Population dynamics, migration and business cycles in Sweden, 1875-1915

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1. Introduction

The industrialisation process in the latter half of the nineteenth century was connected to a massive inflow of labour from agricultural activities in the countryside to the emerging industry and other urban sectors. In parallel with internal migration there was also a mass migration to the United States. Rapid population growth had created a surplus population in the countryside that sought employment and better living conditions either in urban centres in Sweden or across the Atlantic.

Both internal migration and emigration exhibited distinct cyclical fluctuations, in which it appears that internal net migration from the countryside to the urban centres varied inversely with respect to emigration (Wilkinson 1967; B. Thomas 1954). In this regard the Swedish economy was part of a more general business cycle pattern in the late nineteenth century Atlantic economy. In the economic history literature it is a well-established fact that there were long swings of 15–20 years duration, comprising two business cycles, which varied inversely between the US and the British economy. This pattern of inversely related long swings (Kuznets cycles) in the Atlantic economy has been studied by Brinley Thomas (1954; 1972; 1993) who connected them with waves of emigration and accompanying population sensitive residential and infrastructural investments in the US, largely financed by foreign lending. When the US economy was in the upward phase of the long swing, as in the 1860’s, 1880’ and 00’s, it attracted waves of immigrants. Residential and other population sensitive investments increased, largely financed by import of capital from Britain.

In the UK economy internal migration varied inversely with overseas emigration. Internal migration from the countryside to the cities was connected with upswings in the UK building cycle (B. Thomas 1972, ch. 2) and an increase in the rate of home investments, as in the 1870’s and 1890’s. In this phase of the long swing, British savings were concentrated on home investments. It has been shown that cycles of capital exports from the UK alternated inversely with cycles of home investments in the UK (Cairncross 1953).

British and US exports growth rates altered in a characteristic way in the long-swing pattern. In the upward phase of the US long swing, exports from Britain increased concomitantly with capital exports. In the downward phase of the US long swing, and consequently in the upward phase of the British long swing, the rate of growth of US exports increased while the growth of British exports decreased. Monetary factors under the operation of the gold standard also played a role in the long swing and were important for the turnings points, according to Brinley Thomas. When lending from Britain increased it eventually led to such a large outflow of gold that the monetary authorities in Britain, the financial centre of the system, had to replenish its reserves of gold and raised interest rates. This curbed the growth of the money supply in the US and credits became dearer, which put an ending to the credit boom (B. Thomas 1972, ch. 4).

Fluctuations in emigration to the US were of an international character, and consequently Swedish emigration waves occurred at the same time as those from the UK and other European countries. Swedish business cycles also tended to move in accordance with those in Britain and Western Europe and was therefore part of the same long-swing pattern.

Many studies have been published on late nineteenth century Swedish migration.[1] Discussions about the causes of emigration and internal migration have largely circled around the relative importance of push and pull factors. Early research on transatlantic migration tended to stress the importance of pull factors; higher real wages and favourable employment opportunities in the US stimulated emigration (Jerome 1926). Later studies have also pointed at the importance of push factors; adverse conditions in Sweden stimulated emigration if at the same time employment opportunities in Sweden were meagre (D. S. Thomas 1941, 166–169). Often, an upswing in the US business cycle coincided with a downturn in Sweden and vice versa. Accordingly, it is difficult to separate the relative importance of push and pull factors. Instead economic theories of migration tend to view the migration decision as a result of a rational deliberation of the prospective migrant, where the future economic rewards of migration discounted to present value are weighed against the costs of migrating and the income foregone at the place of origin by migrating. In this deliberation not only the wage differentials between the place of origin and the place of destination is taken into account but also the probabilities to gain employment in the new place of residence (Sjaastad 1962; Todaro 1969; Hatton 1995b).

[1] An extensive bibliography is given by Runblom (Runblom and Norman 1976).

Existing studies on Swedish internal migration and emigration can broadly be classified in two types. On the one hand the causes behind transatlantic emigration have been explored by means of econometric models over aggregated time series (Hatton 1995a; Hatton and Williamson 1998; Quigley 1972; Hamberg 1976). However this type of research does not deal with the relationship between emigration and internal migration and their relationship to long swings in the Swedish economy. On the other hand there are many local studies of descriptive character of internal migration and emigration (Kronborg and Nilsson 1975; Norman 1974; Tedebrand 1972; Öhngren 1974). These studies typically also do not deal with the macro-economic consequences of migration and the long-swing pattern. Moreover, it is difficult to draw any general conclusions from dispersed local studies.

A unique place in historical research on Swedish migration and of special interest for this paper is a study by Dorothy Swain Thomas (1941). Thomas and her research team were interested in the relationship between demographics and social and economic development. For this purpose they collected time series data on demographic events for all Swedish parishes (about 2600) for the period 1895–1933. Since the administrative division in Swedish population statistics between towns and countryside parishes did not reflect socioeconomic differences between parishes, Thomas divided the parishes into different groups. The collected data was than analysed mainly by trend estimates and simple correlations. It turned out that population diminished in countryside parishes dominated by agriculture while it expanded in towns and in countryside parishes dominated by industry. The process was driven by differences in natural population increase (differences of births over deaths) as well as differences in the migration pattern. Thomas did not analyze population dynamic and migration with respect to business cycles and the long-swing pattern, however. This was also not possible since her chosen time period started in 1895, and thus did not include data from much of the long-swings in the late nineteenth century.

The purpose of this paper is to explore the pattern of population dynamic and migration in Sweden in the context of business cycle fluctuations in the period 1875–1915. This pattern differed between the towns, especially the big cities, and the countryside as well as between different types of agricultural parishes. We lack knowledge on many aspects of this development, at least before the late 1890’s. An important purpose of the present study is therefore descriptive. We present knew empirical data on the population dynamic and migratory pattern between various types of agricultural parishes and large urban centres and how they varied with the different phases of the business cycle.

We seek answers to the following questions: Did the population dynamic, population growth and depopulation, differ between mainly agrarian countryside parishes and more industrial countryside parishes as well as between agricultural parishes and the big cities? What was the rate of in-migration and out-migration in various types of countryside parishes and in the big cities? Did internal migration in Sweden and emigration to the US vary over time in the characteristic pattern predicted by the long-swing hypothesis, i.e. did the rate of internal migration from agriculture to urban or industrial areas in Sweden weaken when trans-continental emigration increased and vice versa? In that case, what caused the fluctuating rate of internal migration; i.e. where the same type of factors that caused trans-continental emigration also operative in causing internal migration from agriculture to industrial and urban areas?

2. Data

The printed Swedish population statistics[2] give data separately for the towns and the rest of Sweden, the countryside. A characteristic feature of the Swedish industrialization process is, however, that many of the new industrial centres were localized to places in the countryside, outside of the towns proper. Hence the figures presented in the printed population statistics are too aggregated for us to be able to follow the dynamics of the population movement over time between countryside parishes with different socio-economic characteristics. In order to do so we need to study the primary sources behind the printed statistics.

