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Master in Economic History

Women, Work, and the Family Economy:
A Study on the Determinants of Female Gainful Employment in Sweden, 1880-1910

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Abstract: Today, Swedish women have one of the highest participation rates. In the nineteenth century, however, virtually no married women were recorded as working. Their participation rates started rising around the turn-of-the-century. Using full-count microdata from Swedish national censuses for the period 1880-1910, this paper aims to estimate the effects of various determinants on female labour supply. Hypotheses based on economic theories on the demand and supply of female labour are tested. The results indicate that the number of children is positively associated with working for never-married and widowed women. For married women, children had a negative impact. Both married and widowed women were more likely to work if they had at least one servant in the household. Moreover, the impact of a working spouse on a married woman's participation varied by the spouse's occupation; wives of production workers were more likely to work. Structural transformation changed the impact of local economies on women's work. Clerical work arose as an important employer for single women, while married women were negatively impacted by industrialisation in terms of likelihood to be employed. The relative price of butter over rye - a proxy for female-to-male wages - had large positive impacts on single and divorced women, but only small impact on married women. Overall, this study concludes that differences in marital status and family composition created differential experiences for women, which should be taken into account in economic theories.

Key words: gainful employment, family economy, gender, marital status, nineteenth century, industrialisation, Sweden

EKHS11
Master thesis, First Year (15 credits ECTS)
June 2018
Supervisor: Tobias Karlsson, Martin Önnerfors
Examiner: Faustine Perrin
Word Count: 20,712

Acknowledgements

Here I would like to briefly thank those who have helped me in writing this thesis this last year. First of all, my thanks go out to Tobias Karlsson, who as my supervisor has given me extremely helpful comments – even in the final stretches – which has made this thesis to what it is now. Martin Önnerfors, as co-supervisor, played a large role in the empirics of the paper and has been a tremendous help, not the least by constructing the map of Sweden on page 27. Lastly, I want to think the researchers at the *North Atlantic Population Project* who have granted me access to their data, without which this thesis would not be possible.

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1 Introduction

The role of women has gone through drastic changes in the last few centuries. In modern times, most women in the West work at almost the same rate as men (ILO, 2016). Looking at the past, however, we see clear variation in women's work by time and place. For instance, Sweden today has one of the highest female labour force participation (FLFP) rates in the world, but this development to high female participation did not take place until the 1960s (Stanfors, 2014). Rather, it is theorised that women's participation followed a U-shape through economic development, with many industrialised countries facing low rates of female participation in the nineteenth century (Goldin, 1994). During this period, analyses show that men worked at higher rates than women in certain contexts. These periods are thought to be best described by the idea of the *male breadwinner economy*; economies in which men worked and women tended the house (Pfau-Effinger, 2004). During this time male wages increased, mostly due to increased economic growth, and became high enough to sustain a household by itself. Social norms may also have played a large role in determining female work. Some argue, for example, that it became a status symbol for a man's wife to be economically inactive, as this showed the man's ability to provide for the household by himself. As a result, the argument goes, women left the labour market to show off their husband's status (van Poppel *et al.*, 2009). However, this may not have been a viable option for everyone.

Estimating the changes in the rate at which women worked is difficult, especially for the period before the second World War. Data on women's work is scarce to begin with, but even sources that are available for this period come with significant problems. One large problem is under-registration, or in some cases no registration at all, of women. Married women were highly likely to be reported as being a labourer's wife, rather than the work she actually performed herself. Moreover, social norms may have motivated women to lie about not working in order to avoid embarrassment (van Poppel *et al.*, 2009; Schmidt & van Nederveen Meerkerk, 2012). As a result, data may indicate that more women were housewives than there actually were. As single women were less likely to be dependent on someone else's income, they were more likely to be reported with their true occupation. However, even single women were under-counted, as will be described later in the paper.

The aim of this paper is to get a better understanding of women's work, and the decision-making involved with work, in Sweden in the late-nineteenth century. Research on this era focuses mostly on the work of men. They are the ones to which the rapid economic growth that many countries experienced in this time is attributed. Women, however, were important actors in economic development, although the under-registration and under-discussion of women's work would lead us to believe that their role was less significant than it actually was. In order to get an overall and clear picture of economic development, it is therefore necessary to also discuss the woman's perspective.

In order to achieve this aim, full-count microdata is analysed for the whole Swedish female population. Economic theories on women's decision-making to work are discussed and tested. These theories of labour supply find their roots in the work of Becker (1965) and Mincer (1962) and suggest that women's work depends, among other factors, on the amount of household responsibilities. Labour demand is discussed using theories on the change in economic structure, which Ivy Pinchbeck (1930) believed took women out of the labour market. In particular, a model is estimated with both labour demand and supply factors to observe both these sides of the decision-making for work. Moreover, the model is estimated separately for married, widowed, and never-married women. These separate

regressions should give a richer perspective of which women were affected and how they were affected.

This paper contributes to the literature by providing an analysis of the determinants of participation, as theorised by economic literature, for women in the context of nineteenth-century Sweden. While studies on the determinants of participation using microdata have been done for different countries in this era, none have been done for the context of Sweden. Therefore, this paper will add valuable insights to the literature. Moreover, the microdata enables a comparison between married, widowed, and unmarried women. This comparison allows for a better understanding of decision-making in different family contexts, which is relatively rare in the literature.

The paper focuses on the period of 1880 to 1910, a period in which women – as well as society as a whole – underwent significant changes, both in economic and in social terms. For one, Sweden saw great advancements in agriculture and its productivity in the early-nineteenth century. The government invested heavily in large-scale infrastructure, primarily in the form of railways. From the 1870s onwards industrialisation took off, which ultimately changed Sweden from an agrarian society to a leading industrial economy (Schön, 2012). Furthermore, the 1880s saw the start of the fertility transition which changed household decisions for the next century (Bengtsson & Dribe, 2014). Both these economic and demographic changes can be related to female labour market outcomes.

In order to avoid confusion we have to clearly outline what we mean with and how we measure labour supply. A phrase often used in modern times is labour force participation, which denotes the share of the working-age population that perform market labour. It includes those that are currently unemployed, but are actively looking for employment. This term can be considered too modern to use for the context of nineteenth-century Sweden. Instead, when this paper mentions work or labour, it will refer to the idea of *gainful employment*. As labour markets in (pre-)industrial times were less developed than now, many countries did not use wage labour as the norm yet. Many people worked on farms or worked in family businesses (Ruggles, 2015). Therefore, to be economically active is here ascribed to being reported with an occupation, whether it be from home or working for an employer. Moreover, the term gainful employment refers to both intensive and extensive margins of work; not only did one have to be economically active, one also had to fulfil requirements set by the census-taker which could vary over time and space.

The thesis will be structured as follows. Section two will outline important theories and previous literature regarding women's work in the family economy, as well as the development of female employment in industrial and industrialising countries in the eighteenth, nineteenth, and early-twentieth centuries. Moreover, the section will articulate the hypotheses that will be tested in this paper. Section three will discuss the background and context in which women's work decisions took place. This includes the economic background of Sweden, as well as the social and demographic backgrounds of women in Sweden and other industrialising countries. The data used in the analysis will be described in Section four, together with the limitations that come with the use of national censuses in the past. Afterwards, Section five will explain the methodology of the analysis. Section six will report the main results plus the sensitivity analyses. These results will be discussed in Section seven, together with their implications for the hypotheses. Finally, Section eight will summarise and conclude the paper.

2 Theory and Previous literature

2.1 Theory

This section will discuss several theories on the determinants of female labour supply decisions. The theories are economic in nature; this is by choice. The purpose of this paper, as will be discussed in-depth later in the paper, is to test these theories in the context of nineteenth-century Sweden.

2.1.1 *New Home Economics*

In economic terms, individual agents make decisions which maximise their utility. When individuals join together to make a household, for instance through marriage, their decisions are extended in order to maximise household utility. One proponent of this idea was Gary Becker, who wrote extensively on a model of household decision-making in his *A Treatise of the Family* (1991). One important decision that members of a household have to make is whether to work or not. According to Becker, this decision depended on the *comparative advantage* of men and women on the market and in the home. Historically, women specialised in childrearing and household activities due to "biological commitment to the production and feeding of children" (p. 37). In return, men would hunt for food, or in more recent times, specialised in earning an income. Their participation in the labour market led them to invest more in *labour capital*, while women invested more in *household capital*, creating comparative advantages by differential investments. Intuitively, this would explain why married women in (pre-)industrial times worked so rarely, conditional on the male's ability to provide for the family with a single wage. Naturally, if a man was not able to provide fully for the family by himself, other members of the household were necessitated to contribute.

Another model that focuses on the decision-making of women is that of Jacob Mincer (1962). Rather than limiting their options to only labour and leisure – as is done in traditional labour economics – Mincer added a third option; *productive service to the home sector*. Similar to the model by Becker, women would work productively in the home if this resulted in a higher utility than if they were to work outside of the home. Both the models by Becker and Mincer clearly show the importance of alternative options on household decision-making. If the utility gained by one of the options changes, this may affect the final decision. For instance, an increase in the market wage for women on the labour market raises the opportunity cost of working in the home and might alter the household decision if the utility of working outside of the home at the new wage rate is higher than the utility gained from tending to the household. Conversely, if the man's wage increases, the utility gain of female income is reduced, and women are more likely to stay at home.

After Mincer introduced the three options for time-use for women in the family economy, Reuben Gronau (1977) further developed the distinction between leisure and home production. According to Gronau, women's propensity to work was related to education, wages, and income. His theory stipulates that an increase in the income of the family – for instance, through an increase of the male's wages – would induce an income effect, leading women to enjoy more leisure. Higher female wages, on the other hand, would lead to substitution of home production for market production. Moreover, Gronau theorised that child care could be *produced* at home by the mother or by the consumption of a market good, namely a housemaid. The extent of using this market alternative to child care is determined

by the relative price of the alternative (maids) to the woman's wage. If the woman's potential market wage increases, she would be more likely to hire a maid to provide the home production. Conversely, an increase in the wages of maids would induce more women to work domestically.

Inspired by the work of the New Home Economists, Galor and Weil (1996) theorise another link between wages, fertility, and women's labour. Their theory relates to the relative advantage men had in strength, which gave them a relative advantage in the (pre-)industrial economy. Labour-intensive work paid more to men than women because of this difference in strength. With industrialisation, the relative input of capital over labour increased, which reduced the advantage men had in strength as strength became less important. Relative wages increased for women, which drove them to the labour market, reducing their fertility due to a changed opportunity cost. This, in turn, increased female labour even more, leading to a positive feedback loop. Diebolt and Perrin (2013) build on the ideas of Galor and Weil, and theorise that women's move towards the labour market depended on their ability to invest in their education. With low bargaining power, women were left at home to care for children, while men benefited from increasing returns to education. A subsequent increase in women's bargaining power allowed women to invest in their own human capital and benefit from higher wages due to better job opportunities. This, in turn, reduced the fertility of women but increased the quality of children. In this way, equality between men and women had important consequences for economic growth.

On the other end of the labour supply decision is home production. Productive service in the home has been an important sector for women in the (pre-)industrial era. The models by Becker and Mincer highlight the importance of wages and productivity on the labour market for household decisions. However, the productivity of women in the home sector may also have increased. Joel Mokyr (2000) discusses one way in which this productivity has changed. In the late-nineteenth century, reductions in mortality became common in several leading countries. Part of these reductions in mortality can be explained by an increase in knowledge on proper sanitation and the ways in which infectious diseases spread. With this knowledge becoming more widespread, women's domestic responsibilities expanded to include using this new knowledge to keep their household members healthy, which may have motivated women to spend more time at home rather than providing market labour.

2.1.2 *Structural Transformation*

So far, we have discussed theories focusing on the context of married women. However, not all women were married, and those that were unmarried did not have a spouse that could support them. Instead, many women had to work to support themselves. Whether they worked depended on the economic opportunities that were available for them. A change in such opportunities would therefore surely affect their propensity to work. Such changes took place in the nineteenth century in many Western countries; industrialisation altered the economic structure for both men and women. The importance of industrialisation to women's work has been noted, perhaps earliest by Ivy Pinchbeck (1930). Her work on female labour in Britain during the period of industrialisation argues that women working in agriculture remained in place, although married women were likely to drop out of this work as productivity increases in this sector increased male wages. Initially, the new industries led to declining opportunities for women, especially married women. For example, many women worked casually from home, but their work got replaced by the production output of factories. Pinchbeck, however, argues that

women withdrawing from the labour market was related to increases in living standards, as she considered leisure and working in the house a luxury. Moreover, after industrialisation women's opportunities on the labour market improved as white-collar work became available for women. Nonetheless, her argument that women's lives improved during industrialisation is considered dubious today.[1]

According to Boserup (1970) modernisation widens the gap between men and women in terms of productivity and opportunity. Methods of production, which were formerly accessible to everyone, now became male-dominated. In the case of mid-twentieth-century Africa, gender differences in work were nested in the use of the plough in cultivation. The plough required strength, an aspect in which men stereotypically fare more favourably than women. As a result, agriculture became less labour-intensive, reducing the demand for female workers, while men increased their productivity and earnings.[2] This further places women in a disadvantageous position and pushes them towards dependency.

More recently, the participation of women was discussed by Claudia Goldin (1994). Her theory of a U-shaped progression of female labour force participation suggests that a large share of women worked before modern economic growth. When economies were driven by Malthusian forces, low wages and many subsistence workers meant that everyone had to contribute, including women and children. With modern economic growth, driven by industrialisation, came higher wages, especially for men, and subsequently a *male-breadwinner economy* came to exist. In this economy, men used their comparative advantage in market work to earn an income while women were productive in household work. Women's low educational attainment, relative to that of men, provided them with few work opportunities outside of manual labour, work with a social taboo for women to work in. Thus, rising male incomes led to the middle of the U-shape with few women working. The upturn in female labour came with increased education for women, which allowed women to start working in white-collar occupations such as clerical labour. These became more available as industrialisation increased the size of workplaces, requiring more clerks and other clerical workers. In this way industrialisation increased women's participation in the long run.

2.2 Previous literature

The literature on the female labour force participation and gainful employment by women has been steadily growing in recent years. Additions have been made in different geographic contexts and time periods. However, a majority of the literature still regards economies that were economically strong in the nineteenth century; Britain and the United States. Little research has been done on the peripheral economy of Sweden before the twentieth century. Moreover, studies in the literature often concern either one region or the whole country. Hence, few studies have examined the determinants of female labour and the regional differences in the changes of female work using large microdata sets.

[1] Horrell and Humphries (1995) argue that the increase in the dependency of women should be considered a negative impact, while Davidoff and Hall (1987) describe marriage as the "only survival route for middle-class women" due to decreased work opportunities for women (p. 273).

[2] Alesina *et al.* (2013) show that these agricultural practices are related to persistent gender norms. African regions that used the plough have lower rates of female participation now, half a century later, regardless of current agricultural practice.

2.2.1 *Determinants of female employment*

Whether a woman worked was not only a question of availability of work, but also that of women choosing to work. Theoretically, women were less likely to work if they had more household responsibilities, for instance if there were more children in the household. On the other hand, higher wages for women would have the opposite effect. Horrell and Humphries (1995) studied the determinants of the female labour force participation in nineteenth-century Britain. During this period, commercialisation of agriculture led to the displacement of many working women. Industrialisation raised the wages of women, both in absolute terms and relative to that of men. Moreover, it brought new job opportunities for women. Furthermore, Horrell and Humphries' analysis suggests that the number of children is negatively associated with the participation rate of women. Young children under the age of 2, however, increased participation greatly, while family income was inversely related to employment. Moreover, female wages were positively related, and male wages negatively, to women's work. While these family characteristics were important in explaining female participation, they are not enough to fully explain the drop in participation that was seen midway through the nineteenth century. Instead, Horrell and Humphries argue it is mostly changes in the demand of female labour that shifts the participation of women during the end of this period.

Grantham (2012) studied the French population census of 1851 and examined the supply and demand sides of female participation. France was a mostly agricultural country where many women worked on farms. His model shows that for nineteenth-century France, young children under the age of 3 negatively impacted female participation. Despite that, being a mother did not generally change women's probability of working, nor did an increase in the family income. Nonetheless, an income effect was found in having a spouse with a high income, for instance a blacksmith, which made it less likely for a woman to work. Moreover, factors such as the percentage of arable in sugar beets, an indicator for the demand for female labour in the fields, were found to be significant. Thus, both supply and demand factors seem to have been relevant. Poverty pushed poor women onto the labour market, while changing opportunity costs determined the participation of others.

The fact that different economic structures lead to different labour market outcomes for women is clear when looking at different contexts in different time periods. A separate literature, focused on the reconstruction of female employment, allows for such comparisons. In a summary piece written by Humphries and Sarasúa (2012), the authors mention that women would work if they were given the opportunity. For example, Muñoz Abeledo (2012) finds that more than half of all women worked in certain cities of nineteenth-century Spain, with the demand for female labour being the most important determinant. Taken as a whole, this literature demonstrates the relevance of economic structures on women's participation.

2.2.2 *Female wages*

The importance of the relative wages of women has been made clear in the Theory section. When discussing historical wages for women, one question that is posited often is whether they were adequately compensating women for their marginal productivity. Historically, men generally received higher wages than women. This difference is often ascribed to differences in productivity due to strength or brawn (Goldin, 2006). When this difference is not explained by productivity differences we speak of wage

discrimination. If we follow the labour supply theories as described by Becker and others, wage discrimination would lead to lower female participation. Thus, wages and discrimination in wages are relevant for our study.

Cox and Nye (1989) examined the gendered differences in wages for the French textile industry in the nineteenth century. Their approach, estimating productivity functions rather than the standard earnings function, gives them no reason to support the hypothesis of discrimination against women on the labour market. Conversely, McDevitt (2009) studied the Canadian case of clothing manufacturing and found significant gender wage differences. Thus, discrimination did not occur everywhere and was context dependent.

