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Intermarriage determinants and consequences for Swedish immigrants in the US in 1910

by

Huiwen Ma

hu2250ma-s@student.lu.se

I use the full count data of census year 1910 to examine the intermarriage determinants in Swedish immigrants and the consequences to those who were married to natives compared to their counterparts in endogamy. The results from intermarriage determinants were in line with prior research in general. The results showed that immigrants in exogamy with natives wouldn't have a high probability of getting employed in the labor market compared to their counterparts in endogamy, but the economic performance of male immigrants in exogamy with natives were always better than their counterparts in endogamy. Furthermore, I explored the impact of intermarriage on household specialization by involving the presence of young children in the households.

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1 Introduction

During the age of mass migration, millions of immigrants from different source countries came to the US, composing a "melted" America with natives. Foreign-born people accounted for a large part of the whole US population during this time period. Abundant supply of labor force from immigrants fueled the industrialization of the US. Intermarriage, often regarded as the ultimate stage of assimilation of immigrants, connected natives and immigrants together. "What makes intermarriage sociologically relevant lies in its inherent dynamic: It is not just a reflection of the boundaries that currently separate groups in society, it also bears the potential of cultural and socioeconomic change" (Kalmijn, 1998). Therefore, intermarriage pattern can be regarded as a social indicator, even though it couldn't reflect everything in a society. By investigating the intermarriage pattern in immigrants from a historical perspective, we can get some clues regarding the changes in social interactions in the US.

I use the full count data of census year 1910 to examine the intermarriage patterns in Swedish immigrants and the following consequences to those who got married to natives compared to their counterparts in endogamy. There were three marriage types in the Swedish immigrant stock in 1910 in this paper, endogamy with single-ancestry first- and second-generation Swedish immigrants, exogamy with first- and second-generation immigrants from other origins, and exogamy with white natives with both US-born parents. I implement a multinomial logistic regression to identify the determinants that would produce intermarriage in Swedish immigrants. The results were in accordance with previous studies in general. Then I employ the multinomial logistic regression and OLS regression separately to examine the consequences of intermarrying natives from two aspects, the probability of getting employed and the economic performance in the labor market in comparison to those in endogamy. Furthermore, I check that if there was an exist of lower gender-based household specialization in exogamy with natives in Swedish immigrants in historical context. The results showed that the economic performance of male immigrants in exogamy with natives were always better than their counterparts in endogamy no matter at the time of marriage or after having children or after have a certain number of children, while no evidence indicated the shift of household specialization in intermarriage formation in a historical context. My contribution is to explore the impact of intermarriage formation on household specialization from a historical perspective.

The paper is organized as follows. Section 2 introduces the historical contexts. Section 3 reviews the theories and prior research. Hypotheses are displayed in section 4. Section 5 discusses the data and methodology. Empirical analysis is in Section 6. Section 7 is the conclusion.

2 Context

2.1 The Immigration Context of the US during the Age of Mass Migration

Around 55 million Europeans emigrated to the New World destinations because of famine, burdened taxes, land shortages at home after 1820. The US, as the dominant destination country, received over 30 million Europeans during the age of mass migration (1850-1913). The number of immigrants was up to over one million per year at the turn of the twentieth century. By 1910, the share of foreign-born labor force in the US was about 22% (Abramitzky et al., 2014). The source of inflow varied in different periods. The main stream started from British Isles and Germany in the first half of the nineteenth century. People from Northern and Western European countries joined in the 1850s, followed by people from Southern and Eastern Europe in the 1880s. Historians termed new and old immigrants based on the arrival time. British, Irish, Scandinavians and Germans emigrated to the US in large numbers before the 1880s, called old immigrants, while Italians, Russian, Polish were new immigrants. Apart from arrival time, the two groups were very different in many ways, such as customs, demographic characteristics. Because of these notable characteristics of immigrants on arrival time, sources of home countries, initial cultural distances or even looks during the age of mass migration, it is common for scholars to study intermarriage patterns with respect of national-origin groups (Dribe et al., 2018; Logan and Shin, 2012; Kalmijin and Tubergen, 2010; Sassler, 2005; Pagnini and Morgan, 1990).

Hatton and Williamson (1992) concluded some characteristics of these European emigrants. Male immigrants accounted for 64% of all immigrants in the US from 1851 to 1910. The unbalanced sex ratio would produce marriage outside the own origins. Another characteristic was about the similar pattern they came to the US. The immigrants were usually aided by previous immigrants in the late of nineteenth century. “Chain migration” or “friends and relative effect” was used to depict that the descendants often followed the path of earlier immigrants to a specific host country. The earlier immigrants provided accommodation or financial aids to new comers. But it promoted residential segregation. Segregation for new immigrants was much stronger than for old immigrants in the early twentieth century, and it peaked in 1900 and 1910 in European immigrants (Eriksson and Ward, 2022). Immigrants also tended to reside in urban areas for more wages while the majority of US population were living in rural areas in 1910. The urban premium ranged from 15 to 40 percent from 1850 to 1940 in the US, meaning the wage was higher in urban areas (Abramitzky et al., 2012; Boustan et al., 2018). In addition, immigrant groups were inclined to concentrate in certain regions. For example, Germans were dominant in Midwestern region, and few of them resided in south and New England. These residential characteristics of immigrants would impact the marriage market, affecting exposure

to same national-origin immigrants or natives. They are also the roots when involving contextual variables as key independent variables.

Attitudes toward immigrants ebbed and flowed in the nineteenth century in the US. Anti-immigrant sentiment emerged in the 1880s along with large numbers of immigrants flooded into the US. A literacy test was imposed in 1905 after a series of attempts to limit immigration. In addition, the Immigration Commission spent four years to investigate every aspect of immigration problem, and published a report in 1911. The report concluded a sharp distinction between old and new immigrants. The new immigrants were seen as unskilled men from less advanced European countries, coming to the US temporarily. The Commission also viewed new immigrants far less intelligent and charged their slow assimilation compared to old immigrants (Hatton and Williamson, 1998). The prejudice and discrimination to new immigrants set boundaries between new immigrants and old immigrants and natives, hindering assimilation. In this sense, intermarriage between immigrants and natives, often considered as the final stage in assimilation (Gordon, 1994), was rare among the majority in the host country. However, it is insightful to figure out which determinants could impel intermarriage by observing intermarried couples, thereby encouraging assimilation and integration. It is one of the research questions in this paper.

As the most dominant destination country, US attracted millions of European immigrants from various national origins at the turn of the twentieth century. It seems a relatively fair-opportunity window for European immigrants because of the open border in the US, and it also seems an ideal time period, where behaviors of European immigrants were less interrupted or restricted by outside factors like the administration or relevant laws, to observe the marriage pattern of immigrants.

2.2 Swedish Immigrants in the US

The Swedish mass emigration started from the 1860s because of harvest failures at home and opportunities and good returns in the US, peaked in the 1880s and was over by 1930. The Swedish emigration was mostly motivated by the economic conditions in the two countries and expected returns from migration. Other factors like relatively affordable transportation and growing Swedish communities in the US made emigration more accessible. For example, the ship price from Europe to the US decreased in later of the 19th century for the innovation of steam (Keeling, 1999; Castillo, 2025). As other national-origin immigrants, chain migration also played an important role in Swedish immigrants. Castillo et al. (2025) found that migrant networks from siblings, especially the same-sex siblings, and even kin outside the nuclear family promoted emigration in the Swedish context from 1880 to 1920. Moreover, the earlier immigrants had an influence on residential or occupational choices of new immigrants. Norman (1976) found the occupational and economic structure in some Midwest counties in the US was as similar as that in origin Sweden parish by examining the settlement patterns of Swedish immigrants in 1860 and 1870. This provided some empirical evidence when considering contextual variables of residential segregation and job segregation in the later section.

Studies show that the assimilation of Swedish immigrants into the US labor market well during the age of mass migration. Permanent immigrants had a modest low occupational earning gap compared to natives upon first arrival and the gap would decrease after years in the US (Abramitzky et al., 2014). Dribe et al. (2022) found that Swedish from medium-skilled class were more likely to migrate to the US, and this pattern was applied to men and women.

3 Theory and previous research

3.1 Theoretical Framework

3.1.1 Assimilation Theory

There are two acknowledged theories to describe assimilation, classic assimilation theory and the more recent segmented assimilation theory. Gordon (1964) completed the refined the assimilation theory in his book "Assimilation in American Life: The Role of Race, Religion, and National Origins", laying a foundation for latter research on immigrant integration. He suggested seven assimilation stages, and acculturation was the first and inevitable one which was defined as adaption to the host country in cultural patterns, norms or behavior. He viewed the structural assimilation as a more complete assimilation, meaning a decline of prejudice and discrimination and common phenomena of intermarriage. His work provided operationalization and hypothesis formulation for subsequent studies, although it was limited in not accounting assimilation to broader social processes (Alba and Nee, 1997). With the decrease of endogamy in immigrants, one interpretation of assimilation from the generational perspective is that immigrant subgroups integrate into the host country gradually through generations. It gets easier for all ethnic groups to integrate if more second or third ethnic generations compose the society (Kalmijn, 1998) with respect to a macro level. In terms of individual level, there is a productivity hypothesis about the relationship between intermarriage and assimilation, that is, immigrants who marry native spouses are supposed to integrate into the host country quickly than their counterparts in endogamy with the integral help of native spouses in country-specific human capital accumulation (such as language, norms) (Kantarevic, 2004). Many studies have aimed to testify and explain patterns of intermarriage in various settings in different time frames, as well as the speed and extent of economic assimilation between immigrants in intermarriage and natives based on assimilation theory (Meng and Gregory, 2005; Kantarevic, 2004; Wildsmith et al., 2003).