The already mentioned study by Dorothy Swain Thomas (1941) also used parish data to study the population movement. Thomas' study and a shorter one by Gunnar Myrdal (Myrdal 1933) used the forms (*de summariska folkmängdsredogörelserna*) sent in by the parish priests to the central Swedish statistical agency (Statistiska centralbyrån) every year. When filling in the forms the priests used the parish books on demographic events. The printed population statistics was based on the information collected from these forms. For all Swedish parishes (about 2600) this source gives yearly observations by sex on the number

[2] BISOS A.

of births, deaths, internal migration, emigration and immigration. The Myrdal research group, in which Dorothy Thomas participated, made excerpts of these forms for all Swedish parishes for the period 1895–1933. These excerpts have been digitalised by the Demographic Database (*Demografiska databasen*) at Umeå University and are available for research. They are used in this study for the period 1895–1913.

Because of resource and time constraints and because data were deemed more accurate from 1895 onwards the Myrdal research group did not excerpt the parish forms for the period before 1895 (D. S. Thomas 1941, 207 ff.). It was suspected that the forms sent in by the parish priests were less accurate before 1895 than after, since from 1895 onwards the priests had to receive confirmation from the receiving parish before the migrant could be entered in the parish books as having migrated. However, a source critical examination by Tedebrand (1972, 70 ff.) and other studies quoted by him show that the parish forms (*de summariska folkmängsredogörelserna*) are also quite accurate before 1895. Especially when, as in this study, the intention is to study not the direction of migration from one specific village to another but the total number of migrants to and from parishes with varying socio-economic characteristics, the possible small errors in the data may be disregarded.

Due to resource and time constraints it is obviously not possible in this study to collect data on all Swedish parishes. We therefore use a representative sample of Swedish countryside parishes to explore the dynamics of internal migration and emigration. Data has been collected on demographic events from roughly 400 parishes for the period 1875–1900.

The Myrdal research group divided rural parishes into three categories: rural parishes dominated by agriculture; rural industrial parishes where industrial activities and trade were carried out extensively along with agriculture; and rural mixed parishes where agriculture was predominant but industrial activities also had some importance. To divide rural parishes into these categories the Myrdal research group used information on tax assessment values for real properties, which can be found in the volumes of Swedish official statistics on finance and poor relief of the parishes (BISOS, U). In this statistics we get yearly data for each parish on the tax assessment values (*fyrktal*) of real properties classified as "agricultural" or "other" properties. The statistics on tax assessment values were used as a first crude instrument to group rural parishes. They were categorized as agricultural if the value of “other” properties amounted to less than 15 percent of the total tax value. Rural parishes where “other” properties amounted to 15–35 percent of the total value were considered as belonging to the “mixed” category. If the value of “other” properties amounted to 35 percent or more of the total value they were characterized as “industrial”. This classification was then refined by using other information such as population data, the distribution of recorded land between cultivated land and other uses, information on industrial enterprises in the various parishes etc. (D. S. Thomas 1941, 201–216). The classification of parishes by the Myrdal group has been used also in this study. [3]

For the three largest cities in Sweden I have used data from the printed population statistics (BISOS A). In this publication we get yearly data by sex for each city on population, births, deaths, emigration and immigration.[4] From this data we may them calculate for each year how much internal net migration in Sweden added to th epopulationof the three cities by menas of the equation:

Internal net migration$_{,t}$ = Population$_{,t+1}$ – Population$_{,t}$ – Births$_{,t}$ + Deaths$_{,t}$ – immigration$_{,t}$ + Emigration$_{,t}$

3. Swedish business cycles

The standard account of Swedish business cycles in the 19th century is Jörberg (1961). Jörberg used a simplified form of the NBER reference cycle methodology to determine the turning points, troughs, of Swedish business cycles. The NBER methodology does not use formal statistical methods to determine turning points. Instead the skill of the individual researcher is of paramount importance in interpreting an amalgam of statistical information from numerous time series and qualitative information. Jörberg admitted himself that the determination of turning points in business cycles was to a certain extent arbitrary and he cautioned that it might be better to talk about turning periods rather than turning points (1961, 217–219). An important piece of information in his delineation of business cycles seems to have been that their length should conform to the idea of Juglar cycles of 7 to 11

[3] The classification of parishes by the Myrdal group can be found in Appendix III of the book Population movements and industrialization: Swedish counties, 1895-1910 (Stockholms högskola 1941, 507–538).
[4] Using these data it was necessary to correct for changes in geographic boundaries of the three cities which took place in various years through incorporation of neighboring communes: in Gothenburg 1906, in Malmö 1911 and in Stockholm 1913.

years length. For the period 1869–1912, Jörberg found the following business cycles in Sweden: 1869–1879, 1879–1987, 1887–1893, 1893–1901 and 1901–1909.

Jörberg's chronology of business cycles conforms quite well with variations in GDP growth rates as can be seen from figure 1 where a two year centred moving average of growth rates (difference of logs) in Swedish GDP is displayed.

The period stretching from the middle of the 1870's until the early 1890's has been called "the great depression" in the international literature because the price level declined during these years, putting the profitability of firms under pressure (Saul 1969). In Sweden, however, not only prices, but also GDP growth rates were markedly lower in this period, especially during the cycle 1879-1887 (Table 1).

In Swedish economic historiography Lennart Schön's theory of structural cycles, akin to Kondratieff lopng waves, has been an influential interpretation of Swedish economic growth in the nineteenth and twentieth centuries (Schön 2010; 2006). According to Schön the year 1893 is a watershed in Swedish economic development that marked the beginning of a new structural cycle. Those who believe in the existence of Kondratieff type long waves may also find support in the fact that the two business cycles after 1893 showed markedly faster growth rates than the two preceding ones.

This pattern therefore buttresses the long-swing interpretation. The average yearly GDP growth rate in the Swedish economy was 2.7 per cent in the period 1879–1893, while it was 3.1 per cent between 1893 and 1909. True, the GDP growth rate was higher in the US in both periods, but the difference in US–Swedish growth rates was much higher in the former period than in the latter, or roughly two per cent vs one percent.[5] In line with this long-swing pattern, the Swedish emigration rate was on average 8 per thousand per inhabitants in the former period, while it was 4.5 in the latter.

In the late nineteenth century Atlantic economy, business cycles had become synchronised between countries, and Sweden shared its pattern of business cycles with Western Europe. As is visible from figure 2, Swedish business cycles generally followed the same pattern as

[5] The difference in GDP per capita growth rates was smaller, since US GDP growth was fuelled by immigration.

those of its main trading partners, of which the most important were the UK, Germany and the Scandinavian neighbours. For most years the US GDP growth rates were higher than in Sweden (and other West European countries), but the business cycles were also clearly out of phase with those in Western Europe at least from the late 1880's until the early 1900's.