A reason for discrimination other than productivity differences is described by Burnette (1997). Working women and children were seen as *dependents*, belonging to the family of a male breadwinner. Hypothetically, men were paid more than women and children because their income was supposed to pay for the subsistence of the whole family. Burnette, however, finds that women in Britain were paid a wage congruent with their productivity. She notes the importance of correcting for measurement errors. Moreover, in other works she has argued that gender discrimination on the labour market was uncommon before 1900, as many types of work consisted of piece-rate payments, which made discrimination less feasible (Burnette, 2008). Rather, differences in payment came from differences in either skill or strength.

Humphries and Weisdorf (2015) created a long-run wage series for unskilled women in Britain, ranging from 1200 to 1850. Around 1500 the male-to-female wage ratio was found to be high, but this decreased up to *c.* 1700. At this point two different wage series, based on casual or annual contracts, diverge. According to the authors, casual labour is to be associated with married women, who were not as mobile on the labour market as unmarried women due to their responsibilities in the household, and whose income was merely seen as an addition to that of their spouse. Annual contracts were generally signed by young unmarried women, who were able to take a steady job for a long period. The payments to casual labour decreased relative to that of men, while the wages of the annual contracts increased one-to-one with that of men. These differences in payments likely meant that new forms of work with annual contracts replaced the work of married women working casually.

2.2.3 *Structural transformation*

The theory of the U-shaped development of women's work was tested by Claudia Goldin (1994) herself. She examined the case of the United States primarily, and an additional cross-section with nearly a hundred countries. The results of the cross-section show that this shape is virtually universal for countries undergoing industrialisation. Moreover, increased education positively affected the rate at which women started working in clerical occupations. Goldin's work together with Katz (2009) demonstrates the relationship between education and technology. Technology creates new demand for (female) educated labour, which raises the return to education and motivates more women to invest in their own human capital. The change in the educational attainment of women led to a large increase in the participation of women in early-twentieth-century United States. With secondary schooling many women could enter new white-collar positions, jobs with no social taboos. Clerical work, for example, became increasingly feminised in the beginning of the twentieth century.[3]

[3] See Cohn (1985) for a discussion on the feminisation of clerical work in Britain.

The United States was further studied by Olivetti (2013) from a more comparative perspective. Her work confirms the findings of Goldin's (1994) analyses and links the growth in female employment to structural transformation. Three important substitutions are mentioned in her study; (a) substitution between a woman's labour and other activities, (b) between male and female labour, and (c) between labour and capital. These substitutions relate to the theories mentioned earlier. For example, she notes that women shifted out of agriculture quicker than men did, but did not get employed in manufacturing to the same extent. Instead, women were more likely to shift their work efforts to the service sector.

Another comparative perspective was taken by Costa (2000), who compared the developments of female work in Britain, France, and the United States. These countries make for a good comparison; Britain was a highly industrialised country in the nineteenth century, whereas France was still predominantly agricultural, and the U.S. was somewhere in between. Agricultural France had high levels of participation compared to the other two, especially among married women. The high participation rate started falling in the beginning of the twentieth century with the emergence of industrialisation. In Britain, the male-breadwinner model was already in place due to the early industrialisation. The difference in timing of industrialisation therefore led to these two countries having inverse developments in terms of female work around the turn-of-the-century. Meanwhile, in Britain and the U.S. married women's participation increased tremendously. During the first half of the twentieth century it was unmarried women who predominantly found themselves employed in office work, paving the way for married women, who took over as the main group employed in this sector in the second half of the century.

According to Schmidt and van Nederveen Meerkerk (2012), the U-shape did not always explain female employment well. They find that in the Dutch *Golden Age* (*c.* 1600-1700), women's employment increased rather than decreased during periods of increasing male wages. They do, however, find similar transitions from agriculture to other sectors during industrialisation. The agricultural sector was an important employer of women, and the structural transformation resulting from industrialisation affected women's labour in agriculture in two ways. First, it reduced the importance of the agricultural sector relative to other industries as a source of economic growth. Second, increased productivity in the sector increased male wages and diminished the demand for female labour. Consequently, women left agriculture and sought work in service and manufacturing.

After women's position in agriculture diminished, the employment rate of women was largely determined by whether there were alternative work opportunities available. Atkinson (2012) examined three British towns with different economic structures. From the period 1860 to 1920, two out of three towns suffered a decline in female participation. The decline was lower in Leeds, which had a mixed economic structure, than in Bradford, where wool industry was dominant. Moreover, Atkinson noted a decline in fertility and an increase of the age-at-marriage. Together with the decline in female participation, this may imply a new focus on the *quality*, rather than the *quantity* of children, a development described by Jan de Vries (2008). As a result, families became younger and smaller.

Changes in the family were common in this time period. The United States, for instance, saw large chances in the composition of families. This transformation was studied by Ruggles (2015) for the nineteenth and twentieth centuries. In early nineteenth century many Americans worked in agriculture and lived on farms, and those who worked in non-agricultural sectors predominantly worked in family businesses. Until 1850 most families were *corporate families*, married couples with a self-employed head,

but in the second half of the nineteenth century this shifted towards the dominance of male wage-earners. The structural transformation increased the availability of unskilled manufacturing work for men, work that was considered too dirty for women. This work required little to no skills and paid well, allowing men to provide for the whole family on one income. As a result, many women shifted towards household work, and the age-at-marriage dropped for many couples due to increasing wages for young men.

2.2.4 *Literature on Sweden*

In the Swedish context most studies have focused on the twentieth century. An important contribution was made by Carlsson (1966), who examined Sweden starting from 1870 using the Swedish national censuses. His study shows that working women were predominantly found in the agricultural sector, but this has decreased with the emergence of industrialisation. In the year 1870, 79 percent of women that worked did so in the agricultural sector, whereas in 1960 this was only 5 percent. Their labour shifted to other sectors instead, mostly manufacturing and services, whereas the domestic service sector remained relatively constant for the period 1870 to 1930.

Silenstam (1970) studied a similar time period. The share of women among working people was around 20 percent in the period 1870-1910, and increased to 32 percent by 1965. The largest growth in the share of working women was seen in the period 1910 to 1920, right after the period we study. For the most part this growth was caused by the introduction of more married women in the labour force. The increase in working married women accelerated in the 1960s, but Silenstam could only observe part of this development.

More recently, Maria Stanfors (2014) reaffirmed the shift of women working in agriculture to domestic services, manufacturing, and other industries. Problematically, many women worked inside their own homes, which was often not counted as being gainfully employed. This problem is common in the European context, where censuses had a focus on full-time non-agricultural work (p. 517). As men and young women worked jobs which replaced traditional work with machinery, married women left due to shrinking job opportunities. Moreover, manufacturing work was dangerous and bad for one's health, so the alternative of childrearing and caring for the household was an easy one for married women with a spouse who earned enough.

Thus, around the turn of the twentieth century, virtually no married women in Sweden worked. By 1990, however, a larger share of married women worked than single women (Stanfors & Goldscheider, 2017). The growth in this group, which was already mentioned by Silenstam, was slow, and up until World War II less than 10 percent of married women worked. From 1930 to 1960, Sweden was characterised by increasing demand for office work, teachers, and other occupations with flexible terms for married women. However, rapid growth would come not until the 1960s. At this point in time, higher demand for female work, together with higher education and wages, allowed women to pursue careers while simultaneously being able to afford childcare.

While in the late-nineteenth century few women worked, especially married women, they definitely remained economically active. Lynn Karlsson (1995) describes the tension that working women experienced in this period. Many people were opposed to women working, especially in factories, as women were expected to become mothers and wives, not workers (p. 6). Examining various industries using printed sources from different regions, Karlsson demonstrates how census data can be misleading

due to the under-registration. For instance, only 21 percent of the female pottery factory workers were recorded in the official census. Moreover, marital status and work differed per industry and location. A majority of working women was unmarried, but married women could be found in textile industries and large cities.

Women's factory work was predominantly found in urban areas (Karlsson, 1996). Moreover, *c.* 1900 approximately 40 percent of women worked in one of the four largest cities. Textiles were not the only place where women were to be found, however. In 1870, 60 percent of industries employed at least one woman, and in 1910 this number had risen to almost 80 percent (p. 18). Moreover, in many industries women supplied at least one-fourth of the total labour supply.

Homework, as mentioned, was an important way for women to stay economically active, even while having household responsibilities. In her dissertation, Malin Nilsson (2015) demonstrates the effect of a first child's birth on the mother's work decision. In early-twentieth century, women who just had a first child were more likely to perform industrial work from home. Moreover, the idea that women were *dependents* and were discriminated against for that reason is evaluated. Nilsson finds that women were not described in this way in early-twentieth-century Sweden, and that women who worked from home contributed adequately to the household income. Furthermore, many women who performed industrial work from home were their own household heads, and therefore not dependent on a male breadwinner.

Burnette and Stanfors (2012) studied the Swedish tobacco industry, using matched employer-employee data, to find evidence for the motherhood penalty in late-nineteenth century Sweden. This penalty refers to mothers being paid less than women with no children. However, the authors find that mothers earned more than those with no children, while simultaneously working fewer hours. This was the case for women working for piece-rate; time-rate wages were no different between mothers and non-mothers. This is suggestive of a higher level of effort by mothers – mothers worked harder in order to provide for their dependent children.

The tobacco industry was further used to examine the gender pay gap between men and women (Stanfors *et al.*, 2014). This type of work was unrelated to strength and strength can therefore not be used to justify the gender pay gap. After controlling for individual characteristics, no discrimination is found in the piece-rate section. However, one-third of the difference remains for the time-rate section. This was likely caused by alternative job opportunities for men, which paid higher wages than those of women, as well as the use of customary wages for women. If women were paid less for the same productivity, hiring women could be considered a good strategy to increase profits. The authors find that a larger share of working women increased the likelihood of survival for firms. Using duration models Eriksson and Stanfors (2015) find that firms were less likely to fail and more likely to operate longer.

An important paper by Schultz (1985) examines changes in the fertility and labour market decisions made by women in nineteenth-century Sweden following a change in world prices. In the 1880s Europe experienced a grain crisis, which was enormously detrimental for Swedish grain exports.[4] The drop in demand for grains led to a fall in the relative price of rye compared to butter, and Swedish farmers switched to the production of animal products. In Sweden, it was mostly women who were responsi-

[4]Grain prices in Europe fell rapidly after the United States export-market opened up in Europe, massively increasing the supply of grain.

ble for the livestock (For instance, see Snell [1981]). This change towards more animal products could therefore be seen as an improvement in the position of women on the labour market. Schultz finds that in regions with higher butter-to-rye price ratios, female-to-male wage ratios were higher. Moreover, fertility was lower in these regions. The use of the butter-to-rye ratio may therefore give valuable insights in our analysis.

A master's thesis at Lund University from last year studied the regional variations in FLFP for Swedish women from 1870 to 1950 (Clivemo, 2017). Using aggregated data from the Swedish censuses, Clivemo estimates fixed-effects models at the county-level. According to her results, counties with higher levels of industrialisation had lower female participation rates. Moreover, the determinant explaining the most was the relative wages between women and men, where an increase positively impacted women's work.

The contribution of this paper may be explained best through a comparison with Clivemo's study. The paper by Clivemo and this paper share some similarities; both papers look at female work in Sweden during industrialisation. The focus on regional variety follows naturally from the use of data at the county-level. The difference in data, however, creates a difference in the question that is being asked in the respective papers. This paper, using microdata for the entire country of Sweden, aims to analyse the determinants of female participation at the individual level, not the aggregate level. The lower level of aggregation allows for more variation and, hopefully, more precise results. Furthermore, in contrast to female participation in general, the present study identifies the effects for married, widowed, and unmarried women separately.

2.3 Hypotheses

The theories on female labour discussed above have highlighted aspects that may have had a significant impact on the propensity of women to work in the nineteenth and early-twentieth century. Together with the previous literature they allow us to formulate a list of hypotheses which we can test using econometric analysis. The labour supply theories belonging to the school of *New Home Economics* suggest that children increase the opportunity cost of working. Having one more child would, for that reason, reduce the likelihood of the mother to work. The first hypothesis follows

> Hypothesis 1: *The number of children per mother negatively affects the probability of the mother to work.*

Of course children are not homogeneous, and they might differ by different age groups. This hypothesis will therefore be examined by looking at three different age groups separately; up to 5 years old, 6 to 10 years old, and 11 or older. Moreover, children can also contribute to the family income. The working child's income may be used to substitute for the mother's work. The second hypothesis is

> Hypothesis 2: *The number of working children negatively affects the probability of the mother to work.*

If we consider Sweden to be a male breadwinner economy, we would expect women living in a household where the household head works to be less prone to work. *Vice versa*, if the household head is out

of work, the gap in income has to be filled by someone, possibly the mother. Household specialisation, as described by Becker (1991), is less likely to occur if the man is not able to provide an income high enough for the family's subsistence. Thus, the third hypothesis goes

> Hypothesis 3: *Living in a household with a working spouse or household head lowers the probability of a woman to work.*

An alternative for a woman's productive work in the household is hiring a maid or domestic service to fill this role. Gronau (1977) theorised that higher wages induce women to substitute maids for their household production. Intuitively, having a maid in the household providing household work leaves more time for the women of the household to work on the market. The fourth hypothesis therefore follows

> Hypothesis 4: *The likelihood of gainful employment is higher for women with at least one servant working in their household.*

Labour demand is also an important factor. The impact of structural transformation on female work has been described and explained in various contexts. Industrialisation is expected to shift women's work away from domestic service and agriculture, and towards new sectors such as clerical work and other services. The availability of new types of work may have induced women to work more. Thus, the regional economic structure is likely to affect women's work. Hence, the fifth hypothesis goes

> Hypothesis 5: *The availability of sectors outside of agriculture and domestic service are positively associated with female work.*

Lastly, women's wages are considered an important determinant in the literature. Higher wages would motivate women to work more or start working. Furthermore, the wage ratio between men and women affects the comparative advantage of men on the labour market, and thus the likelihood of household specialisation. One way of proxying for women's relative wages is using the relative price of butter over rye (Schultz, 1985). According to Schultz, women's wages are related to butter prices, as occupations relating to dairy are dominated by women. Men, on the other hand, are predominant in the production of rye. An increase in this ratio should therefore suggest an increase in the demand for female labour. As such, the last hypothesis states

> Hypothesis 6: *The relative price of butter over rye is positively associated with female gainful employment.*

These hypotheses will be tested using econometric analysis, and their results will be examined in the Discussion section.

3 Background

3.1 Economic background

The transformation of Sweden from a peripheral economy to an industrial leader took place in the second half of the nineteenth century. In terms of GDP per capita, modern economic growth started around 1850. Annual growth in the period 1800 to 1850 was only 0.4 percent, but the following periods from 1850 to 1890 and from 1890 to 1930 saw growth rates of 1.5 and 2.1 percent annually, respectively (Schön, 2012). Whereas the world economic leader, Britain, had already become heavily industrialised by the end of the eighteenth century, Sweden was still predominantly agricultural. Most of its population resided in rural areas, and the country had high birth and death rates characteristic for many countries in this era. The mortality transition, starting in 1820 with a decrease in the infant mortality rate, led to a rapid increase in population growth. As a result, downward social mobility became more common, especially for those in the lower socioeconomic classes. Farmers were no longer able to give all their offspring a share of their land, which led to an increase in the share of the population that owned no land. This induced an exponential increase in wage labour as workers had to find a new source of income to subsist. At the same time, unpaid household work – predominantly performed by women – was the largest contributor to growth (p. 33).

The increase in the growth rate of annual GDP per capita from 1850 onwards was largely due to changes in the agricultural sector. Important were enclosure movements and reclamation of land, especially in the Southern region (Olsson & Svensson, 2010). An Agrarian Revolution followed, pushed by the introduction of new equipment and the redistribution of land, and this revolution would continue until the mid-nineteenth century. Agricultural productivity increased greatly, while at the same time new arable land was becoming available for the growing population. The new equipment increased labour productivity, whereas the soil became more productive through the use of new crops (Schön, 2012: p. 35). With the availability of new lands with arable soil, population growth and productivity saw a boost in woodland regions, where agriculture had thus far been fairly limited.

With the completion of the agricultural transformation came a shift of focus towards investments in infrastructure, particularly railway networks. These networks were important for Swedish workers, not only because its construction increased labour demand, but also because of its role in lowering transport costs. Lower transport costs made migration more affordable and made exports more feasible, and generally increased economic growth for towns with access to the network (Berger & Enflo, 2017). Exports had already played an important role for the growth of Sweden, but their dominance increased after the construction of the railway network. The increasing share of exports persuaded farmers to change their crops to oats and grains, which were exported heavily. Moreover, the increase in exports helped spur industrialisation in Sweden. This industrialisation was facilitated by the abundance of natural resources as Sweden had a favourable position in the export of steel.

While this was happening, Sweden underwent a largescale wave of deregulation (Schön, 2012: p. 82). A reduction in tariffs facilitated the export of grains and benefited free trade. With the growing integration into the world market Sweden became an increasingly market-oriented economy. However, while it had abundant supply of labour and natural resources, Sweden lacked the capital funds necessary for continuous growth. This gap was filled by the borrowing of large amounts from foreign economies. The country's large labour supply supressed wages, which pushed workers to emigrate for economic

reasons. Emigration from rural areas often happened in two steps: first to an urban area in Sweden, then to North America.

These two steps are demonstrated clearly by the example of Sundsvall.[5] This city was one of the fastest growing cities in Europe in the late-nineteenth century (Vikström, 2003), predominantly due to accepting many incoming migrants. The city was a continuously attractive destination for migrants, but migration increased when famines plagued the countryside and economic conditions improved in Sundsvall. For example, a large fire in the city in 1888 required largescale rebuilding, which increased demand for labour and was followed by a large influx of migrants in 1889. The migrants that came into Sundsvall were mostly young, unmarried, and from lower socioeconomic classes. The gender distribution of migrants was equal, suggesting that female migration was just as sensitive to economic conditions as male migration. After the peak in migration in 1889 the economy slowed down, largely due to the timber economy stagnating, and migration to Sundsvall fell dramatically. Instead, many migrants that had moved to Sundsvall for economic reasons now moved to the United States.