Segmented assimilation theory arose from the failure of the classic assimilation theory to explain some contemporary immigrant patterns in the US. It proposes that new immigrants have varying paths to assimilate in different segments based on the fact that American society is extremely diverse, stratified, uneven and segmented. Segmented assimilation theory emphasizes that more than one way to assimilate especially when it comes to certain ethnic attributes of immigrants. Portes and Zhou (1993) provided three possible paths. First, straight-line assimilation is integration into the American mainstream class. Second, downward assimilation is integration into urban underclass. Third, selective acculturation is preservation of ethnic own culture while pursuing economic integration. It is used as a substituted prediction to some immigrant groups especially ones with Asian background. In this way, intermarriage should also vary by race and ethnicity. For example, black people had the highest rates of

endogamy while European subgroups showed the lowest probability of endogamy in a study from Lieberson and Water (1988).

3.1.2 Exchange Theory

Exchange theory argues that members of ethnic groups could trade a high socioeconomic status for high prestige in host societies by marrying outside (Davis, 1941; Merton, 1941). The empirical evidence shows that the aspects of exchange could be education, physical attractiveness and cultural participation. It is more often for white women marry a black man with more education than a white man with more education (Schoen and Wooldredge, 1989). However, this pattern of black-white marriage is not always applied to other ethnicities in some locations. Though results about studying exchange between female attractiveness and men's occupational prestige or education from Taylor and Gleenn (1976) and Stevens et al. (1990) are contrary, this kind of exchange is a widespread stereotype in secular society. A study in Netherlands supports the exchange theory between the wife's cultural participation and husband's education, but it is not always the case in other studies.

3.1.3 Social Structural Theory

Social structural theory proposes to take social structure into account, such as group size and heterogeneity. It relates to the exposure to potential partners for immigrants. Group size refers to the share of members from a specific group of all population, and it is inversely related with the proportion of intermarriage. Heterogeneity is defined as the chance expectation of two random persons not belonging to the same group (Blau et al., 1982). Also, results from the 125 largest American metropolitan areas corroborate the theory. That is, heterogeneity has strong positive associations with intermarriage (Blau et al., 1982). Besides group size, the availability of potential partners is also related to the numbers of opposite-sex persons in age range.

3.1.4 Marriage Pattern

Apart from the chance of intermarriage above, the participating forces behind intermarriage should also be examined. The marriage pattern is changing along with the replacement of values and progress in economic overtime, and it is surely varying depending on locations and culture. According to the observation from Kalmijn on Western societies in the last several decades, three forces are involved in the intermarriage pattern, the preferences for certain traits in partners, the influence from third parties, and local markets which they are in. First, socioeconomic and cultural resources are most common aspects people consider about partners. The earnings and social status of one partner can compensate the other, or both partners can contribute to the maintenance or even the upward mobility of the family's status which largely leads to homogamy in socioeconomic status. With the rising of labor market participation of females, wives' socioeconomic resources are becoming important to families. Cultural resources mainly focus on similarities of both partners. Similarities of two partners are the foundation of joint marriage activities and a common lifestyle in daily life. Marriage is more

than a combination of socioeconomic and cultural resources for sure, other social and individual characteristics involved. Second, people tend to identify themselves with a sense of group identification which could prevent them from exogamy. Moreover, marriage could be interfered with by family, the church and the state. Although the influence of families is not that profound in western families, it can affect to some extent the probabilities of meeting spouses. The stronger sanction is from church, and it originated from competitions of different religions. Interfaith marriage could reduce the attachment with church in the future. The strongest sanction was from the state. There used to be laws to forbid racial intermarriage in the US. Third, marriage markets can be decided by population composition, geographical distribution and local marriage markets. The numbers of potential spouses affect the probability of getting married. Traditionally, the school, neighborhood and workplace are three local markets discussed often. How the three markets affect homogamy and endogamy depends on their composition with respect to social characteristics. Generally, universities promote homogamy in education while neighborhoods could promote homogamy in ethnic or background. Workplaces have more variations (Kalmijn, 1998). In more recent years, the marriage market theoretically can be expanded nationwide or regionwide because of social media and changes in dating behaviors. It may transform the traditional marriage patterns above, but it is not discussed in this paper.

After discussing the overall marriage pattern, the empirical evidence shows that other demographic factors, such as gender, ethnic origins and generations, also impact marriage behavior in different ways. It is more common for black men to marry white women than black women to marry whites (Schoen and Wooldredge, 1989). Men are tended to marry down while women marry up traditionally, but it can be due to the asymmetry of men and women in socioeconomic status and education. Logan and Shin (2012) found that a disparity in endogamy among Irish, Germany and British immigrants in 1880 by examining their intermarriage patterns. Some immigrant groups have very low intermarriage rates, like Mexican and Asian immigrants. In terms of generation, the first generation of immigrants had very low propensities to marry out generally, while the second or third generations were more likely to marry out than the first one, in line with assimilation theory.

3.2 Previous Research

Many studies have focused on determinants and patterns of intermarriage among different national-origin groups in regard to generations, genders or mixed- or single-ancestry in historical and contemporary period (Pagnini and Morgan, 1990; Wildsmith et al., 2003; Sassler, 2005; Kalmijn and Van Tubergen, 2010; Logan and Shin 2012; Dribe et al., 2018).

Wildsmith et al. (2003) tracked the history of intermarriage in Mexicans and some European immigrants over one century (1880-1990) to test assimilation theory which was measured by intermarriage rates, picturing an overview in intermarriage patterns. The data revealed some trends: exogamy increased in all immigrant groups over a century, while with different extent in groups and different speeds in specific timeframe; generational effects persisted. Their study stated that Swedish and Irish immigrants showed high exogamy rates by the 20th century and

experienced the most rapid increases in intermarriage. Multivariate analysis confirmed individual and contextual factors were important in intermarriage other than only ethnicity, such as education, sex ratios, group size and settlement locations. And the effect of contextual factors changed along with time. Group size became the most important factor while the influences of sex ratio declined after World War II (Wildsmith et al., 2003). In terms of generations and mixed ancestry, Logan and Shin (2012) depended on data from 1880 to 1910 to find a lower rate of marital assimilation in third generations in Irish, Germans, British men while a nearly complete marital assimilation among mixed ancestry.

Some prior studies used 1910 census data to explore intermarriage, the same census year in my study. Pagnini and Morgan (1990) drew 0.4% sample of the 1910 census data and a marriage registered sample in New York city from 1908 to 1912 to identify mating pattern of eight European immigrant groups (British, Irish, German, Scandinavian, Italian, Polish, Jewish from Central and Eastern European). Birthplace and mother tongue were used to define origins. The mainstream of immigrants to the US at the turn of twentieth century were from Europe, but there were clear different characteristics between new and old immigrants in their origins, customs and relative size. New immigrants were from southern and eastern Europe while British, Irish, Scandinavian and German immigrants belonged to the old ones from the view of historians. They mentioned some features immigrants had at that time. First, immigrant groups were normally segregated spatially from natives and concentrated. Immigrants tended to have their own ethnic communities leading to less contact with natives, and this kind of tendency was even more obvious in new immigrants. Second, they were also inclined to do same business which led to occupational segregation. Third, social distance like language was also important to intermarriage, and prejudice and discrimination to new immigrants were very common at the beginning of the twentieth century. Fourth, they discussed the religion of immigrant groups. Religions and time of arrival were associated with immigrants' origins, and it was hard to disentangle them. Several important patterns were shown from their results. Endogamy overwhelmed in first generations but it varied in different groups. Weaker endogamy pattern was in second generations except Jews. Intermarriages were very rare across old and new immigrants, implying effects from social distance like discrimination, faith distance were strong at the turn of the twentieth century. Homogamy in generation was strong within ethnic groups. There was an interaction between ethnicity and religion. That is, evidence showed that intermarriage was frequently accompanied with religious endogamy in 1910.

