic diversity if the ethnic heterogeneity affects only inequality prior to redistribution.

The second paper of this dissertation analyzes the relationship between ethnic diversity and inequality before redistribution (pre-transfer or market inequality) in a sample of 122 countries over the period from 1960-2013. To best of my knowledge, this is the most comprehensive dataset on the topic to date. A larger dataset contributes to the credibility of the results. On top of that, as in the first paper of this thesis, ethnic diversity is treated as time-varying. Usage of the dynamic measures of ethnic diversity does not require an assumption that ethnic diversity is not changing over time. In addition, it allows the application of econometrical approaches that provide more credible results.

Time-varying measures for ethnic diversity are obtained from the *Historical Index of Ethnic Fractionalization* (HIEF), compiled by Dražanová (2020), as in the first paper of this thesis. Measures for inequality before redistribution are acquired from the ninth version of *The Standardized World Income Inequality Database* (SWIID), the database gathered by Solt (2020).

To analyze the relationship between ethnic diversity and inequality before redistribution, the second paper of the thesis uses the fixed-effects approach. Due to the potential problem of reverse causality and problems related to "bad controls", this approach is complemented with the dynamic panel System GMM estimation. Both approaches allow controlling for the country-specific, time-invariant factors that may contemporaneously affect inequality and diversity.

Results from the analysis conducted in the second paper of the thesis lead toward the conclusion that ethnic diversity has a statistically significant impact on inequality before redistribution. This effect is, economically, small, but it can gain

relevance as countries are opening their borders. Paper further concludes that redistribution may not always be the best solution to counteract the increase in inequality driven by the rise of ethnic diversity.

Trade and nationalism: Market integration in Interwar Yugoslavia

The third paper of the thesis is published in 2020 in the *European Review of Economic History*, 24(2), 288-313.

The aim of the third paper is to empirically evaluate how ethno-confessional tensions impacted regional trade integration among ethnically diverse regions in the Kingdom of Yugoslavia during the interwar period.[31] After WWI, the Kingdom of Yugoslavia was creating an institutional and infrastructural environment conducive to inter-regional trade within the Kingdom. At the same time, nationalistic sentiments may have impeded the creation of trade networks, thus, hindering the levels of trade between ethnically different regions.

The paper argues that opposing forces affecting trade integration could have simultaneously existed. This was shown in previous studies of the topic in other historical contexts, most notably in Schulze and Wolf (2012), whose methodology was adapted to the context of this paper and used to derive conclusions.

Besides the mentioned centrifugal and centripetal forces affecting the trade integration, a significant effort was made by the ruling elites – the king – to suppress nationalistic sentiment and artificially generate a unified ethnic identity for individuals living in the Kingdom. As history shows, these efforts were politically futile, but it remains unanswered if these policies annulled the potentially negative impact of ethnocentric sentiments.

Systematic deviations from the *Law of One Price* are explained via trade costs: transportation costs, network formation costs, and costs related to a single market but not to any pair of markets (cities). The variable for religious similarity is used as the independent variable for trade formation costs, and it is the principal variable of interest regarding the question posed.

All of the data upon which the analysis was conducted was collected and digitalized; it was not readily available. Because of the potential impressions in measurements, various robustness checks are conducted.

The analysis implies that the ethno-confessional tensions in the form of nationalistic ideologies have increased trade costs and thus retarded economic interconnectivity in the Kingdom of Yugoslavia. Historical and quantitative evidence point in the same direction. Whether the econometric model is estimated

[31] Readers interested in the topic of trade in the interwar Yugoslavia are referred to Chilosi and Nikolić (2021), a study that improves upon findings from the third paper of this thesis as well as upon Nikolić (2017).

via OLS or fixed effects estimators, the main conclusions are the same. Institutional and infrastructural improvements were not futile, and they have helped trade integration. At the same time, prevailing nationalism was slowing down trade integration within the Kingdom, which contributed to the political disintegration of the Kingdom. King's measures to curtail ethnic tensions did not reduce the negative effect of these tensions on interregional trade, but they may have even been counterproductive.

Brotherhood and Unity: Ethnic Diversity and Economic Performance in Socialist Yugoslavia

The last paper investigated how ethnic diversity, measured via the ethnic fractionalization index, impacted the municipal economic performance in socialist Yugoslavia from the year 1960 to 1990 in almost five hundred municipalities. On the one hand, socialist Yugoslavia was a dictatorship, and the existing models, especially Collier (2000, 2001), predict a negative impact of ethnic heterogeneity on economic growth. On the other hand, political elites have fostered inclusivity and punished ethnocentric activity. This should at least reduce the predicted negative effect of ethnic diversity on economic performance. Expression of the ethnic identity was not suppressed, as was the case in the Kingdom of Yugoslavia, and diversity was celebrated.

The Yugoslavian dictator did not draw political and military power from the group consisting of individuals that shared his ethnic background. This violates one of the main assumptions from the models suggesting that in dictatorships, ethnic diversity will systematically impact economic performance.

For this analysis, a new dataset was constructed consulting statistical yearbooks of socialist Yugoslavia as well as census data. A measure for ethnic diversity was calibrated based on data about municipal ethnic heterogeneity from censuses. An advantage of observing municipalities in socialist Yugoslavia is that everybody could express ethnic identity without significant obstacles.

Municipal economic performance was derived by distributing the regional GDP to municipal levels following the methodology proposed by Kukić (2017). This distribution was primarily based on the employment figures from the statistical Yearbooks and census data, which also had to be assembled and digitalized.

The analysis conducted using OLS estimators, seemingly unrelated regressions, and an IV approach, found the negative impact of ethnic diversity on municipal economic growth in socialist Yugoslavia. This was despite efforts of the highest government officials to encourage inclusion along ethnic lines and even with the fact that the Yugoslavian dictator did not draw political and military power from the pool of individuals who shared his ethnic background. Formal laws prohibiting segregation and nationalism, accompanied by an ideology that sought to foster

inclusion, were not sufficient to neutralize the negative economic consequences of ethnic diversity. The paper further educes that these political efforts to encourage inclusion probably did not even contribute to the reduction of the negative effect of ethnic fractionalization on economic growth. However, the last assertion is merely a suggested conclusion that depends on rigorous assumptions; proper counterfactual evidence demands currently unavailable data.

Chapter 5:
Concluding remarks

The previous chapter of the thesis briefly presented the results from each paper. In this chapter, general conclusions based on these results and overall discussion up to this point will be presented.

Ethnic diversity is rising across the globe leading to growing multiethnic societies. The proper understanding of processes underlying the connection between diversity and economic activity and outcomes is essential for the decrease of costs and the increase of benefits that ethno-confessional heterogeneity brings. An adequate assessment of the economic consequences of ethno-confessional diversity is necessary to form policies that aim to foster a positive impact on economic performance and prevent the adverse effects of diversity on economic outcomes and economic activity.

This dissertation helps in bringing us a step closer to an adequate understanding of the mechanisms behind the association between ethno-confessional diversity and economic activity and outcomes. The thesis conducts four independent empirical research papers to achieve this. Each paper contributes with evidence from unexplored contexts by employing new datasets to derive conclusions or by observing phenomena from different, including temporal, angles compared to previous studies in the field.

The first paper adds the time dimension of ethnic diversity to the analysis of the impact of diversity on economic performance. In doing so, it is expanding on the existing literature that usually assumes the time-invariant ethnic diversity. Results from this paper suggest the existence of the negative impact of ethnic heterogeneity on economic growth. The direction of the effect of ethnic diversity on economic performance is in line with conclusions from the previous cross-country studies in the field. However, the first paper of this dissertation can provide additional information regarding the mechanism behind the relationship observed. Namely, the evidence implies that ethnic heterogeneity has an impact on growth by affecting other growth determinant or determinants. This insight also has the potential to explain the opposing results stemming from previous studies focused on different sizes of the observed territory; it is not incompatible with the existence of different mechanisms behind the relationship between ethnic heterogeneity and economic performance on different levels of spatial aggregation. The critical task for future studies is to identify the exact growth determinants that are affected by the time-varying ethnic diversity.

The second paper adds an inequality dimension to the overall topic. The evidence presented in this paper contributes significantly to the literature focused on the relationship between ethno-confessional diversity and income inequality. This is because paper 2 of this dissertation provides another angle to the study of the topic,

a more robust methodological approach, and, arguably, higher quality data used in an analysis. This paper suggests that income inequality before redistribution increases as a society becomes more diverse. The estimated effect of ethnic heterogeneity on pre-transfer income disparity is statistically significant but small. To a certain extent, it can be comforting to know that increasing ethnic diversity is not a major contributor to rising inequality before redistribution. Still, there are two reasons why these results should not be neglected. First, the mere existence of a statistically significant impact of ethnic heterogeneity on pre-transfer income distribution can indicate that institutional settings limit the opportunities for certain groups in a society. To what extent is this true depends on the country observed and the moment in history when the country is observed. Second, if the trend of globalization continues, with fewer barriers to the movement of individuals, this effect can become economically significant. Again, the extent of the impact of significant increases in ethnic diversity on income inequality before redistribution will depend, to a certain degree, on the inclusivity of formal and informal institutions in society – are there barriers for minorities to earn or not.

Results from the last two papers suggest a negative impact of ethno-confessional diversity on trade and economic performance. These results are obtained from the historical contexts that were not analyzed previously within the realm of the topic of this thesis. As such, they strengthen the conclusions from previous empirical findings. On top of that, historical and quantitative evidence from the last two papers indicate that top-down policies do not prevent the negative effect of ethno-confessional diversity on economic performance or the negative impact on economic activity. It does not matter how strict these policies are, nor does it matter if they were codified or implemented via informal mediums; these policies could not annul the adverse effects of ethno-confessional diversity on economic growth and activity. Based on the evidence from the last two papers, these policies could probably not reduce the adverse effects of ethno-confessional diversity on economic activity and performance. However, the suggestion about the total impotence of the policies applied is less robust in both papers and requires further investigation.

While results show that increasing ethnic diversity leads to higher inequality and lower economic growth, and they point towards ineffective policies in reducing costs of the diversity, it would be a mistake to interpret these results as a policy prescription to decrease the diversity. It should not be neglected that there are economic benefits stemming from variety. If the idea is to achieve and expand the growth potential, then, with an adequate inclusive environment, ethnic diversity is desirable. Similarly, inequality before redistribution will probably not increase with an increase in ethnic heterogeneity if the opportunities for minorities are not systematically restricted. Finally, preventing the free movement of labour, or even slowing down the opening of countries, can impede the global economic progress. Perhaps the best response to rising ethnic diversity is creating and implementing effective inclusive policies. How to achieve that? From Yugoslavia's example, it is

evident that the “brute-force” top-down approach that neglects history and particular needs of ethnic groups does not work. Maybe the answer is in education or grassroots movements that promote inclusion and acceptance. This dissertation cannot answer this question, and it is left for future research.

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PART 2:
Research papers

Paper 1:
Economic Growth and Dynamic Ethnic Diversity: Evidence from the second part of the XX century

Abstract

Existing cross-country empirical studies concerned with the relationship between ethnic diversity and economic growth usually assume time-invariant ethnic heterogeneity and find a negative impact of ethnic diversity on economic performance. Previous studies, in which the temporal dynamics of ethnic diversity are considered, draw conclusions based on a small sample of relatively similar countries. This paper includes the time dimension of ethnic diversity and analyzes a sample of 76 countries over four decades intending to observe the association between ethnic fractionalization and economic growth. Dynamic panel models and methodological replication of the previous studies on an expanded sample have provided results that suggest a negative impact of ethnic diversity on economic performance. However, results imply that ethnic diversity is not a determinant of economic growth but, instead, that it is influencing other growth determinants and, in doing so, altering economic performance.

Introduction

An adequate understanding of the relationship between economic performance and ethnic diversity is vital as nation-states become more ethnically heterogenous (Putnam, 2007). The in-depth knowledge about this relationship would enable policymakers to grasp the costs and benefits of the rising ethnic diversity and craft policies accordingly. Theoretically, diversity can be both conducive and detrimental to economic growth, as shown in the model by Alesina and La Ferrara (2005). High ethnic fractionalization may impede economic activity through ethnic conflict, conflict of preferences, prejudices, and racism. On the other hand, ethnically diverse countries may benefit from a higher likelihood of innovation and higher productivity due to a variety of experiences, abilities, and cultures. Existing empirical evidence offer an abundance of nuanced information about the interplay between economic growth and ethnic fractionalization (Alesina et al., 2003; Bove & Elia, 2017; Collier, 2000; Easterly & Levine, 1997; Gören, 2014; La Porta et al., 1999; among the others). Still, empirical studies cannot provide unequivocal answers to questions of the direction and the magnitude of the impact of ethnic diversity on economic performance.

Moreover, most of the empirical work regarding the analysis of economic consequences of ethnic diversity is done with an assumption of the time-invariant ethnic structure of the society. If this assumption is violated, conclusions from these studies may be jeopardized. Since insufficient attention is granted to the dynamics of ethnic diversity, there is a gap in the understanding of the relationship and, more importantly, conclusions from previous studies which have assumed the constant ethnic diversity may be distorted. Because of that, Patsiurko et al. (2013) argue that a lack of measurement of the diversity over time is a severe problem in the literature.

This paper incorporates the time dimension of ethnic diversity in the empirical analysis of the economic consequences of ethnic heterogeneity. The analysis is done on a sample of 76 countries over four decades – from 1960 to 1999 –to observe how dynamic ethnic diversity impacts economic growth. Besides applying the standard methodological approaches, the paper analyses the relationship between economic growth and ethnic diversity by using a maximum likelihood estimator in a dynamic panel model – an approach that will enhance the robustness of the obtained results.

Most existing cross-country empirical assessments find a stable and negative association between ethnic diversity and economic growth (Alesina et al., 2003; Easterly & Levine, 1997; Gören, 2014; to mention a couple). However, recent studies on smaller geographical units than countries, the smallest being the grid country-cell, suggest a more complex interplay between economic performance and ethnic heterogeneity. For example, Montalvo and Reynal-Querol's (2021) analysis finds a positive impact of ethnic diversity on the economic growth of smaller geographical units and no impact on a state level.

Empirical studies that incorporated dynamics of ethnic diversity in the analysis find a negative connection between ethnic heterogeneity on economic growth. Patsiurko et al. (2013) conclude that diversity may change significantly within 15 years and that fractionalization is a significant predictor of economic performance. Campos and Kuzeyev (2007) and Campos et al. (2011) also find a negative association between ethnic diversity and economic growth. They suggest that, in the case of transitional economies, changes in the ethnic structure of society within only five years can be sufficient to affect conclusions regarding the economic consequences of ethnic diversity. However, in these studies, mentioned association is significant only when ethnic fractionalization is instrumented with the first lag of the measure for the diversity and latitude of the country. Campos and Kuzeyev (2007) and Campos et al. (2011) conclude that ethnic fractionalization is not an exogenous variable in growth equations, which contrasts with findings based on analyses that treat ethnic diversity as fixed. Nevertheless, Campos and Kuzeyev (2007) and Campos et al. (2011) do not provide a detailed interpretation of why this may be the case; exogeneity and endogeneity of ethnic diversity are only discussed from an econometric standpoint. This paper aims to provide an intuitive explanation for the results of these studies.

This paper improves upon existing empirical studies in several aspects. First, it does not assume that ethnic diversity is time-invariant. The analysis moves away from this frequent assumption by using a novel data source containing annual information about ethnic diversity: the *Historical Index of Ethnic Fractionalization Dataset* (HIEF) compiled by Dražanová (2020).

Second, the paper expands on the number of observations used in the analysis compared to other studies that treat ethnic diversity as a time-variant and improve the conclusions' robustness. In studies by Campos and Kuzeyev (2007) and Campos et al. (2011), conclusions are drawn from a small sample of 27 countries observed over a period of fewer than 20 years. The sample from these studies only consists of economies in transition and the external validity of their conclusions is questionable due to the selection bias, which the authors recognize. Similarly, a study by Patsiurko et al. (2013) analyzes a sample of 30 OECD countries in two periods, 1985 and 2000. As mentioned, the sample used in this paper covers 76 countries from all continents and from different development levels from 1960 to 1999.

Finally, the paper applies a rigorous robustness check using maximum likelihood dynamic panel data modelling. This estimator is based on the same identification assumptions and is asymptotically equivalent to Arellano and Bond (1991). However, it is more efficient when the sample is small (Moral-Benito et al., 2019).

In the beginning, the paper follows the methodological approach, standard in the literature on the topic, in which growth equations are expanded to accompany the possibility that ethnic diversity is a determinant of economic growth (Alesina et al., 2003; Bove & Elia, 2017; Collier, 2000; Easterly & Levine, 1997; Gören, 2014; La Porta et al., 1999; Montalvo & Reynal-Querol, 2002, 2003, 2005a). Growth equations are formulated such that growth is treated as a dependent variable while determinants of growth are independent variables. Expanded growth equations are adding independent variables such that the measure for ethnic diversity can be evaluated as a potential growth determinant. Initially, expanded growth equations (based on Barro, 1991; and Montalvo & Reynal-Querol, 2005a) are evaluated by the seemingly unrelated regression method (SUR) in a scenario where ethnic diversity is treated as time-invariant. SUR is a model consisting of several equations with different dependent and, sometimes, independent variables where it is assumed that error terms of different equations are correlated (Zellner, 1962). In this paper, an equation is formulated for each decade in the sample. Then, the estimation is repeated with the time-varying measures for ethnic fractionalization and results are compared with estimation results from the situation in which the measure for ethnic diversity was held constant through time. The results should not differ substantially if the assumption about the constant ethnic diversity is valid.

Some authors evaluate growth equations by three-stage least-squares estimators to avoid simultaneity (Barro, 2003) caused by the interconnectedness of economic growth and its determinants. However, scholars concerned with the potential impact

of ethnic fractionalization argue that SUR is less prone to specification errors (Gören, 2014; Montalvo & Reynal-Querol, 2005a). Since the evaluation of the impact of ethnic diversity requires altering the growth equations, the risk of specification errors is higher, and, therefore, estimation of the potential association between ethnic diversity and economic performance is done using SUR.

The paper follows the methods already used in the literature before checking the results with the more rigorous maximum likelihood approach. This is done to compare the results with previous studies and make sure that the results obtained are not due to the lack of variability of the measure for ethnic fractionalization in the dataset. The assumption of stagnant ethnic diversity is not entirely baseless, and it is necessary to check if sufficient variability of the measure for ethnic diversity exists.

After the preliminary estimation procedures are conducted, the analysis proceeds by checking for the possibility of the *endogenous* impact of ethnic fractionalization on growth. This paper initially applies the instrumental variables (IV) technique to capture the potential endogenous effect of ethnic diversity on economic performance. The IV technic is applied as in Campos and Kuzeyev (2007) and Campos et al. (2011), where ethnic diversity is instrumented with its first lag and latitude of the observed country. The validity of these instruments can be disputed, even though results from the mentioned studies are replicated. The paper proceeds by establishing a hypothesis that the endogeneity problem occurs because of the correlation between the past levels of economic activity – GDP per capita levels – and current ethnic fractionalization. It does so without the usage of arguably spurious instruments.

Maximum likelihood estimation applied on the dynamic panel model allows for the past levels of GDP to be correlated with current fractionalization. Technically, the paper shows that the ethnic fractionalization variable has a significant and negative impact on economic growth when it is treated as predetermined. At the same time, it loses significance if it is treated as strictly exogenous. In other words, there is no need for the utilization of instruments that are contestable. This methodological approach also enables controlling for time-invariant correlates of economic performance and ethnic diversity, such as persistent non-explicit and often immeasurable inter-ethnic prejudices. The endogeneity problems due to the omission of time-fixed country characteristics in cross-country analysis will be avoided. Moreover, this methodology can serve as a robustness check for results obtained by standard methodological approaches, i.e., it will circumvent the potential problems of SUR and the IV approach (Moral-Benito et al., 2019).

Campos and Kuzeyev (2007) and Campos et al. (2011) use a dynamic panel approach evaluated with system GMM estimators to check the robustness of their results obtained via the IV procedure. The maximum likelihood estimators of the dynamic panels can deal with the same issues as system GMM estimators. In particular, these models can absorb a lag-dependent variable in a model and deal

with potential endogeneity problems caused by the individual (in this paper country) correlates, fixed in time – fixed effects. Nevertheless, this method performs better than GMM in the small samples, it is more efficient and does not rely on the mean stationarity assumption (Allison et al., 2017; Moral-Benito et al., 2019). The mean stationarity assumption is particularly problematic in the country panels (Barro & Sala-i-Martin, 2003).

Results obtained by applying the depicted methodological approaches are primarily in-line with conclusions from existing studies that consider the time dimension of ethnic fractionalization in the analysis of the economic consequences of ethnic diversity. When ethnic fractionalization is treated as an exogenous growth determinant, its estimated effect on the economic performance is insignificant. However, results indicate a fairly strong and a significant negative impact of ethnic diversity on economic growth when it is allowed that previous levels of economic performance can affect the present measure of ethnic diversity; in technical terms, when the measure of ethnic heterogeneity is treated as sequentially exogenous or, as it is sometimes referred to, as predetermined. Differently stated, when ethnic diversity is treated as predetermined, it is assumed that current idiosyncratic errors from growth equations are not correlated with the current measure for ethnic diversity. In contrast, past errors from growth equations can be correlated with current levels of the measure for ethnic heterogeneity.

Although obtained results are in-line with the previous studies on the impact of the dynamic ethnic diversity on economic performance, conclusions from this paper are more robust and refine the existing assertions regarding the relationship observed. This is because a larger sample and a stricter methodological approach are used in an analysis compared to the existing studies. Results obtained further suggest that, by itself, ethnic diversity is not necessarily detrimental to economic growth. When treated as exogenous, "independent" from the previous processes of formation of GDP, ethnic diversity does not show to be related to economic growth. Rather, the dynamic interplay of ethnic diversity and other determinants of economic growth makes a difference.

The rest of the paper is organized as follows. The next, second section of the paper provides a brief overview of the studies concerned with the topic of interest. The third part analyzes the dynamics of ethnic diversity by exploring the first dataset recording the yearly state of ethnic heterogeneity for more than 150 countries. Afterwards, the paper describes the data and methodology that will be applied to the collected data in order to draw conclusions about the relationship between the dynamic ethnic diversity and economic growth. In the fifth part of the paper, the empirical results are presented and discussed. The last part of the paper is reserved for conclusions.

Ethnic diversity and economic growth: literature review

Easterly and Levine's (1997) and Mauro's (1995) studies sparked the scientific community's interest in the effect of ethnic diversity on economic performance. While ethnolinguistic fractionalization was used as an instrument to show the stability of the connection between corruption and growth in Mauro's (1995) study, Easterly and Levine's (1997) work has directly observed how ethnic diversity negatively impacts economic performance through public policies in Africa.

Scientific work regarding the association between ethnic diversity and economic growth improved upon Easterly and Levine's (1997) study. Analysis conducted by La Porta et al. (1999) has substantiated the findings by Easterly and Levine (1997) about the importance of ethnic fractionalization for the "good government". They have refined the existing findings by using a nuanced approach to the quality of government. By observing the relationship between ethnic diversity and economic growth from a political and economic systems perspective, Collier's (2000, 2001) studies have provided empirical and theoretical assertions that the type of governance, democratic or dictatorial, is crucial for the economic consequences of ethnic diversity.

Data concerning ethnic homogeneity were also improved since Easterly and Levine's (1997) paper. Arguably higher quality datasets than widely used *Atlas Narodov Mira* (1964) for assessing ethnic constellations were introduced. An impactful study by Alesina et al. (2003) did not simply criticize the data in *Atlas Narodov Mira*. This study has also presented the disaggregated measure of ethnic diversity that distinguishes ethnic from linguistic diversity, an impossible task using only *Atlas Narodov Mira*. The principal data source regarding the ethnic and linguistic fractionalization in Alesina et al. (2003) is *Encyclopedia Britannica* (2001). Some authors have opted for using multiple data sources concerning ethnic, religious, and linguistic diversity instead of *Atlas Narodov Mira* (1964) or *Encyclopedia Britannica* (2001). For instance, Montalvo and Reynal-Querol (2005a) consult three sources for vital information regarding ethnic diversity: *World Christian Encyclopedia* (1982)*, L'Etat Des Religions Dans Le Monde* (1987), and *The Statesman's Yearbook* (1987). Finally, some authors rely on censuses as a direct source of ethnic, linguistic, or religious constellations (for example, Campos & Kuzeyev, 2007).

Various indices were proposed as measures that ought to capture different dimensions of diversity that may be relevant for economic activity: ethnic fractionalization index (Alesina et al., 2003), cultural diversity index (Fearon, 2003), polarization index popularized by Reynal-Querol (2002) and Montalvo and Reynal-Querol (2002, 2003, 2005a, 2005b), and many other indices relatively less represented in literature. The ethnic fractionalization index (EFI), a measure of the probability that two randomly selected individuals are members of different ethnic

groups, is still pervasive. This index is used in Easterly and Levine's (1997) study and is the primary measure of ethnic diversity this paper is using.

Due to numerous complexities surrounding the relationship between ethnic fractionalization and economic performance, there is no consensus regarding the economic consequences of ethnic diversity. Theoretically, ethnic diversity may be beneficial and/or detrimental to economic activity. Alesina and La Ferrara's (2005) paper establishes a model that captures both benefits and costs of high ethnic fractionalization. In a production function, authors include the number of groups that comprise a society. Utility function for an individual is impacted by the individual's consumption and the amount of public goods provided. The amount of public goods provided depends on the number of different groups in society. The simple inclusion of the number of groups in the individual utility function and a production function allowed Alesina and La Ferrara (2005) to capture costs and benefits from diversity. Costs from high fractionalization stem from ethnic conflict, conflict of preferences, prejudices, and racism. Benefits from ethnic heterogeneity for economic activity are channelled through a higher likelihood of innovation and higher productivity due to a variety of experiences, abilities and cultures.

Empirical studies have, until now, demonstrated the existence of a nuanced relationship between ethnic diversity and economic growth that theoretical models predict. The majority of the studies mentioned above that have observed the relationship between ethnic diversity and economic performance have empirically found that ethnic fractionalization has either a direct or indirect negative impact on economic performance. The empirical finding that ethnic diversity impedes economic growth holds both when the cross-section of countries is observed (for instance Patsiurko et al., 2013) or when a single country is at the focus of the study (for example, Dincer & Wang, 2011, for the case of China). Nevertheless, the number of studies finding a positive relationship between ethnic diversity and economic growth is rising. A paper by Ashraf and Galor (2011) is one of the examples where empirical findings have supported the possibility of the positive impact of ethnic – in this case, cultural – diversity on growth. Studies in which the unit of observation are cities, or other geographical localities smaller than the state, also document how ethnic diversity may be conducive to local economic growth (Lee, 2011, 2015; Ottaviano & Peri, 2005, 2006; Sparber, 2010). A recent paper by Montalvo and Reynal-Querol (2021) is designed to allow inspection of the relationship between ethnic homogeneity and economic growth on different spatial scales: from the grid-country cell expanding to the state level. They conclude that ethnic diversity has a strong and positive effect on the economic performance of smaller geographical areas. This effect declines when the size of the observed space is increasing – the positive impact of ethnic diversity on growth disappears on the largest scale of observation – the state level.

The complexities surrounding the relationship between ethnic homogeneity and economic growth are not limited to whether the ultimate impact of ethnic diversity

is beneficial or detrimental to economic performance. These complexities extend to channels through which ethnic homogeneity can potentially impact economic growth. Scholars have identified various transmission channels through which ethnic diversity may affect economic performance, for example, through human capital formation (Ali et al., 2012). Gören's (2014) paper has separated indirect from direct effects of ethnic diversity on economic growth. Results from Gören's (2014) work suggest the direct adverse impact of ethnic fractionalization on economic growth. Some transmission channels (such as trade openness) send positive feedback from ethnic diversity to economic performance.

Depicted advancements in understanding the complex relationship between ethnic diversity and economic performance since Easterly and Levine's (1997) paper mainly were made under the assumption that ethnic fractionalization is time-invariant. If ethnic constellations are not time-invariant, we are not just missing out on insights that could be gained by the inclusion of the time component, but also some conclusions made with the assumption of absolute persistence of ethnic diversity may be less credible. This paper seeks to remedy this by including the time-dynamic ethnic diversity in the analysis. The possibility of analyzing how the evolution of ethnic homogeneity impacts economic growth arose with the emergence of a new database, compiled by Dražanová (2020), that provides information about the ethnic structure of numerous countries from the end of the Second World War until 2013.

This paper is not the first to dedicate attention to the importance of a time component in an analysis of the relationship between economic performance and ethnic diversity. Patsiurko et al. (2013) incorporate different measures for ethnic diversity for the years 1985 and 2000 in a study that analyzes 30 OECD countries. Using the SUR approach, Patsiurko et al. (2013) study finds a negative and significant impact of ethnic diversity on economic growth. Campos and Kuzeyev (2007) and Campos et al. (2011) are the first studies, to best of our knowledge, that have attempted to exploit the time dynamics in the analysis of the connections between ethnic diversity and economic growth. They have explored the impact of evolving ethnic diversity on economic performance in a sample of 27 former centrally planned economies (former the Soviet Union and Central European countries) from 1989 to 2002. First, Campos and Kuzeyev (2007) and Campos et al. (2011) assume that their variables for ethnic diversity are not correlated with the error term in expanded growth regressions[32], which is a frequent assumption in the literature. With this assumption of an *exogenous* ethnic diversity, they use the SUR approach in analysis and do not find a significant relationship between diversity and

[32] These studies have both used expanded versions of Barro (1991) growth equations, in Campos and Kuzeyev (2007), as well as, in Campos et al. (2011), expanded versions of augmented Solow model similar to approach by Mankiew et al. (1992).

economic growth. Afterwards, they assume an endogeneity problem and try to solve it by instrumenting the variable for ethnic diversity with the first lag of ethnic diversity and latitude (in a more recent paper by Campos et al., 2011). After applying mentioned IV approach, they found a negative and significant impact of ethnic diversity on economic growth. Campos et al. (2011) use Blundell and Bond's (1998) system GMM approach on a dynamic panel but only as a robustness check for their results. Their results obtained by system GMM support findings obtained via implementing IV. The same instruments were used in the dynamic panel estimated via system GMM estimators.[33]

Why does the significance of the impact of ethnic diversity change when Campos et al. (2011) instrument the measure for ethnic heterogeneity? In their study, Campos et al. (2011) do not explain these results except for recognising that the diversity measures are endogenous in the growth model. At the same time, scholars that treated diversity as time-invariant frequently find a negative and significant impact of diversity on economic growth. This paper arrives at similar results, which will be shown later. This composition of results can be explained if it is accepted that some of the determinants of economic growth may be the outcome of ethnic diversity. For instance, Gören (2014) finds that ethnic fractionalization substantially impacts the size of government. If the size of government is an "outcome" variable of the ethnic fractionalization, then specifications from earlier works may be suffering from a "bad control" problem (Angrist & Pischke, 2008). When one explanatory variable is an outcome variable of another, the estimation results may be biased and standard errors inflated. The "bad control" explanation can explain why studies that treat ethnic diversity as stagnant did not run-up to this problem, while Campos et al. (2011) did and were able to resolve it via IV. Namely, if the ethnic diversity is kept constant in an analysis that observes longer periods, other growth determinants will not be a direct consequence of the state of the ethnicity. For example, a civil war may result from a state of ethnic heterogeneity at a given point in time. The subsequent civil war can be a consequence of an ethnic structure in society at a different point in time. However, this will not be captured if ethnic fractionalization is kept constant, but it will be observable if the measures for diversity are changing over time. Instrumenting diversity measures with their lagged values may remove an immediate impact of ethnic diversity on other predictors of economic growth. These notions will be crucial for the later interpretation of the results obtained in this paper.

The relatively short period of observation in the studies by Campos and Kuzeyev (2007) and Campos et al. (2011) and contextual similarities between the countries included in the analysis prevent the extension of conclusions to other regions and

[33] For detailed description of variables used in a differenced and level equations see Campos et al. (2011)

time periods; external validity of the conclusions from these studies can be questioned as authors of these papers rightfully recognize. For that matter, this paper seeks to expand the short timespan from these studies as well as to increase the limited number of observed countries and, therefore, improve the robustness of conclusions laid out in these papers. On top of that, the IV approach, which authors use as their main methodological tool, can be contested. Namely, one can argue that the latitude is not a proper instrument since it may be correlated with the economic performance through other determinants of economic growth, not only through ethnic diversity. For example, latitude is correlated with the climate of the country. In order to compare the results, this paper will conduct an analysis using IV as in Campos et al. (2011). However, because the depicted IV approach can be contested, this paper primarily relies on other estimation procedures, specifically the maximum likelihood estimation of the dynamic panels.

The next part of the paper will describe the main data source for the time-varying ethnic diversity measure and present some general properties of the dynamics of the ethnic fractionalization index for the chosen sample of countries.

Dynamics of ethnic fractionalization

The first task of this part of the paper is to analyze the time dynamics of ethnic fractionalization. In the short run – one year – the assumption of static ethnic diversity should hold under the "usual" circumstances. Only shocks, such as sudden mass migrations or ethnic cleansings, could significantly change the ethnic composition of society in a short time frame. However, ethnic diversity may change in the long run due to natural migrations and differences in fertility rates between ethnic groups. Alesina et al. (2003) contend that in 30 years, changes in ethnic structures are not substantial. However, Campos and Kuzeyev (2007) and Campos et al. (2011) suggest that in some instances, even changes in ethnic constellations within five years may be sufficient to affect our conclusions concerning the impact of the diversity on economic growth. Therefore, the relevance of the dynamics of ethnic diversity is still on the table, and further analysis will benefit the resolution of the issue of justification of the assumption of the time-invariant ethnic fractionalization.

A new database, the *Historical Index of Ethnic Fractionalization* (HIEF), can allow weakening of the assumption of temporally fixed ethnic diversity. The HIEF database, compiled by Dražanová (2020), contains annual ethnic fractionalization indices[34] (EFI) from 1945 to 2013 for 162 countries, covering all continents. This

[34] At the moment of writing of this paper, other measures of ethnic diversity are not readily available in the dataset. The author has mentioned inclusion of polarization indices in the future iterations of the database (Dražanová, 2020).

database records ethnic fractionalization under the country's name and borders at the moment of observation. For example, before 1991, the ethnic fractionalization index for Slovenia was not recorded but was rather included under the observations for Yugoslavia.

The HIEF database relies on various sources to compile the longitudinal information about ethnic diversity measured via the ethnic fractionalization index. These include the CIA World Factbook, World Almanac Book of Facts, and Britannica Book of the Year (Dražanová, 2020). Authors of the HIEF database have made a significant effort to meticulously collect the data and conduct consistency checks that would make the dataset reliable and ready for further analysis.[35] Regardless, some caveats must be considered when this dataset is used. We will return to the limitations of this dataset later in the paper.

The ethnic fractionalization index in the HIEF database ranges from 0 - no diversity - to 1 – everyone in the country has different ethnicity. This index should be interpreted as the probability that two randomly drawn individuals from a country will be of different ethnic backgrounds. The index is calculated via the following specification:

$$EFI = 1 - \sum_{i=1}^{k} {s_i}^2$$

where s_i is relative participation of an ethnic group i in a country, and k is the number of ethnic groups in the country.

The analysis of the ethnic fractionalization index dynamics in this paper starts from the year 1960 for several reasons. First, it is necessary to allow some time to pass after the Second World War. This is because, on the one hand, records immediately after WWII are arguably of questionable quality. On the other hand, we want to avoid obtaining results driven by initial migrations due to the consequences of the war. Second, most of the measurements for the socio-economic factors of interest presented later in the paper are available only from the year 1960. Third, the HIEF database provides more than 20 additional country observations for continuous analysis of the dynamics of the EFI if the observation period starts from 1960 instead of 1945.

The paper assesses the evolution of ethnic diversity until the year 1999. This timeframe, from 1960-1999, corresponds with the period covered in an analysis of the association between ethnic heterogeneity and economic growth that will be conducted later. Within this time frame, the number of potential observations is the highest since some crucial data points regarding socio-economic factors necessary

[35] For detailed depiction of data collection, procedure, and sources used to construct ethnic fractionalization index in HIEF see Dražanová (2020).

for the analysis are readily available until 1999 (such as a measure for market instability and black-market premium, which are frequently used in literature).[36] Moreover, the paper is concerned with this relationship in the second half of the XX century.

Figure 1.1 describes the evolution of the average values of the EFI from 1960 to 1999 on a global scale (solid line) and a macro-regional level (dashed and dotted lines).[37] The global average of the EFI slowly rose during the observational period, and it moved from 0.395 in 1960 to 0.434 in 1999, a change in magnitude of the EFI around 0.04. The slow rise in the measure of ethnic heterogeneity from 1960 to 1999 is also notable in Africa, the Americas, and Asia. In Africa, EFI has risen from 0.61 to 0.63. The change in average EFI for Americas in the observed period was similar to that of Africa, and it was around 0.02 but on the lower starting levels of the EFI. A somewhat sharper increase in average diversity happened in Asia. In 1960 the average EFI of Asian countries was 0.36, and in 1999 it was 0.40 – an absolute change of 0.04. More drastic increases in ethnic fractionalization happened in Europe and Oceania. In Europe, the EFI rose from 0.138 to 0.204 (absolute change of around 0.07). In Oceania, the EFI increased from 0.103 in 1960 to 0.266 in 1999 (absolute change of 0.163).

On a global scale, the chance of randomly choosing two individuals of a different ethnic background rose by 4%. If the choice of individuals was limited to Australia and New Zealand, the probability of randomly drawing two individuals with different ethnicities rose by more than 16% from 1960 to 1999. Overall, the world has become more diverse. The EFI averaged over countries comprising macro-regions has increased in every region observed to a smaller or greater extent.

