Master programme in Economic History

From Trade-Off to Win-Win!
Prudent Policy or Coincidental Conditions for Latin American economies

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Abstract: Many Latin American economies benefited greatly from increasing international trade and an unprecedented commodity boom in the dawn of the 21st century. At the same time the region successfully reduced the prevailing income inequality, apparently without compromising economic growth. These events seem to challenge the common belief of economists, who proclaim the mutual exclusiveness of growth promoting measures and inequality reducing policies. They also contrast the trends of rising income disparities in the western world, as famously expressed by Thomas Piketty (2014).

Given Latin America's long and burdensome history of high income inequality, the recent changes are untypical, which made the region a popular subject for research of economic inequality. While, numerous scholars tried to explain the relationship between economic growth and income inequality, this study primarily focuses on the impact of international trade on this very relationship. The contemporary case of Latin America fits this purpose greatly and is above all fascinating due to its historical properties in respect to income inequality. Moreover recent events in Latin America may indicate the beginning of a "win-win scenario" in which economic growth and reduced income inequality do not necessarily exclude each other. Admittedly the scenario is yet hypothetical as only the future will show if a sustained "win-win" trend occurs. However, with descriptive statistics and panel data regressions this study investigates if the increased commodity trade may have triggered the alleged regime change to a "win-win scenario". The impact of changes in the commodity terms of trade on the ratio between social expenditures and GDP are analyzed in detail to get a better understanding of trade's impact on income disparity. The results show that an increase in international trade is unlikely to be the sole culprit for reduced income inequality in Latin America. For the alleged change in the relationship between income inequality and economic growth, international trade cannot be held responsible either.

Key words: Income Inequality, Economic Growth, Latin America, International Trade

Table of Contents

List of Tables

List of Graphs

I. Introduction

In his newly published book, *"Capital in the Twenty-First Century"*, Thomas Piketty (2014) explains the current phenomenon of a widening gap between the rich and the poor in western societies. He thereby drags the ill-reputed discussion about wealth and income distribution out of the "Marxian shade" and tries to push it away from political polarization. The researcher analyzes the underlying mechanisms of increasing wealth and income inequality, and discusses the consequences. Piketty (2014) offers a historical analysis of income inequality in Europe and the US in unprecedented depth and explains paths and patterns of income disparity. Without a doubt the researcher takes a critical stand towards the economic model of the western world. He demands more government intervention and states that unregulated capitalism would serve to divide societies economically. The consequences of such a development would be detrimental for the social and economic stability (Piketty, 2014).

Piketty's work is certainly a breath of fresh air in the economic debate. By breaking with a taboo, the scholar made research on the relationship between income distribution and economic growth once more acceptable. Though, his statement that only state intervention could prevent high economic inequality is controversial. Nevertheless, it served as a great source of inspiration for this study.

In this study Piketty's thesis is turned around and analyzed from a different angle. Can income equality be achieved through external factors that are not directly influenced by re-distributive policies, such as progressive wealth or income tax? We will analyze the effect of international trade on the relationship between income inequality and economic growth in a region where the income distribution recently became more equal instead of more unequal – the case of Latin America in the 21st century. Could a "win-win" between economic growth and income equality be achieved due to the increased commodity trade in Latin America of the 21st century?

Why Latin America?

Latin America is an ideal region for this purpose because it showed a recent decline in income inequality, which contrasts the current economic development of the western world according to Piketty (2014). Moreover, the region could take advantage of the rising demand for primary resources on the world market and currently experienced vast gains from increased international trade (Jenkins et al., 2008, Gasparini & Lustig, 2011). The pattern of Latin

America's rising international trade and its outstanding achievements in income inequality reduction are furthermore accompanied by sound economic growth beginning in the late 1990's and early 2000's. The region benefited from an average Gross Domestic Product (GDP) growth rate of 5.5% between 2003 and 2008 (Cornia, 2010).

In addition these patterns allow a new perspective on an old theoretical discussion that divides the economic literature; is the reduction of income inequality harmful or even beneficial for economic growth? Coined by researchers like Kuznets (1955), Kaldor (1955) or Lewis (1954), it became conventional wisdom that initial income inequality is necessary for economic growth and reductions in such could even harm the economic development in the fashion of a trade-off (Birdsall, 1998). This view is however challenged by Persson and Tabellini (1991), Galor and Zeira (1993) or Birdsall (1998, 2007), as they suggest that income equality would increase the efficiency of economic, political and social processes and therefore propel economic development in the fashion of a "win-win situation".

The economic history of Latin America comprises both, episodes of "trade-off" and "win win", which makes the case even more suitable for this study. We will therefore focus on the most recent shift from a "trade-off" to a "win-win" in the year 2002. Benign external conditions and increasing exports entailed economic growth in the region, which occurred more or less simultaneously to the decline in income inequality. However, it is unclear if external conditions were responsible for diminishing income disparities or if they even enabled the win-win.

We seek to analyze to what extent the increased international terms of trade contributed to achieving both, increased economic growth and reduced income inequality after 2002. Did prudent political choices make a difference in the relationship, or did external conditions make political changes affordable? More specifically, did the dramatic export boom enable the win-win situation in Latin America?

1.2 Purpose, Aim and Contribution

Measures of political intervention to reduce income inequalities, such as progressive (wealth) taxing, cash-transfer programs, free education or free health care, are often difficult to implement due to political head-wind. They are labeled distributive or re-distributive policies and increase the possibility of falsely being accused to be a communist, a socialist or trying to create class warfare. Thus many western politicians often avoided such loaded topics. This

5

study continues to improve the reputation of the ill regarded issue of income distribution and contributes to putting it beyond political prejudice.

Moreover, this study aims to create a deeper understanding of mechanisms that influence the dynamic relationship between economic growth and income inequality. Previous research has already established that this relationship is interactive, multifaceted and changing over time and space (Adelman, 2000; Barro, 2000). It is known that there are many channels through which income inequality affects economic growth and vice versa. Based on previous research, this study will focus on factors that influence the direction of this relationship, rather than the channels itself. We want to find out why economic growth and income inequality reduction did not exclude each other in Latin America after the year 2000. In other words, what caused the alleged shift from trade-off to win-win?

We focus in particular on the impact of international trade because it becomes an ever more important factor in times of ongoing globalization. By analyzing the impact of international trade on the relationship between economic growth and income inequality we aim to reveal a factor that enables a "win-win" and allows economic growth and income inequality reduction simultaneously. Thereby we contribute to the theoretical discussion about the relationship between growth and income inequality, and put it into a modern context.

Additionally, and may be most importantly, we improve the methodological state of research. In this study we are taking out panel data regressions under consideration of the data's time-series properties. Previous studies largely failed to acknowledge the possibility of spurious regression caused by non-stationary data and disregarded important unit-root tests. These shortcomings are severe and warrant caution in drawing conclusions. A more detailed explanation about the methodological issues will be provided in section 3 and 4.

Therefore, the aim of this study is on the one hand to improve the methods of economic research and to contribute to the theoretical discussion about the mutual exclusiveness of economic growth and income inequality reductions, and on the other hand to make the reduction of income inequality a more relevant point on the political agenda.

1.3 Definitions and Outline

In order to avoid confusion about the content analyzed in this paper, the central assumptions and key words will be defined clearly in the following.

Income inequality is considered the unequal distribution of household or individual income across the population of one country. Note that income equality never refers to perfectly

equally distributed income or wealth. Natural income differences due to talents, knowledge, motivation or work ethics are acceptable as long as the chances, e.g. upward job mobility are sufficient. In this study the term inequality always refers to income inequality. Furthermore the terms economic inequality, income inequality, income concentration or income disparity are used interchangeably.

We define distributive or redistributive measures as actions of the government and other economic actors to reduce income inequality. Examples include raising social expenditures, progressive taxation, and capital taxation, lowering credit interest rates for the majority, human capital investments, decreased unemployment and higher labor participation.

External factors exclusively refer to aspects that influence the ex- and imports of a country or a region. The term external refers to the actions of governments or other economic actors, which are not primarily aiming at inequality reduction. As many Latin American countries are raw material exporters this study takes a closer look into the trade balance of the primary sector and the external factors governing it.

The terms trade-off and win-win will be used to describe the interactive relationship between economic growth and income inequality. Trade-off refers to a state in which either economic growth or income inequality reduction is achieved. Win-win depicts a situation in which the economy is growing and income concentration is reduced simultaneously.

Trade openness refers to a state of trade liberalization where formal and informal import and export barriers are eliminated in order to promote international trade.

In order to fully grasp the magnitude of the recent economic development in Latin America, the historical roots have to be recognized. For that reason this study will firstly give insights into the economic history of the region and briefly discuss potential origins to contextualize. Subsequently the underlying theory will be discussed in section 2 before the results of previous studies will be reviewed in section 3. The applied data and methods will be explained in section 4 followed by the main analysis in section 5. Finally, we conclude and reflect critically upon the results in section 6.

II. Latin America – A history of income inequality

Large income disparities have been highly persistent throughout Latin America's economic history. The region faced successively rising income inequality during the inclusion in the global economy in the late 19th century and could not improve this state throughout most of the 20th century (Gasparini & Lustig, 2011). In the following the economic course of Latin

7

America will be discussed in respect to international trade and the origins of inequality to provide a background for more recent economic events.

Although economic historians struggle to come to an agreement about the origins of high income inequality, it is undisputed that factor endowments, land in particular, always played an important role for Latin America's economic path.

Engerman and Sokoloff (2000, 2002), as well as Acemoglu et al. (2000) argue that the emergence of extreme income inequality dates back to the times of colonialism, when European powers began to exploit the Americas for their natural resources (Perry, Ferreira & Walton, 2003). The researchers suggest that the pattern of high income inequality is rooted in the early implementation of highly extractive institutions used by the *conquistadores* to enrich themselves. According to Acemoglu (2000) such institutions have been persistent throughout the 19th and 20th century and have not changed profoundly after Latin American countries gained independence. Despite social, political and economic changes, the established institutions tended to reproduce highly unequal distributions of income, land and even political power (Perry et al., 2003).

Acemoglu et al. (2000) argue that income disparities widened dramatically during the 19th century due to increasing relative returns to land. High returns to land may have been pulled by the demand for natural resources, partially triggered by rising international trade. As the ownership of land was typically very concentrated, an economic elite, richly equipped with land, could establish. Hence, only a few benefited from the inclusion into a globalized trade system and the income gap widened.

Moreover, investments in education developed slowly, making it nearly impossible for the poor majority to take advantage of increasing returns to education during the process of economic development. Thus, not only land ownership but also education became privileges reserved for the rich (Acemoglu et al., 2000). Concentrated economic power and limited access to schools additionally prevented the poor from participating in political processes, and constraint democratic processes. Thus the political power was also accumulated in the hands of a small group closely related to the economic elite of the region. These aspects contributed mainly to the maintenance of an extractive status-quo in Latin Americas' institutions throughout the 19th and 20th century (Acemoglu et al., 2000).

Adelman's (2000) thesis of dependent economic development paths appears to corroborate Acemoglu's (2000) argument as the scholar states that the initial preconditions impact the

economic development in the future. Highly extractive institutions may pose such path dependent parameters in the development of future income distribution and economic growth.

Williamson (2010) on the other hand, disagrees with Acemoglu et al. (2000). He points out that the inequality in Latin America has not been significantly higher than in other regions before the 19th century. He challenges the argument of persistent extractive institutions, acknowledges however, that income inequality has been widening substantially in Latin America throughout the 19th and 20th century (Williamson, 2010).

Even though the debate about the origins of inequality is insightful, it is plagued by fragmented and scarce data. Therefore methodological problems are limiting factors and make the provision of strong empirical evidence difficult. The theoretical inquiries yet revealed that land and natural resources have had a central role for the Latin American economies. Moreover, through highly concentrated ownership of land and natural resources only few benefited from international trade which may contributed to increasing economic disparities in the late 19th century.