Sassler (2005) extended Pagnini and Morgan's work in examining intermarriage patterns from the aspects of sex difference, structural factors at the state level and more specific intergenerational pattern by using the 0.4% sample of 1910 census data as well. Her sample was constituted of third-generation or higher-generation native whites with native parents, first- and second-generation old immigrants (English, Irish and German) and new immigrants (Italian, Polish and Jewish). From her results, English descendants had higher probabilities of marrying out both to natives with native parents and other white ethnic ancestry, and this was less among German and Irish ancestry. Jews had very strong boundaries of intermarrying to other ethnics. It implies that ethnic difference in intermarriage was distinct at the early twentieth century. Her findings suggested that more consideration should be given to specific white ethnics when discussing the relationships between intermarriage and geographic distribution and residence concentration. The intermarriage was more common in white ethnic men with larger group size, and that was less consistent with structural theory. And they seemed to have preference of native

white wives. Her interpretation of it was that old immigrants spent longer enough time in host country to make sure establishments of economic advantages and familiarity in host country which can be exchanged with natives. Immigrants residing in urban areas had higher exposure to multiple ethnics than those in rural areas, and less exposure to white natives since majority of the US population lived in rural areas in 1910. Her results also indicated that women were more likely to be in endogamy than men. Her opinion was women played an important role in retention of ethnic identity, and it was inherently related with the difference in social expectation of men and women. Women were expected to dedicate their time to the family, and in addition they gained little from the labor market. All of these reinforced women's role in family and transmitting ethnic identity. Another assumption from her was that women who were in exogamous marriages seemed to utilize their own traits such as literacy, language capability as attractiveness in the marriage market.

Dribe et al. (2018) extended previous research with respect to the contextual determinants of intermarriage by relying on complete-count data in census 1910 from IPUMS. They investigated how contextual factors shape marriage outcomes by examining impacts from relative group size, sex ratio, time spent in the US, diversity index and proportion of white natives at the county level. Their results revealed that a relatively greater group size of the same national origin could increase the probability of endogamy. The sex ratio of the same national origin affected the likelihood of endogamy in male and female immigrants in different ways. To men, the finding was in line with the expectation that a greater supply of women of the same origin produced endogamy. However, the result didn't support the similar pattern in female immigrants. In their view, the possible reason could be the surplus of male immigrants. The diversity and proportion of natives in a community was positive associated with exogamy in general. They also explored the patterns over generations. The impacts on intermarriage from group size, sex ratio, diversity index and proportion of white natives were similar across generations. However, one exception was the effect from the time spent in the US. The longer time spent in the US could promote exogamy in first- and 1.5-generation immigrants, while this pattern didn't apply to the second-generation immigrants.

Besides the historical intermarriage patterns, some studies focus on the contemporary context and beyond European-origin immigrants. Kalmijn and Van Tubergen (2010) found effects from cultural factors were more important than structual factors on endogamy by analysing 94 national-origin groups from 1994 to 2006. They measured culture on early-marriage customs, religious orientation, language origin and globalization in home countries, apart from more-discussed structural variables like group size, sex ratio and ethnic diversity. Chriswick and Houseworth (2010) found a positive relationship between accumulation of US-specific human capital and probability of intermarriage from the human capital perspective from the 1980 US census, which somehow may imply a similar pattern in the labor and marriage market among immigrants. And there was a propensity that intermarriage happened between individuals with similar education levels and proficiency of English language (Chriswick and Houseworth, 2010).

Along with the improvement of women's educational attainment and labor market participation in modern times, the discussion about household market specialization in intermarried households rose. From Espiritu (1999), the traditional gender-based specialization model could be weakened because of migration and intermarriage. Furthermore, as mentioned above,

intermarriage are more likely to happen between the two with similar education levels which is also a crucial factor for labor market, implying a relatively equal labor market returns for both and a lower trational specializaiton in households. Basu (2017) studied the impact of intermarriage on household specialization by employing the 2010 American Community Survey, arguing that gender-based household specialization is lower in intermarriage formation than in endogamous formation for male intermarried households (immigrant husband and native wife). But her study also revealed that the specialization difference is small and insignificant between exogamous- and endogamous-married European immigrants. In her work, the most key factor to affect household specialization is the immigrants' own level of education in the intermarriage with natives in the contemporary context. Immigrants with low education levels would share more household work for more engagement of native partners in the labor market while their counterparts with highest end of the education have no significant specializaiton shifts, and the pattern is similar in men and women. Basu also considered the number of children, presence of young children, bargaining power, duration of the marriage are determinants for household specialization.

4 Hypotheses

According to the theories and prior research in section 3, some determinants in regard to intermarriage can be identified among immigrants.

First, the time spent in the host country, one important factor in assimilation theory. It is highly related to the country-specific human capital accumulation, and then consequently impacts their assimilation into the host country. The disparity in socioeconomic status and incomes between immigrants and natives will affect the probability of intermarry natives in immigrants as certain partners' traits are one of three forces regarding the intermarriage pattern. Therefore, my hypothesis about Swedish immigrants in the US in 1910 is as follows.

Hypothesis 1: The longer time the Swedish immigrants spent in the US, the higher probability they would get married to natives.

Second, immigrants would be willing to trade their high educational level and economic status for social status by intermarrying natives in the host country based on the exchange theory. I don't consider physical attractiveness and cultural participation because they are hard to measure.

Hypothesis 2: Swedish immigrants with a higher educational level and economic status were more likely to intermarry natives.

Third, group size and sex ratio of same-origin immigrants are associated with the potential spouses' pool in a community for immigrants according to the social structural theory. Group size is inversely related to the probability of intermarriage in immigrants. Abundant opposite-sex immigrants of the same origin would reduce exogamy in the immigrants.

Hypothesis 3: Group size was negatively related to the probability of intermarriage in Swedish immigrants.

Hypothesis 4: A high sex ratio of Swedish females (males) to Swedish males (females) would reduce the probability of intermarriage in Swedish male (female) immigrants.

Fourth, based on facts of immigrants' behavior in the early twentieth century and the distribution of natives, immigrants residing in urban areas would have less exposure to the native population, lower the probability of intermarrying natives than those residing in rural areas.

Hypothesis 5: It was more likely for Swedish immigrants residing in rural areas to get intermarried to natives than their counterparts living in urban areas.

Fifth, from the contemporary study about determinants of intermarriage (Chriswick and Houseworth, 2010), there is a positive relationship between accumulation of US-specific human capital and probability of getting intermarried. And the accumulation of US-specific human capital would benefit immigrants in the labor market as well. Hence, I propose two hypotheses regarding the consequences of intermarrying natives in Swedish immigrants in terms of the labor market, in comparison to those in endogamy.

Hypothesis 6: There was a high probability for Swedish immigrants in exogamy with natives to get employed than their counterparts in endogamy in 1910.

Hypothesis 7: Swedish immigrants in exogamy with natives earned more than their counterparts in endogamy. In other words, there was a premium for immigrants in exogamy with natives compared to their counterparts in endogamy.

Furthermore, considering that the gender-based household specialization is lower in intermarriage formation than in endogamous formation for male intermarried households (immigrant husband and native wife) in contemporary context (Basu, 2017), I propose the similar pattern may exist in historical context as well. The immigrants faced discrimination at the turn of the 20th century. Although for old immigrants like Swedish, the discrimination was not as much as the new immigrants. Immigrant husbands may rely on the networks of native wives to supply the family. Hence, native wives might have more bargaining power in intermarriage households compared to the Swedish wives in endogamy in 1910. As mentioned, the presence of young children is one of determinants for household specialization. With the increase of number of young children in the households, native wives might request more household work from immigrant husbands. Because there was no data on hour allocation in household and labor market, I think it can be showed by the decrease of premium at the time of marriage. That is, the relatively more decrease of premium of Swedish male immigrants is a proxy of lower gender-based household specialization in intermarriage with natives. In conclusion, there was a more decrease of economic performance in Swedish immigrants in exogamy with natives compared to their counterparts in endogamy because of the lower gender-based household specialization in intermarriage with natives.

Hypothesis 8: There was a more decrease of economic performance in Swedish immigrants in exogamy with natives compared to their counterparts in endogamy after having children.

5 Data and Methods

5.1 Study Sample

My study sample is the Swedish immigrants in the US in the Age of Mass Migration. The reason can be stated from two aspects, the sample size and initial social distance. As one of the most important sending countries, around 1.1 million Swedes headed to the US from 1850 to 1930 which was quite a large number considering the total population of Sweden (Dribe et al., 2022). Moreover, the distance in mother tongue and cultural norms between Sweden and the US can bring us a better understanding of outcomes from intermarriage in Swedish immigrants. In this paper, there are two intermarriage types which are distinguished by the origins of spouses of Swedish immigrants, including exogamous marriage to immigrants from other origins and exogamous marriage to the US natives. The endogamous marriage means the endogamy with single Swedish origin.