Analysis on a country level portrays a slightly different picture. Namely, it is not the case that EFI has increased in every country from the sample. When individual

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[36] It may be possible to approximate the market instability via other measures and expand the observational period at most to 2013, as that is the last year covered in HIEF database. Utilization of different measures to capture the market instability would reduce the potential of comparability of the results with previous studies. Therefore, we were faced with a trade-off where higher number of observations used in an analysis will result in the loss of comparability of results with previous works in the field. Since, as it will be shown later, country-decade is the unit of observation, the gain from including one more decade is less beneficial than preserving the potential comparability with the previous studies concerned with connection between ethnic diversity and economic growth.

[37] Data used for the creation of the Figure 9.1 was restricted to countries for which the data was continuously available from 1960 to 1999. Since observations for ethnic diversity in some countries enter the dataset later, it would appear as the EFI was growing more if these observations were taken into account in the calculation of average global and a macro-regional EFI. For example, if Fiji was included, the line for Oceania would suddenly "jump" in 1970, giving the false impression of higher change in diversity. Excluded observations do not change the conclusion that the ethnic heterogeneity was rising during the observed period. These observations will not be excluded in the analysis of the association between ethnic diversity and economic growth.

countries are examined, stability, growth, and decline of the EFI can be seen over time. Figures 1.2 and 1.3 illustrate increasing and decreasing trends of ethnic fractionalization indices in selected countries.

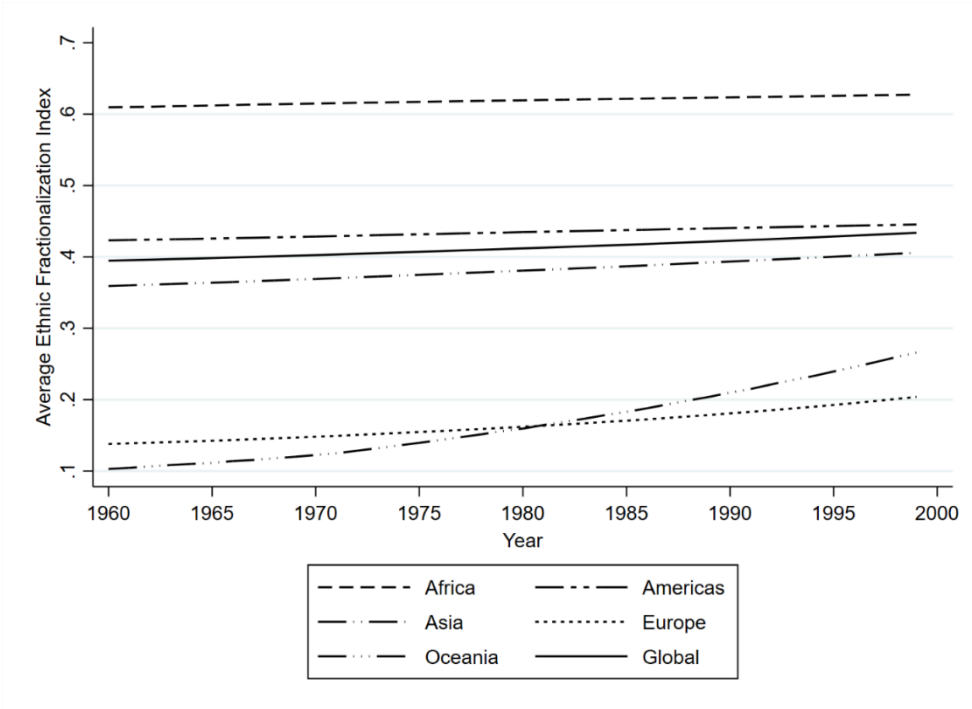

Figure 1. 1: Average annual global and macro-regional levels of the EFI. *Source*: HIEF database

Ethnic diversity in Haiti, South Africa, Japan, and Ghana is almost entirely time-invariant during the observation period. This is not the case with the evolution of the EFI in the Netherlands, New Zealand, Turkey, and the United States (Figure 1.2). In these countries, ethnic diversity was growing continuously from 1960 to 1999. The probability that two individuals had different ethnicities in 1960 in New Zealand was around 16%; in 1999, this probability was close to 40%. A perhaps more dramatic example is the case of the Netherlands, where, in 1960, the probability of two randomly chosen individuals belonging to different ethnicity was around 1%, while in the same country in 1999, that probability was 13%.

Not all countries with the time-varying EFI experienced an increase in ethnic diversity. For example (Figure 1.3), in Ecuador, Sri Lanka, Tanzania, and Jamaica, ethnic diversity had a decreasing trend. In 1960 in Sri Lanka, the EFI was 0.451, while in 1999 amounted to 0.353. The EFI in Jamaica in 1962 was close to the global mean, while in 1999, it was around one half of the global mean.

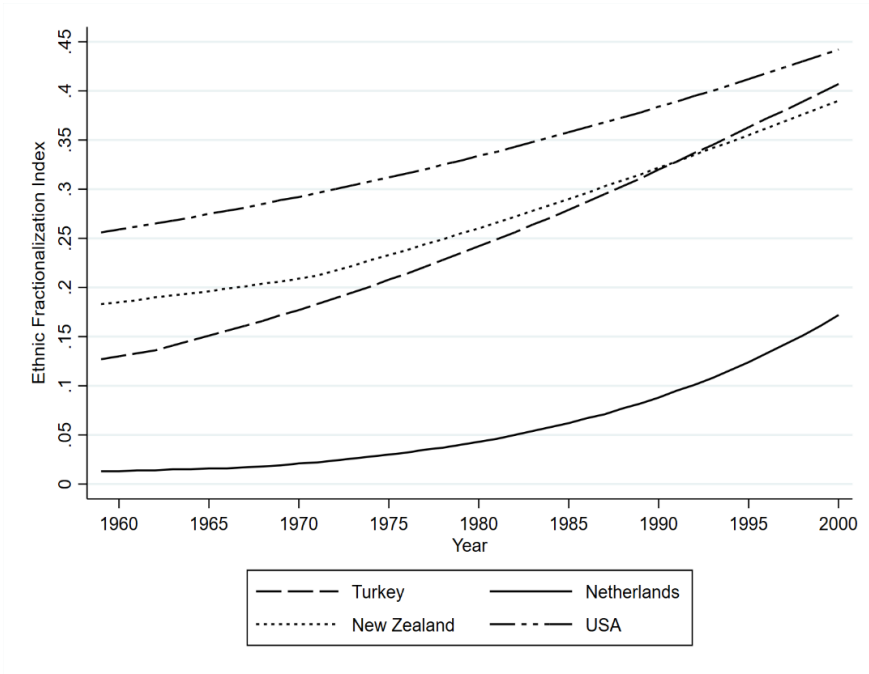

Figure 1. 2: The EFI rising over time – selected countries. *Source*: HIEF database

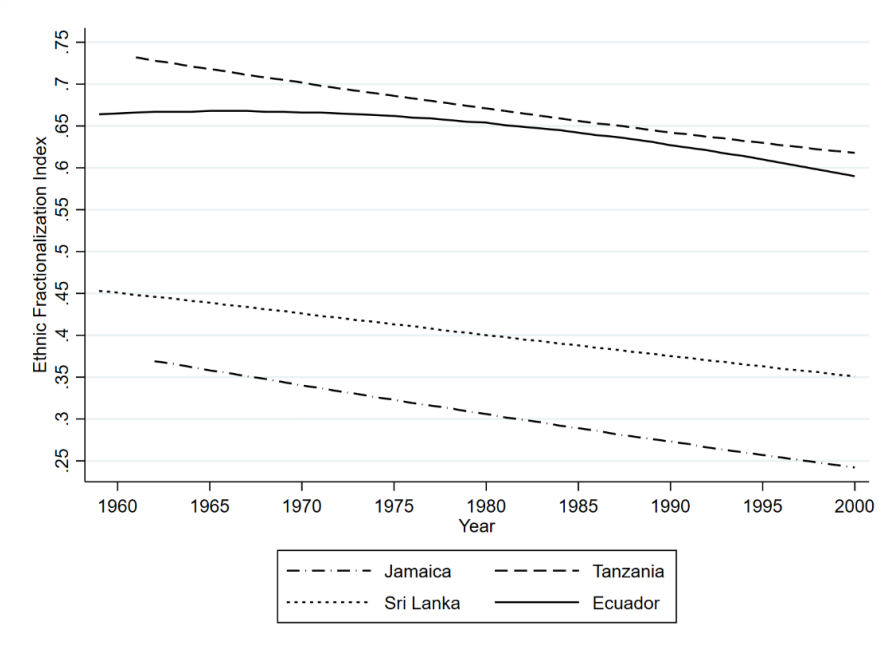

Figure 1. 3: The EFI decreasing over time – selected countries. *Source*: HIEF database

The numerical value of the ethnic fractionalization index usually changes slowly. This can be observed from the country and macroregional examples presented above. The most considerable absolute change in the fractionalization index between 1960 and 1999 happened in Turkey where the average annual change in the EFI was around 0.012. From 1960 to 1999, the average global EFI increased by 0.04 (based on HIEF data). This does not seem like a significant change for the variable on a domain from 0 to 1.

The EFI depends on the relative participation of ethnic groups in a society; it changes when the relative sizes of ethnic groups change. If the share of each ethnic group stays the same and no new ethnic group has entered a society, the increase in the population does not affect the EFI. Still, the larger the society is, the harder it is for the fractionalization index to change. The total number of people is the denominator in the calibration of the relative participation of ethnic groups in a society.

Although the ethnic fractionalization index usually changes slowly in numerical terms, even a minor change in the index can be significant for society. For example, from 1966 to 2013, the change in the EFI in the United States of America was only 0.03. At the same time, the political power structure, along ethnic lines, in the US has completely changed (Vogt et al., 2015).[38] Such a change in political power structure probably impacted the public policies and, ultimately, the economic performance.

What can be considered as a "meaningful" change in ethnic diversity over time depends on the initial levels of diversity, the source of change, the political power of ethnic groups, the political regime, the historical relationship between ethnic groups, and many other factors contingent on the spatial and temporal context. Following the power classification of Vogt et al. (2015), the change in EFI by 0.01 in the United States (continuing with the same example) during the 1960s would probably not have a major effect on the economic policies since the ethnic group designated as "Whites" had a monopoly on political power or were undisputedly dominant. After the 1960s, the same change in favour of minorities may have caused the shift in public choice and, therefore, impacted the USA's economic growth. Another informative example is the case of China, which experienced a change in EFI from 1960 to 1999 by almost 0.07. Regardless of this change, and even though China is the country with the most people in the world – meaning that a larger number of individuals were necessary for changes in the relative shares of ethnic

[38] This is by no means an assertion that political changes were just a consequence of the changes in relative participation of ethnic groups in the United States. The example is intended to present a suggestion that the changes in ethnic structure might have played a role in political climate of the US, not necessarily that they have played a significant role. The investigation of the extent to which the changes in ethnic diversity in the US have impacted political structures of power is beyond the scope of this paper.

groups – there was no change in political power structure along ethnic lines (based on Vogt et al., 2015).

Whether the change in the EFI will be significant for economic activity is highly contextual, as presented. However, it is safe to assume that, on average, *ceteris paribus*, more prominent changes in the EFI are more likely to impact economic performance than minor changes. Another practical observation is that the annual changes in ethnic diversity are relatively small. The changes are usually more significant when the time between two measurements of EFI is larger. This becomes obvious when we observe the average changes in diversity over periods of different lengths. Average variations of diversity, measured by the EFI, for the period of one, five, and ten years are presented in Table 1.1.

Yearly analysis of the relationship between ethnic fractionalization and economic growth would probably not yield meaningful results, not only because the yearly changes of the EFI are small (see Table 1.1) but also because yearly growth rates could be affected by short-term shocks. The latter is one of the reasons why almost all of the studies in the field use five-year or decade average economic growth rates when analyzing the relationship between ethnic diversity and economic performance. For the analysis in this paper, the principal observation will be a country-decade because, over the five years, the average probability that two randomly selected individuals are from different ethnic groups does not even change by 1%. Decade average changes in the EFI are larger than five-year period variations and are, by assumption, more likely to reveal the effect of the diversity dynamics on economic growth. On top of that, in their conclusion, Campos et al. (2011) assert that a decade should be a long enough period to capture sufficient changes in ethnic diversity.

Before commencing the analysis of the economic consequences of the dynamic ethnic diversity, it is necessary to reflect on the potential drawbacks of using the HIEF database as the only source for the time-variation of ethnic diversity. One of the disadvantages of the HIEF database is that it only provides the EFI as a measure of ethnic diversity. Since it does not provide the relative participation of ethnic groups that comprise countries in the dataset, it is not possible to calibrate other measures of ethnic diversity. A complete analysis of the evolution of ethnic diversity would necessitate the assessment of other measures, for example, the polarity index, besides the ethnic fractionalization index. However, considering the prevalence of the usage of the EFI in literature, its consistency, ease of interpretation, and sometimes high correlation with other measures for ethnic diversity, examination of the EFI will provide important insights into the evolution of ethnic diversity and later its relationship with economic growth.

Table 1.1: Average changes in diversity by period length

Length of a period	Average global absolute change in the EFI
1 year	0.002
5 years	0.009
10 years	0.014

Source: HIEF database

Another problem stems from the fact that the precise distribution of ethnic groups in a country can only be obtained from census data. Surveys and other data sources can be credible but are never as precise as censuses. There is a high likelihood that the sources from which the HIEF database is compiled have used some forms of intra/extrapolation methods to obtain yearly approximations of the relative sizes of ethnic groups that may distort the accurate picture of the relative participation of ethnic groups in a country. This problem is lessened to a certain extent since the following analysis in this paper will use the EFI estimations at the beginning of each ten-year period.

Lastly, the issues of every cross-country dataset with information about ethnic structures of countries are also present in HIEF. These include different definitions of ethnic groups in different countries, historical changes in the definitions of ethnic groups, country differences in gathering the information about ethnicity, whether minorities and discriminated groups are "objectively" covered when the ethnic structure of society is being determined, and many other problems that may reduce the potential of cross-country comparisons. An *ad hoc* solution to these problems is to assume that most countries at least record the shares of the most important ethnic groups. As the collection of data regarding the evolution of ethnic diversity continues, higher-quality datasets will demonstrate to what extent this auxiliary assumption, omnipresent in literature concerned with the association between ethnic heterogeneity and growth, was violated.

Methodology and data

The analysis of the impact of dynamic ethnic diversity on economic performance starts with an evaluation of an expanded Barro-type (1991) growth equation:

$$Growth\ rate_{id} = \beta_0 + \beta_1 \log(GDP0_{id}) + \sum \theta_j GR_{jid} + \sum \gamma_k TC_{kid} + \beta_2 EFI0_{id} + u_{id} \quad (1.1)$$

where $Growth\ rate_{id}$ is an average growth rate of PPP converted GDP per capita (chain series) at 2005 constant prices in a country i over the decade d;[39] $\log(GDP0_{id})$ is PPP converted GDP per capita (chain series) at the beginning of the decade d; the set GR includes j determinants of economic growth; the set TC includes k variables – transmission channels – related simultaneously to both growth rates and ethnic diversity; $EFI0_{id}$ is the level of ethnic fractionalization index in country i at the beginning of the decade d; and u_{id} is an error term.

Montalvo and Reynal-Querol (2005a) identify values of the real government consumption as a share of GDP, domestic investments as a share of GDP, the number of revolutions and coups per year, the number of assassinations, primary and secondary school enrolment, and the absolute deviation of the PPP value of the investment deflator from the sample mean (PPDEV) as elements of the set *GR*. In addition, the *GR* set includes macroregional dummy variables for countries located in Sub-Saharan Africa, Latin America and Caribbeans, and East Asia.

The primary and the secondary school enrolment rates are intended to capture human capital formation, while the number of revolutions and coups and the number of assassinations approximate political instability. Instead of these values, this paper follows Gören's (2014) revised approach, where the human capital formation is approximated by the logarithm of the average years of schooling (measured at the beginning of the decade *d*) and political instability is assessed only through the number of revolutions and coups.[40] In this paper values of real government consumption as a share of GDP, domestic investments as a share of GDP, and PPDEV are measured as decade averages for country *i* in a decade *d*.

Montalvo and Reynal-Querol (2005a) recognize government spending and investments as potential transmission channels through which ethnic diversity impacts economic growth. Government policies are affected by ethnic diversity (La Porta et al., 1999), and, therefore, government consumption may act as a transmission channel. Levels of investments can be altered by misallocation of resources due to rent-seeking behaviour of the ethnic group in power, which may impede economic performance. Gören (2014) asserts that the human capital formation may also act as a transmission channel through the provision of education by the government (Ogbu & Simons, 1998), and human capital is an important determinant of economic performance (Easterly & Levine, 1997). Political order and stability are also essential for economic growth, and order and stability may be

[39] For Tunisia and Jamaica, the value of GDP at the beginning of the decade is not from the first year of the decade. For example, for the initial value of GDP for the 1960s in Jamaica was taken Jamaican GDP from 1962. The initial value for Tunisian GDP in 1960s was taken from the year 1961. This had to be done if Jamaica and Tunisia were to stay in the sample, since the first observations for Tunisia and Jamaica start in 1961 and 1962, respectfully.

[40] The main conclusions of this paper do not change if the human capital accumulation is measured via primary and high school enrolment. Results available upon reader's request.

fragile in areas where ethnic tensions are present (Collier, 2001; La Porta et al., 1999). Therefore, political order and stability can also act as transmission channels of the impact of ethnic fractionalization on growth (Gören, 2014).

Variables representing mentioned transmission channels are already contained in the *GR* set. However, other potential channels, through which ethnic diversity may impact growth, have to be included in the specification (1.1) because their omission may create an endogeneity problem. For that matter, the *TC* set contains a dummy variable that takes the value of one if a country experienced a civil war during the observed decade, a variable that captures market distortions calibrated as a logarithm of (1+black market premium), a variable measuring country's average openness during a decade, and a variable measuring net fertility rate at the beginning of a decade.

In ethnically diverse countries, there is a higher likelihood of a civil war which can affect economic activity (Montalvo & Reynal-Querol, 2005a). Market distortions can also impact economic activity, and, at the same time, distortions are correlated with ethnic fractionalization (Gören, 2014). Similarly, openness can be simultaneously related to economic performance and ethnic diversity because of international connections via ethnic lines (Alesina & Spolaore, 1997; Gören, 2014). Finally, there are differences in female labour participation along ethnic and cultural lines (Fernandez & Fogli, 2009) and fertility rates are found to be related to economic growth (Barro, 2003).

Following further the methodological approaches by Montalvo and Reynal-Querol (2005a) and Gören (2014), the specification (1.1) will be estimated by the seemingly unrelated regressions method (Zellner, 1962).[41] The estimation procedure will consist of four specification (1.1) equations, each equation for one decade as in Alesina and La Ferrara (2005), Alesina et al. (2003), Easterly and Levine (1997), and many other studies using SUR for the analysis of economic consequences of ethnic diversity. Montalvo and Reynal-Querol (2005a) rightfully pointed out that three-stages least squares estimation would probably generate more consistent estimates. However, the SUR estimation method is more robust to potential mistakes in equation specifications, and adding variables to standard growth equations increases the risk of misspecification. As SUR allows equation errors to be correlated, the problem of consistency of estimates is reduced to a certain extent. At the same time, the risk of model misspecification is minimized.

Campos and Kuzeyev (2007) and Campos et al. (2011) suggest that ethnic diversity should be treated as endogenous in its relationship with economic growth.

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[41] Nearly identical methodological approaches to the one depicted could be found in almost all studies concerned with an impact of ethnic diversity on economic growth, starting from Easterly & Levine (1997). The differences are mostly in how certain political and economic factors are measured and/or approximated. The approaches by Montalvo and Reynal-Querol (2005a) and Gören (2014) are used as a starting point because, together, these approaches are the most comprehensive.

The paper employs the instrumental variables methodology to capture the potential endogenous impact of ethnic fractionalization on economic growth. As in Campos et al. (2011), the ethnic fractionalization index is instrumented with its first lag and the country's latitude.[42]

Until now, the paper is mainly relying on the methodological approaches developed by previous authors. The results could be compared with previous findings when these approaches are employed. Another benefit of replicating results from previous studies is to gain further insight into the variability of EFI. As mentioned in the previous part of the paper, whether the change in EFI is significant depends on the context. Therefore, it is impossible to claim that a given change in EFI within a decade is "meaningful" without a contextual background. However, if the results from the previous studies are replicated, it is safer to conclude that there is a sufficient change in EFI that yields significant results. If our measurement for diversity is not changing enough through time, it would be less likely, for example, to gain different results when the variable for EFI is instrumented compared to the situation when it is in its original form since one of the instruments is lagged EFI. Notice that this only partially resolves the question of the potential lack of variability of the measure of diversity, but it gives some confidence in further results. If the insufficient changes in EFI caused a significant problem, this would be observable when dynamic panel models are estimated.

Because of the already discussed potential problems of weak instruments and potential endogeneity problems of SUR, the paper adopts a more rigorous methodology. Namely, the maximum likelihood estimators (ML) are applied to a dynamic panel model. We start with the following specification, similar to the specification (1.1):

$$\log(GDP_{id}) = \gamma \log(GDP_{id-1}) + \beta EFI0_{id} + \sum \theta_j GR_{jid} + \sum \gamma_k TC_{kid} + a_i + v_{it} \qquad (1.2)$$

where $\log(GDP_{id})$ is the logarithm of average PPP converted GDP per capita (chain series) at 2005 constant prices in a country *i* over the decade *d*; the set GR includes *j* determinants of economic growth; the set *TC* includes *k* variables – transmission channels – related simultaneously to both growth rates and ethnic diversity; $EFI0_{id}$ is the level of ethnic fractionalization index in country *i* at the beginning of the decade *d*; a_i is the term capturing the country fixed-effects and v_{it} is an error term.

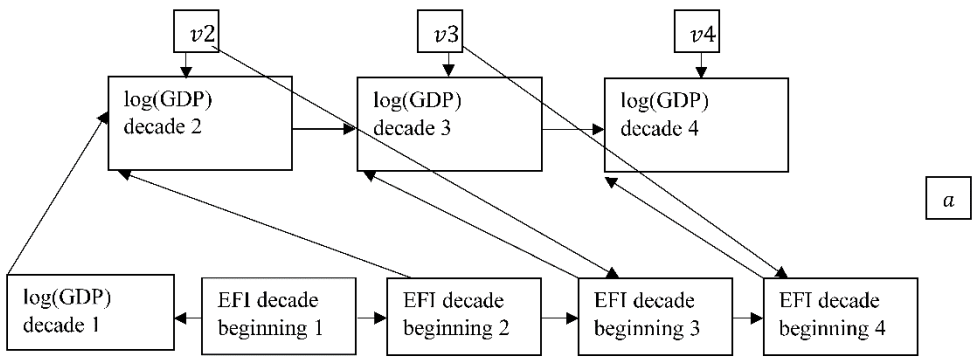
[42] It should be noted that Campos et al. (2011) base their conclusions on the estimation of the augmented Solow growth equations. This paper does not explicitly follow the methodology by Campos et al. (2011) since their estimation procedure does not include potential transmission channels. Although their approach is more theoretically substantiated, the approach used in this paper has a less chance of distorted results due to the omitted variable bias.

When $\log(GDP_{id-1})$ is subtracted from both sides of the equation, the specification (2) becomes:

$$Growth\ rate_{id} = (\gamma - 1)\log(GDP_{id-1}) + \beta EFI0_{id} + \sum \theta_j GR_{jid} + \sum \gamma_k TC_{kid} + a_i + v_{it} \quad (1.3)$$

where $Growth\ rate_{id}$ is a growth rate of PPP converted GDP per capita (chain series) at 2005 constant prices in a country *i* over the decade *d*.

Specification (1.2) – equivalent to specification (1.3) – is estimated via the application of ML on structural equation modelling. Structural equation modelling (SEM) allows the creation of the paths between variables as well as error terms. Since the specification (1.2) is estimated over four periods with nine variables on the right-hand side, the presentation of all the paths created by structural equation modelling would be confusing. Instead, Scheme 1.1 provides a simplified illustration of how structural equation modelling is working or what the model on which we apply ML estimators looks like.[43] The simplified version only includes a logarithm of GDP, EFI, v_{it}, and a_i.



Scheme 1.1: Simplified version of the structural equation model of the specification (2)

Scheme 1.1 illustrates the SEM where EFI is treated as predetermined, meaning that the past error terms can impact the current EFI. The error *v2* can impact EFI at the beginning of decade 3, and the error *v3* can impact EFI at the beginning of decade 4. EFI would be treated as an exogenous variable if these correlations with the previous error terms were not specified. Fixed effects term *a* should be connected to all variables (except error terms). Note that the term *a* affects each log(GDP) with the coefficient of 1, accounting for the fixed effects. This is not presented in the

[43] Scheme 6.1 is inspired by illustrations in Allison (2017)

scheme to preserve the transparency of other paths. All of the EFI variables in different decades are allowed to be correlated with each other and with log(GDP) in decade 1.

Having in mind Scheme 1.1, it is not difficult to imagine why the depiction of the complete model would be cumbersome, especially when it is recognized that all of the other variables included in the specification (1.2) are also treated as predetermined. Fortunately, the construction of SEM models and applying maximum likelihood estimators is made easier with Stata command xtdpdml (Williams et al., 2016).

ML estimation of dynamic panels via SEM resolves the issues of the lagged dependent variable. In addition, it can capture the unobservable fixed effects. Arellano and Bond's (1991) GMM approach as well as Blundell and Bond's (1998) system GMM approach, can also deal with the issues of fixed effects and the lagged dependent variable. However, ML estimation is superior for smaller samples in terms of efficiency. In addition, ML estimation does not require a mean stationarity assumption that postulates that dynamic processes from the distant past have generated variables observed in a given data set (Moral-Benito et al., 2019). As mentioned, this assumption is probably violated when it comes to the analysis of economic performance.

The sample used in this paper is restricted to 76 countries due to data availability, and it consists of 22 countries from Africa, 22 countries from the Americas, 15 countries from Asia, 15 countries from Europe, and 2 countries from Oceania. The complete list of countries used in the analysis is provided in Appendix 1.

Values of GDP, investments, openness, government consumption, population, and PPDEV for these countries were taken from Penn World Tables 7.1 (PWT: Heston et al., 2012).[44] Data about civil wars was collected from The Peace Research Institute Oslo (PRIO: Gleditsch et al., 2002), and fertility values are obtained from World Bank: World Development Indicators (WDI).[45] The number of coups and revolutions per year for the countries in the sample are collected from Banks (2021). All definitions of variables and data sources are provided in Appendix 2.

Summary statistics for the main variables of interest are presented in Table 1.2. The correlation matrix between these variables is depicted in Table 1.3. The majority of the correlation coefficients between variables have an expected sign. When the sign of the correlation coefficient is the opposite of the expected (for

[44] The paper uses data from Penn World Tables 7.1 (PWT) instead of newer versions, because that is the last PWT dataset in which datapoints for some countries (such as Afghanistan) are available. In addition, in PWT 7.1 variables of interest have the same definition as used in the previous works on the topic which allows the comparability of the results. For instance, investment share of GDP is not available at constant, but rather in current PPPs in newer versions of PWT.

[45] Fertility and mortality indices were linearly extrapolated/interpolated. The number of missing values was low, but those values were necessary in order to not lose an entire country-decade observations.

example, negative correlation between openness and economic growth), the magnitude of the coefficient is small, below 0.1.

Table 1.2: Summary statistics for the main variables of interest

Variable	Number of observations	Mean	Standard Deviation	Minimum	Maximum
EFI	304	0.417	0.285	0.000	0.889
Average decade growth (in %)	304	2.102	2.575	-10.222	9.705
Log(GDP at the beginning of the decade)	304	8.183	1.203	5.731	10.445
Decade average share of investments in GDP	304	22.503	8.758	3.786	56.907
Civil war (dummy variable)	304	0.303	0.460	0	1
Human capital (average years of schooling-decade beginning log values)	304	1.496	0.610	0.076	2.590
Government	304	9.791	5.650	2.037	36.506
Instability (coups and revolutions in a decade)	304	0.664	1.560	0	10
Distortions (average decade black market premium)	304	63.228	400.810	-1.408	6406.612
Openess (average imports and exports, % GDP)	304	50.031	31.963	3.816	183.894
Net fertility (beginning of the decade)	304	4.102	1.503	1.317	7.217

Table 1.3: Correlation matrix for the main variables of interest

	EFI	Growth	Initial GDP	Invest-ments	Civil war	Human Capital	Govern-ment	Insta-bility	Distor-tions	Open-ness	Fert-ility
EFI	1										
Growth	-0.271	1									
Initial GDP	-0.498	0.081	1								
Investments	-0.197	0.320	0.188	1							
Civil war	0.266	-0.143	-0.136	-0.107	1						
Human Capital	-0.414	0.108	0.814	0.168	-0.100	1					
Government	0.042	-0.144	-0.319	-0.159	-0.054	-0.225	1				
Instability	0.076	-0.067	-0.244	-0.108	0.165	-0.301	0.058	1			
Distortions	0.070	-0.095	-0.065	0.023	0.158	-0.054	0.280	0.012	1		
Oppeness	0.044	-0.006	-0.017	0.213	-0.025	-0.029	0.138	0.003	-0.039	1	
Fertility	0.458	-0.236	-0.746	-0.183	0.175	-0.752	0.301	0.241	0.096	0.185	1

Results

SUR estimation results of the different variations of specification (1.1) are provided in Table 1.4. Results of the estimation of the specification (1.1) with all variables from the *GR* set and instability (civil wars) variable from the *TC* set are given in column 1, Table 1.4. In this version of the specification (1.1), which is the version used in Montalvo and Reynal-Querol (2005a), the coefficient for ethnic diversity measure is negative and only significant at a 10% level. Other variables have expected signs or are insignificant.

The second column in Table 1.4 provides estimation results for the specification (1.1) with all the GR and TC set variables. This specification also takes into account the potential concavity of the convergence and, besides the variable for initial GDP, it includes the values of the squared initial GDP. Results from column 2, Table 1.4, imply no significant impact of EFI on economic growth. As was the case with the specification which estimation results are presented in column 1 of the same table, other variables have expected signs or are insignificant.

Gören (2014) suggests that there is no need to include the PPDEV variable in the *GR* set. In the third column, Table 1.4, results without PPDEV of specification (1) with all other variables from *TC* and *GR* sets are presented. The main conclusions do not change regarding the estimation results depicted in column 2. Finally, column 4, Table 1.4, provides estimation results for the version of the specification (1.1), which includes all variables from *TC* and *GR* sets and one additional control variable: average decade population growth. This variable has been included since it appears in the works of Campos and Kuzeyev (2007) and Campos et al. (2011). Results presented in column 4 do not substantially differ from estimation results without the additional control. The ethnic fractionalization coefficient stays statistically insignificant, and other variables have an expected or insignificant impact on economic growth.

Estimation results of different variations of the specification (1.1) using SUR methodology imply no significant relationship between dynamic ethnic fractionalization and economic growth. This result differs from most studies treating EFI as time-invariant, which frequently find a negative and statistically significant relationship between ethnic heterogeneity and economic growth.

The identical versions of the specification (1.1), as presented in Table 1.4, were estimated with a time-invariant ethnic fractionalization index. Instead of decade beginning EFI, in each specification (and SUR decade equation), the EFI from 1960 was used. Estimation results of the variation of the specification (1.1) with the static measure for ethnic diversity are presented in Table 1.5.

When ethnic diversity is treated as time-invariant, the coefficient for the EFI is significant (at a 5% level) in almost all of the variations of specification (1.1). Results presented in Table 1.5 show that static EFI only loses significance when the control for the population growth is added. However, even in that case, the coefficient for ethnic fractionalization is still significant at the 10% level.

The difference in the statistical significance of the coefficient for the ethnic fractionalization when it is treated as time stagnant compared to when it is time-varying suggests that the time-variation of EFI is not negligible. It further indicates that the relationship between ethnic diversity and growth is more complex than what could be inferred solely from observing time-invariant measures for ethnic diversity.

Researchers who have observed the relationship between the dynamic ethnic diversity and economic performance (Campos & Kuzeyev, 2007; and Campos et al., 2011) suggest that the measure for ethnic heterogeneity should be treated as

endogenous. Campos et al. (2011) propose instrumenting the ethnic diversity measure with latitude and the first lag of ethnic diversity to inspect the potential endogenous nature of ethnic fractionalization in the relationship with economic activity.

Table 1.4: SUR estimation of the specification (1.1) with dynamic EFI

Dependent variable: Average decade growth rate				
	(1)	**(2)**	**(3)**	**(4)**
Log(GDP)	-0.715***	4.095*	4.027*	4.098*
	(0.192)	(2.290)	(2.244)	(2.285)
Log(GDP)2		-0.313**	-0.308**	-0.312**
		(0.137)	(0.134)	(0.137)
Human capital	1.124***	0.607	0.601	0.614
	(0.334)	(0.397)	(0.396)	(0.396)
Investments	0.042**	0.037**	0.036**	0.038**
	(0.019)	(0.016)	(0.016)	(0.016)
Civil War	-0.410	-0.303	-0.298	-0.307
	(0.252)	(0.278)	(0.277)	(0.277)
Market distortions		-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
Openness		0.006	0.006	0.005
		(0.004)	(0.004)	(0.004)
Government	-0.025	-0.005	-0.005	-0.004
	(0.027)	(0.033)	(0.033)	(0.033)
Instability	-0.028	-0.069	-0.069	-0.070
	(0.063)	(0.073)	(0.073)	(0.073)
PPDEV	0.001	-0.001		-0.001
	(0.003)	(0.003)		(0.003)
Fertility		-0.747***	-0.743***	-0.660***
		(0.183)	(0.181)	(0.214)
Average population growth				-13.030
				(24.009)
EFI	**-1.028***	**-0.848**	**-0.861**	**-0.769**
	(0.557)	**(0.533)**	**(0.531)**	**(0.587)**
Regional controls	Yes	Yes	Yes	Yes
Decade controls	Yes	Yes	Yes	Yes
Observations	76; 76; 76; 76	76; 76; 76; 76	76; 76; 76; 76	76; 76; 76; 76
R^2	0.143; 0.351; 0.438; 0.260	0.201; 0.372; 0.524; 0.301	0.196; 0.377; 0.524; 0.300	0.203; 0.375; 0.519; 0.302

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 1.5: SUR estimation of the specification (1.1) with time-invariant EFI

Dependent variable: Average decade growth rate				
	(1)	**(2)**	**(3)**	**(4)**
Log(GDP)	-0.735***	4.091*	4.039*	4.089*
	(0.191)	(2.259)	(2.215)	(2.255)
$Log(GDP)^2$		-0.314**	-0.310**	-0.313**
		(0.135)	(0.132)	(0.135)
Human capital	1.134***	0.616	0.612	0.622
	(0.332)	(0.395)	(0.394)	(0.394)
Investments	0.043**	0.037**	0.036**	0.038**
	(0.019)	(0.015)	(0.016)	(0.016)
Civil War	-0.388	-0.280	-0.275	-0.283
	(0.248)	(0.274)	(0.273)	(0.273)
Market distortions		-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
Openness		0.006	0.006	0.006
		(0.004)	(0.004)	(0.004)
Government	-0.028	-0.008	-0.008	-0.007
	(0.027)	(0.032)	(0.032)	(0.033)
Instability	-0.032	-0.073	-0.073	-0.074
	(0.063)	(0.073)	(0.073)	(0.073)
PPDEV	0.002	-0.001		-0.001
	(0.003)	(0.003)		(0.003)
Fertility		-0.745***	-0.742***	-0.666***
		(0.182)	(0.181)	(0.213)
Average population growth				-11.891
				(23.521)
EFI	**-1.201****	**-1.041****	**-1.055****	**-0.974***
	(0.537)	**(0.512)**	**(0.506)**	**(0.559)**
Regional controls	Yes	Yes	Yes	Yes
Decade controls	Yes	Yes	Yes	Yes
Observations	76; 76;76;76	76; 76;76;76	76; 76;76;76	76; 76;76;76
R^2	0.136; 0.355; 0.445; 0.265	0.193; 0.377; 0.530; 0.306	0.189; 0.380; 0.530; 0.305	0.195; 0.379; 0.526; 0.307

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 1.6 provides instrumental variables (IV) estimation results of the specification (1.1). Columns in Table 1.6 are organized as in Tables 1.4 and 1.5 and represent different variations of the specification (1.1) depending on which variables were included in *GR* and *TC* sets.[46]

The difference between Table 1.6 with previous tables depicting different estimation results of the specification (1.1) is in the last several columns where various diagnostics tests for IV are reported: Kleibergen-Paap rank LM statistic underintentification test, F-statistic, Hansen J statistic of overidentifying restrictions, and Pagan-Hall test for heteroscedasticity, For all variations of the specification (1.1), diagnostics tests imply that we cannot reject that errors are homoscedastic, that we cannot reject that overidentifying restrictions are valid and that we can reject that the equations are underindentified.

Results in Table 1.6 suggest that ethnic fractionalization, when treated as endogenous has a negative and statistically significant (at a 5% level) impact on economic growth. This implication holds regardless of changes in variables included in the estimation. The magnitude of the coefficient for the EFI is reasonably stable, around 1.5. To what extent is this coefficient economically significant will depend, as presented in the third part of this paper, on the contextual background of a particular country.

At this moment, it is not possible to deduce why is the coefficient for EFI significant when it is instrumented and insignificant when it is treated as an exogenous growth determinant. This is because of the mentioned problems with the choice of instruments. The paper now turns to the ML estimation of the dynamic panel model to get more robust results.

[46] Simple OLS estimation results also show that, when treated exogenously, ethnic diversity is not statistically significant in various presented versions of the specification (1). OLS estimation results are provided in the Appendix 3.