The data on income inequality became significantly better in the 1970's, when national surveys on the disposition of household incomes were conducted in Latin America for the first time (Gasparini & Lustig, 2011). In order to describe the inequality development, based on more reliable studies, we will focus on the period after the 1970's in the following. Note that the additional macroeconomic changes described are not meant to account for patterns of income distribution per se, but are provided to contextualize the trajectories of the Latin American economies.

Win-wins, trade and trade-offs in Latin America

Throughout the 1950's and 1960's rapid GDP growth was partially achieved through import substitution, which protected domestic industries from foreign imports. This strategy might have spurred income inequality as it mostly benefited the owners of land and production factors. At this time the relation between economic growth and inequality resembled a trade-off in which inequality reduction could not be achieved (Cornia & Martorano, 2010).

The relationship seemed to change for a brief episode in the 1970's. Income distribution became less concentrated in most Latin American countries except of the Southern Cone (Argentina, Chile and Uruguay), where extreme neo-liberal reforms were implemented (Cornia & Martorano, 2010). The declines in income inequality in the 1970's might be attributed to achievements in poverty reduction, increased female labor participation and the

9

benign economic climate in that period (Perry et al., 2003). This positive development could however not peter out the widening of the income gap in the 1950's and 1960's. Cornia and Martorano (2010) state that by the early 1980's all medium-to-large Latin American countries recorded inequality levels higher than in the early 1950's. To emphasize the severity of the inequality level it has to be noted that the Gini-coefficient[1] of the Latin American countries, with exception of Uruguay and Argentina, ranged between 0.45 and 0.60 in the 1950's. It was among the highest in the world next to Sub-Saharan Africa (Cornia & Martorano, 2010).

The 1980's were a dismal period for Latin America. The world recession between 1982 and 1984 was accompanied by large declines in commodity prices, which hit the economies in Latin America hard, partially due to its focus on land based production. Furthermore, the region experienced its most severe financial crisis since the 1930's, which left many countries unable to pay their foreign debts. The region was plunged into a painful economic crisis. Between 1982 and 1989, the so called "lost decade", Latin America suffered from regressive or stagnant GDPs, rising unemployment and declining incomes. Governments were forced to induce adjustment programs involving heavy cuts in social spending and the devaluation of currencies. With the exception of Colombia, Uruguay and Costa Rica, inequality increased significantly in the whole region (Devlin & French-Davis, 1995; Cornia & Martorano, 2010). Although economic growth declined, income inequality rose, as the middle class lost disproportionately, while the share of income of the top ten percent increased (Gasparini & Lustig, 2011). We want to highlight that economic growth and income inequality moved together between 1982 and 1989, and did not follow the before mentioned trade-off relation as in the 1950's and 1960's.

In reaction to the economic crisis the Latin American countries introduced market oriented reforms in the 1980's and early 1990's. Those mainly focused on liberalization of trade and (foreign direct) investment, privatization and financial liberalization (Gasparini & Lustig (2011). Cornia and Martorano (2010) state that despite this extensive liberalization of the external sector and returns to moderate economic growth, increasing income polarization continued throughout the 1990's, though not as drastically as in the 1980's. Szekely (2003) finds that inequality increased in 10 countries throughout the 1990's and stagnated or declined in 7. Particularly the four years between 1998 and 2002 featured an aggravating income

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[1] *"The Gini-Index (or Gini-coefficient) is a measurement of income distribution developed by Corrado Gini, an Italian statistician of the early 20th century. It is a measure of income distribution of a country's residents. This number, which ranges between 0 and 1 and is based on residents' net income, helps define the gap between the rich and the poor, with 0 representing perfect equality and 1 representing perfect inequality*." This definition is taken from Investopia.com. It is available at http://www.investopedia.com/terms/g/gini-index.asp [accessed 10.05.2014]

inequality pattern (Szekely, 2003). This income polarization corresponds to a decline in economic growth between 1998 and 2002. In this "lost half decade" between 1998 and 2002, Latin America suffered from severe economic recessions, likely due to the repercussions of the East Asian financial crisis that spilled over to Latin America in 1997 (Gasparini & Lustig, 2011; Jenkins et al., 2008).

In the 1990's the worsening of income inequality could not be stopped in spite of moderate economic growth between 1990 and 1997, which indicates that the relationship between economic growth and income inequality reverted back to its trade-off character from the 1950's and 60's. However, it again disappeared during the economic downturn of the "lost half decade" (1998-2002).

In contrast to the development of the 1980's and 1990's, the early 21st century may has marked the beginning of a new era; falling income inequality in almost all countries in Latin America, especially after the year 2002. Gasparini et al. (2009) show that income distribution became less concentrated in 14 out of 17 countries in Latin America between 2002 and 2007, while the economy prospered. The relationship shifted towards a win-win situation.

The economic growth is once more based on the role of factor endowments. Like in the past, the factor land and its ties to international trade play an important role for Latin America. In the 2000's the region benefited greatly from terms-of-trade[2] improvements in the primary sector (Cornia and Martorano, 2010). Rapidly increasing export prices were highest in energy and agricultural products such as vegetable oils, flour and seeds. Additionally export volumes rose. This generated a positive yearly shock of 3.7 percent of the Latin American GDP between 2003 and 2007. The oil and metal exporting countries of the Andean region (Bolivia, Chile, Ecuador, Peru and Venezuela) benefited even more as they are richly equipped with energy and agricultural commodities. Between 2003 and 2007 these countries recorded positive shocks of up to 15 percent of GDP, induced by the terms-of-trade gains (Cornia and Martorano, 2010). The current importance of the factor land appears to mirror Latin Americas history. It may imply that economic institutions, centered on primary resources, were persistent and had a sustainable impact on the structure and the development of the Latin American economies, as suggested by Acemoglu et al. (2000). However, we leave this

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[2] *"The value of a country's exports relative to that of its imports. It is calculated by dividing the value of exports by the value of imports, then multiplying the result by 100. If a country's terms of trade (TOT) is less than 100%, there is more capital going out (to buy imports) than there is coming in. A result greater than 100% means the country is accumulating capital (more money is coming in from exports)"*. Definition take from Investopia.com and is available at http://www.investopedia.com/terms/t/terms-of-trade.asp [accessed 13.05.2014]

discussion to further studies and focus subsequently on the effect of trade on the relationship between economic growth and inequality.

The recent fall in income inequality is remarkable for many reasons. The gap between rich and poor seems to become narrower, while the rest of the world faces a counter development. Although some researchers consider this pattern to be a mere hiccup in the long path of high inequality, it might be a breaking point that releases Latin America from the burden of history.

Another interesting aspect of this development is the apparent reversal from a trade-off to a win-win situation in the 2000's. This change to win-win riddled many scholars who tried to understand the underlying mechanisms. Due to the historical and current importance of international trade in relation to income inequality, this study will analyze if the apparent shift from trade-off to win-win might have been induced by the export boom in the primary sector.

Before we analyze if the commodity boom catalyzed the win-win situation, we will discuss the theoretical properties of the relationship between economic growth and income distribution, and review previous research results on the topic in the next section.

III. Theoretical Background and Key Concepts

Simon Kuznets (1955) was among the early economists who pioneered research on the relationship between economic growth and income distribution. His famous hypothesis of the "*Kuznets curve*" of income inequality became prominent in the 1960's and 1970's and served as a theoretical base for later studies. According to Kuznets (1955), the relationship between economic growth and income inequality follows an inverted U-shaped curve over time. Inequality would initially surge with increasing income before it peaks and falls with further economic growth (see graph 1).

The Kuznets curve of inequality
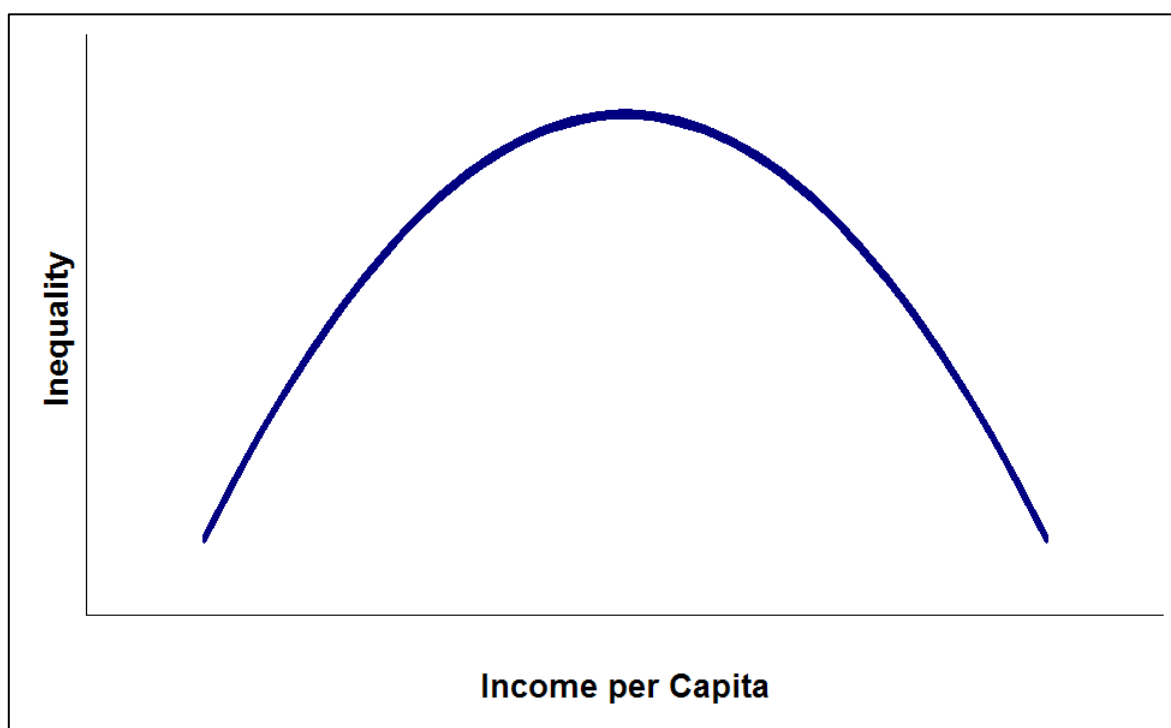
Graph 1: Stylized Kuznets' curve. The graph has been taken from:
http://en.wikipedia.org/wiki/File:Kuznets_curve.png [accessed 21.04.2014]

Graph 1 depicts the theoretical path of income inequality in the course of economic development in a stylized form. It shows the typical asymmetric relationship between inequality and growth, as described by Kuznets (1955).

In essence Kuznets (1955) assumed a) that countries undergo a process of industrialization and b) that economic growth is the main driver for the emergence and reduction of income

13

inequality. His thesis draws on the idea that imperfect labor markets and productivity differences between economic sectors, lead to shifts from agriculturally based economies to industry based economies. In his dual economy model, the process of mechanization would spur economic growth and increase the profitability of the industrial sector disproportionally compared to the agricultural sector. The growing productivity differences between the sectors are accompanied by growing wage differences in the economy as workers achieve higher wages in the growing industrial sector. Consequently inequality increases as well as the structure of the economy changes in favor for the high productive sector. Additionally the economy would become more capital intensive as the mechanization requires production equipment and processes to become more complex.

Kuznets (1955) also describes rising within-sector inequality in the industrial sectors which reinforce the inequalities even more. Capital holders can take advantage of multiplying investment opportunities and benefit from income yielding assets such as land, production facilities and complex machinery. Therefore income would concentrate in the hands of a small elite, which increases their relative income share relative. The average labor income on the contrary would remain stagnant as more laborers from rural areas drive up the industrial labor supply and flood the labor market in the urban centers. This effect further widens the inequality within the industrial sector and causes overall inequality to surge (Kuznets, 1955).