I leverage the full count data of census year 1910 to get enough observations in this paper. The data source is the Integrated Public Use Microdata Series (Ruggles et al., 2024). It is a website and database offering integrated and high-precision samples of the American population. Furthermore, IPUMS collaborate with Ancestry.com and FamilySearch to construct full count data for decennial census years from 1850 to 1950. It provides many demographic characteristics of each individual, and it can attach the same demographic data of the respective spouse if the one was married which is important and necessary for me to identify the origins of spouses. I restrict the research group to the white Swedish immigrants aged 20 to 40 with both Sweden-born parents. I follow prior research to study on a narrow age range to capture recent marriages (Dribe et al., 2018; Sassler, 2005; Wildsmoth et al., 2003). It can also eliminate the chance of being married more than once as possible, because the times of marriage were not recorded. Pagnini and Morgan (1990) and Sassler (2005) determined immigrants' origin by the birthplace and mother tongue relying on limited samples of 1910 census data. However, because there is no information about mother tongue in the full count census data, the origin of an individual is decided by the birthplace and the birthplaces of parents in this paper. The Swedish immigrants are defined as people in the US in 1910 with the birthplace in Sweden. I additionally restrict the birthplaces of their parents were both in Sweden. The origin of their spouses is key and closely related to the marriage types. As mentioned above, I categorize marriages into three types in Swedish immigrants, endogamy, exogamy with immigrants from other origins and exogamy with the US natives. If the birthplaces of spouses were in Sweden and the birthplaces of both parents were in Sweden as well, or if the birthplaces of spouses were in the US while the parents' birthplaces were both in Sweden, I define it as the endogamy. In short, the endogamous marriage is that the spouses were single-ancestry first- and second-generation Swedish. If the birthplaces of the spouses and their parents were all in the US, plus the spouses were whites, it was exogamous marriages to the US natives in this paper. About the

exogamous marriages to other-origin immigrants, this category included other-origin immigrants of first generation and second generation, and the origins of other immigrants are defined by spouses' or their fathers' birthplace. More specifically, the national origin is decided by the spouses' birthplaces for the first generation, and it is decided by the fathers' birthplaces for the second generation. Some scholars either gave priority to the mother's birthplace or father's birthplace to determine the origin of second generation in prior studies. I decide it by fathers' birthplaces in this paper. The definition of these three marriage types is consistent with the study of Kalmijn and Van Tubergen (2010). The database provides variables of years in the US, duration of current marriage, and marital status. The research group can be restricted further through these three variables by excluding immigrants who had got married before migration, were currently single, divorced, spouse-absent or widowed (Sassler, 2005). Therefore, to sum up, the study sample in this paper is the white Swedish immigrants, who got married in the US and were still currently in a married status, aged 20 to 40 with both Sweden-born parents. The study sample contains 140705 individuals in total, 64226 male respondents and 76479 female respondents respectively.

5.2 Variables

Contextual variables need to be considered when studying marriages of immigrants (Dribe et al., 2018; Logan and Shin, 2012; Kalmijin and Tubergen, 2010; Meng and Gregory, 2005; Sassler, 2005). Group size and sex ratio of an immigrant group, as contextual variables in this paper, are used to discuss opportunities of intermarriage, and the heterosexual marriage is only considered. The group size is the share of males or females from a specific origin (Swedish) group of the entire male or female population. It is normally inversely related with the proportion of intermarriages (Sassler, 2005). Previous studies, such as Wildsmith et al. (2003) and Sassler (2005), included the group size at the state or state economic area (SEA) level to study intermarriage in the US. Telles and Ortiz (2008) downsized the spatial distance to the neighborhood level, finding a positive association between Mexican intermarriage and proportion of mixed groups in the neighborhood. I don't have geographical variables on neighborhood and the state seems too large for a marriage market. Hence, I construct the contextual variables at the county level, following it as Dribe et al. (2018). The sample contains 1897 counties, and the populations aged 20 to 40 of counties are from 108 to 1176718 with the mean is 232626. The opposite-sex group size is used in separate male/female models. Specifically, the number of female Swedish immigrants aged 20-40 in census year is divided by the total number of females aged 20-40 in each county for male models, and vice versa. The equations are (1):

$$Groupsize_{formale} = \frac{n_c^f}{N_c^f} \qquad Groupsize_{forfemale} = \frac{n_c^m}{N_c^m} \qquad (1)$$

Where n denotes the number of Swedish immigrants aged 20-40 in each county, f denotes female, m denotes male, N is the total number of people aged 20-40 in each county, c is the county.

Another contextual variable is sex ratio. The sex ratio can be distributed unevenly dramatically due to selective migration (Dribe et al., 2018; Sassler, 2005). The skewed sex ratio should drive the surplus sex to find spouses from other national origin groups. The number of female Swedish immigrants aged 20-40 is divided by the number of male Swedish immigrants aged 20-40 in each county for male models, and the inverse equation is for female models. The equations are (2):

$$Sexratio_{formale} = \frac{n_c^f}{n_c^m} \qquad Sexratio_{forfemale} = \frac{n_c^m}{n_c^f} \qquad (2)$$

Other more contextual variables were applied in prior research like diversity index and proportion of white natives of the locality (Dribe et al., 2018), and these two can somehow indicate the degree of residential segregation of immigrants. Kalmijn and Van Tubergen (2010) thought that the association between residential segregation and intermarriage was not strong, because it could be caused by intermarried couples moving out of ethnic enclaves. Moreover, Pagnini and Morgan (1990) mentioned that segregation on the job was common in 1910 and it would reduce interactions as well. But only jobs couldn't indicate segregation. It made more sense to connect jobs and locations together to assess the extent of segregation. In my opinion, since smaller geographical units like neighborhood data are not provided and we can't assume the mobility of a person in 1910, contextual variables of group size and sex ratio at the county level are enough for my research.

I also take regions and place of residence (urban or rural) as control variables. The distribution of particular immigrant groups was unbalanced across the US, no matter in regions and rural or urban areas. Immigrants were more willing to reside in urban areas. German immigrants predominated in Midwestern cities and rural areas (Ward, 1989). Around 85% of foreign-born population were living in the northeast and north central states in 1910 (Landale and Tolnay, 1993). There are nine divisions involved in my study sample, and states are listed of each division in the IPUMS USA website. The definition of urban from census 1910 in IPUMS USA is all cities and incorporated places of 2500+ inhabitants. Table 1 displays the distribution of total white Swedish immigrants of all ages in the US based on the census of 1910. They were more concentrated in the central northern region, East North Central division and West North Central division, about 59% of total. In more details, Minnesota and Illinois were the top two states that the Swedish immigrants resided, 18.52% and 17.36% respectively of total in 1910. Swedish immigrants went to the southern region least. Around 60% of Swedish immigrants resided in urban areas, 40% in rural areas. This kind of distribution pattern of urban and rural areas was similar to other immigrants (such as Irish, Italian). The sex ratios of male immigrants divided by female immigrants were more than 1 in most division except New England (it was close to 1), meaning males accounted for a larger part in Swedish immigrants.

Table 1 Distribution of total white Swedish immigrants in the US in 1910, in number and %

Regions	Male N	Female N	Sex Ratio=M/F	Total N	% of Swedes
New England Division	35,204	35,587	0.99	70,791	11%
Middle Atlantic Division	43,208	43,348	1.00	86,556	13%
East North Central Division	96,231	81,910	1.17	178,141	27%
West North Central Division	124,140	90,433	1.37	214,573	32%
South Atlantic Division	1,829	1,133	1.61	2,962	0%
East South Central Division	1,016	552	1.84	1,568	0%
West South Central Division	4,021	2,431	1.65	6,452	1%
Mountain Division	21,389	14,068	1.52	35,457	5%
Pacific Division	43,623	25,021	1.74	68,644	10%
Total	370,661	294,483	1.26	665,144	100%
Rural / Urban area					
Rural area	161,806	107,359	1.51	269,165	40%
Urban area	208,855	187,124	1.12	395,979	60%
Total	370,661	294,483	1.26	665,144	100%

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

Some independent individual-level variables are accounted for the marriage market, affecting mate selection, as well as the labor market. Years in a host country is positively associated with the performance in the marriage and labor market. An immigrant would acquire more country-specific skills and have more chances to meet a potential native partner if he/she spent more years in the host country. I use the variables of years in the US before marriage and years in the US respectively to investigate the marriage pattern and outcomes of the labor market in Swedish immigrants. Some scholars divided immigrants into 1.5 generation (migrated into the host country before 12 years old) and first generation for 1.5-generation immigrants were supposed to have a higher probability of exogamy (Dribe et al., 2018; Wildsmith et al., 2003). Years in the US can be worked in the same way. People with higher education are more likely to marry out from more contemporary evidence (Kalmijn and Van Tubergen, 2010). Variables of educational attainment are absent in 1910, but it contains records of literacy. I set that only the one can read and write is identified as literate, otherwise illiterate. Speaking English, as a US-specific skill, is also an important factor measuring assimilation in the US. The variable of speaking English indicates whether the respondent was able to speak English in 1910. Literacy and speaking English are both binary variables. Kennedy (1944) proposed the "triple melting pot" theory to include religion as one factor affecting intermarriage (Pagnini and Morgan, 1990). Kennedy predicted that intermarriage occurred within the religious boundaries. Kalmijn (1998) also regarded it as one of three forces when stating the marriage pattern. Church supported endogamy in faith to keep its competitiveness. From this perspective, religion is also one important variable. Since the database does not have variables regarding religion, and the majority of Scandinavians were protestants, I skip the religion variable. Since I am interested in the probability of being employed in the US labor market in Swedish immigrants, the variable of employment status is included. Respondents were in the labor market if they were working

or seeking jobs, and they were currently employed or unemployed in the labor market. Otherwise, they were not in the labor market (not working and not seeking jobs). I contain the variable of number of children under age 5 for my later study about children effect on incomes. Other individual-level variables are current age and age in squared terms.