Table 1.6: IV estimation of the specification (1) – instruments lagged value of EFI and latitude of the country

Dependent variable: Average decade growth rate				
	(1)	**(2)**	**(3)**	**(4)**
Log(GDP)	1.067	2.799	2.932	2.805
	(2.664)	(2.963)	(3.003)	(2.974)
$Log(GDP)^2$	-0.100	-0.226	-0.235	-0.226
	(0.157)	(0.177)	(0.180)	(0.178)
Human capital	0.928**	0.409	0.431	0.416
	(0.405)	(0.422)	(0.432)	(0.423)
Investments	0.023	0.022	0.023	0.023
	(0.020)	(0.019)	(0.019)	(0.019)
Civil War	-0.495	-0.300	-0.315	-0.304
	(0.340)	(0.333)	(0.335)	(0.334)
Market distortions		0.000	0.000	-0.000
		(0.000)	(0.000)	(0.000)
Openness		0.006	0.006	0.006
		(0.005)	(0.005)	(0.005)
Government	-0.025	-0.014	-0.013	-0.014
	(0.031)	(0.038)	(0.038)	(0.039)
Instability	-0.142*	-0.154*	-0.137	-0.156*
	(0.080)	(0.087)	(0.087)	(0.086)
PPDEV	0.003	0.003		0.003
	(0.003)	(0.003)		(0.003)
Fertility		-0.681***	-0.680***	-0.629**
		(0.190)	(0.191)	(0.245)
Average population growth				-8.414
				(26.822)
EFI	**-1.725*** **	**-1.578** **	**-1.523** **	**-1.523** **
	(0.668)	**(0.664)**	**(0.663)**	**(0.687)**
Regional controls	Yes	Yes	Yes	Yes
Decade controls	Yes	Yes	Yes	Yes
Observations	228	228	228	228
R^2	0.429	0.465	0.464	0.465
Diagnostics				
Kleibergen-Paap rank LM statistic	83.317	84.364	83.951	91.728
p-values	0.000	0.000	0.000	0.000
F-statistic	13.35	14.39	14.01	13.58
p-values	0.000	0.000	0.000	0.000
Hansen J statistic	0.947	0.391	0.375	0.300
p-values	0.331	0.532	0.540	0.584
Pagan-Hall test statistic	17.125	20.866	20.996	21.096
p-values	0.311	0.286	0.227	0.3315

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Estimation results from the ML-SEM approach are provided in Table 1.7. The structural equation model is evaluated with maximum likelihood estimators for two scenarios: when EFI is treated as a predetermined variable and when it is treated as an exogenous variable. In the first case, it is allowed for EFI to be correlated with the past errors, as illustrated in Scheme 1.1. In the second case, it is assumed that EFI is uncorrelated with both past, future, and present error terms. In both scenarios same control variables were used: all variables from *TC* and *GR* set without PPDEV (as in Gören, 2014) and the measure for the market distortions. Exclusion of the measure for the market distortions was necessary to achieve convergence.[47] The exclusion of this variable should not represent a significant problem since its estimated effect in all previous specifications was zero. By definition, the ML-SEM approach takes into account country and decade fixed effects.

Table 1.7: ML estimation of SEM

Dependent variable: log(GDP)		
	EFI is predetermined	**EFI is exogenous**
Lagged dependent variable	1.082***	1.070***
	(0.120)	(0.160)
EFI	-0.320**	-0.205
	(0.160)	(0.221)
Control variables	Yes	Yes
Achieved convergence	Yes	Yes
Number of observations	228	228

Note: First dependent variable is from the second decade. All of the variables from GR and TC sets are included in the estimation except the log(1+black market premium). All control variables are considered as predetermined, and all variables are standardized with a mean 0 and a standard deviation of 1. Wald test of significance of all coefficients implies that the null hypothesis of all coefficients equal to zero cannot be accepted at the 1% level. The model controls for country and decade fixed effects. Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1).

Results from the ML-SEM estimation presented in Table 1.7 suggest that ethnic diversity has a statistically significant and negative impact on economic growth only when EFI is treated as predetermined; when it is allowed for it to be correlated with the past errors of the growth regression. When it is treated as exogenous, the results suggest no statistically significant impact of EFI on economic growth.

Conclusions

The paper has exploited the time dynamics of ethnic diversity and analyzed the relationship between economic growth and ethnic heterogeneity in a sample of 76 countries over forty years – from 1960 to 1999. It provides valuable empirical

[47] It is likely that convergence could not be achieved since all developed countries and some of the developing countries in all decades do not have black market premium – it is equal to 0.

insights for an in-depth understanding of the relationship between diversity and economic performance – an understanding necessary in a world with a growing number and size of multi-ethnic societies.

It has contributed to the existing literature in three distinct areas. First, the analysis was conducted without the assumption that the ethnic structure of society is fixed in time. Although this assumption may be valid for specific countries, the analysis has shown that in a non-negligible number of countries, ethnic fractionalization was not stagnant in the second half of the XX century. This observation may cast doubt on the validity of conclusions derived in the majority of the papers on the topic under the assumption that ethnic diversity is time-invariant.

Second, the paper expands on the number of observations and time periods compared to previous studies that have included time dynamics of ethnic diversity in assessing the effect of ethnic fractionalization on economic performance. The analysis conducted on a larger sample provides more robust conclusions with higher confidence in their external validity.

Third, the inclusion of the time-varying ethnic diversity in the analysis of the relationship between ethnic homogeneity and economic growth allowed for the usage of sophisticated methods capable of providing more reliable results.

The paper successfully replicated the results from the previous studies. However, it has also detected methodological pitfalls present in those studies and proposed an approach capable of avoiding these pitfalls. Results obtained by using maximum-likelihood estimators on a dynamic panel model imply that ethnic diversity harms economic growth, but only when it is allowed for ethnic diversity to be correlated with the past processes that shape economic performance. These results refine the existing conclusions which merely suggest that ethnic diversity should be treated as an exogenous variable.

Results from this paper lead towards the conclusion that ethnic diversity is either affecting economic performance through its impact on the known determinants of economic growth or approximating some factor of economic performance that is not yet recognized. We opt for the former explanation due to the quantity and quality of scientific endeavour dedicated to discovering the determinants of economic growth and in studies of channels through which ethnic diversity may impact economic performance. Suppose ethnic diversity, for example, generates costs through public policies. In that case, it is possible to explain why the benefits of the diversity are observable on a micro level while costs appear in a cross-country analysis.

Although the conclusions from this paper improve our understanding of the complex relationship between diversity and growth and provide some insights into why different studies came to dissimilar and even contrasting conclusions, it is still necessary to "unpack" ethnicity variable (using the terminology from Milanovic, 2003). In other words, this field of research would greatly benefit from further

studies dedicated to unveiling the exact path ethnic diversity takes before it impacts economic performance.

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Appendix 1.1: List of countries used in an analysis

Name of the country	Continent	Macroregion
Argentina	Americas	South America
Australia	Oceania	Australia and New Zealand
Austria	Europe	Western Europe
Burundi	Africa	Eastern Africa
Belgium	Europe	Western Europe
Benin	Africa	Western Africa
Bolivia	Americas	South America
Brazil	Americas	South America
Central African Republic	Africa	Middle Africa
Canada	Americas	Northern America
Switzerland	Europe	Western Europe
Chile	Americas	South America
China	Asia	Eastern Asia
Cote d'Ivoire	Africa	Western Africa
Democratic Republic of Congo	Africa	Middle Africa
Congo	Africa	Middle Africa
Colombia	Americas	South America
Costa Rica	Americas	Central America
Denmark	Europe	Northern Europe
Dominican Republic	Americas	Caribbean
Algeria	Africa	Northern Africa
Ecuador	Americas	South America
Egypt	Africa	Northern Africa
Spain	Europe	Southern Europe
Finland	Europe	Northern Europe
United Kingdom	Europe	Northern Europe
Ghana	Africa	Western Africa
Greece	Europe	Southern Europe
Guatemala	Americas	Central America
Honduras	Americas	Central America
Haiti	Americas	Caribbean
Indonesia	Asia	South-Eastern Asia
Ireland	Europe	Northern Europe
Iran	Asia	Southern Asia
Israel	Asia	Western Asia
Italy	Europe	Southern Europe
Jamaica	Americas	Caribbean
Jordan	Asia	Western Asia
Japan	Asia	Eastern Asia
Kenya	Africa	Eastern Africa
South Korea	Asia	Eastern Asia
Sri Lanka	Asia	Southern Asia
Morocco	Africa	Northern Africa

Table continued from the previous page

Name of the country	Continent	Macro region
Mexico	Americas	Central America
Mauritania	Africa	Western Africa
Malawi	Africa	Eastern Africa
Malaysia	Asia	South-Eastern Asia
Niger	Africa	Western Africa
Nicaragua	Americas	Central America
Netherlands	Europe	Western Europe
Norway	Europe	Northern Europe
Nepal	Asia	Southern Asia
New Zealand	Oceania	Australia and New Zealand
Pakistan	Asia	Southern Asia
Panama	Americas	Central America
Peru	Americas	South America
Philippines	Asia	South-Eastern Asia
Portugal	Europe	Southern Europe
Paraguay	Americas	South America
Romania	Europe	Eastern Europe
Rwanda	Africa	Eastern Africa
Senegal	Africa	Western Africa
El Salvador	Americas	Central America
Sweden	Europe	Northern Europe
Syria	Asia	Western Asia
Togo	Africa	Western Africa
Thailand	Asia	South-Eastern Asia
Tunisia	Africa	Northern Africa
Turkey	Asia	Western Asia
Tanzania	Africa	Eastern Africa
Uganda	Africa	Eastern Africa
Uruguay	Americas	South America
United States	Americas	Northern America
Venezuela	Americas	South America
South Africa	Africa	Southern Africa
Zambia	Africa	Eastern Africa

Appendix 1.2: Variables and data sources

Variable	Source and a brief description
Ethnic fractionalization index	*Historical Index of Ethnic Fractionalization* (HIEF) database compiled by Dražanová (2020). Measured at the beginning of ten-year period.
Growth	PWT 7.1; ten-year average growth rate of PPP Converted GDP Per Capita (Chain Series), at 2005 constant prices.
Log(GDP)	PWT 7.1; logarithm of PPP Converted GDP Per Capita (Chain Series), at 2005 constant prices at the beginning of ten-year period.
Investment	PWT 7.1 – variable labeled *ki* in the dataset; Investment Share of PPP Converted GDP Per Capita at 2005 constant prices. Ten-year average.
Human capital	Log(1+average years of schooling) at the beginning of the decade. From: Barro and Lee (2013).
Market distortions	Measured as log(1+Black market premium) averaged over a decade. From: Levine and Renelt; World's Currency Yearbook (for 1985, 1990-93); Adrian Wood, Global trends in real exchange rates: 1960-84, WB Discussion paper no. 35. 1988 (filling in missing observations); Global Development Finance & World Development Indicators (for 1996-1997, calculated as (parallel Exchange rate/official exchange rate-1)*100); values for developed countries are added as 0).
Price level of investment	PWT 7.1; PPP over investment/exchange rate (variable labeled *pi*) at the beginning of the decade.
Civil war	A dummy variable taking the value of 1 if a country experienced at least one internal conflict in a decade/twenty-year period that generated more than 25 deaths. From PRIO.
Population growth	PWT 7.1
Sub-Saharan Africa	A dummy variable taking the value of 1 if a country is settled in Sub-Saharan Africa and 0 otherwise. World Bank classification.
Latin America and the Caribbean	A dummy variable taking the value of 1 if a country is settled in Latin America or on the Caribbeans and 0 otherwise. World Bank classification.
East Asia	A dummy variable taking the value of 1 if a country is settled in East Asia-Pacific region and 0 otherwise. World Bank classification.
Government	PWT 7.1 – variable labeled *gi* in the dataset; Government Consumption Share of PPP Converted GDP Per Capita at 2005 constant prices. Ten-year average.
Openness	PWT 7.1 – variable labeled *openk* in the dataset; Openness at 2005 constant prices (%). Decade average.
Instability	Measured as a number of coups and revolutions during a decade. From Banks (2021).
Fertility	Net fertility at the beginning of the decade. Data for total fertility rates (children per women) and mortality rates for children (ages 0-4) obtained from World Bank: World Development Indicators. Net fertility rate=total fertility rate*(1-mortality rate for children).

Appendix 1.3: OLS estimation results

Dependent variable: Average decade growth rate				
	(1)	**(2)**	**(3)**	**(4)**
Log(GDP)	2.306	4.699*	4.665*	4.721*
	(2.523)	(2.660)	(2.663)	(2.680)
$Log(GDP)^2$	-0.171	-0.331**	-0.329**	-0.332**
	(0.148)	(0.159)	(0.159)	(0.160)
Human capital	0.359	-0.146	-0.149	-0.126
	(0.436)	(0.456)	(0.456)	(0.458)
Investments	0.047**	0.050***	0.049***	0.052***
	(0.019)	(0.018)	(0.018)	(0.019)
Civil War	-0.719**	-0.627**	-0.625**	-0.627**
	(0.313)	(0.305)	(0.303)	(0.306)
Market distortions		-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)
Openness		-0.002	-0.002	-0.002
		(0.004)	(0.004)	(0.004)
Government	-0.018	0.008	0.007	0.009
	(0.032)	(0.036)	(0.036)	(0.036)
Instability	-0.016	-0.024	-0.025	-0.026
	(0.063)	(0.070)	(0.069)	(0.069)
PPDEV	0.001	-0.000		-0.000
	(0.004)	(0.004)		(0.004)
Fertility		-0.552***	-0.551***	-0.410*
		(0.163)	(0.162)	(0.226)
Average population growth				-22.948
				(26.550)
EFI	-0.998	-0.711	-0.714	-0.580
	(0.638)	(0.638)	(0.637)	(0.654)
Regional controls	Yes	Yes	Yes	Yes
Decade controls	Yes	Yes	Yes	Yes
Observations	304	304	304	304
R^2	0.333	0.367	0.366	0.368

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Paper 2:
Diversity and Inequality: The empirical assessment of the relationship between the dynamic ethnic diversity and income inequality before the redistribution in a panel of countries

Abstract

Theoretically, ethnic diversity can affect inequality before redistribution, which can signify a systemic discrepancy of opportunities between different ethnic groups. However, although empirical studies regarding the association between ethnic heterogeneity and income after redistribution exist, little is known about the connection between income inequality before redistribution and ethnic diversity. This paper investigates the relationship between ethnic fractionalization and inequality before redistribution, analyzing the sample of 122 countries from 1960 to 2013. The system GMM estimators approach applied yields results that suggest an increase in inequality before redistribution when the ethnic heterogeneity increases. The impact of ethnic diversity on inequality before redistribution is statistically significant but not large in magnitude. Regardless, the paper argues that these results should not be neglected.

Introduction

There is a growing concern that the increasing ethnic heterogeneity[48] will cause a rise in income inequality (Meisenberg, 2007). This concern is not unfounded since, theoretically, greater ethnic diversity can lead to higher levels of inequality. For example, high ethnic fractionalization can cause conflict over resources, resulting in one ethnic group controlling resources and appropriating all resource rents (as shown in the model developed in Caselli & Coleman, 2013). On top of that, a relatively novel database, the *Historical Index of Ethnic Fractionalization* (HIEF), compiled by Dražanová (2020), provides quantitative support to the belief that countries are, on average, becoming more ethnically fragmented in the last couple of decades. However, the relationship between ethnic homogeneity and inequality

[48] The terms ethnic heterogeneity, diversity, fractionalization, and fragmentation will be used interchangeably since nuanced differences between these terms are not detrimental for this study. It should be noted, however, that these terms are not always equivalent. For example, the diversity does not necessarily mean that ethnic groups will be fragmented.

is empirically understudied compared to the volume of scientific work dedicated to examining the impact of ethnic diversity on economic growth.

Furthermore, existing empirical studies that have analyzed this relationship are, due to data limitations, mainly focused on the impact of the diversity on inequality after redistribution (Ajide et al., 2019; Dincer & Hotard, 2011; Dincer & Lambert, 2012; Fum & Hodler, 2010; to name a few). In other words, little is known about the impact of ethnic heterogeneity on inequality before the redistribution takes place. The data availability further hinders our understanding of the relationship at hand since the dynamic measures of ethnic diversity for larger sets of countries were unavailable before the creation of HIEF.

This paper addresses whether higher ethnic fractionalization leads to higher income inequality before the redistribution.[49] The paper seeks to enhance our understanding of the relationship between income inequality and ethnic diversity by analyzing the impact of ethnic heterogeneity on the market income inequality – inequality before redistribution – in a sample of 122 countries over the period from 1960 to 2013. This is the largest sample used in a country-level panel empirical analysis of the association between ethnic heterogeneity and income inequality.[50]

The paper also incorporates time-varying measures for ethnic diversity. This enables the usage of panel-based methodological approaches, such as fixed effects estimators and dynamic panel models. These methodological tools will exploit the temporal dynamics of the relationship between ethnic fractionalization and pre-transfer income inequality, contributing to the obtained results' reliability.

Analysis of the association between diversity and inequality before redistribution goes above and beyond mere intellectual curiosity and simple "filling" of the literature gap. Namely, an adequate understanding of this relationship is crucial for creating and implementing effective policies intended to reduce the rise in inequality due to the increase in ethnic heterogeneity. For example, in the 1940s USA, higher levels of redistribution would probably have a negligible impact on inequality, as they would address the symptom instead of the underlying cause of ethnically driven inequality.[51] Rather, the efficient reduction of the inequality would have been achieved through investments in the discouragement of racism and the reduction of educational disparity between ethnic groups. In other words, policies that would affect "pre-market" determinants of income would be more efficient than redistribution. The wage inequality between blacks and whites in the southern parts

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[49] Income before redistribution (pre-tax or pre-transfer income) includes all household earnings, excluding any governmental benefits (Solt, 2020).

[50] To best of my knowledge.

[51] Race and ethnicity of an individual do not have to overlap, but in the context of the USA they are frequently treated as the same categories (Davis, 2011). Even in the USA censuses, the categorization of individuals' ethnicities are almost equated to their racial origin.

of the USA would be decreased by 29%-48% if only these ethnic groups had equal access to education of a similar quality (Carruthers & Wanamaker, 2017). The analysis of the relationship between income inequality and diversity, where income inequality is measured only after redistribution, would not be able to distinguish whether the "pre-market" factors should be affected by policy or redistribution ought to be altered for the reduction of inequality.

The second part of this paper examines theoretical assertions of why ethnic diversity can be relevant for income inequality before redistribution. This part of the paper also presents some empirical studies related to the topic of interest and further elaborates on the advances made in the empirical analysis conducted in this paper compared to the previous studies.

Methods used to analyze the relationship between ethnic and cultural diversity and income inequality before redistribution are presented in the third part of the paper. In addition to the depiction of the methodology, this part of the paper also demonstrates why chosen analytical tools are superior to the ordinary least squares (OLS) approach – sometimes used as the main estimator in empirical studies of the topic (for example, in Dincer & Hotard, 2011; Fum & Hodler, 2010; Milanovic, 2003, for the case of Africa).

The fourth part of the paper depicts data used to assess the connection between ethnic homogeneity and market inequality. Apart from the presentation of datasets used, this section of the paper presents how ethnic diversity and income inequality before redistribution are measured. This part of the paper explicitly states some of the analysis restrictions imposed by the data limitations. For example, the data availability imposes the focus on ethnic diversity and not on religious or linguistic diversity.

The fifth part of the paper presents the results of the analysis. The paper finds that the higher ethnic diversity is statistically related to higher levels of market income inequality. Whether the impact of ethnic heterogeneity on the inequality before the redistribution will be economically significant depends on the other contextual factors. The last part of the paper is reserved for conclusions.

Income inequality and ethnic diversity: previous findings

Several theoretical perspectives imply the potential existence of a relationship between diversity and income inequality. Although the starting points of these perspectives differ, they predict a similar outcome: an increase in inequality when diversity increases.

One way to think about the relationship between inequality and ethnic diversity is through the lenses of the theoretical framework developed by Caselli and Coleman (2013). Their theory asserts that the conflict along ethnic lines is one of the ways to secure control over natural resources and obtain rents. A group that

controls the resources is at risk of enlargement and watering down rents that the resource control provides. In a homogenous society, "leakages" from a group that does not control the resources to the group that controls resources will be higher than in ethnically heterogeneous societies, especially when ethnic groups have distinct markers. This theory implies that ethnically diverse societies have a higher likelihood that one ethnically defined segment of the population will control natural resources and collect rents at the expense of other ethnic groups. More heterogenous societies may experience higher levels of inequality.

It is important to note that the model developed by Caselli and Coleman (2013) does not impose how the ethnic group that controls natural resources distributes rents to its members; the rent distribution does not have to be done via redistribution of income. Nevertheless, the model implies the existence of limitations for ethnic groups that are not in power to benefit from the natural resources. Since groups that are not in charge of the natural resources have limited opportunities for earning, it would not be surprising to see the higher income inequality before redistribution in countries with higher ethnic diversity.

A similar way of reasoning may be applied if the phenomenon is observed from a political perspective. In an ethnically fragmented society, the political elites that do not necessarily have direct control over natural resources may use ethnic and religious divisiveness to accumulate political power (Collier, 2000, 2001). Political power can, then, be used to alter market outcomes – through institutional manipulations –to benefit constituents of the same ethnic background. The rationale presented is analogous (if not the same) to the existing theories that emphasize the importance of the social position of the "elites"[52] for the long-run wealth creation (Acemoglu et al., 2001; Sokoloff & Engerman, 2000).

The political elites may choose to create an environment in which the members of their ethnic group would economically thrive while opportunities for others would be limited. In that case, ethnic diversity would be related to the inequality before redistribution. Of course, political elites may choose to use only redistributive mechanisms to benefit the individuals belonging to their ethnic group. However, the changes in the "rules of the game" – institutions (North, 1995) – would enable a more stable political and economic power preservation. After all, as Glaeser and Saks (2006) argue, in a multiethnic society, the voters will continue to support the politician who is a member of their ethnic group when that politician allocates resources toward that ethnic group, even if that politician is corrupt.

Implications from the political perspective are essentially the same as in the model developed by Caselli and Coleman (2013): income inequality is likely to be higher in a more ethnically heterogeneous society. Neither of the two presented perspectives does not command that the distribution of wealth within the ethnic

[52] If the "elites" are defined based on their ethnic lineage.

group must be done via redistribution. On the contrary, there are reasons to believe that it is more likely that pre-transfer income inequality would be affected by the ethnic diversity than inequality after redistribution if it is assumed that the ethnic group in power has a preference to preserve the political power or the control over resources.

A power struggle is at the centre of the presented theoretical considerations that can provide reasoning for the existence of the relationship between ethnic fragmentation and inequality before redistribution. However, for the impact of ethnic diversity on income inequality, the conflict for power is not necessary.

A staggering amount of theoretical and empirical studies, from psychology to economics, have shown that members of a specific group have more empathy towards other members of their group compared to the empathy for members of other groups (Becker, 1957; Bobo & Kluegel, 1993; Cikara et al., 2011 to name a few studies from different scientific fields). This phenomenon is accompanied by differences in preferences between groups[53] (Alesina & Glaeser, 2004). An ethnic group in a position to affect the economic environment may create institutions and policies that favour members of that group without the explicit conflict over political or economic power with other ethnic groups that comprise the society. An extreme case of the described situation is the formation of racist and ethnocentric institutions and policies that limit or completely eradicate opportunities for wealth creation for ethnic groups that are not in power. Returning to the example from the introduction, segregation in the United States was not a consequence of a conflict over power for resource control or political power but rather the consequence of racism.

The conflict over political power, racism, ethnocentrism, and the conflict over control of natural resources are a few of the reasons why ethnic diversity may impact market income inequality, as presented. Although some of the models and rationalizations presented have been known for a long time, there is still no empirical evidence regarding the relationship between ethnic fragmentation and income inequality before redistribution on a country level.

As mentioned in the introduction, an empirical relationship between ethnic heterogeneity and inequality is relatively understudied, even when inequality is observed after redistribution. Previous studies on the topic can be divided into two groups: first, studying the direct effect of ethnic diversity on inequality, and second, exploring the impact of fractionalization on redistribution – indirect analysis. Regarding the principal subject of this paper, the first group of studies will be presented in greater detail. However, it is worth noting that findings from the second group unequivocally suggest that the higher ethnic diversity is related to the lower

[53] Preferences regarding values, attitudes, and norms can be formed along ethnic lines. However, recent studies are suggesting a more nuanced relationship between the individual's ethnic background and individual's values attitudes, and norms. This discussion goes above and beyond the scope of this paper. For more information the reader is referred to a study by Desmet et al. (2017).

levels of redistribution (Alesina et al., 1999; Desmet et al., 2009; Houle, 2017; Luttmer, 2001; Okten & Osili, 2004; Sturm & De Haan, 2015; Van Velthoven et al., 2019).

Existing studies from the first group imply that inequality is higher in more ethnically fragmented societies. Glaeser (2005), by reviewing "facts" about inequality, suggests that higher ethnic heterogeneity leads to higher inequality. The provisional explanation for such finding, Glaeser (2005) finds in the reduced redistribution or differences in educational levels along ethnic lines. By analyzing a sample of 56 countries, Dincer and Hotard's (2011) empirical study indicates a similar relationship. More specifically, the mentioned study finds an inverse U-shaped relationship between ethnic and religious fractionalization and income inequality and higher inequality when ethnic and religious polarization[54] are higher.

Fum and Hodler's (2010) empirical analysis more closely follows the theoretical model by Caselli and Coleman (2013). This analysis hypothesizes that inequality is more pronounced in ethnically polarized societies due to rent-seeking and that the state of natural resources shapes a given relationship. Empirical evidence Fum and Hodler (2010) present suggest that income inequality after redistribution is higher in more ethnically polarized societies.

The evidence from the analysis of African countries (Ajide et al., 2019; Milanovic, 2003) leads to similar conclusions to the ones presented: higher levels of inequality are related to higher ethnic diversity in Africa. Similarly, the study focusing on the sample of states comprising the USA (Dincer & Lambert, 2012) comes to identical conclusions as the Dincer and Hotard's (2011) country-level empirical study.

The analysis conducted in this paper expands on the previous literature in a couple of domains. First, this study explores the impact of ethnic diversity on inequality before redistribution. Due to data scarcity, previous studies have only focused on the impact of ethnic diversity only on income inequality after redistribution (Dincer & Hotard, 2011; Fum & Hodler, 2010; Milanovic, 2003; and many others). Sometimes, these studies have used whichever inequality measure is available – regardless of whether the measure is derived before or after the redistribution. When only an inequality measure after redistribution is applied in an analysis, it is not known if the impact of the ethnic fractionalization on income inequality is due to redistribution policies and practices or if the initial – market – distribution is "distorted" due to specific forces triggered by ethnic heterogeneity.

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[54] Ethnic polarization is a concept popularized by Montalvo, J. G & Reynal-Querol (2005a, 2005b). Ethnic polarization is not only dealing with relative sizes and number of different ethnic groups, like fractionalization, but pays special attention to the relative sizes of the two biggest ethnic groups. This concept will not be used in this paper due to the data restrictions as it will be elabourated later in the paper.

Second, the dataset used in this paper consists of observations of 122 countries over five decades – from 1960 to 2013. Compared to the studies mentioned above from the field, this is the most comprehensive dataset. For comparison, a study by Dincer and Hotard (2011) deals with information about 56 countries over ten years, and Fum and Hodler's (2010) work observes a cross-section of 79 countries to draw conclusions about the effect of ethnic diversity on inequality. Since this paper is not confined to a particular region, such as Africa (Ajide et al., 2019) or states comprising the USA (Dincer & Lambert, 2012), it has information about a larger number of countries than studies restricted to the specific geographical unit. On top of that, the timespan in the dataset used in this paper is more extensive than in studies confined to a certain region, with a temporal component, as Ajide et al. (2019) and Dincer and Lambert (2012).

Third, some of the mentioned empirical studies rely on the results obtained by using OLS estimators (Dincer & Hotard, 2011; Fum & Hodler, 2010, for example). This paper applies fixed effects estimators and the System Generalized Method of Moments (GMM) approach to derive conclusions regarding the relationship between ethnic diversity and pre-redistribution income inequality. Although some studies have used GMM and fixed effects estimators (Ajide et al., 2019; Dincer & Lambert, 2012), these studies were focused on the particular territorial regions, while the analysis conducted here observes countries from all over the world.

When it comes to the empirical analysis of the economic consequences of ethnic diversity, the majority of the previous work focuses on the association between ethnic, religious, and linguistic heterogeneity and economic growth (Alesina et al., 2003; Easterly & Levine, 1997; Gören, 2014; Montalvo & Reynal-Querol, 2005b; to name a few). In these studies, sometimes inequality is of great importance (for example, Baldwin & Huber, 2010; Casey & Owen, 2014). Therefore, the insights from this paper will not only contribute to the relatively understudied field but also have the potential to improve the understanding of the interplay between ethnic diversity, inequality, and growth.

The next part of the paper illustrates the methodological approach used to assess the relationship between ethnic diversity and inequality before redistribution. When devising methods for the analysis, conclusions from presented theoretical and empirical studies will be considered.

Methodology

This paper notes several common characteristics of models used in previous empirical studies that evaluate the impact of ethnic diversity on inequality to construct the main regression specification.

First, all of the mentioned empirical studies dealing with the relationship of interest use the GINI coefficient to measure inequality[55]. Although it would be interesting to see how results change when different inequality measures are used, at the moment, only GINI coefficients are available as measures of pre-transfer inequality. This will be discussed in greater detail in the next section of the paper.

Second, different empirical studies use different measures for diversity. Some put more emphasis on the polarization measures (like Fum & Hodler, 2010), some on fractionalization indices (for example, Ajide et al., 2019; Milanovic, 2003), while others use both polarization and fractionalization concepts (Dincer & Hotard, 2011; Dincer & Lambert, 2012). This paper focuses on ethnic diversity, measured via the ethnic fractionalization index – the probability that two randomly chosen individuals belong to different ethnic groups. As is the case with the measurements of inequality, the choice of fractionalization is data-driven since, at the moment of writing this paper, data regarding time-varying ethnic polarization is not available.

Third, most mentioned studies assume a linear relationship between diversity and inequality (Ajide et al., 2019; Fum & Hodler, 2010; Milanovic, 2003). But, as mentioned, some studies find the inverted-U relationship between diversity and inequality (in particular, Dincer & Hotard, 2011; Dincer & Lambert, 2012). In countries where diversity is persistently very high, institutions may have been developed over time to accommodate the coexistence of people of different ethnic origins. Inclusion of the squared term for ethnic diversity in the main specification would account for this. For this study, it is essential to note that Dincer and Hotard (2011) only find a stable inverted-U relationship between inequality and religious fractionalization, while the squared term for ethnic fractionalization is statistically insignificant.

In this paper, it is assumed that the relationship at hand is linear. It is possible to use a non-parametric method, kernel regressions, where the independent variable is ethnic fractionalization and dependent variables are GINI coefficients before redistribution to check the validity of this assumption. The paper uses an Epanechnikov, data-driven, kernel regression with a half bandwidth of 15% and clustered standard errors by country, as suggested by Dincer and Hotard (2011). Results of conducted kernel regressions are presented in Figure 2.1.[56] Since there is no suggestion regarding the "quadratic" curvature in Figure 2.1, the paper will not assume an inverted-U relationship between ethnic fractionalization and the inequality before redistribution.

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[55] GINI coefficient is a measure of inequality based on the distance of actual income distribution from the equal distribution. In this case, its values are on a domain from 0, lowest inequality, to 1, highest inequality.

[56] Data used for this procedure is presented in the next part of the paper.

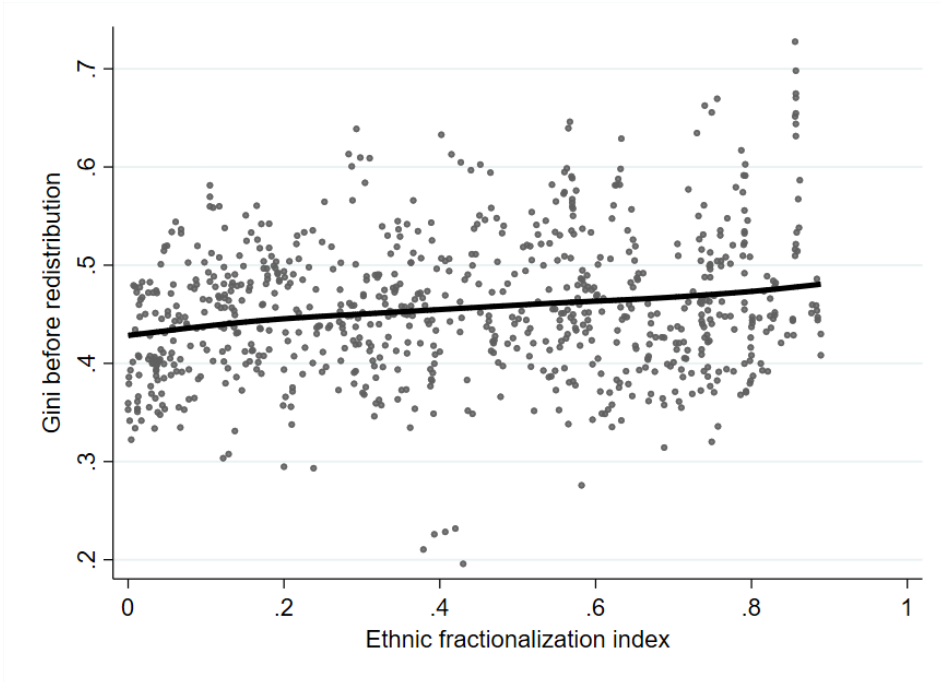

Figure 2. 1: Kernel regression – Ethnic fractionalization and inequality before redistribution. *Sources:* Solt (2020) for inequality measures, and Dražanová (2020) for ethnic fractionalization index.

Fourth, almost all of the previous empirical studies that analyze the impact of the ethnic diversity on the inequality acknowledge the potential existence of a Kuznets-type relationship between the inequality and the levels of economic activity (Ajide et al., 2019; Dincer & Hotard, 2011; Milanovic, 2003). Because of that, models of the impact of ethnic heterogeneity on inequality usually contain the levels of gross domestic product (GDP) and the squared value of GDP.

Fifth, most studies interested in the association between diversity and inequality include the variables that capture time-invariant country-specific characteristics in their models. For example, all of the mentioned studies that use OLS estimators include macro-regional dummy variables. Another example is Fum and Hodler (2010), where a dummy variable capturing information if a country is landlocked is included in the model.

Sixth, sometimes studies combine inequality data from different sources. To check if their results are not the consequence of the combination of different inequality sources, empirical studies dealing with the relationship between inequality and diversity usually conduct a robustness check by including variables that capture the information about the differences in the source material. As it will be demonstrated in the next part of this paper, this will not be necessary for the analysis conducted here since the single source is used for inequality observations.

Finally, almost all empirical studies analyzing the interplay between ethnic heterogeneity and inequality include one or more variables intended to capture the political situation and institutional quality in an observed country. This is because the political regime of the country, as well as institutional quality, can be contemporaneously correlated with levels of diversity and inequality. Fum and Hodler (2010), for instance, use the Polity2 score and constraints on the executive power; Dincer and Hotard (2011) include the Bayesian corruption index in their model; Ajide et al. (2019) incorporate the set of institutional quality variables in their estimation.

The main regression specification for this paper combines the information regarding the previous literature and the aim of the paper:

$$GINI_{if} = \beta_0 + \beta_1 EFI0_{if} + \beta_2 \log(\text{GDP0})_{if} + \beta_3 (\log(\text{GDP0}))^2{}_{if} + \gamma_j \sum_{j=1}^{k} C_{jif} + u_i + \varepsilon_{if} \quad (2.1)$$

where β_0 is an intercept; $GINI_{if}$ is the average value of the GINI before redistribution in the country *i* over the five-year period *f*; $EFI0_{if}$ is the value of ethnic fractionalization index at the beginning of the five-year period *f* in a country *i;* $\log(\text{GDP0})_{if}$ is the logarithm of the GDP per capita in a country *i* at the beginning of the five-year period; $(\log(\text{GDP0}))^2{}_{if}$ is a squared value of the $\log(\text{GDP0})_{if}$; C_j is set of control variables (total number of control variables is equal to *k*); u_i is time-invariant country-specific error term; and ε_{if} is an i.i.d. error term.

The specification (2.1) takes a five-year period as a time unit. The main reason for not estimating the specification (2.1) on an annual basis is the highly persistent nature of the ethnic fractionalization index. The ethnic fractionalization index moves sluggishly, and the annual variations would probably not be sufficient to provide credible results. For the regression analysis, the variation in the independent variable must exist for a proper estimation of the relationship between the dependent and the independent variable. The next section of this paper provides more detailed information about the changes in the ethnic fractionalization index. It offers further justification for choosing a five-year period as a time unit.

The principal analysis estimates the specification (2.1) using fixed-effects estimators. This approach allows controlling for time-invariant covariates. In other words, there is no need to include country-specific time-invariant variables since all time-invariant determinants of GINI are captured within the error u_i. Fixed-effects estimators provide coefficients that do not suffer from bias due to the correlation of this error term and other explanatory variables.

The income inequality before redistribution and the levels of human capital in society can be correlated. At the same time, the levels of human capital can be shaped by ethnic diversity. The mentioned example of wage discrepancies in the USA during a Jim Crow era illustrates how discrepancies in a human capital acquisition may impact pre-transfer income inequality. To avoid potentially biased results, the set of controls should include the variable that provides information regarding levels of human capital, as human capital can be simultaneously correlated with ethnic diversity and inequality before redistribution. Some of the previous empirical studies on the topic have also argued that human capital must be included as a control in the assessment of the relationship between the diversity and the inequality (for instance, Ajide et al., 2019; Dincer & Hotard, 2011; Dincer & Lambert, 2012).