However, as economic growth passes a certain threshold, it would reduce the income gap again. Human capital would become increasingly important compared to capital. Furthermore, political interference and the introduction of a welfare state would contribute to reducing income disparities, more or less automatically, as economies mature (Kuznets, 1955). In later reflections of his findings, Kuznets (1973) emphasizes the role of human capital. The increasing pervasiveness of technology in a non-dual economy paired with further structural shifts towards a growing service sector would lead to the replacement of physical capital with human capital. Investments into human capital would become crucial for economic growth and tend to reduce inequality as more people benefit from skill premia (Barro, 2000).

Kuznets' popular theory received great attention in the 1970's and was supported by researchers like Ahluwalia (1976), who tried to calculate exact inversion points of the famous *Kuznets Curve*. However, with data and methodological improvements Kuznets' theory became increasingly challenged later on. Kuznets (1955) himself criticized the scarcity of the data and stated that there is room for methodological improvements. His rather descriptive theory matches the development of the many western countries, as it is based on the development in the USA, England and Germany in the early 20th century. Though, it does not

14

seem to hold for the evolution of income inequality in many countries after the 1970's (Bourguignon, 2004). Increasing inequality was repeatedly recorded, for example in Latin American countries and in western countries. In some cases the inverted-U shaped curve of inequality turned rather into a "horizontal S-shape" as inequality was on the rise again (Piketty, 2014; Gasperini & Lustig, 2011). The availability of better and more comprehensive data, e.g. the data set compiled by Deininger and Squire (1996), revealed that the *Kuznets Curve* loses significance if decadal differences for countries are taken into account. The inverted-U shape practically disappears if fixed-effects models, which account for country specific effects, are estimated across big panels (Bourguignon, 2004).

On a more theoretical note Kuznets missed the possibility of interaction between economic growth and inequality. His theory does not leave room for interactions, nor the impact of external factors such as globalization and international trade. These theoretical shortcomings are widely acknowledged even by modern proponents of the *Kuznets Curve* hypothesis. Barro (2000) and Gregorio and Lee (2002) agree that Kuznets theory did not account for interactions in the relationship, which may be relevant for economic growth. They further admit that the Kuznets curve "[…] *explains relatively little of the variations in inequality across countries over time*" (Barro, 2000). Thus, there is a need for theoretical extension.

Despite the shortcomings of his theory, Kuznets disserves credits for pioneering the research on the relationship of economic growth and income inequality. He raised awareness for this issue, propelled further research and provided fertile grounds for theoretical augmentation and empirical advancement.

Based on Kuznets ideas, this study includes external factors like international trade, in the theoretical framework, which will be explained in the following sections.

3.1 The relationship between economic growth and inequality re-defined

In the 1990's the notion of effects that may run from income inequality to economic growth gained traction in the scientific world. Scholars like Persson and Tabellini (1991), Alesina and Rodrik (1994) or Galor and Zeira (1993), pushed the research frontier further as they firstly argued for the existence of negative effects of high income inequality for the economy. This line of research was at odds with the works of Kuznets (1955; 1973) and Ahluwalia (1976). It was particularly provocative because it implied flaws in the capitalistic system, which was hailed as it triumphed over the recently collapsed socialistic system in early 1990's.

Lewis (1954), Kaldor (1955) or Forbes (2000) argue that income inequality distributes more income to "high savings capitalists" who, in contrast to the poor, can gainfully invest bigger shares and therefore promote economic development. Hence, the *Kaldorian argument* and Kuznets' (1955) theory lead to the conclusion that income inequality is a necessary precondition for economic growth. This opinion has been the general economic knowledge in the western world of the second half of the 20th century. (Kaldor, 1955; Forbes, 2000; Lewis, 1954).

However, Alesina and Rodrik (1994), Persson and Tabellini (1991) or Easterly (2007) propose that high income inequality is a significant hindrance for economic growth. Their various arguments range from saving and investment opportunities, to credit and labor market imperfections, history, institutional paths, harmful redistributive policies, educational inequality, economic instability and social unrest. The interplay of economic growth and income inequality is very complex and crosses the borders of disciplines like economics, political science and sociology frequently. As this interesting discussion would exceed the limits of this study, we recommend the works of Easterly (2007), Bourguignon (2004), Galor and Zeira (1993), Persson and Tabellini (1991) and Alesina and Rodrik (1994), and proceed based on the current state of research.

The investigation of negative economic effects of high income inequality was essential to the establishment of today's dominant view that the relationship between economic growth and income inequality is interactive and not mainly determined by the level of economic development, as suggested by Kuznets or Kaldor (Bourguignon, 2004; Easterly 2007, Birdsall, 1998, Barro 2000). Furthermore, there is a broad consensus that inequality can be both, a constructive motivator if kept in reasonable boundaries, as well as a destructive force when it is driven to extremes over extended periods (Birdsall, 1998; 2007). This consensus was reached after a broad discussion that divided the economic literature.

Instead of discussing how inequality can affect economic growth and vice versa, it is more relevant for this study to find factors that influence the direction of this dynamic, non-linear, multifaceted relationship that changes over time and space (Adelman, 2000; Bourguignon, 2004). The described complexity makes it difficult to capture the interplay of economic growth and inequality appropriately in a theoretical model. Though, Simon Kuznets (1955) laid out the fundament for a broader theory that helps to understand the relationship.

The current pattern of inequality in Latin America resembles a win-win, with economic growth and simultaneous inequality reductions. This development is similar to the downswing

scenario described in the *Kuznets Curve*. Yet, the underlying factors are different. Latin America's economies have not undergone dramatic structural changes or experienced extreme productivity differences between the sectors after 2002 as described by Kuznets (1955). However, they experienced a dramatic boom in international trade. Therefore, we will analyze if international trade might have contributed to the current win-win relationship that partially resembles the right side of Kuznets famous inverted U-shaped curve.

In order to provide a conceptual framework for this analysis, we will introduce ideas from international trade theories in the following and combine them with the income inequality hypothesis of Simon Kuznets (1955).

3.2 Theoretical augmentations - international trade and inequality

International trade can promote economic growth and impact prices and wages in different sectors. Thus, it potentially affects the level of income inequality and may be an important factor for the relationship between growth and inequality in a country.

The Heckscher-Ohlin model explains that international trade between two countries is theoretical determined by factor endowments and the degree of specialization. It is based on the assumption of comparative advantages between countries and constant returns to scale. This implies that the initial preconditions, like land or labor abundance, play a significant role for the trading patterns and subsequently for the inequality development.

The theoretical model predicts trade patterns according to the relative abundance of production factors among trading partners which share the same technology. Between two countries A and B, country A would export goods that use intensively those factors of production that are relatively abundant and import goods that use factors that are relatively scarce in relation to country B (Wood, 1997). Two relevant theorems derive from this model; a) the factor price equalization theorem and b) the Stolper-Samuelson theorem. Both deal explicitly with the link between trade and wages, land rents and other factor prices.

The factor price equalization theorem by Paul Samuelson asserts that prices of the factor of production will be equalized under the assumption of the Heckscher-Ohlin model and a regime of unrestricted free trade (Burtless, 1995). Hence, the wages of equivalent labor and the rents for standardized land units would become equal between two trading partners (Burtless, 1995).

17

Derived from the Hechscher-Ohlin model, the Stolper-Samuelson theorem links prices to wages. Wages of skilled workers (used mainly in import-competing sectors) will be reduced due to higher competition in the specific sectors, while the unskilled workers (used mainly in the export sectors) benefit from rising exports. In other words, decreasing protective tariffs will lower the real wages of laborers in the import-competing sector due to increased competition, while laborers in the export-competing sector gain due to bigger markets to supply (Burtless, 1995; Goldberg & Pavcnik, 2004).

If unskilled labor is usually more abundant than skilled labor, trade will theoretically raise unskilled labor wages and lower skilled labor incomes and therefore reduce income inequality (Wood, 1997). A situation similar to that in Latin America, where unskilled labor is abundant Cornia & Martorano, 2010; Gasparini & Lustig, 2011).

According to the Heckscher-Ohlin and Stolper-Samuelson theorem, international trade could reduce income inequality within a country. The factor price equalization theorem suggests the equalization of wages and prices even across countries which eventually would lead to a global income inequality reduction.

However, the Heckscher-Ohlin theorem has been criticized due to low empirical support in methodologically advanced studies. Furthermore, the assumptions of constant returns to scale and identical production technologies are harshly criticized (Burtless 1995). In particular if trade between very different countries, e.g. rich and poor, is analyzed these assumption are an issue and can lead to false conclusion. Like other models, the Heckscher-Ohlin theorem reaches its limits when very complex trade relationships between more than two countries are studied. Likewise if countries are analyzed which are dissimilar.

Despite its weaknesses, the Heckscher-Ohlin and the Stolper-Samuelson theorem can be used as a conceptual framework in less complicated cases. The models permit the analysis of the rising export patterns in the land abundant, primary sector of Latin American economies. In combination with Kuznets' (1955) "downswing hypothesis", where economic growth drives income inequality reduction, we will analyze the role of international trade in achieving the recent downswing, or win-win situation in Latin America.

Before we begin the analysis we will introduce previous studies on the topic to illustrate the current state of research. After critically reviewing the studies we will present a summary of the hypotheses based on theory and previous research.

18

3.3 International Trade and Inequality development – Previous research

With ongoing globalization, international trade became more important both in the scientific literature and for Latin American economies in the early 21st century. The region experienced positive terms of trade gains which exceeded the average level of the 1990's by 33 percent in 2007. This development resulted in positive shocks for the GDP of the region as a whole (Cornia and Martorano, 2010). The market oriented reforms and the growing world market demand for primary resources such as iron ore, copper, oil or agricultural products are among the most prominent explanations for this boom in Latin America's international trade and economic growth (Jenkins et al., 2008; Ocampo, 2007; Gasparini & Lustig, 2011).

Against theoretical expectations, the trade promoting reforms in the late 1980's and early 1990's did not decrease the income inequality in the region. According to Gasparini and Lustig (2011) the average Gini Coefficients for 14 Latin American countries even increased during the 1990's and culminated in 2002 at a value between 53 and 54, before it began to decline.

Furthermore, skill and wage differentials widened due to the reduction in trade barriers to imports, which contradicts the assumption of the Stolper-Samuelson theorem (Wood, 1997). Wood (1997) suggests two possible explanations for this a-theoretical development. First, the timing is important. The world market conditions have changed dramatically with the market entrance of China and other large low-income countries in the 1980's and 1990's. This might have shifted the comparative advantage away from unskilled labor to medium or high skilled labor. Such events could have caused sectors of low skill intensity to contract in Latin America due to increased competition, e.g. from China. Second, the technical progress in the 1980's was biased against unskilled labor, as the world demand for high skilled labor gained more importance in the 1980's and 1990's, possibly due to the aftermath of the IT-revolution (Wood, 1997).

The explanations given by Wood (1997) are plausible but were based on rather weak available evidence and dissimilarities in the countries' data basis. More recently Jenkins et al. (2008) however, used more comprehensive data and focused solely on the impact of China on the Latin American economies. They partially support Wood's (1997) explanations and corroborate the hypothesis that the external conditions and the timing were unfavorable for Latin America. China's extreme abundance in low skilled intensive production has increased the competition on the world market in this segment, possibly to the disadvantage of Latin

America's low skilled sector (Jenkins et al., 2008). Furthermore, China could protect its own industries more fiercely than Latin America. The economically devastating period (the lost decade in the 1980's), pushed many Latin American politicians to liberalize trade vigorously and reduce trade barriers in the 1990's (Jenkins et al., 2008, Gasparini & Lustig, 2011). Thus, the a-theoretical widening of the wage gap despite increased openness might have been due to the unfavorable timing and the changing world market conditions.