During this period Sweden had one of the highest emigration rates in Europe, with approximately 20 percent of the population leaving the country from 1870 to 1910 (Bohlin & Eurenius, 2010). Those leaving the country were, to a large extent, young men between the ages of 15 and 34. Although migration to Sundsvall was gender neutral, women migrated outwards more rarely than men did. Female migration thus seems less sensitive to fluctuations in economic conditions out of the country, perhaps because the type of work women could potentially get in the U.S. (domestic service) was less sensitive to business cycle fluctuations (p. 548). High rates of emigration were found in the South and West, with counties with important urban areas such as Malmöhus and Göteborg being exceptions to the rule. In these regions population growth had been rapid, and redistribution of land had made typical farms smaller in size compared to the core East, where large estates had high demand for wage labour. The growth in population increased population density in the South and West, which increased the competition for work and pushed many to emigration.

The large number of outbound migrators increased wages which had originally been pushed down by the large labour supply. O'Rourke and co-authors (1996) show clear cyclical behaviour in the wages-to-land values ratio between 1870 and 1910, resulting from the relationship between migration, wages, and population size. Population increases with wages, which in turn push down wages and work opportunities, increasing migration. This relationship, together with investments in large infrastructure, increased wages and further facilitated the industrialisation that took place in the 1890s. For instance, these higher wages created a domestic demand for industrial products, strengthening the position of industry.

Industrialisation in Sweden originally started in rural areas with the development of proto-industry. The agricultural sector, as well as forestry and other rural industry, were the first to develop in the nineteenth century. Because of these geographical origins, industrialisation in urban areas - with increasing urbanisation as a consequence - did not take place until late in the nineteenth century. This markedly affected the regional wage differences between the cities and the countryside. This gap, shown to be persistent in the nineteenth and twentieth centuries (Lundh & Prado, 2014), shows a slight increase in terms of the nominal wage ratio between urban and rural areas from 1880 to 1910, but a large increase in the following thirty years in favour or urban areas. After controlling for cost-of-living and health

[5] Sundsvall is a city in the county of Västernorrland in the North of Sweden.

premiums, the gap amounts to approximately 7 percent during the period studied in this paper. However, Enflo *et al.* (2014) highlight the importance of migration for convergence towards equal wages in the cities and countryside. As many workers left for urban areas, wages rose in rural areas, while the agglomeration effects of larger cities did not outweigh the depressing effect of the increased labour supply on wages.

Overall, there were clear differences in the development between the different regions in Sweden. In the early-eighteenth century agriculture was dominant, and improvements in productivity were important stimulants for the growth in southern Sweden (now *Skåne*) and in east-central Sweden, where the soil was most arable (Söderberg, 1984). Changes in the mining industries diverged from those in agricultural regions; government-inspired restriction on the production of iron, designed to keep prices of iron exports high, caused slumping growth in central Sweden where iron industry was largest. The west of Sweden and Skåne enjoyed increased dynamism in agriculture when oats became a more favourable export product. At the same time, forestry became an increasingly profitable industry in both northern Sweden and the west.

With industrialisation came further divergence in regional developments. Peripheral regions such as *Norrland* increased in relevance due to their abundant supply of raw materials.[6] Malmöhus was able to diversify its industrial structure with a focus on the foodstuffs industry, which led to increased growth. Western Sweden possessed a large share of the textile industry, east-central Sweden expansive mechanical engineering, Stockholm skilled manufacturing, south-east Sweden glass industry and furniture industry. Skåne switched from oats to livestock due to relative price movements in the late nineteenth century. Summarising, regions were differentiated into various main industries, which could have meant diverging changes in female gainful employment.

3.2 Sociodemographic background

The role of women underwent great changes in the nineteenth century, not only in economic terms, but also demographically, socially, and politically. Industrialisation had a great impact on the lives of women, including their labour market outcomes. Improvements in health changed decision-making for many women, and urbanisation came paired with changes in social norms. Overall, the context changed, which required new decision-making to accommodate the new situation people found themselves in.

3.2.1 *Health developments*

One of the most important changes in the late nineteenth century was the improvement in the health of the population. Many Western countries saw large decreases in the rate of infant mortality already in the eighteenth century. This rate kept decreasing rapidly until the 1960s, when the infant mortality rate (IMR) reached a level of virtually zero. In Sweden this development was spread unevenly across regions (Brändström *et al.*, 2002). In the early nineteenth century, mortality was much higher in the north and east of Sweden compared to the west and south. Until the end of the nineteenth century

[6] Norrland is a region in the north of Sweden consisting of the counties: Gävleborg, Jämtland, Norrbotten, Västerbotten, and Västernorrland.

rates converged, with Western and Southern counties (*län*) having the lowest rates at the end of the century. Urban regions had higher IMR, but only few places were urbanised. This relationship reversed starting from the 1920s, and nowadays urban regions have a lower IMR than rural areas. Noteworthy is the extent of variation within the counties and at the parish level. The paper by Brändström and others (2002) shows that an important factor for this variation is the way babies were fed. Poor regions, where women participated in market labour and thus had less time to breastfeed their children, had higher rates of mortality on average. Moreover, regions with high rates of illegitimate children performed worse as well, as the mortality rates of illegitimate children was above the average mortality rates of children. A clear socioeconomic differential is observable in the survival rate of children; the survival rates of the upper class were much higher and those of peasants much lower than the national average (Edvinsson *et al.*, 2005).

For adults, rapid declines in mortality rates did not occur until the late-nineteenth century. Life expectancy had already been increasing in the first half of the century but experienced an acceleration in the second half (Sundin & Willlner, 2007). An important factor was increased knowledge on fighting and preventing infectious diseases. Cholera, a large problem in Europe, saw its last large-scale epidemic in 1873 (p. 103), after which improvements in sanitation and hygiene prevented large outbreaks, and major crop failures were no longer a factor since the 1860s through the development of a system of emergency relief (p. 89). Industrialisation brought with it higher male wages, but also longer working days and worse labour conditions for many occupations, for instance factory workers. Urbanisation proved to cause problems for housing conditions, which dropped to accommodate the growing urban population (p. 117). At the same time, infectious diseases became less of a problem, and the growth in wages allowed the population access to better nutrition. As cities improved their sanitation systems, the gap between urban and rural health – which had been in favour of rural areas – started decreasing, and today urban areas have better health on average.

In the late nineteenth century the maternal mortality rate saw a stronger reduction than the general female mortality rate (Högberg *et al.*, 1986). During the period from 1861 to 1900, the number of mothers that died dropped from 567 to 227 per 100,000 live births. This reduction was caused mostly by improved antiseptic techniques, but the social acceptance of midwives was instrumental, too. Especially rural areas took long to adopt the use of midwives. Loudon (1988) underlines the essential role of midwives and illustrates that the decline in maternal mortality was early and steep in Sweden compared to other western countries.

Overall, improvements in health were positively related to the economic growth experienced in the nineteenth century (Tapia Granados & Ionides, 2008). Modern economic growth, which began around 1850 in Sweden, increased the health of the population significantly. Interestingly, this relation reversed in the twentieth century. Economic growth in the nineteenth century was associated with better nutrition and hygiene, whereas these improvements had already been in place in the twentieth century. Rather, economic growth in the twentieth century is related to increased industrial activity and output, while causes of death were more likely to come from work, consumption, or the environment than from undernutrition or infectious diseases (p. 14).

3.2.2 *Fertility transition*

Not only mortality dropped considerably during the nineteenth century. Fertility, the other part of the scale, experienced a transition which started in the 1880s and would continue well into the twentieth century. The fertility transition reduced the number of children per 1000 married women from around 300 in 1860 to 150 in 1945 (Carlsson, 1966). The reduction did not show a clear geographical pattern, to which Carlsson concluded that it must have been an adjustment process (new context), rather than a technology and knowledge spread (of contraceptive use), which explained the decline. Wilkinson (1973) found that the reduction in infant mortality was an important factor in the reduction, but with a stronger effect after 1910 than prior. Similarly, economic changes like the earning's potential of the wife were more important explanations in the early twentieth century than in the late nineteenth century, while male wages were positively associated with the number of births over the period 1870-1965.

Schultz (1985) utilised the changes in relative prices in Sweden, resulting from changes in the world market, to estimate the effect demand for female labour had on their fertility. The relative price of butter to rye is seen as a proxy for relative female-to-male wages. Schultz' results show that one-fourth of the decline in fertility can be explained by a ten percent increase in the relative wages of women. Other important determinants are found to be the reduction in child mortality and the share of urban population. Moreover, the results suggest that male wages are not directly associated with fertility, but rather indirectly through marriage at an earlier age.

More recent research on the fertility transition was conducted by Martin Dribe (2009). Dividing women into age groups, Dribe shows that the start of the fertility transition took place at an earlier point in time for older women than for younger ones. Moreover, the reduction in the IMR did not immediately reduce the crude fertility rate. After all, child mortality had been decreasing for more than a hundred years before the fertility transition kicked off in the 1880s. The marital fertility rate (MFR) was negatively associated with several demand-side factors. A higher supply of children, resulting from the decrease in IMR, decreased the fertility rate. Urbanisation reduced the benefits of children, whom could work on farms but not as easily in urban areas, and increased the costs through *inter alia* higher educational attainment. Thus, the MFR in urban areas was lower than in rural areas. Moreover, socioeconomic differences may have had a large impact on the fertility rates of married couples. The relative wage of women only significantly reduced the fertility rate for older women (age 35 to 44), while women living in industrialised areas had a lower number of births.

3.2.3 *Male breadwinners*

In the nineteenth century, Europe saw a change towards male breadwinners and female housewives. The emergence of wage labour made men the main income-earner, while women and children became characterised as *dependents* (Folbre, 1991). Men took pride in being able to provide for their families; it was considered a status symbol. In fact, having an employed wife was considered worse than having an employed child (Seccombe, 1986). The introduction of wage labour made work more gendered. It was men who were first to enter wage labour, while women often assisted or were productive in the house. This led to a gendered division of labour, where wage labour became connected with masculinity and the house became connected with femininity (Simonton, 1998).

This gender division was encouraged by groups of men in powerful positions. In both Britain

and the United States, for example, unions urged for *family wages* paid only to men, high enough to provide for their families (Folbre, 1991). Moreover, Seccombe (1986) argues that a conservative labour movement was important for establishing women's domesticity. The mass employment of women and the effect their cheap labour would have on the employment and wages of men was considered a threat, and women were for this reason kept off the labour market. Inversely, the idea was that women's absence on the labour market would raise male wages to the point where women did not need to contribute to the family income at all in order to provide for the family.

During this century, social norms encouraged women to stay at home. In the U.S. and Britain, the number of servants increased, and the wives of middle- and upper-class men were expected to become a source of nurturance and civilisation (Folbre, 1991). This ideal of *domesticity* was predominantly a middle-class value, and middle-class women therefore performed little market labour (Tilly & Scott, 1975). Nonetheless, women that worked in the home performed many non-trivial tasks, and women at home were considered always busy. On the other hand, wives of peasants and poor urban workers were forced to generate some kind of income or sustenance in order to survive. In either case, women were actively productive.

3.2.4 *Gendered occupations*

Women that were gainfully employed in the this period worked mostly in female-gendered occupations. One interesting example of this in Sweden is that of *dairymaids*. Sweden was primarily an agrarian society in the nineteenth century, and many women worked and contributed on farms. They had specific roles; they prepared food, cared for the home, and took care of the cattle. The keeping of cows required the cows to be milked, and this was a type of job that was exclusively performed by women (Sommestad, 1994). The work of dairymaids was hard and required significant strength, yet social taboos kept men from participating in this type of work. Sweden was special in this; the United States, where many Scandinavians moved to, did not have these social taboos (Sommestad & Curry, 1998). However, industrialisation brought new machines, which required technical skill. Simultaneously, foreign demand for animal products increased more quickly than female labour could supply. These two developments led to a slow but sure increase in the number of working *dairymen*, although by 1950 this occupation was still predominantly female.

3.2.5 *Servanthood*

The occupation of servant or maid was another important occupation for women's work in pre-industrial Sweden, not only as a source of employment, but also as a substitute for household activities. Sons and daughters of the proletariat had few opportunities for work, and instead had to find work as servants (Sundin, 1999). Contracts of servants lasted one year, after which the contract was either extended or the servant had to find a new place of employment (Lundh, 1999). Largescale circular migration of servants from one parish to the other was the result. The work servants performed depended largely on gender. For example, on farms male servants cared for the horses and threshed grain, while women's servant work was caring for cattle and household chores (Lundh, 2003). The type of work in a region just affected demand for servants.

For the elite, the number of servants was a symbol of wealth, but even middle-upper class families

often employed two servants. However, in the late-nineteenth century servanthood started to lose its relevance when the middle-class demand for servants declined. Rather than hire multiple servants for different tasks, families started to hire only one (Higgs, 1983). Moreover, the supply of servants may have dropped due to an increase in alternative work opportunities for women due to industrialisation. This *servant crisis* was also found in Sweden (Edvinsson & Söderberg, 2010). One-maid households became more common, which reduced the quality-of-life for servants due to isolation and little prospects for career advancement. As a result, even more servants left this type of occupation for better alternatives.

3.2.6 *Swedish families*

In nineteenth-century Sweden, families were nuclear and small, with few extended families. The size of the family depended on the type of work that was common in their region of residence. Households were more complex where work required different occupations and where land accumulation was important for economic activity (Moring, 2003). Households were smaller where wage work was dominant. Moreover, people married late, and many people – especially the poor – did not marry at all. This is an important aspect of Swedish demography. For instance, Sweden's neighbour – Denmark – was considered by Hajnal (1982) to be representative of Northwest Europe, and the perfect example of a country with a *European Marriage Pattern* (EMP); high age-at-marriage and many women remaining unmarried. Dennison and Ogilvie (2014) characterise Sweden as *extreme EMP*.

One's background had important consequences for their future marital status. For example, the daughters of farmers married earlier than those related to the landless, and rich men married younger women (Moring, 2003). The daughters of the poor worked in order to build dowries and make themselves more attractive on the marriage market (Clarke, 1993). For this reason, many young women migrated in order to find work elsewhere. Because young daughters left, households were often small unless larger households were necessary for economic reasons. The size of the family also depended on inheritance strategies and the care for elderly (Lundh, 1995). When a couple married they would leave their parents' home and form their own household. However, the eldest son, especially on farms, was most likely to remain living with their parents. Upon retirement of the parents, the business or farm was inherited by the son in exchange for old-age care for his parents.

3.2.7 *Child care*

An important aspect that needs to be considered when talking about a mothers' work is how to care for her children. Before industrialisation many mothers worked productively from home, and could therefore combine child care and work. Industrialisation, however, took the workplace away from the home, which made it much harder for working mothers to take care of their children (Nyberg, 2000). The state did not consider child care its responsibility, and therefore it was private initiatives that dominated the supply of child care until the 1930s.

Like many other types of female work, child care was mostly informal. A common form of childcaring for children whose mothers worked were child-cribs (*barnkrubba*). These were full-day institutions based on the French *crèche* model. Its care was primitive; it was intended for poor working mothers, and the cribs encouraged order, cleanliness, and other good manners in order to better the future of the poor (Holmlund, 1999). The staff in these institutions were not necessarily well-qualified. Rather,

their competence was assumed on the basis of their sex and status. Moreover, they were not paid – child-cribs subsisted off of donations.

In the late nineteenth century, kindergartens (*barnträdgårdar*) became available for the upper classes. These existed with more pedagogical ideals in mind, and focused on teaching rather than *raising* the children, as was considered necessary for the children of the poor (Bergman, 1993). Kindergartens were established by unmarried women in the bourgeoisie. In contrast to the child-cribs, they were established without the involvement of men. Unmarried women were considered imperfect without a family, and thus for these women it was a possibility to perform family-type responsibilities without having their own family (Holmlund, 1999: p. 150).

In some cases, if child-cribs or kindergartens were not available, women would leave their child or children at home by themselves. Another option was foster care; until 1918, many foster children were sold off to families who were willing to receive the least renumeration to take care of them (Lundberg, 2000). These English auctions brought foster children into families who were willing to take care of another child. Many families, however, did so for their own reasons. Foster children had high rates of mortality because people took them on for selfish reasons, especially the poor. Overall, informal child care was available, but it was scarce and based on philanthropy. It would not be until the 1930s that child care rose in quality and made being a working mother more accessible.

4 Data

4.1 Dataset

The data necessary for analysing the role of women in the nineteenth-century Swedish labour market was obtained from the *North Atlantic Population Project* (NAPP, 2017). This project, executed by IPUMS, digitalises population censuses for a collection of countries. Four censuses are available for Sweden; those of 1880, 1890, 1900, and 1910. We can therefore analyse the progression of female work for this thirty-year period. The censuses include every person living in Sweden, which had a population of around 4.8 million inhabitants in 1880 and 5.6 million in 1910. In total the dataset includes approximately 20.25 million observations. Additionally, regional price levels on a selection of foodstuffs is found in Jörberg's (1972) analysis.

In order to use the dataset, some clean-up work was performed. Primarily, as we are interested in the progression of women on the labour market, men were excluded from the sample. A law in 1881 prohibited children from working, so the decision was made to look only at women starting from the age of 16. Furthermore, those above the age of 79 were excluded, leaving us with a sample of women aged 16 to 79. More exclusions include those living in *institutions*, prisons for instance, the few international migrants, and those whose marital status were unknown. After exclusions we are left with samples ranging from 1.5 million to slightly over 1.8 million women, as can be seen in Table 1.