In this paper, consideration of the human capital levels is critical as the outcome variable measures income differences before redistribution. Some income discrepancies due to differences in human capital are reduced due to government transfers. The level of human capital is approximated by the percentage of people who completed primary school and the percentage who completed secondary school at the beginning of the five-year period (an approximation for human capital used in Montalvo & Reynal-Querol, 2005). The percentage of people who completed secondary school is never used in the same specification with the percentage of people who completed primary school. This is because the former can be the latter's outcome variable, which can generate the "bad control" problem and unnecessary biases (Angrist & Pischke, 2008).

As mentioned, all of the previous empirical studies that analyze the relationship between ethnic diversity and inequality take into account the political situation in observed countries. More democratic countries are presumed to be more inclusive. At the same time, ethnically homogenous countries may have fewer obstacles in establishing and practising democracy. This is why it is necessary to include variables that contain information about the political situation of the observed country in the set of controls.

In this paper, the principal variable measuring the level of democracy in a country is a binary variable taking the value of 1 if an average Polity2 score is higher than 4 in a given five-year period and 0 otherwise. Polity2 score is a composite measure of authoritarianism, ranging from -10 to 10, where the maximum value represents the highest level of democracy (Marshall & Gurr, 2020).

Levels of inequality can determine economic growth[57], education, but also ethnic diversity. Kyriacou and Velásquez (2015) find that inequality impacts the diversity of cultural traits. If the cultural traits are formed along ethnic lines, this result can

[57] A comprehensive discussion regarding the relationship between inequality and growth is provided in Van der Weide & Milanovic (2018).

be expanded to ethnic diversity – that inequality determines ethnic diversity. If the changes in ethnic diversity are driven by migrations, and people tend to migrate towards less unequal societies, an effect of income inequality on ethnic diversity is plausible. Differently stated, this paper has assumed that ethnic fractionalization impacts inequality, but a causal relationship may go from inequality to ethnic heterogeneity.

Because of the potential existence of the reversed causality, GDP, ethnic fractionalization index, and measures for human capital enter the specification (2.1) at their levels at the begging of the five-year period. The reasoning behind this approach is that future levels of inequality cannot cause the past levels of ethnic fractionalization, economic activity, or levels of human capital.

However, the approach described above does not entirely resolve the potential problem of reverse causality. This is because of the high persistence of the ethnic diversity measure and the presence of autocorrelation in the measure for inequality. The paper uses the System GMM[58] approach (Blundell & Bond, 1998) to account for the autocorrelation and address the problem of the potential reversed causality. This approach permits controlling for the impact of the past values of inequality on present levels of inequality. In addition, it allows controlling for the country-specific, time-invariant characteristics.

To obtain coefficients for the variables of interest, the System GMM approach uses two equations: specification (2.1) with added lagged variables of inequality (level equation), and the first difference of the specification (2.1) with added inequality lags (differenced equation). The coefficients are estimated by applying GMM estimators to this system of equations. This approach is more efficient than simply estimating the differenced equation (known as the Arellano-Bond approach based on Arellano & Bond, 1991).

All of the control variables in the System GMM are treated as predetermined or sequentially exogenous, meaning that variables can be correlated with the past values of the error term but are independent of all future errors. This accommodates the potential reverse causality (Moral-Benito et al., 2019).

The System GMM approach, further, allows the incorporation of an additional control variable for institutional quality. Namely, Dincer and Hotard (2011) use the Bayesian corruption indicator as a measurement for institutional quality.[59] As

[58] In certain instances, the maximum likelihood (ML) estimators can perform better than GMM estimators. However, since there are enough observations, GMM should provide credible results (Williams et al., 2018). Since both ML and GMM would provide credible results, the paper uses GMM because Blundell-Bond approach is more intuitive. Namely, the ML approach uses structural equation modeling which can be cumbersome.

[59] There are numerous indicators of institutional quality in existence. This paper uses Bayesian corruption indicator for two reasons: this indicator is used in the previous studies of the topic, and

shown in Dincer (2008), inequality can impact corruption, generating additional problems related to reverse causality. Nevertheless, in the System GMM setting, the Bayesian corruption indicator can be treated as predetermined, and the mentioned problems are dampened.

To sum up, the paper estimates specification (2.1) using the fixed-effects method in order to deal with the unobserved time-invariant part of the error term, u_i. The System GMM approach complements this method because of the potential reverse causality and high dependency of present inequality on its past values. The next part of the paper presents the data used in these estimations.

Data

The income inequality in this analysis is measured via the GINI coefficient calibrated on income before redistribution. *The Luxemburg Income Surveys* (LIS) is probably the best individual-level data source that captures incomes from different sources (Milanovic, 2010). It is, therefore, able to provide information about pre-transfer income inequality. However, the number of countries, as well as time points covered, are limited in LIS. Solt (2020) has compiled The Standardized World Income Inequality Database (SWIID) to address this problem. The SWIID aims to provide a long-run dataset on inequality comparable over space and time with as many representative country-year observations as possible.

Version 9 of SWIID is the main source of the pre-redistribution GINI coefficients for the analysis conducted in this paper. This database provides GINI coefficients before and after the redistribution from 1960 to 2020 for 198 countries. SWIID takes data from *The Luxemburg Income Surveys* (LIS) as a starting point and as a standard for predicting inequality for countries and years that LIS does not cover. The predictions of country-year levels of GINI not available in LIS are based on other data sources – OECD Income Distribution Database, CEDLAS and the World Bank data, Eurostat, and many others, 384 sources in total (Solt, 2020). Bayesian approach and *k-fold* cross-validation procedure[60] are used to predict, and evaluate predictions, of country-year levels of inequality before and after redistribution.

Each country-year prediction in SWIID is accompanied by a standard error of the predicted value for inequality. Accounting for measurement uncertainties is possible

it is available for more countries and years than, for example, measures provided by World Governance Indicators used in Ajide et al. (2019).

[60] Simplified, the *k-fold* cross validation is a machine-learning procedure that divides the known observations into *training* and *testing* sets. The training set is generating the model that predicts its own values. Parameters gained from the model based on data points from training set are applied to predict the values of the testing set. Since the observations from testing set are also known, it is possible to evaluate the precision of the predictions. Reader is referred to Solt (2020) for further explanations.

when using SWIID in Stata software since the author has preformatted the database to enable straightforward incorporation of standard errors for each predicted value of inequality.[61]

Based on the inequality values and corresponding standard errors provided in SWIID, it is possible to observe the overall evolution of inequality during the period of observation. Figure 2.2 depicts values of GINI over the years averaged over countries.[62] Post redistribution inequality is declining, while pre redistribution income inequality stagnates before 1985. Since 1985, both pre and post redistribution GINI have been increasing, slowing their pace around 1995. After 1995, both GINI before and after redistribution are stagnant or in negligible decline after 2010.

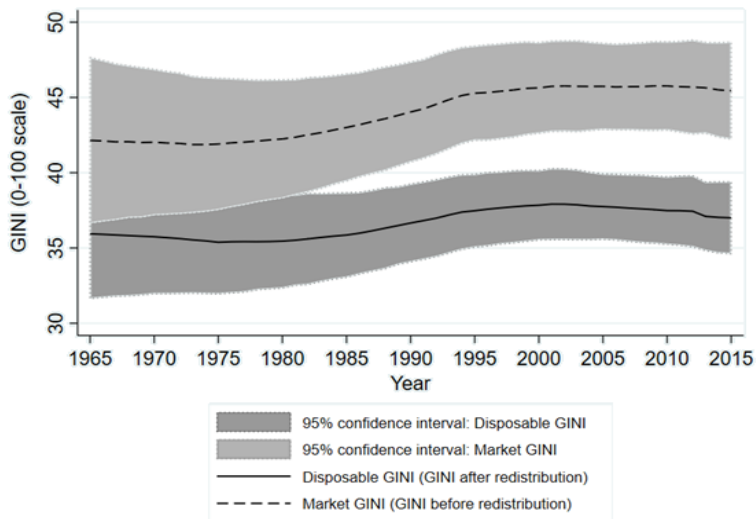

Figure 2. 2: Evolution of GINI before and after redistribution (SWIID). *Source:* Solt (2020)

[61] The dataset (publicly available at: https://fsolt.org/swiid/ at the time of the writing of this paper) is pre-formatted for Stata software such that estimations of interest for this paper are feasible by usage of the command: mi estimate. This command is usually used for the multiple imputation when dealing with missing data, but in this case, it allows estimations to be more accurate by repeating estimations 100 times with different measurements and, therefore, accounting for potential measurement errors of GINI coefficients by encompassing standard errors of predicted inequality values.

[62] Note that evolution of GINI presented in the Figure 2 only illustrates GINI averaged over countries for which the data was available for the entire period of observation – 22 of them. Sample is limited in order to avoid the noise stemming from adding countries over the years, i.e., to obtain more credible picture of the evolution of the inequality measures.

The World Income Inequality Database – WIID (UNU-WIDER, 2021) – is frequently used in the empirical studies concerned with the relationship between inequality and diversity (for example, Dincer & Hotard, 2011; Fum & Hodler, 2010). Although it might be considered as the literature standard, the WIID database does not provide information about market inequality which is the focus of this study.

The trajectory of GINI coefficients after redistribution in Figure 2.2 resembles the path of the average GINI coefficients calculated over observations from WIID (Figure 2.3). Until the mid-1980s, the inequality after redistribution is declining. From 1985 to the mid-1990s, inequality increases, and it hoovers around the same values from 1995 to 2015. The general tendency of the GINI after redistribution is similar in Figures 2.2 and 2.3, but the changes in the average GINI values presented in Figure 2.3 are more drastic. The more noticeable annual changes in Figure 2.3 are probably due to different sources for GINI coefficients recorded in WIID. Regardless of the causes for the presented discrepancy between Figures 2.2 and 2.3, for this analysis, it is important to note that there is a similar trajectory of GINI coefficients based on SWIID and WIID, as WIID is one of the major sources for inequality measures in empirical studies of the topic.

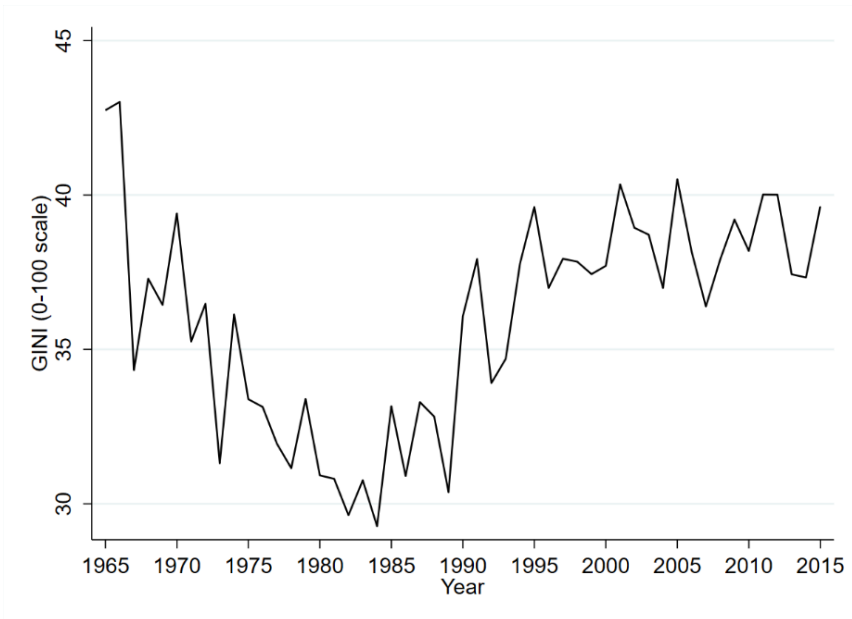

Figure 2. 3: Evolution of GINI after redistribution (WIID). *Source:* UNU-WIDER, 2021

The main data source regarding ethnic diversity is the *Historical Index of Ethnic Fractionalization* (HIEF) database, compiled by Dražanová (2020)[63]. The HIEF database records annual levels of ethnic fractionalization indices (EFI). This database records ethnic fragmentation from 1945 to 2013 for 162 countries under the country's name and borders at the moment of observation. For instance, East and West Germany entries are separated before the 1990s.

The ethnic fractionalization index is the most commonly used measure for the level of ethnic diversity in literature. This index represents the probability that two randomly drawn individuals from a given society belong to different ethnic groups (Alesina & La Ferrara, 2005). EFI takes the values on a domain from 0 to 1 – 0 representing total ethnic or religious homogeneity and 1 representing the theoretical case where each individual from a given society is from a different ethnic or religious background. EFI is calculated as:

$$EFI = 1 - \sum_{i}^{n} s_i^2$$

where s_i is the portion of group i in the population.

The HIEF database relies on various sources to compile the longitudinal information about ethnic diversity measured via the ethnic fractionalization index. These include the CIA World Factbook, World Almanac Book of Facts, and Britannica Book of the Year (Dražanová, 2020).[64]

As mentioned in the introduction, data from *HIEF* suggests that the world is, on average, becoming more ethnically heterogeneous. From 1945 to 2013, the average global EFI has risen by more than 0.1, meaning that there is more than 10% higher chance in 2013 that two randomly drawn individuals in the world have a different ethnic origin than in 1945.

In some countries, such as Mongolia, ethnic diversity has decreased over the last half a century. In others, for example in Portugal, it has been increasing. There are also countries, for instance Angola, where there has been almost no change in ethnic diversity since the mid-1970s. Nevertheless, as mentioned, in all countries, the annual changes in EFI are negligible and do not exceed 0.02, even in extreme cases. That is why the estimation of specification (1) is done for five-year periods.

The diversity does not only comprise ethnic differences. It can also include cultural, linguistic, or religious differences within a society. Similarly, the EFI is not a unique way of measuring diversity. However, *HIEF* does not provide relative

[63] For detailed description of the dynamics of ethnic fractionalization reader is referred to Paper 1 of this thesis.

[64] For detailed depiction of data collection, procedure, and sources used to construct ethnic fractionalization index in HIEF see Dražanová (2020).

participation of ethnic groups, and it is, for now, impossible to calculate the other measures of the diversity, like the polarization index, that could potentially capture different aspects of ethnic heterogeneity. Data regarding religious, linguistic, or cultural diversity over time for a larger number of countries is not yet compiled. Although it would be interesting to see how these different aspects and different measures of diversity impact inequality before redistribution, the ethnic diversity index is more than capable of providing initial insights into the interconnectedness between diversity and pre-transfer inequality.

Data regarding levels of control variables are gathered from different sources. Information regarding primary and secondary school completion rates is obtained from Barro and Lee's (2013) Educational Attainment dataset. Observations concerning education are available on five-year instances, which further justifies the usage of five-year periods as time units. GDP per capita levels, measured in 2015 constant US dollars, are obtained from World Bank – World Development Indicators (WDI). As mentioned, the primary variable for the political regime in a country is based on the Polity2 variable acquired from the Polity V dataset within The Polity Project (Marshall & Gurr, 2020). Annual levels of the Bayesian corruption indicator are gathered from the Quality of Government dataset (Teorell et al., 2015).

When datasets for inequality before redistribution and ethnic diversity are merged with data available for the necessary controls, the sample consists of 122 countries 122 for 11 five-year periods (form 1960-2013).[65]

Summary statistics for the main variables of interest are presented in Table 2.1, and the correlation matrix for these variables is provided in Table 2.2.

For some countries, data is available for every five-year period. However, there are countries for which there are only more recent observations. It should be noted that, because of the data availability, it is likely that the developed countries are slightly more represented for earlier periods of observation. That is why there are some peculiar results in Table 2.1 regarding the variables approximating the level of human capital. The average percentage of people who completed secondary education is seemingly higher than the average percentage of those who completed primary education because poorer countries later join the sample. In the main analysis, this should not pose a significant problem since it is possible to restrict the sample to observations only after the 1980s – a period after which observations for a majority of countries are available.

Results obtained from applying the methods described in the third part of this paper on data presented in this section are laid out in the next part of the paper.

[65] The last period captures four years: 2010, 2011, 2012, and 2013.

Table 2.1: Summary statistics – main variables

Variable	Mean	Standard deviation	Minimum	Maximum	Number of observations
GINI before redistribution[66]	0.459	0.072	0.217	0.728	748
GINI after redistribution	0.392	0.094	0.202	0.678	748
EFI	0.418	0.264	0	0.889	748
log(GDP) per capita	8.359	1.522	0.117	11.315	748
$(\log(GDP))^2$ per capita	72.181	24.657	0.014	128.025	748
Primary education complete (%)	17.885	11.163	0.098	66.323	748
Secondary education complete (%)	22.755	17.025	0.501	72.243	748
Democracy	0.620	0.486	0	1	748
Bayesian corruption indicatior	45.635	15.441	7.021	71.399	738

Table 2.2: Correlation matrix – main variables

VARIABLE	GINI before redistri-bution	GINI after redistri-bution	EFI	Log (GDP) per capita	$(\log(GDP))^2$ per capita	Primary education complete (%)	Secondary education complete (%)	Demo-cracy	Bayesian corruption indicatior
GINI before redistribution	1								
GINI after redistribution	0.608	1							
EFI	0.199	0.496	1						
log(GDP) per capita	0.011	-0.454	-0.421	1					
$(\log(GDP))^2$ per capita	0.009	-0.502	-0.442	0.984	1				
Primary education complete (%)	-0.002	0.017	-0.151	0.028	0.023	1			
Secondary education complete (%)	-0.107	-0.451	-0.360	0.466	0.480	0.409	1		
Democracy	0.071	-0.266	-0.260	0.420	0.444	0.045	0.376	1	
Bayesian corruption indicatior	-0.006	0.500	0.417	-0.681	-0.743	-0.012	-0.304	-0.270	1

Results

Estimation results of the specification (1) stemming from the fixed-effects approach are presented in Table 2.3. The first column of Table 2.3 provides estimation results when only GINI before redistribution is regressed on EFI. Estimation results, when the logarithm of GDP per capita and its squared value are added to the regression, are provided in column 2. The third column of Table 2.3 presents results when the

[66] Summary statistics calibrated over five-year averages.

democracy variable is included in the estimation. Columns 4 and 5 depict the estimation results when primary and secondary education variables are added to the specification, respectively. The last, sixth column of Table 2.3 provides estimation results for the specification (1) when the sample is restricted to observations after 1980.

Table 2. 3: Fixed-effects estimation of the specification (1)

	Dependent variable: GINI before redistribution					
Explanatory variables	**1**	**2**	**3**	**4**	**5**	**6**
EFI	0.194***	0.175**	0.164**	0.164**	0.156**	0.151**
	(0.071)	(0.073)	(0.072)	(0.072)	(0.072)	(0.076)
Log(GDP)		-0.031*	-0.031*	-0.026	-0.032*	-0.032
		(0.018)	(0.017)	(0.018)	(0.017)	(0.063)
$Log(GDP)^2$		0.003*	0.003*	0.002	0.003*	0.003
		(0.002)	(0.002)	(0.002)	(0.002)	(0.004)
Democracy			-0.010*	-0.009	-0.010*	-0.008
			(0.006)	(0.006)	(0.006)	(0.005)
Primary education complete (%)				-0.000		
				(0.000)		
Secondary education complete (%)					-0.000	0.000
					(0.000)	(0.000)
Constant	0.357***	0.431***	0.441***	0.438***	0.447***	0.443
	(0.031)	(0.053)	(0.052)	(0.052)	(0.052)	(0.291)
Observations	795	751	748	748	748	651
R-squared	0.034	0.053	0.049	0.046	0.053	0.0315
Number of id	124	123	122	122	122	122
F	2.525	1.985	1.943	1.850	1.880	2.324

Cluster robust standard errors in parentheses. All estimations include five-year dummy variables and are repeated 100 times for each potential predicted value of GINI. *** p<0.01, ** p<0.05, * p<0.1

In every version of the specification (1) presented in Table 2.3, the ethnic fractionalization index has a statistically significant coefficient (at a 5% level). The magnitude of the coefficient for ethnic fractionalization is relatively stable, hovering around 0.15-0.18. Hypothetically, if a country went from completely ethnically homogenous (EFI=0) to entirely heterogenous (EFI=1) in five years, that would increase the five-year average pre-transfer inequality by around 0.16, which is more than two standard deviations (see Table 2.1). Nevertheless, it is improbable that a country would experience such a drastic change in diversity. One of the most significant changes in EFI is recorded in the case of the Netherlands, where over 50 years, the probability that two randomly drawn individuals belong to different ethnic groups rose a bit more than 25% (a change in EFI by 0.25). On average, EFI in the Netherlands was changing by 0.025 per five-years. An increase in EFI by 0.025 corresponds to an increase in inequality before redistribution by 0.004, which is one-tenth of an average GINI before redistribution. Note that the case of the Netherlands

is extreme; the economic impact of EFI on pre-transfer GINI is smaller for almost all other countries in the sample. While statistical significance is present, the economic relevance of the impact of ethnic diversity on inequality before redistribution is questionable at best.

Similar conclusions can be derived from the simple OLS estimation (presented in Table 2.6, Appendix 1). The statistical significance and the direction of the effect of ethnic diversity on pre-transfer inequality are the same as in Table 2.3. A smaller coefficient for EFI in OLS estimation, compared to the fixed-effects model, is a consequence of a different comparison: between versus within-country effects, respectively.

There is no suggestion of a Kuznets-type relationship between GDP per capita and GINI before redistribution, judging from the significance and sign of coefficients for the logarithm of GDP per capita and its squared value. Other coefficients have expected signs, democracy and human capital accumulation reduce pre-transfer inequality, but these coefficients are not stable in terms of statistical significance.

Table 2.4 provides estimation results when the outcome variable in the specification (1) is GINI after redistribution. This table is organized similarly to Table 2.3 for easier direct comparison. The suggestion that pre-transfer income inequality rises when ethnic diversity increases gains credibility when results presented in Table 2.3 are compared with results presented in Table 2.4. Namely, when the dependent variable is capturing inequality after redistribution (post-transfer GINI), the estimated coefficient for EFI is not statistically significant, regardless of which controls are included in the model.

However, as mentioned in the third part of the paper, the potential existence of the reverse causal relationship between ethnic diversity and inequality before redistribution did not disappear when the results presented in Table 2.3 are compared with the results when the dependent variable is post-redistribution GINI. The comparison of these results is encouraging, but it does not do much in resolving the potential reverse causality. On top of that, the high dependence between past and present values of GINI coefficients cannot be taken into consideration with the fixed-effects approach.

In order to take into account the persistent nature of inequality before redistribution and reduce the potential problem of reverse causality, the analysis conducts the two-step System GMM estimation as described in the third part of the paper. Results from this estimation are presented in Table 2.5.

Table 2. 4: Fixed-effects estimation of the specification (1) – inequality after redistribution

	Dependent variable: GINI after redistribution					
Explanatory variables	**1**	**2**	**3**	**4**	**5**	**6**
EFI	0.072	0.074	0.065	0.064	0.047	0.085
	(0.066)	(0.069)	(0.068)	(0.068)	(0.065)	(0.071)
Log(GDP)		-0.018	-0.017	-0.024	-0.020	0.047
		(0.014)	(0.014)	(0.016)	(0.014)	(0.061)
$Log(GDP)^2$		0.001	0.001	0.002	0.002	-0.002
		(0.001)	(0.001)	(0.001)	(0.001)	(0.003)
Democracy			-0.008	-0.008	-0.007	-0.007
			(0.005)	(0.005)	(0.005)	(0.005)
Primary education complete (%)				0.000		
				(0.000)		
Secondary education complete (%)					-0.001	-0.000
					(0.000)	(0.000)
Constant	0.353***	0.395***	0.402***	0.405***	0.417***	0.111
	(0.030)	(0.053)	(0.052)	(0.052)	(0.051)	(0.290)
Observations	795	751	748	748	748	651
R-squared	0.237	0.0964	0.113	0.064	0.122	0.087
Number of id	124	123	122	122	122	122
F	2.376	1.713	1.657	1.566	1.657	1.916

Cluster robust standard errors in parentheses. All estimations include five-year dummy variables and are repeated 100 times for each potential predicted value of GINI. *** p<0.01, ** p<0.05, * p<0.1

The system GMM model includes two lags of the dependent variable. Instruments for the differenced equation include the second lag difference of GINI before redistribution, the first lags of EFI, the logarithm of GDP per capita and its squared value, democracy, percentage of people that have completed primary school, and Bayesian corruption index. The level equation uses the following instruments: the first lag difference of pre-transfer GINI and the first differences of logarithm of GDP per capita and its squared value, democracy, percentage of people that have completed primary school, and Bayesian corruption index.

Results of the estimation of the specification (2.1) stemming from the System GMM approach are presented in column 1, Table 2.5. Column 2 of Table 2.5 provides estimation results with an additional control variable for corruption (Bayesian corruption index). In the third column of Table 2.5, estimation results obtained by the application of the System GMM are provided for the sample limited to the period after the year 1980. Values of the Sargan-Hansen test statistics in Table 2.5, in all specifications, imply that the null hypothesis, stating that overidentifying restrictions are valid, cannot be rejected. The choice to include two lags of the dependent variables stems from the information obtained from the Arellano-Bond test for autocorrelation, which suggested the existence of the first and second-order autocorrelation in the differenced equation. The test statistics for the first three lags are provided in Table 2.5. Only after the inclusion of the two lagged dependent

variables we cannot reject the null hypothesis that there is no autocorrelation in the errors of the differenced equation.

Like results obtained via the fixed-effects approach, the coefficient for ethnic fractionalization is statistically significant (at 5% and 1% levels) and in all presented variations of the specification (1). The levels of the central coefficient of interest are relatively stable.

Table 2. 5: The System GMM estimation of the specification (1)

	Dependent variable: GINI before redistribution		
Explanatory variables	**1**	**2**	**3**
GINI before redistribution (1st lag)	1.124***	1.129***	1.099***
	(0.044)	(0.051)	(0.051)
GINI before redistribution (2nd lag)	-0.325***	-0.323***	-0.322***
	(0.004)	(0.050)	(0.049)
EFI	0.030**	0.036***	0.039***
	(0.012)	(0.012)	(0.013)
Log(GDP)	-0.044***	-0.022	-0.028*
	(0.012)	(0.016)	(0.016)
$Log(GDP)^2$	0.003***	0.001	0.002*
	(0.001)	(0.001)	(0.001)
Democracy	-0.000	-0.001	-0.000
	(0.003)	(0.003)	(0.001)
Primary education complete (%)	-0.000	-0.000	0.000
	(0.001)	(0.001)	(0.001)
Bayesian corruption index		-0.000	-0.000
		(0.001)	(0.001)
Constant	0.246***	0.167***	0.205***
	(0.066)	(0.063)	(0.067)
Number of groups	113	112	112
Number of observations	556	548	516
Sargan-Hansen test	104.9	103.2	102.6
Arellano-Bond test for autocorrelation:			
Lag 1	-5.542	-5.541	-5.203
Lag 2	-0.131	-0.221	-0.509
Lag 3	0.029	0.107	0.238

GMM standard errors in parentheses. All estimations are repeated 100 times for each potential predicted value of GINI coefficients. The two-step estimator is used in all specifications. *** p<0.01, ** p<0.05, * p<0.1

Conclusions

The paper has analyzed the potential impact of ethnic diversity on income inequality before redistribution. Until now, empirical studies have focused only on the association between ethnic fragmentation and inequality after redistribution.

Although it is theoretically possible for ethnic diversity to affect inequality before redistribution, data limitations prevented empirical evaluation of this relationship until now. Novel datasets have allowed this paper to assess the relationship between dynamic ethnic heterogeneity and pre-transfer inequality.

Results obtained from a panel of 122 countries over more than half a century imply that an increase in ethnic diversity leads to an increase in inequality before redistribution. On top of that, results from the analysis suggest a potential existence of a differential impact of ethnic diversity on inequality before redistribution compared to inequality after redistribution.

Several methodological approaches have produced results pointing in the same direction. There is a statistically significant relationship between ethnic diversity and pre-transfer inequality. From an economic perspective, the impact of ethnic fractionalization on inequality before redistribution is relatively small. However, the economic significance can gain relevance if the trend of border opening continues. Many developed countries that are a destination for migrants with different ethnic backgrounds are still ethnically homogenous. It is easier for diversity to rise in less fractionalized countries than in already diverse societies.

Conclusions from this paper are both optimistic and pessimistic in terms of the creation of economic policies intended to reduce inequality due to rising diversity. On the one hand, the paper has shown that there are instances where other measures besides redistribution can be more effective in resolving the issue of increasing inequality when society becomes more heterogenous. If inequality before redistribution in a particular country is affected by the increase in ethnic diversity, while inequality after redistribution is not, then policies can be crafted to address the cause of inequality. This can potentially be more efficient and beneficial in the long run than simply pouring in resources in the redistribution. On the flip side, the existence of a discrepancy in pre-transfer incomes due to ethnic diversity can signal that there are problems embedded in the institutional constellations of a country and these problems are sometimes difficult to resolve.

Before any straightforward policy recommendations are given, additional research is necessary. How exactly diversity impacts pre-transfer inequality is still an open question. Although the paper has provided several possible mechanisms, there is a need for studies that would focus on finding the precise path through which ethnic fragmentation impacts inequality before redistribution. Hopefully, the future will bring more high-quality data that would enable the inclusion of different measures for diversity and inequality and yield further precision in addressing how ethnic fragmentation and inequality are related.

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Appendix 1: OLS estimation

Table 2. 6: OLS estimation of the specification (1)

	Dependent variable: GINI before redistribution					
Explanatory variables	**1**	**2**	**3**	**4**	**5**	**6**
EFI	0.044***	0.070***	0.073***	0.075***	0.063***	0.053***
	(0.012)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
Log(GDP)		0.001	0.002	0.000	-0.000	0.088***
		(0.015)	(0.015)	(0.015)	(0.015)	(0.025)
$Log(GDP)^2$		0.000	0.000	0.000	0.000	-0.005***
		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democracy			0.016**	0.016**	0.020***	0.024***
			(0.007)	(0.007)	(0.007)	(0.007)
Primary education complete (%)				0.000		
				(0.000)		
Secondary education complete (%)					-0.001***	-0.001***
					(0.000)	(0.000)
Constant	0.426***	0.398***	0.387***	0.383***	0.394***	0.030
	(0.023)	(0.063)	(0.060)	(0.059)	(0.062)	(0.110)
Observations	795	751	748	748	748	651
R-squared	0.483	0.680	0.687	0.693	0.709	0.727
F	2.493	2.761	2.912	2.737	3.864	5.144

Cluster robust standard errors in parentheses. All estimations include five-year dummy variables. *** p<0.01, ** p<0.05, * p<0.1

Paper 3:
Trade and nationalism: Market integration in Interwar Yugoslavia

Abstract

This paper empirically analyses the relationship between nationalism and regional economic integration in the Kingdom of Yugoslavia between the First and the Second World War. It argues that prevailing nationalism had a negative impact on the economic integration of the regions within the Kingdom and further contributed to the political disintegration of the Kingdom. The analysis implies that the ideology of nationalism increased trade costs and thus retarded economic interconnectivity in the Kingdom of Yugoslavia, notwithstanding the favourable trade environment and the desire of the central elites to discourage ethnocentric sentiment.

Introduction

In the years between the two world wars, the level of commercial integration between the various markets of the Kingdom of Yugoslavia[67] was affected by several opposing forces. Advances in communications and transportation, the removal of trade barriers, and the formal advocacy of free trade with modest economic growth in the years immediately following the First World War (WWI) all had the potential to enhance the interconnectivity between Yugoslav regional markets. At the same time, the rise of nationalist movements and ideologies supported by nationalistic sentiments in some European countries in the second half of the 1920s may have hindered the reduction in trade costs favourable to the promotion of commerce in regional Yugoslav markets.

In the aftermath of WWI several ethnic, national and religious groups in the Balkans agreed to form one country and remove the trade barriers then in operation at provincial and regional levels (Troch, 2010). The merging of these disconnected regional markets and the creation of the Kingdom of Yugoslavia reduced the cost of trade. A unified market was created under political institutions which officially promoted free trade and protected property rights (Petranović & Zečević, 1985). In addition, certain investments were made throughout the newly formed market in the transportation infrastructure (Ilijin, 2014; Jovanović et al., 2015). *Ceteris paribus*,

[67] In this paper the Kingdom of Yugoslavia will be the "default" name used when referring to this country to avoid confusion. Only when historical events are depicted will the name 'The Kingdom of Serbs, Croats, and Slovenes' be used for its period of its existence.

one would have expected a considerable rise in market integration in the Kingdom of Yugoslavia. The rise in economic interconnectivity was able to provide trade-related benefits which would strengthen the political ties between the various ethnicities and contribute to the building of the newly formed Kingdom of Yugoslavia and its political stability in general (Oneal & Russett 1997, 1999; Gartzke, et al. 2001; Russett & Oneal, 2001). However, mostly due to the concurrent rise of nationalism, different regions of the Kingdom of Yugoslavia ended on opposing political and warring sides in the WWII.

This paper analyses whether the prevalent ethnocentric ideologies which impacted on political decisions at the regional level in the Kingdom of Yugoslavia also slowed down the integrating economic forces in the Kingdom. Widespread chauvinistic beliefs would, therefore, not only affect the political division of regions at the beginning of WWII, but also slow down the economic forces, in particular the market integration of different regions, which could encourage political "unification" in the various ethnicities and regions. The study tests the hypothesis that economic integration in the Kingdom of Yugoslavia was slowed down by the nationalist ideology, and, therefore, never fully realized, at least, not to the point where economic benefits of trade between different regions occupied by different ethnic groups were high enough to mitigate political division at the regional level during the war. It is asserted that the forces which typically play a role in enhancing economic integration existed side by side with nationalism, which presumably slows down the integration process.

Studying market integration and commerce in the Balkans during the interwar period may yield insights beyond mere intellectual curiosity. The analysis of the markets in the Balkans will provide observations from the as yet unexplored contextual background, the Kingdom of Yugoslavia in the interwar period, to the growing literature concerned with similar social phenomena. This study managed to gather a new dataset for the Kingdom of Yugoslavia to which previously developed methodology in the field of interest will be applied.

The government of the time implemented strict policies intended to deter nationalism and foster a common Yugoslav identity which would suppress and supersede the existing national identities and interests. Analysis of the trading patterns between different regions in the Kingdom of Yugoslavia may show how certain policies designed to alter the presumptions of ethnicity and identity affected the impact which nationalism might have had on economic integration.

The first part of the essay provides the historical context of interwar political and economic conditions in the Kingdom of Yugoslavia as the framework for the development of the central argument in this essay. The methodological approach used as a testing tool for the thesis is presented in the second part of this essay and mainly relies on the methodology employed by Schulze and Wolf (2012) for the case of Austro-Hungarian Empire. Their formal methodology is used as a tool for

testing the study hypothesis.[68] The third part of the study describes the data that is used in the formal analysis. In the fourth part of the paper, the results of the research are presented, applying a formal econometric analysis. This part of the paper provides confirmation of the findings from previous studies on similar topics, i.e. that nationalism impacts the formation of trade networks, increases trade costs, and consequently reduces the economic integration of different markets. In addition, these results should provide an insight into the way that very strict policies, designed to attain certain goals, might be completely ineffective for the task no matter how strict these policies are. They might even produce the opposite consequences of the ones intended. Some final conclusions and remarks on the results are presented in the fifth part of the study.

Historical Background

On July 20, 1917, the committee for the representatives of the Croatian, Slovenian and Serbian politicians and elites in exile[69] signed the Corfu Declaration[70], agreeing to create Yugoslavia, *the Kingdom of the Southern Slavs*, which would join the territories and peoples of the independent Kingdoms of Serbia and Montenegro and the former South-Slav territories of the Austro-Hungarian Empire. The newly formed kingdom was proclaimed on December 1, 1918, as a constitutional parliamentary monarchy, led by the Serbian Karađorđevic dynasty. The Kingdom of Yugoslavia incorporated the present-day states of the Republic of Serbia, Republic of Montenegro, Croatia, Slovenia, Bosnia and Herzegovina, The Former Yugoslav Republic of Macedonia, and Kosovo*[71]; in addition to the three dominant ethnic groups – the Serbs, the Croats and the Slovenes – the Kingdom of Yugoslavia included a sizable number of other ethnic groups.

Centripetal forces of market integration

One of the first policies of the Yugoslav government in 1919 was the Agrarian Reform (Petranović & Zečević, 1985, p. 275), which resulted in the breakup of privately owned large landed estates and the elimination of feudal institutions (e.g., kmetstvo) in the areas where they persisted after the end of the war. In an attempt

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[68] The methodological approach developed by these two authors has been somewhat adapted to the specific features of the time frame and region with which this paper deals.

[69] Sometimes called the *Yugoslav committee* in the literature.

[70] Further information about these negotiations and the Corfu Declaration can be found in the original documents of the time published by Petranović & Zečević (1985, pp.65-75).

[71]*This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

to officially promote free trade within the country, the government issued two official Trade Liberalization Acts, on March 18, 1919 and on November 5, 1919. These acts were introduced because the government believed that free trade would allow the uninterrupted supply of goods and services to all regions in the kingdom; the goal of these acts was to legally eliminate existing trade barriers at national and provincial levels (Miletić, 2003).

Before the passing of the Trade Liberalization Acts, trade barriers existed at both national and provincial levels; afterwards, resistance to trade liberalization in the form of trade barriers existed only at the municipal level (Miletić, 2003). Nevertheless, the Trade Liberalization Acts did not completely eliminate trade barriers. Miletić (2003) argues that the reason for this is to be found in the lack of government legitimacy before the adoption of the constitution. Thus, any discussion regarding free trade in the Kingdom of Yugoslavia becomes relevant only after 1921, when the first constitution was adopted and all official major forms of trade impediment were removed.

On June 28, 1921, the Kingdom of Serbs, Croats and Slovenes established its first constitution. This limited the king's powers, protected private property, and established "Serbo-Croat-Slovenian" as the official languages of the kingdom. In addition, the constitution achieved some sort of institutional stability, which had an impact on the economy through the influx of foreign capital immediately after the constitution was adopted (Petranović & Zečević, 1985, p. 400).