The synchronization between Swedish business cycles and those of it s trading partners leads naturally to the supposition that there is a causal connection between them. There are in fact some statistical evidence that export demand growth led the GDP growth rate. The logarithm of the Swedish export volume and a weighted index of the GDP of Sweden's main trading partners are cointegrated according to Johansens trace test. This allows us to use the data in level form in a time series regression. A Granger causality test also shows that the logarithm of GDP of Sweden´s main trading partners led Swedish exports. An autoregressive distributed lag model[6] with the log of exports as the dependent variable and the log of foreign GDP as the independent variable yielded the following result:

$$\log \text{exports}_{,t} = \underset{(0.21)}{0.23} + \underset{(0.14)}{0.69} \log \text{Exports}_{,t-1} + \underset{(0.18)}{0.41} \log \text{GDP\_foreign}_{,t} \qquad (1)$$

Adj. $R^2 = 0.96$; Breuch Godfrey serial correlation test: prob $chi^2 = 0.62$

(Standard errors in parentheses under the coefficients)

The estimated equation suggests that a one percent increase in the GDP of Sweden's trading partners led to an increase by 1.3 percent[7] in Swedish exports. Export growth led GDP growth, as shown by a Granger causality test, and not the other way around, which suggests that growth of export caused GDP growth from the demand side. A model with the log of GDP as the dependent variable and the log of exports as the independent variable yielded the following result:

$$\log \text{GDP}_{,t} = \underset{(0.10)}{0.10} + \underset{(0.14)}{0.56} \log \text{GDP}_{,t-1} + \underset{(0.14)}{0.31} \log \text{GDP}_{,t-2} + \underset{(0.04)}{0.15} \log \text{Export}_{,t} \qquad (2)$$

Adj. $R^2 = 0.99$; Breuch Godfrey serial correlation test: prob $chi^2 = 0.16$

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[6] In a time series framework an independent variable may influence the dependent variable not only in the same year but also in the following years. Moreover, a dependent variable may be influenced by its own value the year before and so on. We therefore need to estimate an autoregressive distributed lag model. To determine the number of lags in the estimated model we have used the Bayesian Schwarz information criterion. All estimations have been carried out in Eviews 9.

[7] Calculated as the longrun multiplier: 0.41/(1–0.69).

(Standard errors in parentheses under the coefficients)

Assuming a "correctly" specified model it tells us that a a one percent increase in exports would have led to an increase by 1.1 percent in GDP.

It is self-evident that an increase in exports led to an increase in GDP since exports are an important part of GDP. It is more illuminating to run a regression of the GDP growth rate in Sweden against the GDP growth rate among its most important trading partners, since the latter influenced the former by stimulating Swedish export growth.[8]

Equation (3) shows that a unit percent increase in the GDP of Sweden's trading partners led to an increase in Sweden's GDP by 1.2 percent (=0.6/0.5).

$$\log GDP_{,t} = \underset{(0.37)}{1.26} + \underset{(0.14)}{0.50} \log GDP_{,t-1} + \underset{(0.16)}{0.60} \log GDP\_foreign_{,t} \qquad (3)$$

Adj. $R^2 = 0.99$; Breuch Godfrey serial correlation test: prob $chi^2 = 0.57$

The role of external and internal factors in late nineteenth century Swedish industrialization is a long-standing theme in Swedish economic historiography. The most prominent exponent for a view stressing the role of export demand for Swedish economic development in the late nineteenth century is probably Lennart Jörberg (1966; 1961; 1965). In recent decades researchers such as Lennart Schön and Jonas Ljungberg (Ljungberg and Schön 2013; Schön 1997) has instead stressed the role of internal factors and the home market. That Swedish business cycles were export led, statistically speaking, may be interpreted as support for the "export model". Things are not so easy, however, since economic growth induced by export demand also stimulated the growth of the home market. The most important source of demand for Swedish GDP was quite naturally domestic demand, since exports only constituted around 20–25 percent of Swedish GDP. More interesting is perhaps how the various demand sources affected growth and structural change in the Swedish economy. While domestic demand, given its weight in the economy was always the most important

[8] A Granger causality test shows that GDP growth among Sweden's trading partners led Swedish GDP growth rather than vice versa.

source of demand, the role of exports and import substitution varied between the business cycles. In the 1890's import substitution was an important aspect of the industrialization process, while after the turn of the century the role of export demand increased again (Bohlin 2007).

Foreign trade was not the only influence from late nineteenth century globalization on Swedish economic development. Another important factor was capital import. From the research of Lennart Schön we know that a big slice of investments in Sweden was financed by international loans, not the least during the surge in the home market base growth in the 1890's (Schön 1989; 2010).

Business cycles influenced migration, which in turn reinforced the pattern of business cycles. Numerous studies has shown that fluctuations in emigration from Sweden to the US can be explained by the ups and downs in the US and Swedish business cycles. When the gap between the US and Swedish GDP growth rate widened , emigration from Sweden to the United States widened, and vice versa (Hatton 1995b; 1995a; Hatton and Williamson 1993; 1998; Bohlin and Eurenius 2010). When Swedish economic growth and industrialization gained pace, whether stimulated by exports or home market demand, it led to an inflow of labour from agriculture to industry. To the extent that the US and Swedish business cycles were out of phase with each other, internal migration within Sweden should have increased when emigration to the US slowed down and vice versa. Immigration to the new industrial centra in Sweden in itself also reinforced the business cycle, since it stimulated the construction of dwellings and infrastructure. Consequently the building cycle lagged he general business cycle with some delay (Schön 2006, 28–32).

4. Migration and population dynamic

4.1. Migration and population dynamic in countryside parishes

During the industrialization and modernization process, migration out of countryside parishes, whether transcontinental emigration to North America or internal migration in Sweden to industrial and urban centers, was a steadily ongoing process. Figure 3 shows the net internal migration rate for countryside parishes. As can be seen internal migration between different types of countryside parishes differed to a large extent, which motivated the construction of the typology in the first place. For industrial parishes there was a net inflow of internal migrants for most years; over the period 1876–1915 the average net inflow of internal migrants was 3.2 migrants per thousand inhabitants. Mixed and especially purely agrarian parishes experienced a constant outflow of net migrants to industrial parishes and towns. Between 1876 and 1915 the average net internal migration rates in our sample are –4.3 per cent and –7.4 per cent per annum, respectively, for these two categories of countryside parishes.

The time pattern of fluctuations in internal migration also differed between industrial parishes and mixed and rural parishes. When industrialization gained pace from the 1890's internal net migration streams tended to vary inversely between industrial and agricultural parishes. The inflow of internal migrants to industrial parishes increased most rapidly in years when the outflow from rural and mixed parishes peaked. This can be clearly seen in the period stretching from the early 1890's to around 1905. In other words the outflow of migrants from rural and mixed parishes furnished industrial parishes with labour.

When it comes to emigration the difference was not so large between different types of countryside parishes as can be seen in Figure 4. Over the period 1876–1915 yearly average emigration rates was 5.5 for industrial parishes, 5.1 for mixed parishes and 5.3 for rural parishes. The time pattern of fluctuations in emigration for each type of countryside parishes was also the same as for Sweden as a whole, as expected.

One prediction of the long-swing hypothesis is that there was a steady outflow of migrants from agriculture, but that the outflow to urban and industrial centers in Sweden varied inversely with overseas migration. This prediction is confirmed by figure 5 which shows that internal outmigration from agrarian parishes increased when the rate of emigration decreased and vice versa. The graph also shows that while emigration was slightly higher than internal net migration in the 1880's, the latter was clearly much higher in the 1890's, which is also in accordance with the long swing hypothesis.

