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Master in Economic Demography

**Development of Divorce in Sweden 1910-2000:
A county-level analysis of divorce and economic
determinants**

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***Abstract:** One of the larger changes in society that affected individual's lives during the 20th century is the increase in divorce rates that happened in almost all industrialized. It went from being an uncommon feature reserved for the rich to a prominent part of family-life. The increase occurred against the backdrop of economic growth and the industrialization. This study constructs a data set for the change in aggregate divorce behavior using county-level data for Sweden from 1910 to 2000 to analyze the development of marital instability. Main theory and previous research predicts a positive relationship between divorce and female labor force participation but knowledge on the long-run aggregate relationship is limited, while divorce rates relationship with other economic factors are ambiguous or unresearched in long-run. Methods of pooled OLS and fixed-effects are used, and the results indicate that the increase in female labor force participation during the 20th century is positively and significantly related to the increase in divorce rates, and that the industrialization is important in explaining the rise in divorce rates. However, the study does not include measures of values and norms that most likely are related to divorce, which means the results should be taken with caution.*

Key words: divorce, female labor force participation, industrialization, Sweden, county-level

EKHS01

Master thesis, First Year (15 credits ECTS)

June 2018

Supervisor: Maria Stanfors

Examiner: Martin Dribe

Word Count: 15126

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1 Introduction

The 20th century was a period of almost unparalleled demographic and economic change. Mortality and fertility declined, while life expectancy increased, and the economy was transformed through the industrialization and technological advancement. As the lives of individuals were dramatically changed, so was their relations with one another, not only social but within families. The family and household transition that occurred during the 20th century is characterized by decreasing marriage rates, lower marital fertility and, most important for this study, divorce. In previous centuries, marriage was the foundation of a family and a life-long commitment; however, in the last hundred years marriages have become increasingly unstable and divorce is a fundamental part of family behavior to the same extent as marriage or re-marriage. In 1910, a total of 609 marriages were dissolved in Sweden, but in the year 2000, the number had increased to over 21 000 divorces. Taking the married population into account, the refined divorce rate increased from 0.5 to 12.7 divorces per 1000 married women. (BiSOS A, 1910; Befolkningsstatistik, 2000). During this period divorced went from being an uncommon feature, mainly reserved for the rich and hard to obtain, to be a normal characteristic in family's lives.

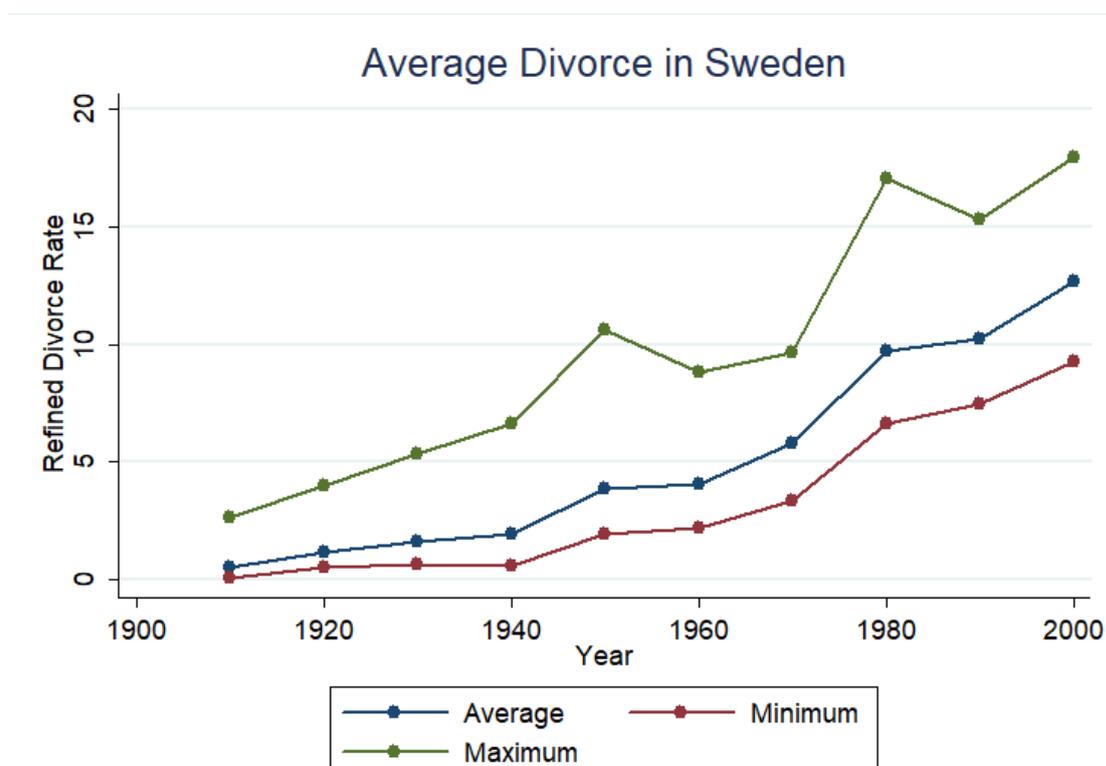


Figure 1: Number of divorces per 1000 married women 1910-2000.

Source: BiSOS *Befolkningen A 1910* (1855-1910). Statistics Sweden. *SOS Befolkningsrörelsen*, 1911-1966. Statistics Sweden. *SOS. Befolkningsförändringar del 1-3, 1967-1990*. Statistics Sweden. *SOS. Befolkningsstatistik del 1-4, 1991-2003*. Statistics Sweden. *Folk- och bostadsräkningen. Folkräkningen 1910-1960*. Statistics Sweden. *Folk- och bostadsräkningen. Folk- och bostadsräkningen 1965-1990*. Statistics Sweden. *Officiel Statistik. Statistikdatabasen 2000*. Statistics Sweden.

Despite divorce being a common feature in today's society family demographers and economists have yet to understand the phenomenon of divorce and the trends in marriage rates that most Western countries experienced over the 20th century. How a marriage dissolution affects the finance, well-being, and other individual characteristics of the people involved have been extensively studied since the 60's (South, 1985; Stevenson & Wolfers, 2007), but research and studies on the long-run national and regional trends in family formation and its relation to macroeconomic variables and conditions are few, and most have a focus on the post-WWII period in the US and other Anglo-Saxon countries. More importantly, there are also few studies that look at Sweden and the macro-trend in divorce, since Sweden together with the other Nordic countries are unusual in relation to other industrialized countries in that they were early in experiencing a high divorce rate, but quite late in their industrialization. Modern trends in Sweden exhibit low marriage rates and high rates of cohabitation, compared to the US and social norms do not link marriage and fertility to the same extent (Stevenson & Wolfers, 2007). The rise and trend in divorce over the 20th century is shown in Figure 1, but also the regional high and low which seems to indicate that there have been regional differences within Sweden. Sweden is seen as a forerunner in terms of family change, not only in a high rate but also in institutional acceptance of divorce, which is evident with an early adoption of a national no-fault divorce law in 1915.

The early 20th century was also a period of industrial revolution and restructuring in Sweden, which was late in the process compared to other countries but had become a leader in terms of economic growth. The growth also continued far into the 20th century driven by the economic politics known as the Swedish Model with a large public sector (Schön, 2012). Additionally, Sweden experienced a relatively early growth in non-married cohabitation, a family arrangement similar to divorce but with less strict and formal rules.

Divorce as a demographic concept is further intriguing since it is something new in society, which we do not fully understand in relation to other factors, and that other Western countries experienced similar changes to their marital stability through the 20th century (Stanfors, Sandström & Andersson, 2014), making divorce not only a new but also one of the bigger demographic changes in the past century (Stevenson & Wolfers, 2007). The changes in divorce rates have often been associated with changes in the function of the family, the economy, and gender relations. These aspects have all undergone large changes over the period, especially in industrialized countries such as Sweden. Generally, in theory, women's economic independence and their labor market attachment is related to marriage instability and family change (Becker, 1981). The transformation from agriculture to industrial society is also associated with the changes in family formation and end through its relationship with urbanization and modernization (Stanfors & Goldscheider, 2017), while both theories and empirics are ambiguous on the long-run relationship between divorce and economic growth (Hellerstein, 2011; Stanfors, Sandström & Andersson., 2014).

The aim of this study is to analyze the relationship between divorce and female economic independence by looking at the county-level development of the refined divorce rate and female labor force participation (female LFP) in Sweden from 1910 to 2000. To do this, a panel data set for the regional trends in divorce, female LFP, the level of living standard and industrialization is constructed. The main question in the study is: Is there a relationship between female LFP and divorce rates in Sweden in the period 1910-2000, and how are they

related? Since the century under study was a period of economic restructuring, the study also includes analyzing the relationship between divorce and measures of economic standard of living and the level of industrialization, with a few other variables with a theoretically predicted relationship to divorce. The study does not include any specific controls or measure for the effect of culture on the rise of divorce rates. The change of attitude toward divorce is most likely a main determinant of the increase, however, this study is mainly interested in the economic and demographic conditions which have been theorized to affect divorce (Stevenson & Wolfers, 2007).

Divorce rates are measured as the number of divorces in a county by the number of 1000 married women. A different measure, which is sometimes used, is the crude divorce rate – divorces by people in the population, however, the refined divorce rate is more suited since it only takes the population at risk into account. Included in the analysis are indicators for the industrialization and demographic variables which theory predicts are related to the divorce trends on a macro-level. These are the economic wealth per capita, the size of the industrial sector relative to the agriculture sector, the relative cohort size, net migration and the mean age at first marriage. All at county-level. Data is collected from reports and census published by Statistics Sweden.

Research on the development of divorce trends in Sweden is scarce, an exception being Stanfors, Sandström and Andersson, (2014) who looks at divorce in relation to the business cycle, female economic independence, and welfare between 1915-2010, but the study is only on the national level. Hence, our knowledge about the nature of the relationship between macro determinants and the rise of a divorce culture in Sweden from a regional perspective is very limited. There is a need within family demography and social sciences to explore what happened to the family in the 20th century and how the changes in marriage behavior have been related to other societal changes that transformed the economy and culture.

The rest of this study is structured as follows. Section 2 details the background of divorce, as a concept and in a historical perspective for Sweden, an overview of the economic history for Sweden during the 20th century, and a description of the regional variation in divorce. In section 3, the theoretical theories and perspectives on marriage and divorce are presented and discussed, which gives a basis for which variables that are later used in the model and their expected relation with the divorce rate. Section 4 describes the previous literature and research with a focus on the association between female LFP, economic growth, and industrialization. In section 5, the data is described, and models explained. The empirical results are presented in section 6, together with an analysis of the results. The results indicate that female LFP rates had a positive correlation with divorce rates for the period 1910-2000 in Sweden. The result is robust when adding variables for economic conditions and demographic changes, with small changes to the coefficient. Industrialization and per capita GDP have mixed results and do not seem to be robust to modifications. Section 7 contains a conclusion with a discussion of the results and what we can learn from them and how they add to existing research.

2 Background

2.1 Divorce

Although divorce as the end to a marriage has existed, it has not been common in most countries. In some, there is no occurrence of divorce simply because divorce is not a legal option (Trost, 1993), where couples can spend their lives apart from each other, but if they are married in the eyes of the state (or church) nothing will separate them legally. Before the 20th century, people were not likely to live that long, and widowhood used to be a common civil status. Marriages ended, and people remarried because their spouse died. Of the first four presidential wives in the US, three had the president as their second husband (Caroli, 2010).

Among the industrialized countries of the 20th century, Sweden is portrayed as unusual in its patterns of family formation and behavior (Goldscheider, Bernhardt & Lappegård, 2015). The early adoption of a no-fault divorce law and the relatively early rise of unmarried cohabitation in the late 1960's favors such a view. Still, the long-term development of marriage, divorce, and re-marriage behavior are closely paralleled by countries in Northern Europe and North America (Stanfors, Sandström & Andersson, 2014). Divorce rates in Sweden were growing slowly during the first half of the century but experienced a significant growth in the 1960's and 1970's. This is like the trends in the US and UK (Sander, 1986), where reforms of the marriage laws were not made until after the Second World war (later in some states of the US) (Oppenheimer, 1997b; Genadek, Stock & Stoddard., 2007).

In Sweden, there has existed the possibility of divorce for a long time, however it has not always been easy. Before a reform of the marriage laws in 1915, married couples who wanted a divorce had to be granted this by the monarch or have been separated for over three years and one of the spouses assumed dead (Trost, 1993). Strict laws on and difficulty of divorce in a society can be argued to reflect the general attitude toward it. The new law also stated that the household resources were to be divided between the spouses and if one were not able to provide for themselves, the other would pay alimony (Sandström, 2011). Similar reforms were implemented in the other Nordic countries before the Second World war, while other Western countries issued similar reforms in the 1970's and some Catholic countries in the western world still see divorce as a non-existing form of civil status. The progressiveness in divorce and marriage law in Sweden can be argued as a sign of early secularization or modernization, however, the 1915 reform was mainly enacted to increase or stabilize falling marriage rates. The ruling power was worried that the difficulty and high cost of divorce was a major deterrent to marriage among the young (Sandström, 2011; 2012). Included in the reform was the concept of separation ('hemskillnad'), which was considered as the first step in a divorce ('äktenskapsskillnad'), but not a legal divorce. It stipulated that a married couple could file for separation and wait for one year, during which they were to try harder in their

relationship. If either of the individuals in the couple still wanted to be legally divorced after one year, this was allowed (Troost, 1993; Sandström, 2012).