The digitised data was originally collected by the SCB. Prior to the founding of the SCB in 1858 population registration had been sent to its predecessor, *Tabellverket* (Sköld, 2004). Parish records were gathered by parish priests and sent to Tabellverket for registration and analysis. The founding of the SCB led to ten-yearly national censuses, starting in 1860 up to 1930, after which information was extracted in either five or ten-year intervals (Axelsson & Wisselgren, 2016). Gathering the information

was, however, still done by clergymen. Sweden was virtually exclusively Protestant, and the Church of Sweden took gathering information about the population as one of its tasks. As a result, ecclesiastical records that were already being collected were sent by the clergy to the newly-founded SCB for centralised analysis (SCB, 1969). Thus, information was recorded by clergymen, and not reported by individuals themselves. This creates the possibility for ideology to play a role in the recording of, for example, occupational status. This will be further discussed below.

4.2 Problem of undercounting

One problematic aspect of using national censuses, specifically for the period before World War I, is the under-registration of women in certain positions or occupations. This phenomenon has been observed in many contexts, all throughout Europe, and includes Sweden. Undercounting occurred for different reasons, many of which are common across countries. For one, women generally worked fewer hours than men, and often did not work full-time in the same way men did (Higgs, 1987). In this case, census-takers were sometimes asked to only record women as having an occupation if she performed it similarly to how men did. Moreover, married women often worked as *assisting labour* or as a *labourer's wife* (Schmidt, 2014). Together they would earn a *family wage*; however, it would be solely men and not both being recorded as the labourer. In this way, many married women who did indeed work were recorded as not having worked. In both cases, unmarried women were less likely to be underrecorded than married women. Moreso, unmarried women were more likely to be employed as a domestic servant, an occupation that suffered little underrecording due to the necessity of reporting your servants in the household. Agriculture, on the other hand, suffered the most from underrecording. In many farming households there was a clear division of labour. Men worked on the fields, while women performed most of the work with cattle and in the household. Census-takers may therefore not have observed them as working. Moreover, social ideologies at the time may have motivated census-takers to report women's work through the lens of their own ideology; if the census-taker believed women should not be working, then they would be more prone to record the woman as unoccupied. Important to note, too, is that censuses served political agendas (Humphries & Sarasúa, 2012). Censuses were a critical way of measuring the taxable population, as well as the size of the reserve army. For this reason, men were clearly the focus of censuses, with women being regarded as a sidenote.

The data used in this paper seems to exhibit the problem of undercounting women, especially in agriculture. For instance, Stanfors and Goldscheider (2017) show that women in late-nineenth-century Sweden were still predominantly employed in agriculture, which was their main employer. The data of the current paper, however, estimates a much lower share of women in agriculture (see Table 5). This problem of undercounting cannot be circumvented in the dataset available without making strong assumptions about which women were expected to be undercounted and which ones were not. Instead, alternative data sources are necessary to get closer to the truth. Unfortunately, for a full count dataset of the population this is impossible. Nonetheless, at lower levels of aggregations such analysis can be achieved. One example for the Swedish context is the work by Vikström (2010). Through the comparison of data from parish registers with newspaper articles and advertisements, tax registers, and trade directories, Vikström is able to identify for a group of *c.* 200 women where the parish registry incorrectly states the occupation of a woman. Moreover, the use of newspaper advertisements allow for Vikström to identify the self-identification of a woman's occupation. Her findings show that around 85 percent

of the register entries were erroneously entered. This was especially the case for married women that were recorded without an occupation while there were, in fact, economically active. The results in the present paper should therefore be considered carefully, as they may be imperfect indicators for actual women's gainful employment.

4.3 Variables

As described in the *Theory* section, the marital status of a woman was very likely to impact a woman's decision to work. If a woman's spouse earned enough she did not have to work in order to survive and could instead focus her time and efforts on the household. For instance, the *ideology of the housewife* pushed women towards the home in nineteenth-century Netherlands (van Poppel *et al.*, 2009). De Vries (2008) argues similarly; increases in male incomes, as well as a change in the preference for consumption bundles with a focus on comfort, health and education, urged more women to domestic production. Conversely, unmarried women were more likely to live in single-person households and had to work in order to subsist.

The number of children is also likely to be an important determinant of female work. The existence of children in the household raises the opportunity cost of working for women, as they would be unable to spend time raising their child and would have to find an alternative caretaker if they chose to work. The number of children is therefore expected to negatively impact the propensity of women to work. However, the age of children may be important if older children are capable of taking care of themselves. Naturally, children under the age of five are unable to take care of themselves, and thus are likely to reduce female participation. Children older than five may, instead, have been more self-sufficient. If this is the case, then women with older children are more likely to work than those with younger children.

Alternatively, having children actively participating in the labour force may have impacted the employment status of mothers differently. Working children still living in the home increase the family income, which may be used as a substitution for the mothers' income. In this case, mothers would be less pressured to work. For instance, Fraundorf (1979) mentions that if the male income was insufficient, it was the children rather than the mother who would have to work to fill the gap. However, having working children in your family may for the same reason be an indication of low income of the family head, in which case working children could imply an increased necessity for women to work. Empirical findings on this go both ways. For instance, Pérez-Fuentes (2013) examined the case of Spain in 1825 and found that having children under the age of ten did not decrease women's participation and having working children increased women's participation. Conversely, Borderías (2013) found that Catalonian women with children in the early-twentieth century had higher participation rates, unless the child worked, in which case it was lower.

Another important indicator is age. Economists have theorised about the life-cycle of labour, and generally it is assumed that women work when they are younger and become less likely to work as they get older (Heckman, 1983). Moreover, younger women are less likely to be married, and thus more likely to have to work for their own income. Furthermore, in the eighteenth and nineteenth centuries, many young women were sent away by their parents to work in urban areas as a maid or domestic servant (Eriksson & Rogers, 1978). Perhaps more importantly, the type of unskilled work required in the nineteenth century may value strength and endurance, two aspects which may be decreasing with age (Burnette, 2008).

Whether the woman resides in an urban area or not is also an important variable. Urban areas are often considered to have better employment opportunities for women, and young girls were therefore often sent to the big city in order to find work. These jobs were not only in domestic service, but also factory and service work, which were prevalent in urban areas. Thus, in a naive regression we expect women in urban areas to be more likely to work. Moreover, the urban-rural divide serves as an indication of regional variance, and it is therefore worthwhile to identify changes over time for this variable.

The occupation of the household head in which the woman resides may have an influence on both the probability of the woman to work, and the probability of being undercounted by a census. Certain occupations required women to help their spouse, in which case the woman would work as an *assisting labourer* or *labourer's wife* (Schmidt, 2014). Other occupations allowed no such possibilities for partners to work together, in which case the woman either worked domestically or had her own occupation. In the case the household head was not the spouse but a relative, say her father, there were possibilities for skills being taught to own kin (Vikström & Ericsson, 2012). Moreover, women living in a household where the household head did not work may have had to work (or work more) in order to compensate for the lack of income.

Domestic service was a common form of employment before the twentieth century, and many households therefore had one or more servants living and working in household. The impact the number of servants may have on female work is ambiguous. On the one hand, women living in households with servants may have enough income such that they are no longer necessitated to work. On the other hand, the help of servants decreased the demand for women in domestic production, which allowed her more time to work. Overall, the number of servants is expected to positively affect the female participation rate as many middle-class women started their own businesses or were otherwise occupied (Ericsson, 2001).

Characteristics of the parishes and counties in which the women live are also considered. At the parish level the economic structure may play an important role. Women living in parishes which offer economic opportunities are likely to work more than those living in parishes which offer no opportunities. Thus, the share of women's employment per HISCO-classification is used.[7] Moreover, at the county-level the relative price of butter over rye are included. The relative price of butter over rye is included as a proxy for the demand for female labour. When the demand for women is high, butter prices rise as dairymaids have to be offered higher wages in order to remain at their current jobs, while other women's employers need to compensate their employees for the relatively higher wages elsewhere. Moreover, rye is generally strongly related to the position of men, and the ratio of the price of butter over the price of rye can therefore work as an indicator of the relative position of women on the labour market.

4.4 Descriptive statistics

The descriptive statistics of the data can be found in Table 1. The columns are divided into the four census years to get a clear view of the progression of the variables. The population remains relatively

[7] HISCO is a *Historical International Standard Classification of Occupations*, developed by van Leeuwen, Maas, and Miles (2002).

Table 1: *Descriptive statistics*

	Census year			
Variables	1880	1890	1900	1910
Age	39.24	40.52	40.58	40.37
Marital status				
Married & present	48.52	48.65	47.84	47.44
Married & absent	0.52	0.92	0.89	1.02
Divorced	0.13	0.15	0.21	0.28
Widowed	11.07	11.19	10.86	10.15
Never married	39.77	39.09	40.21	41.10
Urban	17.53	20.87	23.26	25.75
Migrant status				
Lives in birth county	84.49	83.06	81.60	79.82
Across county, to rural	11.72	12.23	12.80	13.71
Across county, to urban	3.79	4.72	5.60	6.46
Number of children				
Aged 0-5	0.35	0.34	0.32	0.31
Aged 6-10	0.30	0.30	0.30	0.29
Aged ≥10	0.69	0.69	0.72	0.73
Total	1.33	1.33	1.34	1.32
Of which working	0.03	0.04	0.06	0.14
Average primary family size	4.27	4.16	4.18	4.13
Average household size	5.10	4.81	4.78	4.66
Number of servants				
0	84.49	87.35	88.89	91.91
1	9.10	7.93	7.38	5.65
2-5	5.96	4.44	3.53	2.32
6+	0.45	0.28	0.20	0.11
No. of observations	1,505,045	1,584,248	1,694,287	1,824,366

Note: Average household size includes servants living in the household.

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

constant in certain aspects, but undergo large changes in others. The age of the population, for instance, sees only a slight increase, most likely due to out-migration of many young people. The marital status of women only changed slightly as well. The number of widowed women dropped by approximately one percentage point, probably caused by the decrease in mortality in later years. At the same time the country experiences a growth in the number of women who are either divorced or whose husband is absent.

One clearly observable development is that of urbanisation. In 1880 a little over one-sixth of women lived in urban areas. By 1910, this number had grown to more than one-fourth. Many young women moved to cities in order to find work as domestic servants, and with industrialisation these cities offered an increasing number of job opportunities to young women. The number of people living in the county they were born in decreased during the period, with more people moving towards urban areas in other counties.

The introduction of new opportunities for young women, spurred by industrialisation, decreased the relative attractiveness of working in domestic service. This can be seen in decline in the number of servants per household. While in 1880 slightly more than 15 percent of women had the help of at least one domestic servant, by 1910 this number was below 10 percent. Moreover, the households that did have servants hired fewer.

The change towards fewer servants can partially be seen in the decline of the average household size. Concurrently, the number of children per family remained relatively constant around 1.33 children per household. Besides the lower number of servants, another possible explanation for the slight drop in the average household size would be relatives living with another family. This may have become less common, as the elderly were cared for better and a decreasing old-age mortality would keep more older couples together, no longer requiring the assistance of their offspring.

4.5 Preliminary findings

Examining how the reported occupational status differed between women with different attributes may give us a better understanding of the analysis to come. Table 2 and Figure 1 display the changes in the female gainful employment rate by regions and county. The regions Norrland and Götaland are shown to have had a much lower rate of working women than Swealand. This difference, however, is completely due to the inclusion of Stockholm, without which the region would be similar to the rest of the country.

Over the time period it was Götaland which had the most impressive growth in the rate of working women, with an increase of 46 percent from 1880 to 1910. Fast growers among the counties were exclusively found in this region, for instance the counties with the large growing cities of Malmö and Göteborg. Stockholm, on the other hand, had already developed its female labour force much earlier, and the competition from other towns had led to stagnating economic growth in the capital (Söderberg, 1984: p. 9). Malmö was able to diversify its industrial structure during this period, with a new focus on foodstuffs, which may have created more opportunities for women. At the same time, Göteborg emerged as the most important export port of Sweden (p. 12).

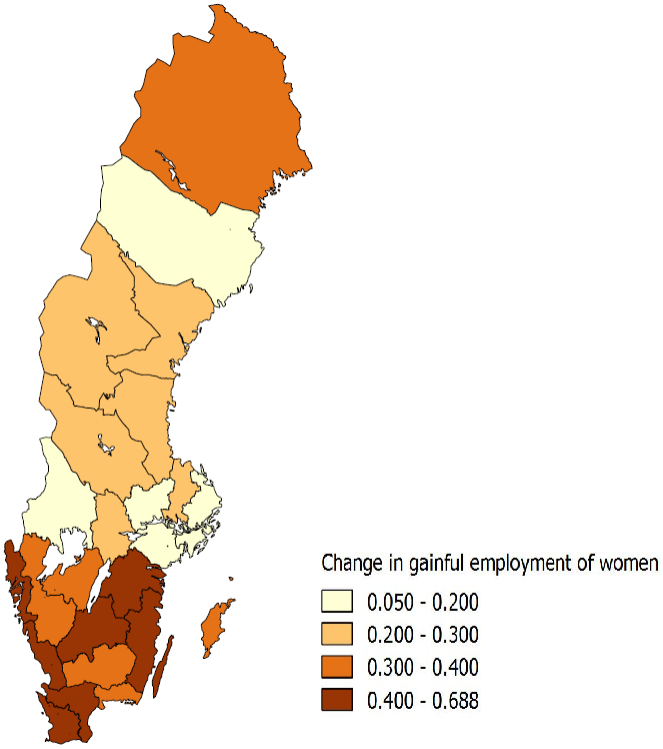
Table 2: *Gainful employment of women by county, 1880-1910*

	Census year				
County	1880 (a)	1890 (b)	1900 (c)	1910 (d)	Ratio (d/a)
Swealand	26.25	25.64	26.39	32.87	1.25
Stockholm	40.45	39.60	40.51	46.05	1.14
Uppsala	22.31	20.68	21.14	27.42	1.23
Södermanland	21.41	19.77	19.34	25.56	1.19
Värmland	18.20	16.51	15.06	19.95	1.10
Örebro	19.98	18.06	18.35	24.79	1.24
Västmanland	23.60	20.73	20.73	24.77	1.05
Kopparberg	14.08	13.77	11.98	17.82	1.27
Norrland	18.91	17.78	18.62	23.00	1.22
Gävleborg	21.06	20.56	21.60	25.66	1.22
Västernorrland	19.70	18.13	18.86	24.72	1.25
Jämtland	16.14	15.14	16.88	20.56	1.27
Västerbotten	19.12	15.74	17.22	20.23	1.06
Norrbotten	15.20	16.31	15.41	20.26	1.33
Götaland	18.79	18.28	19.37	27.44	1.46
Östergötland	20.99	21.04	21.61	29.80	1.42
Jönköping	15.94	14.88	14.16	22.54	1.41
Kronoberg	13.14	11.91	12.12	17.47	1.33
Kalmar	13.88	13.30	14.83	23.44	1.69
Gotland	22.20	23.96	24.94	29.34	1.32
Blekinge	19.30	16.98	18.59	26.48	1.37
Kristianstad	22.20	20.66	21.67	31.75	1.43
Malmöhus	22.68	22.52	23.81	32.79	1.45
Halland	16.47	16.31	15.96	24.72	1.50
Göteborg och Bohus	21.40	20.83	23.35	32.14	1.50
Älvsborg	17.79	17.14	17.37	23.56	1.32
Skaraborg	17.04	16.51	17.64	22.97	1.35
Total	20.56	20.03	20.88	27.90	1.36

Note: Counties as they existed in 1910.

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

Figure 1: *The change in the rate of female gainful employment by county, 1880-1910*



Note: Counties are depicted as they were defined in 1910.
Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

One characteristic we expect to explain the most variation is the marital status of a woman. Married women had access to a spouse, the likely income-earner, and had more responsibilities in the household. Unmarried women, particularly never-married women, were more likely to be by themselves, and thus the sole breadwinner. For this reason they were much more likely to have been reported as having a gainful occupation. Married women were also at a higher risk of being under-recorded in the censuses due to social norms among the census-takers and the type of activities married women performed. Moreover, distinguishing between urban and rural women allows us to observe whether the work opportunities, which were supposedly more present in urban areas, had an effect on women's propensity to work. Table 3 shows the occupational status of women by marital status and living area.

Over the thirty-year period the share of women with an occupation is increasing in every group of marital status and in each region, with the exception of single women in rural areas. While the shift towards animal products improved women's agricultural job opportunities in the South of Sweden, other changes, such as new machinery which favoured men, led to reduction in work opportunities for women. These machines made work more complex and dependent on strength, as well as increase the productivity, both developments decreasing the demand for female labour in agriculture, as was seen in other countries (van Nederveen Meerkerk & Paping, 2014).

Table 3: *Gainful employment by marital status and region of residence*

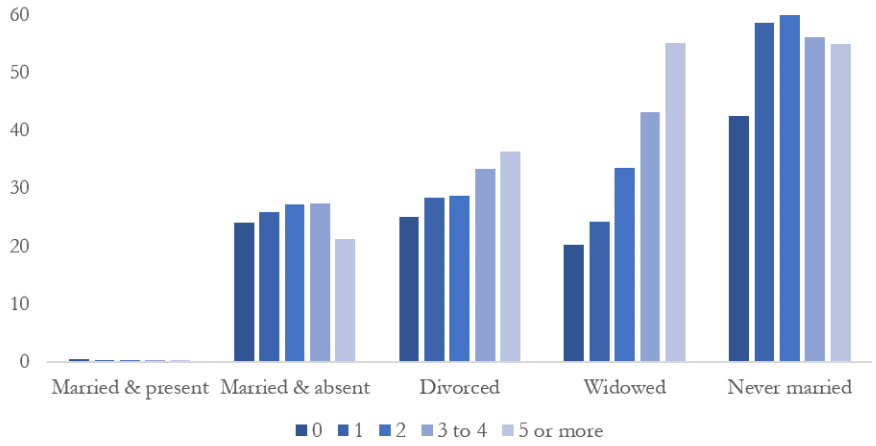
	Panel A: Rural women				
Marital status	1880 (a)	1890 (b)	1900 (c)	1910 (d)	Ratio (d/a)
Married & spouse present	0.26	0.38	0.45	0.85	3.21
Married & spouse absent	19.16	29.64	27.72	45.66	2.38
Divorced	23.88	26.61	34.08	50.42	2.11
Widowed	26.16	27.63	31.14	64.55	2.47
Single	38.32	34.64	32.70	37.73	0.98
Total	17.45	16.17	16.08	21.94	1.26
	Panel B: Urban women				
Marital status	1880 (a)	1890 (b)	1900 (c)	1910 (d)	Ratio (d/a)
Married & spouse present	0.77	0.77	0.76	2.85	3.70
Married & spouse absent	36.79	34.64	38.82	60.76	1.65
Divorced	31.55	40.74	37.76	49.09	1.56
Widowed	32.21	33.55	42.56	79.72	2.48
Single	60.52	60.94	62.56	70.61	1.17
Total	35.17	34.65	36.72	45.10	1.28

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

The group with the most growth was the group of married women with their spouse present in the household. This group was more than three times as likely to be reported with an occupation in 1880 than in 1910, although the share of the women working in this group remained negligible, with less than one percent in rural areas and less than three percent in urban areas being reported as occupied. Conversely, the share of widowed women with an occupation increased to two-thirds and four-fifths in rural and urban areas, respectively. New opportunities presented by industrialisation may have allowed them to find employment at a higher rate. The group of single women in urban areas was affected only slightly by these opportunities, mostly due to their already high rate of occupational status in 1880. Instead, improved opportunities may have bettered their standard of living by giving them access to work other than domestic service.