Finally, I include occupational income scores, proxying incomes following common practice in previous studies (Tabellini, 2020; Abramitzky et al., 2014). The occupational income score is a constructed integrated continuous variable, representing the median total income (in hundreds of 1950 dollars) in each occupation based on the economic returns of all persons in that occupation in 1950. This kind of occupation-based earnings is a convenient and reasonable proxy for income (Abramitzky et al., 2014). But we need to be cautious of its limitation. First, it is not the actual personal income. It is an economical tool to scale occupations, turning occupation into a continuous measure. Therefore, it is impossible to measure the full economic assimilation of immigrants. That is, I can't measure earning convergence among Swedish immigrants in different marriage types by occupational income scores if they were in the same occupation. Second, no weighting controls shifts for change in occupational incomes over time. It is not robust to adapt the 1950 scores to 1910. Third, the occupational scores could overstate immigrants' initial earnings if they were in low-paying occupations. The scores were constructed by taking year 1950 as the base measure year in incomes. However, it was a period of wage compression in the 1940s and 1950s (Abramitzky et al., 2014; Goldin and Margo, 1992). Fourth, the income scores are a tool in scaling occupations in earnings. Although high-status occupations are normally in company with good incomes, good incomes don't make sure high occupational status. It is essentially an economic score, not a socioeconomic one. In my study, occupational income score is used as the dependent variable when assessing immigrants' economic performance in the labor market, but it is also included as a control variable in regressions for the marriage pattern, mainly for controlling an individual's economic status (Dribe et al., 2018). The overview of variables is shown in Table 2.

Table 2 Summary of variables

Variable	Description	Codes
age	respondent's current age	continuous variable
age2	respondent's current age in squared terms	continuous variable
region	the region and division where the respondent resided	categorical variable. 9 divisions in the sample
urban	rural or urban areas the respondent resided	binary variable. 1=rural, 2=urban
speak english	respondent's ability to speak English	binary variable. 1=No, 2=Yes
literacy	respondent's ability to read and write	binary variable. 0=illiterate, 1=literate
years in US	years in the US since the respondent's migration	continuous variable
years in US before marriage	years between migration and marriage	continuous variable
number of children under age 5	number of children under age 5 the respondent had	categorize numbers into "0 child", "1 child", "2 children", "3+ children" in regressions
occupational income score	the median total income (in hundreds of 1950 dollars) in each occupation. a proxy of the respondent's income and socioeconomic status.	constructed 2-digit continuous variable. 00=N/A, maximum value=80.
groupsize_formale / groupsize_forfemale	the share of female(male) Swedish immigrants aged 20-40 of total females(males) aged 20-40 in each county	categorize group size into "0-0.02", "0.02-0.04", "0.04-0.07", "0.07+" in regressions
sexratio_formale / sexratio_forfemale	the ratio of number female (male) Swedish immigrants and number of male(female) Swedish immigrants aged 20-40 in each county	continuous variable
employment status	indicate whether the respondent was a part of the labor force. If a person was not in the labor market, the person was not working and not seeking work. Otherwise, the person was employed or unemployed currently.	categorical variable. 1=employed, 2=unemployed, 3=not in the labor market
marriage types	It was decided by the spouses' origins	categorical variable. 1=endogamy, 2=exogamy with other-origin immigrants 3=exogamy with white natives

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

5.3 Methods

I first estimate a multinomial logit model to determine the likelihood of being intermarried. As mentioned, there were three marriage types in Swedish immigrants. I follow Dribe et al. (2018) to use a multinomial logistic regression to examine the intermarriage determinants. It is a statistical method, and is normally used to predict the probability of at least three categorical outcomes that do not have a natural order, given one or more independent variables. Since Swedish immigrants showed three types of employment status in the labor market, the multinomial logistic regression is also used to estimate the probability of getting employed. At last, an OLS regression is applied to estimate immigrants' economic performance in the labor market.

The multinomial logit model (3) is as follows. π_1, π_2, π_3 are the probabilities of various outcomes. For example, π_1, π_2 and π_3 are the probabilities of endogamy, exogamy with immigrants from other origins, exogamy with white natives respectively when examining the marriage pattern in Swedish immigrants. β_1 is the effect of X on the log-odds of being π_2 instead of π_1. β_2 is the effect of X on the log-odds of being π_3 instead of π_1. So π_1 is treated as the base outcome in the equation (3). Relative risk ratios can be obtained by calculating the exponential of coefficients. X denotes relevant independent variables above, including age, age in squared terms, region, place of residence, literacy, speaking English, years in the US before marriage, occupational income score, group size and sex ratio.

$$\log\frac{\pi_2}{\pi_1} = \alpha_1 + \beta_1 X \qquad \log\frac{\pi_3}{\pi_1} = \alpha_2 + \beta_2 X \qquad (3)$$

OLS models (4) and (5) are employed to study the economic performance in the labor market. Y_i is the occupational income score of individual i observed in census year 1910. X_i includes all relevant variables of individual i, such as age, age in squared terms, region, place of residence, literacy, speaking English and years in the US. M_i denotes the marriage type of individual i. Furthermore, I study the influence of children on immigrants' income. Hence, C_i denotes the number of children under age 5 of individual i. The interaction terms of marriage types and children are examined as well.

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 M_i + \varepsilon_i \qquad (4)$$

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 M_i + \beta_3 C_i + \beta_4 M_i * C_i + \varepsilon_i \qquad (5)$$

6 Empirical Analysis

6.1 Descriptive Analysis

Table 3 presents the descriptive statistics of the study sample. There were 140705 respondents in the sample, 64226 and 76479 for males and females separately. The married Swedish immigrants aged 20-40 resided in urban areas more, around 67%. Most of them were able to speak English (97%), read and write (98%). They spent about 9 years in the US before getting married on average, and total average years in the US were about 17. The mean duration of their current marriage was 7.6 years. The endogamous marriage was overwhelming as expected, 77.51% of all. The percentage of exogamy with natives was the least, 7.74%. The low occupational income score was due to the very low participation of women in the labor market. Male immigrants were more than female immigrants in general, as the mean group size and sex ratio for males was smaller than for females.

Table 3 Descriptive statistics of married Swedish immigrants aged 20-40 with Sweden-born parents in the US in 1910

VARIABLES	N	Percent	mean	sd	min	max	Remark
age	140,705		32.800	5.114	20	40	
race	140,705		1	0	1	1	1=white
place of residence	140,705						
rural areas	45,930	32.64					
urban areas	94,775	67.36					
language ability	140,705						
non-speak English	4,339	3.08					
speak English	136,366	96.92					
literacy	140,705						
illiterate	2,601	1.85					
literate	138,104	98.15					
years in US	140,705		16.840	7.653	0	40	
years in US before marriage	140,705		9.261	6.703	0	40	
marriage types	140,705						
endogamy	109,060	77.51					
exogamy_others	20,748	14.75					
exogamy_natives	10,897	7.74					
years of current marriage	140,705		7.577	5.292	0	39	
number of children under 5	140,705		0.881	0.886	0	6	
employment status	140,705						
employed	62,762	44.61					
unemployed	2,147	1.53					
not in labor market	75,796	53.87					
occupational income score	140,705		11.200	13.590	0	80	00=N/A, maximum=80
groupsize_formale	140,705		0.044	0.046	0	0.322	
groupsize_forfemale	140,705		0.048	0.053	0	0.354	
sexratio_formale	140,705		0.877	0.300	0	8	
sexratio_forfemale	140,705		1.302	0.783	0	56	

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

6.2 Regression Analysis

6.2.1 Intermarriage Determinants

This section aims to explore intermarriage patterns in Swedish immigrants aged 20-40 in 1910, finding which determinants would produce intermarriages, and whether there is a difference between males and females.

First, take a close look at the compositions of spouses in census 1910 in regard to generations and national origins in Table 4 and Table 5. Swedish immigrants in endogamy tended to marry the first generation, 83.11% and 92.94% in men and women respectively from Table 4, much

higher than marry the second-generation Swedish immigrants. The possible explanations could be as follows. On one hand, according to the marriage pattern theory, it made sense that people were intended to seek potential partners of many similar characteristics. First-generation immigrants shared the same cultural resources and might encounter common issues in host countries, having a solid foundation in daily life. And the first generation were more likely to reside in the same-origin enclaves which could increase their exposure to other first generation based on Blau's size theory. On the other hand, second-generation immigrants assimilated into the host country better than the first generation. Empirical evidence showed that they were more open to exogamous marriages and were more accepted by natives according to the assimilation theory. In terms of residing locations, the second generation were more likely to move out of the enclaves compared to the first generation, reducing exposure to each other. Women seemed to marry the first generations more. The generational distribution of exogamy with other-origin immigrants was less distorted than those in endogamy. Table 5 presents the national distribution of other-origin spouses of Swedish immigrants in exogamy with other-origin immigrants. The national origins were defined by spouses' birthplaces (for first generations) or their fathers' (for second generations). Denmark, Finland, Iceland, Lapland and Norway were listed into Northern Europe in the database. Swedish immigrants in exogamy with other-origin immigrants tended to seek spouses from similar origins (Northern Europe), followed by "old" immigrants (British, Irish, Germany) from Table 5. Being the first immigration wave to the US, old immigrants spent longer time in the US, ensuring larger stock size and relatively high socioeconomic status. And it could be one of the reasons for a relatively big share of intermarriage between Swedish immigrants and British or Irish. From the religious perspective, Kennedy (1952) once predicted that "Protestant British-Americans, Germans and Scandinavians intermarry; Catholic Irish, Italians and Poles form a separate intermarrying group; while Jews remain almost completely endogamous". The shorter social distance (for example religion, language) of Swedish to German than British and Irish might be the reason of much higher probabilities of intermarriage to Germans rather than British and Irish. The geography factor might be one of the reasons for intermarriages to Canadians. Swedish immigrants were concentrated in the central northern region in the US, close to Canada, and it might be the concentrated residing locations for Canadians as well. More information about Canadian immigrants' behaviors needs to be examined.