In the interwar period the most important mode of commercial transportation in the Kingdom of Yugoslavia was by rail (Latifić, 1997). Over 90 percent of goods were transported in this way. An increase in the number of imported road vehicles can be observed throughout this period, but they were not used for cargo (Petranović & Zečević, 1985, pp. 400-401).[72] The data of the Statistical Office of the Republic of Serbia indicates that the transportation of goods within the kingdom by river or sea was insignificant.

Documents from a Yugoslavian archive collection (especially collection number 65, which contains documents of the Yugoslav Ministry of Trade and Industry) show that even in the early period of the kingdom's existence the importance of rebuilding the transportation infrastructure destroyed in WWI, and investment in new infrastructure was recognized by the ruling elites as crucial to trade and the overall development of the kingdom. These documents further reveal the significant efforts made in the period 1918-1926 for the restoration of transport links that had been destroyed. Researchers do not wholly agree whether major advances were ever made during the interwar period in building the new railroad infrastructure in the Kingdom. The consensus is that Yugoslav railroads were in a dismal condition after WWI but that for the first years after the war the process of rebuilding and repair

[72] Imports of road vehicles, hence, had not substantially increased commercial transportation by road.

was slow but effective (Ilijin, 2014; Jovanović et al., 2015). While Jovanović et al. (2015) state tentatively that there was a "certain advancement in the construction of new railways," Ilijin's analysis (2014) paints a less optimistic picture. These studies are either focused on specific time periods after WWI or they do not provide convincing evidence to support their claims. One may conclude from additional sources[73], however, that the overall condition of the railroads in the Kingdom of Yugoslavia was modestly improving during the interwar period.

Figure 3.1 depicts the total railway length in kilometers (solid line) and total ton-kilometers for the transported commodities (dashed line) by year for the period observed, starting in 1922.[74] Throughout the period, weak increasing trends can be noted in the total length of track: it increased by approximately 25% from 1922 to 1939, suggesting that some improvements were made, at least in terms of length of track. Sharper and increasing trends are present in the total ton-kilometers. Between 1922 and 1939, the total length of ton-kilometers had a three-fold increase. Figure 3.1 shows that the increasing trend of total ton-kilometers was not uninterrupted since there was a sharp decline in ton-kilometers between 1929 and 1932. The series bottomed out in 1936, and the increasing trend continued afterwards.[75]

[73] Such as "Sto godina železnica Jugoslavije, 1849 – 1949", 1949; Burzanović et al., 2009; data from the book by Wiener Institut für Wirtschaftsforschung, & Wiener Institut für Wirtschafts, 1938.

[74]The first year for which data are available.

[75] Coincidentally, the break in the total ton-kilometers series coincided with the introduction of the dictatorship of King Aleksandar Karađorđević. The break in the series may also have resulted from the Great Depression, which is considered later in the study.

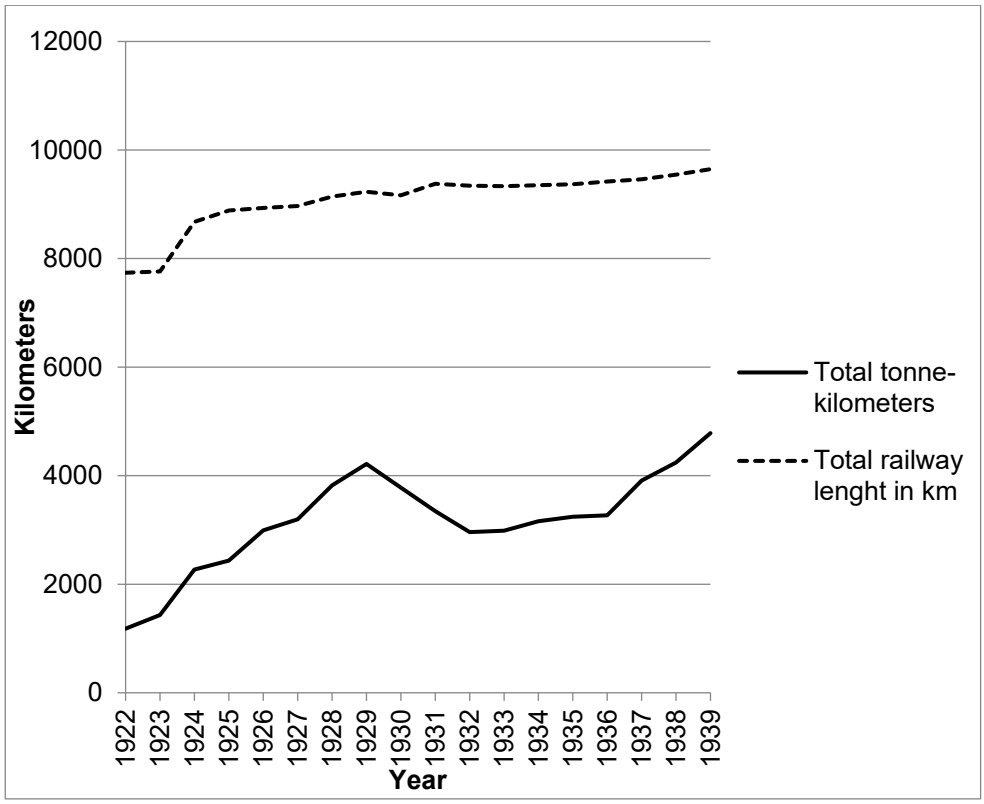

Figure 3. 1: Railroads in the Kingdom of Yugoslavia. *Source:* Statistical Office of the Republic of Serbia; publication "Jugoslavija 1918-1988, Statistički godišnjak"

Centrifugal forces of market integration

Between the conclusion of WWI and the beginning of WWII, government-sponsored endorsement of free trade in the Kingdom of Yugoslavia went hand in hand with the elimination of trade barriers and opened a path to increased commercial activities among Yugoslav "member states". However, the formal removal of institutional trade barriers among these "member states" and improvements in the transportation infrastructure would have been irrelevant without the support of the prevalent ideologies (McCloskey, 2015).

Ethnocentric ideologies may have inhibited the creation of trade networks between ethnically different markets and prevented the potential commercial cost reductions. Theoretically, the formation of trade networks reduces trading costs. One can identify two major channels through which ethnic networks might promote trade between the markets (Greif, 1993; Rauch & Trindade, 2002). First of all, networks could provide possible "supply centers" of market information. Secondly, commercial networks could create mechanisms for community administration and the enforcement of penalties for traders who disregarded the established rules of the

community. Given that trade networks tend to evolve along socio-cultural and ethnic lines (Greif, 1993), two markets characterized by modest or absent ethno-linguistic similarities, or, in this case, ethno-confessional similarities,[76] are, *ceteris paribus*, less likely to trade more with each other than markets with larger ethno-confessional similarities. These theoretical considerations are empirically observed in some recent studies in the field (such as Schulze & Wolf, 2012 for the case of the Austro-Hungarian Empire).

Openly expressed nationalism was part and parcel of the dominant ideologies in the Kingdom of Yugoslavia. The question why nationalism existed in the kingdom is extremely complex and is beyond the scope of this study. It is relevant that some general variables impacted on the popularity of nationalism in this region at the time: the history of the regions constituting the Kingdom, the rise of nationalism in Europe, unequal distribution of war reparations (Yugoslavian archive, collection 65, folders 1-3), Serbian dominance in political decision making, etc.

In spite of the consensual creation of the Kingdom and adoption of the new constitution, the nationalistic narrative was present even in the Kingdom's earliest years. The following quotation from the Memorandum of the Croatian political block[77] (Petranović & Zečević, 1985, p.108) well exemplifies the ongoing ethnic rivalries:

> Serbian politicians…inaugurated under the aegis of Yugoslav national unity a Croat-eating policy. The primary and obvious aim of this policy is simply to ethnically destroy the people of Croatia.

This paper also considers covert economic nationalism; its activities are often not documented because of their informal nature. Nevertheless, there is some documented historical evidence suggesting that trade in early Yugoslavia was not immune to ethnocentric strife; that multi-ethnic trade relationships were manipulated by some trading cooperatives and used to promote certain political ideas. Specifically, evidence was found in the Yugoslavian archives among documents issued by the Ministry of Trade and Industry at the time that commercial actions were manipulated in order to support the nationalistic narrative. The documents showed that the prices of wheat sent from Belgrade to Croatian cities were intentionally inflated by Croatian trading cooperatives so that the nationalists in Croatia could support the rumor that the Serbs were setting high prices in order

[76] The methods of measuring ethnic similarities and the reasons that religious similarity is used instead of, for instance, language, to account for ethnic differences are discussed in the third part of this study.

[77] The Croatian political block was made up of the Croatian political parties. Parties constituting this heterogeneous coalition shared only one aim: to show the strength of Croatian political will in opposition to the so-called centralist powers (Petranović & Zečević, 1985, p.108).

to "*starve the Croats*" (Yugoslavian archive, collection 65, folder 1, file 1). Moreover, the documents show that public officials in the Ministry of Trade and Industry appointed to a certain region could, as a rule, only share the dominant nationality of the region; otherwise, the local trading unions would protest.[78] [79]

The above discussion and examples provide two additional reasons, besides trade networks, for supposing that nationalism influenced the domestic integration in the Kingdom of Yugoslavia. Advocates of ethno-centric ideologies had been manipulating trade in order to strengthen their political narrative. Finally, the nationalistic ideology may have persuaded people to stop trading with other nationalities because of the ethnocentric beliefs rooted in nationalism. These are probably the reasons writers on the period considered nationalistic programs exogenous factors in the integration process (Suesse, 2014, for instance).

Royal Dictatorship

Between 1920 and 1928, ethnic tensions between the Serbs and Croats continued to escalate (Glenny, 2012). The threat of Croatian secession resulted in the constitutional and parliamentary crisis which political parties could not resolve (Dobrivojević, 2008), On January 6, 1929, King Aleksandar Karađorđevic suspended the parliament and the 1921 Constitution and established a dictatorship.[80] The name of the Kingdom of Serbs, Croatians and Slovenes was changed to the Kingdom of Yugoslavia in 1929. The king formally eliminated territorial borders between the "member states", eliminated the existing 33 regions (*oblasts*), and divided the country into nine provinces *(banovine)*. None of the new provinces was large enough to be economically self-sufficient.[81] To preserve the unity of the

[78]The trading unions would complain how the appointee does not understand the language, which as it will be shown, is just an excuse for ethnocentric ideology since the languages were not that different in the Kingdom.

[79] The examples provided might lead to the fallacy that tensions existed only between the Serbs and the Croats. However, the examples in this study are chosen and presented with the sole intention of improving its comprehensiveness. The relationship between Serbs and Croats with respect to national identity was probably more intense than the relationships between other ethnicities due to Italian influence (Yugoslavian archive, collection 65, folder 1, file 1), which is the reason why the development of this relationship is used as a "descriptive tool" for the ethnic conflicts in the kingdom. Nevertheless, it should be noted that ethnic conflicts existed between the country's other national groups (Yugoslavian archive, collection 65, folder 1, files 1-4).

[80] Since almost all political power was now in hands of the King, scholars use the term the "King's dictatorship" in order to refer to the political state of affairs from 1929 to 1934. For an in-depth discussion of the dictatorship, see Dobrivojević (2008).

[81] The King thought that a division of the country making regions economically "self-sufficient" would promote nationalism and provide support for potential secession. Smaller regions, economically dependent upon one another would have a higher incentive to stay within the same borders (Kovačević, 2015).

kingdom and suppress nationalism, the king outlawed all political parties based on ethnic, national, or religious affiliation. His goal was to replace the old parochial ethnic sentiments with a new, unified Yugoslav national sentiment, and his policies were crafted to create a "melting-pot" wherein his subjects would begin to feel like Yugoslavs rather than Serbs, Croats, Slovenes, etc.

Above and beyond these policies, King Aleksandar advocated an ideology of "integrated Yugoslavenism".[82] Integrated Yugoslavenism included language unification (Petrović, 2009) and the inclusion of the Yugoslav national idea in the standardized system of education (Troch, 2010), the legal system, and national holidays. Since the constitution was suspended and the freedom of the press no longer guaranteed, the government heavily controlled and censored the press to promote the sense of national unity, and cultural life was managed in a way that promoted the ideology of Yugoslavenism (Dobrivojević, 2005).[83]

On October 9, 1934, King Aleksandar Karađorđević was assassinated in Marseilles. The assassination was organized by the pro-Bulgarian Internal Macedonian Revolutionary Organization[84] in alliance with the Ustashe, the extreme right-wing Croatian nationalist secessionist movement. The assassination of the King marked the end of the royal dictatorship and the end of the policies intended to create a unified Yugoslavian national sentiment.

A full decade after the creation of the Kingdom of Yugoslavia, the decrees and policies of King Aleksandar's January 6 Dictatorship singularly failed to stimulate popular enthusiasm for the national unification of the South Slavs (Petrović, 2009). In the aftermath of Aleksandar's assassination, it was evident that there could be no return to the dictatorship and the decrees/policies of Yugoslavenism. The establishment of the *Banovina Hrvatska*[85] provided Croatia's political elite with a sense of greater autonomy within the Kingdom and appeared to be a good compromise which could potentially end ethnic conflicts. The status of Croatia within the Kingdom of Yugoslavia appeared to have been resolved, and the ill-founded belief amongst the ruling elite that it would be possible to preserve the Kingdom of Yugoslavia lasted until 1939.

On April 10, 1941, however, Yugoslavia was occupied by the Axis forces, and the Independent State of Croatia, an Axis puppet state, was founded under the ultra-nationalist Ustashe leader Ante Pavelić. Engaged in a bloody civil war and the

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[82] The official name for the ideology which promoted a unified Yugoslav national sentiment.

[83] For example, articles published in the newly-established magazine "The Yugoslav" obeyed the principles of a politically acceptable ethnic identity within the limits of integrated Yugoslavenism (Petrović, 2009).

[84] IMRO or VMRO, as they are referred to in the literature. This organization fought for the secession of Vardar Macedonia from Yugoslavia.

[85] An autonomous province consisting of those regions with a majority Croat population.

struggle for national liberation, Serbia joined the Allies. Thus, in WWII Croatia and Serbia found themselves on opposing sides.[86]

If ethnocentrism had been a significant obstacle to economic integration, the royal policy of creating an artificial Yugoslav "melting-pot" would have been important. Had Aleksandar's policies successfully altered the dominant ethnocentric ideologies and suppressed ethnocentrism, they would have had a positive effect on regional economic integration in this kingdom. Dividing a country into regions which were not self-sufficient may also be thought of as intra-trade enhancing policy. However, it is possible that royal policies were mostly counterproductive. Although most of the public activities that encouraged nationalism were forbidden, "undetected" or "informal" ethnocentrism may have remained alive in commercial activities. For instance, one may always decline to trade with a member of a different ethnic group without showing explicitly that the refusal to participate is ethnically based. Individuals who were prevented by law from expressing their strong ethnic beliefs may have continued to participate covertly in ethnically motivated decision making. In this case, even if their hidden attitude was obvious, the authorities may not have labeled them as nationalistic. Moreover, the forceful suppression of ethnocentrism may backfire and produce a higher degree of nationalism, i.e. the reaction to the king's autocracy may have been an even stronger nationalism which would affect the economic integration even more. The possibility of rising nationalism due to the King's dictatorship is inferred from numerous historical documents, such as the letter of Croatian politicians to the League of Nations in 1930 where they express concern at the rise of Serbian nationalistic hegemony, while simultaneously implicitly justifying their ethnocentric ideas as a reaction to the King's measures (Čulinović, 1968).

Methodology

The formal estimation of the impact of nationalism on economic integration will rely on *The Law of One Price*, as in Engel and Rogers (1994), Trenkler and Wolf (2005), Federico (2007), and Schulze and Wolf (2012). Systematic and non-random

[86] Certain regions, such as today's Serbia, formally joined the allies and were occupied by the Axis forces. Others, such as Croatia, formally joined the Axis. Although it could be argued that Croatia was simply a puppet state of the Axis, and that there were resistance movements in Croatia, formally Croatia stayed independent during the war while Serbia was formally occupied. In general, the statement that these regions which constituted the Kingdom ended up on opposing warring sides is vague, since it ignores the detailed depiction of the historical role of given region in the war. However, although vague as a historical interpretation, the statement that certain regions were on opposing warring sides is correct and it should not affect the main results of the analysis conducted in this paper.

deviations from this law will be used as indicators of the total cost of trade, as in Schulze and Wolf's (2012).

Primarily, it is the relationship between trade costs and price dynamics that should be analyzed. Analysis of a kind would be a good starting point in formulating the econometric model to which data will be applied. Let the total cost of trade be equal to $(1 - e^{-\tau})P_{i,t}$, where *P* is the price of a certain good in a market (city) *i* in period *t*, and $\tau > 0$ is a cost parameter. Following further methodology employed by Schulze and Wolf (2012), let city *i* trade with city *j*, where $P_{i,t}$ and $P_{j,t}$are the respective prices of certain goods in these cities, and $(p_{i,t} - p_{j,t}) = gap_{ijt}$ represents the percentage gap between these prices.[87] Trade revenue is, therefore, $e^{-\tau}P_{i,t}$ for the unit of a good sold in market *i*, and trade is only profitable in the cases when it is traded from city *j* to city *i*, if $e^{-\tau}P_{i,t} > P_{j,t}$. The above provides a condition which will be used in formulating an econometric model: $\log\left(\frac{P_{i,t}}{P_{j,t}}\right) = gap_{ijt} > \tau$. Note that parameter τ determines the area for arbitrage.

As in Schulze and Wolf (2012), the total cost of trade which determines economic integration is assumed to be composed of three elements:[88]

1. Transportation costs which are completely, or at least to a great extent, dependent on the distance between markets.
2. Trade costs that depend on networks and related trade creating factors.
3. Market-specific trade costs, specific to a particular market but not specific to any pair of markets.

Transportation costs in the present study are approximated by the rail distance between markets *i* and *j* in kilometers[89], while the ethnic networks effect is approximated by the religious similarity between markets *i* and *j*. Religious similarity is calibrated by:

[87] It is assumed that the trade costs are proportional to the prices in the importing market place (Schulze & Wolf, 2012).

[88] The existence of the formal trade barriers on the "member state" level is not assumed, since for the time and place of the analysis formal trade barriers did not exist.

[89] Documents from Yugoslavian archives (collection 65, folders 1-5) suggest that the freight rates were determined in accordance with the railway distance. It should be noted, however, that this suggestion was inferred from the content of various documents and no explicit mention of a relationship between freight rates and railway distance was found. Hence, the study is unable to provide the direction or intensity of a possible bias when using the railway distance as an approximation for the freight rates concerned in this issue.

$$religion_{ij,t} = \sum_{r=1}^{n} (c_{i,t}^{r} * c_{j,t}^{r})$$

where $c_{i,t}^{r}$ is the percentage share of religion *r* in the market *i* at time *t,* and *n* is the total number of religious groups. This measure is based on the ethno-linguistic measure presented in Schulze and Wolf (2012) and varies between 0 (no similarities between markets *i* and *j*) and 1 (no differences). This can be observed as a "matching probability" which is used as a proxy for membership of a specific ethno-confessional network.

Schulze and Wolf (2012) use language in order to estimate bilateral ethno-linguistic similarity between the populations of the observed markets. In the present study, however, language differences cannot be used to provide a realistic measure of ethnic similarity because the languages in the Kingdom of Yugoslavia, except for Slovenian, are not sufficiently dissimilar (Lencek, 1976; Brozović & Ivić, 1988). Even if the languages were not closely related or were desirable in the study despite their similarity, it would be practically impossible to use them since Serbian, Croatian, Macedonian, Montenegrin, and Bosnian, are often identified as 'Serbo-Croat' in the censuses, which are the only known data sources for ethnic composition.

It is safe to assume that, excluding Slovenian,[90] language differences among the ethnic groups of the Kingdom of Yugoslavia would not create any major frictions in trade transactions. In the Balkans, much of the ethnic sentiment is based on religious affiliation. In certain censuses, an individual declaration of being a Muslim is treated both as a statement of religious confession and ethnicity. In the case of the Kingdom of Yugoslavia, it is more reliable to use religious confession rather than language in the assessment of ethnic differences.[91]

The above discussion suggests an econometrical specification formulated as follows:

[90] If the Slovenian language created a special barrier to trade, this would be captured in one of the market specific dummies since, as is shown below, we are observing only one market for Slovenia. This hypothesis is valid if we assume that the other languages are different from Slovenian to a similar extent. The assumption also applies to Macedonian, which is also sometimes observed as specific to a certain degree.

[91] The close ties between ethno-confessional differences and nationalism in the Balkan region are studied in detail in Bardos (2013).

$$\log\left(\frac{P_{i,t}^{g}}{P_{j,t}^{g}}\right) = \alpha_0 + \alpha_1 \log(raildistance)_{ij,t} + \alpha_2 religion_{ij,t} + \sum_{h=1}^{c} \gamma_h market_h + \varepsilon_{ij,t}^{k} \qquad (3.1)$$

where $\log\left(\frac{P_{i,t}^{g}}{P_{j,t}^{g}}\right)$ is the logarithmic price ratio of the good *g* between markets *i* and *j* in period *t*; $raildistance_{ij,t}$ is the railway distance between markets *i* and *j* in period *t*; *market* is a set of dummies over all markets *h* which captures unobservable market-specific factors; $\varepsilon_{ij,t}^{k}$ is an i.i.d. error component; while the index *g* represents the good which is observed. The markets are geographically defined – one city is considered to be one market – since price data are available at the city level only.

If the above hypothesis is valid, it should be expected that the coefficient of the *religion* variable (α_2) is negative and significant. This would suggest that the pairs of markets with higher ethno-confessional similarities will be more closely integrated since the costs of trade are higher for the pairs of cities with smaller ethno-confessional similarities. In the case of the Kingdom of Yugoslavia, if we accept the premises that ethnicities were determined significantly by the religious practice, this would suggest the existence of economic nationalism affecting the economic integration of markets.

Another expectation is that the coefficient of the railway distances is positive; the further the markets are from each other, the higher the trade costs are. If both of these expectations turn out to be true, it is likely that *centrifugal* and *centripetal* trade forces concurrently affected the market integration in the Kingdom of Yugoslavia.

Federico (2007) argues that, given independent variables that are strictly exogenous, it is safe to use the OLS estimator in estimating the theoretical model to present. In addition, time-invariant sources of potential problems of estimation are mostly eliminated by including the market specific variables. For instance, the inclusion of market specific dummies controls for the potential of omitted variable bias caused by the major religion practiced in the given market. Helble (2006) argues that the type of religion practiced significantly affects the level of trade. The major religion practiced will simultaneously be related to our measure for ethnicity. But this problem, as well as many other time-invariant problems (such as minor impediments to trade at the municipality level, or a particularly inaccessible position of the market) should in principle be captured within the market-specific controls. Although the direct implications of the theoretical model are followed, additional caution can be beneficial in terms of the resulting robustness especially when certain contextual facts are taken into account and OLS is used to estimate the specification of model (3.1).

Since the methodology relies on *The Law of One Price* it has to be established that the observed markets traded with each other. Otherwise, the estimated

specification of the model (3.1) will be imprecise. Unfortunately, there is no quantitative evidence leading to waterproof conclusions about the volume of the trade between the markets in the Kingdom of Yugoslavia. Documents from the Ministry of Trade and Industry, however, provide solid historical backup for this necessary condition (Yugoslavian archive, collection 65, folders 1-5).

It is unlikely that many time-variant factors are missing since the estimations refer to a relatively short timeframe. Nevertheless, to avoid errors in assessing the observed relationships, some factors must be accounted for. An appropriate example for one time-variant factor that must not be neglected is the economic consequences of the Great Depression, which were borne in the Kingdom of Yugoslavia during the observed period. The Great Depression may simultaneously have affected the trade costs and the volume of trade which, preventing some economies of scale, would have an impact on the economic integration. In addition, some researchers suggest that the Great Depression increased economic and political nationalism (Robbins, 2011) and had a negative impact on the formation of commercial networks.

The impacts of the Great Depression would not have been uniform over time. Therefore, to the main specification (3.1) should be added further controls that could approximate some of the time-variant factors. Unfortunately, this will not eliminate the possibility that other undetected time-variant factors are distorting the results. However, additional robustness checks with minor changes in the specification should provide additional support for the strength of the results obtained.

Limited data availability introduces some restrictions on the possible methods for estimating the desired relationships. For instance, if fixed-effects estimators were used, it would not be possible to track some of the key variables of interest. In this case, the fixed-effects estimator, although more consistent than pooled OLS, would not provide complete information of interest for this study because some of the important variables are time-invariable – railway distances do not change over time, while the measure for ethnic similarity changes only once, as the next part of the paper shows. It is possible, however, to interpolate/extrapolate the variable for religious similarity between cities. This can provide a proxy for time-varying series for ethnic similarities, enabling the usage of fixed-effects estimators for estimation of the observed relationships. Fixed-effects estimation with time-varying ethnic similarities still does not allow the tracking of the variable for transportation costs. Nevertheless, results obtained from utilization of fixed-effects estimators can potentially serve as a robustness check which could provide additional confidence in the consistency of estimation.

It turns out that the estimation process provided meaningful results even when the main estimations relied on pooled OLS, in the absence of more suitable estimators for this study. For that matter, the main specification (3.1) was estimated with pooled OLS and random effects methods and a Hausman specification test was conducted. From the results, it can be concluded that the differences in the

coefficients obtained from different methods are not systematic[92]. In other words, the Hausman test suggests that using the pooled OLS is permitted. Even though this is no more than a suggestion from a single test that relies on certain assumptions, it should increase the reliability of the results obtained via pooled OLS.

Data

Data for the Kingdom of Yugoslavia are limited but can be considered sufficient to provide some insights into the relationships observed.

From 1926-1939 the Statistical Office of the Republic of Serbia[93] kept track of the retail prices for 13 products on 10 markets. Only the price data for several products can provide meaningful information with respect to the theoretical framework used in this paper. Since this research relies on *The Law of One Price*, the quality of the goods used for the estimation should be as homogenous as possible. For some products, such as laundry-detergent (soap), various meat products, cheese, etc., it is not safe to assume that the measured prices reflect the prices of goods of similar quality. Statistical offices of the time most likely attempted to measure the prices of similar types of product, but there is no evidence to confirm this supposition especially concerning some vaguely labeled products. For instance, products categorized as "in-bone pork cuts" could refer to a specific cut of pork or to the average price of in-bone pork meat.

Another property that a given product should possess if its price is to provide meaningful information for the purposes of this paper is *tradability*. If a product is untradeable then its price reveals nothing about the trade costs or the market integration.[94] In addition, some goods can be tradable but still not traded in sufficient volume for their price to provide any evidence of trade costs.[95] These are some of the reasons why researchers use the price of grains in most of the studies that use the above-described methodology.

The datasets from the Statistical Office of the Republic of Serbia do not provide prices of grains for the observed periods. However, there is one product that can be

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[92] Under 5% level of significance the null hypothesis could not be rejected: that the difference in coefficients is not systematic between the models.

[93] These data have been collected from yearbooks, mainly from the Statistical Yearbook of Yugoslavia 1918-1988 (Statistički godišnjak Jugoslavijie (1918-1988)).

[94]For example, it is reasonable to doubt that the quality of highly perishable food items, such as white cheese or meat, transported on trains with poorly developed or non-existent refrigeration, can be preserved.

[95]For instance, the prices of goods specifically related to religion-based dietary preferences, such as meat products, should not be taken into consideration since the proposed measure for ethnicity is based on religion.

safely assumed to be homogenous (potatoes) and three that are tradable or at least accurately indicative of grain prices (white bread, black bread, and white wheat flour). The trajectory of these prices in dinars[96] per kilogram over the years is presented in Figure 3.2. While price levels for the chosen products differed, the general trends of the price movements over time were quite similar for all the products observed. It is asserted that the prices of these four products are the least likely to create bias because they reflect the assumption of homogeneity in the case of potatoes, and the price of grains which in most cases satisfies the assumption of tradability in the case of wheat flour and breads. It is also assumed that the prices of these products were not regulated during the observed period. The existence of minor, local, and undetectable price controls will be captured by market (city) specific variables.

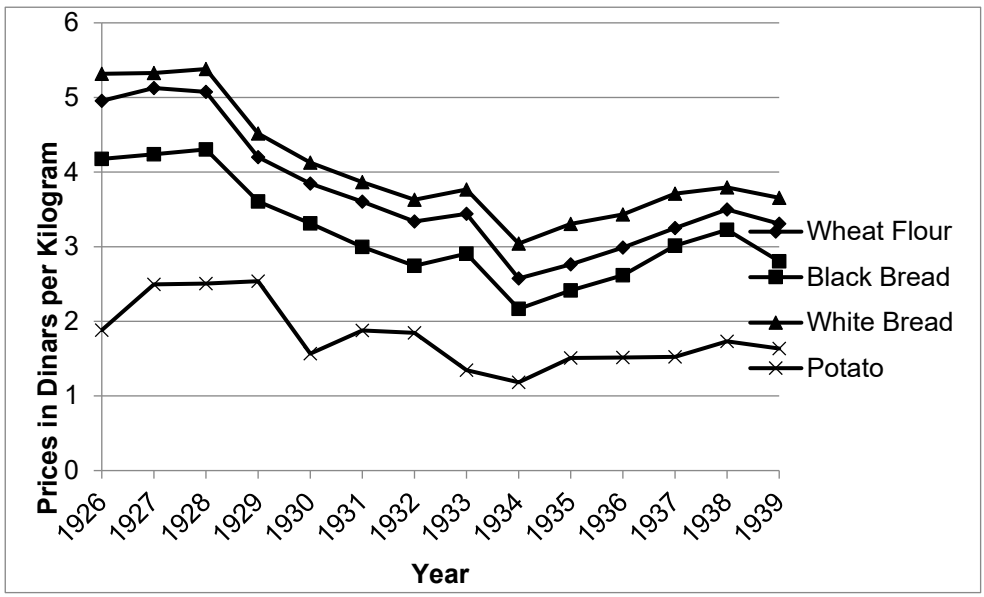

Figure 3. 2: Prices of selected products through years. *Source:* Statistical Yearbook of Yugoslavia 1918-1988 (Statistički godišnjak Jugoslavijie (1918-1988)

It is possible to extract prices in dinars per kilogram for these four products from 10 major cities in the Kingdom of Yugoslavia: Belgrade, Banja Luka, Sarajevo, Split, Zagreb[97], Skoplje, Cetinje, Ljubljana, Niš, and Novi Sad. Three of the cities are located in the present-day Republic of Serbia (Belgrade, Nis, and Novi Sad); two in

[96]Currency used in the Kingdom of Yugoslavia.

[97]Prices from Zagreb for the year 1926 were not available for some products. We have interpolated their values by using a simple linear trend.

the present-day Bosnia and Herzegovina (Sarajevo and Banja Luka); two in the present-day Croatia (Zagreb and Split); one in the present-day Slovenia (Ljubljana); one in the present-day Former Yugoslav Republic of Macedonia (Skoplje); and one in the present day Republic of Montenegro (Cetinje).

Unfortunately, the data from Cetinje must be disregarded, since the city of Cetinje had no direct railway connection to any of the above cities during the observed period (Burzanović et al., 2009). Consequently, it would be very difficult, if not impossible, to arrive at an accurate estimate of the transportation costs between Cetinje and these trade centers; and, even if it were possible to accurately calculate transportation cost estimates, they would most likely be extraordinarily high, creating unnecessary outlier distortion of the final cost analysis.

The railway distance for 36 city-pairs are calculated mostly from the information obtained from the book *Sto godina železnica Jugoslavije* (A Hundred Years of Railways in Yugoslavia). Scattered data about the distances between different city-pairs have been collected and rearranged in a comprehensive dataset of railway distances for all city pairs in kilometers.

Additional railroads were built during the observed period, but the data from *Sto godina železnica Jugoslavije*, indicate that the railway distances between the city-pairs were not altered and that the quality of railways was not improved enough to reduce the transportation costs significantly. The data suggest that the measure of railway distance is time-invariant because the distance between city-pairs stayed the same during the entire observation period of 1926 and 1939. Due to the lack of direct length measurement of different railway segments between city-pairs, estimated rail length measures were added to calculate the approximate railway length. This method can result in measurement errors[98] which would have a distortive impact on the accuracy of the estimations of interest. To ensure that the measurement results obtained were not affected by the possible measurement errors, the shortest, straight-line distance between pairs of cities (the distance "as the crow flies") will also be used as the transportation cost approximation in estimation (3.1) as an additional robustness check.

Census data from 1921 and 1931 provided by the Statistical Office of the Republic of Serbia are used to create the measure of religious similarity. Data from the 1921 census were used to create the measure of religious similarity between all city pairs during the period between 1926 and 1931, and the 1931 census data were used to generate religious similarity measure for all city pairs during the period between 1931 and 1939. The religious categories used in these censuses are as

[98] To avoid possible errors in measurement we have also compared our estimates with the today's distances between city-pairs observed by using the tariff calculator from web-page: http://jizdnirady.idnes.cz/vlakyautobusymhdvse/spojeni/. The distances which the tariff calculator reports are very similar to our estimations of the railway distances. Clearly, improvements were made over the years and the distances are not exactly the same for some city pairs.

follows: Orthodox-Christian, Catholic-Christian, Evangelical Christian, and Muslim.[99] Table 3.1 presents the constellation of religions in the cities observed.

Table 3. 1: Religious Structure in the Cities of Interest

	Census 1921					Census 1931				
City	*Orthodox*	*Catholic*	*Evangelical*	*Muslim*	*Other*	*Orthodox*	*Catholic*	*Evangelical*	*Muslim*	*Other*
Belgrade	99.45	0.49	0.03	0.01	0.02	77.70	15.28	1.33	1.47	4.23
Nis	97.35	0.78	0.06	1.52	0.30	94.48	2.28	0.05	2.79	0.40
Skopje	51.75	0.69	0.06	46.19	1.30	55.13	2.91	0.08	39.71	2.18
Cetinje	97.81	1.24	0.02	0.91	0.03	96.12	2.95	0.01	0.80	0.12
Banja Luka	57.33	22.50	0.76	17.08	2.33	59.93	27.24	0.26	11.25	1.32
Sarajevo	34.02	18.22	0.19	44.68	2.89	38.55	20.43	0.42	34.93	5.68
Zagreb	23.51	74.84	0.04	0.07	1.55	7.16	85.08	1.11	0.67	5.98
Split	17.11	82.73	0.01	0.08	0.08	2.51	96.94	0.07	0.09	0.40
Novi Sad	21.25	61.74	13.45	0.12	3.44	38.80	42.75	10.75	0.81	6.89
Ljubljana	0.63	96.57	2.59	0.06	0.15	0.35	99.45	0.11	0.06	0.03

Source: Statistical Yearbook of Yugoslavia 1918-1988 (Statistički godišnjak Jugoslavije (1918-1988)

The obtained data polled over the 14-year period resulted in 2016 observations. These data-points were used to estimate specification (3.1) and check robustness. In Table 3.2 the summary statistics for the key variables from the sample are presented.

Table 3. 2: Summary Statistics of the Main Variables

Variable	Number of observations	Mean	Std. Dev.	Min	Max
Absolute price difference	2016	0.515	0.383	0	2.363
Railway distance	2016	588.715	281.611	77.1	1308.300
Religious similarity	2016	0.341	0.228	0.010	0.968

Source: Statistical Yearbook of Yugoslavia 1918-1988 (Statistički godišnjak Jugoslavije (1918-1988)

Results

As a starting point, some general patterns of the economic integration in the Kingdom of Yugoslavia can be determined by inspecting the coefficient of variation (CV) of prices. Figure 3.3 depicts the overall (between) CV – solid line – for the observed period for the specified cities in Serbia and Croatia.[100] Prices were

[99] Besides official religions, there are two more categories: other and unknown. These were also included in the estimations because it can be considered that they also provide some information about the ethnic structure of the population.

[100] To represent both the overall and within CVs of prices, the analysis of the CV is only possible for prices in the countries for which data for 2 or more cities are available, i.e. Serbia and Croatia. It can be conceded that, for the time observed, Bosnian borders were not straightforward and that the inclusion of Belgrade as the capital of the kingdom would cause unnecessary distortion. However,

averaged over the observed products for every year. The overall coefficient of variation declines only until 1929 when the king's dictatorship policies were introduced. Afterwards, hardly any overall integration occurred; since the CV never reaches levels near that of 1928. It is interesting, nonetheless, to note that a major decline in overall CV took place between 1934 and 1937, after the abandonment of the king's policies.