However, the new situation on the world market and the rise of the Asian countries might have affected Latin America positively later on. The trade between China and Latin America was expanding in the 1990's but soared particularly after the year 1999. Apparently *"[…] the resource constraints really began to bite China"* (Jenkins et al., 2008), which increased the world demand for primary goods. China had a net trade deficit in a number of primary commodities, such as copper, iron ore, nickel, soybeans and other commodities, which are prominently abundant in Latin America's exports. China also became a member of the WTO in 2001, which might have additionally boasted Latin America's exports (Jenkins et al., 2008).

There is a broad consensus in the literature that producers of raw materials and agricultural goods, such as Argentina, Brazil, Chile and Venezuela could benefit from the rise of China and the subsequently improved terms of trade at the turn of the millennium (Jenkins et al., 2008). However, economies that specialized in commodity chains and industrial production, such as many Central American countries, suffered from increased trade openness both on the world and domestic market (Jenkins et al., 2008). Thus, the initial conditions of countries, as well as the external circumstances can play a significant role for the effect of trade openness on economic growth and income inequality.

The changes on the world market were studied by Goldberg and Pavcnik (2004) in respect to their direct effects on inequality and poverty reduction. The scholars analyzed the relationship between globalization and income inequality and focused on the trade liberalization efforts undertaken in Latin America in the 1980's and 1990's. They focused on short- and medium-run effects of tariff reductions in order to relate to the effects to trade policy changes. Goldberg and Pavcnik (2004) concentrate on the link between trade policy and income distribution that operates through relative prices and wages rather than considering the indirect effects through economic growth.

Despite conflicting empirical evidence of previous studies, Goldberg and Pavcnik (2004) state that there may be a common pattern across countries in terms of the relationship between

trade liberalization and income inequality. Trade openness can have a negative impact on unskilled labor in the short- and medium-run if other countries keep up import barriers for low skilled sectors. Especially developing countries often protected their low-skill intensive sectors fiercely. This impact can widen the disparities between skilled and unskilled labor in the short- and medium-run, as seen in Latin America. Moreover, trade liberalization can affect developing countries negatively if a lack of labor reallocation across sectors is persistent. According to Golderg and Pavcnik (2004), this has been the case in Latin America. Unequal educational attainment in Latin America, as described by Gregorio and Lee (2002) contributes to low labor reallocation, hinders upward job mobility and underlines the point made by Goldberg and Pavcnik (2004). Hence, the researchers suggest that the pattern in Latin America can partially be determined by external factors, as the described changes on the world market.

Morley (2001) summarizes that the implemented trade reforms in Latin America have been regressive at first. While the researcher is ambiguous about the effects of capital liberalization, for example the impact of foreign direct investments (FDI), he concludes that there is a consensus on the negative impact of trade openness on income inequality in most Latin American countries throughout the 1990's (Morley, 2001).

Székely and Sámano (2012) extent these analyses with a more comprehensive 30 year database and observe the effects of trade liberalization on income distribution in Latin America between 1980 and 2010. Their study eliminates within country inconsistencies in the data as described by Wood (1997). It provides a more comprehensive methodological approach as the researchers apply both fixed and random effects models across an unbalance panel with observations from 18 Latin American countries. The researchers agree partially with Wood (1997), Goldberg and Pavcnik (2004) and state that greater trade openness can, against trade theory be associated with a contemporaneous increase in income inequality if the circumstances are unfavorable. However, in contrast to previous studies, Székely and Sámano (2012) observe longer-term dynamics of trade liberalization and state that once fully implemented the trade openness did not lead to rising inequalities in Latin America.

According to Székely and Sámano (2012) the initial negative impacts in the late 1980's and 1990's have almost completely been counteracted by the improvements after the year 2000. The key finding of the scholars is that the relationship between openness and inequality is dynamic and can change over time, similarly to the relationship between economic growth and income inequality. The negative pressures of trade liberalization on inequality after the

21

early trade reforms have disappeared in the 2000's and might have even turned positive (Székely & Sámano, 2012).

In contrast to previous studies, Scully (2001) investigates more specifically if there is a trade-off between economic growth and income inequality. The researcher uses a panel of 26 countries of advanced industrial countries and some fast growing Asian countries, for the period between 1975 and 1990 including 4 time points in this period. This panel data analysis is conducted within a multi-equation framework of structural and reduced form models. In order to capture the degree of economic freedom Scully (2001) applies an aggregated indicator of a range of indices that include variables such as government-owned enterprises, amount of taxation, international trade, foreign direct investments, redistributive expenditures, transfers and subsidies as percentage of GDP and many more (see Scully, 2001). Economic growth is measured in GDP per capita in purchasing power parity (PPP) adjusted in U.S. dollars and the Gini-coefficients generated by Deininger and Squire (1996) are utilized to capture equity.

Methodologically, Scully (2001) estimates parameters for economic freedom in a simple OLS regression, while the parameters for economic growth and inequality are estimated by 2 and 3 stage least square regressions.

Scully's (2001) main finding is that economic freedom, promotes both economic growth and equity in advanced economies. However, although economic freedom may be beneficial for both variables, the researcher further concludes that economic growth can raise income inequality by shifting market income to the highest quintile. Thus Scully (2001) supports the idea of a trade-off relationship between growth and inequality. He further adds that this effect is however expected to be too small to adversely affect the growth rate across the applied sample (Scully, 2001). Although there is a small trade-off, it could be outweighed by other factors in order to achieve both economic growth and equity.

Cornia and Martorano (2010) focus on income inequality reducing policies in Latin America between 1990 and 2007. Furthermore, the researchers analyzed if the terms of trade gains affected income inequality through an increased state budget, which in turn could be used for social expenditures. At first the researchers tested if the terms of trade gains correlate with the tax to GDP and non-tax to GDP ratios. According to Cornia and Martorano (2010) the terms of trade and the tax to GDP ratio is only weakly correlated in 18 Latin American countries between 1990 and 2007 and does not improve if only the main commodity exporters are

considered[3]. However, the correlation becomes significantly stronger if the focus is put on the non-tax to GDP ratios. Some rents from commodity exports accrue to the state as non-tax revenues or royalties, e.g. when the government acts as the owner of natural resources or land (Cornia & Martorano, 2010). In the case of the commodity exporting countries the correlation between terms of trade and non-tax to GDP ratios increased significantly between 2003 and 2007 compared to previous years.

With tools of panel regressions the researchers further tested if the increased correlation is captured in a direct effect of terms of trade on the Gini-coefficient. They apply a fixed effects model including time fixed effects and a comprehensive amount of explanatory variables. Despite the increasing correlation, they find only a marginal direct impact of the commodity boom on inequality in Latin America. Their results suggest that the improvements in terms-of-trade reduced inequality only marginally. This reduction may largely operate through the growth of GDP and other distributional channels (Cornia & Martorano, 2010).

According to the scholar it is plausible that the commodity boom was favorable for economic growth, the effect on inequality is however undetermined as it hinges on the specific use of the additional resources (Cornia and Martoran, 2010).

Gasparini and Lustig (2011) share this view and argue that the pure growth dividend from the commodity boom cannot held accountable for the decline in inequality, as inequality has decreased in both fast and slow growing countries. In fact, the longest periods of income inequality reductions are documented in Brazil and in Mexico, two countries whose growth rates were comparatively low in the region (Gasparini and Lustig, 2011).

Overall there is only limited evidence for a commodity trade induced increase of the tax to GDP ratio and no evidence of a positive effect on the Gini-coefficient.

3.4 Critical appraisal of the previous studies and hypotheses

Previous research has given valuable insights into the development of income inequality, its relation to economic growth and underlying mechanisms. Rodrik (2000) criticizes early studies which solely relied on results based on OLS estimations. They would disregard country specific effects, which can impact economic growth and subsequently the pattern of income distribution (Rodrik, 2000). Thus, simple OLS estimations comprise the risk of spurious regressions, which can lead to wrong conclusion. Following this critique, many modern studies ameliorated such problems and accounted for country and time specific

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[3] Main commodity exporting countries in Latin America: Argentina, Bolivia, Brazil, Chile, Ecuador, Mexico, Peru and Venezuela (Cornia & Martorano, 2010).

effects, which improved the state of research. Gregorio and Lee (2002), Cornia and Martorano (2010), Székely and Sámano (2012) or Scully (2001) apply more advanced fixed and random effects models and include time fixed effects in their regressions. Furthermore, researchers like Deininger and Squire (1996) contributed greatly to the establishment of a more comprehensive income inequality database and improved thereby the quality of modern studies.

However, the previously introduced studies have a major methodological drawback in common. The studies fail to acknowledge the possibility of spurious regressions due to the existence of unit roots in their panels. Even in the modern studies by Scully (2001), Cornia and Martorano (2010) or Székely and Sámano (2012) the authors disregard to pre-test their variables for stationarity. This shortcoming increases the risk of interpreting spurious regressions. Thus even advanced methods such as fixed effects models can lead to false conclusions.

In order to ameliorate this problem and to contribute to the existing literature, all the variables in this study will be tested for existing unit roots.

Additionally we approach the development in Latin America from a different angle as we want to check the impact of trade on the relationship between economic growth and income inequality, rather than solely focus on inequality reduction. The lion share of the previously introduced studies tried to find explanations for the recent narrowing of the gap between rich and poor without analyzing how the interplay between economic growth and inequality changed. This trend reversal from trade-off to win-win has not been given the deserved attention. Therefore, we will use the previously described explanations for inequality reduction and incorporate them in our analysis to investigate underlying mechanisms for the shift from trade-off to win-win.

Cornia and Martorano (2010) came to the conclusion that the terms of trade boom cannot be held accountable for the achieved inequality reductions in the 21st century. However, they also state that the impact of international trade on the tax and non-tax to GDP ratios does not reveal how the additional revenue was spent. The researchers admit that possible distributive effects might occur through other channels. Therefore this study will focus on the effect of the terms of trade gains on relative social expenditures on health, education, social security and housing. Thereby, we analyze a channel closer related to income inequality reduction and relate this to the progress in economic growth.

Hypothesis Summary

Based on previous research, the theory of a *Kuznets Curve* and the theorems of Heckscher-Ohlin and Stolper- Samuelson, we infer the following testable hypotheses:

1. The relationship between income inequality and economic growth is expected to change in Latin America between 1990 and 2008.

2. Following the hypothesis of a downswing in the *Kuznets Curve* it is expected that economic growth can reduce income inequality. Growing income inequality can likewise be harmful to economic growth.

3. Against theoretical assumptions based on Heckscher-Ohlin and Stolper-Samuelson, we expect international trade to accelerate the income concentration in Latin America in the 1990's.

4. International trade has a positive effect on the relationship between economic growth and inequality reduction after the year 2000 and triggered the shift from a trade-off to a win-win situation in Latin America according to the theories of Heckscher-Ohlin, Stolper-Samuelson and Kuznets

Before these hypotheses will be tested, the applied data and methods will be explained in the following section.

IV. Applied Methods and Data

In order to analyze how the win-win relationship between economic growth and income inequality was achieved in Latin American we will make use of the comprehensive "Income Distribution in Latin America" (IDLA) data set, which has been developed within the UNU-WIDER's research project on "The New Policy Model, Inequality and Poverty in Latin America: Evidence from the Last Decade and Prospects for the Future". The data set documents the political and economic development in Latin America and comprises information on 18 countries between 1990 and 2008. The IDLA data set is a compendium of secondary statistics from different sources. It includes 137 variables on economic (60), political (44) and social (33) factors. The data is set up for macro panel data analysis and is therefore ideal for the purpose of this study. Furthermore, it permits the division into sub-groups and enables the analysis of commodity exporting countries in the region.[4]

For some variables the coverage of the IDLA varies in regard to time and country data, which requires further data management. The following section explains this process in detail and introduces the variables used for the subsequent analysis.