The 1915 law was changed in 1974 when the currently active divorce law was passed, which allowed for complete no-fault divorce and the concept of separation was removed. All and any personal reasons for divorce are now determined to be private matters for the couple, except in the event of the couple having a child below the age of 16. If a child is involved, a mandatory six months waiting period is required before the divorce is legally accepted (Troost, 1993; Sandström, 2011). It was implemented after years of debate (Sandström, 2011) and came in the aftermath of the 1960's sexual revolution, political radicalization and heated discussions on women's political and labor rights. The change in reform can be argued to be a result of the pressure of changing norms in society. This would explain the peak in divorce rates in Sweden of 14.33 divorces per 1000 married women (Stanfors, Sandström & Andersson, 2014), which occurred in 1974, and the following decline to more stable trend around 10 divorces per 1000 married women. The 1974 law was unique in the international context in that it removed any obligation for alimony after a divorce (Sandström, 2012).

Figure 2 shows the counties in Sweden and the distribution of divorces for specific years during the 20th century. The colors indicate which percentile a county belongs to in the distribution of refined divorce rates. A county with the color black means that for that specific year, the county was in the top percentile of the divorce rate in Sweden. While a one-variable map does not produce any conclusions, it is interesting, but not surprising, to find that the big city-counties of Stockholm, Västra Götaland and Skåne are in the top percentiles in all years, while the regions of Jönköpings län and Kronobergs län tend to be white, meaning they are in the lower percentiles. (See Appendix A for maps of all years and Appendix B for the county names on the map).

2.2 Industrialization and development in Sweden

The main trend for Sweden over the course of the 20th century is population and economic growth. The developments of economic conditions and institutional structure are phenomenal when compared to the state of Sweden before 1890 (Schön, 2012). The modern economic growth started relatively late but can be argued to have continued for a greater part of the 20th century (Isacson, 2007; Schön, 2012), and with the economic development, the wealth and living standard of the population increased rapidly. Compared to the early 20th century, an individual today consumes 20 times more goods and services and the life expectancy has increased by 50 years (Isacson, 2007).

Percentiles in refined divorce rate – changes in the *leaders* and *laggers* in divorce.

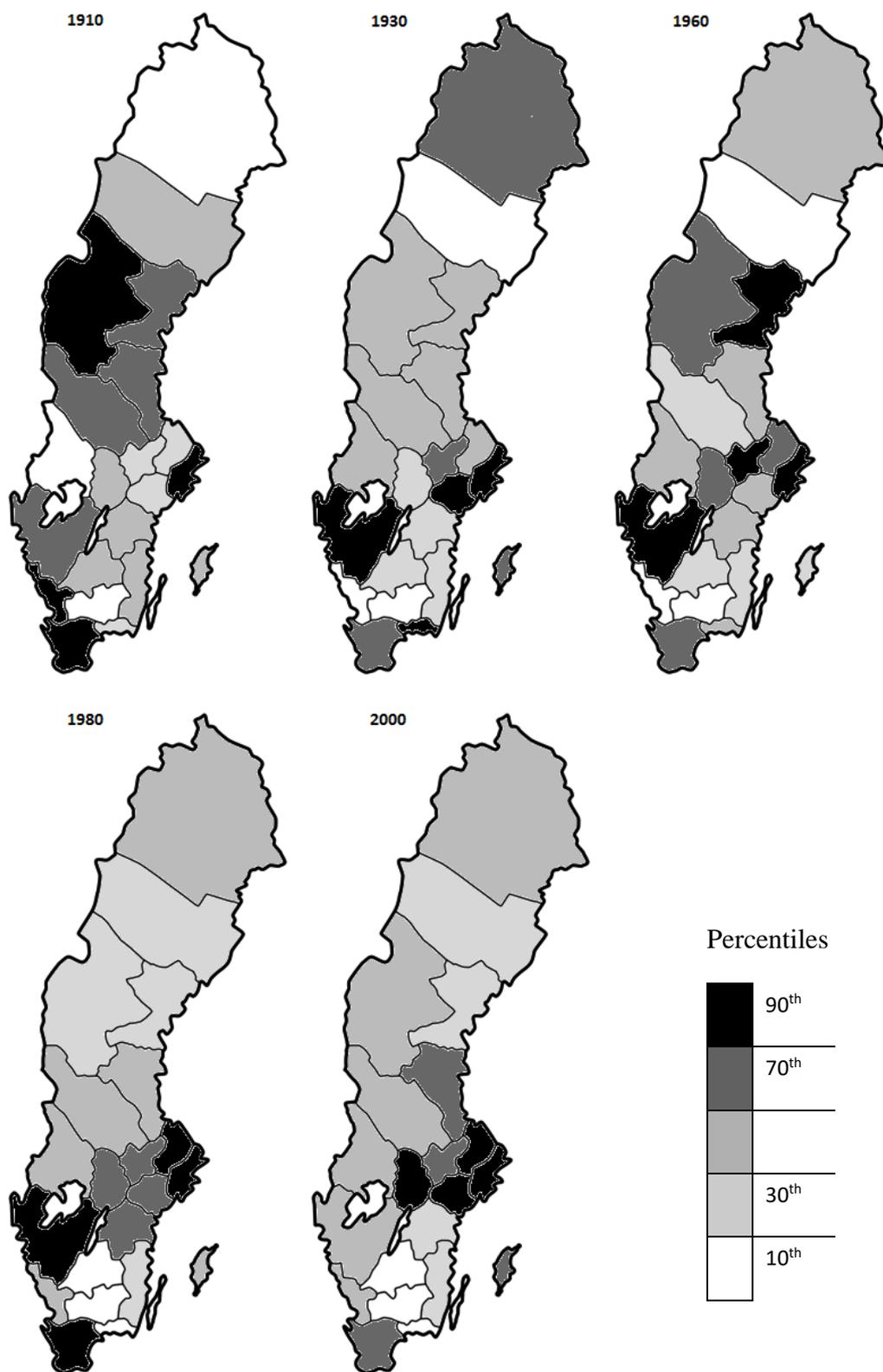


Figure 2: Number of divorces per 1000 married women in Swedish counties 1910-2000.

Source: BiSOS *Befolkningen A 1910* (1855-1910). Statistics Sweden. *SOS Befolkningsrörelsen*, 1911-1966. Statistics Sweden. *SOS. Befolkningsförändringar del 1-3, 1967-1990*. Statistics Sweden. *SOS. Befolkningsstatistik del 1-4, 1991-2003*. Statistics Sweden. *Folk- och Bostadsräkningen. Folkräkningen 1910-1960*. Statistics Sweden. *Folk- och Bostadsräkningen. Folk- och Bostadsräkningen 1965-1990*. Statistics Sweden. *Officiel Statistik. Statistikdatabasen 2000*. Statistics Sweden.

The economic and societal change is also evident by the migration flows, which at the end of the 19th century were high outflows. Estimates indicate that 1.5 million Swedes left the country in total and that 20 percent of men born during the 19th century emigrated from Sweden (SCB, 2004). The counties that had the highest out-migration were Kronoberg, Jönköping, Östergötland, Västra Götaland, Värmland and the counties in Bergslagen, parts of Västmanland, Örebro, Dalarna, and Värmland where mining and iron industries were important (Isacson, 2007). People left Sweden (often for North America) in search of better opportunities, but by 1930 the flows changed direction and the country experienced an inflow of labor. Schön argues that the explanation for the success is the restructuring of industries from iron- and wood processing towards engineering- and consumption-based industries. In demographic developments, fertility started to decline within marriages, first for older couples but beginning in 1910's it also declined for younger couples and with it, the age at first child increased. This development is explained by Schön as a social process, spreading from the upper classes to the lower-class and rural population.

The industrial period in Sweden is argued by Isacson (2007) to consist of three distinct phases marked by technology: 1) the steam engine and factories, 2) the combustion engine and electricity, and 3) industrial specialization and organization. This makes the period stretch well into the 20th century until the 1980's, when industries moved out of the country and the service sector became the main employer of labor. Sweden also focused on expanding its public sector. Public economic policies and reforms after the Second World War led to an expansion of the welfare sector, with benefits of health-, child- and elderly care, as well as free education (Isacson, 2007). This created more opportunities for women in the labor market. Women had worked before the 1960's, but the female LFP rates were not higher than in other industrialized countries (Schön, 2012). Men dominated both the private and public life. While there were women who worked, their pay was often lower than their male colleagues' (Isacson, 2007) and their place was in the household. The industrialization has been argued to be a shift toward norms of working women, but Schön (2012) notes that the structural change from a rural and agricultural society towards an urban and industrial one also had a regressive effect on household and family structures. The trends on the labor market and in society, where women were given a bigger part, were also met by a change in the view of women in the opposite direction. The bourgeois traditional view, that women (specifically a wife) should stay at home and maintain the household while men should work, spread from the upper- and middle-classes to the working class. The late agricultural society had women working with household production and the production of goods – milkmaids were important for the milk production before machines were introduced. The early 20th century's urbanization led to a separation of women and production. Laws existed to minimize women's involvement in the industrial sector and although it later, in the 1970's, became a sector of employment for women, the expansion of the service sector was more important for women. Hence, it was not until the latter period of the 20th century that women were allowed, by norms and laws, to fully partake in the labor market. The welfare sectors expansion led to women being able to work while their children were in day-care, as well as provided women with jobs within health-, elderly- and child-care. (Schön, 2012).

In all industrialized countries, the transformation from rural living and agriculture to urbanization and industrial work brought with it changes to behavior and priorities among the citizens. Urbanization narrowed the distance between people and increased the number of

ideas and norms, while new types of work changed the working hours and possibilities for paid work (Isacson, 2007). One important aspect of city-life and industrial work was that it paved the way for a transition from production households to consumption households. In the traditional, often agricultural, households of every-day people, most goods were produced in the households. A higher income was beneficial since it provided the means to afford resources and certain luxuries, but the household chores and work were time-consuming and laborious. However, the latter half of the 20th century has seen technological advances which decreased the time needed for certain chores and new opportunities to get help. Examples of technology are the vacuum cleaner or washing-machine, while child-care and education have lowered the time needed for child production (Isacson, 2007; Isen & Stevenson, 2010). Couples and parents are no longer bound to the household, and if they can afford it, almost everything can be bought at the market.

The regional development of demographic and economic variables during the 20th century has not been the same for the counties in Sweden, although there are similarities. Over 100 years ago, Gustaf Sundbärg, an early researcher on the demographic changes in Sweden, divided the counties into three larger regions with similar trends in fertility and marriage. Sundbärg claimed that eastern Sweden was characterized by a high marriage frequency and early age at marriage, western Sweden by lower marriage frequencies and older ages at marriage, while northern Sweden had even fewer marriages. Although Dribe (2008) describes the culture and norms as similar between the counties, the differences between the regions could be attributed to the Lutheran State Church (traditional values) which had a stronger influence in the regions of western Sweden and the Eastern regions being more secular (Lundh, 2013). In addition to the marital patterns pointed out by Sundbärg, Lundh (2013) argues that there were cultural and socioeconomic features that were region-specific other than religion. The Western counties had at the end of the 19th century a larger proportion of farms and few paid contract workers. Such a socioeconomic structure could have led to more family-based values and personal relations.

Table 1 - Sundbärg's (1910) regional division of the counties

Eastern Sweden ³ High Marriage Low age	Gotlands län, Gävleborgs län, Jämtlands län, Stockholms län, Södermanlands län, Uppsala län, Västmanlands län, Östergötlands län
Western Sweden ³ Low Marriage High age	Blekinge län, Älvsborgs län ¹ , Göteborg och Bohus län ¹ , Hallands län, Jönköpings län, Kalmar län, Kristianstads län ² , Kronobergs län, Malmöhus län ² , Skaraborgs län ¹ , Värmlands län
Northern Sweden Low Marriage	Norrbottens län, Västerbottens län, Västernorrlands län

¹ These regions later formed Västra Götalands län

² These regions later formed Skåne län

³ Örebro and Dalarna county are split between East and West.

Source: Lundh (2013)

Lundh (2013) uses the division to study marriage behavior in different parts of Sweden 1870-1900 and finds that even though there are similar patterns in the levels the counties in each group, the counties differ much in terms of age at marriage, wages and socioeconomic structure. The development in these trends has not been homogenous, although Malmberg (2001) finds that there is a geographical gravitational behavior around the large city-areas (Storstadslän) of higher growth rates in both population and economy. While different counties might have different sizes of their economy, the income levels and wealth of the population in the counties have converged. In 1909, the mean income in Västerbottens county was 2 000 SEK per year (in 2001 monetary value), while in Stockholms län it was closer to 20 000 SEK (Malmberg, 2001). In the late 20th century, the mean income in Västerbottens län was 83 percent of Stockholms.

Regional differences in industries in Sweden at the beginning of the industrialization is argued by Schön (2000) to be based on the accessibility of natural resources. The northern counties were dominated by forestry, while mines were important in Gävleborgs, Västmanland and Örebro county. Iron and steel industries in Bergslagen increased their production almost tenfold in the years prior to the first World War (Schön, 2000). The counties in the south and on the west coast specialized in textiles and paper pulp industry. Expanding industries and urbanization led to seasonal workers in the northern regions taking full-time jobs in cities, where workshop industries increased in quantity. The north-eastern regions of Sweden experienced an out-migration of young women at the end of the 19th century, as production shifted from textile to wood and agriculture (Magnusson, 2010).

3 Theory

To discuss the theoretical determinants of divorce, one must understand the theoretical reasons for why people marry. A simple answer is that people get married because of love, but there are theoretical benefits to marriage that extends beyond love, and if love or companionship are the only explanations people could live together without the contract of marriage. The following section presents theories on marriage and divorce.