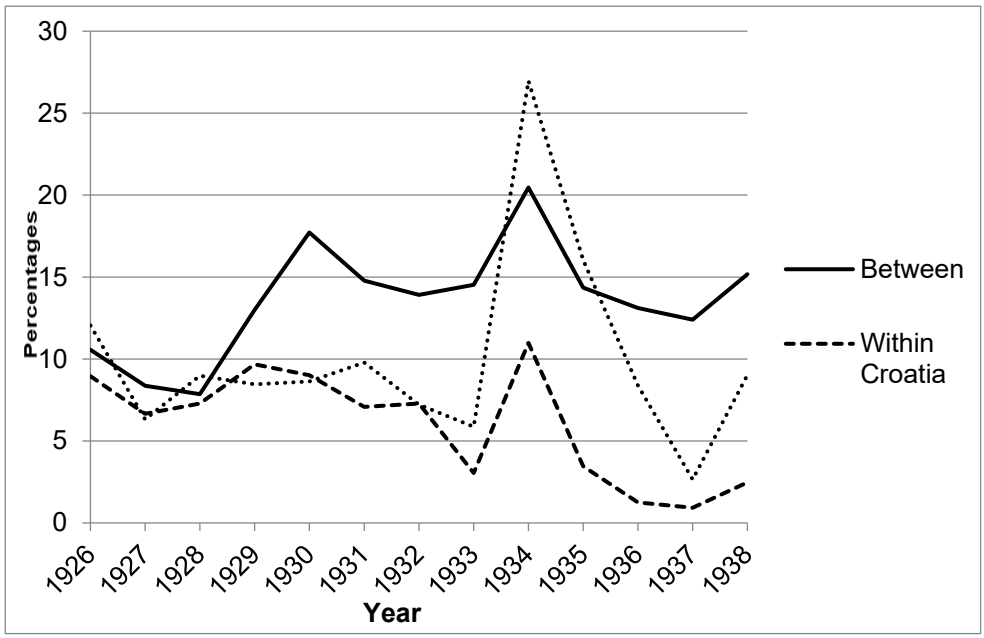

Figure 3. 3: Integration Measured by Coefficient of Variation

Although the level of overall integration was lower than the level reached in 1928, trends of declining coefficients of variation are observable for the intra-trade (within CV). Declining trends for within Serbia (dashed line) and within Croatia (dotted line) levels of the coefficient of variation suggest that the cities within these "member-states" were becoming somewhat more integrated during the observed period. Clearly, these small declining trends are observable only when the year 1934 for Croatia, and 1934 and 1935 for Serbia are considered to be outliers. Since King Aleksandar was assassinated in 1934 it could be thought that this event caused the level of trade in general to decline. Lower levels of trade in these years may also be the consequence of the reduction by almost 10% of total output in the country in 1939. Another explanation may be that the spike in CV was a reflection of the

when the prices from Bosnian cities and Belgrade are included, the provisional conclusions do not change; only the CVs have higher variability, as expected.

concurrent price decline and stable rail transportation costs (Federico and Sharp, 2013). However, for now, there is no robust historical evidence that any of the explanations provided is actually responsible for the spike in the coefficients of variation. Whatever the reasons for the outliers, these observations should not be neglected in further analysis. Nevertheless, they will probably not severely distort the overall results and conclusions.

The percentage difference between overall (between) CV and average within CV is plotted in Figure 3.4. As expected, according to the observations from Figure 3.3, the percentage difference of between and within CV shows a rising trend over the period observed, suggesting asymmetrical economic integration in the kingdom, with the years 1934 and 1935 observed as outliers.

The concurrent existence of integration within countries and the absence of integration on the overall level, based on the CV of prices, can be the result of transportation costs. But the distance between the Croatian city of Zagreb and the Serbian city of Novi Sad is 388km, and the distance between Zagreb and the Croatian city of Split is 418km. On top of that, judging by the width of the railway tracks and the permitted speed (based on data from the Wiener Institut für Wirtschaftsforschung, & Wiener Institut für Wirtschafts, 1938), it appears that the railway from Novi Sad to Zagreb was of better in quality than that from Split to Zagreb. A different explanation for the "asymmetrical" integration may be found in market-specific factors: the fact that Split was a port, or the fact that Novi Sad had an official commodities market.

Finally, as the hypothesis of this paper suggests, the reason for the asymmetrical" integration may be found in the ideologies prevalent at the time. To assess whether this is true, other approaches must be taken beyond this analysis of the coefficient of variation.

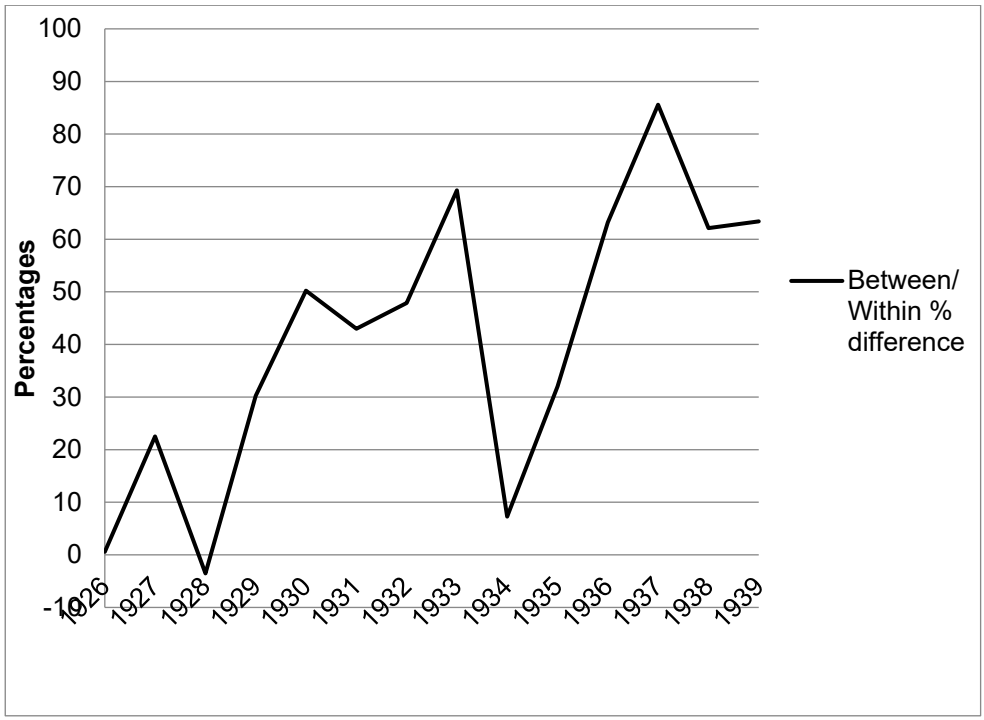

Figure 3. 4: Percentage Difference of Between and Within CV

Estimation

In Table 3.3, column 1, the results of the main estimation (3.1) are shown, without the variables that represent the city fixed effects. In the same table, column 2, the main results of a pooled ordinary least squares estimation of specification (3.1) are presented. In both of these specifications, the variable for religious similarity behaves as expected and in accordance with the hypothesis proposed. The coefficient for religious similarity is negative and significant, under standard statistical significance levels (1%), which suggests that city-pairs with more similar ethnic population structures, in terms of the religion that people were practicing, have on average smaller trade costs (are more integrated) than city-pairs where the ethnic structure of the population is dissimilar. Only when it is controlled for the city specific factors is a variable which approximates transportation costs significant and positive, which is in line with expectations.

Table 3. 3: Pooled OLS Estimation

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
log(Rail distance)	-0.0102	0.0745**	0.0745**	0.0745**	0.0744**	
	(0.0024)	(0.0031)	(0.0031)	(0.0031)	(0.0031)	
Religious similarity	-0.0895***	-0.0740***	-0.0741***	-0.0739***	-0.0741***	-0.0759***
	(0.0413)	(0.0064)	(0.0064)	(0.0064)	(0.0064)	(0.0064)
Controlling for the growth	No	No	No	Yes	No	No
Controlling for the lag of growth	No	No	No	Yes	No	No
City specific variables	No	Yes	Yes	Yes	Yes	Yes
As the crow flies distance						0.06300**
						(0.0033)
Controls for the years 1934 and 1935	No	No	Yes	No	No	No
Control for the year 1932 and after	No	No	No	No	Yes	No
Constant	0.0932***	0.0160	0.0204	0.0204	0.0232	0.0196
	(0.0165)	(0.0224)	(0.0246)	(0.0511)	(0.0214)	(0.0229)
Observations	2,016	2,016	2,016	2,016	2,016	2,016
R-squared	0.007	0.137	0.142	0.139	0,137	0.137

Beta coefficients presented; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Estimations presented in Table 3.3, columns 1 and 2, demonstrate the importance of the inclusion of city (market)-specific variables in the main estimation. When the city-specific variables are included, significance levels of the coefficient for the variables representing the railway distance and ethnic similarity are different and explain the greater degree of variability of the dependent variable. That is to say, in any estimation which ignores the city-specific effects, the coefficient for the railway distance is not significant, whereas when the city-specific effects are controlled for it is significant at the 5% level. In addition, when city-specific variables are not included in the estimation, only around 0.7% of the total variability in the average price differences is explained, while when the city-specific effects are controlled for around 14% of the total variability in the dependent variable is accounted for.[101]

Observation of the trajectory of the coefficient of variation suggests that the years 1934 and 1935 should perhaps be treated as outliers. In column 3, Table 3.3, the dummy variables for these years were included in the main estimation. As can be observed, none of the coefficients of interest has changed significance or level.

In order to grasp the effects of the Great Depression, which may bias the estimations, the variables for growth rates and lagged growth rates of real GDP per capita measured in 1996 Purchasing Power Parity (PPP) dollars were added (Maddison Project, 2013) to the specification (3.1). The growth rate of the economy may reflect accurately enough the possible effects of the Great Depression on the key variables of interest. It seems meaningful to control for the contemporaneous effect of the growth as well as the lagged effect, to capture the possibility that trade

[101]This can be inferred by observing the coefficient of determination (R-squared).

reacts slower to changes in general economic conditions (Table 3.3, column 4). Comparing it with the main estimation (column 2 in Table 3.3), the coefficient for religious similarity has not changed: it is still statistically significant, negative and almost the same in its level.

Using GDP growth as the approximation for the effects of the Great Depression may not be an adequate solution to the omitted variable bias problem, and the inclusion of growth could create non-existent estimation distortions. For instance, it would not be hard to find the factors that impact simultaneously on economic growth and market integration (the degree of specialization, for instance). Thus, the inclusion of the variable for economic growth would generate a new omitted-variable bias problem which did not exist in the specifications presented above.

The impact of the Great Depression on the Yugoslav economy, according to Kovačević (2015), was insignificant at its outset. Kovačević identifies 1932 as the year in which the Great Depression made its greatest impact on economic activity in the Kingdom of Yugoslavia and further argues that the effects of the crises were felt until the beginning of the WWII. With respect to these assertions, the inclusion of a dummy variable for the years after 1932, including 1932, in the main specification can presumably account for the effects of the Great Depression; maybe even better than the variables which used economic growth to account for the effects of the Great Depression. Column 5 of Table 3.3 presents the results obtained when this variable is included in specification (6.1). All the coefficients of interest stay stable with respect to the results of the main estimation of specification (3.1).

The "as-the-crow-flies" distance between city pairs, instead of railway distance has been used in specification (3.1) and presented in Table 3.3, column 6, to ensure that the results are not affected by errors in measurement of the rail distance between city pairs. The coefficients of interest do not change their sign or the level of significance and are in-line with expectations.

The Great Depression is identified as the most evident time-variant factor that may distort results if neglected, but other factors, such as technological progress, might be even more important and could lead to unreliable results if not taken into consideration. To lessen the impact of this problem and to further increase the confidence in the accuracy of the obtained results, it is possible to estimate the specification (3.1) with 14 dummy variables, with each one of them capturing a different year in the observation period.[102] This estimation would only partially resolve problems of omitted variables, but it would capture "year specific" effects which in combination with controls for market specific effect should provide more reliable results. For similar reasons, it might be prudent to test the robustness of the estimation of the specification (3.1) by including either a linear or quadratic trend.

[102] Estimation is done with 13 year-specific variables in order to avoid multicollinearity.

The estimation results of specification (3.1) with time variables are presented in Table 3.4. Column 1 of Table 3.4 presents the results of the estimation of specification (3.1) with year dummies, column 2 with a linear trend and column 3 with a quadratic trend. Neither of the specifications changes the overall conclusions about the parameters, unlike the pure estimation of specification (3.1) from Table 3.3, column 2.

Table 3. 4: Pooled OLS with Time Variables

VARIABLES	**(1)**	**(2)**	**(3)**
log(Rail distance)	0.0745***	0.1157***	0.1157***
	(0.0030)	(0.0000)	(0.0000)
Religious similarity	-0.0740***	-0.0555**	-0.0555**
	(0.0062)	(0.0068)	(0.0068)
City specific variables	Yes	Yes	Yes
Year Dummies	Yes	No	No
Trend	No	Yes	Yes
Trend Squared	No	No	Yes
Constant	0.0177	0.0515***	0.0513***
	(0.0214)	(0.0086)	(0.0094)
Observations	2,016	2016	2,016
R-squared	0.168	0,141	0.141

Beta coefficients presented; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

For the sake of breadth and clarity, in all estimations presented above, including the main estimation with all robustness checks, only the coefficients and their significance levels for the main variables of interest are presented. Nevertheless, it is interesting to note that one of the control variables for city-fixed effects stands out. While all coefficients for the city-fixed effects change their statistical significance, sign, or their levels when different specifications are used, the coefficient for the Slovenian city of Ljubljana does not change its significance or scale. In every specification, the coefficient for the variable representing Ljubljana is significant at 1% level, and its coefficient is positive and varies around 0.03. This means, that the average price difference between any town from our sample and Ljubljana is higher compared to city-pairs that do not include Ljubljana. This is not surprising since Ljubljana is the only representative of Slovenia in the sample, and the Slovenian language differs the most from all other languages in the Kingdom of Yugoslavia. In addition, Slovenia was well connected with other observed markets. It is possible, that the language barrier played a role in the formation of the trade networks only for Slovenia, since the estimate of the coefficient for the city-specific variable representing Ljubljana is the only one stable in every mentioned specification category.

It is possible to interpolate/extrapolate the variable for religious similarity between cities which enables the usage of fixed-effects estimators for estimation of the observed relationships. This does not enable tracking of the magnitude and significance of other relevant variables, but it can serve as an additional robustness check, since fixed effects estimators are generally more consistent than pooled OLS estimators. Specification (3.1), without market specific variables and proxies for transportation costs (since these are time-invariant), is estimated using the fixed effects estimators and the results are presented in Table 3.5. Variable for religious similarity was interpolated/extrapolated linearly (column 1, Table 3.5) and logarithmically (column 2, Table 3.5) with the upper and lower values limited to 1 and 0, respectively. Coefficient for religious similarity in these estimations is negative and significant at 1% level for the values predicted by using logarithmic interpolation/extrapolation and at 5% level for the values predicted by using linear interpolation/extrapolation. Although magnitude of the parameter for religious similarity is slightly lower in this case, comparing to the results obtained by conducting pooled OLS estimation, overall conclusions do not change.

Table 3. 5: Fixed Effects Estimation

VARIABLES	**(1)**	**(2)**
Religious similarity (linear trend)	-0.0356**	
	(0.0180c)	
Religious similarity (logarithmic trend)		-0.0649***
		(0.0195)
Constant	0.0373***	0.0475***
	(0.00655)	(0.00686)
Observations	2,016	2,016
R-squared	0.002	0.006

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Inclusion of Royal Policies into the Formal Analysis

If royal policies intended to curb nationalism and create common Yugoslav identity were *de facto* successful, one would expect increased market integration among Yugoslav regions. This would mean that the coefficient for the religious similarity should be larger and insignificant for the duration of royal policy of Integral Yugoslavianism. The estimation results presented in Table 3.6[103] imply that the royal policies were unable to stop economic nationalism with respect to economic integration. Moreover, these policies could have been counterproductive and may have increased the trade costs deriving from nationalism.

[103] These are the estimations of specification (6.1) for the specific time periods within the time frame observed.

Prior to the establishment of the January 6 Dictatorship in 1929, the variable for ethnic similarity did not have statistically significant effects on market integration in the Kingdom of Yugoslavia (Table 3.6, column 1). In contrast, from the introduction of royal policies of forced Integral Yugoslavianism and absolutist centralism in 1929 to the assassination of the king in 1934, the estimated coefficient for religious similarity became statistically significant and negative (Table 3.6, column 2). These two estimations indicate that the ethnocentric ideology started to impact market integration in the Kingdom of Yugoslavia in 1929. It may be the case that the rise of economic nationalism was triggered by royal policies. Since openly expressed nationalism was forbidden, it is conceivable that the estimations are capturing the rise of covert nationalistic activities, within the general context of nationalism triggered by unpopular government policies. Estimation for the years preceding 1929 suggests that the study is not simply capturing the time-invariant effect of nationalism on economic integration or certain effects originating from the fact that some of the observed city pairs were subject to the rule of foreign imperial governments prior to World War I.

Table 3. 6: Pooled OLS with Policy Impact

VARIABLES	Before 1929	(1929-1934)	(1929-1934)	After 1934
log(Rail distance)	0.1488***	0.0724*	0.0715*	0.0152
	(0.0051)	(0.0046)	(0.0046)	(0.0054)
Religious similarity	0.0277	-0.0940**	-0.0823*	-0.1281***
	(0.0130)	(0.0104)	(0.0133)	(0.0096)
City specific variables	Yes	Yes	Yes	Yes
Control for the year 1932 and after			0.0065	
			(0.0075)	
Control for the year 1932 and after* Religious similarity			-0.0231	
			(0.0978)	
Constant	-0.0113	0.0087	0.3650***	0.0637*
	(0.0362)	(0.0345)	(0.0778)	(0.0379)
Observations	432	864	864	720
R-squared	0.055	0.189	0.233	0.193

Beta coefficients presented; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

If one were to form conclusions based only on hitherto discussed results, it would be easy to claim that the royal policies were counter-productive. However, it must be considered that the estimated results for the years when the policies were not yet active do not constitute a valid counterfactual. If there was a factor which operated concomitantly with royal policies and that factor was not the result of the policies, then it is still possible that the policies somewhat reduced the impact of nationalism on market integration. It may be the case that in the years when the royal measures were active other forces strengthened nationalism.

When the effects of the Great Depression are controlled by the inclusion of a dummy variable for the post-1932 period and the interaction of this variable with

the measure of ethnicity is tested, negative effects of royal policy do not seem to be as straightforward as they appear; see specification (3.1). The results from Table 3.6, column 3, suggest that during the period of active anti-nationalistic policies, the Great Depression[104] was probably also responsible for the increase in the significance (compared to the period prior 1929) of the impact of ethnicity on market integration. Included controls for the effects of the Great Depression yield results which decrease the significance of the coefficient for religious similarity (now significant only at a 10% level) and suggest that the sudden increase in the impact of ethnicity on market integration was not only due to government policies (if these policies increased ideological impact at all), but also to other factors which supported the rise of nationalism.

During the period 1934-1939, it seems that the impact of ethnicity on market connectedness was greater in level and in statistical significance than in all the other periods from this sample. The results of the estimation for the after-policy period (1934-1939) are shown in Table 3.6 column 4.

Table 3.6 comprehensively depicts why it is important to take into account certain political and economic occurrences of the time. However, when the sample is divided into three time periods, it is implicitly assumed that every variable of interest was differently affected by these occurrences, including market-specific variables. It may be valid to assume that every variable is affected differently by political and economic shocks in the Kingdom of Yugoslavia, but it is also possible that this is not the case. On the other hand, a division of the sample into three time periods restricts the number of observations used in each regression. In order to utilize all observations and relax the previously mentioned implicit assumption, it is possible to estimate specification (3.1) and include the effects of the royal policies and potential effects of the Great Depression in a slightly different manner. Namely, specification (3.1) can be expanded with the dummy variable which takes values of one for the observations in the years prior to 1929 and zero otherwise, another dummy variable which takes values of one for the observations between 1929 and 1934 and zero otherwise, and interactions of these two dummy variables with the variables for religious similarity and rail distance. The inclusion of these variables in the specification (3.1) allows for tracking potentially differing relationship between economic connectivity and ethnic similarity before, during, and after the introduction of the royal policies, while accounting for all observations and allowing for the city-specific effects to remain unaffected by political and economic shocks. As it was done in estimations when the sample is divided into three periods, the effects of the Great Depression should be captured by the inclusion of a dummy

[104] Besides the Great Depression, in the same period the rise of nationalism elsewhere in the European polity could also have strengthened the nationalistic ideology, indeed, this would seem likely.

variable for the post-1932 period and the interaction of this variable with the measure of ethnicity.

Results from estimation of the previously described "expanded" version of specification (3.1) are presented in Table 3.7. In column 1, Table 3.7, estimation results are presented for the specification without controls for the Great Depression and in column 2 for the specification with the controls for the potential effects of the Great Depression. Note that the base period in this version of specification (3.1) is the period after 1934. Inspection of the estimated coefficients presented in Table 3.7[105] suggests the same conclusions as the ones derived from the results of the models based on the time-division of the sample.

Conclusions and Final Remarks

The results presented above confirm the results from previous studies for the case of Yugoslavia: the ideological state of affairs of a given country or region (in this case, rising nationalism) does matter when it comes to economic integration. The estimations conducted in previous chapters have something to contribute to theoretical and historical considerations.

In the context of rising nationalism, not even the strict policy of the elites could curtail the growth of ethnocentrism. It is not clear whether these policies had any effect on economic nationalism or what the nature of this effect was, if it existed. It has been unconvincingly suggested that these measures were counter-productive, but since it is not possible to completely isolate the pure effect of the policy, such a claim cannot be taken very seriously.

It could be the case that the forces which fostered nationalism, such as the Great Depression, were very strong and that policies from 1929 on actually alleviated the effects of these forces, although they could not completely discount their effects. This argument could be advanced with respect to the results which show the greatest impact of ethnicity on economic integration to have been after 1934, when these policies were abandoned. One could also make the case that nationalistic sentiments were strengthened and that both, government policies and external forces, such as the Great Depression, prevented or even destroyed the formation of a "multi-ethnic" network. This would imply that the estimated effects after the measures were abandoned (1934-1939) amount to the cumulative effect of the counterproductive government policies and the external forces that encouraged ethnocentrism.

[105] Based on the F-tests for the mutual significance of the variables of interest.

Table 3. 7: Policy Impact with The Interaction Variables

VARIABLES	(1)	(2)
log(Rail distance)	0.003	0.003
	(0.004)	(0.004)
Religious similarity	-0.140***	-0.140***
	(0.010)	(0.010)
City specific variables	Yes	Yes
Before 1929	-0.303***	-0.310***
	(0.012)	(0.012)
Before 1929*Religious similarity	0.145***	0.145***
	(0.017)	(0.017)
Before 1929* log(Rail distance)	0.145***	0.146***
	(0.001)	(0.001)
Religious similarity*From 1929-1934	0.071	0.072
	(0.014)	(0.014)
log(Rail distance)*From 1929-1934	0.145**	0.145**
	(0.000)	(0.000)
From 1929-1934	-0.122	-0.117
	(0.001)	(0.001)
Control for the year 1932 and after		-0.007
		(0.00441)
Control for the year 1932 and after* Religious similarity		-0.003
		(0.00539)
Constant	0.076***	0.076***
	(0.027)	(0.027)
Observations	2,016	2,016
R-squared	0.152	0.153

Beta coefficients presented; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Market integration in the Kingdom of Yugoslavia was slowed down by nationalistic ideologies despite the institutional conditions for integration which greatly favoured it. Therefore, nationalism not only gave rise to a political environment that would set different ethnic groups on opposing sides during WWII but also inhibited the creation of an economic environment that would have encouraged the unification of the country. The results in the present study suggest that it is not enough to establish formal institutions that foster multi-ethnic trade; the prevalent ideologies should support these institutions and allow enough time for the trade networks to be established and preserved.

Since the conclusions in this paper are based on an analytical examination of the conditions unique to the Kingdom of Yugoslavia, the external validity cannot be assumed. However, in view of the results of this study, it might be dangerous to disregard the possible implications of policies intended to ignore national sentiments. In spite of the strong commitment to globalization, ideology in general, and nationalism, in particular, continue to play an exceedingly powerful role in all aspects of social and political life, including the processes of economic integration.

Ideology matters in the process of economic integration.

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Paper 4:
Brotherhood and Unity: Ethnic Diversity and Economic Performance in Socialist Yugoslavia

Abstract

The experience of Yugoslavia appears as an exception to literature that points to the negative impact of ethnic diversity on economic performance – an effect more prominent in dictatorships. Ethnic inclusiveness was actively promoted in Yugoslavia. Was this sufficient to stimulate a resource allocation that favoured diverse regions and resulted in an unexpected positive impact on economic performance from ethnic diversity? With new datasets, this paper is the first quantitative assessment of the negative economic impact of ethnic diversity in Yugoslavia. The paper provides insights into the relevance of inclusive policies to the relationship observed in a dictatorship.

Introduction

Theoretical models on the impact of ethnic diversity on economic performance predict that ethnic heterogeneity may both benefit and impede economic performance (Alesina & La Ferrara, 2005). A variety of experiences, abilities, and cultures in ethnically heterogeneous societies may enhance productivity and boost innovations. But equally, ethnically diverse societies may face costs stemming from different types of ethnic conflict. Whether or not a society reaps the benefits or bears the costs of ethnic diversity seems to depend on the level of inclusion of minorities in social life and political decision-making. Both theoretically and empirically (Collier, 2000, 2001), ethnic diversity in countries under dictatorial rule seems to have a higher adverse effect on economic growth than it has in democratic countries.

Socialist Yugoslavia[106] was a single-party multi-ethnic federation in the Balkans[107] led by the dictator Josip Broz Tito. When it was formed, after the Second

[106] For Yugoslavia between 1945 and 1990, the paper uses the generic term "socialist Yugoslavia". When necessary, the official name of the country will be explicitly stated, in order to avoid unnecessary confusion since the country changed its name a couple of times without significantly changing its borders. First, in 1945 upon its formation and the establishment of its constitution, the initial name of Democratic Federative Yugoslavia was changed to the Federative People's Republic of Yugoslavia. Afterwards, in 1963, the name of the country was changed to the Socialist Federative Republic of Yugoslavia.

[107] The territory of Balkans with boundaries as in Lampe (2000).

World War, political elites set up institutions and encouraged behaviour that promoted inclusion along the lines of the ethnic groups that comprised the country. These institutions, policies, and ideologies intended to promote ethnic inclusiveness in Yugoslavia adopted a slogan coined by the communist resistance during WWII: *Brotherhood and Unity*.

On the one hand, *Brotherhood and Unity* seems to have fostered cohesion between ethnic groups in socialist Yugoslavia. This could have conduced to garnering the economic benefits of ethnic heterogeneity. On the other hand, the federation from the Balkans was under a dictatorship, and it is, therefore, more likely to have experienced higher costs of ethnic diversity than a non-dictatorship.

This paper looks at the way in which ethnic diversity affected municipal economic growth in socialist Yugoslavia. Was top-down encouragement of ethnic cohesion enough to neutralize the predicted negative effects of ethnic diversity on economic performance in a dictatorship? In order to answer this question, new estimates of economic performance for 498 municipalities for census years 1961, 1971, and 1981 are produced. The association stemming from these estimates between municipal economic growth and measures of ethnic diversity is analyzed via pooled OLS estimators and the Seemingly Unrelated Regressions (SUR) model. A study of the relationship on a municipal level captures the essential composition of ethnic diversity, which could not have been observed if the territorial focus had been on Yugoslavia's states. In other words, by taking municipalities and not states as units of observation, the paper was able to account for non-negligible regional differences in ethnic composition that would not have been captured if the ethnic diversity had been analyzed on a state or federal level. Furthermore, if inclusive policies and practices were efficient and, therefore, sufficient to neutralize the predicted adverse effects of ethnic heterogeneity on economic growth in a dictatorship, this would reflect more distinctly on municipalities than on larger geographical areas (Montalvo & Reynal-Querol, 2021; Ottaviano & Peri, 2005, 2006; Sparber, 2010; Lee, 2011, 2015).

Beyond the case of Yugoslavia, this analysis provides additional empirical evidence contributing to the literature in the field. Collier's (2000) model, for example, predicts that in dictatorships ethnic diversity will have systematically adverse effects on economic growth, while in democracies the case may not be the same. This prediction is made by assuming that a dictator draws military and political power from the support of individuals who are of the same ethnic origin as the dictator. By observing the case of socialist Yugoslavia, we may check whether Collier's (2000) predictions hold when this assumption is violated. In other words, the Yugoslav case will suggest the existence of other factors, different from an ethnically powered accumulation of political power, that cause dictatorships to suffer the higher costs of ethnic heterogeneity than democratic societies pay. More importantly, findings from the paper may provide valuable insights into the effectiveness of inclusive policies in non-democratic societies.

Furthermore, this paper allows a glimpse of a region's economic history that is under-researched compared to the economic histories of the developed world. Recently, the economic history of the region is capturing the attention of scholars since its historiography – various economic systems during the XX century, changes in borders, multiethnicity – provides fruitful soil for the investigation of various phenomena (for example Chilosi & Nikolić, 2021; Miladinović, 2019; Kukić, 2017; Nikolić, 2018).

The paper is the first to estimate municipal economic performance in socialist Yugoslavia. Although they are not the primary concern, these estimations may provide a further understanding of the development of local economies and the database generated can support future scientific endeavours.

The results imply that, when ethnic diversity is measured with an ethnic fractionalization index, ethnic diversity has harmed the economic growth of Yugoslav municipalities. This effect was not found when the ethnic heterogeneity is measured via polarization index. Additional tests that were conducted indicate that institutions, policies, and ideology under the slogan of *Brotherhood and Unity*, were ineffective in contesting the impact of ethnic diversity on the economic growth of these municipalities. However, further research in the domain of regional economic performance before WWII is needed for an intertemporal counterfactual and complete assessment of the effect of this policy.

The paper is organized as follows. In the first section of the paper, theoretical and empirical assessments of the relationship between ethnic diversity and economic performance are presented. The second section briefly explores historical occurrences in socialist Yugoslavia relevant to the following analysis. The methodology used to assess the observed relationship is described in the third section of the paper. In the fourth, the paper presents the data on which the methodology will be applied. The main results are presented in the fifth section of the paper, and the last is reserved for conclusions.

Ethnic diversity and economic performance

In a study on Africa, Easterly and Levine (1997) suggested that ethnic diversity can explain why some countries choose public policies that have adverse effects on economic development. Specifically, they find that more ethnically diverse societies are more likely to adopt socio-economic structures and policies that are correlated with slower economic growth. However, there are several countries whose experience seems to contradict this finding; for instance, the United States of America, one of the wealthiest countries in the world, is simultaneously ethnically, religiously and racially diverse.

In an attempt to resolve this apparent contradiction, Alesina and La Ferrara (2005) devised a model that captures the potential costs and benefits of high ethnic diversity

in a given society. They reason that higher levels of ethnic diversity may benefit innovation and creativity due to a larger pool of individuals with different cultural backgrounds, experiences, and abilities. Yet they recognize that higher levels of ethnic diversity may impede economic development because of racism, the different preferences of individuals from different ethnical backgrounds, and prejudice. When ethnic minorities are pushed to their extreme, Alesina and La Ferrara (2005) note, political unrest and civil wars are not unexpected.

Although their model does not provide unequivocal direction of the impact of ethnic diversity on economic performance, Alesina and La Ferrara (2005) offer important insights. Ethnic heterogeneity may positively affect development through variety in the production of private goods. At the same time, the costs of higher ethnic diversity appear because of differences in the preferences of ethnic groups, which may lead to sub-optimal choices of public goods and policies. The model developed by Alesina and La Ferrara (2005) also implies that richer societies may benefit from productivity increases due to ethnic diversity, while poorer societies may not experience this productivity boost. The last implication from their model is concerned with the impact of ethnic diversity on the size of jurisdictions; an implication which is not crucial for this paper.

The model developed by Alesina and La Ferrara (2005) also has some limitations. It does not consider the difference in the impact of ethnic diversity on economic performance in different political environments. Collier (2000, 2001) argues that ethnic diversity will impact economic performance in democracies that is unlike its impact in dictatorships. To demonstrate this, Collier (2000) constructs a simple model where the government is faced with a trade-off between growth and redistribution. The crucial assumption of Collier's (2000) model, and the most important assumption for the present paper, is that dictators draw political and military power from a base of individuals who share the dictator's ethnicity.

In both works, from 2000 and 2001, Collier derives the same conclusion: the growth rate of economic activity will not be systematically affected by the level of ethnic diversity in democratic societies. In a dictatorship: "…*the extent of ethnic diversity will systematically reduce the growth rate"* (Collier, 2000, p. 231).

In line with the theoretical considerations, empirical assessments of the relationship between ethnic diversity and economic performance usually suggest an adverse impact of ethnic heterogeneity on economic development (Alesina, & La Ferrara 2005; Alesina et al., 2003; Bluedorn, 2001; Collier, 2000, 2001; Dincer & Wang 2011; Easterley and Levine, 1997; Gören, 2014; Montalvo & Reynal-Querol, 2002; 2005). Scholars may analyze how different growth-related factors and policies are impacted by ethnic diversity (for instance, La Porta et al., 1999). However, the interest of the scientific endeavour may be to observe the direct effect of ethnic diversity on economic growth (as in Collier, 2000). Some studies simultaneously assess the direct impact of ethnic heterogeneity on economic growth

and observe how different growth-related factors are affected by ethnic diversity (for example, Alesina et al., 2003).

Most of the empirical studies in the field are focused on cross-country analysis to evaluate the relationship between ethnic diversity and economic performance. Nevertheless, some studies are focused on this relationship in a single country, and this paper contributes to that, arguably less represented, line of work. Dincer and Wang's (2011) analysis, for instance, suggests that Chinese provinces show a negative relationship between economic growth and ethnic heterogeneity. Other empirical studies in which the unit of observation are cities, or other geographical localities smaller than the state, frequently document the positive impact of ethnic diversity on local economic growth (Lee, 2011, 2015; Ottaviano & Peri, 2005; 2006; Sparber, 2010;). A paper by Montalvo and Reynal-Querol (2021) inspects the relationship between ethnic homogeneity and economic growth on different spatial scales: from the grid-country cell expanding to the state level. They conclude that ethnic diversity has a strong and positive effect on the economic performance of smaller geographical areas because the effects of specialization along ethnic lines are emphasized on a local level. As Montalvo and Reynal-Querol (2021) increase the geographical scope of their observations, the economic consequences of ethnic diversity gradually disappear.

This paper analyzes the relationship between ethnic heterogeneity and the economic performance of Yugoslav municipalities from 1960 to the early 1980s. The major advantage of observing a single country, compared to cross-country analysis, is that the former creates less risk of imprecision stemming from the dissimilar institutional contexts between countries. Moreover, it would be interesting to see if there is a positive relationship between ethnic diversity and economic performance – usually found in studies focused on smaller geographical units than states – in the case of Yugoslavia. A Yugoslavian economic system (presented in the next section of the paper) or other contextual peculiarities may have prevented specialization along ethnic lines.

An aspect on which most of the empirical studies in the field agree is that the adverse effect of ethnic heterogeneity on economic growth is smaller in democracies. This result, predicted by Collier's (2000) model, is justified by the notion that in democracies, there is a higher likelihood that minorities will feel represented (Alesina & La Ferrara, 2005). Proper inclusion of minorities in society could reduce the costs arising from ethnic heterogeneity and, simultaneously, encourage the benefits of variety (from Alesina & La Ferrara, 2005 model).

Empirical studies do not suggest a unique channel through which ethnic diversity may affect economic performance. The above empirical studies establish that ethnic heterogeneity is associated with a variety of growth-related factors and policies – government quality, corruption, education, quality of financial systems, etc. However, no single factor has been identified as the most important carrier of the adverse effect of ethnic heterogeneity on economic growth.

What can we learn from the Yugoslav case, with its contextual peculiarities? Before the main analysis, it may be helpful to describe these briefly. The following section presents a brief account of historical events and the state of affairs in Yugoslavia between the 1960s and the 1980s, which is relevant for this paper.

Brotherhood and Unity

In 1945, the new Federal People's Republic of Yugoslavia was established as a federation of six states: the Federal States of Bosnia and Herzegovina, Montenegro, Macedonia, Croatia, Serbia, and Slovenia (Lampe, 2000). This newly formed state was a successor of the Kingdom of Yugoslavia that had existed in the interwar period. Monarchy was abolished, and the Croatian- born leader of the communist resistance movement, *Partizani,* Josip Broz Tito, became the first prime minister of socialist Yugoslavia. Tito later obtained the status of lifelong president of this country and would remain the president and undisputed Yugoslav leader until his death in 1980.

Any assessment of Tito's dictatorship still awaits consensus. For this paper, however, it is sufficient to state the fact that Tito was a dictator – as most historians agree (Andjelic, 2003; Boeckh, 2006; Djilas, 1995; Pavlowitch, 1992; Shapiro & Shapiro, 2004; West, 2012). Tito's rule had all the common traits of a dictatorship: almost absolute political power, no viable political opposition, purges and the demonization of political and ideological opponents, the cult and glorification of personality, media control, etc. Nonetheless, Tito did not draw his political power from the pool of individuals with his ethnic background. Moreover, individuals with different ethnic backgrounds took the highest political and military positions below his. For instance, the Minister of the Interior of Yugoslavia from 1946 to 1953 was Aleksandar Ranković, who was born and raised in Serbia; the Deputy Prime Minister of Yugoslavia from 1946 to 1963 was the Slovenian-born politician Edvard Kardelj; the President of the Council of Peoples of the Federal Assembly from 1969-1974 was a Croat, Mika Špiljak. Similarly, the highest-ranking military personnel were drawn from different ethnic backgrounds.

Socialist Yugoslavia was politically organized as a one-party state. Even before the end of WWII, when communists were sure of their victory, Tito considered the multi-party system redundant (Ramet, 2006). In the early days of its existence, socialist Yugoslavia followed the Soviet centralized model of governance. Decisions concerning national defence, economic policy, transport, ideology, culture, and foreign policy were in the hands of political leaders, just as they were in the Soviet Union (Jović, 2009). The nationalization of private capital began by 1946, and central economic planning was embedded in the constitution adopted in the same year (Horvat, 1971). Milić (1951) records that by the 1950s Yugoslavia could have been characterized as a proper Soviet-style, centrally run economy.

Following Soviet footsteps in economic planning and political affairs was, however, short-lived. Political frictions between Tito and Stalin peaked in 1948 when Yugoslavia was removed from the Communist Information Bureau (Granville, 1998; Perović, 2007), shifting the Yugoslav socio-economic and political path away from the Soviet model. The Yugoslav version of socialism was born and developed through the 1950s and 1960s. The new economic model envisioned enterprises run by workers' collectives instead of state administration and bureaucrats. The law granted greater autonomy to self-governing collectives and the economy began to be somewhat more open.[108] To say that workers' collectives were entirely independent of the political influence would be false. In other words, workers' collectives were not making decisions simply based on market circumstances. The practice of allocating profits from one workers' collective to cover the losses from another workers' collective was prevalent (Cerović, 2003). The economic performance of socialist Yugoslavia measured in GDP per capita is depicted in Figure 4.1.