From the overview of the distribution of spouses, Swedish immigrants seemed be more likely to marry the first generation. They had a propensity to intermarry partners with shorter social distance when it came to the intermarriage with other-origin immigrants.

Table 4 Generations of spouses in married Swedish immigrants aged 20-40 in 1910

	Total	spouses: first generation		second generation		natives
Male		N	%	N	%	N
endogamy	49,866	41,446	83.11	8,420	16.89	
exogamy_others	9,335	5,226	55.98	4,109	44.02	
exogamy_natives	5,025					5,025
Female		N	%	N	%	N
endogamy	59,194	55,016	92.94	4,178	7.06	
exogamy_others	11,413	7,791	68.26	3,622	31.74	
exogamy_natives	5,872					5,872

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

Table 5 Spouses' origins of married Swedish immigrants aged 20-40 in exogamy with other immigrants in 1910, in number and %

		Northern Europe	England	Ireland	Germany	Canada	others	Total
Male	N	4,646	571	784	1,906	517	911	9335
	%	49.77	6.12	8.40	20.42	5.54	9.76	
Female	N	4,939	1,134	713	2,404	795	1,428	11413
	%	43.28	9.94	6.25	21.06	6.97	12.51	

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

Then, a multinomial logistic regression is used to assess the likelihood of being intermarried. I take endogamy as the base outcome in the multinomial logistic regression. Table 6 shows exponentiated coefficients from a multinomial logit model for male and female immigrants separately. The exponentiated coefficients are interpreted as relative risk ratios of the other two marriage outcomes compared to the base outcome of endogamy. The relative risk ratios of variable "years in the US before marriage" were all significantly larger than 1 for both men and women, meaning that longer years in the US would increase the probability of marrying out (H1). Specifically, when controlling other variables, one more year in the US would increase the odds of exogamy with natives rather than endogamy by 11.1% for male immigrants, 9.4% for female immigrants. And one more year in the US would increase the odds of exogamy with other-origin immigrants rather than endogamy by 6.2% for male immigrants, 4.9% for female immigrants. The pairwise associations were statistically significant. The immigrants, spending longer time in the host country, assimilated into the local society better, getting more exposure to potential partners from other national origin groups than newly-arrived immigrants. The result is accord with the assimilation theory that intermarriage can be seen as one of outcomes of the assimilation process (Dribe and Lundh, 2008; Lieberson and Waters, 1988).

The capacity of speaking English and being literate were positively associated with the likelihood of exogamy for both men and women (though it was not at a significant level for

males with literacy in exogamy with other-origin immigrants), especially for women in exogamy with natives. Female immigrants, who were literate (or spoke English), had 3 times higher odds of being exogamous marriage to natives rather than endogamy than illiterate (or non-English-speaking) women when controlling other variables, and it was statistically significant. The ability of speaking local language, as an important aspect of measuring social distance, was a crucial factor in mate selection when interacting with natives (Pagnini and Morgan, 1990). Moreover, the results from women echoes Sassler's expectations. Since women were not expected to work and gained little in the labor market, those who got intermarried seemed to transmit their individual characteristics (linguistic capacity, literacy) as the attractiveness from the labor market to the marriage market (Sassler, 2005).

Immigrants with higher occupational income scores (a proxy of economic status) were more likely to marry out (H2). The pattern was more apparent in the exogamous marriage to natives, as the relative risk ratios of exogamy with natives were larger than exogamy with other-origin immigrants for men and women. It reflects the exchange theory to some degree, other-origin individuals willing to trade high economic status for better integration into the majority society such as marry down to natives (Dribe and Lundh, 2008; Davis, 1941). In terms of sex, the pattern was more apparent among female immigrants. The odds of exogamy with natives rather than endogamy were 3.2% higher with one unit increase in occupational income score in females, compared to 1.8% in males.

Urban Swedish immigrants were less exogamous with natives (H5). Urban males had 32% lower odds of exogamy with natives rather than endogamy than rural males. The pattern was similar to females. More exposure to the same-origin group in urban areas may be one of explanations. The majority of US population were residing in rural areas in 1910. The less exposure to white natives lowered the chance of exogamy with natives. 67% of Swedish immigrants aged 20-40 chose to reside in urban areas from the descriptive statistics above, and immigrants had a tendency to reside in one particular place. The factor like residential segregation would reduce the probability of exogamy as well.

The result of contextual variable "group size" is in accordance with Hypothesis 3. I categorize the group size into four categories according to the minimum and maximum value of it to examine the effect better. The relative risk ratios decreased along with the group size getting larger, indicating the chance of exogamy was lower if the share of opposite-sex Swedish immigrants of entire opposite-sex population at the county level became greater, more likely to meet potential partners from the same origin. The pattern for men and women was highly similar.

The relative risk ratio of sex ratio was less than 1 for males, meaning that sex ratio was negatively associated with exogamy as I expected (H4). However, it was reverse for females that the sex ratios and exogamy were positively related and it is statistically significant. Females would more likely to intermarry in a location with a higher sex ratio of Swedish males to females when controlling other variables. That is contradictory to my expectation. It might be caused by the unbalanced sex ratios and geographic dispersion among Swedish immigrant in different regions. It is clear that the sex ratios of Swedish males to females were super high in most of regions except New England and Middle Atlantic Division in 1910 from Table 1. The sex ratios were 1.17 and 1.37 in Swedish-concentrated divisions, East North Central and West

North Central division. But the sex ratio was from 1.52 to 1.84 in the rest of southern and western regions. The extremely skewed sex ratios may cause relative risk ratio of sex ratio for females larger than 1.

The section explores the determinants of intermarriage pattern in Swedish immigrants in 1910. The results of the empirical example from Swedish immigrants were mainly consistent with the assimilation theory. Staying longer in the host country and mastering country-specific skills (English speaking) could accelerate assimilation in the local societies. Female immigrants seemed good at leverage their advantages of being literate and English speaking to get intermarried to the natives. More exposure to diverse environment beyond own-origin enclaves would produce intermarriages, vice versa. Swedish immigrants residing in urban areas had lower probabilities of intermarrying to natives than ones in rural areas as the majority of US population were living in rural areas in 1910. Immigrants with high occupational income scores had propensities to marry out that may can be explained by the exchange theory. They traded high economic status for social status by marrying down to natives in the host country. The effects of place of residence and group size echoed predictions from structural marriage-market theory (Blau et al., 1982). A relative larger size of the same-origin people and residing in urban areas would reduce exogamy. The patterns for men and women were similar except the effect of sex ratios, but different in extent. Female immigrants, who could better integrate into the US by measuring language ability and literacy or were in a high economic status, had a stronger propensity to marry to natives than males.

Table 6 Determinants of marriage outcomes in Swedish immigrants aged 20-40 in 1910

	Male				Female			
	mlogit: endogamy is baseoutcome				mlogit: endogamy is baseoutcome			
	exogamy_others		exogamy_natives		exogamy_others		exogamy_natives	
	RRR	P	RRR	P	RRR	P	RRR	P
age	0.873	0.000	0.779	0.000	0.912	0.000	0.859	0.000
age2	1.002	0.001	1.003	0.000	1.001	0.005	1.001	0.007
new england division	1.000	ref	1.000	ref	1.000	ref	1.000	ref
middle atlantic division	1.587	0.000	1.590	0.000	1.731	0.000	0.908	0.066
east north central division	1.786	0.000	1.889	0.000	1.642	0.000	0.987	0.797
west north central division	2.274	0.000	2.032	0.000	2.172	0.000	1.423	0.000
south atlantic division	2.215	0.000	10.506	0.000	2.423	0.000	2.444	0.000
east south central division	3.548	0.000	10.857	0.000	1.179	0.542	1.322	0.297
west south central division	1.159	0.292	3.675	0.000	1.262	0.070	1.874	0.000
mountain division	2.078	0.000	2.579	0.000	2.623	0.000	1.992	0.000
pacific division	2.016	0.000	2.144	0.000	2.469	0.000	1.642	0.000
rural	1.000	ref	1.000	ref	1.000	ref	1.000	ref
urban	0.977	0.401	0.674	0.000	1.024	0.328	0.800	0.000
does not speak english	1.000	ref	1.000	ref	1.000	ref	1.000	ref
speak english	1.337	0.001	1.490	0.002	1.873	0.000	3.036	0.000
literacy=0	1.000	ref	1.000	ref	1.000	ref	1.000	ref
literacy=1	1.050	0.646	1.867	0.002	1.489	0.000	3.150	0.000
years in the US before marriage	1.062	0.000	1.111	0.000	1.049	0.000	1.094	0.000
occupational income score	1.008	0.000	1.018	0.000	1.025	0.000	1.032	0.000
groupsize_formale_cat								
0-0.02	1.000	ref	1.000	ref				
0.02-0.04	0.743	0.000	0.433	0.000				
0.04-0.07	0.546	0.000	0.267	0.000				
0.07+	0.416	0.000	0.189	0.000				
sexratio_formale	0.698	0.000	0.492	0.000				
groupsize_forfemale_cat								
0-0.02					1.000	ref	1.000	ref
0.02-0.04					0.628	0.000	0.433	0.000
0.04-0.07					0.509	0.000	0.340	0.000
0.07+					0.388	0.000	0.232	0.000
sexratio_forfemale					1.050	0.000	1.058	0.001
Constant	0.890	0.825	2.900	0.128	0.226	0.000	0.230	0.004
Observations	64226				76479			
overall P	0.000				0.000			
Loglikelihood	-39687				-48624			