3.1 Reason for Marriage

Although there was scholarly work dealing with family formation and dissolution during the first half of the 20th century, the modern approach to divorce behavior can be argued to start with Gary Becker and his *A Theory of Marriage: Part I* (1973) and his latter *A Treatise on the Family* (1981). While acknowledging that there are reasons such as love, tradition or norms that lead to individuals marrying, Becker argues that the concept of family formation can be analyzed like other human behavior. This is formalized in the ideas of New Home Economics (see Weiss, 1997 for a review).

Becker (1973;1974a) initiates the economic modeling of marriage behavior and marital instability and introduces the concept of marriage market and gains from marriage. Using the rational choice framework, Becker proposes his theory based on two assumptions. First, marriage is a voluntary act between two individuals, and second, people compete for matches and try to find the best one. In this setting, people make a choice either to be single or married, where marriage is the formation of a shared household. Marriage will only be the outcome if it increases both person's utility above that of being single. There are similarities between the marriage theory and job search theory, which Becker utilizes. Individuals search for a mate in a similar way to how they would search for a job. The longer an individual search for a good match, the more likely it is to be good; however, since there is competition, good matches might be decreasing with time. Another important aspect is that individuals with more desirable characteristics will have a higher expected likelihood of finding a good match.

The question is then, why and how is the utility higher within a household than if an individual is alone? Of course, the production of children is the most common feature of a family. Historically, even if there were illegitimate births outside of marriage, the norm was that having children was a family matter. But other than children, the theoretical arguments to marry are similar to economies of scale and can be summarized in four parts. First, through marriage a couple can make use of risk pooling by having one partner work while the other is unemployed or sick. Second, couples can share in consumption of non-rival goods such as a

home, a child or information. Third part is coordinating investments, such as one person working and providing income while the other one gets education. The fourth reason for getting married is to exploit comparative advantages in the division of labor in the household. Marriage allows the individuals to make use of economies of scale, by working together.

The main logic from Becker (1973; 1974a) is based on the sexual-division of labor based on comparative advantages, which becomes the foundation for gains to marriage and the discussion of marital instability. The simplest form of the model considers two individuals and two different goods that need to be produced by a household – be it single or married. The goods are produced through market labor and household labor. Market production can be defined as anything that provides income and household production concerns non-paid work, for example cooking meals, the birthing of children, caring for children and other commodities not immediately acknowledged as such. The two individuals differ in certain characteristics, which enables for comparative advantages and specialization through a division of labor. Because of the disposition of women as child-bearers, they are considered to have an advantage for home production. Hence, the gains from marriage are highest when production is fully specialized between the partners, where utility-maximizing behavior is the driver (Becker, 1974a; 1974b; 1981). The opportunity cost for women to work is high in this model, as their investments in market production will diminish the possibility of having a family.

In the specialization model, marriage both increases the utility of both individuals and ensure a form of security. A husband knows his children and the house are taken care of when he works and the wife gains “financial security” since her work is non-paid. A different and more modern view on the gains to marriage focuses on the positive benefits of having a dual-earner family. Isen & Svensson (2010) formalize the idea that as western society has changed from household production is an important factor towards household consumption, so has the characteristics on which individuals match. A household where both the husband and the wife work for income will be able to buy technological equipment (washing machine, dryer, vacuum, etc.). The dual-earner family will have to spend less time on household chores and more time on expanding their joint consumption possibility, which becomes the determinant of the gains to marriage. The important difference is that Isen & Stevenson argue that marriage sorting (finding a spouse) is based on consumption complementarities, instead of production complementarities as in Becker’s model.

Among other explanations as to why people marry are culture, traditions, and norms. These factors, and changes in them, most likely affect the patterns of marriage formation. Regardless of specialization, it is easy to argue that a married couple has more than just the division of labor as a guarantee for the gains of marriage. Having been married for some years, most couples have children or shared ownership of a house or a car. Such things should have a negative effect on the probability of divorce as it is marriage-specific capital. (Becker, 1974a; Weiss, 1997). But if how people value the investments in marriage change, the relationship will change. Lesthaeghe (2010), a proponent of the Second Demographic transition, producing children as the main priority within a marriage. One-hundred years ago, marriage and fertility were the goals in life as it was a way of establishing your own life, specifically for women.

3.2 Marriage Instability in Economic Theory

Labor force participation of women and marriage behavior has been related in theoretical approaches since the 1970's after scholars witnessed both the emergence of women on the labor market and a decrease in the marriage rates. Women working meant that less time was spent on building a household and having children, but the theories also extended to include explanations for the increase in divorce rates that had been occurring in the western world since the beginning of the 20th century and had "exploded" in the late 60's.

When extending his theory on marriage to include divorce and separation, the main explanation for the increase in marriage instability proposed by Becker is the change in opportunities for women that lead to increasing female LFP, and in turn affected the division of labor within households (Becker, 1974a; 1981). Parsons (1949) argued from a sociologist's view that sex-role segregation was a requirement for marriage stability since any sex-role convergence would lead to dangerous competition between the husband and wife but in the specialization model, the sex-role differentiation is what determines the benefits of a marriage.

Sex-based specialization within a marriage will maximize the utility of both individuals and reduce the probability of divorce (Becker, 1981). In the center of this argument lies the view that differentiated gender roles are of utmost importance for marriage. In the specialization model, the married partners are dependent on each other. The man cannot bear children or "take care of the household". The woman does not have an income since she is focused on household production. Both parties gain the most from this dependence and a disruption of this sexual division will decrease the gains to marriage. This mutual dependence and a trade of skills between the partners has led to the view of divorce being a consequence of female economic independence. If women's wages or female LFP increases, they become less dependent on their spouse and less specialized in their field, which decreases the gains to marriage. The results would be increasing rates of never-married and divorces.

Part of the view that female economic independence increases marital instability relies on the assumption that some women wanted to end their marriage but did not have the means to support themselves outside of a marriage. When the opportunity for paid-market work arises, women can gain the means to leave bad marriages without outside help. But this is only one aspect of how female independence influenced divorce rates. Another perspective from the specialization model would emphasize that women who start working will invest less in the marriage-specific capital and more in labor market capital. The consequence would be that the specific sex-role differences in skills converge. If there are no differences, the married partners will not be able to trade to increase their utility. Following the decrease in fertility at the end of the 19th and beginning of the 20th century, producing children became less of a full-time job, and childbearing is one of women's advantages for household production.

For Becker, the deterioration of the gains to marriage are twofold: fertility declined, which decreases the usefulness of household specialization, and the increase in female wages during the 20th century, which changed the opportunity cost of being married. This changed the setting for utility-maximizing behavior since women could stand to gain more from being single than from being married. Becker's theories do not provide a clear prediction of divorce and economic conditions. Prosperous times or regions might be related with increased marital stability if there is an income effect that reduces stress to family life but could also make the alternative to marriage for women more beneficial thus reducing the gains to marriage further.

Divorce and research theories often stress the changing pattern toward dual-earner households and the increased participation of women in the workforce as important factors for the increase in divorce rates in the 20th century. While Becker argues that stronger connection to the workforce for women decreases the attractiveness of married life, there are those who oppose the idea. Oppenheimer (1997) and Isen & Stevenson (2010) argue that the structure of dual-income families is more beneficial since it allows for more consumption. An important distinction is that the gains to marriage in the traditional specialization model are based on production and comparative advantage. Isen & Stevenson claim that the technological progress of the 20th century has decreased the relevance of investing in household skills. Having a microwave, a vacuum or a dishwasher minimizes the cost of home production and the need for specialization within the household. With the view of consumption as more important than production, female LFP should increase the gains to marriage and make marriages more stable. However, divorce rates should experience an increase due to the fact that the 20th century saw the change from production-marriages to consumption-marriages. If people were matching and marrying based on expectations from traditional specialization, divorce rates should increase because some people change partner to a one more suited for the new family formation criteria. Female LFP in general, and more specifically the level of education, should be positively related with divorce rates in the first half of the 20th century, but as technology advances in the latter half, the relation should change to a negative association.

Women working will lead to an income effect, where couples are better off having two incomes instead of one. For Becker and proponents of the independence hypothesis, the theoretical approach places more weight on the independence effect as a driver for marriage instability and the deterioration of gains to marriage (Ruggles, 1997), but the income effect could work in the opposite direction (Oppenheimer, 1997b).

Critique of Becker's economic model of marriage and divorce is often aimed at specialization on comparative advantages in production being outdated in modern society. However, opposition to the idea that female economic independence has been and is an important determinant of divorce is limited. Oppenheimer (1988; 1994; 1997) advocates that female LFP and the increased earnings of women should increase marital stability rather than decrease it. While her theories on divorce and marriage are not fully applicable in a long perspective, Oppenheimer opposes the idea that changing economic opportunities for women is the main cause for marriage instability. The main arguments from Oppenheimer are that the gains to marriage in the model of specialization are wrongly specified and that the income effect on marriage from female LFP is larger than what economic models predict. Marriages and the gains to marriage should benefit from the extra income provided by the wife and not

Further, Oppenheimer argues that the “male breadwinner” family is not a historically accurate description of what households have looked like and that while divorce rates have been increasing in the 20th century, widows and widowers have declined. Oppenheimer (1997b) argues that an increase in marriage dissolutions are wrongfully seen as a being caused by a decreasing attractiveness of being married, while divorce might only be connected to the unhappiness of a specific marriage.

3.3 Other theories

Proponents of the Second Demographic transition (van de Kaa 2001; Lesthaeghe, 2010) connect the changes in family behavior with ideational change. Their argument is based on Maslow’s hierarchy of needs and the (first) Demographic transition. As mortality and fertility have decreased, and the economic wealth of individuals increases, individuals will value self-realization and individualistic goals higher. Women, specifically, do no longer see marriage and having a child as the definitive goal in life. The drivers of family change towards less marriage and more divorce are the growth in personal wealth, women’s economic independence, and the fertility decline. Similar ideas were proposed earlier (Thornton, 1989; Riley 1991), where the change towards industrialization was associated with individualism. It is argued that in the past, decisions regarding married life were made in relation to the norms and traditions and not in calculated cost-benefit analysis such as proposed by Becker (1981). The industrialization led to urbanization and more “modern” values and norms, and a change in attitude towards individual goals, rather than family being the importance. While Becker’s model does not provide any clear predictions for how wealth and standard of living are related to marriage and divorce, the Second Demographic transition views the increasing affluence as a determinant of marriage instability.

Among the theories which try to explain the changes in demographic variables, Richard Easterlin’s (1980) theory on the effects of belonging to a relatively small and large cohort is one of the most often recurring. In its simplest form, belonging to a large cohort will lead to pressure and stress that affect an individual’s outcomes in life, such as divorce, income, marriage, fertility, and other variables. The relation between the size of the cohort and demographic and economic conditions will, according to the relative cohort size hypothesis, create a cyclic pattern where a large cohort is followed by a small, which in turn produces a large one, as a smaller cohort will experience the opposite conditions to a large one. The relation is also affected by expectations and realization. Individuals belonging to a larger cohort will grow up and witness society and the economy during the time of the smaller cohort. The childhood experience will influence what to expect in finding a mate for marriage or a job, but since the individual belongs to a larger cohort, life will be harder, and the expectations are not realized. Easterlin attributes many demographic changes to the cycle of the relative cohort size and among them divorce. Belonging to a relatively larger cohort will increase the probability of divorce.

3.4 Hypothesis

Based on the historical background and theory presented above, this study formulates the following main hypothesis: There was a significant positive relationship between female LFP and divorce rates in Sweden between 1910 and 2000. A further aim is to determine if there a significant positive relationship between per capita GDP and divorce rates in Sweden 1910-2000 and between the industrialization and divorce rates.

The positive associations are made based on Becker's model of specialization and the independence hypothesis, the Second Demographic transitions prediction of wealth and individualistic values. While Easterlin's relative cohort hypothesis is included in the model, the focus of the analysis is on the economic and social factors.

4 Literature Review

The interest in divorce and its relationship with economic and societal change was high during the 1980's, when projected trends for marriage instability indicated that half of everyone that married would divorce (South & Spitze, 1986), and while there are indications that divorce rates have fallen or levelled-off in recent years (Goldstein, 1999; Stevenson & Wolfers, 2007), research and studies have not yet reached any affirmative conclusions on the aggregate relationships with divorce rates. Since this study is concerned with the aggregate economic factors and changes in society, limited attention is given to the micro-level studies, and changes in culture and norms that most likely have affected the rise in marital instability.

One of the most often recurring explanations for the increase in marriage instability is that of female LFP (Cherlin, 2009). On the individual level, working women have been shown to both think about divorce more frequently than non-working women and more likely to obtain a divorce (South, 1985), and relatively higher earnings of women is linked to increasing the probability of divorce (Becker, Landes & Michael, 1977; Johnson & Skinner, 1986). South & Spitze (1985) evaluates determinants of divorce and their relationship with duration of a marriage and finds that a wife's employment is related to increased probability of divorce regardless of the length of a marriage, however South & Lloyd (1995) find that the risk of divorce is highest in local areas where LFP among unmarried women and mobility is high, but married women's work status is not related to increased probability of divorce.

Land & Felson (1977) evaluated demographic variables and their association with societal changes in the early post-war period in the USA and finds a positive relationship between divorce rates and female LFP. Using aggregate data, South (1985) analysis the time-series trends of divorce and economic conditions in the post-war United States and finds that the increase in divorce rate has been positively linked to the rise in female LFP and changes in the age structure. His results also indicate that divorce rates are negatively related to unemployment, however, the relationship is weak. Bremmer & Kesselring (2004) use time-series data to estimate a causal relationship between female LFP rates and divorce rates in the US with data between 1960 and 2000 with results indicating a positive relationship.