4.1 Description of the applied variables

For the first part of the analysis the relationship between economic development and inequality will be described following the approach of Scully (2001). Thus, economic growth will be represented by GDP per capita in purchasing power parity (PPP), which is measured in constant international dollar of 2005.[5] The Gini-coefficient serves as the income inequality variable. The GDP figures are originally taken from the WDI and reported in the IDLA database. The Gini-coefficients come from different sources, namely the SEDLAC, WIID, CEPALSTAT, WDI, SWIID (version 3.0) and national statistics. They have also been collated in the IDLA data set.

In order to depict how economic growth and income inequality relate to each other between 1990 and 2008, the sample had to be reduced to eliminate incomplete data series. For the first part of the analysis Bolivia was taken out of the sample due to fragmented inequality data.

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[4] The main commodity exporters in sample are: Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Peru and Venezuela.

[5] An international dollar has the same purchasing power over GDP as the US dollar has in the United States. GDP at purchaser prices is the sum of the gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.

Thus the relation between the two variables GDP per capita and the Gini-coefficient is based on a sample of 17 Latin American countries (Ecuador, Guatemala, Nicaragua, Paraguay, Peru, Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Honduras, Mexico, Panama, Uruguay and Venezuela).

For the second part of the analysis a strongly balanced panel with full data coverage is required. Thus, the sample size was further reduced by the countries Ecuador, Guatemala, Nicaragua, Paraguay and Peru due to fragmented data points. The final sample for the regression analysis consists consequently of 12 countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Honduras, Mexico, Panama, Uruguay and Venezuela).

The variables are used in their natural logarithmic form to eliminate possible exponential trends across the panel. The summary statistics of the applied variables are presented in the following table (see table 1).

Variable	Label	Obs.	Mean	Std. Dev	Min	Max	Measurement
Year	year	228	1999	5.48927	1990	2008	
GDP/c (PPP)	LnGDP	228	8.908324	0.395779	7.882936	9.505515	International Dollar 2005
Gini-coefficient	LnGini	228	3.933288	0.0954293	3.718438	4.100643	Index points

Table 1: Summary statistics and variable description for the regression analysis of economic growth and income inequality.

In order to find out how international trade is associated with measures of inequality reduction we combine the approaches of Gregorio and Lee (2002), and Cornia and Martorano (2010). The variables commodity terms of trade and service terms of trade represent international trade, which follows the approach of Cornia and Martorano (2010). Measures of inequality reduction on the other hand, are represented by total social expenditures, following Gregorio and Lee (2002). The figures for the terms of trade and the total social expenditures for the Latin American countries are originally from CEPALSTAT and are combined in the IDLA data set. The total social expenditures variable is aggregated and combines spending for education, health care, social security and housing. Those types of social expenditures contribute according to Gregorio and Lee (2002) to a more equal distribution of income in a society. Thus we consider the variable total social expenditures to be a valid proxy for

inequality reductions. The variable terms of trade has been proven successful to proxy external effects in the study by Cornia and Martorano (2010).

Due to further limitations of the IDLA database we are forced to shorten the time period by two years to maximize the observations and include the maximum number of countries. The remaining countries in the main analysis are Argentina, Chile, Colombia, Costa Rica, Guatemala, Honduras, Mexico, Nicaragua, Paraguay, Peru, Uruguay and Venezuela. For those 12 countries we obtain full information on social expenditures, commodity terms of trade and service terms of trade as displayed in the following table (see table 2).

Variable	Label	Obs.	Mean	Std. Dev	Min	Max	Measurement
Year	Year	204	1998	4.911031	1990	2006	
External Factors							
Social Expenditures	LnSoc_tot	204	2.336	0.4556	1.0508	3.1263	Percentage of GDP
Terms of Trade (Commodities)	LnTot1	204	4.561	0.1809	3.8498	5.2171	Index (2000=100)
Terms of Trade (Services)	LnTot2	204	4.568	0.1389	4.0173	4.8177	Index (2000=100)

Table 2: Summary statistic and variable description for the regression analysis of external effects.

Table 2 displays the applied variables, their properties and measurements. Furthermore, we achieved a strongly balanced panel which is crucial for the panel unit root testing procedure, which is explained in detail in appendix 1 (see appendix 1).

The application of three different unit root tests reveal that all series are integrated at order 1, except of total social expenditures to GDP (LnSoc_tot). The existence of unit roots in the panel warrants caution and bares the risk of interpreting non-sense regressions. In order to avoid spurious results due to non-stationarity, the first differences of the series will be applied to analyze how external factors (LnTot1, LnTot2) are associated with social expenditures (LnSoc_tot). The interpretation changes accordingly from changes in levels to changes in growth rates of the variables.

The avoidance of spurious regressions sets this analysis apart from previous studies by Gregorio and Lee (2002), Cornia and Martorano (2010) and Székely and Sámano (2012). Moreover, robust standard errors are applied to eliminate errors caused by heteroskedasticity in the panel. The thorough data management helps to improve the methodology of this analysis, which will be explained in the following.

4.2 Method and Models

In the initial analysis we apply descriptive statistics to establish an understanding of the relationship between economic growth and income disparity in Latin America. At first we calculate and display the average GDP per capita and the Gini-coefficient before conducting the first panel data regression.

A panel data analysis follows with fixed effects models to capture country specific effects in the panel. The fixed effects model explores the relationship between predictor variables and the outcome variables (GDP per capita, Gini coefficient and total social expenditures to GDP). We assume that each Latin American country has its own individual characteristics that may or may not impact the explanatory variables. This assumption is based on Dani Rodrik's (2000) institutional framework for high-quality economic growth, in which the scholar emphasizes the role of differences in local knowledge, culture and codes of conduct. Such differences can impact the economic development of a country and therefore its income distribution. Furthermore, this approach has been proven useful in similar analyses and has been applied by Gregorio and Lee (2002) and Cornia and Martorano (2010). We assume that there is no "best practice" approach for inequality reduction and that individual, country specific traits matter. The applied fixed effects model accounts for such individualities.

The underlying assumption of a fixed effects model is that factors within a country impact or bias the independent or dependent variables and therefore need to be controlled for. The fixed effect model removes the effect of time-invariant factors from the predictor and permits the assessment of the net effect of the independent variables (Asteriou & Hall, 2011).

Moreover, we assume that the time-invariant factors are unique to each country and they should not be correlated with the characteristics of other countries. As we suppose that every country in the panel is different, the country's error term and the constant (which captures country specific traits) should not be correlated with the other countries in the panel.

As the fixed-effects model controls for all time-invariant differences, such as geographical, cultural, race or religious factors, the estimated coefficients cannot be biased due to omitted time-invariant characteristics of each country (Asteriou & Hall, 2011). Of course it can be argued that culture and religious, yet even geographical factors change over the course of time. However, such changes are assumed to take place over centuries or even millennia. In the relatively short period between 1990 and 2008 it is safe to stipulate such factors as time-invariant. It is therefore possible to control for unobserved omitted variables that are fixed over time. In the following we introduce the models used in our regressions.

29

Fixed effects models

(1) *GDP per capita* $_{it} = \alpha_i + \beta_1*Gini$ $_{it} + \beta_2*Gini$ $_{it-1} + \beta_3*Gini$ $_{it-2} + \nu_i + \varepsilon_{it}$

(2) *Gini* $_{it} = \alpha_i + \beta_1*$ *GDPpc* $_{it} + \beta_2*$ *GDPpc* $_{it-1} + \beta_3*$ *GDPpc* $_{it-2} + \nu_i + \varepsilon_{it}$

The subscript i denotes the cross country component in the panel and t denotes the time component. The unobserved country specific effects that might affect the Gini-coefficient or the GDP per capita respectively are captured in ν_i. The subscript ε_{it} represents the error term which comprises all remaining factors that impact GDP per capita (1), respectively the Gini-coefficient (2).

With the initial fixed-effects models (1 and 2) we will analyze the potential impact of GDP per capita and Gini-coefficient on each other. These regressions will provide insights into the relationship between economic growth and income inequality, before we try to analyze the effect of external factor on this relationship. We include one and two year lags of the independent variables to account for delays in the impacts.

In order to analyze the impact of external factors on the relationship between income inequality and economic growth we use international trade as a component that is positively related to economic growth and proxy it with the variable terms of trade. Similarly we use the ratio between total social expenditures and GDP to include a proxy for income equality. An increase in the ratio of social expenditures to GDP is assumed to reduce income inequality, while a decrease is supposed to raise the income concentration. If the terms of trade have a positive impact on the ratio between the total social expenditures and GDP, we conclude that international trade had a positive impact on economic growth and inequality reduction and would therefore be an important factor that contributed to the win-win situation.

For the analysis of the terms of trade and the social expenditures to GDP ratio we apply the following model.

(3) *Social expenditures to GDP* $_{it} = \alpha_i + \beta_1*$ *tot1* $_{it} + \beta_2*$ *tot2* $_{it} + \nu_i + \varepsilon_{it}$

The subscripts i and t, as well as the error term ε_{it} are similar to the ones used in equation 1. The unobserved country specific effects that might affect the total social expenditures to GDP ratio are captured in ν_i.

In the following we want to reflect on methodological limitations and data constraints before we conduct the analysis.

4.3 Methodological Limitations and Data constraints

An often reoccurring critique in income inequality research is the application of the Gini-coefficient in combination with other variables. The fluctuations in the Gini-coefficient are generally difficult to interpret in terms of the magnitude of their effects. Furthermore, the point-scale does not indicate which part of the population became richer or poorer. Improvements in form of a decline in the Gini-coefficient might indicate that only the richer share of the population became poorer, which hardly improves the situation within a society. Hence, a decreasing Gini-coefficient should not be confused with overall inequality improvements.

In terms of regression analyses the Gini-coefficient does not seem to be ideal because fluctuations are often instable, which make the determination of a pattern difficult. In order to avoid these problems we employ the variable total social expenditures to GDP, which according to Gregorio and Lee (2002) serves as a proxy for inequality reduction and hence for the Gini-index. Moreover, improvements in this ratio may not indicate a worsening for the rich, but rather aim to support the poor through social security measures, housing and health care.

However, total social expenditure is only an aggregated value which hides how the budget actually was spent. This shortcoming cannot be avoided in this study due to existing data limitation.

The data at hand are a compendium of different sources which may vary in quality. Thus, this study is not immune to possible measurement errors or false data ascertainment, which is always of concern when using secondary data. Although the data set is very comprehensive in few cases we had to use linear interpolation to obtain consistent series, which lowers the quality of the data. Though, the majority of the data compiled in the IDLA data live up to high research standards and is obtained from officially-recognized international sources. The data set has also been proven useful in the research of Cornia (2010) and Cornia and Martorano (2010). Thus, we regard it as sufficient for this analysis.

In terms of methodological issues it has to be noted that the panel regressions used in this study cannot generate the profound insights of an in depth time series analysis. Yet, the data at hand are limited in their time observation of maximum 20 years which does not permit such an analysis.

In terms of methodological issues this study mitigates the risk of spurious regressions due to non-stationary data, however, the models might suffer from omitted variables bias which can

contaminate the results. The application of fixed effects models may lower the before mentioned risks, it can however not exclude it. The main analysis of this study follows in section 5.

V. Analysis

Before we proceed to analyze the possible impacts of international trade in detail, the character of the relationship between income inequality and economic growth has to be determined. The descriptive statistics from the IDLA are therefore used in the following, to depict how the average GDP per capita and the average Gini-coefficient in Latin America relate to each other between 1990 and 2008 (see graph 2).