The difference in migration patterns between different categories of countryside parishes also contributed to vastly different patterns in population growth or decline, as shown by figure 6. From the early 1880´s, population diminished in the typically agrarian parishes. It increased slightly in mixed parishes until 1900, after which it stagnated. Industrial parishes on the other hand showed strong population growth for the entire period 1876–1915, especially in the 1890´s. These differences were obviously related to the combined effects of internal net migration and net emigration as well as natural population growth (excesses of births over deaths).

On average, agricultural parishes lost almost 1.3 percent of its population each year because the combined effect of net internal migration and net emigration. In industrial parishes on the other hand the corresponding loss was 0.2 percent, i.e. positive internal net migration nearly compensated for the emigration outflow in industrial parishes.

The pattern of natural population growth also differed between the different types of countryside parishes. As shown by Figure 7 the natural population increase was much higher in industrial parishes than in agricultural parishes, with mixed parishes in between.

For industrial parishes, natural population increase hovered around 1.4 percent per year until around 1910 when it started to fall. In industrial parishes it more than compensated for the slight outflow due to the combined effects of internal migration and emigration, which led to population increase. This was not the case for agricultural parishes. In these, the rate of natural population increase roughly halved from around 1 per cent in the late 1870´s to about 0.5 per cent around 1910. The rate of natural population increase fell also in the mixed parishes. This difference between parishes was mostly fuelled by much higher birth rates in industrial than in the other types of parishes, as shown by Figure 8. As a consequence of a higher mean age in in agricultural parishes, death rates were also higher than in industrial parishes after 1900.

Obviously the differences in natural population growth and birth rates were also to a major extent related to differences in the migration pattern between parishes. It is well known that most migrants were found in the age-group 18–30 years. Much higher outmigration from agricultural parishes than from industrial parishes led to diminished population shares for young adults in agricultural parishes and thus also to lower birth rates and eventually also higher death rates.

4.2. Migration and population dynamic in the big cities

The yearly average population growth in Sweden´s three largest cities (Stockholm, Gothenburg, Malmö) in the period 1875–1915 was roughly 2.5 per cent per annum. Natural population increase added approximately 1.3 percent per annum to the population. The remainder was accounted for by net migration. On average net internal migration added about 1.5 percent each year to the population in the three big cities, while net emigration diminished it by roughly 0.3 percent per year. For most years before 1900 net internal migration contributed more to big city population growth than natural population increase, after which the latter predominated for most years until 1915.

Amidst a declining trend from the 1880's both the net internal migration rate and the net emigration rate exhibited strong fluctuations. Figure 9 shows the net internal migration rate as well as the net emigration rate for the three big cities. The inflow of internal migrants was particularly strong in the first half of the 1880's and from 1892 to 1899. Somewhat weaker bursts of migration inflow to the big cities took place in 1901–1906 and 1910-1913. Characteristically the inflow of internal migrants to the big cities varied counter-cyclically with the net emigration rate. When emigration increased, the inflow of internal migrants typically declined and vice versa, in line with the long-swings hypothesis.

5. Internal net migration and business cycles

5.1. Net outmigration from agrarian countryside parishes

We have seen that there was a steady stream of outmigration from agrarian countryside parishes, whether it was outmigration to the United States or to other parts of Sweden. The literature on Swedish emigration to the United States has shown that migration responded to economic fluctuations. There is also an argument that the downward trend in the Swedish-US emigration flow from the 1880's to WWI is explained by a catch-up in Swedish unskilled wages to US unskilled wages. Net internal outmigration from agrarian parishes also fluctuated markedly, and mostly counter-cyclically to emigration so that internal net migration increased when the emigration flow ebbed and vice versa. Did internal net migration from agrarian occupations to industrial or urban occupations respond to the same types of economic variables as emigration? To try out this hypothesis we estimate a regression model with the net internal migration rate (internal net migrants per thousand inhabitants) as dependent variable against the ratio rural/urban unskilled wage ratio and the log difference in GDP. The idea is that outmigration from agrarian parishes to urban occupations was stimulated if the rural-urban wage gap widened and also if job opportunities in urban occupations increased. The GDP growth rate may be interpreted as a proxy for the latter.

Since we are dealing with time series data we first need to establish the time series properties of the variables. Regarding the dependent variable, the net internal migration rate, we can reject the null hypothesis of a unit root.[9] The log of GDP enters the regression model (Table 2 below) in first difference form, so it is also non-stationary. The urban wage rate and the agricultural wage rate are clearly non-stationary. Figure 10 shows how the agricultural wage rate tracked the urban wage rate for the period 1875–1913. It turns out that they are cointegrated.[10] Consequently, the ratio between rural and urban wages does not contain a unit root.[11] Since they are cointegrated, the relationship between the log of agricultural and the log of urban wages may be written as an error correction model, as in equation (4) for the period 1878–1913. The estimated equation implies that in the long-run agricultural wages increased by 1.1 per cent as urban wages increased by 1 per cent.[12] Consequently agricultural wages increased slightly faster than urban wages. As shown by Figure 10 the catch-up mainly occurred in the late 1880's.

$$\underset{}{\Delta w_{A,t}} = \underset{(0.17)}{-0.41} - \underset{(0.17)}{0.56}\, w_{A,t-1} + \underset{(0.20)}{0.64} w_{M,t-1} + \underset{(0.23)}{1.18} \Delta w_{M,t}\,; \quad R^2=0.47 \qquad (4)$$

(standard errors in parentheses)

where w_A is the log of agricultural wages and w_M is the log of wages in the manufacturing industry

Table 2 shows the results of an autoregressive distributed lag model estimated for the period 1878–1913.[13] The model shows that net migration from typical agricultural parishes responded to economic incentives in the form of wage rates and employment opportunities as hypothesized.

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[9] The prob-value for the test statistic in an augmented Dickey-Fuller test with an intercept (no trend) for the period 1878–1913 was 0.02.

[10] A Johansen cointegration test for the period 1877-1913 yielded a prob-value of 0.00 for the null hypothesis of no cointegration between the two variables.

[11] The prob-value for the test statistic in an augmented Dickey-Fuller test with an intercept and a linear trend for the period 1877–1913 was 0.00.

[12] Obtained by dividing the coefficient for the lagged urban wage rate with the coefficient for the lagged dependent variable.

[13] For specifying the number of lags included in this and the following regression equations, I have used the Bayesian Schwarz information criterion. All estimations have been carried out in Eviews 9.