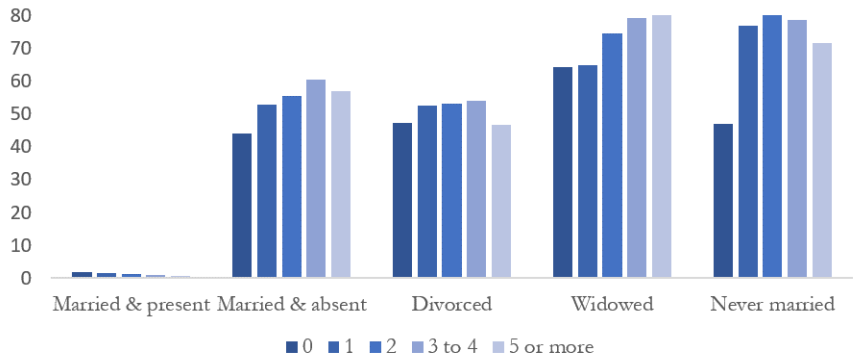
Another important determinant, as speculated by economic theory, is the number of children in the household. An increase in the number of children increases the pressure of household responsibilities for women. This pressure may have affected women with varying marital statuses differently. A married woman was expected to take care of the domicile by her spouse, but unmarried women have no spouse that earns the income. Instead, these women may have had to work regardless of their number of children, and possibly even increase their propensity to work with the number of children. Figures 2 and 3 show the rate of gainful employment of women by their marital status and number of children for 1880 and 1910, respectively.

Figure 2: *Gainful employment by marital status and the number of children, 1880*



Source: Author's own calculations using the Swedish 1880 census.

Figure 3: *Gainful employment by marital status and the number of children, 1910*



Source: Author's own calculations using the Swedish 1910 census.

The figure shows that the impact of the number of children on a woman's occupational status indeed varies with her marital status. Married women with their spouse present experience a downwards trend with more children. The increased opportunity cost of working appears to be dominant here. Divorced and widowed women, on the other hand, show an increasing participation with the number of children. For them, the lack of a male breadwinner may have necessitated them to work, and having more children merely forced them to work more. If the woman is married but her spouse is absent, the number of children increases her tendency to work up to 4 children, while having 5 or more children decreases this tendency. Women who have never been married show participation rates that are higher with children than without, but this increase is lower if they have at least three children. Clearly, different factors are playing a role for different women here. The patterns remain similar in 1910, but the magnitude of the impacts have changed.

Table 4: *Gainful employment by number of working children*

	Census year				
Number of working children	1880 (a)	1890 (b)	1900 (c)	1910 (d)	Ratio (d/a)
No working children	20.69	20.20	21.14	28.62	1.38
1 working child	14.03	13.91	14.79	21.42	1.53
2 or 3 working children	15.39	15.98	16.17	20.76	1.35
4 or more working children	18.12	22.59	19.19	20.56	1.13

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

In addition, the number of working children per family was an important factor. Table 4 shows the occupational status of women by the number of working children. Overall, having one working child seems to have lowered the employment of women. If there were more than one working child, however, the participation rates went up for all years except 1910. This may suggest that up to 1910, having a working child may have substituted the income of the mother, but having more than one working child may be an indicator of a poor household. In the last year, however, the substitution effect for the mother's income may have disappeared.

Table 5: *Distribution of occupations of gainfully employed women*

	Census year				
Variables	1880 (a)	1890 (b)	1900 (c)	1910 (d)	Ratio (d/a)
Has occupation	309,395	317,276	353,804	508,985	1.65
Professional, technical, and related workers	3.43	4.76	6.10	7.43	2.16
Administrative and managerial workers	0.28	0.39	0.60	1.12	4.02
Clerical and related workers	0.33	0.74	1.54	3.66	11.15
Sales workers	1.25	2.21	3.32	5.58	4.48
Service workers (excl. domestic servants)	4.67	6.13	8.52	12.13	2.60
Domestic servants	69.86	59.27	47.47	29.43	0.42
Agricultural workers	9.62	11.57	11.11	15.21	1.58
Production and related workers	10.57	14.92	21.34	25.44	2.41
No occupation	1,195,650	1,266,972	1,340,483	1,315,381	1.10

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

Instead of looking at the determinants of gainful employment, we may also examine the types of work women performed. Industrialisation in Sweden drastically changed the composition of female work. Table 5 displays this composition and shows large changes over the thirty-year period.[8] In 1880 women were mainly employed as domestic servants, with this group employing more than two-thirds of all gainfully employed women. This occupation lost its importance quickly, and by 1910 only employed *c.* one-third of the female working population. Instead, women moved to all other sectors, with many choosing to work in other types of service work, factory work, and agriculture. The largest growing sector was that of clerical occupations, an occupational group that we know would really take off as a large employer of women in the twentieth century (Goldin, 1994).

Table 6: *Common occupations of working women*

	Census year				
Occupation	1880 (a)	1890 (b)	1900 (c)	1910 (d)	Ratio (d/a)
House servants and maids[a]	209,290	183,662	163,770	104,074	0.50
General farmers[a]	19,746	25,013	27,033	43,693	2.21
Workers[a]	11,845	13,582	21,145	14,415	1.22
Husbandmen or cottars	8,299	8,552	8,939	14,749	1.78
Sewers	8,075	13,944	21,824	34,949	4.33
Housekeeping service supervisors	5,810	8,626	14,750	30,074	5.18
Personal servants and valets	5,341	3,119	3,511	37,511	7.02
Teachers[a]	2,780	3,336	4,069	5,403	1.94
Factory labourers	2,774	2,937	7,208	11,397	4.11
Teachers (primary school)	2,771	5,458	8,220	13,572	4.90
Dealers and merchants	2,548	4,366	6,590	13,526	5.31
Washing and laundry services	2,288	3,288	5,225	9,488	4.15
Charworkers	1,236	1,765	2,583	5,312	4.30
Weavers	795	1,780	2,664	5,134	6.46
Clerks in shops and stores	791	2,101	4,493	13,232	16.73
Farm workers[a]	788	1,715	1,810	13,539	17.18
Office clerks[a]	122	547	1,726	6,740	55.25

[a] Not further specified or specialisation unknown.

Note: Occupations are listed with at least 5000 women in one of the census years.

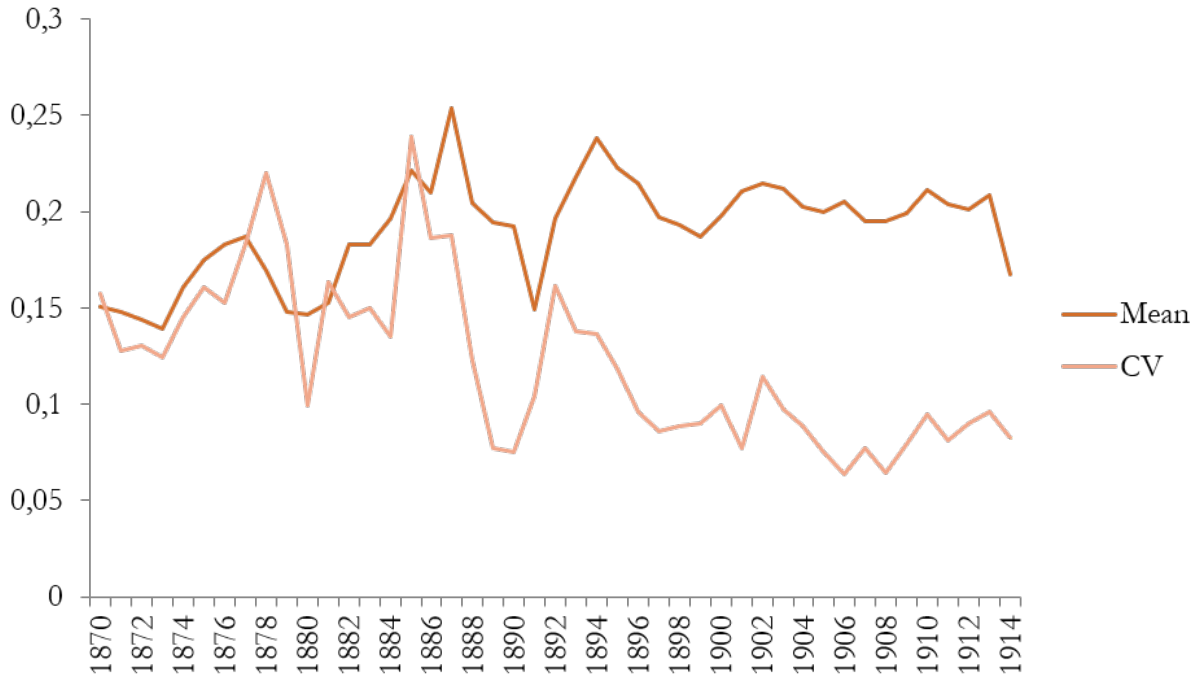
Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

Digging deeper into the types of work performed by women, Table 6 shows the most common occupations held by working women. It clearly shows the decrease in the prevalence of domestic service. The decrease in the group *house servants and maids* does not tell the whole story, however, as many servants were described under a different title in the 1910 census. For example, *personal servants and valets*

[8] Due to undercounting of women working in agriculture, the rest of the occupations are overestimated. However, the trends over time remain the same.

increased by more than 30000 between 1900 and 1910. Women emerged as teachers, predominantly in primary schools, but in later censuses the number of female teachers in secondary schools increased greatly, too. As seen in Table 5, agriculture was already a large employer of women, but in the early-twentieth century certain occupations within the sector grew large, such as *husbandmen and cottars*. More women started working in clerical occupations, both in offices and in stores. Industrial work also became a more important employer, as more women were employed as *sewers*, *factory labourers*, and *weavers*.

Figure 4: *The relative price of butter over rye over time, Sweden, 1870-1914*



Source: Author's own calculations using Jörberg's (1972) price data.

In order to get a better understanding of the price of butter over rye variable, Figure 4 shows the development of this ratio over time, together with the *Coefficient of Variation* (CV). The CV is an indicator of the divergence in prices between counties. The grain crisis in Europe in the 1880s caused an increase in the relative price of butter due to a decline in the price of grain (Schultz, 1985).[9] After the demand shock increased the relative price of butter in the 1880s, many farmers shifted their production to animal products. The decrease after the peak in the late 1880s may therefore be explained by a large increase in the production of butter and a large decline in the production of grain. By the early-twentieth century the ratio has stabilised.

[9]Grain prices dropped rapidly in Europe in the 1880s after the introduction of American grains to the market.

5 Methodology

5.1 Models

While the cross tabulations give us valuable insights, they cannot tell us about more deeply rooted relations between variables. Therefore, in order to properly analyse the determinants of female occupational status, econometric methods will be used. The dependent variable – whether a woman was recorded to be gainfully employed – is binary. The estimations from a standard OLS regression with a binary dependent variable would result in a *Linear Probability Model* (LPM). The estimated outcome of a LPM gives the probability of being reported as gainfully employed conditional on the independent variables. However, as the name suggests, the model is linear and allows the estimation to go below 0 and above 1, which may lead to unrealistic outcomes. For these reasons the preference is given to a *Multivariate Logistic Regression* (MLR). The MLR makes use of a logistic distribution, which is non-linear and keeps estimated outcomes between 0 and 1, avoiding the problem of the LPM. The logistic regression will estimate the probability of a woman being recorded with a gainful employment, conditionally on the explanatory variables in the model. Specifically, the model is specified as follows

$$Prob(E_{it} = 1) = F(\beta_0 + \beta_1 C'_{it} + \beta_2 X'_{it} + u_{it}) \tag{1}$$

where E_{it} is the employment status of person i in year t (the census years 1880, 1890, 1900, and 1910), F is the likelihood function, C'_{it} is a vector of control variables, X'_{it} is a vector of explanatory variables used to test the hypotheses of this paper, and u_{it} is the standard error. The outcomes will be given in *odds ratios*, allowing us to interpret the results as either an increase or a decrease in the odds of being registered with an occupation, relative to the reference group. If we define the function given in (1) as equal to E, then the logistic distribution giving the odds ratios looks as follows

$$F(E) = \frac{e^E}{1 + e^E} \tag{2}$$

Odds ratios are one way of interpreting the results. Easier interpretation is possible when we use *Average Marginal Effects* (AME). The marginal effect of a variable (X) is the difference between the estimated outcome (Y) when the specific variable (X) equals 1 compared to when it is 0. This difference is calculated for every individual in the sample, after which the average is calculated over the entire sample. In this way, we can identify a more nuanced number for the effect of our variable of interest. The AME allow us to interpret the outcomes as a percentage increase, rather than an increase in the odds. Therefore, results for the main explanatory variables will be presented in Average Marginal Effects as well.

Furthermore, in the Theory section certain aspects were discussed as to why women may have had different determinants by marital status. In the Preliminary findings we also saw that there were large differences in gainful employment by certain characteristics and the woman's marital status. For instance, married women have lower participation rates on average with an increasing number of children, while unmarried women's participation increases on average with children. These differences warrant an inspection into the differential determinants between married and unmarried women. To achieve this, the model described above is ran separately for three different marital statuses; never-married

women, married women, and widowed women. These separate regressions should give a good indication of the different experiences women with different matital statuses had.

For the never-married group, the explanatory variables include the number of children, the economic structure in the parish of residence, and the relative butter price. Few unmarried women had servants, and unmarried women were much more likely to be a servant themselves. For this reason, the model for unmarried women does not include a servants-variable. For widowed and married women, the inclusion of this variable makes more sense in practice. Moreover, the occupation of the household head may give additional information about the household situation of married women. Because never-married and widowed women do not have an (occupied) spouse, this variable is omitted for these two groups of women.

5.2 Sensitivity analyses

The data in combination with the methodology have some limitations. For example, undercounting of women in agriculture, as has been noted to occur in various countries according to the literature, could possibly affect our results. If this were to happen, results move away from their true outcome. For this reason, various sensitivity analyses will be implemented to see how robust the results are.

First, OLS and Probit regressions are run with the same models in order to affirm that the results are not due to the specific distribution chosen. For instance, Mood (2010) raises the problem of *unobserved heterogeneity* in the case of logistic regressions. While the Average Marginal Effects are already a partial solution (p. 78), alternative specifications may give more credibility to the results.

Second, the undercounting of women in agriculture is a marked problem. While it is not possible to address this problem head-on, we may alter the variable that is most likely to be affected, namely the shares of occupation by parish. Women were most likely to be undercounted, while male breadwinners experienced little to no undercounting. In the second sensitivity analysis female economic structures are therefore replaced with their male counterparts, which should be more representative of the economic structure of the parish.

Third, standard errors may be incorrectly estimated if we believe that there is correlation between them. This might occur if there is similarity in errors between women in specific groups, for example the region in which they live. Preferably, standard errors are clustered at the city-level, the most likely level of association. Unfortunately, the individuals' parish and county are observable, but not the city. Angrist and Pischke (2008: p. 238) suggest at least 42 separate clusters for the use of clustered standard errors. The number of counties is therefore insufficient. One possibility would be to use multi-way clustering; separate clusters by county and marital status (Cameron & Miller, 2015). However, regressions are estimated for marital statuses separately, making this approach infeasible. Instead, the decision is made to cluster at the parish level, which suffices for the purposes of this paper.

5.3 Selection problem

Another problem with the methodology that should be discussed is the *selection problem* (Angrist & Pischke, 2008: p. 9). This problem relates to the possibility of causal inference. Ideally, one would measure the impact of a variable by simultaneously *treating* and *not treating* the same person. For example, to measure the impact of an extra child on wages for a specific person, this person would both receive

and not receive a child in alternative dimensions, holding everything else constant. The causal impact would then be the difference in wages between these two identical people. In reality this is not possible. Analysis should instead get as close to this ideal as possible.

One way of achieving this is the use of certain panel data approaches, such as *instrumental variables*, *difference-in-difference*, and *regression discontinuity designs*. The data used in this paper, however, consists of repeated cross-sections rather than panel data. These approaches are therefore unavailable. The exact data from this study was linked over time by Dribe and co-authors (2017), transforming the data into panel data and allowing for the use of the above methods. However, by linking, the sample was reduced to approximately 90,000 women. Not only is linking the data beyond the scope of this paper, it would also have a large negative impact on the size of the samples, which is considered one of the upsides of the data.

Consequently, the results of the analysis cannot be inferred as causal. Rather, the outcomes are associations between the dependent and independent variables. For example, the average employment rate of women with children is compared with the average employment rate of women without children, controlling for all other variables in the model. However, these associations still provide important insights on the determinants of gainful employment of Swedish women in the late-nineteenth and early-twentieth centuries.

6 Results

This section will present the results from the methodology as described above. The results are split into the subsections for the different marital statuses. Models will be estimated starting from only contol variables. Subsequently, the explanatory variables are then introduced stepwise to observe the interrelatedness of the different variables.