In a study on labor-market conditions and marriage instability, Ruggles (1997) argues that the rise in female labor-market opportunity has led to the demise of the gains to marriage and sequentially increased divorce. His data encompasses a long period between 1880 and 1990 for the USA. The results both favor and disfavor the independence hypothesis. While women's increased participation in the labor market is positively related to higher divorce rates, it has no effect on marriage formation, which should exist even if at a relatively small level. However, Ruggles states in his conclusion that the increased economic opportunity for women has caused the increase in divorce rates to some degree, but that there seem to be unmeasurable cultural factors that are important to fully understand the relationship. A problem with Ruggles analysis is that the states had differences in divorce laws and different

years of reforms. A positive impact of divorce laws on divorce rates have been found in the US by Friedberg (1998), but Wolfers (2006) finds that rises in divorces rates caused by reforms are often temporary and small.

Using national data for Sweden and studying the period 1915-2010, Stanfors, Sandström & Andersson (2014) find that the improved economic opportunities for women have had a positive effect on divorce rates. However, the authors use a time-series model to distinguish between long-, medium- and short-run effects of the business cycle and while the positive association in the long-run is positive, it is limited, and the medium-run effects seem to be negatively related to divorce. These results are argued by the authors to favor Oppenheimer's views that a dual-income household strengthens a marriage, instead of decreasing the gains to marriage.

Research on divorce and economic conditions have in the last decades been an effort to discern how marriage instability is affected by the booms and busts of the business cycle. Despite a lack of empirical evidence, until recently the view that divorce rates decrease in times of economic distress has been generally accepted (Hellerstein & Morill, 2011). South (1985), Fischer & Liefbroer (2006) and Stanfors, Sandström & Andersson. (2014) finds evidence for a counter-cyclical divorce trend, while Hellerstein & Morill (2011), Amato & Beattie (2011) and Schaller (2013) presents results for a pro-cyclical relationship. The differences might be attributed to the choice of models and estimation techniques, but also the period under study and the country of study. Not only is there an issue of the empirical observation, but the relationship is also ambiguous from a theoretical perspective. In the model from Becker (1981), the individuals in a marriage compare their utility of being in a marriage with the "outside-of-marriage" alternative and the cost associated with a divorce. If the alternative to marriage becomes more attractive in an economic upturn, the probabilities for divorce should increase, while marriage could work as a security in a recession. There is also the cost of divorce, which means that in an economic downturn, couples might not afford a divorce. However, negative income shocks and job loss increase the uncertainty in marriage and would on an individual level lead to more marriage instability (Hellerstein & Morill, 2011).

As mentioned above, South (1985) studies unemployment rates in the USA, with the results indicating a negative correlation between divorce rates and unemployment rates. Using consumer confidence as a proxy for macroeconomic conditions, Fischer & Liefbroer (2006) study union dissolution rates in the Netherlands 1972-1996. The authors find that consumer confidence is negatively related to the union dissolution rates of women. For Sweden, there is evidence of divorce rates being counter-cyclical for the period 1915-2010 (Stanfors, Sandström & Andersson, 2014).

In research on other determinants of divorce, Glass (2014) studies differences in divorce rates between states in the United States that are prominently conservative or liberal, based on religion and political affiliation. Using both individual data and aggregate, the author finds a positive relationship between conservative values and divorce, and a higher probability of divorce in protestant religious states. The results show that divorce is not a simple analysis since conservative values would be expected to be related with less divorce; however, the

author argues that the results are driven by lower age ages at marriage, which are related with religious values, and lower income levels in conservative states on an aggregate level.

When studying the marital behavior on a regional level in Sweden 1870-1900, Lundh (2013) finds a negative relationship between age at marriage and secular values and norms, measured as the number of illegitimate births. However, illegitimate births might not be a good measure of more modern values because of shotgun-weddings. Younger people might be more care-free and have a child, which forces them to marry young because their families insist on the child being raised in a family. Using illegitimate births as a proxy for values and norms in the long-run will not work because of the normalization and increased tendency for people to cohabit and have children within cohabitation.

5 Data and Method

5.1 Data

The constructed data set is in the form of panel data. With panel data, observations on the same individuals or regions are repeated over a time-period. Hence, the data contains information on the 21 counties for every tenth year from 1910 until 2000 and is a cross-sectional times-series of disaggregated data on a regional level. Data on demographic characteristics are collected from Statistics Sweden (Statistiska Centralbyrån) and their published historical tables on changes in the population both on the national level and regional. Since 1870, the bureau has published a yearly report on vital events for regions and national level, but data on specific subgroups in geographical locations were only published every tenth year in the census Folkräkningen. Between 1965 and 1990 the same data was published every fifth year. The later periods of this data have been made electronically available for download from Statistics Sweden's archive.

Reports and census published by Statistics Sweden have undergone changes in name. What follows is a brief account of the changes and from where the specific data was collected. The number of divorces per county has been published every year in the publications *Befolkningen - A 1910*, which was part of the reports *BISOS A 1851-1910*. From 1911 similar information was published in *Sveriges Officiella Statistik (SOS)*, where the part *Befolkningsrörelsen* (later changed to *Befolkningsförändringar* in 1970) included yearly information on vital statistics on both national and regional level.

While data on divorces are available for each year over the period, information on the population at risk (those who are married) on a county level is only available through the census performed every tenth year, which is why the constructed dataset spans 90 years, but only contains 10 time-observations. Measuring only every tenth year decreases the observed variation in the variables, but since the censuses are only published every tenth year it is an issue that cannot be addressed. The number of married women per county, the number of women in working age (16-64) and the number of working women ('förvärvsarbetande') is collected through *Folkräkningen* until 1960, after which the same statistics were published every fifth year in *Folk- och Bostadsräkningen*. Information from censuses is generally reliable and is accurate for use in research on demographic patterns and changes. The main shortcoming is the limited information for some variables on a regional level, which affects the construction of some measures, but the census is still the most comprehensive source available for this study.

The counties in Sweden have gone through some minor changes during the period under study and one major change. The smaller changes have mainly been redrawing of county borders, with the consequences being that a small village changes which county it belongs to.

Over the period, this will most likely not make a difference for the results which means there is no need to correct for it. However, there has been one major change to the composition of Swedish counties. Before 1998, there were 24 counties in Sweden, but in the late 90's some counties merged together into bigger regions. The counties Göteborgs and Bohus län, Skaraborgs län, Älvsborgs län were merged in 1998 into the county of Västra Götalands län. The counties Malmöhus län and Kristianstads län merged to form the county (region) of Skåne. To correct for this change in the structure, all counties have been re-structured into the form they have in the year 2000. Even though all but one of the measured periods is affected by this change the correction was needed because some of the electronically available data from Statistics Sweden has already been adjusted to the regional changes for earlier periods. The constructed main dataset consists of 210 observations on the 21 regions according to the division of Swedish regions in 1998 and is a strongly balanced panel data set.

5.1.1 Dependent variable

The measure of divorce rates is defined as the number of divorces divided by the number of 1000 married women and is called the refined divorce rate. This is used to analyze the regional development of marital instability. Other measures that are sometimes used in studies are the crude divorce rate and the divorces per marriages ratio. The crude divorce rate is not a well-suited measure in empirical studies since it does not take the population at risk into account, which means that it does not react to changes in proportion married. The divorces to marriage ratio only compare those who divorce in a year with those who marry in a given year. While this can infer a trend in marriage and divorce behavior, it compares two groups who are at different stages in their marriage-cycle and is not a good measure for this study. Stanfors, Sandström & Andersson (2014) argue that one issue with the refined divorce rate is that it is insensitive to the age structure of the married population. While this could harm the results, including a measure of the age structure (cohort size, see below) can correct for this insensitivity.

All measures on the number of divorces have been collected from the tables in Statistics Sweden's annual publications, except for data on the year 2000 which is available through download from Statistics Sweden. Before 1970 the information was presented as Äktenskapsskillnader which means the marriages that ended with divorce, but after 1970 the data was published divided between men and women. Since this study is mainly concerned with the female perspective of divorce and the dependent variable in the model is divorces divided by 1,000 married women, all numbers from 1970 and onwards only take the number of divorced women in a given year. The number of married women in each county is collected through Folkräkningen 1910-1960, Folk- och Bostadsräkningen 1965-1990 and from Statistics Sweden's electronic database.

5.1.2 Explanatory variables

Previous research on the increase in divorce rates has often connected it with the change in women's labor market participation. The relationship is argued to be positive since female

LFP decreases the level of women's specialization in household production, which deteriorates the gains to marriage in Becker's framework. The association has also been argued to work through an increase in women's economic independence from their husbands, thus offering divorce as a means of leaving an unhappy marriage for married women, or by working to insure against the possibility of divorce (South, 1985; South & Spitze, 1986). The idea that women join the labor force as a protection against being left without economic means in the event of a divorce gives cause to be careful with any causal inference, since it can be subject to reverse causality. However, this study and the constructed data set are not comprehensive enough to discern causality and is interested in the relationship over the extended period. For the years 1910 to 1950, the variable for female LFP per county was compiled by Clivemo (2017), and the later period was constructed by the data from the census and Statistics Sweden's Arbetskraftsundersökning (AKU). The rates are defined as the number of gainfully employed women on 100 women, age 15 and older.

Economic wealth and the standard of living is often related to divorce in theory, however, the relation is ambiguous both theoretically and empirically. A negative relation between per capita GDP and the divorce rate is argued from the perspective that for men, lower wealth and less favorable economic conditions is connected to decreased gains to marriage, as their role of earner loses its importance. However, if marriage is an insurance against negative shocks or recessions, the divorce rates should decrease, implying a positive relationship. A further argument for a positive association is that divorce is expensive, suggesting that in periods of lower economic growth, marriages are more stable because they cannot afford to divide the household. Other non-economic theories predict a positive relationship, Goode (1973) with the social growth hypothesis and the Second Demographic transition (Lesthaeghe, 2010) with economic affluence affecting the priorities of values. Based on the study of Sweden by Stanfors, Sandström & Andersson (2014) where a negative relationship is found between economic growth and divorce rates, the variable can be expected to have a negative association with divorce in this model; however, per capita GDP does not measure economic growth, but a general standard of living. This means it is not the perfect measure of economic conditions and the business cycle but is applicable – both for the economic and non-economic theories. The measures on regional gross domestic production and population are collected from the Swedish Regional Accounts 1860-2010 constructed by Enflo, Henning, & Schön (2014). GDP is given in SEK with constant prices for the levels in 1910/1912.

Industrialization is viewed as an important factor in demographic changes. Dribe (2008) connects the expanding industry sector in Sweden to a lower demand for children in the late 19th century and early 20th century. In its relation to divorce, one could argue that the growing number of jobs in factories led to higher female employment rates, but there were regulations in place to keep women away from industry work. There is also the view that the change from farm work to factory work and regulations against child-labor seems to have been a deterrent to traditional household formations. Work in a factory was harder to combine with small children or household work, than agricultural farm work (Dribe, 2008). Hence, the industrialization not only came with increased opportunities for women to work but rather decreased the importance and the value of families. The level of industrialization is measured as the ratio between employment in industry and employment in agriculture. This means that an increase in the ratio could mean either a growing industrial sector or a declining agricultural sector, but since the variable is considered to measure the level of

industrialization, both effects on the ratio are interpreted in a similar way, and the ratio is expected to be positively related with the divorce rate.

In order to capture the effects proposed by Easterlin and the relative cohort size hypothesis, a variable is created which is the ratio of men between the ages 35-66 divided by men in the ages 20-34. This variable is meant to capture the stress attributed to belonging to a larger cohort than the previous one. As it is constructed, the variable hinges on the assumptions that young and old worker are not perfect substitutes. Its relationship with divorce rates is expected to be negative, since as the ratio decreases the relative situation for the young men will deteriorate. The same measure was used in Stanfors, Sandström & Andersson (2014). Another means of creating the variable is to use the ratio between men in the ages 25-39 divided by men 15-64. This would have the same implication but could account for the fact that most divorces happen in the age between 25-34.

A variable commonly used in regional analysis is the migration patterns (Dribe, 2008). It can be seen as a measure of the attractiveness and the economic or social development of a specific county. If people are moving away, the economic conditions might be worse of within the region than elsewhere. The variable used in the model is calculated as the total net migration by 1000 population, which means that a positive value is an inflow to the county and a negative value is an outflow from the county. Its association with divorce can be positive or negative depending on what factors that influence the immigrants or the emigrants. If a region is different in its divorce laws, one could argue that a negative net migration would be associated with lower divorce rates, since people might be moving away to get divorced. However, Swedish divorce laws were implemented on a national level. Hence, any association between net migration and the divorce rate should exist through channels like a better job or life opportunity, which would indicate a positive relationship between the variable and divorce rates if the outside opportunity to marriage and household production is higher in these regions.

Age at first marriage has been argued to be negatively related to divorce. Rotz (2015) states that if people marry later in life, they make more well-informed decisions about their partner and a subsequent marriage will be longer lasting than a marriage entered at a young age. Women marrying at a young age is also a consequence of Becker's theory on marriage since women are able to improve their specialization skills while still living at home and are able to marry at a younger age than men. Marrying at a later age would mean that women are changing their specialization from household to market production, which would decrease the gains to marriage (Becker, 1981). In this view, the age of first marriage for women can be seen as a proxy for a changing of norms in regard to marriage. Hence, the expected relation in the specialization theory between divorce rates and age at first marriage should be positive. The variable in the model is constructed by using the number of people who married for the first time, sorted in five-year age-groups in Befolkningsrörelsen, and multiplying it with the average age in each group. The sum is divided by the total number of people who married for the first time, which provides the measure of the mean age at first marriage.

5.2 Models and Specification

With panel data, observations on the same regions are repeated over a time-period. Hence, the data contains information on the 21 counties for every tenth year from 1910 until 2000.