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

6.2.2 Employment in the Labor Market

This section aims to see whether immigrants in exogamy were more likely to be employed in the labor market than ones in endogamy. On one hand, immigrants, who married to natives, were usually considered to integrate into the US well, accumulating country-specific human capital quickly and having a broader local network according to the productivity hypothesis. On the other hand, the marriage market and labor market sometimes share similar screening pattern. Immigrants in exogamy with natives were more likely to have some particular attributes that were favored by the employers in the host country. It arose from the selection hypothesis, that is, immigrants in exogamy are positively selected from all married immigrants. No matter which kind of mechanism is behind it, the performance in the labor market of immigrants in exogamy with natives should be better based on the two hypotheses. Therefore, my expectation is that there was a high probability for Swedish immigrants in exogamy with natives to get employed than their counterparts in endogamy in 1910 (Hypothesis 6).

Table 7 shows the distribution of labor market outcomes in Swedish immigrants in census 1910. The majority of female immigrants were not in the labor market. It is somehow consistent with the pervasive sexual division of labor between the market and household sectors. Married women traditionally devoted most of their time to household activities, while married men were mainly in market activities (Becker, 1993). Occupational income scores of males were much higher than females, indicating female immigrants were in an inferior position in the labor market. Female immigrants bore two kinds of discrimination, gender discrimination and being immigrants. The average occupational income score of male and female immigrants in exogamy with natives was a bit higher than those in other two marriage types. The share of employed status among immigrants in different marriage types was a bit contrary to my expectation. The percentage of employed male immigrants in exogamy with natives was 91.86, smaller than their counterparts in endogamy (93.18%). However, 6.2 percent of female immigrants in exogamy with natives were employed, bigger than 3.6 percent of ones in endogamy.

Table 7 Married white Swedish immigrants aged 20-40 in the US labor market in 1910

	mean occscore (exclue 0)	SD occscore (exclue 0)	employed %	unemployed %	not in labor force %
Male					
endogamy	24.66	8.39	93.18	2.99	3.83
exogamy_others	25.11	9.37	91.96	3.72	4.33
exogamy_natives	25.59	10.62	91.86	3.64	4.50
Female					
endogamy	13.37	9.69	3.60	0.14	96.26
exogamy_others	15.75	11.91	5.26	0.28	94.46
exogamy_natives	15.88	11.10	6.20	0.26	93.55

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

In addition, I implement a multinomial logistic regression for to test the probability of being employed in the labor market. Unemployed status is taken as the base outcome in the regression. Table 8 shows exponentiated coefficients from the logit model. I am interested in the probability of getting employed. However, only one result was statistically significant. Male immigrants in exogamy with other-origin immigrants had 15% lower odds of being employed rather than unemployed than ones in endogamy. Relative risk ratios of employed rather than unemployed of male and female immigrants in exogamy with natives were both less than 1 although these pairwise associations were not statistically significant at any conventional level of significance (0.886 and 0.903 for men and women respectively), showing immigrants who were in exogamy with natives wouldn't have a high probability of getting employed in the labor market, contradictory to my expectation (H6).

Table 8 Employment in the labor market in married Swedish immigrants aged 20-40 in 1910

	Male				Female			
	mlogit: unemployed is baseoutcome				mlogit: unemployed is baseoutcome			
	employed		not in labor market		employed		not in labor market	
	RRR	P	RRR	P	RRR	P	RRR	P
age	1.031	0.636	0.972	0.738	0.827	0.384	0.846	0.436
age2	1.000	0.624	1.000	0.714	1.003	0.377	1.002	0.494
new england division	1.000	ref	1.000	ref	1.000	ref	1.000	ref
middle atlantic division	0.600	0.000	0.469	0.000	0.876	0.690	0.800	0.496
east north central division	0.895	0.211	0.751	0.007	0.601	0.094	0.796	0.444
west north central division	0.611	0.000	0.499	0.000	1.403	0.358	1.771	0.116
south atlantic division	0.801	0.545	1.157	0.732	0.619	0.651	0.450	0.440
east south central division	1.142	0.822	1.037	0.959	63460.6	0.984	55476.8	0.984
west south central division	0.637	0.056	0.395	0.006	0.580	0.482	0.445	0.285
mountain division	0.432	0.000	0.368	0.000	0.515	0.104	0.526	0.107
pacific division	0.385	0.000	0.306	0.000	0.514	0.058	0.556	0.086
rural	1.000	ref	1.000	ref	1.000	ref	1.000	ref
urban	1.013	0.802	1.224	0.003	0.758	0.198	0.814	0.330
does not speak english	1.000	ref	1.000	ref	1.000	ref	1.000	ref
speak english	1.306	0.056	0.885	0.496	0.239	0.158	0.236	0.153
literacy=0	1.000	ref	1.000	ref	1.000	ref	1.000	ref
literacy=1	1.600	0.004	0.914	0.666	2.182	0.103	2.074	0.113
years in the US	0.997	0.347	1.005	0.278	1.005	0.739	1.004	0.762
endogamy	1.000	ref	1.000	ref	1.000	ref	1.000	ref
exogamy with others	0.848	0.008	0.982	0.827	0.725	0.140	0.488	0.001
exogamy with natives	0.886	0.144	1.070	0.537	0.903	0.730	0.510	0.021
Constant	14.846	0.009	3.266	0.385	1299.7	0.045	32697.7	0.003
Observations	64226				76479			
overall P	0.000				0.000			
Loglikelihood	-19443				-13752			

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

6.2.3 Economic Performance in the Labor Market

The section explores the economic performance of immigrants in different marriage types, measured by occupational income scores. My expectation is that Swedish immigrants in exogamy with natives earned more than their counterparts in endogamy based on the productivity hypothesis and selection hypothesis. In other words, there was a premium for immigrants in exogamy with natives compared to their counterparts in endogamy (Hypothesis 7). Considering the empirical evidence in contemporary context that the gender-based household specialization is lower in intermarriage formation than in endogamous formation for male intermarried households (immigrant husband and native wife), I propose the same pattern may exist in historical context. Since there was no data on hour allocation in household in 1910, I take the economic performance as a proxy of it. Therefore, my hypothesis is that there was a more decrease of economic performance in Swedish immigrants in exogamy with natives compared to their counterparts in endogamy after having children for more time spent on households (Hypothesis 8). I additionally include variables of children as the presence of children is one of determinants of household specialization, and introduce two more OLS models.

In contrast to contemporary families, most American family decisions were different in many ways in the nineteenth century. Children were the most common source of labor income (Goldin, 1979). Relatively older children also normally took care of housework besides wives and husbands. The younger the children are, the more care time they need from their parents. Therefore, I use numbers of children under age 5 instead of numbers of children as independent variables in regressions to decrease the influence of older children on the housework. The dataset provides variables to count the number of own children under age 5 residing with each individual. Step-children, adopted children and biological children were all counted. I further categorize it into four categories, 0 child under age 5, 1 child under age 5, 2 children under age 5, 3+ children under age 5. First, I display the distribution of children and children under age 5 among Swedish immigrants in 1910 in Table 9. It seemed that endogamy immigrants were inclined to have a larger size of families with more children than ones in exogamy. Immigrants in exogamy had more shares in none or 1 child, while immigrants in endogamy had more shares in 2 and more children. The share of exogamy with natives with more than 1 child was the least. But Swedish immigrants in the sample were aged from 20 to 40, still in the childbearing ages. Table 9 only presents the distribution of children in stock in 1910, and it ought to change later.