6.1 Multivariate Logistic Regressions

6.1.1 *Never-married women*

Tables 7 and 8 display the results of the MLR for never-married women for the years 1880 and 1910, respectively. Model 1 shows the regression with only control variables. In Model 2, the number of children are added in four categories; up to five years old, those between six and ten, those ten and older, and the number of working children. Model 3 adds the relative share of economic structure for 6 categories – all occupation groups outside of agriculture and domestic service, which are considered the *traditional sectors*. This group of variables is added as percentages on a scale of 1 to 100. The coefficient should therefore be considered as the change in the probability of gainful employment after a one-percentage-point increase in a specific economic sector relative to the traditional sectors, all else equal. Moreover, this model also introduces the relative price of butter over rye. This variable is used as a proxy for the economic demand for female labour.[10]

[10] This variable is defined as the five-year average of the price ratio of butter over rye, using the year of the census and the four precreding years. The variable is multiplied by a hundred; the coefficient for the relative butter price variable is roughly equal to a 5 to 10 percent increase in the butter-to-rye price ratio.

Table 7: *Determinants of gainful employment of never-married women, 1880*

	Model 1		Model 2		Model 3	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.444***	(96.84)	1.433***	(94.07)	1.431***	(91.86)
Age-squared	0.992***	(-78.79)	0.992***	(-76.49)	0.992***	(-74.49)
Age-cubed	1.000***	(63.88)	1.000***	(62.07)	1.000***	(60.27)
Urban residence	1.847***	(10.81)	1.851***	(10.85)	1.445***	(6.29)
Migrant status						
County of birth, rural migration	0.949	(-1.64)	0.949*	(-1.65)	0.900***	(-3.26)
County of birth, urban migration	1.029	(0.89)	1.029	(0.87)	0.934**	(-2.04)
Other county, rural migration	0.990	(-0.21)	0.987	(-0.27)	0.958	(-0.88)
Other county, urban migration	0.979	(-0.43)	0.978	(-0.47)	0.924	(-1.60)
Nörrland residence	0.918***	(-8.77)	0.916***	(-9.01)	1.201***	(16.87)
Götaland residence	0.875***	(-19.49)	0.877***	(-19.20)	1.001	(0.13)
Stockholm residence	1.863***	(50.25)	1.871***	(50.60)	1.631***	(36.05)
No. of children						
Aged 0-5			1.562***	(22.66)	1.584***	(22.78)
Aged 6-10			0.999	(-0.03)	0.996	(-0.17)
Aged 11+			1.007	(0.46)	1.017	(1.04)
Working child			1.566***	(6.60)	1.490***	(5.84)
Share of women employed by parish						
Professional, technical, and related workers					0.976***	(-19.35)
Administrative and managerial workers					1.167***	(19.96)
Clerical and related workers					0.978***	(-3.22)
Sales workers					0.998	(-1.19)
Service workers (excl. domestic service)					1.008***	(29.71)
Production and related workers					1.008***	(26.12)
Relative butter price					1.112***	(69.58)
No. of observations	598,502		598,502		579,696	
Pseudo R^2	0.060		0.061		0.071	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1880 census

Model 3 is the full model for never-married women. In terms of labour supply, it shows that an increase in the number of young children (under the age of 6) increases the probability of gainful employment for single women. In 1880, more children over the age of 5 did not significantly affect the likelihood of participation for single women. By 1910, however, this had changed. All categories of children were significant and positive in this year, with the effect being higher for young children compared to older children. Moreover, in both 1880 and 1910, the number of working children significantly increased the probability of being gainfully employed for single women.

Table 8: *Determinants of gainful employment of never-married women, 1910*

	Model 1		Model 2		Model 3	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.351***	(90.86)	1.337***	(87.16)	1.335***	(83.96)
Age-squared	0.995***	(-63.57)	0.995***	(-60.75)	0.995***	(-57.93)
Age-cubed	1.000***	(45.50)	1.000***	(43.41)	1.000***	(41.07)
Urban residence	3.852***	(25.05)	3.800***	(24.66)	1.478***	(6.51)
Migrant status						
County of birth, rural migration	1.081*	(2.15)	1.082*	(2.14)	1.049	(1.25)
County of birth, urban migration	1.122**	(3.11)	1.123**	(3.13)	1.082*	(2.04)
Other county, rural migration	0.930	(-1.80)	0.941	(-1.51)	1.211***	(4.14)
Other county, urban migration	0.861***	(-3.66)	0.871***	(-3.35)	1.066	(1.37)
Nörrland residence	1.034***	(3.91)	1.016	(1.83)	1.068***	(7.08)
Götaland residence	1.182***	(25.19)	1.183***	(25.26)	1.034***	(4.60)
Stockholm residence	2.179***	(74.69)	2.191***	(75.15)	1.416***	(27.03)
No. of children						
Aged 0-5			2.789***	(33.68)	2.545***	(30.19)
Aged 6-10			1.718***	(15.03)	1.700***	(14.48)
Aged 11+			1.137***	(6.44)	1.143***	(6.50)
Working child			1.382***	(7.70)	1.293***	(5.95)
Share of women employed by parish						
Professional, technical, and related workers					0.932***	(-68.37)
Administrative and managerial workers					1.056***	(16.84)
Clerical and related workers					1.060***	(28.54)
Sales workers					1.030***	(21.09)
Service workers (excl. domestic service)					1.016***	(51.30)
Production and related workers					1.013***	(57.17)
Relative butter price					1.078***	(27.71)
No. of observations	749,841		749,841		731,357	
Pseudo R^2	0.130		0.133		0.158	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1910 census.

On the labour demand side, economic structure at the parish level significantly affected the participation of women. At the beginning of the period, a higher share of professional and clerical occupations in the parish of residence reduced the likelihood of working. More administrative, service, and production work increased this likelihood. The share of sales work had no effect. At the end of the period, all occupation groups but professional work had a positive effect on single women's work, with clerical work and administrative occupations having the highest effects. Moreover, in both years, an increase in the relative price of butter over rye had a positive effect on the women's work.

6.1.2 *Widowed women*

The experience of widowed women was different from that of never-married women. In Tables 9 and 10, the results are shown for widowed women in 1880 and 1910, respectively. Here Model 2 adds the children variables, and Model 3 adds the number of servants in four categories; no servants (the reference category), one servant, two to five servants, and six or more servants. The share of economic structure and the relative butter price are added in Model 4.

In 1880, children had a mostly positive effect on the likelihood of work for widowed women. This effect was larger for older children (aged 11 or older), and only weakly significant for children in between the ages of 6 and 10. Nonetheless, after the introduction of demand-side variables in Model 4, the number of working children had a negative effect on the work probability. In 1910, young children no longer affected widowed women's work. Older children still affected widowed women positively in terms of occupation, while the working children variable turned positive.

Because domestic servants are almost exclusively never-married women, this variable was omitted in the single women's model. Here, however, we can observe the effect of servants on the likelihood of work. In both years, the number of servants had a positive effect on the likelihood of work. This effect was increasing with the number of servants, six or more servants having the largest effect.

For these women, professional work had a negative impact on the probability of being reported with a gainful occupation in 1880. More sales work had no effect, while the other sectors had a positive effect on the employment of widowed women. Larger effects are found for clerical and administrative work. By 1910, clerical work had turned into a detrimental sector for widowed women. Service work lost its effect, while sales work became positive. Moreover, just like single women, an increase in the relative price of butter positively affected participation rates.

Table 9: *Determinants of gainful employment of widowed women, 1880*

	Model 1		Model 2		Model 3		Model 4	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.286***	(12.25)	0.980	(-0.95)	1.009	(0.43)	0.999	(-0.03)
Age-squared	0.995***	(-12.15)	1.000	(0.35)	1.000	(-0.84)	1.000	(-0.31)
Age-cubed	1.000***	(10.26)	1.000	(-1.06)	1.000	(-0.08)	1.000	(-0.65)
Urban residence	0.477***	(-5.18)	0.500***	(-4.78)	0.478***	(-5.03)	0.311***	(-7.74)
Migrant status								
County of birth, rural migration	1.327***	(4.15)	1.334***	(4.19)	1.362***	(4.44)	1.385***	(4.45)
County of birth, urban migration	1.316***	(3.93)	1.345***	(4.20)	1.366***	(4.37)	1.397***	(4.46)
Other county, rural migration	2.391***	(6.92)	2.397***	(6.82)	2.463***	(6.94)	1.646***	(3.80)
Other county, urban migration	3.314***	(9.42)	3.335***	(9.31)	3.441***	(9.43)	1.993***	(5.20)
Nörrland residence	1.728***	(29.26)	1.691***	(27.54)	1.709***	(27.82)	1.680***	(23.33)
Götaland residence	0.631***	(-32.81)	0.622***	(-33.34)	0.628***	(-32.59)	0.692***	(-23.77)
Stockholm residence	2.335***	(36.47)	2.600***	(40.34)	2.555***	(39.13)	1.513***	(16.01)
No. of children								
Aged 0-5			1.086***	(3.84)	1.085***	(3.82)	1.089***	(3.73)
Aged 6-10			1.015	(1.00)	1.021	(1.42)	1.035**	(2.22)
Aged 11+			1.334***	(54.56)	1.316***	(51.74)	1.368***	(55.20)
Working child			0.996	(-0.22)	1.014	(0.79)	0.930***	(-3.88)
No. of servants								
1					1.829***	(30.18)	1.955***	(31.53)
2-5					1.889***	(25.02)	2.030***	(26.35)
6+					2.055***	(7.11)	2.312***	(7.74)
Share of women employed by parish								
Professional, technical, and related workers							0.984***	(-5.59)
Administrative and managerial workers							1.655***	(33.81)
Clerical and related workers							1.526***	(27.72)
Sales workers							1.005	(1.35)
Service workers (excl. domestic service)							1.006***	(9.57)
Production and related workers							1.040***	(63.63)
Relative butter price							1.061***	(16.40)
No. of observations	166,584		166,584		166,584		161,623	
Pseudo R^2	0.073		0.091		0.098		0.146	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1880 census.

Table 10: *Determinants of gainful employment of widowed women, 1910*

	Model 1		Model 2		Model 3		Model 4	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.258***	(12.05)	1.153***	(6.95)	1.155***	(7.00)	1.137***	(6.07)
Age-squared	0.996***	(-11.60)	0.997***	(-6.91)	0.997***	(-6.95)	0.998***	(-5.99)
Age-cubed	1.000***	(9.52)	1.000***	(5.45)	1.000***	(5.48)	1.000***	(4.54)
Urban residence	2.913***	(8.62)	2.923***	(8.63)	2.939***	(8.67)	2.717***	(6.95)
Migrant status								
County of birth, rural migration	1.423***	(5.42)	1.423***	(5.39)	1.423***	(5.40)	1.519***	(6.08)
County of birth, urban migration	1.446***	(5.57)	1.448***	(5.57)	1.448***	(5.57)	1.486***	(5.67)
Other county, rural migration	0.842	(-1.62)	0.828	(-1.77)	0.819	(-1.87)	0.810	(-1.67)
Other county, urban migration	0.913	(-0.84)	0.902	(-0.95)	0.891	(-1.06)	0.869	(-1.10)
Nörrland residence	0.986	(-0.83)	0.969	(-1.82)	0.975	(-1.48)	1.182***	(8.84)
Götaland residence	1.039**	(2.97)	1.028*	(2.16)	1.031*	(2.37)	1.036*	(2.48)
Stockholm residence	1.585***	(19.74)	1.639***	(21.10)	1.623***	(20.66)	1.388***	(12.22)
No. of children								
Aged 0-5			0.982	(-0.66)	0.984	(-0.60)	0.991	(-0.32)
Aged 6-10			1.059**	(3.17)	1.063***	(3.32)	1.069***	(3.56)
Aged 11+			1.056***	(9.96)	1.052***	(9.40)	1.085***	(14.35)
Working child			1.197***	(17.36)	1.203***	(17.86)	1.158***	(13.74)
No. of servants								
1					1.273***	(10.54)	1.256***	(9.82)
2-5					1.351***	(7.93)	1.261***	(6.04)
6+					1.986**	(3.19)	2.294***	(3.53)
Share of women employed by parish								
Professional, technical, and related workers							0.940***	(-37.49)
Administrative and managerial workers							1.110***	(16.32)
Clerical and related workers							0.992*	(-2.00)
Sales workers							1.012***	(4.38)
Service workers (excl. domestic service)							1.000	(0.60)
Production and related workers							1.003***	(6.98)
Relative butter price							1.116***	(20.07)
No. of observations	185,252		185,252		185,252		179,951	
Pseudo R^2	0.051		0.054		0.055		0.068	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1910 census.

6.1.3 *Married women*

Married women's experiences may have been different from the other two groups because, unlike the other groups, they had a spouse. The possible income from the spouse reduced the pressure for married women to work. In fact, having a spouse may even have increased the pressure not to work for social reasons. Thus, results are expected to be different.

The number of children show effects opposite of those for never-married and widowed women. At all ages, children have a negative effect on married women's likelihood to work. Working children, on the other hand, had a positive effect. These determinants were constant over time, although the effect of working children seems to have been a larger influence in 1880 than in 1910.

Moreover, in both years the number of servants had a positive effect. The highest effect was for those with six or more servants. The effect of two to five servants, however, was lower than the other two, unlike widowed women, for whom the effect was continuously increasing.

Because women were married, it is possible to take into account the occupation of the household head. This may be an important determinant if certain occupations of the household head (generally the spouse) allowed a partner to work in assistance. Model 4 in Table 10 (1880) shows that if the spouse worked in administrative or clerical occupations, this had no significant effect on women's work. If the husband worked in a professional or technical occupation, in sales, in production or in service, women were more likely to work. A household head employed in agriculture reduced the likelihood of working. If a married woman was her own household head, for example in the case of an absent spouse, women were much more likely to work. In 1910, a spouse working in either production or service no longer had an impact, while clerical occupations had a positive effect on married women's work.

In 1880, all shares of economic structure had a positive effect on married women's likelihood of working, besides administrative work, which was insignificant. While clerical work had the highest effect in 1880, in 1910 it had turned into a negative effect, together with administrative, professional, and service work. Moreover, in 1880 the relative butter price was weakly significant and positive, whereas in 1910 it became significant and negative.

Table 11: *Determinants of gainful employment of married women, 1880*

	Model 1		Model 2		Model 3		Model 4	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.475***	(9.45)	1.468***	(9.26)	1.421***	(8.34)	1.409***	(8.03)
Age-squared	0.992***	(-9.03)	0.992***	(-8.77)	0.992***	(-8.06)	0.993***	(-7.74)
Age-cubed	1.000***	(8.09)	1.000***	(7.78)	1.000***	(7.29)	1.000***	(6.99)
Urban residence	0.909	(-0.27)	0.887	(-0.34)	0.596	(-1.50)	0.359**	(-2.90)
Migrant status								
County of birth, rural migration	0.875	(-0.66)	0.871	(-0.69)	0.882	(-0.59)	0.837	(-0.84)
County of birth, urban migration	0.688	(-1.79)	0.680	(-1.86)	0.673	(-1.81)	0.668	(-1.84)
Other county, rural migration	1365	(1.08)	1374	(1.12)	1410	(1.25)	1254	(0.81)
Other county, urban migration	1.852*	(2.12)	1.850*	(2.15)	1.844*	(2.22)	1508	(1.47)
Nörrland residence	1.208**	(3.06)	1.223**	(3.24)	1.252***	(3.61)	1.229**	(2.95)
Götaland residence	0.923	(-1.73)	0.925	(-1.67)	0.871**	(-2.90)	0.950	(-1.02)
Stockholm residence	3.181***	(20.92)	3.128***	(20.58)	2.906***	(19.08)	1.889***	(9.78)
Spouse absent	75.54***	(113.74)	80.72***	(114.19)	25.21***	(38.49)	24.24***	(37.20)
No. of children								
Aged 0-5	0.771***	(-9.39)	0.770***	(-9.47)	0.757***	(-10.06)	0.757***	(-9.90)
Aged 6-10	0.844***	(-6.13)	0.844***	(-6.16)	0.855***	(-5.75)	0.865***	(-5.25)
Aged 11+	0.885***	(-7.05)	0.882***	(-7.31)	0.887***	(-6.71)	0.892***	(-6.28)
Working child	2.208***	(16.76)	2.215***	(16.87)	2.116***	(14.89)	1.978***	(13.16)
No. of servants								
1			1.781***	(12.15)	2.359***	(15.77)	2.475***	(16.37)
2-5			1.483***	(6.32)	2.118***	(10.84)	2.278***	(11.72)
6+			3.578***	(7.00)	4.970***	(9.65)	5.286***	(9.84)
Occupation of household head								
Professional, technical, and related workers					1.881***	(5.50)	1.628***	(4.20)
Administrative and managerial workers					1094	(0.61)	0.966	(-0.23)
Clerical and related workers					1.603**	(3.02)	1352	(1.92)
Sales workers					1.974***	(5.58)	1.575***	(3.71)
Service workers					1.387**	(3.17)	1.291*	(2.45)
Agricultural workers					0.557***	(-6.97)	0.509***	(-7.89)
Production and related workers					1.721***	(6.86)	1.476***	(4.80)
Woman is own household head					5.332***	(15.50)	4.858***	(14.30)
Share of women employed by parish								
Professional, technical, and related workers							1.055***	(8.76)
Administrative and managerial workers							1027	(0.63)
Clerical and related workers							1.125***	(3.80)
Sales workers							1.090***	(17.62)
Service workers (excl. domestic service)							1.006**	(3.15)
Production and related workers							1.025***	(16.01)
Relative butter price							1.025*	(2.14)
No. of observations	738,014		738,014		737,857		715,920	
Pseudo R^2	0.276		0.279		0.286		0.297	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01
Source: Author's own calculations using the Swedish 1880 census.