From the estimated autoregressive distributed lag model we may also obtain long-run coefficients[14], which are 48.4 for the log of the manufacturing/agrarian wage ratio and 257 for the log difference of GDP.[15] The GDP growth rate may be interpreted as indicating a change in the prospect of getting employment outside of the agricultural sector. The long-run coefficient suggests that a rise in the GDP growth rate by one per cent would have raised the net outflow of migrants from agrarian countryside parishes by 2.6 migrants per thousand. The yearly average GDP growth rate between 1875 and 1913 was 2.6 per cent so on average the GDP growth rate explains a yearly net outflow of about 6.7 migrants per thousand from these parishes, which amounts to almost 90 per cent of the net outflow of migrants. The long-run multiplier for the ratio between manufacturing and agrarian wages is estimated as roughly 48, which means that the long-run effect of a 10 per cent increase in the wage differential would have led to an increase in the net outflow of migrants by almost 5 migrants per thousand. Actually agricultural wages caught up slightly with urban wages in the period 1877–1913, however. The urban–agricultural wage differential declined on average by 0.4 per cent per year, which cumulates to a compression of the wage differential by 15 per cent between 1877 and 1913. Most of this catch up took place in the 1880's, as already mentioned. If we redo the estimation for the period 1890–1913 the rate of decline drops to 0.2 per cent per year. Consequently, the urban–agrarian wage gap seems mainly to have affected short-term fluctuations in the net migration rate, although strictly interpreted eq. 2 would predict a long-run decline of the outmigration from agricultural parishes. But, such a drop only took place during the economic hardships of 1907–1909. Before 1907, especially during the 1890's, there is a rising trend in net out-migration from agrarian parishes. In sum, in contrast to the GDP growth rate, the urban-rural wage gap does not seem to explain this long-run trend, or others expressed the rise in relative agricultural wages rather dampened the outflow of net migrants from agrarian parishes.

The model may be run also for men and women separately, as shown in Table 2. For men the relationship between agrarian outmigration and the two independent variables comes

[14] A Bound test (Pesaran, Shin, and Smith 2001), performed in Eviews 9, clearly rejected the null hypothesis of no long-run relationship.

[15] The long-run coefficients are obtained by dividing the sum of the coefficients for all lags of an independent variable by 1– the sum of the coefficients for all lags of the dependent variable.

out somewhat stronger, while it is weaker for women. The latter corroborates what has been shown also for late century trans-Atlantic emigration, namely that female migration does not respond as much to changes in the state of the business cycle as does male migration. This probably has to do with the fact that women to a larger extent were employed in occupations less sensitive to the business cycle, such as maids (Bohlin and Eurenius 2010).

5.2. Net migration industrial countryside parishes

We have seen that internal net migration contributed to population growth in industrial countryside parishes, in contrast to agrarian countryside parishes. Does the same type of model as in Table 2 explain net migration to this type of parishes as well? It appears not. When running a regression with the same type of specification as in Table 2 we do no not find any significant contribution (statistically or substantially) of the urban-agrarian wage ratio to the net inflow of migrants to industrial parishes. This may be caused by the fact that parishes categorized as industrial were in fact quite heterogeneous. Some of them surely had a high concentration of industrial occupations, while in others the difference with parishes dominated by agriculture was not so big. This also accounts for the fact that the net internal inflow per thousand inhabitants in industrial countryside parishes was much lower than the net internal outflow from agricultural countryside parishes (Figure 3). For the same reasons the GDP growth rate does not contribute much to explain the oscillations in the slightly positive out-migration rate from industrial parishes.

5.3. Net migration to the three largest cities

Net migration to the three largest cities (Stockholm, Göteborg, Malmö) from other parts of Sweden fluctuated wildly along with business cycles. In Table 3 estimates for an autoregressive distributed lag model of the same type as in Table 2 is presented. In addition to the variables included in Table 2 for agricultural countryside parishes we here also include the emigration rate. The motivation for this is that the emigration rate tended to fluctuate inversely to the net internal migration rate. Secondly, according to the literature[16] migration from the countryside to the largest cities was often an intermediate step before undertaking the emigration to the US. In contrast to the outmigration rate from agrarian parishes in the

[16] Carlsson 1976

countryside, the in-migration rate to the big cities exhibited a downward trend. We have therefore also included a linear trend in the estimated equation.

The short-run effects of emigration on net internal migration to the large cities are small, but statistically discernible. Increased emigration in a given year leads to a small decrease in net internal migration the same year, as expected. The long-run effect of emigration on net internal migration to the big cities, however, is small and not statistically significant. As in the case of net internal out-migration from agricultural countryside parishes there is a clear effect of the state of the business cycle, as reflected by the GDP growth rate, on the rate of net internal migration to the big cities. According to the estimated long-run coefficient a unit per cent rise in GDP would have typically enticed an increase in net internal migration by 1.8 migrants per thousand inhabitants. This is not much considering the fact that the mean yearly net migration rate to the big cites was 15 per thousand, which tells us that the inflow of migrants to the big cities, though fluctuating, was quite large for most years in this period. The estimated model in table 3 accounts well for the yearly fluctuations in the internal net migration to the big cities. It cannot account, however, for the he overall high level of the internal net migration rate to the big cities. This was driven by the industrialization process and was therefore consistently high, quite irrespective of year-to-year fluctuations in the GDP growth rate.

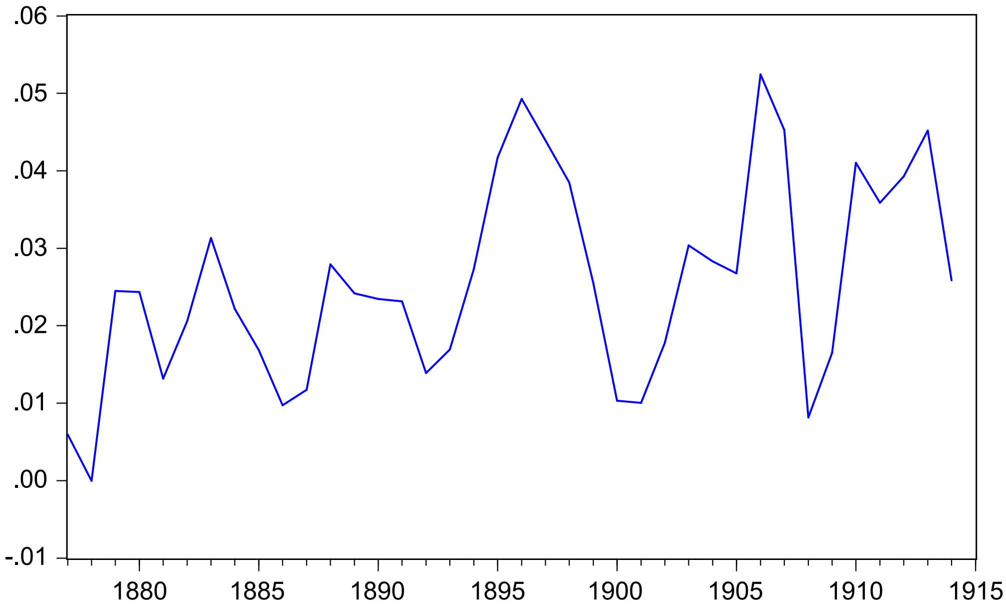
6. Conclusions

The industrialization process was connected to a massive inflow of labour from the countryside to industrial and urban centers. At the same time there was an ongoing mass migration of Swedes to the US. In this paper we have documented, based on a new dataset, that the population dynamic and migration pattern differed between various types of countryside parishes and the big cities. In countryside parishes which were dominated by agriculture the size of the population decreased steadily while it strongly increased in parishes were industry was more predominant. The process was driven by migration as well as by natural population increase. In agricultural parishes the outflow of migrants to industrial and urban areas in Sweden, and to the USA, changed the demographic composition of the population so that the natural populations increase was also much smaller than in industrial countryside parishes. In industrial countryside parishes the inflow of migrants from agricultural parishes more or less balance the outflow of emigrants to the

US. Natural population increase drove the strong population increase in these parishes. In urban centers, such as the largest three cities, population grew strongly both through migration from the countryside and an excess of birhts over deaths.