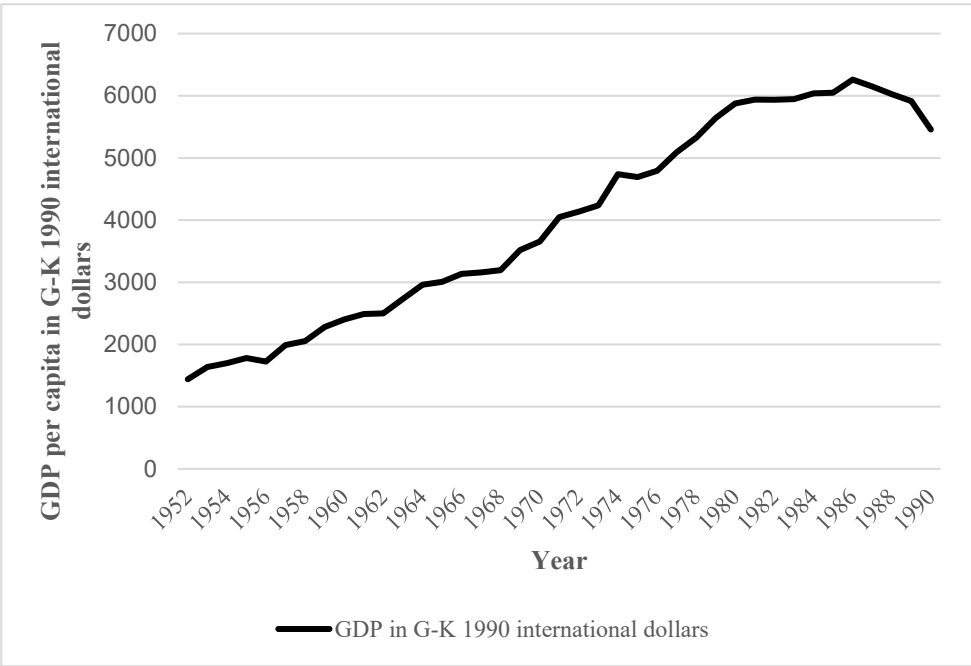

Figure 4. 1: GDP per capita in socialist Yugoslavia (1948-1989) in G-K 1990 international dollars. Source: Kukić (2017)

[108] For a detailed description of the Yugoslav version of socialism and its development, readers are referred to Horvat's (1971) historical account.

The post-war period until the 1960s was not only turbulent in economic terms. Political uncertainties also characterized this period. Frequent changes in the economic system combined with political turbulence were reflected in unstable economic performance. Per capita GDP growth rates from 1948-1989, as presented in Figure 4.2, exemplify this. From the beginning of the observed period, 1948, to the early 1960s, the GDP per capita growth in socialist Yugoslavia was marked by fluctuation. During the 1960s and for the greater part of the 1970s, the Yugoslav economy grew steadily at an average annual rate of 5%. After the 1980s, a new political and economic crisis started to take its toll and from the beginning of the 1980s, GDP per capita growth started to hover around 0.

Apart from political and economic affairs in socialist Yugoslavia, it is necessary to address the question of the state of ethnic cohesion (or lack of it) in the country. The origins of ethnic tensions in the Balkans can be traced to the XIV century and the colonialization of the region by the Ottoman Empire. The historical development of ethnic strife in the region is above and beyond the scope of this paper. Complexities surrounding the development of the relationship between any pair of ethnic groups are impossible to depict in a single paper. Therefore, the focus of this paper will be on the brief depiction of the evolution of the ethnic tensions in the XX century, specifically after WWI.

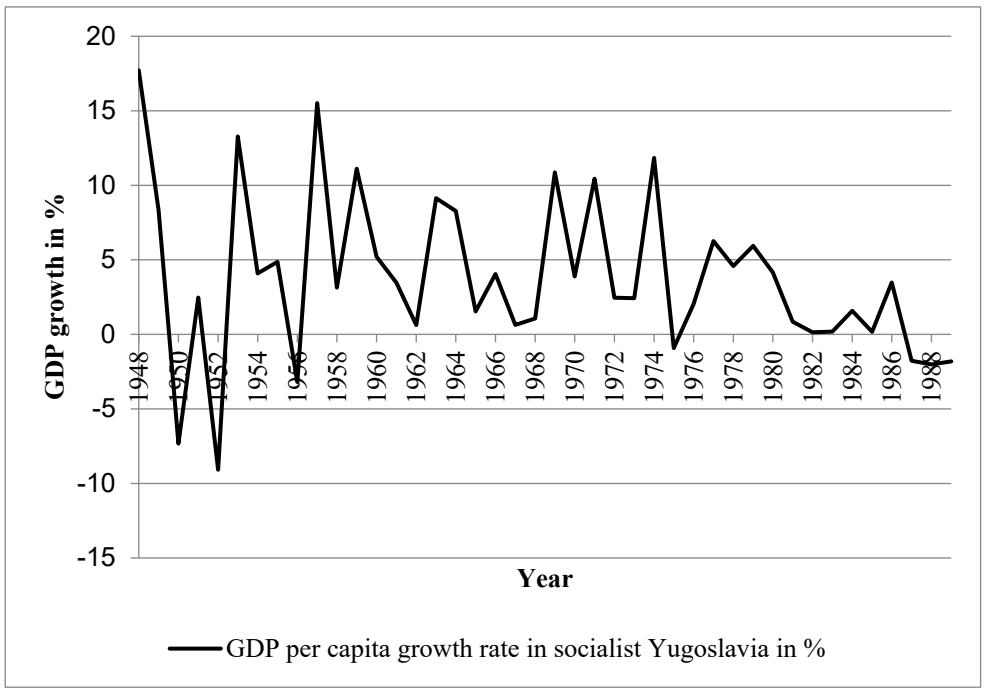

Figure 4. 2: GDP per capita growth in socialist Yugoslavia (1948-1989) in G-K 1990 international dollars in percentages. Source: Kukić (2017)

Before WWII, in the Kingdom of Yugoslavia, ethnic tensions were prevalent.[109] The monarchy made several attempts to counteract these tensions: the abolishment of ethnicities[110] and the introduction of "*Integrated Yugoslavism*", a set of top-down policies which encouraged individuals to abandon their ethnic origins and embrace a new, *Yugoslav*, ethnicity. This policy failed miserably, despite the King's efforts to impose *Integrated Yugoslavism* (Jović, 2009). After the Second World War, the communist regime did not want to pursue the same course. Even ignoring its inefficiency, communists still rejected *Integrated Yugoslavism* because, within this set of policies, one proclamation banned the Communist Party from the Kingdom[111] (Jović, 2009).

Immediately after the end of the Second World War, when the new country was taking shape, the communist regime adopted a law that forbade the provocation of national, racial, and religious hatred and strife – *Zakon o zabrani izazivanja nacionalne, rasne i verske mržnje i razdora od 24. maja 1945. Law No.322, Sl. List DFJ, I, 36 (May 29, 1945), p 298*. This law was accompanied by an ideology that was crafted during WWII and known by its slogan *Brotherhood and Unity*. This law and the ubiquitous ideology imposed by the ruling party in socialist Yugoslavia called for "inclusive"[112] behaviour with regard to ethnicity (Roksandić, 2011; Singleton, 1983). In contrast to the King's policies, political elites in socialist Yugoslavia did not forbid the existence of ethnicities but were openly against any kind of oppression or segregation based on an individual's ethnic background. The similarity to the King's policies concerned only the political elites' attitude to language. From 1954 until the dissolution of socialist Yugoslavia, the ruling party tried to impose Serbo-Croat or Croat-Serbian as a hybrid language for all the ethnic groups comprising the Federation (Lewis, 2009). The following quote from Tito can provide an illustrative insight into the idea of the co-existence of Yugoslav identity with individual ethnic affiliation:

[109] See Petranović & Zečević (1985) for historical documentation; Nikolić (2018); Miladinović (2019), and Chilosi & Nikolić (2021) for economic consequences of ethnic tensions in the Kingdom.

[110] All individuals were to be treated as Yugoslavs, regardless of their *de facto* ethnic origins. Put differently, it was not possible to declare oneself a member of any ethnic group that comprised Yugoslavia. The King's policy permitted individuals to declare themselves members of ethnic groups that were not among the constituent ethnic groups of Yugoslavia.

[111] As a national party, the communist party was seen by the monarchy as an enemy of the Kingdom.

[112] Inclusive only for the ethnicities which comprised socialist Yugoslavia; it is debatable, and not within the scope of this paper, how inclusive this ideology was towards people from ethnic backgrounds which were beyond those of socialist Yugoslavia.

> "Our ideal is that the culture of each Yugoslav people, while retaining its own characteristics, should at the same time become the culture of all the others in a dynamic, united totality" Josip Broz Tito (from Wachtel, 1998, page 134)

The law from 1945 forbade anyone to provoke religious hatred. Nevertheless, it is a matter of debate how far political authorities respected religious freedoms, especially in the early years of Yugoslavia's existence (Boeckh, 2006). Religious affiliations and one's mother tongue were not the questions asked in censuses.

Although it was not forbidden to self-identify as a member of a certain ethnic group, it was necessary to suppress any type of activity that even resembled nationalism, especially because certain parts of the country were on opposing sides in WWII. Later in his rule, Tito justified the persistence of a one-party system by the fear that nationalist parties would form (Djilas, 1995).

The ideology embodied in the phrase *brotherhood and unity* was not static (see Jović, 2009). However, the political elites embraced some of its main principles, at least until Tito's death in 1980. Nationalism was overtly despised and ethnic cohesion was widely promoted. An excerpt from Tito's speech at a sporting event in 1972 neatly summarizes the attitudes of the political elites to ethnic diversity and nationalism:

> "…I want the future to foster brotherhood and unity, which needs to steadily become stronger and to be consolidated. I want especially you, the younger generation that follows sport, to become the first soldiers to protect us against every nationalist assault…You must be united; you should cherish and strengthen the brotherhood and unity of our nation. That is our socialist way." Josip Broz Tito, 1972 (from: Škoro, 1982, p. 6)

Brotherhood and unity was not simply an ideology backed up by the law. Informal, and semi-formal institutions were in place in Yugoslavia with an aim to promote this ideology. For example, every year on Tito's birthday, on May 25th [113], from 1949 to 1987, Yugoslavia was celebrating the Day of Youth. On this day, a stick made from wood, or metal that has passed throughout the whole country was given to Tito – after his death to high officials from the party. The idea was that before reaching Tito, the stick is passed from the hands of one ethnic group to another, symbolizing the celebration of differences in unity (Gorp, 2012).

The idea of *Brotherhood and unity* was also present in the educational system. In particular, the manner in which Yugoslavia was represented in history textbooks was aimed to promote the ideology by portraying Yugoslavs as exceptional in their determination to preserve the unity despite the alleged pressures from both Eastern and the Western block (Georgeoff, 1966).

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[113] This was not the day Josip Broz Tito was born, but for reasons related to WWII victories of Partisans he accepted to celebrate his birthday on this day.

At the beginning of the 1970s, traces of ethnic tension[114] became perceptible in socialist Yugoslavia. The *Croatian Spring*, a notable event in 1971, where a Croatian movement called MASPOK demanded, among other things, the declaration of Croatia as the national state of the Croatian people, called for immediate action on the part of the political elites (Trbovich, 2008). Tito stripped the leaders of the movement of their political privileges and soon quelled the movement, showing that nationalistic tendencies were unacceptable in socialist Yugoslavia. However, the stance of the political leaders of the time was that more should be done to prevent the further spread of nationalism, present in all constituent states. In light of these events, a new Constitution was crafted and enacted in 1974. This gave greater political and economic autonomy to the constituent states of the Federation (Curtis, 1992).

After Tito's death in 1980, nationalism grew slowly but steadily in Yugoslavia. In the first half of the 1990s, Yugoslavia split apart after a bloody civil war.

As described above, following Collier's (2000) model, the theoretical expectation would be that ethnic diversity would have a high and negative effect on economic performance in socialist Yugoslavia. In this sense, an empirical analysis of the relationship in question in this country could contribute to the literature by providing additional historical evidence that would deepen our understanding of the relationship. Nevertheless, the Yugoslav dictator did not draw political and military power from individuals of the same ethnic origin like himself, as Collier (2000) assumes. In other words, the case of Yugoslavia does not strengthen the validity of Collier's (2000) model. Rather, studying the relationship between ethnic diversity and economic growth in socialist Yugoslavia can show whether or not Collier's (2000) predictions hold if this assumption is violated. To be more precise, the results of this paper may suggest the existence of other factors besides the political and military power to be gleaned from a dictator's ethnic background that would cause dictatorships to suffer higher costs of ethnic diversity than non-dictatorships pay.

Brotherhood and unity is an additional reason why it may be interesting to observe how ethnic diversity and economic performance are related in socialist Yugoslavia. The ethically inclusive attitudes of Yugoslav political leaders, including Tito, could foster the benefits that ethnic diversity confers on growth (as predicted in the model of Alesina & La Ferrara, 2005). If inclusive laws, attitudes, policies, and ideology have been successful in eliminating ethnic strife, then it is theoretically possible to observe the positive impact of ethnic diversity on economic performance. It may also be the case that Collier's (2000) predictions are valid even when one of its assumptions is violated, but that *brotherhood and unity* reduced the

[114] Ethnic and national identity are highly correlated and almost identical for the observed context (Layton, 1995).

negative effects of ethnic diversity on economic performance in dictator-led Yugoslavia.

To sum up, the theoretical models would predict a negative impact of ethnic diversity on economic performance in socialist Yugoslavia since Yugoslavia was under dictatorial rule. But the assumption regarding the ethnic preferences of a dictator to draw military and political power from his own ethnic background is violated in the case of Yugoslavia. Therefore, this analysis cannot test the validity of the model developed by Collier (2000), as the principal assumption of that model is violated. Rather, this paper is asking if Collier's (2000) predictions are valid despite the mentioned invalidity of the model's main assumption. Differently stated, if results show that ethnic heterogeneity does not affect economic performance, or that there is a positive relationship between ethnic diversity and economic growth, then it would be impossible to say if these results are a consequence of the violated assumption of the model, or the model does not apply in dictatorships where ethnic inclusion is encouraged.

It is important to note that the encouragement of ethnic diversity, under the slogan *Brotherhood and Unity*, did not have to necessarily reduce the potential negative impact of ethnic diversity on economic activity.[115] The underlying assumption behind the depicted models predicting the positive impact of ethnic diversity due to variety (in particular, Alesina & La Ferrara, 2005) is that individuals act and specialize led by market forces. In socialist Yugoslavia, market forces were present to some extent (Horvat, 1971) but the socialist nature of the economic system was omnipresent. Workers' collectives could have been operating rationally but sub-optimally since the profit maximization principle could have been misplaced by the wage maximization principle.[116] In addition, the goals of social policies would sometimes supersede any maximization principle (Cerović, 2003). In the economic environment of socialist Yugoslavia, it is not clear if incentives were set up to encourage specialization along ethnic lines or specialization at all. In addition, some may argue that intrinsic differences between ethnic groups in Yugoslavia were not sufficient to create comparative advantages in the production of different goods by different ethnic groups. The non-perfect alignment of the Yugoslavian context to the theoretical considerations makes it even more thought-provoking to see what the economic consequences of ethnic diversity in this country were.

The next section sketches the methodological approach employed to analyze the relationship between ethnic diversity and economic performance in socialist Yugoslavia.

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[115] I thank Leonard Kukić for this insight.

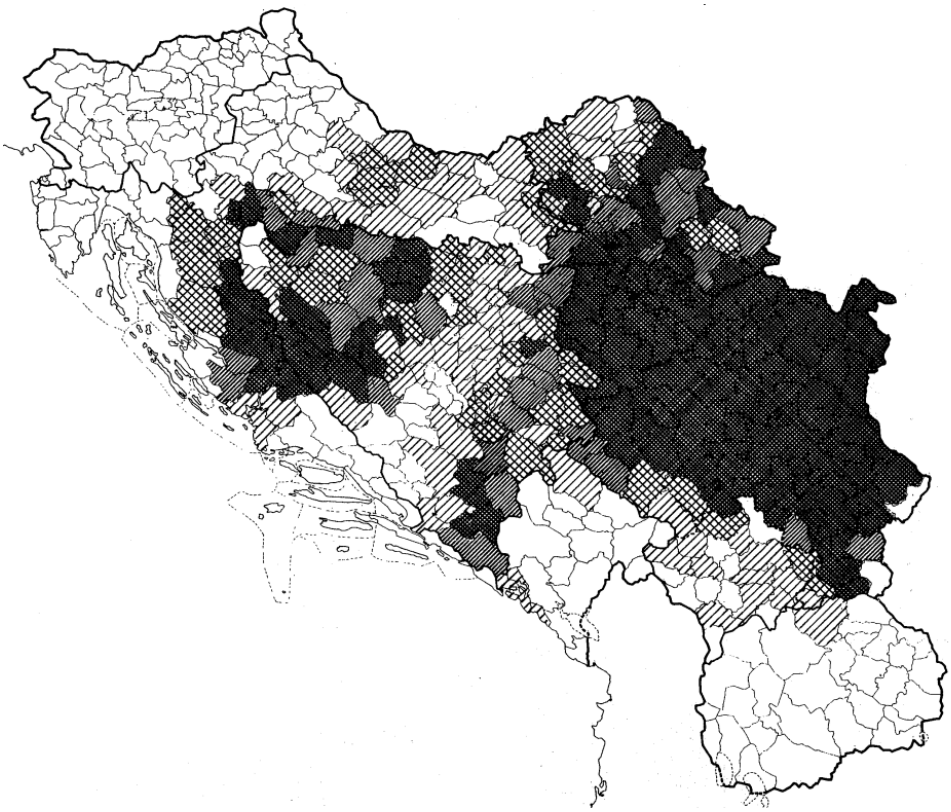
[116] For detailed discussion see Furubotn, & Pejovich (1970).

Methodology

In order to analyze the relationship between ethnic diversity and economic performance in socialist Yugoslavia, the observational domain must be specified. Analyzing socialist Yugoslavia as a whole is not suitable for the purposes of this paper. Since the ethnic configuration of the Federation as a whole did not significantly change throughout the country's existence, analysis on a federal level would not provide meaningful conclusions to the discussion. Analyzing at the state level may seem more reasonable. However, state-level data may hide nuanced but relevant differences in ethnical composition within states. For example, individuals declaring as Serbs were not only living in Serbia and, in certain areas of Serbia, Serbs were not a majority. Map 4.1 illustrates this example by showing the distribution of people declared as Serbs by the municipality in Yugoslavia (1971 census). In addition, the state-level analysis does not provide enough observational points. Municipalities are the next territorial level for which data are available. Therefore, the analysis will be conducted at a municipal level, since it is the level at which ethnic composition is properly captured.

The economic system of socialist Yugoslavia was experiencing frequent and turbulent changes even before the 1960s. Only after 1960 can the system be viewed as stable, at least in relation to the immediate post-war years. For this reason, the paper will observe the relationship between economic growth and ethnic diversity after 1960. But by the end of the 1980s Yugoslavia's political system was experiencing shocks that would result in the dissolution of the country. Therefore, the observational period must be confined to the interval between 1960 and the early 1980s.

Apart from the intention to avoid frequent economic and political shocks, the observation points for this paper are, to a certain extent, data driven. Data concerning the ethnic composition of municipalities are available only in the censuses held in 1961, 1971, and 1981. Moreover, the present study considers the data about employment for the census years – data that will be used for estimating the economic performance of municipalities – to be more reliable than the data from non-census years.



Map 4.1: Individuals declared as Serbs in Yugoslavia. Legend: solid thick line: borders of socialist republics; dashed thick line: autonomous provinces; solid thin lines: municipal borders. Darker shading represents a higher percentage of people declaring as Serbs. Source: Popis stanovništva, domaćinstava i stanova u 1971

In order to observe the relationship between ethnic diversity and economic performance in socialist Yugoslavia, this paper will rely on a slightly modified methodology developed by Alesina et al. (2003). The average annual municipal GDP growth rates are regressed on the fixed ethnic composition of Yugoslav municipalities and a set of controls as presented in the specification (4.1):

$$growth_{t,j} = \beta_0 + \beta_1 ethnicity_{61,j} + \gamma_k \sum_{k=1}^{n} X_{k,j,t} + \varepsilon_{t,j} \quad (4.1)$$

where $growth_{t,j}$ is the average annual compound growth rate of municipality *j* in decade *t* (1961/1971 and 1971/1981); $ethnicity_{61,j}$ is a measure of ethnic diversity in the year 1961 in municipality *j*; and X is a vector of the control variables including the macro-regional dummy variables (state fixed effects), decade control, the logarithm of municipal initial income (income in 1961), the squared logarithm of the initial income, and average years of schooling at the beginning of the decade for each municipality.

Studies on the present topic treat ethnic diversity as time-invariant. In any case, ethnic diversity in Yugoslavian municipalities was relatively stable over the observed years, as is shown later in the paper. Because of the time invariability of the ethnic diversity, as well as only two time observations, panel estimators, such as fixed-effects, are not capable of providing meaningful insights. Nevertheless, decade controls and macro-regional dummy variables capture a significant portion of the fixed effects. Combined with other control variables, this approach does not substantially deviate from that in previous studies of ethnic diversity and economic performance.

The paper estimates specification (4.1) with OLS estimators and seemingly unrelated regressions (SUR). The seemingly unrelated regressions approach defines two equations, one for each time period observed. Most of the previous empirical studies evaluating the impact of ethnic homogeneity on economic performance use SUR (for example, Alesina & La Ferrara, 2005; Alesina et al., 2003; Easterly & Levine, 1997; Gören, 2014; Montalvo & Reynal-Querol, 2002, 2005). The error terms from each equation in SUR are allowed to be correlated (Zellner, 1962).

Alesina and La Ferrara's (2005) model predicts that the impact of ethnic diversity on economic performance may differ according to the stage of development. Because of this theoretical prediction, specification (4.1) is expanded for an interaction variable between ethnic diversity and the estimated logarithm of the initial income of a municipality.

Ethnic diversity may have a different effect on economic performance in the various macro-regions that comprised socialist Yugoslavia. Similarly, the impact of ethnic diversity on economic growth may be more pronounced in the 1970s than in the 1960s since some signs of nationalistic sentiments first appeared in the 1970s. To account for these potential differences in the effect of ethnic diversity on economic growth, interaction variables between dummy variables for regions and ethnic diversity and between variables for ethnic diversity and decade controls are added to the specification (4.1).

Due to the rich history of ethnic relations in the region, it may be the case that the ethnic diversity of a municipality can be shown to have been impacted by the economic performance of the territorial unit. Average annual compound growth rates from 1961 to 1971 and from 1971 to 1981 – two outcome variables for each municipality – are regressed on ethnic composition in 1961. Since the imminent growth rates are regressed on a pre-existing ethnic distribution, the potential problem of reverse causality is mitigated. This is not to say that the potential existence of reverse causality is entirely resolved. The definitive answer of whether or not the reverse causality has impacted results from this analysis necessitates data that are currently unavailable. However, to further enhance the credibility of the obtained results, the paper conducts a robustness check in the form of instrumental variables estimation (IV). The ethnic diversity in 1971 is instrumented by ethnic diversity in 1961 (an instrument proposed in Campos & Kuzeyev, 2007) and a

proportion of people who did not identify as members of any of the major ethnic groups.

The choice of municipalities, which belong to broader regional units, may cause clustering of standard errors. This is recognized in the estimations in order to avoid serial correlation and standard errors are clustered on the state (and regional) level. It should be noted that the potential existence of spatial autocorrelation is, perhaps, not entirely resolved by clustering standard errors on the regional level. The paper conducts an additional robustness check by applying the spatial autoregressive model to specification 4.1 (Stata reference manual, 2017) to check if the results are driven by spatial autocorrelation. Using the information about the positioning of the municipalities, the paper constructs a spatial weighting matrix that is included in the main specification. The introduction of the information from this matrix allows accounting for spatial correlation between growth values, the correlations between ethnic diversity and control values, as well as potential correlation between the errors of nearby municipalities.

Defining and measuring ethnic diversity

An ethnic group can be defined by various characteristics among the individuals who comprise it: race, language, cultural heritage, religion, skin colour, etc. For example, when studying educational status and the trends of racial and ethnic groups in the United States, Musu-Gillette et al. (2016) use a combination of heritage, origin, and skin colour in constructing ethnic groups for their analysis. The literature concerned with the relationship between the ethnic composition of a society and its economic performance often uses the ethnic origins, religious, and linguistic traits of individuals in order to define different ethnic groups (Alesina & La Ferrara, 2005). In this study, the ethnic groups are defined by individuals' ethnic self-identification in Yugoslav censuses. As elaborated in the next part of this paper, and was hinted at above, religious and linguistic characteristics, as well as skin colour, cannot be held as the defining factors of an ethnic group in socialist Yugoslavia. Even if one wanted to use these traits for this purpose, it would be practically impossible since Yugoslav statistics did not take account of these individual characteristics.

The subjective assessment of one's ethnicity in the available historical data provides an advantage for the overall evaluation of ethnic diversity. That is to say, it is not necessary to arbitrarily pick a characteristic, or set of traits, of an individual that assigns her or him to a particular ethnic group. The self-identification of individuals reduces the chance that a person, or a group, will be misplaced in an ethnic group since the individual's feelings of affiliation may not be perfectly correlated with arbitrarily chosen group-defining characteristics.

When ethnic groups are defined, the most commonly used measure for the level of ethnic diversity in literature is the ethnic fractionalization index (EFI). This measure, based on the Herfindahl index, takes the values on a domain from 0 to 1.

Extreme values of 0 and 1, respectively, represent absolute ethnic homogeneity and absolute ethnic heterogeneity. The EFI index can be interpreted as the likelihood that two randomly drawn individuals from a given society belong to different ethnic groups (Alesina & La Ferrara, 2005).

The ethnic fractionalization index (EFI) is calculated as:

$$EFI = 1 - \sum_{i}^{n} s_i^2$$

where s_i is the portion of group i in the population.

The second standard measure of ethnic diversity in literature is the polarization index. Ethnic polarization may be important for the case of socialist Yugoslavia because it correlates with the probability of armed ethnic conflict (Montalvo, & Reynal-Querol, 2005). However, the civil war in Yugoslavia does not start within the period of observation of this study. Therefore, polarization may be less potent compared to fractionalization to capture the effects of interest within the period analyzed in this paper.

The index of polarization (POL) captures the distance of the ethnic groups from bipolar distribution (Montalvo & Reynal-Querol, 2005). The index is equal to 1 – its maximum – when the ethnic structure of the society follows bipolar distribution, i.e., when two groups of the same size comprise a society. Society is more polarized the closer it gets to 50:50 participation of the two largest ethnic groups. It is calculated as:

$$POL = 1 - \sum_{i=1}^{N} \left(\frac{\frac{1}{2} - s_i}{\frac{1}{2}}\right)^2 s_i$$

where s_i is the portion of group i in the population (Montalvo & Reynal-Querol, 2005).

At low levels of EFI, polarization and fractionalization indices are positively correlated. At higher levels of EFI, the correlation between EFI and POL is negative. The relationship between the ethnic fractionalization index and POL in Yugoslav municipalities in 1961 is presented in Figure 3. While EFI is an increasing function of a number of groups that comprise society, POL reaches the maximum when two groups are of the same size and decreases with the number of groups after that number reaches two (Dincer & Wang, 2011).

Specification (4.1) with the extensions mentioned is estimated by using EFI and POL as the main measures for the ethnic diversity of this paper.

It is important to note that only ethnic diversity, in terms of an individual's expression of affiliation with a particular ethnic group, can be measured in the case

of socialist Yugoslavia; we treat this as an advantage. As suggested above, records of religious affiliation are not available for Yugoslavia for periods observed. Even if they were available, the religious prosecutions in the early years of the country's existence would discourage individuals from openly disclosing their religious affiliations. Similarly, records of the native language spoken by individuals do not exist. Regardless of their availability, religious differences would probably not provide insights beyond the conclusions obtained by observing only ethnic differences. This is because of the very high correlation between ethnic affiliations and religious confessions in Yugoslavia (Bardos, 2013). Moreover, the linguistic differences between the languages spoken in Yugoslavia, except maybe Slovenian, are not sufficiently large (Brozović & Ivić 1988; Lencek 1976). Regardless of their availability, probably neither linguistic nor religious differences would affect our results.

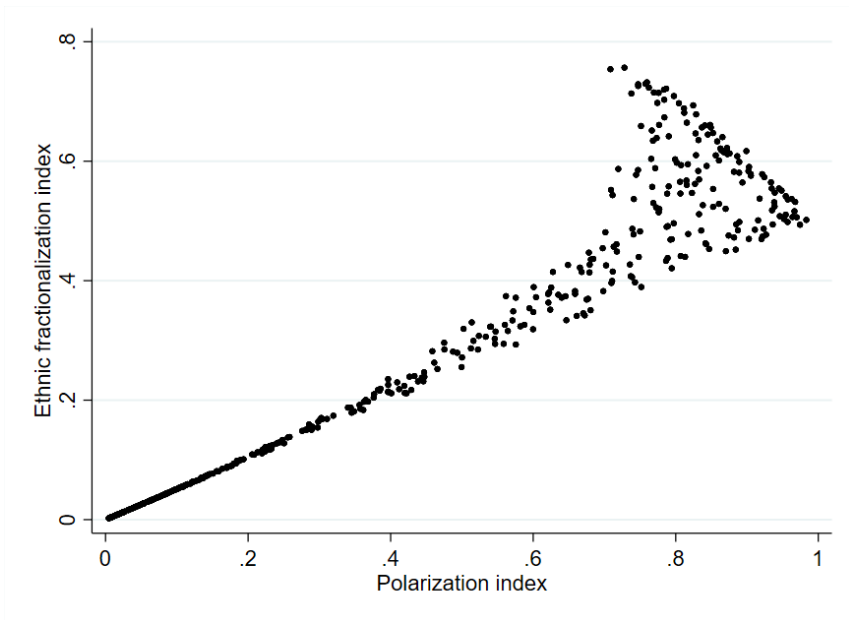


Figure 4. 3: EFI and POL in Yugoslavia in 1961. *Source:* Author's calculations based on Yugoslavian census data

Data

This paper estimates the economic performance of territorial units smaller than states in Yugoslavia. This is done here for the first time to the best of our knowledge. The average growth rates of economic performance in each municipality in the periods 1961-1971 and 1971-1981 comprise the outcome variable. The principal idea of this paper was to allocate regional GDP levels to municipalities in order to

obtain estimates of a municipal economic activity for the three reference years: 1961, 1971, and 1981.[117] Regional GDP levels estimated by Kukić (2017) were distributed to municipalities. Kukić's (2017) method for allocating federal GDP levels to regions was applied in distributing GDP from regions to municipalities. This method was slightly altered in a way that ensured greater precision in estimating municipal levels of GDP with respect to the available data. The estimation of municipal GDP for Yugoslavia, the methodology employed for obtaining municipal GDP, as well as solutions for certain data limitations are presented in detail in Appendix 1. After the data were consolidated in a manner presented in Appendix 1, it became possible to estimate comparable GDP per capita figures for 498 municipalities in 1961, 1971, and 1981. These figures were then used to estimate the average annual growth rates of economic performance in Yugoslavia's municipalities.

Data concerning the municipal ethnic composition of socialist Yugoslavia were obtained from censuses in 1961 and 1971: *Popis stanovništva, domaćinstava i stanova u 1961. godini* and *Popis stanovništva, domaćinstava i stanova u 1971. godini*. Both censuses report ten major ethnic groups: Montenegrins, Croats, Muslims (as ethnic affiliation), Slovenians, Serbs, Macedonians, Albanians, Hungarians, Yugoslavs, and Roma people. The eleventh group is reserved for people who did not identify as members of any of the mentioned ethnic groups. In these two censuses, it is safe to state that individuals could freely – there was no systematic coercion – express their ethnic affiliations. Census data from 1961 and 1971, therefore, allow ethnic diversity in Yugoslav municipalities in the years in question to be estimated.

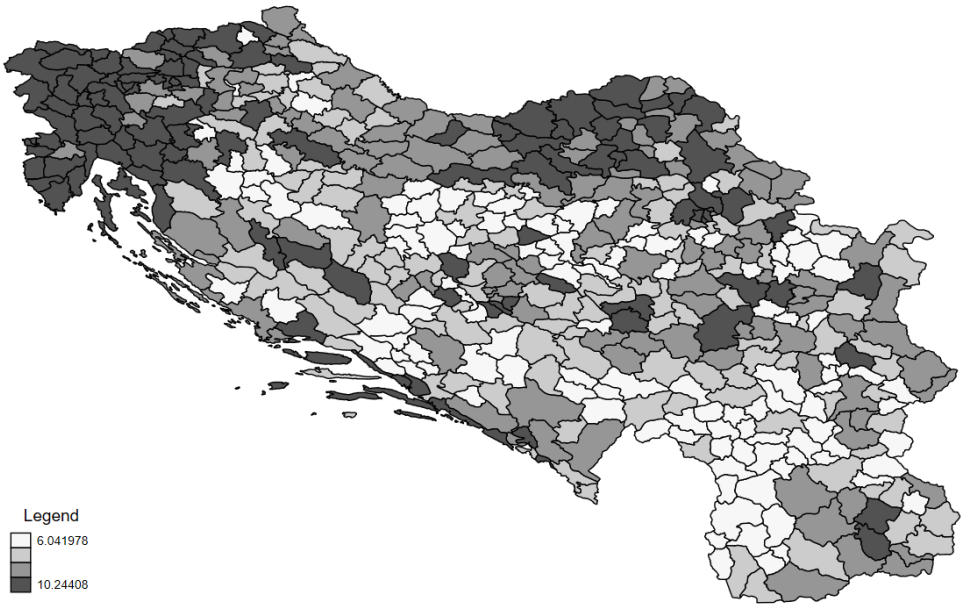
Census data from 1961 and 1971 also provide information concerning the total population of municipalities as well as descriptions of the territorial coverage of municipalities. Information about the total municipal population was used to estimate the per capita municipal GDP. The latter information is crucial for the formation of temporally comparable territorial units. This process is reported in detail in Appendix 1.

The number of people above the age of ten who obtained various levels of education is available in censuses from 1961 and 1971, as well. These censuses report the total number of municipal inhabitants above the age of ten as well as the number of individuals who finished four years of elementary school, the final year of elementary school, schools for highly qualified workers, technical high schools, gymnasiums, higher secondary schools, and universities. The number of people

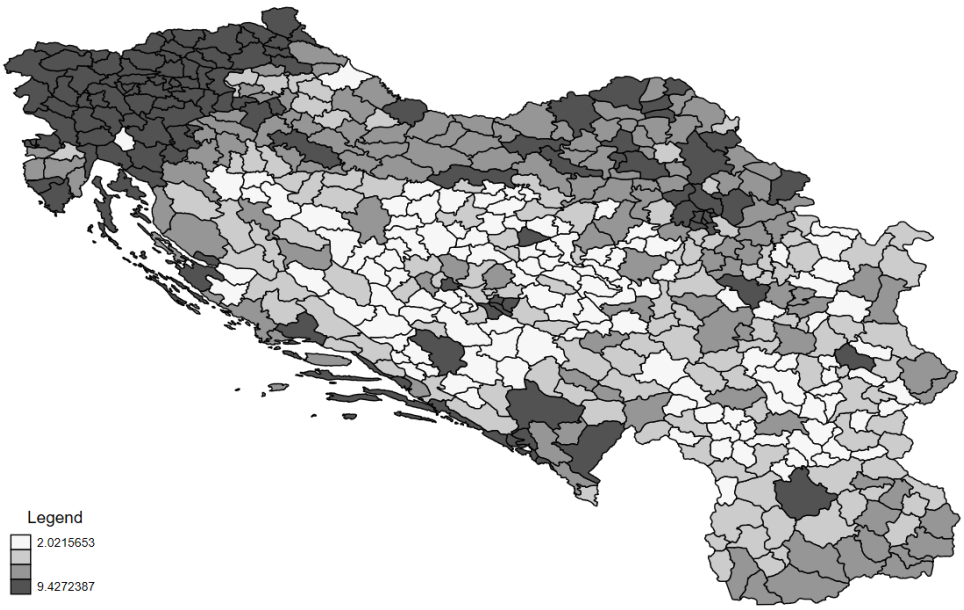
[117] Following the adoption of the Constitution in 1974, Yugoslavia was formally divided into six states: Slovenia, Serbia, Croatia, Macedonia, Bosnia and Herzegovina (BIH), and Montenegro. Serbia was regionally divided into: Serbia-proper, and two autonomous provinces: Kosovo and Vojvodina. For reasons of brevity, the paper refers to these eight macro localities (5 states and 3 parts of Serbia) as regions, as in Milanovic (1987).

without educational certification is also reported. This paper estimated the average years of schooling per municipality by summing up the minimum number of years necessary for the attainment of certain levels of education multiplied by the number of people who attained a given educational level and dividing that sum by the total number of municipal inhabitants above the age of 10. The number of people without formal educational attainment was multiplied by 0; the number with four years of elementary school by 4; with the final year of elementary school by 8; with schools for highly qualified workers by 10; with technical schools by 11; with gymnasiums by 12; with higher secondary education by 15; and with university degrees by 16. The average years of schooling may be underestimated because individuals sometimes take more years than the minimum to attain a certain level of education. The possible underestimation of average years of schooling will probably not distort the main results of the analysis, however, since the average years of schooling serve as an approximation of human capital. Any person who took a year longer to complete high school will ultimately possess the same level of human capital as an individual who finished school "on time".