Table 12: *Determinants of gainful employment of married women, 1910*

	Model 1		Model 2		Model 3		Model 4	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.476***	(19.06)	1.466***	(18.68)	1.404***	(16.29)	1.402***	(16.01)
Age-squared	0.993***	(-16.23)	0.993***	(-15.89)	0.994***	(-13.76)	0.994***	(-13.46)
Age-cubed	1.000***	(12.69)	1.000***	(12.39)	1.000***	(10.54)	1.000***	(10.26)
Urban residence	2.009***	(4.13)	2.051***	(4.23)	1.465*	(2.21)	1.618**	(2.68)
Migrant status								
County of birth, rural migration	0.936	(-0.52)	0.947	(-0.43)	0.944	(-0.43)	0.899	(-0.78)
County of birth, urban migration	0.909	(-0.76)	0.918	(-0.67)	0.917	(-0.64)	0.880	(-0.91)
Other county, rural migration	1.027	(0.23)	1.013	(0.11)	0.999	(-0.01)	0.893	(-0.99)
Other county, urban migration	1.107	(0.87)	1.092	(0.75)	1.085	(0.73)	0.957	(-0.38)
Nörrland residence	1.836***	(20.33)	1.845***	(20.45)	1.876***	(20.84)	1.715***	(16.63)
Götaland residence	1.551***	(17.51)	1.558***	(17.69)	1.514***	(16.40)	1.285***	(9.35)
Stockholm residence	2.187***	(25.28)	2.174***	(25.07)	2.033***	(23.17)	2.210***	(21.45)
Spouse absent	74.61***	(220.09)	75.92***	(219.58)	19.92***	(72.53)	19.42***	(70.47)
No. of children								
Aged 0-5	0.778***	(-18.55)	0.778***	(-18.50)	0.763***	(-19.65)	0.759***	(-19.70)
Aged 6-10	0.870***	(-11.14)	0.873***	(-10.87)	0.853***	(-12.44)	0.848***	(-12.71)
Aged 11+	0.824***	(-23.80)	0.826***	(-23.49)	0.825***	(-22.31)	0.822***	(-22.39)
Working child	1.295***	(16.77)	1.298***	(16.96)	1.257***	(13.59)	1.242***	(12.64)
No. of servants								
1			1.515***	(13.23)	1.746***	(17.47)	1.755***	(17.42)
2-5			0.917	(-1.42)	1.230***	(3.58)	1.254***	(3.88)
6+			2.240**	(2.72)	3.419***	(4.95)	3.780***	(5.59)
Occupation of household head								
Professional, technical, and related workers					1.551***	(7.85)	1.612***	(8.42)
Administrative and managerial workers					0.723***	(-4.92)	0.743***	(-4.46)
Clerical and related workers					1.315***	(4.36)	1.329***	(4.47)
Sales workers					1.228***	(3.67)	1.231***	(3.66)
Service workers					0.856**	(-2.60)	0.890	(-1.94)
Agricultural workers					0.384***	(-20.28)	0.385***	(-20.03)
Production and related workers					1.038	(0.84)	1.040	(0.87)
Woman is own household head					4.744***	(27.35)	4.673***	(26.56)
Share of women employed by parish								
Professional, technical, and related workers							0.965***	(-11.19)
Administrative and managerial workers							0.934***	(-6.13)
Clerical and related workers							0.986*	(-2.47)
Sales workers							1.017***	(4.17)
Service workers (excl. domestic service)							0.997**	(-3.21)
Production and related workers							1.004***	(5.21)
Relative butter price							0.912***	(-9.78)
No. of observations	884,179		884,179		884,176		860,623	
Pseudo R^2	0.301		0.302		0.324		0.321	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01
Source: Author's own calculations using the Swedish 1910 census.

6.2 Average Marginal Effects

While the odds ratios give us a good indication of how the determinants differed between women by marital status, using Average Marginal Effects may facilitate the interpretation of our results. Moreover, it allows us to interpret the results as the average effects. The average marginal effects for the four child variables are given in Table 13 for all years.

For never-married women, all variables are positive in each year, except for children aged 6 to 10 in 1880. Children aged 6 to 10 did not affect these women up to 1900, but starting from the twentieth century this effect was significant and positive. For widowed women, working children were a negative factor in 1880, but turned into a positive factor in 1910. Children aged 11 or older were always positively associated with work, while children under 6 years old had no effect for the last three census years. Between the ages 6 and 10, children increased never-married women's participation in 1880 and 1910, but lowered it in 1880. Married women were always negatively affected by non-working children, and this effect was increasing over time. Moreover, working children increased the labour supply of married women in all years.

Table 13: *Average Marginal Effects of child variables on gainful employment*

	Census year							
	1880		1890		1900		1910	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Never-married								
Aged 0-5	0.1024***	(0.0045)	0.1301***	(0.0046)	0.1691***	(0.0054)	0.1861***	(0.0061)
Aged 6-10	-0.0008	(0.0049)	0.0345***	(0.0051)	0.0545***	(0.0057)	0.1057***	(0.0073)
Aged 11+	0.0037	(0.0035)	0.0050	(0.0033)	0.0158***	(0.0034)	0.0266***	(0.0041)
Working child	0.0888***	(0.0152)	0.0957***	(0.0123)	0.0590***	(0.0102)	0.0512***	(0.0086)
Widowed								
Aged 0-5	0.0139***	(0.0037)	0.0004	(0.0040)	-0.0021	(0.0042)	-0.0018	(0.0056)
Aged 6-10	0.0056***	(0.0025)	-0.0063**	(0.0027)	-0.0046	(0.0028)	0.0132***	(0.0037)
Aged 11+	0.0512***	(0.0009)	0.0466***	(0.0009)	0.0404***	(0.0009)	0.0162***	(0.0011)
Working child	-0.0118***	(0.0030)	-0.0069***	(0.0026)	-0.0032	(0.0023)	0.0291***	(0.0021)
Married								
Aged 0-5	-0.0013***	(0.0001)	-0.0014***	(0.0002)	-0.0012***	(0.0002)	-0.0045***	(0.0002)
Aged 6-10	-0.0007***	(0.0001)	-0.0004***	(0.0001)	-0.0013***	(0.0002)	-0.0027***	(0.0002)
Aged 11+	-0.0006***	(0.0001)	-0.0012***	(0.0001)	-0.0012***	(0.0001)	-0.0032***	(0.0001)
Working child	0.0033***	(0.0003)	0.0075***	(0.0003)	0.0031***	(0.0003)	0.0035***	(0.0003)

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses.

Table 14 shows the average marginal effects for the categorical servant variable. Both widowed and married women saw an increase in participation if they had servants in their household. Moreover, this effect was larger if they had 6 or more servants. Going from 1 servant to between 2 and 5 servants did not always increase participation, and in many years the effect of having one servant is larger than having multiple.

Table 14: *Average Marginal Effects of servant variables on gainful employment*

	Census year							
	1880		1890		1900		1910	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Widowed								
One servant	0.1190***	(0.0040)	0.1261***	(0.0042)	0.1455***	(0.0042)	0.0441***	(0.0043)
Two to five servants	0.1262***	(0.0052)	0.1318***	(0.0059)	0.1120***	(0.0064)	0.0447***	(0.0071)
Six or more servants	0.1519***	(0.0216)	0.2215***	(0.0272)	0.2498***	(0.0269)	0.1420***	(0.0327)
Married								
One servant	0.0054***	(0.0004)	0.0069***	(0.0005)	0.0115***	(0.0006)	0.0109***	(0.0007)
Two to five servants	0.0048***	(0.0005)	0.0056***	(0.0007)	0.0059***	(0.0008)	0.0039***	(0.0011)
Six or more servants	0.0141***	(0.0025)	0.0190***	(0.0036)	0.0191***	(0.0050)	0.0353***	(0.0100)

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses

Table 15 shows the average marginal effects for the occupation of the household head. Compared with having an unemployed spouse, several occupations increased the probability of working for women. Exceptions were administrative, service, and agricultural work. If a woman was her own household head she had a much higher likelihood of being employed.

Table 15: *Average Marginal Effects of occupation of household head variable on gainful employment*

	Census year							
	1880		1890		1900		1910	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Married								
Professional, technical, and related workers	0.0026***	(0.0007)	0.0038***	(0.0009)	0.0031***	(0.0009)	0.0110***	(0.0013)
Administrative and managerial workers	-0.0001	(0.0006)	-0.0017**	(0.0007)	-0.0031***	(0.0007)	-0.0049***	(0.0011)
Clerical and related workers	0.0015*	(0.0008)	0.0020*	(0.0011)	0.0014	(0.0010)	0.0060***	(0.0014)
Sales workers	0.0024***	(0.0007)	0.0025***	(0.0009)	0.0021**	(0.0008)	0.0043***	(0.0012)
Service workers	0.0012**	(0.0005)	0.0001	(0.0006)	0.0009	(0.0007)	-0.0021*	(0.0011)
Agricultural workers	-0.0021***	(0.0003)	-0.0035***	(0.0004)	-0.0052***	(0.0005)	-0.0122***	(0.0008)
Production and related workers	0.0020***	(0.0004)	0.0008*	(0.0005)	0.0010*	(0.0005)	0.0007	(0.0008)
Woman is own household head	0.0148***	(0.0015)	0.0278***	(0.0020)	0.0211***	(0.0014)	0.0577***	(0.0030)

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses

The results for the sectoral share of female occupation, and the relative price of butter, are found in Table 16. In all four years, a higher share of professional or technical work reduced participation for never-married women. In 1910, all other occupations increased likelihood of employment. The biggest effect came from the clerical sector. Widowed women were similar to never-married women except for clerical work, which had become a negative factor for them in 1910. Moreover, service work became a more important sector for never-married women, but became insignificant for widowed women in 1910. Married women were experienced no negative effects in 1880, but by 1910 nearly all sectoral shares had turned negative, with the exceptions of production and sales work. Furthermore, the relative butter price was positive for all women in all years, except for married women in 1890 and 1910. For never-married women, this effect was slightly decreasing over time, while for widowed women, it was higher in 1910 than it was in 1880.

Table 16: *Average Marginal Effects of economic structure and butter price variables on gainful employment*

	Census year							
	1880		1890		1900		1910	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Never-married								
Professional, technical, and related workers	-0.0054***	(0.0003)	-0.0058***	(0.0002)	-0.0104***	(0.0002)	-0.0140***	(0.0002)
Administrative and managerial workers	0.0344***	(0.0017)	0.0064***	(0.0007)	0.0140***	(0.0008)	0.0109***	(0.0006)
Clerical and related workers	-0.0049***	(0.0015)	0.0172***	(0.0010)	0.0092***	(0.0008)	0.0116***	(0.0004)
Sales workers	-0.0005	(0.0004)	-0.0001	(0.0004)	0.0053***	(0.0004)	0.0059***	(0.0003)
Service workers (excl. domestic servants)	0.0019***	(0.0001)	0.0028***	(0.0001)	0.0031***	(0.0001)	0.0032***	(0.0001)
Production and related workers	0.0017***	(0.0001)	0.0028***	(0.0001)	0.0022***	(0.0000)	0.0026***	(0.0000)
Relative butter price	0.0237***	(0.0003)	0.0181***	(0.0003)	0.0209***	(0.0004)	0.0149***	(0.0005)
Widowed								
Professional, technical, and related workers	-0.0027***	(0.0005)	-0.0082***	0.0004	-0.0097***	(0.0004)	-0.0124***	(0.0003)
Administrative and managerial workers	0.0822***	(0.0024)	0.0253***	0.0032	0.0461***	(0.0015)	0.0207***	(0.0013)
Clerical and related workers	0.0691***	(0.0025)	0.0370***	0.0017	0.0230***	(0.0016)	-0.0015**	(0.0008)
Sales workers	0.0008	(0.0006)	0.0013*	0.0007	-0.0068***	(0.0007)	0.0023***	(0.0005)
Service workers (excl. domestic servants)	0.0010***	(0.0001)	0.0003***	0.0001	-0.0008***	(0.0001)	0.0001	(0.0001)
Production and related workers	0.0064***	(0.0001)	0.0053***	0.0001	0.0031***	(0.0001)	0.0007***	(0.0001)
Relative butter price	0.0097***	(0.0006)	0.0079***	0.0006	0.0049***	(0.0008)	0.0218***	(0.0011)
Married								
Professional, technical, and related workers	0.0003***	(0.000)	-0.0003***	(0.0000)	0.0001**	(0.0000)	-0.0006***	(0.0001)
Administrative and managerial workers	0.0001	(0.0002)	0.0001	(0.0001)	0.0002	(0.0001)	-0.0011***	(0.0002)
Clerical and related workers	0.0006***	(0.0001)	0.0003**	(0.0001)	-0.0001*	(0.0001)	-0.0002**	(0.0001)
Sales workers	0.0004***	(0.0000)	0.0004***	(0.0000)	0.0002***	(0.0001)	0.0003***	(0.0001)
Service workers (excl. domestic servants)	0.0000***	(0.0000)	-0.0001***	(0.0000)	-0.0001***	(0.0000)	-0.0001***	(0.0000)
Production and related workers	0.0001***	(0.0000)	0.0001***	(0.0000)	0.0001***	(0.0000)	0.0001***	(0.0000)
Relative butter price	0.0001**	(0.0001)	-0.0004***	(0.0001)	-0.0001	(0.0001)	-0.0015***	(0.0002)

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01

Source: Author's own calculations using the Swedish 1880, 1890, 1900, and 1910 censuses

6.3 Sensitivity analyses

Four alternative specifications were ran in order to test the sensitivity of the analysis. The results for the year 1880 can be found in Appendix A.[11] Tables 16 through 18 show the results for never-married, widowed, and married women, respectively. The results for the *linear probability model* and the *Probit*, seen in the first two columns, do not differ from the main analysis. Column 3 includes the results from the regression using *clustered standard errors* at the parish level, instead of robust standard errors as used in main analysis. Some results change to a slightly lower significance; however, none of the important results change. Lastly, male economic shares were used rather than the female shares to avoid the problem of undercounting of women. While the interpretation here is different, none of the other variables change importantly.

7 Discussion

In the previous section we observed the estimated effects of the determinants of female gainful employment, as well as the differential effects between married, widowed, and unmarried women. Hypotheses were formulated to test the fit of economic theories developed in the twentieth century in the context of nineteenth-century Sweden. Below these hypotheses will be revisited and discussed in relation to the results of the paper.

7.1 Labour supply hypotheses

According to economic theory having children increases the opportunity cost of working for mothers (Mincer, 1962). Working means temporarily not caring for your child, while hiring a maid or sending a child to a child-crib or kindergarten incur costs. On the other hand, children themselves are net consumers and require a share of the family income, for which women may want to compensate by earning (or increasing) an income. Based on economic theory the first hypothesis stated that the number of children was negatively associated with the probability of the mother's work. The results in Table 13 show that some nuance is required in discussing this hypothesis.

For never-married women, young children had a positive effect on the likelihood of working in 1880, with children above the age of 5 having no effect. In 1910, this effect had turned positive for all ages, with a declining effect as children got older. This seems to suggest that single women, after their children were born and still young, increased their economic activity, but this effect waned as children got older. This fits with the idea that mothers of young children increase their effort on the labour market to provide for their children (Burnette & Stanfors, 2012). Moreover, Nilsson (2015) showed similarly that mothers of newly-born children were more likely to perform industrial work from home.

Widowed women were similar to never-married women in that they no longer had a spouse, and were therefore predisposed to performing market work. However, they may have had higher levels of wealth if they inherited from their late husbands. This could help them subsist while caring for a child. Table 13 shows that widowed women, in the beginning of the period, were positively affected by children of all ages. In 1910, children below the age of 5 did not affect widowed women's probability of working,

[11] The results are available for the other years upon request from the author.

while older children increased it. This effect was increasing with the age of children, suggesting that widowed women were more likely to work if their children were more independent.

If married women had a working spouse, they had fewer financial worries than the other groups, and therefore more of a choice in whether to work or tend to the home. Non-working children of all ages had a negative impact on married women's likelihood of working, and this effect was slightly larger for younger children. Thus, it seems the hypothesis holds for married women, but not for women without a (living) spouse.

Furthermore, hypothesis two stated that working children have a negative effect on a mother's likelihood of working. The argument was that a child's income raises family income and functions as a substitute for the mother's income (Grantham, 2012). The only group of women for which this fits, however, is widowed women in 1880 and 1890. For all other groups and years, the number of working children had a positive effect on the probability of work. A possible explanation for this positive marginal effect is that children only had to work in poor families. In this case, more working children means a poorer family, and a poorer family means a higher likelihood that a mother will work.

Hypothesis four postulated that the presence of at least one servant in a household was positively associated with the work of a woman in that household. The results in Table 14 show that we cannot reject this hypothesis. For both married and widowed women, servants positively affected participation. Theoretically, servants performed household work otherwise performed by the other women in the household. This freed up time for women to work and would subsequently lead to an increase in the propensity to participate in the labour market. This effect was higher for women with at least six servants, which may imply that married and widowed women in the upper class were more likely to work. Gronau (1977) mentioned that if a woman's wages increased, she was more likely to work in the market instead of as a caretaker, and would hire a maid or servant instead. Servants may therefore be proxying an income effect, possibly due to higher participation of women in households with many servants.

The third hypothesis claimed that women in the household of which the household head is not currently occupied would have a higher likelihood of working. For this, we turn to Table 15, which shows that different occupations of the household head had varying effects on married women's likelihood to be gainfully employed. In the beginning of the period, most of the occupations of household heads affected women positively; only administrative workers had no effect, and agricultural workers affected women negatively. The latter can be explained through undercounting; women married to farmers were less likely to be recorded by the census-taker, possibly because they spent more time indoors (Schmidt & van Nederveen Meerkerk, 2012). By 1910, more household head occupations turned into negative determinants of female participation – administrative, sales, and agricultural work were negative influences, while production workers had no effect. Altogether, in many cases women were not more likely to work if their spouse did not work, and thus the third hypothesis is rejected. One possibility is that there is a selection effect of poor women marrying poor men, and richer women marrying richer men, as a woman's economic status partially determined a woman's attractiveness on the marriage market (Clarke, 1993).