Table 9 Shares of numbers of children in married Swedish immigrants aged 20-40 in 1910, in percent (%)

	0 child (all)	1 child (all)	2 children (all)	3+ children (all)
	0 child (<5)	1 child (<5)	2 children (<5)	3+ children (<5)
Male				
endogamy	20.28	26.84	23.76	29.12
	38.39	35.98	21.06	4.57
exogamy with others	24.86	27.07	21.66	26.41
	41.40	33.09	20.86	4.65
exogamy with natives	31.80	28.32	19.20	20.68
	47.34	32.20	16.74	3.72
Female				
endogamy	17.36	23.04	23.08	36.52
	40.71	34.62	20.44	4.23
exogamy with others	22.80	23.96	21.52	31.72
	45.29	31.71	18.47	4.53
exogamy with natives	29.36	25.90	21.37	23.37
	51.46	30.74	14.75	3.05

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

The OLS regression models are implemented to examine the intermarriage premium for males and females separately. Model 1 is the base model, using marriage types as categorical variables to my interest, and occupational income scores as the dependent variable. Since 0 denotes "not applicable" in occupational income scores, I only focus on individuals with actual occupational scores (>0). Model 2 adds the variable of numbers of children under age 5. Model 3 incorporates the variables of marriage types, numbers of children under age 5 and the interaction terms between them.

Considering very low labor market participation of female immigrants, I only analyze and discuss the results of male immigrants. Table 10 displays the results of three OLS models. The coefficients of variables like age, region, English ability, literacy and years in the US in these three models are quite similar, not changing dramatically. There was a significant positive relationship between the ability of speaking English and incomes when controlling other variables, so as literacy. The findings are in line with expectations of human capital theories. Years in the US were positively associated with the incomes of immigrants. Longer time in the US would benefit immigrants' incomes, in line with the prediction of assimilation theory. Male immigrants who resided in urban areas earned more incomes than their counterparts in rural areas and it was statistically significant. In terms of children under age 5, the coefficients are mainly negative, so as the coefficients of interaction terms, indicating a negative correlation of children and incomes.

The coefficients of marriage types changed a lot from model 1 and 2 to model 3 of males, showing a sensitive relationship between marriage types and numbers of children under age 5.

Taking endogamy as the reference category, the coefficients of exogamy were all statistically significantly positive, and the magnitude was much stronger of exogamy with natives. The results show that Swedish male immigrants in exogamy with native did have better economic performance than their counterparts in endogamy (H7).

Table 10 OLS regression results for married Swedish immigrants aged 20-40 in 1910

Table 10 OLS regression results for married Swedish immigrants aged 20-40 in 1910

	Male		
	model 1	model 2	model 3
dependent variable: occupational income score			
age	0.405***	0.486***	0.482***
	(0.090)	(0.090)	(0.090)
age2	-0.006***	-0.007***	-0.007***
	(0.001)	(0.001)	(0.001)
new england division	0.000	0.000	0.000
middle atlantic division	0.355**	0.352**	0.351**
	(0.117)	(0.117)	(0.117)
east north central division	-0.599***	-0.587***	-0.585***
	(0.104)	(0.104)	(0.104)
west north central division	-1.687***	-1.657***	-1.658***
	(0.108)	(0.108)	(0.108)
south atlantic division	1.566**	1.577**	1.574**
	(0.482)	(0.482)	(0.482)
east south central division	0.957	0.915	0.907
	(0.661)	(0.661)	(0.661)
west south central division	-1.919***	-1.881***	-1.869***
	(0.337)	(0.337)	(0.337)
mountain division	-0.547**	-0.530**	-0.521**
	(0.175)	(0.175)	(0.175)
pacific division	-0.728***	-0.742***	-0.748***
	(0.140)	(0.140)	(0.140)
rural	0.000	0.000	0.000
urban	7.319***	7.235***	7.230***
	(0.073)	(0.073)	(0.073)
does not speak english	0.000	0.000	0.000
speak english	0.885***	0.889***	0.890***
	(0.218)	(0.218)	(0.218)
literacy=0	0.000	0.000	0.000
literacy=1	1.927***	1.895***	1.893***

	(0.281)	(0.281)	(0.281)
years in the US	0.077***	0.076***	0.077***
	(0.005)	(0.005)	(0.005)
endogamy	0.000	0.000	0.000
exogamy_others	0.789***	0.781***	1.068***
	(0.093)	(0.093)	(0.144)
exogamy_natives	1.770***	1.720***	2.219***
	(0.124)	(0.125)	(0.179)
0 child(<5)		0.000	0.000
1 child(<5)		-0.083	0.042
		(0.074)	(0.084)
2 children(<5)		-0.586***	-0.405***
		(0.088)	(0.099)
3+ children(<5)		-1.054***	-0.902***
		(0.160)	(0.180)
exogamy_others#0 child(<5)			0.000
exogamy_others#1 child(<5)			-0.400
			(0.213)
exogamy_others#2 children(<5)			-0.689**
			(0.245)
exogamy_others#3+ children(<5)			-0.135
			(0.446)
exogamy_natives#0 child(<5)			0.000
exogamy_natives#1 child(<5)			-0.768**
			(0.274)
exogamy_natives#2 children(<5)			-1.020**
			(0.339)
exogamy_natives#3+ children(<5)			-1.831**
			(0.640)
Constant	9.775***	8.789***	8.756***
	(1.473)	(1.476)	(1.476)
Observations	61687	61687	61687
R-squared	0.18	0.18	0.18
Standard errors in parentheses			
* p<0.05	** p<0.01	*** p<0.001	

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

Moreover, I calculate coefficients including the interaction terms to see the effect after having children (Table 11). Compared to endogamy, immigrants in exogamy with natives always had a better economic performance even when they had the same numbers of children (larger coefficients in exogamy with natives than endogamy). Nevertheless, the magnitude of premiums had been reduced generally along with the increase in number of children within marriage types. The results in Swedish male immigrants show that the income was negatively associated with the children in general. The economic performance of male immigrants in exogamy with natives were always better than their counterparts in endogamy no matter at the time of marriage or after having children or after have a certain number of children. In this sense, there was no lower gender-based household specialization in exogamy with natives in Swedish male immigrants in 1910 compared to their counterparts in endogamy, failing to support my expectation (H8).

However, the causality between exogamy with natives and premium is not clear. The endogeneity between earning potentials and partner selection is problematic. Which kind of mechanism works behind it, the productivity hypothesis or selection hypothesis? Previous research applied instrumental variables or longitudinal data to solve such problem. The study from Meng and Gregory (2005) showed a positive relationship between intermarriages and economic assimilation in immigrants in Australia by employing instrumental variables of group size and sex ratio. However, empirical evidence in the US indicated that immigrants in intermarriages were positively selected in the marriage market (Kantarevic, 2004). Nystedt and Dribe (2015) used longitudinal register data of immigrants in Sweden to reveal that the premium was visible at the time of marriage, meaning the partner selection already existed when entering marriage. The results from this paper only testified the existence of a premium for immigrants in exogamy with natives over immigrants in endogamy, and the premium still existed after having children. Further research is needed to be done to identify roots behind it.

Table 11 Regression results for married Swedish male immigrants aged 20-40 in 1910

	endogamy	exogamy_others	exogamy_natives
Male			
0 child under age 5	ref	1.068	2.219
1 child under age 5	0.042	0.71	1.493
2 children under age 5	-0.405	-0.026	0.794
3+ children under age 5	-0.902	0.031	-0.514

Source: IPUMS Ancestry Full Count Data: Version 4.0, 2024.

7 Conclusions

Intermarriage in some sense can be viewed as a social indicator, implying the integration of immigrants in the host country. I take a close look at the intermarriage patterns in the Swedish immigrants at the turn of the twentieth century in this paper and its following consequences in the labor market.

The distribution of the spouses of Swedish immigrants in 1910 showed that they were inclined to be in endogamous marriages with the first generation, and intermarry partners with shorter social distance when it came to the intermarriages with other-origin immigrants. I identify some determinants that would produce intermarriage to natives in the Swedish immigrants by using a multinomial logistic regression. Staying longer in the host country and mastering country-specific skills (English speaking) could accelerate assimilation in the host country, then further produce intermarriage to natives. Swedish immigrants residing in urban areas had lower probabilities of intermarrying natives than ones in rural areas. The effects of contextual variables (group size and sex ratio) were quite obvious in male Swedish immigrants. Immigrants with high occupational income scores had propensities to marry out. The patterns for men and women were similar except the effect of sex ratios, but different in extent in some aspects. Female immigrants, who could better integrate into the US by measuring language ability and literacy or were in a high economic status, had a stronger propensity to marry to natives than males.

Furthermore, I propose three hypotheses about the consequences of intermarriage to natives in Swedish immigrants. The results from a multinomial logit model doesn't support the hypothesis that immigrants who were in exogamy with natives would have a high probability of getting employed in the labor market compared to their counterparts in endogamy. I also check that the economic performance between Swedish immigrants in exogamy with natives and endogamy, and the impact of intermarriage formation on household specialization by involving the presence of young children. The results showed that the economic performance of male immigrants in exogamy with natives were always better than their counterparts in endogamy no matter at the time of marriage or after having children or after have a certain number of children, while no evidence indicated the shift of household specialization in intermarriage formation in a historical context.

The weakness of my study is that the causality between earning potentials and partner selection is not clear. I took the economic performance as the proxy of hour allocation in household because of lack of relevant data, and this proxy is weak and couldn't show household specialization directly.

I didn’t use AI in this thesis work.

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