Maps 4.2, 4.3, and 4.4 present the estimated GDP, average years of education, and estimated EFI in 1971 in Yugoslav municipalities, respectively. Darker shades represent higher estimated values. As expected, the highest levels of GDP are observed in Slovenia, parts of Croatia, and parts of Vojvodina. The lowest GDP is estimated for municipalities in Kosovo. Higher levels of GDP are also observable for municipalities comprising capital cities. Average years of schooling have a very similar spatial distribution as estimated GDP. The highest evaluated EFI is in Bosnia and, as expected around the borders of states that have comprised socialist Yugoslavia.

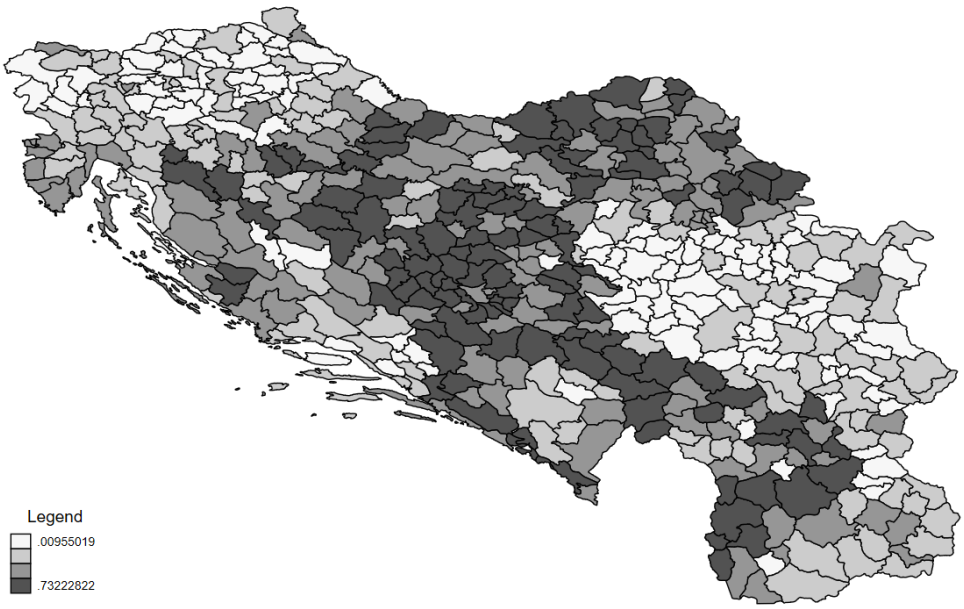


Map 4.2: Estimated logarithm of GDP in socialist Yugoslavia in 1971. *Source:* Author's calculations based on census data



Map 4.3: Average years of education in socialist Yugoslavia in 1971. *Source:* Author's calculations based on census data

Tables 4.1 and 4.2 provide summary statistics for the estimated average years of education and ethnicity variables per census. The low level of intertemporal movement of variables for ethnic diversity, as suggested, justifies the standard assumption in the literature that the ethnic composition is time-invariant. However, the variability of measures for ethnic diversity between municipalities at a single point in time seems sufficient for an analysis to be conducted..



Map 4.4: Ethnic fractionalization index in socialist Yugoslavia in 1971. *Source:* Author's calculations based on census data

The data presented in Tables 4.1 and 4.2 further suggest a slight increase in the average years of education, as expected, due to mandatory elementary education. An average person above the age of 10 did not finish the 4 years of an elementary school in 1961, but in 1971 an average individual completed more than the final year of elementary school. Tables 4.3 and 4.4 provide descriptive statistics for estimated average annual growth rates by region. Data presented in Tables 4.3 and 4.4 suggest both the intertemporal and inter-municipal variability in the growth of annual GDP per capita, making the analysis feasible. The average annual compound municipal GDP per capita is in line with the federal growth levels presented earlier in the paper. Specific values from the top and bottom end of growth distribution may appear inflated. However, if one keeps in mind that opening one factory in a relatively small municipality may result in a disproportionate increase in employment relative to the number of inhabitants of this municipality, these

estimations seem less peculiar. Similarly, the closure of a workers' cooperative in a relatively small municipality may devastate its economic performance.

The next section of the paper uses data collected and generated in order to address the relationship between ethnic diversity and economic performance in Yugoslav municipalities.

Table 4. 1: Education, years of schooling, and ethnicity-summary statistics (census 1961)

1961					
Variable	*Number of observations*	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
Average years of education	498	3.767[118]	1.322	1.472	8.427
EFI	498	0.267	0.234	0.002	0.757
POL	498	0.423	0.338	0.004	0.983

Source: Author's calculations based on data from: Popis stanovništva, domaćinstava i stanova u 1961

Table 4. 2: Education, years of schooling, and ethnicity-summary statistics (census 1971)

1971					
Variable	*Number of observations*	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
Average years of education	498	4.522	1.340	2.022	9.427
EFI	498	0.276	0.218	0.010	0.732
POL	498	0.449	0.325	0.019	0.989

Source: Author's calculations based on data from: Popis stanovništva, domaćinstava i stanova u 1971

Table 4. 3: Average annual compound municipal GDP per capita growth in 1990 G-K international USD (1961-1971)

1961-1971					
Region	*Number of observations*	*Average annual growth rate*	*Standard deviation*	*Minimum*	*Maximum*
Bosnia and Herzegovina	106	0.038	0.044	-0.078	0.171
Montenegro	20	0.041	0.034	-0.040	0.109
Croatia	103	0.058	0.026	-0.007	0.125
Kosovo	22	0.040	0.047	-0.073	0.145
Macedonia	30	0.060	0.032	0.015	0.155
Slovenia	60	0.047	0.022	-0.025	0.115
Serbia-proper	113	0.054	0.042	-0.039	0.205
Vojvodina	44	0.062	0.019	0.017	0.094

Source: Author's calculations

[118] Seemingly lower estimated average years of education should not be surprising when it is recognized that mandatory elementary education did not exist before WWII. The sample covers a large number of individuals born a decade or more before WWII who had no formal education at all.

Table 4. 4: Average annual compound municipal GDP per capita growth in 1990 G-K international USD (1971-1981)

1971-1981					
Region	*Number of observations*	*Average annual growth rate*	*Standard deviation*	*Minimum*	*Maximum*
Bosnia and Herzegovina	106	0.053	0.031	-0.003	0.164
Montenegro	20	0.064	0.033	0.024	0.142
Croatia	103	0.051	0.019	-0.004	0.094
Kosovo	22	0.038	0.023	-0.001	0.083
Macedonia	30	0.045	0.017	0.014	0.089
Slovenia	60	0.047	0.020	0.015	0.122
Serbia-proper	113	0.051	0.024	-0.012	0.122
Vojvodina	44	0.047	0.015	0.009	0.100

Source: Author's calculations

Results

The results of estimating specification (4.1) when EFI measures ethnic diversity are presented in Table 4.5. Column 1 in Table 4.5 provides estimations of specification (4.1) without additional controls. The estimated results suggest a negative impact of ethnic diversity on the economic performance of Yugoslav municipalities. The result is statistically significant at the 10% level. The coefficients for variables for a logarithm of initial income, the logarithm of initial income squared, and average years of schooling are statistically significant. The negative sign of the coefficient representing initial income and the positive one for average years of schooling are expected and in line with the results by Alesina et al. (2003).

When an interaction variable between the logarithm of initial income and EFI is included in the estimation of specification 4.1 (Column 2 in Table 3), the negative impact of ethnic diversity becomes statistically significant at the 5% level. Moreover, the positive and statistically significant coefficient for interaction between ethnic diversity and logarithm of initial income fit the theoretical predictions by Alesina and La Ferrara (2005): the adverse effect of ethnic diversity on economic growth is smaller in wealthier municipalities.

In Table 4.5, Column 3, the estimated coefficients for variables in the specification (4.1) are enlisted with controls set to capture the varied impact of ethnic diversity on economic growth in different regions. When the interaction variables between regional controls and EFI are added to specification (4.1), the estimated coefficient in front of EFI remains negative and statistically significant. The main conclusion does not change even when specification (4.1) is expanded for an interaction variable between decade control and EFI, capturing the potential difference in the effect observed in different decades (Table 4.5, Column 4).

Lastly, it may be the case that the estimated relationship was driven by municipalities that constituted the capital cities of the states which comprised

Yugoslavia. To deal with this, specification (4.1) was further expanded with a dummy variable taking the value of 1 when an observation concerned a municipality that was a part of the capital city and 0 otherwise. The main conclusions did not change when the regression controlled for municipalities comprising capital cities (Table 4.5, Column 5).

The magnitude of the coefficient for EFI changed with the inclusion of different controls in the specification (4.1). When all controls were included, the results presented in Column 5 of Table 4.5, a completely homogenous municipality – EFI=0 – had on average a growth rate of around 5 percentage points greater than an entirely heterogeneous society – EFI= 1 – would have had. One standard deviation increase of EFI was associated with economic growth that was lower by a little above 1 percentage point. These results imply that the effect of ethnic diversity on economic growth was not economically negligible in socialist Yugoslavia.

Table 4. 5: Ethnic fractionalization and growth (dependent variable: average annual GDP growth rate p.c.)

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
EFI in 1961	-0.012*	-0.072**	-0.047**	-0.044**	-0.052**
	(0.005)	(0.024)	(0.014)	(0.015)	(0.017)
Logarithm of initial income	-0.067***	-0.068***	-0.063***	-0.062***	-0.071***
	(0.009)	(0.010)	(0.011)	(0.010)	(0.011)
Logarithm of initial income (squared)	0.003***	0.003***	0.002**	0.002**	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Average years of schooling	0.004***	0.004***	0.004***	0.004**	0.005**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
Log of initial income and EFI interaction		0.008**	0.006**	0.006**	0.007**
		(0.003)	(0.002)	(0.002)	(0.002)
Region controls	Yes	Yes	Yes	Yes	Yes
Decade (1971) control	Yes	Yes	Yes	Yes	Yes
Decade (1971) and EFI interaction control	No	No	No	Yes	Yes
Capital cities control	No	No	No	No	Yes
Region and EFI interaction controls	No	No	Yes	Yes	Yes
Constant	0.388***	0.397***	0.375***	0.373***	0.400***
	(0.032)	(0.039)	(0.039)	(0.038)	(0.039)
Observations	996	996	996	996	996
R-squared	0.185	0.186	0.191	0.191	0.194

OLS estimation. Clustered by state; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The previous procedure, when EFI was used as a measure of ethnic heterogeneity, is repeated but with POL measuring ethnic diversity. Results from these estimations are presented in Table 4.6 (organized the same as Table 4.5 in terms of additional controls).

The fact that ethnic diversity measured by EFI shows consistency in its association with economic growth while POL does not is very interesting. The peculiarity arises when suggestions of the proponents of POL are revisited: that POL

should be a better predictor of ethnic conflicts than EFI. Perhaps, POL would be more informative for periods immediately before the civil war. Another explanation may simply be that the number of ethnic groups, and their sizes, mattered more than the structure of the two largest ethnic groups. It is also possible, although unlikely, that polarization affects economic growth through other variables such as schooling (a suggestion also made in Alesina & La Ferrara, 2005). Whatever explanation may be, for this paper it is sufficient to conclude that the results obtained imply that in the case of socialist Yugoslavia in the 1960s and 1970s, ethnic fractionalization was more important for the economic growth of municipalities than ethnic polarization.

Table 4. 6: Ethnic polarization and growth (dependent variable: average annual GDP growth rate p.c.)

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
POL in 1961	-0.007*	-0.047**	-0.031*	-0.030	-0.035*
	(0.003)	(0.019)	(0.016)	(0.016)	(0.018)
Logarithm of initial income	-0.068***	-0.070***	-0.065***	-0.064***	-0.073***
	(0.010)	(0.011)	(0.011)	(0.011)	(0.011)
Logarithm of initial income (squared)	0.003***	0.003***	0.003**	0.002**	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Average years of schooling	0.004***	0.004***	0.004***	0.004***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log of initial income and POL interaction		0.005*	0.004*	0.004*	0.005*
		(0.003)	(0.002)	(0.002)	(0.002)
Region controls	Yes	Yes	Yes	Yes	Yes
Decade (1971) control	Yes	Yes	Yes	Yes	Yes
Decade (1971) and POL interaction control	No	No	No	Yes	Yes
Capital cities control	No	No	No	No	Yes
Region and POL interaction controls	No	No	Yes	Yes	Yes
Constant	0.394***	0.404***	0.384***	0.383***	0.411***
	(0.036)	(0.042)	(0.039)	(0.038)	(0.039)
Observations	996	996	996	996	996
R-squared	0.184	0.185	0.189	0.190	0.193

OLS estimation. Clustered by state, robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

In only one variation of specification (4.1), the variation with initial controls and the control for interaction between ethnic diversity and logarithm of initial income, the impact of polarization on the economic growth of municipalities is statistically significant at a 5% level (Table 4.6, column 2). In other specifications, the variable for economic polarization is statistically significant only at a 10% level, at best. Regardless of the consistent negative sign of the coefficient for ethnic polarization, this paper takes the conservative approach and concludes that the impact of ethnic polarization on the economic performance of municipalities in socialist Yugoslavia is inconclusive.

As mentioned, most of the previous studies estimate the relationship between ethnic heterogeneity and economic performance by using the seemingly unrelated

regressions approach. In Table 4.7, column 1, estimated coefficients by SUR of the specification (4.1) when EFI is the measure for ethnic diversity are presented. Results of SUR estimation, when the interaction variable between the initial municipal GDP and EFI is added to the specification (4.1), are given in Table 4.7, column 2. Estimated coefficients of the specification (4.1) when the polarization index is the main measure of the diversity are provided in column 3 of Table 4.7. The last column of Table 4.7 presents estimation results when both EFI and POL are included in the specification (1).

Table 4. 7: EFI, POL, and growth (dependent variable: average annual GDP growth rate p.c.)

Variables	**(1)**	**(2)**	**(3)**	**(4)**
EFI in 1961	-0.016***	-0.087**		-0.021**
	(0.004)	(0.038)		(0.010)
Logarithm of initial income	-0.055***	-0.055***	-0.056***	-0.054***
	(0.021)	(0.021)	(0.021)	(0.021)
Logarithm of initial income (squared)	0.002	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Average years of schooling	0.002**	0.002*	0.002*	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)
Log of initial income and EFI interaction		0.010*		
		(0.005)		
POL in 1961			-0.010***	0.004
			(0.003)	(0.007)
Region controls	Yes	Yes	Yes	Yes
Constant	0.341***	0.353***	0.350***	0.338***
	(0.076)	(0.077)	(0.076)	(0.076)
Observations	448; 448	448; 448	448; 448	448; 448
R-squared	0.179; 0.185	0.178; 0.191	0.181; 0.179	0.179; 0.186

SUR estimation, one equation for each decade. Clustered by state; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The results from SUR estimation lead towards similar conclusions derived from the OLS estimation. Namely, the ethnic diversity, measured by the ethnic fractionalization index, has negatively affected municipal economic performance (column 1, Table 4.7), but this impact is smaller in richer municipalities (column 2, Table 4.7). SUR estimation results imply (column 3, Table 4.7) that polarization had a statistically significant impact on economic performance. However, when both EFI and POL are included in the specification (4.1), the polarization index loses statistical significance, while EFI remains statistically significant.

As a robustness check, the paper estimates specification (4.1) for the decade 1971-1981 with an IV approach. The diversity variable, measured by EFI, is instrumented with its value from 1961 and the percentage of people who did not identify as any other major ethnic group in a municipality.

Table 4.8, column 1, provides IV estimation results of the specification (4.1) only with controls for the initial income and schooling. The second column, Table 4.8,

provides results for the estimation when regional dummies are added. The results of further expansion of the specification (4.1), with added interaction variable between the initial income and EFI, are given in column 3, Table 4.8.

Table 4. 8: EFI and growth – IV approach (dependent variable: average annual GDP growth rate p.c.)

Variables	**(1)**	**(2)**	**(3)**
EFI in 1971	-0.026***	-0.029***	-0.113**
	(0.005)	(0.006)	(0.053)
Logarithm of initial income	0.017	-0.020	-0.025
	(0.024)	(0.024)	(0.025)
Logarithm of initial income (squared)	-0.002	0.001	0.001
	(0.002)	(0.002)	(0.002)
Average years of schooling	-0.001	-0.003*	-0.003*
	(0.001)	(0.001)	(0.002)
Log of initial income and EFI interaction			0.010
			(0.007)
Region controls	No	Yes	Yes
Constant	0.038	0.193**	0.220**
	(0.089)	(0.091)	(0.095)
Observations	448	448	448
R-squared	0.158	0.248	0.206
Sargan-Hansen test	0.771	2.317	3.551
LM-statistics	460.3***	443.4***	53.78***

2SLS estimation. Clustered by state; robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The results from an IV approach do not change the principal conclusion: that there is a negative impact of EFI on economic performance. However, the results presented in Table 4.8 cast doubt on the conclusion that the negative impact of ethnic diversity on economic growth is smaller in more prosperous municipalities.

Lastly, Table 4.9 presents the results from the spatial autoregressive model applied to the main specification for the decade 1971-1981 that should account for potential problems of spatial autocorrelation. The results are based on the maximum likelihood estimators. The main results do not change when spatial autocorrelation is taken into account.

The results presented indicate that *Brotherhood and Unity* did not eliminate the negative impact of ethnic fractionalization on economic performance. However, it was possible that the observed impact would have been even larger in absolute terms if the ideology and institutions that promoted inclusiveness had not existed. A proper test of the impact of *Brotherhood and Unity* on the relationship of interest would require observations from periods when the emphasis was not on ethnic inclusivity. Unfortunately, these observations are not available. Censuses before

1961 are too low in quality to allow this endeavour, while census data after 1981 are unreliable due to political turbulence.[119]

Table 4. 9: EFI and growth – Spatial Autoregressive model (dependent variable: average annual GDP growth rate p.c.)

Variables	**(1)**
EFI in 1961	-0.136***
	0.052
Logarithm of initial income	-0.023
	(0.024)
Logarithm of initial income (squared)	0.001
	(0.002)
Average years of schooling	-0.003*
	(0.002)
Log of initial income and EFI interaction	0.015**
	(0.007)
Region controls	Yes
Constant	0.224**
	(0.090)
Observations	448
Wald test of spatial terms	28.81***
Pseudo R-squared	0.254

Maximum likelihood estimators. Standard errors adjusted for spatial autocorrelation in growth variable, in all regressors accept regional controls. *** p<0.01, ** p<0.05, * p<0.1

As mentioned above, individuals, if they wanted, could ethnically identify as Yugoslavs. It is possible to use this information and assume that in those municipalities where people identified as Yugoslavs, the ethnic inclusiveness of *Brotherhood and Unity* was more effective. Although this is strictly no more than an assumption, it can helpfully shed light on whether encouraging inclusive behaviour reduced the negative impact of ethnic fractionalization on economic growth.

Specification (4.1) was altered and instead of ethnic diversity, the proportion of people who declared themselves as Yugoslavs in censuses was used as an explanatory variable. The idea was that, if the above assumption was valid, the estimated coefficient for the variable representing the proportion of Yugoslavs in a given municipality should be positively related to economic growth if *Brotherhood and Unity* mitigated the negative impact of ethnic fractionalization on economic growth.

Table 4.10, Column 1, reports the estimation result where the variable representing the proportion of Yugoslavs was used instead of the variable for ethnic diversity. The coefficient for the proportion of Yugoslavs in a municipality was significant and negatively related to municipal economic growth, suggesting that

[119] For instance, ethnic Albanians in Kosovo (Baltic, 2007) boycotted the census in 1991.

Brotherhood and Unity did not reduce the negative impact of ethnic diversity on economic growth.

In order to provide some further support for the last provisional conclusion, the proportion of people who did not assert that they belonged to any of the ten biggest ethnic groups was used in the specification (4.1), instead of the proportion identifying as Yugoslavs. The results, presented in Column 2 of Table 4.10, show that the coefficient for the variable representing the proportion of people who did not identify as members of larger ethnic groups was insignificant.

Table 4. 10: Brotherhood and Unity and growth (dependent variable: average annual GDP growth rate p.c.)

Variables	**(1)**	**(2)**	**(3)**
% of Yugoslavs	-0.051***		
	(0.009)		
% of the remainder		0.008	
		(0.012)	
% of Croats			-0.014
			(0.009)
Logarithm of initial income	-0.067***	-0.067***	-0.067***
	(0.010)	(0.012)	(0.012)
Logarithm of initial income (squared)	0.003***	0.003**	0.003**
	(0.001)	(0.001)	(0.001)
Average years of schooling	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)
Region controls	Yes	Yes	Yes
Decade (1971) control	Yes	Yes	Yes
Constant	0.388***	0.386***	0.398***
	(0.037)	(0.045)	(0.050)
Observations	996	996	996
R-squared	0.185	0.181	0.187

OLS estimation. Clustered by state, robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Conclusions

The analysis conducted in this paper found the negative impact of ethnic diversity on economic growth in socialist Yugoslavia. This was despite the efforts of political elites to promote inclusion along ethnic lines. Formal laws prohibiting segregation and nationalism, accompanied by an ideology that sought to foster inclusion, were not sufficient to neutralize the negative economic consequences of ethnic diversity. The paper further educes evidence that these political efforts to encourage inclusion, under the slogan *Brotherhood and Unity,* did not even contribute to lessening the negative effect of ethnic fractionalization on economic growth. However, this is merely a suggested conclusion that depends on rigorous assumptions; proper counterfactual evidence demands currently unavailable data.

As noted above, Collier (2000) claimed that a dictator draws its political and economic power from the people who share the dictator's ethnicity. The Yugoslav dictator, Josip Broz Tito, was born a Croat in the part of the Austro-Hungarian Empire which would become Croatia after the First World War. With this in mind, and intending to build further support for the view that *Brotherhood and Unity* probably did not reduce the negative impact of ethnic fractionalization on economic growth, the research included in the specification (4.1) a variable representing the fraction of people who declared themselves to be Croats instead of the variable representing the proportion of Yugoslavs. The results with the proportion of Croats included are given in Table 4.10, Column 3. The variable for the proportion of Croats was not significantly related to the economic growth of municipalities.

The results obtained for the case of socialist Yugoslavia are generally in line with theoretical predictions. Collier's (2000) theoretical predictions – the expectation that in dictatorships, ethnic diversity will have a high adverse impact on economic performance – seem to be valid. This is the case even though the Yugoslav dictator did not draw political and military power from his ethnic background, one of the main assumptions of Collier's (2000) model. It is possible that, in addition to the dictator's reliance on drawing political power from his own ethnic background, other factors make dictatorships liable to experience the high costs of ethnic diversity; at least, socialist Yugoslavia seems to illustrate that they do. For other theoretical predictions, such as Alesina and La Ferrara's (2005) that more prosperous regions will be less affected by the adverse impact of ethnic diversity on economic development, it is not possible to conclude from this study alone if they hold for the case of Yugoslavia.

The conclusions derived do not suggest that inclusive policies are generally ineffective in reducing the costs and/or supporting the economic benefits of ethnic diversity. Nevertheless, the results of this paper suggest that the top-down policies and efforts of political elites may not be sufficient in particular contexts to neutralize the negative impact of ethnic diversity on economic performance. If political freedom of expression is almost completely suppressed, as it was in socialist Yugoslavia under a dictatorial rule, then all other efforts to promote ethnic inclusion may be futile. At the same time, Alesina and La Ferrara's (2005) model predicts that higher ethnic diversity may lead to sub-optimal choices of public goods. In the Yugoslav economic model, production decisions made by workers' collectives may have suffered from these "sub-optimal" choices due to the differed preferences of individuals from different ethnical backgrounds or historical animosity between the ethnically diverse workers. *De facto* centralized influence on workers' collectives can also be a reason why the benefits from specialization along ethnic lines have not occurred. Whether or not these predictions are accurate, the Yugoslav experience should not be neglected when inclusive policies are crafted and implemented. For a policy of inclusiveness to result in economic success, context matters.

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Appendix 1: Estimating the economic performance of municipalities in socialist Yugoslavia

A 1.1 Federal and regional levels of GDP in Yugoslavia

The regional and federal levels of GDP for socialist Yugoslavia are not readily available from the official statistics of the federation. Yugoslav national accounting was based on the "Marxist theory of reproduction" (Statistički godišnjak Jugoslavije, 1991, p.34) which was also known as the *Material Planning System*. This system did not recognize the standard concept of GDP and in consequence, GDP was not formally measured. Instead, the main indicators that the *Material Planning System* generated to assess economic performance were the Gross social product, Social product, and People's income.[120]

Gross social product (GSP) represents the total value of all goods and *material services* produced in Yugoslavia during a certain period, usually one year. Social product (SP) is calculated as the difference between the Gross social product and material costs from all intermediate production phases. People's income (PI) is obtained by subtracting depreciation levels from SP.[121]

SP is closer to the concept of GDP than any other measure mentioned. Kukić (2017) considers GDP and SP to be conceptually equivalent. In any case, these two measures differ in the coverage of goods and services. While GDP takes into account all final goods and services, SP does not cover what the *Material Planning System* treats as *non-productive services*. Non-productive services include expenditure on defence, education, housing, government administration, healthcare, and culture (Kukić, 2017). SP is, therefore, systematically lower than GDP and does not represent an appropriate measure of economic activity.

Attempts have been made (such as in Miljkovic, 1992) to estimate the extent of the difference between SP and GDP, which arises because of the under-coverage of services in SP. However, a simple adjustment of the value of SP to account for non-productive services would still provide a distorted picture of Yugoslav economic performance for several reasons. First, socialist countries tend to overestimate their production growth, which would artificially increase SP (Ofer, 1987). Second, the treatment of what falls under the productive sector or, more precisely, what is going to be included in SP was changing over time (Kukić, 2017). Third, the terms of trade between the agricultural and industrial sectors were intentionally distorted and this

[120] The more frequently used term for this measure is National income. Since people's income is a completely different measure from the standard (SNA) gross national product, the present paper refers to this measure as people's income, in order to avoid unnecessary confusion.

[121] Formal delineations of Gross Social Product, Social Product, and People's income are taken from the last Statistical Yearbook produced for socialist Yugoslavia before the country was dissolved - Statistički godišnjak Jugoslavije, 1991. Definitions of these measures of economic activity did not change throughout the existence of the country.

could particularly affect the evaluation of regional economic performance. More specifically, the prices of agricultural products were intentionally set below global market prices, while the prices of industrial goods were set above the going rate (Kukić, 2017).[122]

A group of scholars led by Thad P. Alton in their *Research Project on National Income in East Central Europe* (The Project) has directly calculated the GPD of Yugoslavia via estimating the factor costs (Alton, 1970; Bombelles, 1983; Staller, 1986; Alton et al., 1992). Their estimations of Yugoslav GDP do not rely on official Yugoslav output data.[123] Therefore, the assessment of Yugoslav economic performance based on GDP estimates from The Project is probably more realistic than any other assessment that relies on official output data.

In the past, the regional economic development of socialist Yugoslavia was analyzed by observing official regional levels of the Social Product (for example Milanovic, 1987; Flaherty, 1988), due to the lack of better estimates of regional economic activity. However, recent endeavours by Kukić (2017) and Bolt et al. (2018) have provided estimations of regional GDP for Yugoslavia.

To calibrate the municipal levels of economic activity, this paper uses Kukić's (2017) methodological approach and estimates of regional GDP, for two reasons.[124] The first stems from the fact that, unlike Bolt et al. (2018), Kukić (2017) incorporates data from The Project in his estimations of regional GDPs and is less reliant on official data on the growth of output.[125] The second reason is that Kukić (2017) provides GDP levels for eight regions, while Bolt et al. (2018) provide GDP levels for the six nation-states comprising Yugoslavia.

For region *i* in period *t,* Kukić (2017) estimates GDP value by the following specification:

$$GDP_{i,t} = GDP_{yug,a,t} * S_{i,a,t} + GDP_{yug,na,t} * S_{i,na,t} \quad (4.2)$$

where $GDP_{i,t}$ is the GDP value of region *i* in period *t*; $GDP_{vua.a.t}$ is the value of agricultural GDP estimated by The Project; $S_{i.a.t}$ is the regional share of agricultural output in the total amount of Yugoslav agricultural output obtained from the official Yugoslav statistics; $GDP_{yug,na,t}$ is the value of non-agricultural GDP estimated by

[122] Policy makers believed that distorting prices in this way would enhance the competitiveness of the federation.

[123] For a detailed description of the methodology see Occasional Paper number 48: Alton, 1970

[124] Kukić's (2017) original methodology, however, has to be adjusted due to the scarcity of municipal level data.

[125] In his paper, Kukić (2017) reports that state level data from Bolt et al. (2018) rely heavily on the official output growth estimates. Kukić (2017) further asserts that he obtained this information from Branko Milanovic, the person who presumably estimated the state level GDPs for Yugoslavia in Bolt et al. (2018).

The Project; and $S_{i,na,t}$ is the regional share of non-agricultural output in the total amount of Yugoslav non-agricultural output obtained from the official Yugoslav statistics. The second part ($GDP_{vua.na.t} * S_{i.na.t}$) of specification (4.2) is further broken down to account for the bias from not accounting for non-productive services:

$$GDP_{yug,na,t} * S_{i,na,t} = GDP_{yug,pna,t} * S_{i,pna,t} + GDP_{yug,npna,t} * \frac{W_{i,npna,t}}{W_{yug,npna,t}}$$

(4.3)

where $GDP_{vua.pna.t}$ is the value of material non-agricultural GDP estimated by The Project; $S_{i.pna.t}$ is the regional share of productive non-agricultural output in the total amount of Yugoslav productive non-agricultural output estimated by official Yugoslav statistics; $GDP_{vua.npna.t}$ is the value of non-material non-agricultural GDP estimated by The Project; and $\frac{W_{i,npna,t}}{W}$ is the ratio of the regional wage bill to the total Yugoslav wage bill for non-material services (data obtained from official Yugoslav statistics). The inclusion of the wage bill ratio preserves the consistency of the estimates, since The Project evaluation of GDP is, as mentioned, based on the factor costs.

A 1.2 Allocating regional GDP to municipalities

The federal statistical bureau – *Savezni zavod za statistiku* –provides only estimates of people's income (PI) at the municipal level; it does not report the levels of SP or GSP for Yugoslav municipalities, nor does it provide sectoral output data. Since PI is derived from SP, the same problems of estimating economic activity arise from using the PI, as well as from using the SP. Furthermore, the PI is obtained when the SP is reduced to take account of depreciation, meaning that the PI may take negative values in municipalities with higher levels of capital endowment, leading to the potentially false conclusion that a given municipality is poorer than it is.

Statistical Yearbooks (Statistički godišnjak Jugoslavije, 1972; 1982; Statistički godišnjak FNRJ, 1962) provide municipal level employment data for agricultural and non-agricultural sectors. Official employment data can be treated as an approximation for labour factor costs at the municipal level – staying in the framework of estimating GDP via factor costs set up by The Project and followed by Kukić (2017). If this proposition is accepted and combined with regional GDP data provided by Kukić (2017), then it is possible to distribute regional GDP across municipalities. The calibration of municipal GDP, in this case, is provided in the specification below:

$$GDP_{j,t} = GDP_{i,a,t} * SE_{j,a,t} + GDP_{i,na,t} * SE_{j,na,t} \quad (4.4)$$

where $GDP_{i.t}$ is the estimated level of the economic performance of municipality j from region i in time period t; $GDP_{i.a.t}$ is the agricultural GDP in a region i estimated by Kukić (2017); $SE_{i.a.t}$ is the share of agricultural employment of a municipality j from region i in the total agricultural employment in the region i; $GDP_{i.na.t}$ is the non-agricultural GDP in a region i estimated by Kukić (2017); and $SE_{i.na.t}$ is the share of non-agricultural employment of a municipality j from region i in the total non-agricultural employment in region i. All state-level GDP figures are expressed in 1990 Geary-Khamis international dollars.

For the sake of clarity, this paper refers to the estimates from specification (4.4) as "municipal GDP". It should be noted, however, that the resultant of specification (4.4) has the following limitations. Neither Kukić's (2017) regional estimations nor municipal level estimations stemming from specification (4.4) can encompass the relative differences in capital income due to the scarcity of official data. However, while Kukić (2017) accounts for productivity (wage) differences between the regions, the data limitations do not allow us to account for the wage differences within a region. Lack of wage data also prevents the direct use of reputable methodologies that do not necessarily rely on factor costs (for instance, Geary & Stark's, 2002) for distributing GDP data from larger to smaller geographical units. Most importantly, the employment data from Yugoslav Statistical Yearbooks only consider the official number of employed people in factories, organizations, and economic communities (Statistički godišnjak Jugoslavije, 1991). This probably results in overestimating the municipal GDPs for richer municipalities – assuming that more people are officially employed in wealthier municipalities – and underestimating the GDPs for less developed municipalities.

Nevertheless, with the above discussion in mind, specification (4.4) provides more accurate results for a municipality's economic performance than any other available indicator. Specification (4.4) avoids problems of inflated output and distorted prices. Moreover, since this study is primarily interested in the growth of municipal economic activity, the distortions mentioned probably have no decisive impact on the paper's overall conclusions.

The presence of individuals working in one municipality but residing in another does not affect the analysis. The Statistical Yearbooks treat employment from the standpoint of where individual works. Since the paper is concerned with finding where value (or more precisely, factor cost) is created, commuters do not represent an issue in estimating municipal economic activity. Equally, it is not likely that potential profits spilt over from one municipality to another because of the nature of the business organization in the Federation. Although "profits" from a successful business were sometimes reallocated to workers' collectives that were less successful (World Bank, 1983), no evidence suggests that this redistribution was affected by ethnic diversity.

A 1.3 Formation of temporally comparable territorial units

The administrative division of Yugoslavia was not static from 1961 to 1981. In Table 4.11, the total number of municipalities and the number of municipalities by region is presented for three observational periods. Since the land coverage of municipalities was changing during the period of interest, it was necessary to account for these territorial changes in order to allow municipal economic performance at different times to be comparable.

In 1971, Yugoslavia was administratively divided into a smaller number of municipalities than it was in any other observational period (see Map 4.5). Regions in 1971 had either the same number of municipalities or fewer. Because it is often impossible in analyzing Yugoslav employment data to reasonably disaggregate data for a larger locality, the administrative division of 1971 must be imposed as a benchmark for territorial divisions. Fortunately, census data from 1971 explicitly show which municipality in 1971 encompassed smaller territorial units that had in the past been considered municipalities. For example, the locality Bosanska Kostajnica was treated as a municipality in 1961, but in 1971 became part of the municipality Bosanski Novi. Employment data from Bosanska Kostajnica in 1961 must be added to employment in Bosanski Novi in 1961 in order to compare them with data in 1971, and those in other periods.

Table 4.11: Number of municipalities by region

							Serbia			
Year	Total Yugoslavia	Bosnia	Monte-negro	Croatia	Mace-donia	Slovenia	*Total*	*Serbia-Proper*	*Kosovo*	*Vojvodina*
1961	782	122	20	244	73	83	240	155	28	57
1971	500	106	20	105	30	60	179	113	22	44
1981	512	109	20	113	34	60	186	114	22	50

Source: Statistički godišnjak Jugoslavije. (1991)

In most cases, simple aggregation of data on the properties of smaller territorial units was sufficient to keep them comparable with data from the administrative distribution of municipalities in 1971. However, some exceptions had to be made. Most notably the Yugoslav Statistical Yearbook in 1981 treated municipalities Umag and Novigrad as parts of municipal Buje. For this reason, data concerning Umag and Novigrad were aggregated for 1961 and 1971 and added to the municipality Buje. Another exception was municipality Rijeka which was divided among several municipalities in 1961 but existed as a whole in 1971 and 1981. The simple merging of these municipalities (Kraljevice, Stari Grad, Zamet, Sušak, and Matulji) in 1961, however, would not provide comparable data for municipality Rijeka in the other periods observed. This is because this group of municipalities in 1961 covered inhabited areas that were not part of municipality Rijeka in 1971 and 1981. Therefore, data for 1961 Rijeka were obtained not simply by aggregating municipalities but by adding the data from the smaller localities that comprised

Rijeka in 1971 and 1981. The unique exception is the case of the municipality Rakovica. This municipality appears only in 1981. It is relatively small (less than 0.001% of the population) and cannot be straightforwardly "assigned" to any of the existing municipalities. Since the cost of distorting data from other municipalities seems higher than the potential benefit of including data concerning Rakovica, it was decided not to include this municipality in the analysis.

It may be important to mention that all the municipal name changes were tracked, but name changes did not affect the territorial coverage of the municipalities. For instance, Novi Travnik was renamed Pucarevo during the period of observation, but the municipality, regardless of the change of the name, occupied the same territory.

The last exception is concerned with the treatment of municipalities that were capital cities. Sometimes the censuses of the capital cities in the states comprising Yugoslavia were divided into more municipal areas than in the Statistical Yearbooks from which employment data are obtained.[126] For instance, Skopje, the capital of Macedonia (nowadays North Macedonia), is treated in the Statistical Yearbooks as a single municipality, together with its periphery. In the censuses, however, one encounters Skopje divided into several municipalities (Idadija, Kisela voda, Đorče Petrov, to name a few). When administrative divisions from Statistical Yearbooks coincided with administrative divisions from censuses, these municipalities were treated regularly. For example, the Belgrade municipality Savski venac is treated as a single point of observation.[127] If the censuses included the municipalities of capital cities that were not to be found in Statistical Yearbooks, then data concerning these municipalities were aggregated appropriately. For example, all the observations concerning Skopje were aggregated and treated as one.

[126] Table 4.11 shows the number of municipalities without the "sub-divisions" of capital cities.

[127] The fact that a certain municipality of a capital city is treated as a single point of observation by no means implies that its connection with the capital city in analysis was neglected.

Map 4.5: Administrative territorial division of Socialist Yugoslavia in 1971. Legend: solid thick line: borders of socialist republics; dashed thick line: autonomous provinces; solid thin lines: municipal borders. *Source: Popis stanovništva, domaćinstava i stanova u 1971*