Models based on panel data are different from other longitudinal time series models because they not only use variation in the variable(s) but also account for variation between units, similar to a cross-sectional analysis (Dougherty, 2011). One of the benefits with a panel structure is that can solve problems of unobserved heterogeneity, which is an often-recurring problem in econometric models. Datasets, where each unit has an observation for each time period, are considered balanced in structure. (Dougherty, 2011).

Two models for panel data are estimated – pooled OLS and fixed-effects. The pooled OLS regression measures differences in levels between counties and fixed-effects measures influence of changes over time in the independent variables on refined divorce rate, while controlling for unobserved heterogeneity at the county-level. Both models include categorical time variables to control for any nation-wide changes over the period (Dribe, 2008).

A pooled OLS is a linear regression does not account for any specific regional-characteristics. It assumes that the refined divorce rates are determined by female LFP, economic growth, the net migration, level of industrialization and the relative cohort size, and that anything else which is not included in the model does is uncorrelated with the variables in the regression, while controlling for changes between the census that affect all regions.

$$y_{it} = \alpha + FLFP_{it} + \frac{GDP}{cap_{it}} + Industry_{it} + Rel.Cohort_{it} + Net Mig_{it} + \lambda_t + u_{it}$$

, where y_{it} is the refined divorce rate in county i in year t , λ_t is the year-dummy and u_{it} is the error term. Since the observations are made for the same regions over time, it is appropriate to cluster the standard errors on a county-level, which could improve the standard errors, but the number of regions is too few for clustering. The data only contains 21 regions and Angrist & Pischke (2008) argue that there needs to be at least 40 regions it to work properly.

Working with a panel structured data set, the same units can be observed over time. Including year-dummies controls for changes that affect each county equally. Similarly, county-specific characteristics, which are unobserved but do not change are controlled for with the method of fixed-effects (Angrist & Pischke, 2008). Examples might be a specific culture in a region, or that Jönköping län is always the same distance from the capital Stockholm. Adding a measure of geographical distance, which could control for gravity-model behavior, would be excluded from the model as it does not change over time. Culture is an unobserved variable which might be change over time, but any variation in divorce rate because of a county's specific culture that does not change over time will be controlled for in the model.

$$y_{it} = \alpha + FLFP_{it} + \frac{GDP}{cap_{it}} + Industry_{it} + Rel.Cohort_{it} + Net Mig_{it} + \lambda_t + v_i + e_{it}$$

, where the variables are the same as in OLS, but the error term is divided into $v_i + e_{it}$. The difference between pooled OLS and fixed effects lies in how the specification deals with the

error term. fixed effect model offers a way to deal with unobserved heterogeneity and omitted variable bias (OVB), where an OLS will suffer.

$$y_{it} = \alpha + \beta x_{it} + \dots + \lambda_t + u_{it}$$

In this simple visualization of the OLS (with year-dummies) formula y_{it} is the divorce rate, x_{it} female LFP, the other variables are included as $+$... $+$, λ_t is the year-dummy, and u_{it} is the error term. One of the main assumptions is the zero conditional mean assumption, $E(u_i|X)=0$. A violation of this might mean the model suffers from OVB, where an important variable has been left out of the regression (Angrist & Pischke, 2008).

In a fixed-effects model, the problem of OVB can be addressed in some cases. The error term, u_{it} , is assumed to consist of two different parts:

$$u_{it} = v_i + e_{it},$$

where v_i is the individual-specific error term and e_{it} is the error term for the specific individual i in a specific time t . The methods of fixed-effects capture the variation in the dependent variable which is related to unobserved variables that are unique for each individual or region (Dougherty, 2011)

$$y_{it} = \alpha + \beta x_{it} + \dots + \lambda_t + v_i + e_{it}$$

When modelling for panel data, there is also the option of using the method of random effects, as opposed to fixed-effects. Random effects assume that the unobservable individual characteristics are unrelated to the observed variables. The choice of method is often determined by expectations. With this data and analysis, there is a reason to expect that divorce is related to factors that are unobserved and correlated with divorce, such as norms and values in regions. A Hausman test is often performed as a formal test to evaluate the efficiency of the estimates. The null hypothesis is that both the random and the fixed-effects estimates are efficient and consistent and if the null hypothesis is rejected only the fixed-effects estimate are. A Hausman test was performed in Stata and produced a p-value < 0.01 . The null hypothesis is rejected, and the models are specified with fixed-effects.

5.3 Limitations

The model is simple and not perfect since an aggregate analysis should include and control for several factors that have been hypothesized to have a relation with divorce. However, there is a problem of data availability, the number of counties in Sweden and multicollinearity between the variables that affect the analysis. However, the model focuses on economic factors and the main theoretical determinants of divorce and any results will give an indication of the determining factors of divorce rates in Sweden. It could be argued that one limitation of the model is that there are cultural factors such as norms and values affecting divorce, which are hard to measure. The only way of controlling for the cultural conditions is to use the fixed-effects estimator and argue that most of the unobserved effect that is captured

by the FE estimates are related to culture and norms. There is, however, no way of being sure about this.

In an analysis of marital fertility in Sweden, pooled OLS is used by Dribe (2008) to look at the difference in levels between the counties, while a fixed-effects model is used to control for unobserved heterogeneity but stresses the issue of endogeneity in such models. It occurs when the explanatory variables partly explain each other. A growing industry sector is most likely related to more opportunities of employment for women, which would in turn increase female LFP. Such issues are common in longer time-series models. One way of dealing with endogeneity is Instrumental Variable regression (IV-regression), where a variable which is highly related with one and only one explanatory variable. The IV can then be used to estimate the effect on the outcome variable. An IV-regression increases the probability of obtaining actual causal estimates of a relation. However, good instrumental variables are hard to find, especially when concerned with a long-run model with different counties. As is, the models interpretation does not suffer completely from the endogeneity problem, but any estimates should not be interpreted causally (Angrist & Pischke, 2008). Further, in their theoretical approach, Becker, Landes & Michael (1977) predicts that divorce begets divorce, and while female LFP has a theoretical relation with divorce, the relationship suffers from reversed causality. If divorce become more common and easier to achieve, women who have no financial security should invest in human capital related to the market. This leads to difficulties to prove any causal relationship in empirical work, and the model constructed in this study cannot be used for anything more than variance-controlled correlations.

The variable for mean age at first marriage does not contain any observations for the year 2000, as Statistics Sweden did not include information on the age-intervals for those who married for the first time. To correct for this, the regressions including age at first marriage do not include the year 2000. The refined divorce rate in the year 2000 includes partnerships and same-sex marriages. Previous years did not include this in their divorce measure, which means that any increase between 1990 and 2000 can include the divorces between men and men or women and women, however, should be captured by the year-dummy.

Unmarried cohabitation is not controlled for. Its popularity as a living arrangement increased in the 1970's, so the years after will contain marriage-like couples who share households and separate, similar to divorce. If people who previously would have married only cohabitate, this could mean that the latter period is not comparable to the earlier. Since cohabitation affects both marriage rates and divorce rates, and separations for cohabitating couples is more common (Trost, 1993; Weeks, 2011), one can expect the refined divorce rate to be an underestimation of the actual number of household dissolutions. This implies that the results might suffer from a downward bias, which means that it can be harder to find any relationship between the divorce rates and explanatory variables. It can also be argued that cohabitation is not as formal as marriage and would not have a similar behavior in relation to the theoretical determinants of divorce. Trost (1993) states that approximately half of the cohabitating couples in Sweden eventually marry and Weeks (2011) argue that cohabitation before marriage seems to increase the probability of divorce. The relationship between cohabitation and divorce is left unexplored in these models but should be included in the analysis for shorter periods after the 1970's.

6 Empirical Results

6.1 Descriptive Statistics

The descriptive statistics for all variables included in the regressions are presented in Table 1. The reported statistics are mean, standard deviation, minimum, maximum and the number of observations. The panel structure of both time and cross-sectional observations allows for overall-, between- and within variation of each variable. The overall shows the total variation of the variable, without controlling for time or county. For the refined divorce rate, the minimum observation is Norrbotten county in 1910 and the maximum is that of Stockholm county in the year 2000.

Table 2 – Descriptive Statistics for Variables in Regression

Variable		Mean	Std. Dev.	Min	Max	Observations
Refined Divorce rate	overall	5.15	4.35	0.08	17.98	N = 210
	between		1.28	3.60	9.81	n = 21
	within		4.17	-2.05	13.92	T = 10
Female LFP	overall	44.21	20.40	16.53	86.36	N = 210
	between		3.14	40.84	55.02	n = 21
	within		20.16	17.04	86.26	T = 10
Per capita GDP	overall	2020.37	1317.03	471.79	5694.10	N = 210
	between		237.75	1596.57	2650.31	n = 21
	within		1296.34	156.31	5172.20	T = 10
Industry / Agriculture ratio	overall	3.84	4.96	0.19	40.01	N = 210
	between		2.74	0.92	13.97	n = 21
	within		4.17	-7.83	36.06	T = 10
Net migration by 1000 population	overall	0.12	5.74	-17.84	21.43	N = 210
	between		3.14	-3.74	8.62	n = 21
	within		4.84	-14.50	16.85	T = 10
Relative cohort size	overall	1.63	0.38	1.00	3.46	N = 210
	between		0.11	1.48	1.93	n = 21
	within		0.37	0.95	3.16	T = 10
Mean age at first marriage ¹	overall	26.76	2.48	23.30	35.55	N = 210
	between		0.39	25.97	27.69	n = 21
	within		2.45	23.41	35.56	T = 10

Note: GDP per capita in 1910/1912 value.

¹ For the year 1970 and 2000, no data on the age at first marriage is provided. Measures for 1970 are interpolated, and for 2000, the mean age at marriage is used, however not in the regression.

Source: Statistics Sweden (SCB) Clivemo (2017) Swedish Historical Regional Accounts

For female LFP, the highest measured observation is Gotlands county in 1990 with an 86 percent participation rate. Looking at the standard deviation in Table 2, the variation seems to have been highest for all variables within regions over time, which is not an unrealistic result, since the period under study is a period of substantial demographic and economic changes. The descriptive results do however provide an indication that there is variation in the variables both between and within the counties.

Table 3 – Refined divorce rates across 1910-2000

County	id	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
Stockholms län ¹	1	2.61	4.01	5.36	6.60	10.64	8.82	9.67	17.08	15.33	17.98
Uppsala län	3	0.36	0.77	1.34	1.57	4.67	4.74	6.85	12.69	11.24	14.14
Södermanlands län	4	0.34	<i>0.50</i>	1.85	1.93	3.45	4.33	7.43	10.91	10.97	14.15
Östergötlands län	5	0.42	0.83	1.10	2.06	3.69	3.96	5.79	10.41	10.45	11.12
Jönköpings län	6	0.36	0.71	1.13	1.15	2.29	2.62	4.38	<i>6.63</i>	<i>7.48</i>	<i>9.25</i>
Kronobergs län	7	0.19	0.92	<i>0.66</i>	<i>0.57</i>	<i>1.93</i>	2.20	4.61	7.40	8.86	9.94
Kalmar län	8	0.39	0.96	1.14	1.29	2.42	2.98	4.42	7.98	8.58	11.18
Gotlands län	9	0.37	1.41	1.73	1.57	5.17	3.31	5.35	9.68	10.65	13.90
Blekinge län	10	0.33	1.81	2.11	1.84	2.69	3.94	5.31	7.45	9.77	10.68
Skåne län ²	12	0.73	1.49	1.74	2.36	4.60	4.67	7.31	11.62	12.42	13.64
Hallands län	13	0.68	0.93	1.01	1.14	2.60	2.23	4.83	9.18	9.79	12.02
Västra Götalands län ³	14	0.47	1.06	1.86	2.95	4.92	5.15	6.87	11.31	10.77	13.49
Värmlands län	17	0.17	0.67	1.39	1.58	4.14	4.24	6.24	9.07	10.59	12.66
Örebro län	18	0.44	1.02	1.12	1.85	4.10	4.60	5.81	9.86	10.81	14.15
Västmanlands län	19	0.33	0.72	1.69	1.64	4.32	4.95	7.56	11.02	11.14	13.53
Dalarnas län	20	0.46	1.98	1.22	1.66	3.77	3.12	6.17	9.41	10.05	12.67
Gävleborgs län	21	0.53	0.85	1.39	1.82	3.54	4.36	6.02	8.97	10.49	13.68
Västernorrlands län	22	0.49	0.73	1.48	1.72	3.44	4.76	5.00	8.54	9.72	11.20
Jämtlands län	23	0.76	0.82	1.35	1.60	3.19	4.36	4.05	7.93	8.41	12.65
Västerbottens län	24	0.37	0.53	0.93	1.44	2.07	2.54	3.36	7.65	8.20	11.43
Norrbottens län	25	<i>0.08</i>	1.16	1.72	1.75	2.82	3.54	5.01	9.32	9.68	12.16

¹ Stockholms county contains numbers from both Stockholm city and the old definition of Stockholm county.

² Skåne is a combination of Malmöhus län and Kristianstads län

³ Västra Götaland is a combination of Skaraborgs län, Göteborg och Bohus län and Älvsborgs län

Source: Source: BiSOS *Befolkningen A 1910* (1855-1910). Statistics Sweden. SOS *Befolkningsrörelsen*, 1911-1966. Statistics Sweden. SOS. *Befolkningsförändringar del 1-3, 1967-1990*. Statistics Sweden. SOS. *Befolkningsstatistik del 1-4, 1991-2003*. Statistics Sweden.