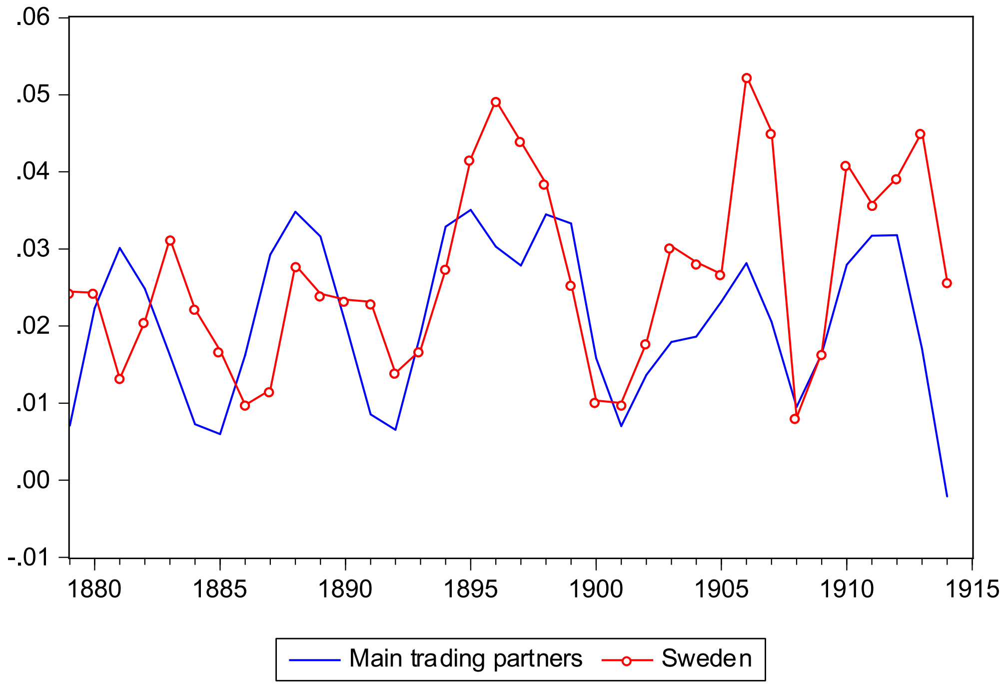
According to the long-swing hypothesis waves of internal migration from the countryside to industrial and urban centers in Sweden alternated with waves of emigration to the US. When the first tide rose the latter subsided anc vice versa. We have been able to confirm this hypothesis by using data for agricultural parishes as well as for the large cities in Sweden. It also turns out similar causes that drove transatlantic migration, namely comparative wages and employment opportunities also drove internal migration in Sweden.

Figure 1. Δ log GDP volume, Sweden 1876–1914



Source: Edvinsson (2014).

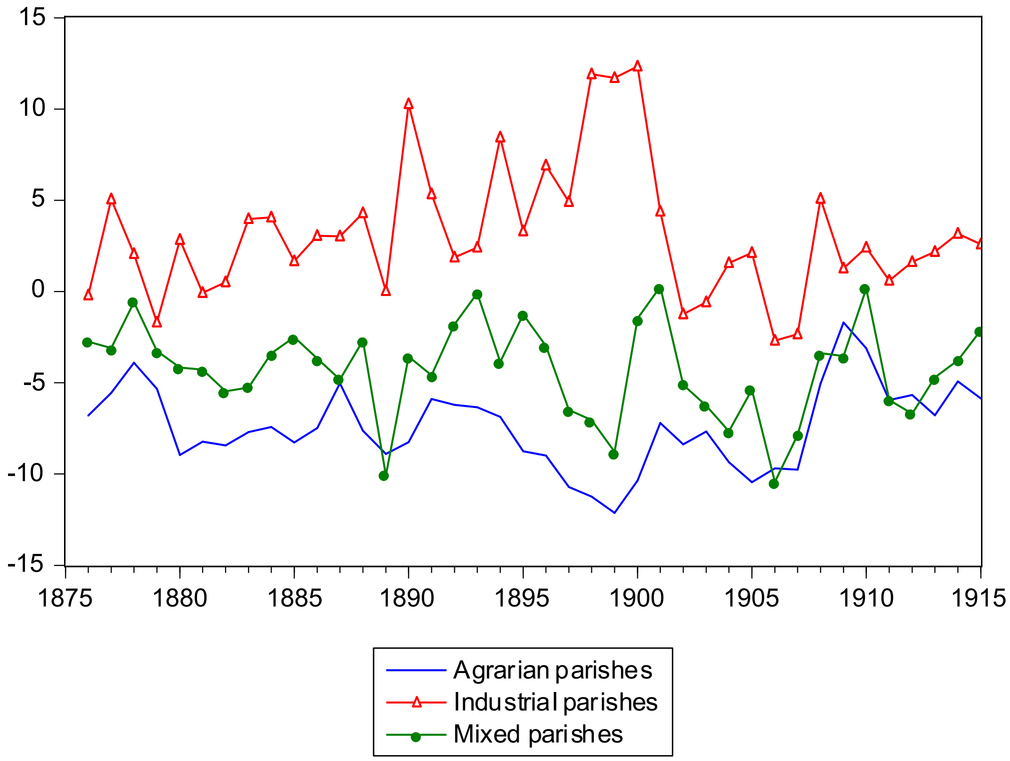
Figure 2. Two year centred moving average in Δ log GDP for Sweden and its main West-European tradning partners, 1879–1914



Source: Edvinsson (2014), Maddison (1991), BISOS F.

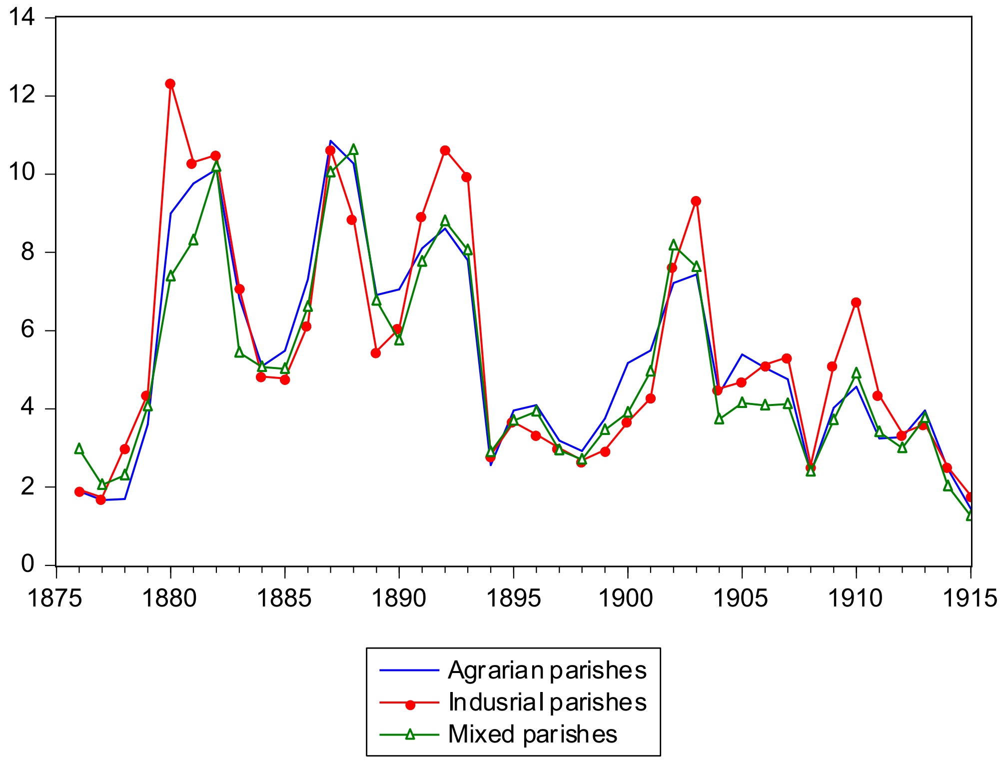
Note: Swedish GDP (Edvinsson), GDP of Swedens main trading partners (Maddison). Among main European trading partners we include Denmark, Norway, UK, Germany, France. These countries are included in the volume index based on their share of Sweden´s foreign trade, as given by the foreign trade statistics (BISOS F).