Regime shift from trade-off to win-win
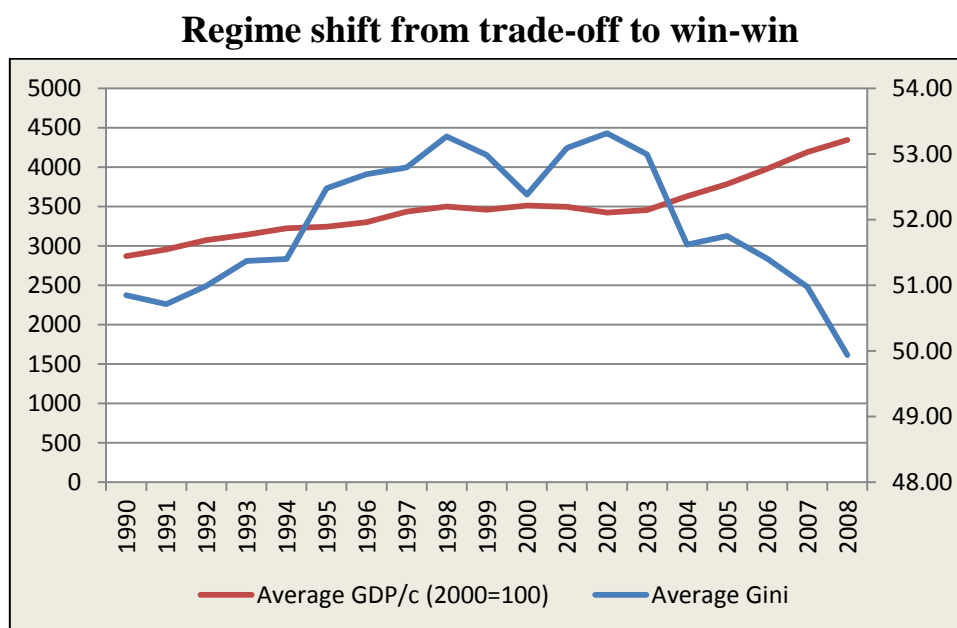
Graph 2: Development of the average GDP/c in constant 2005 prices and the average Gini-coefficient of 17 Latin American economies between 1990 and 2008. The values of GDP/c at constant market prices (dollar of 2005) are displayed on the primary y-axis (left) and the measure of the Gini-coefficient on the secondary y-axis (right). Source: Authors' own elaboration based on the IDLA database.

Graph 2 shows the average development of economic growth (red line) and income inequality (blue line) of 17 Latin American countries[6] between 1990 and 2008. Overall the region experienced slow economic progress in the early 1990's, with a phase of stagnation between 1998 and 2003 (see graph 2). The year 2003 appears to mark a take-off point, as the economy recovered from previous events and began to grow more rapidly than in the beginning of the 1990's (see graph 2). According to Cornia (2010) the average GDP growth was 5.5% between 2003 and 2008, which is also reflected in the development of GDP per capita (see graph 2).

Income disparities on the other hand went up steadily between 1990 and 1998 (see graph 2). Between 1998 and 2002 income inequality decreased briefly before it bounced back up to it

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[6] The countries included are: Argentina, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Ecuador, Dominican Republic, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela.

33

initial levels in 1998 (see graph 2). These brief hiccups may be due to the economic crisis of the so called "lost half decade" between 1998 and 2002. The early 21st century, however, appears to mark a trend reversal as the Gini-coefficient continuously declines after the year 2002 (see graph 2).

In terms of the relationship between economic growth and inequality, the graph reveals a trade-off relationship from 1990 to 1998 (see graph 2). The average the Latin American economy grew slowly while the average income became more concentrated (see graph 2). Between 1998 and 2002 income disparity was firstly reduced before it increased again. The average economic growth on the other hand remained relatively stagnant (see graph 2). Due to the short time span and the volatility of the Gini-coefficient it is difficult to interpret this brief period in terms of a clear trade-off or a win-win. However, after the economic crisis in the late 1990's, the relationship changed substantially. The average Gini-coefficient shows a sharp and constant decline after the year 2002 (see graph 2). Roughly with a one year lack, the average GDP per capita begins to recover and increases steadily afterwards (see graph 2). Thus, the year 2002 seems to mark a regime shift from an initial trade-off relationship with to a win-win situation. The average income inequality declined while the average economy prospered.

Thus, the development in Latin America supports the first hypothesis of this study. Both, a trade-off as well as a win-win scenario occurred in Latin America during the observed period. The relationship between economic growth and income inequality appears to change in 2002, which indicates that underlying factors impact the relationship.

The timing of this shift deserves particular attention in regard to external aspect. It has to be noted, that the commodity boom in Latin America began in the late 1990's. High volume international trade soared in 1999 and was potentially boasted after China became a member of the WTO in 2001 (Jenkins et al., 2008). If these events could possibly have affected the inversion from trade-off to win-win in Latin America will be tested in the following. We will firstly take a closer look at the binary relation between GDP per capita growth and the Gini-coefficient, before we analyze the external impacts on their relationship.

5.1 Economic Development and Income Inequality

Based on the obtained insight that the relationship between inequality and growth changed between 1990 and 2008, we will test how the two parameters, GDP per capita and Gini-coefficient, affected each other during this period. We want to analyze if the relationship is

truly interactive or if a driving force, as described by Kuznets (1955) and Kaldor (1955) can be determined. Therefore, we apply the differenced GDP per capita and the differenced Gini-coefficient series in the first multi-equation model to account for unit roots in the panel (see table 3). Note that the values have to be interpreted as percentage rates of change and not in levels.

Regression of the GDP/c growth on Gini growth in Latin America from 1990 to 2008

VARIABLES	Dlngdp		Dlngini	
	(1)	(2)	(3)	(4)
	GLS	FE	GLS	FE
dlngini	-0.357***	-0.378***		
	(0.002)	(0.009)		
L.dlngini	-0.501***	-0.521***		
	(0.000)	(0.002)		
L2.dlngini	-0.024	-0.052		
	(0.643)	(0.403)		
dlngdp			-0.133***	-0.136**
			(0.004)	(0.017)
L.dlngdp			0.034	0.029
			(0.655)	(0.704)
L2.dlngdp			-0.064	-0.068
			(0.508)	(0.515)
Constant	0.024***	0.024***	0.003**	0.004**
	(0.000)	(0.000)	(0.03)	(0.024)
Observations	192	192	192	192
Number of countries	12	12	12	12
F-test	0.001	0.015	0.002	0.028
Rho	0.003	0.064	0	0.033

Robust std. errors; P-values in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Regression analysis of the differenced GDP/c series on the differenced Gini series, and vice versa. Panel consists of 12 Latin American countries between 1990 and 2008. Regressions are conducted by the author and based on the IDLA data set.

Table 3 shows statistically significant results for the impact of changes in income inequality on the growth rate of GDP per capita and the other way around (see table 3). A positive one percent change in the growth rate of the Gini-coefficient is associated with a decline in the growth rate of GDP of around 38% in the same year, and up to 52% in the following year (see column 2). However, this effect loses economic significance after two years and becomes statistically insignificant, which is indicated by the estimated effect of the second lag (see column 2).

In the opposite direction we find the growth of GDP per capita to have a decreasing effect on the widening income disparities (see column 4). A one percent increase in the growth rate of GDP per capita is associated with a 14% decrease in the growth of the Gini-coefficient (see coloumn 4). The growth of GDP per capita of the previous year appears to have no significant impact on the growth of the Gini-coefficient as indicated by the low and statistically insignificant coefficients of the lagged values (see column 4).

These results indicate that growing income inequality had a negative impact on the rate of economic growth in Latin America between 1990 and 2008. Vice versa, the results congruently indicate that an increasing rate of economic growth was associated with lower income inequality growth.

At a first glance these findings seem to support the hypothesis of a downswing *Kuznets Curve*, in which higher economic growth decelerates the widening gap between rich and poor. The results also support the conclusion of Bourguignon (2004) or Adelman (2000) that economic growth and reductions in income inequality can move together in a win-win fashion due to their interactive character. Furthermore, the findings give weight to the hypothesis that growing or high income inequality can have harmful effects for economic growth á la Piketty (2014), Easterly (2007) or Persson and Tabellini (1991).

If the degrees of influence are compared, table 5 hints at a stronger effect running from growing income inequality to economic growth (see table 5). While a positive change in the growth of the Gini coefficient is associated with a 38% percent decline in the growth of GDP per capita, a positive shock vice versa is only associated with a 14% decrease in the growth of the Gini-coefficient in the same year. Although, these results seem to show that growing income inequality might have influenced economic growth more profoundly between 1990 and 2008, they have to be interpreted with caution. The volatility in values of the Gini-coefficient in points is relatively little compared to the behavior of GDP per capita. This might lead to an overstatement of the effects that run from an increased Gini-coefficient to

economic growth. Hence, the evidence base is not strong enough to support any hypothesis of a driving force in the relationship explicitly. Against the theoretical works of Kuznets (1955) or Kaldor (1955) we cannot determine if economic growth was the driver for the achieved inequality reductions in Latin America. The findings show that both factors influence each other. The degree to which they mutually influence each other varies over time and is likely dependent on other underlying mechanism.

Between 1990 and 2008, international trade became increasingly important for Latin America. Therefore we want to analyze how this factor impacts the relationship between economic growth and income inequality in the following.

5.2 External contribution to the win-win

In order to avoid the described problems of the relationship between the Gini-coefficient and GDP per capita, we will substitute them with other related variables. Increased exports, reflected in improved terms of trade, are directly correlated to economic growth and contribute positively to GDP. Therefore, we will use terms of trade as a proxy for economic growth in the following analysis. The issues of income inequality as represented by the Gini-coefficient are ameliorated through the application of variables directly linked to inequality reduction, such as social expenditures for health care, education, housing and social security. If factors that are positively related to economic growth, can affect inequality reduction positively, they are expected to impact the relationship between them alike and thereby contribute to a win-win scenario.

Thus we will analyze the effect of improved terms of trade on the ratio between total social expenditures to GDP in order to improve the analysis and reveal the impact of external factors on the relationship between economic growth and inequality.

5.2.1 Descriptive statistics

The external effect of the commodity boom did not seem to impact income inequality through the tax to GDP ratio according to Cornia and Martorano (2010). However, the researchers pointed out, that it is difficult to make any inference from such a correlation because it is unknown how the extra revenue is allocated. We will build on their research and check if the terms of trade boom was directly associated with other distributive variables. Furthermore, we will check how this correlation changed in the periods before and after the described shift in 2002. Thereby we obtain an understanding of the distribution of the additional revenue from

37

the commodity boom and find out if it was used for re-distributive measures like social expenditures. Additionally we check for differences between the main commodity exporters[7] and the other Latin American countries, as we expect the impact to be more pronounced in exporting economies which benefited greatest from external factors.

If the whole sample is considered we find no strong correlation between the social expenditure to GDP ratio and the terms of trade gains between 1990 and 2008[8] (see Appendix 2). Through 322 observations we obtain a relatively low correlation coefficient (r = 0.1385) similarly to the low values obtained by Cornia and Martorano (2010). The relation becomes significantly weaker if we only analyze the period from 2002 to 2008 separately. The correlation coefficient is reduced from 0.1589 between 1990 and 2001 to a mere 0.0322 between 2002 and 2008 (see Appendix 3 and 4). Similarly weak are the correlations between the terms of trade, minimum wage and unemployment rate in the whole sample (see Appendix 5).