For the regional development of divorce rates in Sweden, except for the big city- counties of Stockholm, Västra Götaland and Skåne, there does not seem to be a clear distinction between high rates and low rates regions. Table 2 presents the refined divorce rate for each county in each year in the data. The second highest rate is highlighted in bold since Stockholms county has the highest divorce rate throughout the time observations. The lowest divorce rates are highlighted in italic. Low rates do seem to be the trend for the counties Kronoberg and Jönköping, which both experience multiple observations as the lowest rate in the county. The almost nation-wide jump in rates between 1940 and 1950 could be explained by how Sweden was affected by the Second World War. Stanfors, Sandström & Andersson (2014) find that the

years of the war and those following it, even though Sweden was not directly involved, was related to a higher number of divorces. Similarly, between 1970 and 1980, the new divorce law was implemented. In 1974, year of the reform, the refined divorce rate had its highest peak at 14.33 divorces per 1000 married women (Sandström, 2011).

Recalling Sundbärg's division of Sweden (see Background section) into three regions with different patterns in high and low marriage rates, the overall mean in refined divorce rate is for the Eastern region over all years is 5.86 and 4.69 in the Western region, indicating that Sundbärg's claim of different demographic characteristics is not inaccurate, even though it is 100 years old. Culture and norms are not measured or controlled for in the model regressions, but the results from the descriptive table below show that it could be of importance for differences in divorce rates. Hence, the fixed-effects to control for county-specific unobserved variables seems correct.

6.2 Regressions Results

Table 4 presents the output from the pooled OLS and the fixed-effects models. Column (1) and (4) only include female LFP and categorical year-dummies to control for nation-wide changes, column (2) and (5) include all variables except age at first marriage, which is included in (3) and (6) where the year 2000 has been removed from the data.

The first model (1) is a bivariate pooled OLS regression of female LFP on the refined divorce rate. The results indicate a strongly significant positive relationship between the variables, as was predicted. The magnitude of the coefficient is 0.206, and if the model was to have a causal interpretation it would mean that one percent higher female LFP rate is related to 0.206 more divorces per 1000 married women. This effect is quite large in economic terms when compared with the development of divorce rate depicted in Table 3, where divorce increased quite slowly (except for the years of the war and the law) since a 5 percent higher level of participation indicates one more divorce per 1000 married women. Although, according to the theory of Becker, where female independence and work is attributed the main role for the increase in divorce, the effect might be considered small. However, the model is not suited for any causal inference, given the gaps in years and possible misspecification of the model because of lacking data. Further, there is the problem of endogeneity in the model, given Becker, Landes & Michael (1977) theorizes that increasing divorce rates could lead to women joining the labor force in anticipating behavior. The importance of model (1) is that the association between divorce rate and female LFP is as predicted by theory and previous research and provides an indication that female participation is important for the level-differences between counties. Column (4) includes both year and county fixed-effects, where the magnitude of the coefficient is lower (0.0539) than in the OLS but still positive and significant. This indicates that changes in the female LFP rate are important in explaining changes in refined divorce rate within counties over time. The causal interpretation of the coefficient in (4) would be that as female LFP increases by one percent over time, the refined divorce will increase by 0.054. The observed relationship is consistent with previous research and the magnitude of the coefficients seems plausible in relation to previous studies. South's

(1985) results from an OLS model on US data reports a significant coefficient of approximately 0.3 for female LFP on the refined divorce rate when using similar controls. While the OLS estimate in (1) is lower and comparisons between models using different data is risky, the similarity provides an indication that the estimates in this model are not completely incorrect.

In column (2) and (5) of table 4, the variables for per capita GDP, industrialization, relative cohort size and net migration are included. The fixed-effects model (5), has a within-county R² of 0.971. This means the about 97 percent of the variation within the counties over time is accounted for, while between-county R² is 0.534. The coefficient for female LFP rate decreases to 0.143 in the OLS and increases to 0.065 in the fixed-effects but is still positive and significant in both models. The inclusion of the other variables is expected to change the coefficient since model (1) and (4) is bivariate. GDP per capita is negative in both specifications, but not significant. This means that there are no conclusions that can be drawn on its association with divorce rates in the model, and the predicted relationship is not found. It is also worth remembering that wealth and affluence has an ambiguous relationship with divorce rates in both theory and previous studies. This model could have trouble to discern between effects of wealth reducing marital stress or increasing the out-of-marriage options and individualistic focus. The variable for industrialization in (2) and (5) is significant at the 10 percent level and its positive relation is as hypothesized. Regions with a higher share of industrial employment compared to agriculture employment are associated with higher rates of divorce and changes toward more industry relative to agriculture is related to increasing divorce rate within counties over time. However, the relationship could be driven by the big city regions. The variable for relative cohort size is negatively related with the divorce rate as predicted by Easterlin's theory, but it is not significant, and any further conclusions are not being based in the results. Net migration is significant in both (2) and (5), however the direction of the relationship changes between the models. The variable was expected to be positive in its relation, where it was a measure of the attractiveness of a county, and this could explain the results for the level-differences in the OLS, but the significant negative coefficient in (5) indicates that positive changes in net migration are related to lower divorce rates over time.

Regressions (3) and (6) include a measure of mean age at first marriage (MAFM). Since no data is available for the calculation of MAFM for the year 2000, all observations for this year are removed. This lowers the number of observations from 210 to 189, but the number of regions is the same. Comparisons between the models should be made with caution, but the coefficients and their significance stay relatively similar. The exception is the industry ratio which is not significant in (3) and net migration which is not significant in both (5) and (6). The coefficient for MAFM is positive, but not significant. It is interesting that the coefficient for female labor force is positive and significant in all regressions presented in Table 4, and while the coefficient changes its magnitude, it does not change that much except in (1). If the sign of the coefficient changed or the numerical value changed too much, there would be an indication that the model was wrong. Any differences between the OLS and fixed effect can be argued to be a result of unobserved heterogeneity in the counties, variables which cannot be controlled for. As the only difference between regression (1) and (4) is the inclusion of county fixed-effects, there seems to be high variation in divorce rate which are explained by non-included county-specific characteristics.

Table 4 – OLS and fixed-effects regression estimates on refined divorce rate

	OLS (level)			Fixed-effects (change)		
	(1)	(2)	(3)	(4)	(5)	(6)
Female LFP	0.206*** (0.0316)	0.143*** (0.0258)	0.133*** (0.0232)	0.0539** (0.0218)	0.0654*** (0.0218)	0.0760*** (0.0233)
Per capita GDP	-	-0.000123 (0.000723)	0.00100 (0.000781)	-	-0.000408 (0.000262)	0.000410 (0.000390)
Industry Ratio	-	0.152* (0.0865)	0.109 (0.0715)	-	0.0504** (0.0205)	0.0464** (0.0199)
Relative Cohort size	-	-0.377 (0.391)	-0.525 (0.507)	-	-0.260 (0.338)	-0.309 (0.335)
Net migration per 1000 population	-	0.0279* (0.0143)	0.0120 (0.0143)	-	-0.0227* (0.0136)	-0.0216 (0.0132)
1920 (1910 omitted)	-1.414*** (0.400)	-0.877*** (0.323)	-0.863*** (0.286)	0.0875 (0.326)	0.0493 (0.320)	-0.160 (0.316)
1930	-1.244*** (0.432)	-0.588 (0.442)	-0.845** (0.360)	0.463 (0.346)	0.474 (0.351)	0.0620 (0.355)
1940	1.104*** (0.214)	1.107*** (0.311)	0.762** (0.341)	1.316*** (0.246)	1.614*** (0.288)	1.255*** (0.301)
1950	2.669*** (0.294)	2.820*** (0.583)	2.247*** (0.659)	3.145*** (0.254)	3.619*** (0.393)	3.082*** (0.437)
1960	1.784*** (0.371)	2.349*** (0.846)	1.735* (0.997)	3.088*** (0.308)	3.647*** (0.571)	3.053*** (0.666)
1970	-0.00867 (0.863)	1.143 (1.453)	-0.404 (1.347)	3.905*** (0.612)	4.504*** (0.826)	2.735*** (0.960)
1980	-0.321 (1.413)	1.785 (2.156)	-0.398 (1.876)	6.709*** (1.038)	7.126*** (1.241)	4.366*** (1.414)
1990	-1.507 (1.735)	1.153 (2.433)	-1.557 (2.155)	6.795*** (1.216)	7.387*** (1.461)	3.995** (1.682)
2000	2.486* (1.461)	4.893* (2.557)	-	9.605*** (1.050)	10.51*** (1.460)	-
MAFM			0.204 (0.142)			0.228 (0.142)
Constant	-4.300*** (0.759)	-2.284** (0.888)	-7.876** (3.673)	-0.744 (0.538)	-0.575 (0.724)	-7.192* (3.715)
R ² within	-	-	-	0.969	0.971	0.964
R ² between	-	-	-	0.566	0.534	0.667
R ² overall	0.923	0.940	0.933	0.904	0.909	0.909
Observations	210	210	189	210	210	189
County Fixed-effects	NO	NO	NO	YES	YES	YES
Number of id	-	-	-	21	21	21

Note: The dependent variable is the refined divorce rate measured as number of divorces per 1000 married women. Robust standard errors in parentheses (***) p<0.01, ** p<0.05, * p<0.1)

Source: see section 5.1 Data

There is also a story in the year-dummy coefficients which has not been discussed. As previously stated, these capture the nation-wide changes between the census years. In column (5), three of the coefficients are of more interest than the others, namely the years 1920, 1950 and 1980. Any changes in divorce rate related to the reform in 1915, mentioned in the background section, is captured by the dummy for 1920. If the divorce rate was at a significantly higher level the coefficient should be significant, but it is not, indicating that divorce rates did not change drastically because of the reform. It is interesting because the coefficient for 1980 can be analyzed similarly since the 1974 reform was enacted between 1970 and 1980. For 1980, the coefficient is significant and is related to 2.6 higher divorce rate (from 4.5 to 7.1) and strengthens the assumption in the background section that the reform was more in line with public opinion. The statistical significance is however not in relation to 1970, but to the reference category which is 1910. The year 1950 is interesting because it also indicates a “jump”-like rise in divorce, which may be related to the Second World war, as discussed in section 6.1 and found by Stanfors, Sandström & Andersson (2014).

Table C1 in Appendix C presents the coefficient for each county (estimates from Table 4). This is the county-fixed effects and Stockholm county is the reference. What is clear from the numerous coefficients is that they are all negative. This describes the difference between the individual county’s divorce rate and Stockholm county’s divorce rate when the year to year variation and all variables are controlled for. Since Stockholm had the highest rate in all periods, the result is not unexpected. However, the question is what the county-fixed effects capture. Technically, they control for the unobserved heterogeneity, but what does that mean? One thing that could differ between counties, but be stable over time is that of traditions, norms, and values. As no real measure of these factors is included in the model, part of the county estimates will most likely control for this. Table C2 in Appendix C presents the county coefficients from Table 5, where Stockholm is removed. The reference category is Uppsala, which is less of an outlier in the data. If only looking at the statistical significance of the coefficients, there seems to be a pattern. Recalling Sundbärg’s regional division of Sweden in demographic patterns (see Background 2.2), Uppsala county was part of the Eastern Swedish high marriage/low fertility pattern. Letters E, W and N show what part each county belonged to, and while not perfect, there seems to be a pattern similar to Sundbärg, where counties in Eastern Sweden are not significantly different from Uppsala, while those in Western and Northern Sweden are. The negative coefficients mean that these counties on general experienced lower divorce rates.

6.3 Robustness of the results

The robustness of the results is checked by removing observations that might have a very different behavior. Regressions are run, with results presented in Table 5 and Table 6, where Stockholm county has been removed and the big-city regions have been removed, respectively. The logic behind the robustness-checks is that the results might be driven by outliers, and the data has one county which is a major outlier in its behavior. Stockholm county is always the leader in divorce rates. It contains the capital of Sweden and is the most urbanized region throughout the period, which could mean that the industry ratio is a poor

measure of industrialization for the region. The regressions in Table 5 are the same as those in table 4 but all observations for Stockholm county has been removed. If the results change drastically, it could indicate that the model results in Table 4 are not completely robust, however, this should not discredit the full specifications in Table 4 since the robustness checks use fewer observations.

Table 5 – Regression results without Stockholm

	OLS (level)			Fixed effects (change)		
	(1)	(2)	(3)	(4)	(5)	(6)
Female LFP	0.0735*** (0.0211)	0.0600*** (0.0202)	0.0790*** (0.0186)	0.0538** (0.0218)	0.0558** (0.0222)	0.0614** (0.0236)
Per capita GDP	-	-0.000215 (0.000487)	0.000647 (0.000544)	-	-0.000461* (0.000253)	0.000500 (0.000365)
Industry Ratio	-	0.0568 (0.0413)	0.0361 (0.0272)	-	0.0187 (0.0222)	0.0199 (0.0210)
Relative Cohort size	-	-0.380 (0.321)	-0.463 (0.403)	-	-0.250 (0.320)	-0.339 (0.312)
Net migration per 1000 population	-	0.0262* (0.0134)	0.0101 (0.0135)	-	-0.0115 (0.0134)	-0.00924 (0.0129)
MAFM	-	-	-0.0221 (0.124)	-	-	0.271** (0.130)
Constant	-1.292*** (0.493)	-0.297 (0.717)	-0.596 (2.980)	-0.835 (0.531)	-0.370 (0.728)	-7.988** (3.403)
R ² within	-	-	-	0.974	0.975	0.969
R ² between	-	-	-	0.077	0.007	0.093
R ² overall	0.947	0.950	0.943	0.947	0.946	0.938
Observations	200	200	180	200	200	180
County Fixed Effects	NO	NO	NO	YES	YES	YES
Number of id	-	-	-	21	21	21

Note: The dependent variable is the refined divorce rate measured as number of divorces per 1000 married women. Robust standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Source: see section 5.1 Data

The output from the regressions is similar to the main results. Columns (1), (2) and (3) in Table 5 show that the female LFP is still positively related to the levels of divorce in the counties. The coefficients are smaller than those in the main model in Table 4 but are significant and stable. No other variables are significant, except Net migration in (2), which maintains its positive relationship with divorce rates. Columns (4), (5) and (6) contains the fixed-effects estimate. Again, female LFP is significant and positive. The coefficient is relatively stable through all specifications. In column (5), GDP per capita is significant at the ten percent level and negatively related to divorce – an association not present in the full regression (4). Removing the year 2000 and including the measure of MAFM does not change the significance or sign of female LFP, but GDP per capita is no longer significant. The estimate for MAFM is significant and positive. Removing Stockholm and the year 2000 could

indicate that age at first marriage has the expected relation proposed by the specialization theory. Stockholm might be the odd observation where a culture of marrying earlier or later is not related with traditional households, and removing Stockholm reveals a relationship that exists in counties with no big city.