7.2 Labour demand hypotheses

Other than factors within the household that affected a woman's decision to work, the demand for female labour was also at play. The fifth hypothesis suggested that the prevalence of economic sectors outside of agriculture and domestic service had a positive impact on female participation. Table 16 shows that this varied over time and by marital status. For unmarried women in the beginning of the period, only administrative, service, and production sectors had a positive effect, while clerical and professional sectors were negative, and sales was insignificant. At the end of the period, all sectors outside of professional or technical work had a positive effect on their likelihood to work. This sector likely carries a negative effect because regions in which upper-middle and upper-class work are a larger share of total employment, low and unskilled work by definition have a lower share of total employment. Thus, less work would be available for the common woman. Overall, structural transformation and the availability of other sectors outside of agriculture and domestic service seem to have benefited never-married women in terms of likelihood of employment.

For widowed women, the story is fairly similar, with one exception. While clerical work was a negative sector for never-married women in 1880, it turned positive in the later censuses. For widowed women, it was positive in 1880, but negative in 1910. Thus, clerical work seems to have substituted the employment of widowed women with that of never-married women. Nonetheless, the hypothesis seems to fit both these groups.

Remarkable is the experience of married women. In 1880, all sectoral shares have a positive effect on women's work, except for administrative work, which was insignificant. Over the years, however, these effects turned negative, and only sales and production work remained positive. Structural transformation was a change that was beneficial for unmarried and widowed women, but was detrimental for married women (Humphries & Weisdorf, 2015). Married women oftentimes had household responsibilities and were economically productive from home. Industrialisation took work out of the home and into the labour market. This seems to have had a much more beneficial impact on unmarried women than on married women, who became marginalised. Unlike the other women, married women were unable to move onto the labour market to the same extent, reflected in the negative impacts of four out of six sectoral shares. For them, hypothesis 5 does not ring true.

Lastly, the relative price of butter over rye was theorised by Schultz (1985) to be a proxy for the gender wage gap. If we follow Schultz' argument, the relative price of butter over rye reflects the female-to-male wage ratio. If more work was demanded which was primarily performed by women, for example the occupation of dairymaid, then wages would rise in order to find women to perform that work. Moreover, other employers would have to increase their wages to compete for the labour of women. If women respond to higher wages by working more, as economic theory suggests (Becker, 1991), then a rise in the relative butter price will increase female participation. The results are shown in Table 16. Higher relative butter prices positively affected all women in 1880, with the highest effect being for never-married women and the lowest for married women. In 1910, the effect was highest for widowed women, and had turned negative for married women. Like the sectoral shares, this variable showcases that married women were marginalised, while unmarried and widowed women gained from economic changes.

Overall, the factors affecting the labour supply decisions and the labour demand for women affected married, widowed, and unmarried women differently. The changes in labour demand in the nineteenth century were mostly positive for unmarried and widowed women. New industries opened up with more work opportunities and higher wages. Married women performed better in the traditional setting in which they could work from home in order to combine home and market work. Instead, industrialisation changed their labour market opportunities for the worse. Furthermore, labour supply decisions were different for women with a spouse compared to those without. The income generated by a working spouse allowed married women the possibility to respond to pull factors, while the economic situations of many women without a working spouse required them to respond to push factors into the labour market out of necessity.

8 Conclusion

In this paper we wanted to learn more about female employment in the late-nineteenth century period of industrialisation in Sweden. The economic and social background of women in this period was examined, as well as their opportunities for work. Economic theories on the supply of labour by women was discussed. Moreover, theories on the changes in economic structure on female participation were outlined. Hypotheses were formed on the basis of these theories and previous literature. In order to test these hypotheses, a model was estimated with both labour demand and supply factors to determine the determinants of female labour supply. The results have shown that the determinants of female work differed significantly by marital status. Children were found to have a negative association with married women's work. For unmarried, this effect was positive, and for widowed women it was positive with the exception of young children. Working children were a positive influence on female work for all groups of women. The presence of servants, too, increased the likelihood of working for widowed and married women. The impact of a household head's occupation differed by occupation, with no general direction for all working household heads. Economic structure at the parish level, however, showed clear directions; by the end of the period, the sectors outside of agriculture and domestic service generally affected single and widowed women positively, and married women negatively, with a few exceptions. Married women seem to have been left behind with the new developments stemming from industrialisation, as they were not able to fully adapt to the requirements for work outside of the home. Lastly, the relative butter price – a proxy for female wages – was found to be correlated with single women's work, but was mostly insignificant for married women.

One of the paper's limitations it the lack of a measure for education, an important determinant of labour supply in more modern times. For instance, Goldin (1994) argues it is education that helped women break through in the labour market. The analysis of the current study, however, does not include a measure for education. The problem with the microdata for the entire population at this time is that it is impossible to attain the educational level of every individual in the country unless this was explicitly registered, which it was not. However, it can be argued that education was much less important in the nineteenth century than in the twentieth century. In the United States, white-collar occupations did not become the go-to occupation for women until the twentieth century (for example see Goldin [2006]). Nonetheless, approximations of educational attainment, even at a level higher than the individual, for example at the city-level, would improve the estimations of the paper. This, however, is a

great task and goes beyond the scope of this paper.

Moreover, the undercounting of specific groups of women requires us to be careful with considering the results. Vikström (2010) has shown that the national censuses did not always reflect the actual occupations of women well. For this reason, we must remember that the results in the present paper are associations, not causal effects, and that the results may have differed if occupations were accurately reported by the census-takers.

Nonetheless, there are several directions in which the paper allows room for further research. The full-count microdata allows for extending the paper with a more in-depth analysis of which occupations women were employed in. Moreover, if women were already employed before industrialisation, another intriguing possibility would be to look into the determinants of working in a specific sector.

In this paper we have seen that the determinants of female labour supply differed by marital status. The economic theories of labour demand and supply did not fit for all types of women. Rather, theories fit specific women in specific contexts. Economic theories on both the demand and the supply of female labour therefore need to clearly specify which group of women they refer to, especially in the context of the nineteenth century, where experiences of married, widowed, and unmarried women clearly differed.

9 References

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10 Appendix A

Table 17: *Sensitivity analyses for never-married women, 1880*

	OLS		Probit		Clustered		Male shares	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.083***	(92.21)	1.249***	(92.71)	1.431***	(47.27)	1.250***	(92.81)
Age-squared	0.998***	(-73.62)	0.995***	(-75.18)	0.992***	(-42.92)	0.995***	(-75.15)
Age-cubed	1.000***	(58.80)	1.000***	(60.84)	1.000***	(39.44)	1.000***	(60.75)
Urban residence	1.091***	(7.05)	1.261***	(6.50)	1.445***	(2.89)	1.129***	(3.25)
Migrant status								
County of birth, rural migration	0.977***	(-3.26)	0.937***	(-3.27)	0.900	(-1.40)	0.933***	(-3.51)
County of birth, urban migration	0.985**	(-2.00)	0.959**	(-2.04)	0.934	(-0.87)	0.950**	(-2.50)
Other county, rural migration	0.992	(-0.87)	0.971	(-0.99)	0.958	(-0.46)	0.961	(-1.34)
Other county, urban migration	0.983*	(-1.74)	0.951*	(-1.70)	0.924	(-0.89)	0.947*	(-1.80)
Nörrland residence	1.042***	(16.95)	1.120***	(17.00)	1.201***	(3.69)	1.236***	(31.14)
Götaland residence	1.001	(0.47)	1.002	(0.41)	1.001	(0.02)	1.055***	(11.75)
Stockholm residence	1.117***	(36.47)	1.352***	(36.21)	1.631***	(9.11)	1.411***	(44.05)
No. of children								
Aged 0-5	1.109***	(25.08)	1.328***	(23.20)	1.584***	(11.58)	1.333***	(23.32)
Aged 6-10	1.002	(0.30)	0.999	(-0.06)	0.996	(-0.12)	1.003	(0.19)
Aged 11+	1.004	(1.05)	1.011	(1.15)	1.017	(0.51)	1.017	(1.64)
Working child	1.091***	(6.04)	1.281***	(5.87)	1.490***	(4.44)	1.301***	(6.16)
Share of women employed by parish								
Professional, technical, and related workers	0.995***	(-19.69)	0.985***	(-19.46)	0.976***	(-4.28)		
Administrative and managerial workers	1.035***	(19.54)	1.100***	(20.00)	1.167***	(5.69)		
Clerical and related workers	0.995***	(-3.41)	0.986***	(-3.33)	0.978	(-0.76)		
Sales workers	0.999	(-1.46)	0.999	(-1.20)	0.998	(-0.23)		
Service workers (excl. domestic service)	1.002***	(29.74)	1.005***	(29.35)	1.008***	(6.97)		
Production and related workers	1.002***	(25.66)	1.005***	(25.69)	1.008***	(5.45)		
Share of men employed by parish								
Professional, technical, and related workers							0.986***	(-17.16)
Administrative and managerial workers							1.088***	(46.14)
Clerical and related workers							1.024***	(14.39)
Sales workers							0.994***	(-4.74)
Service workers							1.006***	(16.32)
Production and related workers							1.001***	(10.58)
Relative butter price	1.024***	(70.28)	1.068***	(70.43)	1.112***	(15.58)	1.072***	(72.98)
No. of observations	579696		579696		579696		579710	
Pseudo R^2	0.071		0.071		0.071		0.073	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01
Source: Author's own calculations using the Swedish 1880 census

Table 18: *Sensitivity analyses for widowed women, 1880*

	OLS		Probit		Clustered		Male shares	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.009**	(2.22)	1.006	(0.43)	0.999	(-0.02)	1.015	(0.68)
Age-squared	1.000***	(-3.15)	1.000	(-0.89)	1.000	(-0.27)	1.000	(-1.08)
Age-cubed	1.000***	(2.78)	1.000	(0.03)	1.000	(-0.57)	1.000	(0.13)
Urban residence	0.809***	(-9.21)	0.502***	(-7.91)	0.311***	(-3.32)	0.503***	(-4.48)
Migrant status								
County of birth, rural migration	1.052***	(4.53)	1.204***	(4.39)	1.385	(1.36)	1.250***	(3.18)
County of birth, urban migration	1.054***	(4.54)	1.212***	(4.44)	1.397	(1.38)	1.206***	(2.60)
Other county, rural migration	1.101***	(4.81)	1.340***	(3.87)	1.646**	(2.06)	1.849***	(4.70)
Other county, urban migration	1.144***	(6.55)	1.504***	(5.33)	1.993***	(3.30)	2.694***	(7.53)
Nörrland residence	1.102***	(22.97)	1.354***	(23.12)	1.680***	(3.64)	1.942***	(29.58)
Götaland residence	0.947***	(-20.93)	0.808***	(-23.75)	0.692***	(-4.52)	0.580***	(-34.79)
Stockholm residence	1.100***	(18.55)	1.284***	(16.20)	1.513***	(2.59)	2.534***	(37.69)
No. of children								
Aged 0-5	1.018***	(3.74)	1.052***	(3.71)	1.089***	(3.51)	1.086***	(3.73)
Aged 6-10	1.008**	(2.57)	1.021**	(2.28)	1.035**	(2.03)	1.029*	(1.89)
Aged 11+	1.060***	(54.11)	1.205***	(56.04)	1.368***	(28.54)	1.328***	(51.60)
Working child	0.985***	(-4.24)	0.958***	(-3.96)	0.930*	(-1.95)	1.017	(0.93)
No. of servants								
1	1.126***	(29.19)	1.484***	(31.50)	1.955***	(16.53)	1.873***	(30.44)
2-5	1.135***	(24.02)	1.515***	(26.09)	2.030***	(14.91)	1.925***	(25.19)
6+	1.164***	(7.10)	1.628***	(7.70)	2.312***	(6.72)	2.176***	(7.43)
Share of women employed by parish								
Professional, technical, and related workers	0.998***	(-4.92)	0.992***	(-4.84)	0.984	(-0.85)		
Administrative and managerial workers	1.104***	(33.52)	1.349***	(33.78)	1.655***	(6.78)		
Clerical and related workers	1.078***	(26.00)	1.278***	(26.06)	1.526***	(4.46)		
Sales workers	1.000	(0.62)	1.003	(1.14)	1.005	(0.31)		
Service workers (excl. domestic service)	1.001***	(11.08)	1.004***	(9.64)	1.006*	(1.71)		
Production and related workers	1.007***	(61.30)	1.024***	(64.27)	1.040***	(11.36)		
Share of men employed by parish								
Professional, technical, and related workers							1.023***	(8.11)
Administrative and managerial workers							0.925***	(-12.37)
Clerical and related workers							0.920***	(-13.44)
Sales workers							1.002	(0.55)
Service workers							1.033***	(24.76)
Production and related workers							1.009***	(18.64)
Relative butter price	1.009***	(15.47)	1.035***	(16.55)	1.061***	(3.26)		
No. of observations	161623		161623		161623		161628	
Pseudo R^2	0.147		0.147		0.146		0.111	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01
Source: Author's own calculations using the Swedish 1880 census

Table 19: *Sensitivity analyses for married women, 1880*

	OLS		Probit		Clustered		Male shares	
Variables	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
Age	1.002***	(8.24)	1.139***	(7.75)	1.409***	(6.87)	1.425***	(8.29)
Age-squared	1.000***	(-7.88)	0.997***	(-7.39)	0.993***	(-6.69)	0.992***	(-7.98)
Age-cubed	1.000***	(7.15)	1.000***	(6.59)	1.000***	(6.09)	1.000***	(7.20)
Urban residence	0.994	(-1.24)	0.744**	(-2.20)	0.359***	(-3.14)	0.521*	(-1.77)
Migrant status								
County of birth, rural migration	0.999	(-1.08)	0.938	(-0.83)	0.837	(-0.63)	0.906	(-0.47)
County of birth, urban migration	0.998**	(-2.57)	0.856*	(-1.96)	0.668	(-1.39)	0.695*	(-1.66)
Other county, rural migration	1.001	(0.34)	1.007	(0.06)	1.254*	(1.69)	1.931**	(2.31)
Other county, urban migration	1.009**	(2.06)	1.119	(1.02)	1.508***	(3.69)	2.465***	(3.18)
Nörrland residence	1.000	(0.97)	1.075***	(2.80)	1.229	(1.27)	1.149*	(1.90)
Götaland residence	1.000**	(-2.11)	0.990	(-0.56)	0.950	(-0.49)	0.804***	(-4.20)
Stockholm residence	1.010***	(16.75)	1.319***	(11.33)	1.889***	(4.84)	3.058***	(19.74)
Spouse absent	1.095***	(14.63)	3.771***	(33.69)	24.24***	(26.29)	24.45***	(37.57)
No. of children								
Aged 0-5	0.999***	(-10.07)	0.896***	(-10.36)	0.757***	(-8.67)	0.758***	(-9.90)
Aged 6-10	0.999***	(-5.59)	0.948***	(-5.13)	0.865***	(-5.08)	0.860***	(-5.48)
Aged 11+	1.000***	(-4.44)	0.953***	(-6.90)	0.892***	(-5.56)	0.886***	(-6.68)
Working child	1.007***	(8.62)	1.356***	(15.57)	1.978***	(6.68)	2.111***	(14.77)
No. of servants								
1	1.004***	(12.79)	1.378***	(15.90)	2.475***	(11.65)	2.381***	(15.85)
2-5	1.003***	(8.00)	1.317***	(10.75)	2.278***	(8.04)	2.144***	(10.90)
6+	1.012***	(4.74)	1.821***	(8.73)	5.286***	(9.20)	4.887***	(9.35)
Occupation of household head								
Professional, technical, and related workers	1.002**	(2.17)	1.214***	(4.56)	1.628***	(3.19)	1.915***	(5.52)
Administrative and managerial workers	0.998***	(-2.65)	0.976	(-0.44)	0.966	(-0.18)	1.199	(1.22)
Clerical and related workers	0.999	(-0.37)	1.111*	(1.74)	1.352*	(1.78)	1.682***	(3.31)
Sales workers	1.002*	(1.88)	1.181***	(3.62)	1.575***	(3.22)	1.922***	(5.32)
Service workers	1.000	(0.03)	1.086**	(2.23)	1.291**	(2.34)	1.462***	(3.65)
Agricultural workers	0.998***	(-9.32)	0.801***	(-7.55)	0.509***	(-5.63)	0.537***	(-7.29)
Production and related workers	1.000	(-1.08)	1.133***	(4.38)	1.476***	(4.53)	1.771***	(6.94)
Woman is own household head	1.229***	(23.22)	2.295***	(17.18)	4.858***	(12.96)	5.437***	(15.33)
Share of women employed by parish								
Professional, technical, and related workers	1.000***	(4.63)	1.023***	(9.81)	1.055***	(3.99)		
Administrative and managerial workers	1.001***	(2.75)	0.995	(-0.34)	1.027	(0.42)		
Clerical and related workers	1.001***	(5.29)	1.027**	(2.14)	1.125	(1.63)		
Sales workers	1.001***	(9.72)	1.035***	(17.99)	1.090***	(16.99)		
Service workers (excl. domestic service)	1.000***	(3.08)	1.002***	(3.28)	1.006	(1.31)		
Production and related workers	1.000***	(15.40)	1.009***	(15.21)	1.025***	(5.61)		
Share of men employed by parish								
Professional, technical, and related workers							0.992	(-1.01)
Administrative and managerial workers							0.893***	(-6.08)
Clerical and related workers							0.952***	(-3.75)
Sales workers							1.063***	(6.64)
Service workers							0.985***	(-4.75)
Production and related workers							0.998*	(-1.71)
Relative butter price	1.000	(0.26)	1.009**	(1.99)	1.025	(1.10)	1.020*	(1.77)
No. of observations	716067		715920		715920		715963	
Pseudo R^2	0.295		0.295		0.297		0.287	

Note: Dependent variable is gainful employment;* p<0.10, ** p<0.05, *** p<0.01
Source: Author's own calculations using the Swedish 1880 census