The correlation between terms of trade and total social expenditures to GDP ratio modestly gains power if only the commodity exporting countries are analyzed. The coefficient for the period 1990 to 2008 corresponds to r = 0.1777 (see Appendix 6). However, a comparison between the periods from 1990 to 2001 and 2002 to 2008 yields more interesting results. Between 1990 and 2001 the correlation appears significantly stronger in the commodity exporting countries (r = 0.3321) than in the overall sample (r = 0.1589) based on 91 observations (see Appendix 6). Surprisingly this relationship changes drastically and becomes negative in the period from 2002 to 2008 (r = -0.1203) (see Appendix 6).

These figures suggest that the association between the average terms of trade and the average social expenditure to GDP ratio were a) stronger in the commodity exporting countries than in the whole sample and b) that the association became significantly weaker after the year 2001. The correlation coefficients indicate that the average terms of trade developed in an increasingly different pattern than the ratio of social expenditure to GDP, particularly in the 21st century. Previous research and the available data show that the terms of trade increased rapidly in the 2000's, which contributes positively to economic growth. Thus we can infer

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[7] The main commodity exporters in this sample are: Argentina, Bolivia, Brazil, Chile, Ecuador, Mexico, Peru and Venezuela.

[8] NOTE: While the terms of trade figures are complete for all countries in the sample from 1990 to 2008, there are missing values for social expenditures, which reduces the observations in the analysis of the social expenditure to GDP ratio. The missing values are presented in the following in parentheses after the country: Argentina (2008), Bolivia (1990-1994; 2007-2008), Dominican Republic (2008), Ecuador (2007-2008), El Salvador (1990.1992; 2008), Honduras (2007-2008), Nicaragua (no social security expenditures), Panama (2008), Venezuela (2007-2008)

that the expenditure to GDP ratio increased significantly slower or in the case of the commodity exporters even decreased. A decrease in this ratio suggests that either a lower share of the GDP was used for social expenditures or that the GDP grew but the social expenditures remained constant, or grew relatively slower to the GDP. Hence, the gains from international trade that promoted economic growth were not equally used for income inequality reduction. The factor trade seems therefore to be more important for economic growth than for equality reduction.

However, such an aggregated correlation often hides more than it reveals and gives only hints but no clear evidence. Therefore we continue with a regression analyses to provide a better evidence base for the effect of international trade on the relationship between economic growth and income inequality.

5.2.2 The effect of terms of trade in Latin America

In order to analyze how the triangular relationship between international trade, economic growth and income inequality changed, the period will be divided into two sub-periods before and after the alleged shift from trade-off to win-win (see table 4). Table 4 shows the regression results of model 3 divided into three periods. Note that the year 1990 is excluded because we use the first differences of each series. In order to obtain a balanced panel the years 2007 and 2008 had to be excluded due to data limitations in the observed countries (see table 4).

The effects of increased terms of trade on social expenditures

Periods	1991-2006	1991-2001	2002-2006
	(1)	(2)	(3)
VARIABLES	dlnsoc_tot	dlnsoc_tot	dlnsoc_tot
dlntot1	-0.058	0.011	-0.647*
	(0.597)	(0.917)	(0.064)
dlntot2	0.263***	0.339*	0.250**
	(0.005)	(0.073)	(0.026)
Constant	0.029***	0.034***	0.032***
	(0.000)	(0.000)	(0.001)
Observations	208	143	65
Number of countries	13	13	13
F-stat	0.016	0.149	0.000

Rho	0.032	0.029	0.18

Robust std. errors, P-values in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Regression analysis of the differenced external factors terms-of-trade (commodities and services) series on the differenced social expenditures to GDP ratio. Panel consists of 13 Latin American countries for the periods 1991 to 2006, 1991 to 2001 and 2002 to 2006. Regressions are conducted by the author and based on the IDLA data set.

Table 4 shows that over the periods from 1991 to 2006 and 1991 to 2001, changes in the growth rate of the commodity terms of trade had neither and economically significant effect on changes in the social expenditure to GDP ratio, nor a statistically significant one (see column 1 and 2). Only the changes in service terms of trade show statistically significance in those periods to some extent (see column 1 and 2). However, column 3 shows two important differences. First, the growth of the commodity terms of trade became statistically significant at a 10 percent level and second, the magnitude of the coefficient increased drastically (see table 4, column 3). The estimation suggests that a one percent increase in the growth of the commodity terms of trade is associated with a 65% decrease in the growth of social expenditures to GDP (see table 4). On the other hand, the changes of the service terms of trade appear to boast the growth of social expenditures to GDP by 25% (see table 4). This positive contribution can however not outweigh the negative effect of the growing commodity terms of trade. This finding suggests that the growing terms of trade gains are associated with a slowdown of the growth in the ratio between total social expenditures to GDP. As an increasing ratio between social expenditures and GDP indicates more relative spending on potentially inequality reducing measures, the commodity boom appears to have a negative effect on the relative social expenditures between 2002 and 2006.

Apparently, the commodity boom in particular did not promote the growth of social expenditures to the same degree as GDP growth. These results indicate that the achieved surpluses in commodity exports had a more profound impact on economic growth than on the expansion of health, education, housing and social security spending in Latin America.

In the following we want to test if such an effect is even more pronounced in the main commodity exporting countries, which benefit most from increased international trade.

5.2.3 Commodity exporters

The biggest beneficiaries of the commodity boom are the commodity exporting countries[9] which are richly equipped with the sought after primary resources. These countries experienced the biggest positive shocks in GDP between 2002 and 2006 in comparison to other Latin American countries. Thus, their might also be a positive effect on the relative social expenditures because more revenue may be allocated to re-distributive measures. In the following we test the effect of changes in terms of trade on total social expenditures to GDP (see table 7).

Increased terms of trade on social expenditures for commodity exporting countries

Periods	1991- 2006	1991 - 2001	2002 - 2006
	(1)	(2)	(3)
VARIABLES	dlnsoc_tot	dlnsoc_tot	dlnsoc_tot
dlntot1	-0.148	-0.095	-0.389*
	(0.591)	(0.779)	(0.082)
dlntot2	0.274***	0.367*	0.258**
	(0.010)	(0.051)	(0.014)
Constant	0.023**	0.025***	0.035**
	(0.020)	(0.000)	(0.040)
Observations	112	77	35
Number of countries	7	7	7
F-test	0.027	0.089	0.03
Rho	0.043	0.057	0.202

Robust std. errors, P value in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: Regression analysis of the differenced external factors terms-of-trade (commodities and services) series on the differenced social expenditures to GDP ratio. Panel consists of 7 Latin American countries that benefited from the commodity boom for the periods 1991 to 2006, 1991 to 2001 and 2002 to 2006. Regressions are conducted by the author and based on the IDLA data set.

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[9] Commodity exporters: Argentina, Brazil, Chile, Ecuador, Mexico, Peru and Venezuela

At first sight table 5 shows a lot of similarities with the results presented in table 4. The changes in the growth rate of the commodity terms of trade had no statistically significant effect on the changes in the social expenditures to GDP ratio over the periods 1991 to 2006 and 1991 to 2001 (see table 5). The coefficients for the service terms of trade do not differ significantly from the previous results and despite the reduced number of observation all coefficients become more significant in the period 2002 to 2006 (see table 4 and 5).

The growth in commodity terms of trade is associated with a 39% decrease in the growth of social expenditures to GDP between 2002 and 2006 (see table 5). In contrast, the changes in the service terms of trade are associated with a positive contribution to the growth of social expenditures to GDP of approximately 26% between 2002 and 2006.

Compared to the whole sample, the changes in terms of trade of the commodity exporting countries are associated with a less profound reduction of the growth of social expenditures to GDP. Similarly to the results of the whole sample this effect cannot be overpowered by the positive contribution of the service terms of trade.

A less profound impact indicates that the effect of external conditions on inequality reduction was worse in the case of the whole sample than for the commodity exporters. However, such a difference should not be overestimated as it is based on a relatively small amount of observations.

In both cases the growing commodity terms of trade are associated with a decrease in the growth of the social expenditure to GDP ratio. Therefore, we infer that the commodity boom in Latin America did not contribute positively to the reductions in income inequality through the channel of relatively increased social expenditures. Hence, international trade could not be detected as the driving force that caused the win-win situation between economic growth and income inequality in Latin America.

VI. Reflection and Conclusion

The presented evidence of this study is not sufficient to determine clearly, whether the win-win relationship between economic growth and reduced income inequality was triggered by improved commodity terms of trade in Latin America.

The analysis has shown that the gap between the rich and the poor narrowed in the 21st century and that the average income inequality began to decline in 2002. On a historical note, Latin America experienced episodes of rising and falling income inequality and did not necessarily follow the proposed inverted U-shaped development as described by Simon Kuznets (1955). In the more recent history the inequality pattern changed and so did the relationship between economic growth and income inequality. The statistics revealed that the initial trade-off relationship of the 1990's changed in 2002 into a pattern of declining income inequality without compromised economic growth. Although, this win-win pattern resembles the downswing of a *Kuznets Curve* the evidence rather support the studies of Bourguignon (2004), Adelman (2000), Birdsall (1998) or (Persson & Tabellin, 1991) and contradict the works of modern proponents of the *Kuznets Curve* such as Barro (2000) or Gregorio and Lee (2002). Thus, the study corroborates the notion of Adelman (1975, 2000) that the relationship between economic growth and income inequality is interactive, multifaceted and changing over time and space. It is theoretically possible that the increasing income concentration affected economic growth negatively in the 1990's and contributed to its acceleration in the 2000's. However, the presented evidence of this study can neither support nor contradict such a statement.

In terms of underlying mechanisms of the complex relationship between economic growth and income inequality the study has shown the difficulties to disentangle influential factors from each other. The isolated analysis of terms of trade and social expenditure to GDP ratio did not yield statistically significant results for the period before the win-win. The improvements in the term of trade during the 1990's were not significantly associated with the development of the social expenditure to GDP ratio in the whole sample or in the sub-group of commodity exporters. Thus, the results are not sufficient to support the a-theoretical hypothesis of trade induced income inequality reduction as described by Goldberg and Pavcnik (2004), Jenkins et al. (2008) or Székely and Sámano (2012).

In terms of the effect of the improved terms of trade on the achievement of the win-win situation in 2002, this study has shown that the international trade in the 21st century plays a more important role for economic growth than for inequality reductions. The regression results indicate that the increased terms of trade rather slowed down the growth of the ratio between social expenditures and GDP in Latin America. Thus, revenue of increased international trade contributed more to GDP growth than to higher social spending, which leads to the conclusion that the external conditions cannot be held accountable for the recent reductions in income inequality in Latin America. Subsequently the increasing international trade was not the driving force for the shift from trade-off to win-win in Latin America.

This finding contradicts Heckscher-Ohlin and Stolper Samuelson theorem to some extent. On the other hand it supports the study undertaken by Cornia and Martorano (2010) and suggests that other mechanisms have been at work for the achievement of a win-win between economic growth and income equality.

Piketty's (2014) inspiring statement that only state intervention can enable a sustainable inequality reduction might have been right after all. This study could not prove this statement wrong. It could not be proven that international trade and benign external conditions are the factors that enable the win-win. Thus, prudent policies might have had a bigger influence on the current development in Latin America after all.

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Appendix

Appendix 1

Unit root testing

As previously mentioned we want to avoid the adulteration of the estimates due to spurious regressions. Therefore we apply the Fisher type-, the Harris and Tzavaris test (HT) and Levin-Lin-Chu (LLC) test to account for possible unit roots in the panel. The fisher test is the most powerful and allows us to check for autocorrelation by including legs. Furthermore, we include trends in the series where we could detect them via ocular inspection and subtract cross-sectional means. The results are presented in the following tables (see table 3 and 4).