Table 6 – Regression results without Stockholm, Västra Götaland and Skåne

	OLS (level)			Fixed effects (change)		
	(7)	(8)	(9)	(10)	(11)	(12)
Female LFP	0.0410 (0.0275)	0.0232 (0.0257)	0.0483** (0.0223)	0.0838*** (0.0236)	0.0908*** (0.0242)	0.0867*** (0.0234)
Per capita GDP		-0.000547 (0.000494)	0.000289 (0.000603)		0.000598** (0.000252)	0.000377 (0.000354)
Industry Ratio		0.0666 (0.0407)	0.0486* (0.0293)		0.0192 (0.0218)	0.0245 (0.0199)
Relative Cohort size		-0.323 (0.296)	-0.499 (0.406)		-0.140 (0.314)	-0.271 (0.296)
Net migration per 1000 population		0.0272** (0.0134)	0.0149 (0.0140)		-0.0145 (0.0135)	-0.00810 (0.0125)
MAFM			0.0327 (0.124)			0.347*** (0.125)
Constant	-0.542 (0.626)	0.671 (0.770)	-1.045 (2.963)	-1.516*** (0.561)	-1.250 (0.761)	-10.56*** (3.260)
R ² within	-	-	-	0.975	0.976	0.972
R ² between	-	-	-	0.024	0.029	0.026
R ² overall	0.949	0.952	0.944	0.948	0.947	0.937
Observations	180	180	162	180	180	162
County Fixed Effects	NO	NO	NO	YES	YES	YES
Number of id	(21)	(21)	(21)	21	21	21

Note: The dependent variable is the refined divorce rate measured as number of divorces per 1000 married women. Robust standard errors in parentheses (***) $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Source: see section 5.1 Data

Results in Table 6 provides a further inclination that the big-city counties are different since when removing all three big city-counties (Stockholm, Västra Götaland, Skåne), the OLS estimates are not significant in (7) and (8). The level differences in the explanatory variables do not seem to explain higher or lower levels of divorce rates. Estimates from fixed-effects are still significant and positive. It seems that increases in the female LFP rate is related to increases in divorce rates within counties over time, and quite robustly. In the robustness regressions, the only variable that shows consistency in its relationship with the divorce rate is female LFP, with point estimates varying between 0.05 and 0.09 in the fixed effects models. However, removing the observations for Stockholm and the big-city counties reduces the between-R2 below 0.1. Variations between the county seem to be mainly driven by these observations.

The last test for the model is dividing it into two samples based on time-period. While the main model, based on theory, assumed that the relationship between the dependent variable and the explanatory variables was the same over the 20th century, there is also an argument that it has changed. Isen and Stevenson (2010) argue specifically that marriage-matching has changed from production- to consumption complementarities, while Oppenheimer claims a relationship between female LFP and divorce should not exist, at least not during the divorce boom in the post-war period. To crudely apply the theory to the data, regressions are run on the period 1910-1960 and 1960-2000. This decreases the number of observation and, with few to being with, might not be appropriate. A different way of testing a change in the relationship is to use interactions between female LFP and the year-dummies, but with 10-year gaps between census years and few degrees of freedom in the model, such specification is not handled well by the data.

OLS and fixed-effects estimates are provided in Appendix D Table D1. Column (1) and (3) for the period 1910-1960. The first half of the 20th century indicate a significant positive relationship for female LFP, per capita GDP and the industry ratio with levels of divorce rates in counties. GDP per capita was not significantly related with divorce rates in the full model, but it seems to be important for explaining level-differences in divorce rates in the first half of the 20th century, however not changes over time. In column (3), female LFP rates and the industry ratio are still significant. It seems that for 1910-1960, these variables are important both in explaining the level of divorce rates in counties and how changes in the variables are related to divorce rates over time. In the latter period of the century, higher female LFP rates are significantly related to higher levels of divorce (see column (2)), however, results from the fixed-effects in (4) do not find that change in the variable is related with the divorce rate. Instead, the coefficients for per capita GDP and net migration are significant and negative. While a relationship between net migration and the divorce rate is not firmly based on theory, the negative coefficient for GDP could speak for theories that affluence is good for marriages, either through reducing economic stress or that the gains to marriage are more based on consumption possibilities and complementarities in the latter half of the 20th century.

7 Conclusion

This study aimed at analyzing the development of divorce rates in Sweden between 1910 and 2000 using regional data and the main economic and social theories on marriage and divorce. Research on divorce has mostly concerned micro-level characteristics, and while some studies have looked at the macro-level relationships for divorce in the US and UK, there is a limited knowledge on the development of divorce rates in Sweden. Sweden, which experienced a late industrialization but an immense economic growth in the early 20th century, is considered a forerunner in gender relationships, thus the limited knowledge on the rise of divorce rates and its aggregate relationships in Sweden needs to be extended.

The analysis uses OLS regression with year-effects to estimate differences in levels and the method year-county fixed effects to estimate how change over time in the explanatory variables are related with divorce rates. This study looks at the theoretical relationship between aggregate divorce rates and economic variables in Sweden 1910-2000 and, except for the year and county-effects, does not include measures of culture. The focus is on the relationship between female labor force participation and divorce rates. Results are similar to previous research and the predictions from theory. The female labor force participation rate is significant in its relation to the refined divorce rate in both the OLS and fixed-effect models, with a coefficient of 0.143 and 0.065, respectively. While no causal inference is made, due to issues of endogeneity, the results are quite robust when removing outliers that could be affecting the estimates. Other variables included are GDP per capita as a measure of the general living standard and wealth in a county, level of industrialization (industry heavy) in a county, the relative cohort size of men and the net flow of migration. Also, the models are estimated without the year 2000 to include the mean age at first marriage. Results indicate that the industrialization is associated with higher divorce rates, net migration is positively related with the levels of divorce but changes over time is negative. The other variables are not significant. Mean age at first marriage is not significant when included in the model but is positive and significant when removing the observations for Stockholm county and the big-city counties.

The only hypothesis, formulated in part 3.4, that is robust throughout all models (except in the subsample in Table C1) is that of the relationship between female economic independence, measured as female labor force participation, and the divorce rates. In the full model (Table 4, column (5)), the hypothesized impact of industrialization is confirmed, but not with different specifications. Per capita GDP is not significantly related with divorce rates in the full model, and changes between positive and negative associations in other specifications.

Despite data issues, the relationship between female labor force participation and divorce rates in Sweden during the 20th century seems robust given various tests. An interesting feature, although with limited value because of few observations over time, is that the relationship does not seem to be strong during the latter half of the 20th century. The results

for the period 1960-2000 do not indicate the same significant association but show a negative significant relationship between per capita GDP and divorce rates.

This study concludes that female labor force participation and the industrialization seems to have been the main determinants of divorce rates in the long-run in Sweden, however there are most certainly other factors that should be accounted for in future studies. The most glaring problem is the non-existent control or measure of norms and values, but it tends to be hard to find proper measures. The censuses are only published for every tenth year and available data is limited, but better measures of economic conditions, such as unemployment or inflation, could be appropriate in order to better distinguish the impact of these. While it might not be possible for a ninety-year long period, more time-observations could be available in the post-war period, where it would also be possible to related divorce rates to the growth of cohabitation.

As this study is one of the first to look at the development of aggregate divorce rates in Sweden using county-level data almost spanning the entirety of the 20th century, the findings should be approached cautiously, but still support the view that female economic independence, specifically their involvement in the labor market, is an important feature in explaining the rise in divorce rates in Sweden.

Despite available data on both regional and national variables, no study has previously looked at the aggregate long-run association between divorce rates and its predicted covariates. Exploring and analyzing the change in family formation and dissolution in the long-run adds insight on how economic factors are related to demographic trends. While there are no evident policy or practical implications based on the results, the study adds a perspective on Sweden to an existing literature on the aggregate relationship between changes within families and household and changes in society. The study lays the foundation for future research on the rise of divorce culture in Sweden during the 20th century.