Figure 3. Net internal migration per thousand inhabitants in agrarian, mixed and industrial parishes, 1876–1915



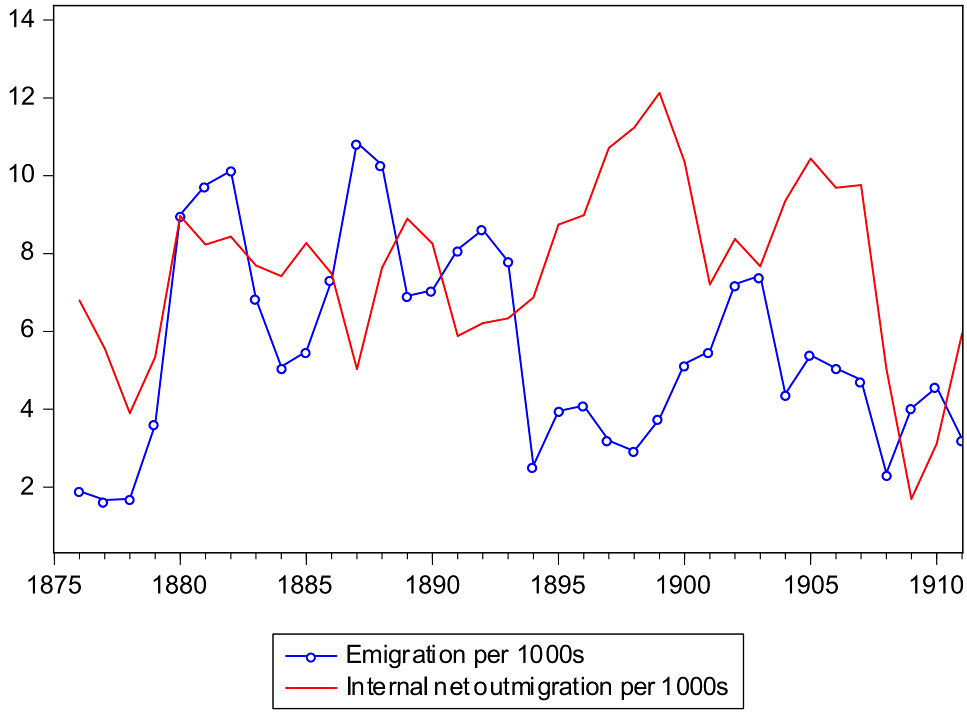
Sources: Primary forms for *De summariska folkmängdsredogörelserna*.

Figure 4. Emigration per thousand inhabitants from rural, mixed and industrial parishes 1876–1915



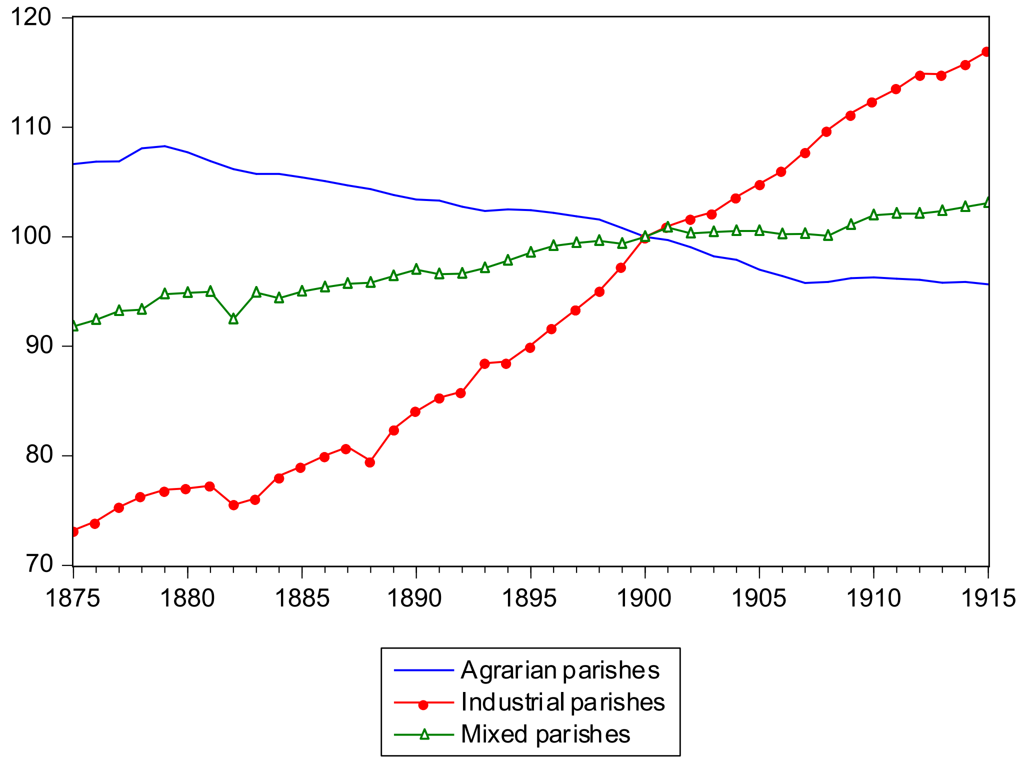
Sources: See Figure 3.