Unit root test for the analysis of economic growth and income inequality

Variable	Lags	Specification	LLC	HT	Fisher-type	Conclusion
LnGDP/c	2	Time trend & Demean	0.0487	0.8424	0.9798	Cannot reject H(0)
LnGini	2	Time trend & Demean	0.0506	0.0406	0.8450	Cannot reject H(0)
Differenced Series						
D.LnGDP/c	2	Demean	0.0000	0.0000	0.0045	Reject H(0)
D.LnGini	2	Demean	0.0000	0.0000	0.0001	Reject H(0)

Table 3: Results of the unit root test for the variables representing economic growth and income inequality

**Unit root test for the analysis of external effects on social expenditures**

Variable	Lags	Specification	LLC	HT	Fisher-type	Conclusion
LnTot1	2	Time trend & Demean	0.0078	0.5210	0.9928	Cannot reject H(0)
LnTot2	2	Time trend & Demean	0.0006	0.3309	0.1897	Cannot reject H(0)
LnSoc_tot	2	Time trend & Demean	0.0000	0.1708	0.0392	Reject H(0)
Differenced Series						
D.LnTot1	2	Demean	0.0000	0.0000	0.0196	Reject H(0)
D.LnTot2	2	Demean	0.0000	0.0000	0.0445	Reject H(0)
D.LnSoc_tot	2	Demean	0.0000	0.0000	0.0001	Reject H(0)

Table 4: Results of the unit root test for the variables representing external factors

If we achieve conflicting results the LLC, HT and the Fisher test, we follow the results of the Fisher test as it a) is the most powerful in terms of avoiding type 2 errors of falsely rejecting the null hypothesis and b) it allows us to correct for autocorrelation through the inclusion of lagged values.

The null hypothesis of the applied tests is that the panel series contain unit roots. We use a 5% significance level to decide whether to accept or reject the null hypothesis.
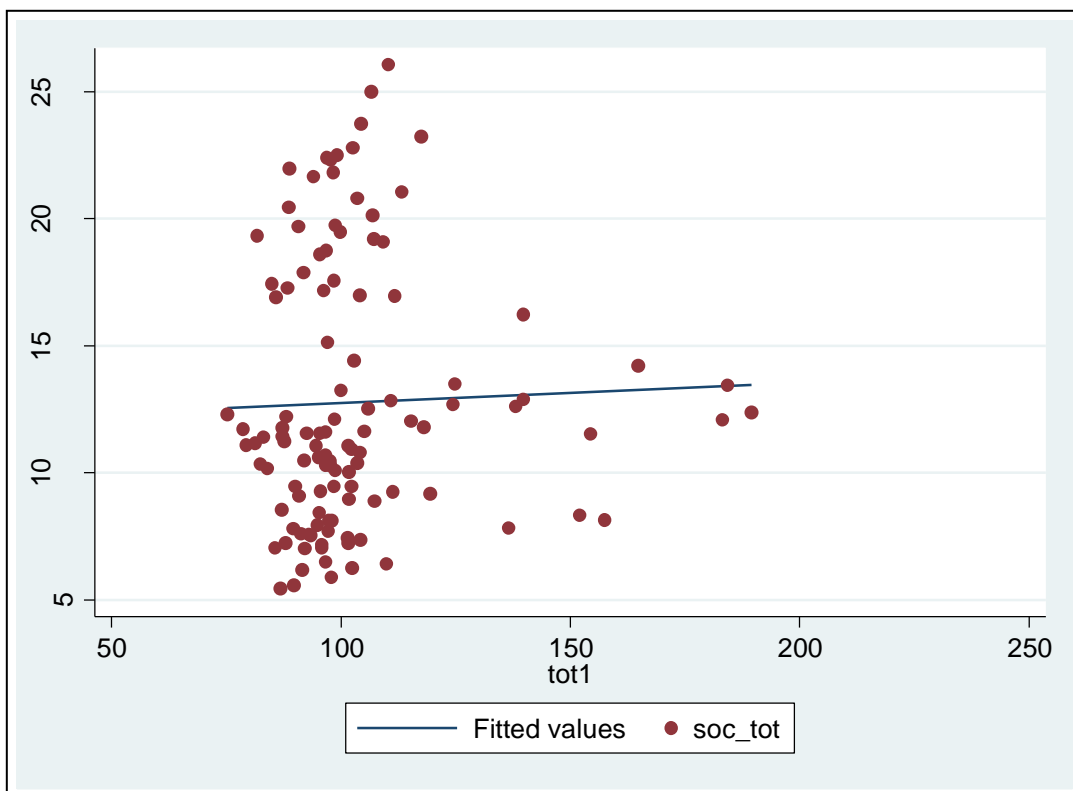
Appendix 2
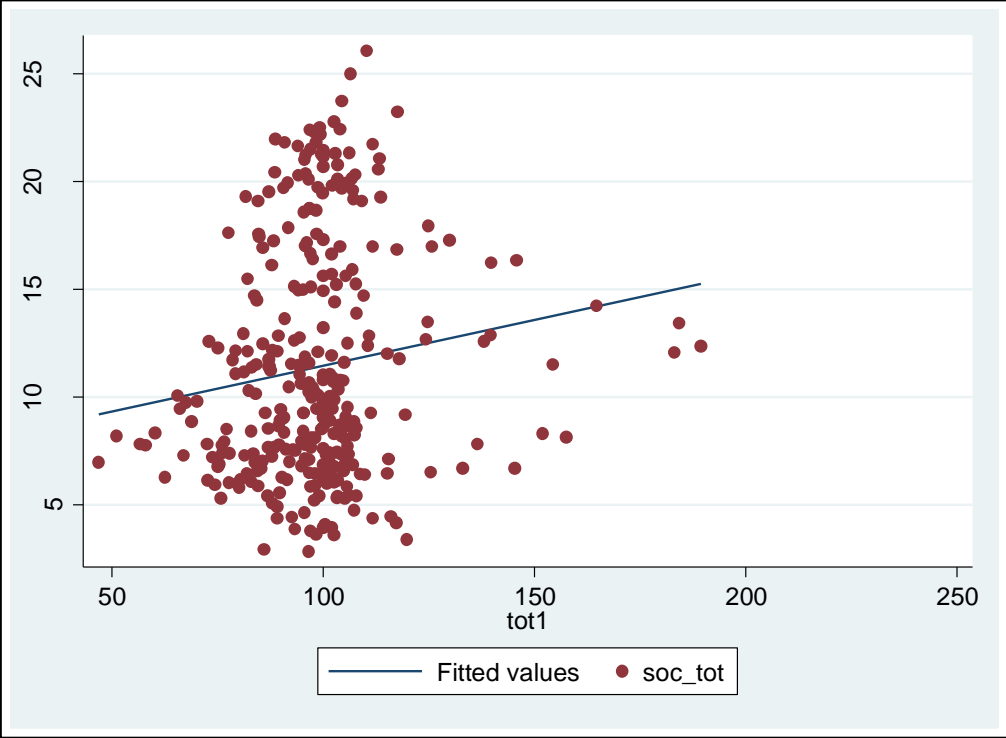
Appendix 2: Scatter plot of terms-of-trade (x-axis) and total social expenditure (y-axis) of all countries in the sample between 1990 and 2008. Correlation coefficient r=0.1385 based on 322 observations.

Appendix 3
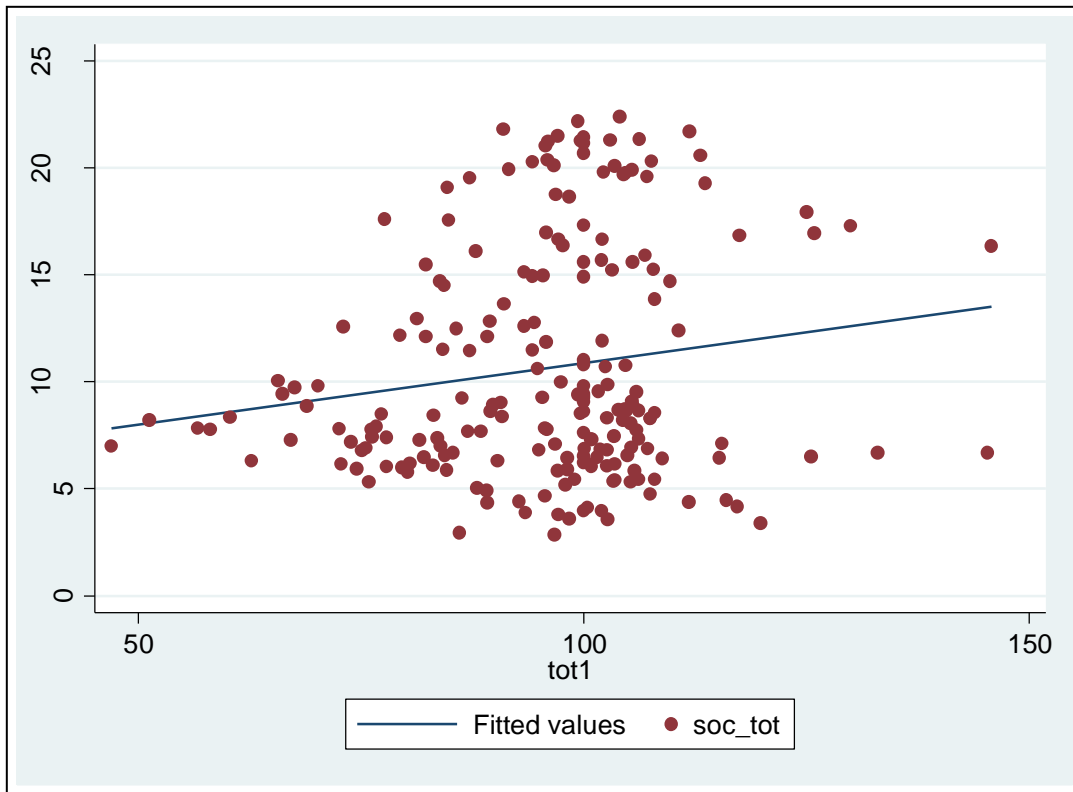
Appendix 3: Scatter plot of terms-of-trade (x-axis) and total social expenditure (y-axis) of all countries in the sample between 1990 and 2001. Correlation coefficient r=0.1589 based on 208 observations.

Appendix 4

Appendix 4: Scatter plot of terms-of-trade (x-axis) and total social expenditure (y-axis) of all countries in the sample between 2002 and 2008. Correlation coefficient r=0.0322 based on 114 observations.

Appendix 5

```
. corr rir tot1
(obs=318)

                 |      rir       tot1
    -------------+------------------
             rir |   1.0000
            tot1 |   0.0577     1.0000


. corr mw tot1
(obs=341)

                 |       mw       tot1
    -------------+------------------
              mw |   1.0000
            tot1 |   0.1220     1.0000


. corr un tot1
(obs=291)

                 |       un       tot1
    -------------+------------------
              un |   1.0000
            tot1 |  -0.0315     1.0000
```

Appendix 5: Correlation coefficients of terms-of-trade (tot1) and credit interest rates (rir), minimum wages (mw) and unemployment (un) of all countries in the sample between 1990 to 2008.

Appendix 6

```
. corr soc_tot tot1
(obs=140)

             |  soc_tot     tot1
-------------+------------------
     soc_tot |   1.0000
        tot1 |   0.1777   1.0000


. corr soc_tot tot1 if period1==1
(obs=91)

             |  soc_tot     tot1
-------------+------------------
     soc_tot |   1.0000
        tot1 |   0.3321   1.0000


. corr soc_tot tot1 if period2==1
(obs=49)

             |  soc_tot     tot1
-------------+------------------
     soc_tot |   1.0000
        tot1 |  -0.1203   1.0000
```

Appendix 6: Correlation coefficients of terms-of-trade (tot1) and total social expenditures (soc_tot) of the commodity exporting countries in the sample between 1990 to 2008, 1990 to 2001 and 2001 to 2008 .