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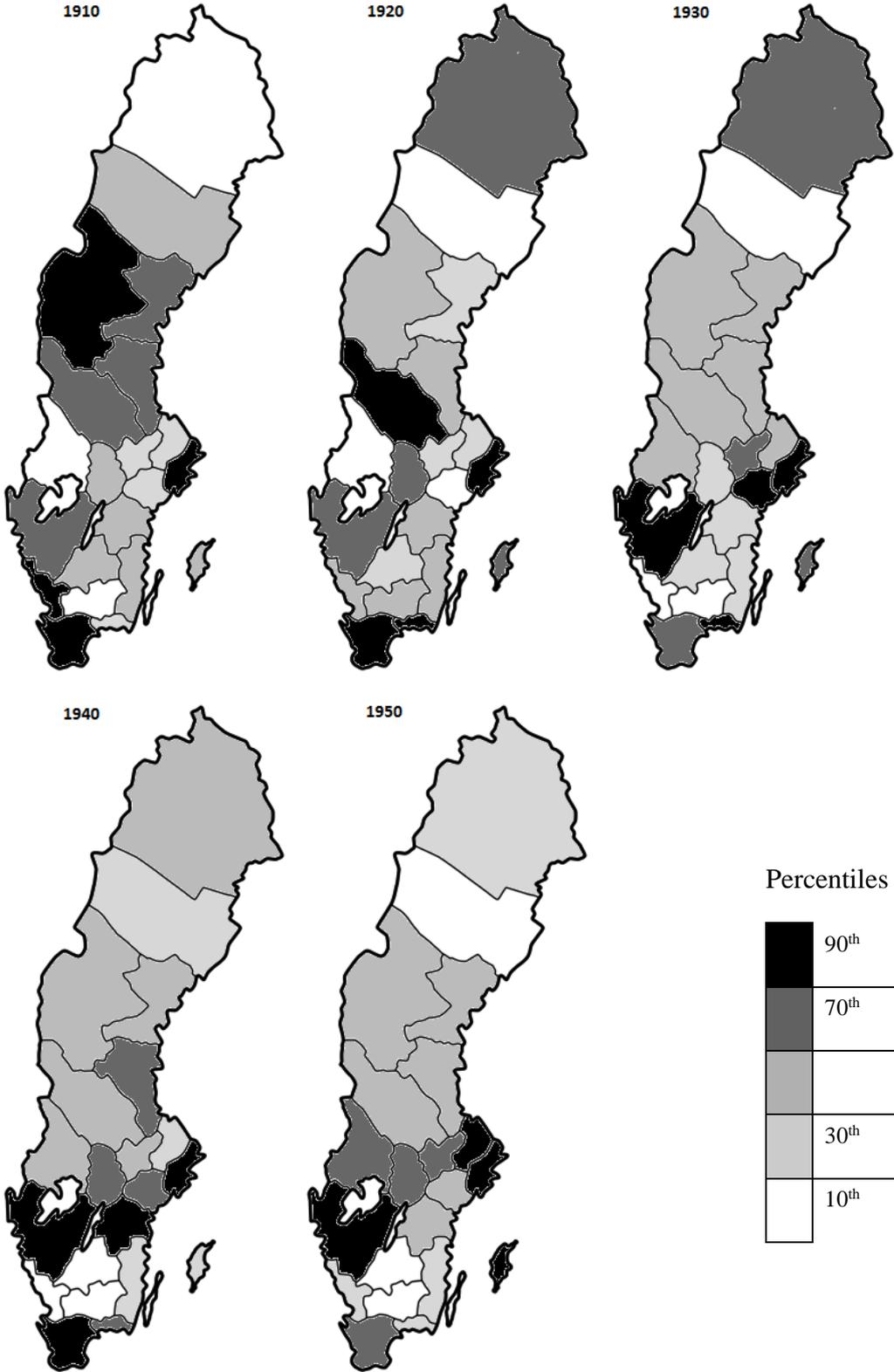
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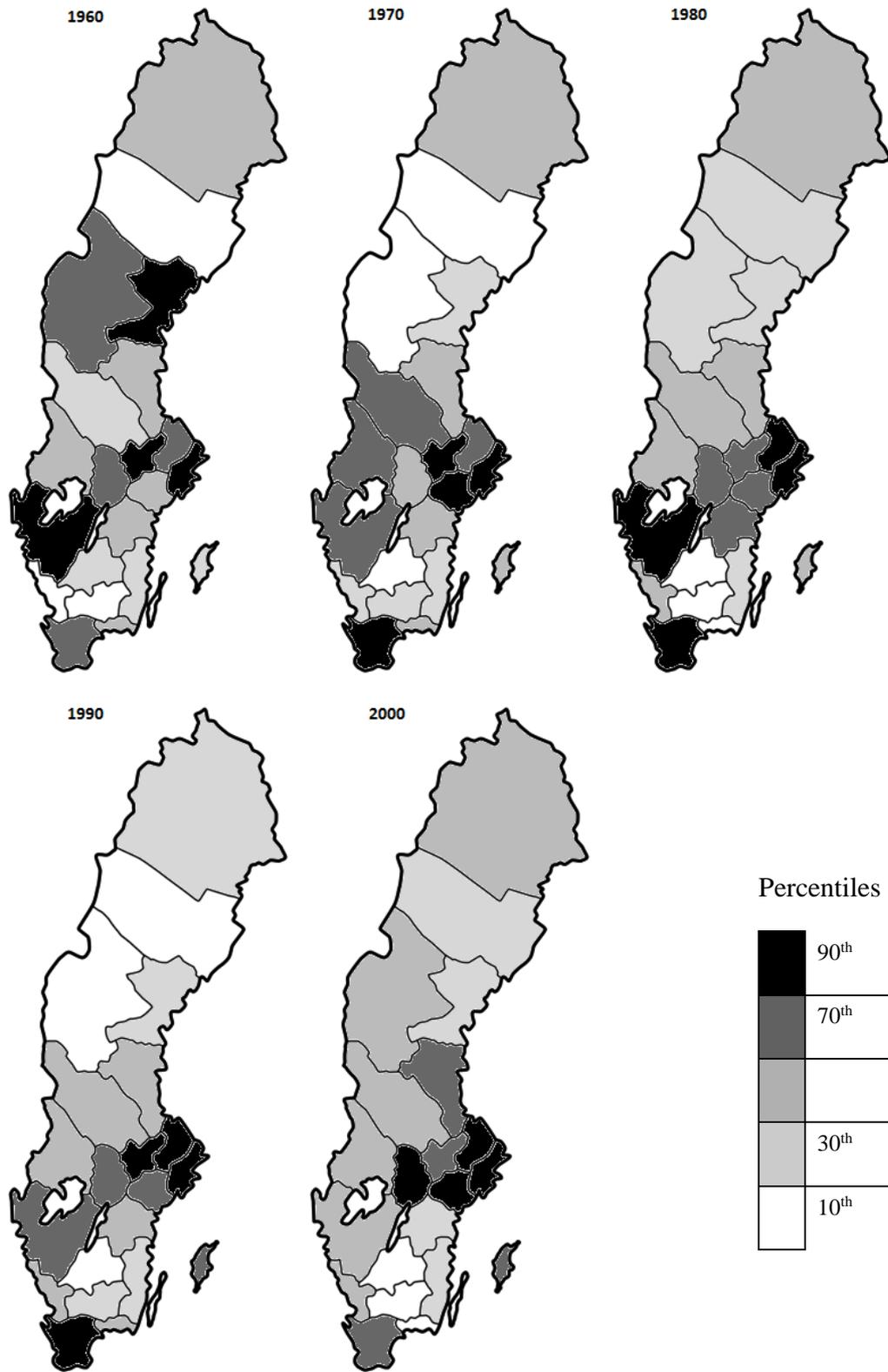
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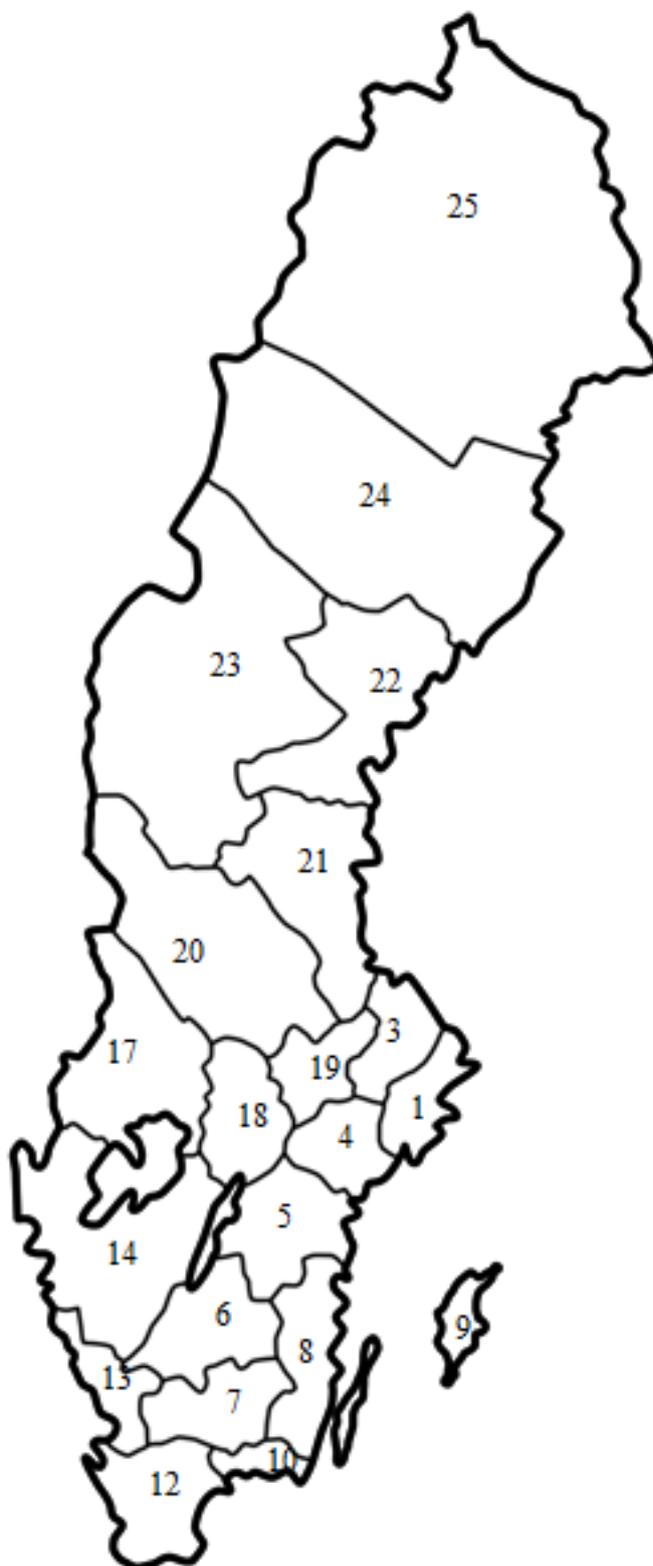
Appendix A





Appendix B

Stockholms län	1
Uppsala län	3
Södermanlands län	4
Östergötlands län	5
Jönköpings län	6
Kronobergs län	7
Kalmar län	8
Gotlands län	9
Blekinge län	10
Skåne län	12
Hallands län	13
Västra Götalands län	14
Värmlands län	17
Örebro län	18
Västmanlands län	19
Dalarnas län	20
Gävleborgs län	21
Västernorrlands län	22
Jämtlands län	23
Västerbottens län	24
Norrbottnens län	25



Appendix C

Table C1 – FE coefficients from Table 4

VARIABLES	County Fixed-Effects		
	(4)	(5)	(6)
Uppsala län	-3.412*** (0.713)	-3.234*** (0.876)	-2.309*** (0.864)
Södermanlands län	-3.543*** (0.706)	-3.229*** (0.835)	-2.409*** (0.837)
Östergötlands län	-4.268*** (0.641)	-3.979*** (0.786)	-3.041*** (0.772)
Jönköpings län	-5.642*** (0.753)	-5.335*** (0.872)	-4.379*** (0.811)
Kronobergs län	-5.488*** (0.699)	-5.260*** (0.873)	-4.196*** (0.847)
Kalmar län	-4.954*** (0.711)	-4.617*** (0.886)	-3.527*** (0.883)
Gotlands län	-3.920*** (0.668)	-3.784*** (0.919)	-2.678*** (0.922)
Blekinge län	-4.551*** (0.727)	-4.423*** (0.887)	-3.211*** (0.902)
Skåne län	-3.364*** (0.633)	-3.074*** (0.792)	-2.363*** (0.787)
Hallands län	-4.878*** (0.626)	-4.600*** (0.823)	-3.667*** (0.810)
Västra Götalands län	-3.551*** (0.613)	-3.296*** (0.734)	-2.743*** (0.729)
Värmlands län	-4.055*** (0.675)	-3.780*** (0.850)	-2.901*** (0.835)
Örebro län	-3.844*** (0.653)	-3.708*** (0.790)	-3.091*** (0.779)
Västmanlands län	-3.419*** (0.696)	-3.077*** (0.782)	-2.193*** (0.820)
Dalarnas län	-4.051*** (0.684)	-3.733*** (0.841)	-2.811*** (0.832)
Gävleborgs län	-3.912*** (0.693)	-3.654*** (0.853)	-2.935*** (0.835)
Västernorrlands län	-4.453*** (0.680)	-4.270*** (0.860)	-3.292*** (0.847)
Jämtlands län	-4.719*** (0.675)	-4.572*** (0.907)	-3.669*** (0.872)
Västerbottens län	-5.322*** (0.689)	-5.199*** (0.904)	-4.140*** (0.907)
Norrland län	-4.323*** (0.694)	-4.188*** (0.905)	-3.048*** (0.925)

Note: Stockholms län is the reference category
Results from Table 4 columns (4), (5) and (6).

Table C2 – FE coefficients from Table 5

County	County Fixed-Effects		
	(4)	(5)	(6)
Södermanlands län (E)	-0.132 (0.414)	0.0328 (0.391)	-0.110 (0.390)
Östergörlands län (E)	-0.856** (0.375)	-0.683* (0.359)	-0.705** (0.355)
Jönköpings län (W)	-2.230*** (0.493)	-2.021*** (0.425)	-2.065*** (0.426)
Kronobergs län (W)	-2.077*** (0.412)	-1.972*** (0.380)	-1.859*** (0.392)
Kalmar län (W)	-1.543*** (0.389)	-1.368*** (0.381)	-1.212*** (0.403)
Gotlands län (E)	-0.508 (0.402)	-0.556 (0.401)	-0.314 (0.462)
Blekinge län (W)	-1.139** (0.442)	-1.098*** (0.419)	-0.813* (0.433)
Skåne län (E)	0.0483 (0.458)	0.229 (0.451)	0.0138 (0.523)
Hallands län (W)	-1.466*** (0.373)	-1.370*** (0.348)	-1.357*** (0.408)
Västra Götalands län (E)	-0.139 (0.418)	0.0679 (0.432)	-0.367 (0.449)
Värmlands län (W)	-0.644* (0.365)	-0.518 (0.351)	-0.601 (0.385)
Örebro län -	-0.432 (0.382)	-0.288 (0.379)	-0.657* (0.344)
Västmanlands län (E)	-0.00796 (0.396)	0.229 (0.402)	0.123 (0.393)
Dalarnas län -	-0.639* (0.365)	-0.464 (0.354)	-0.512 (0.385)
Gävleborgs län (E)	-0.501 (0.361)	-0.354 (0.351)	-0.620* (0.348)
Västernorrlands län (N)	-1.041*** (0.382)	-0.961** (0.369)	-0.943** (0.379)
Jämtlands län (E)	-1.308*** (0.414)	-1.337*** (0.420)	-1.356*** (0.454)
Västerbottens län (N)	-1.910*** (0.397)	-1.930*** (0.391)	-1.794*** (0.450)
Norrland län (N)	-0.911*** (0.348)	-0.912*** (0.339)	-0.712* (0.390)

Note: Observations on Stockholm is removed. Uppsala län is the reference category. Results from Table 5 columns (4), (5) and (6). E, W, N refer to Sundbärg's division. Örebro and Dalarna are split between East and West.

Appendix D

Table D1 – OLS and fixed-effects regression estimates on refined divorce rate

	OLS (level)		Fixed effects (change)	
	(1)	(2)	(3)	(4)
Female LFP	0.0784*** (0.0180)	0.164*** (0.0609)	0.0806*** (0.0241)	0.0398 (0.0371)
Per capita GDP	0.00217** (0.000876)	-0.000230 (0.000753)	0.000994 (0.000844)	-0.000886** (0.000345)
Industry Ratio	0.281** (0.116)	0.136 (0.0867)	0.193*** (0.0601)	-0.0307 (0.0237)
Relative Cohort size	0.0473 (0.151)	-1.516* (0.837)	-0.00124 (0.264)	-0.373 (0.759)
Net migration per 1000 population	-0.00251 (0.0138)	-0.00142 (0.0293)	-0.00981 (0.0124)	-0.0487** (0.0224)
1920	-0.370* (0.213)	-	-0.264 (0.273)	-
1930	-0.676** (0.277)	-	-0.250 (0.340)	-
1940	0.146 (0.374)	-	0.766* (0.387)	-
1950	0.779 (0.758)	-	1.970*** (0.689)	-
1960	-0.676 (0.950)	-	1.088 (0.958)	-
1970	-	-1.862 (1.420)	-	1.898** (0.742)
1980	-	-1.630 (2.837)	-	5.507*** (1.497)
1990	-	-2.154 (3.449)	-	6.288*** (1.823)
2000	-	2.064 (3.208)	-	9.473*** (1.709)
Constant	-2.791*** (0.546)	2.080 (2.979)	-	5.235** (2.367)
R ² within	-	-	0.971	0.964
R ² between	-	-	0.534	0.667
R ² overall	0.923	0.940	0.909	0.909
Observations	126	105	126	105
County Fixed Effects	NO	NO	YES	YES
Number of id	-	-	21	21

Note: The dependent variable is the refined divorce rate measured as number of divorces per 1000 married women. Year 1910 is the reference category in (1) and (3). Year 1960 is the reference category in (2) and (4). Robust standard errors in parentheses

(*** p<0.01, ** p<0.05, * p<0.1)

Source: see section 5.1 Data