Figure 5. Internal net outmigration and emigration, agricultural parishes



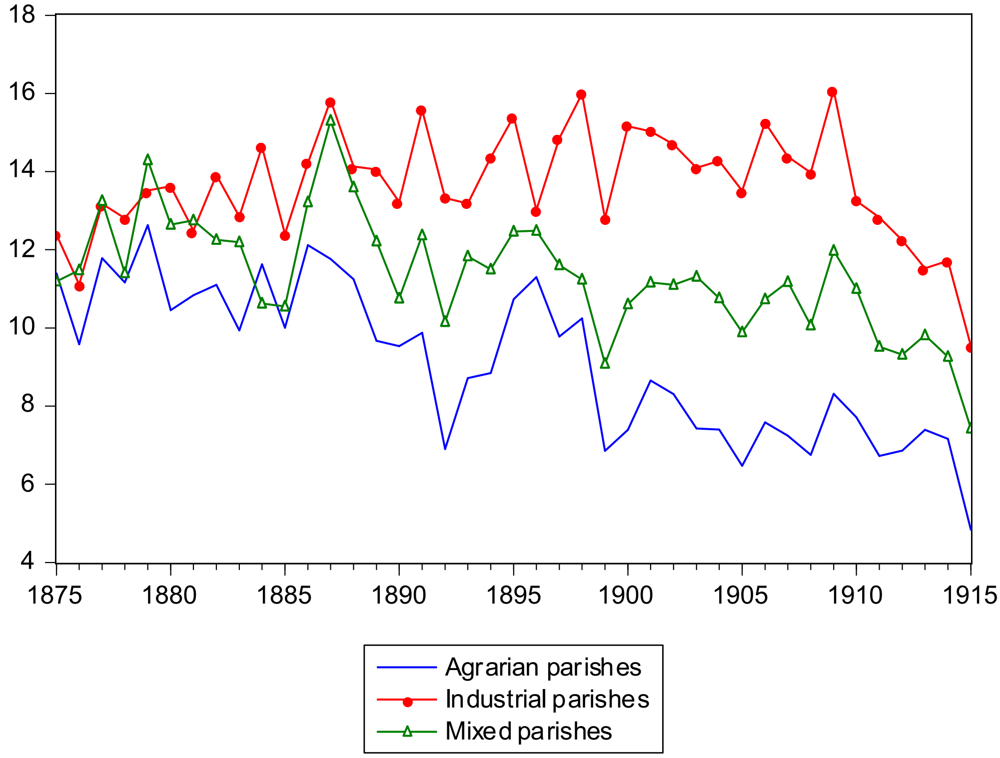
Source: See Figure 3.

Figure 6: Development of population for rural, mixed and industrial parishes (1900=100), 1876–1915



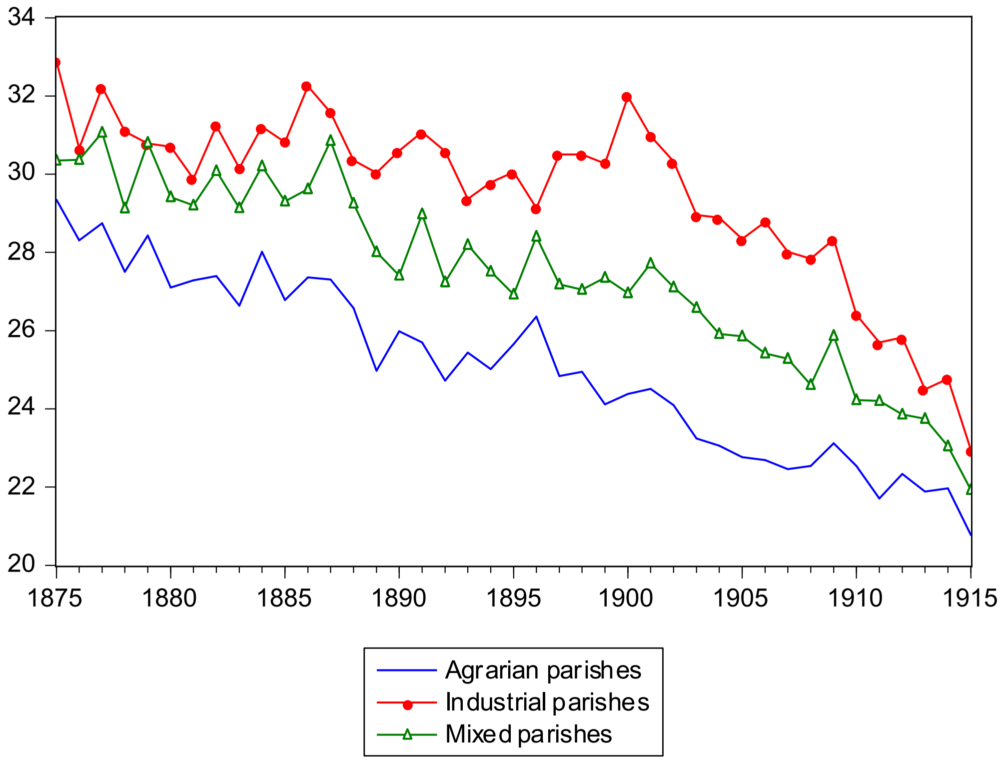
Sources: See Figure 3.

Figure 7. Natural population increase (births – deaths per thousand inhabitants) in industrial, mixed and agrarian parishes, 1876–1915



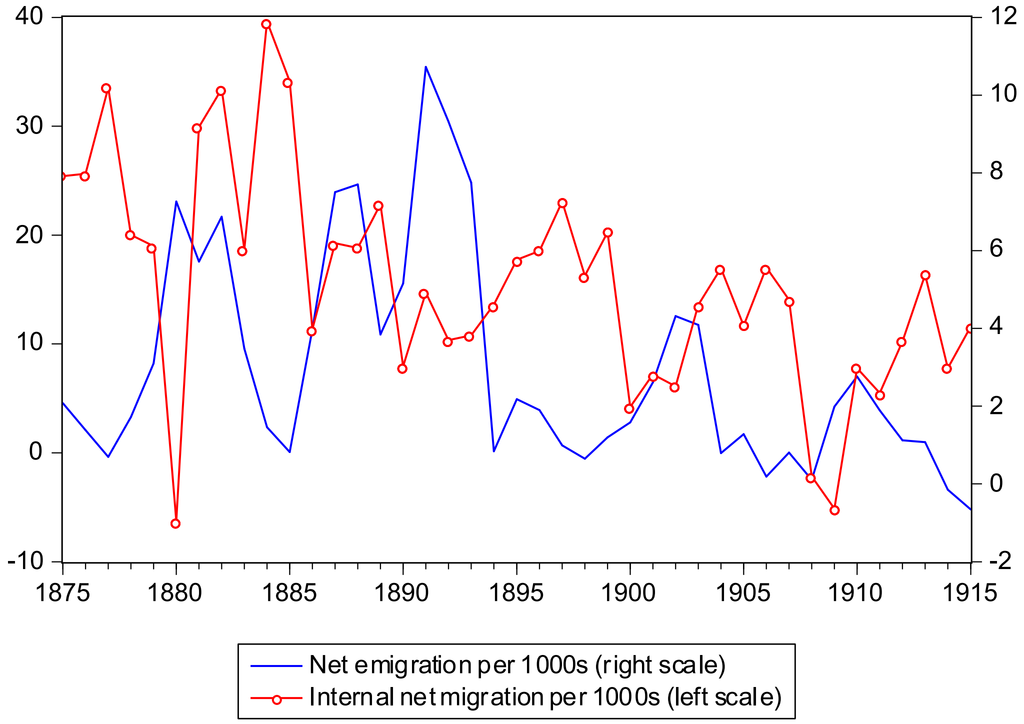
Sources: See Figure 3

Figure 8. Birth rates (births per 1000 inhabitants) in industrial, mixed and rural parishes, 1876–1915



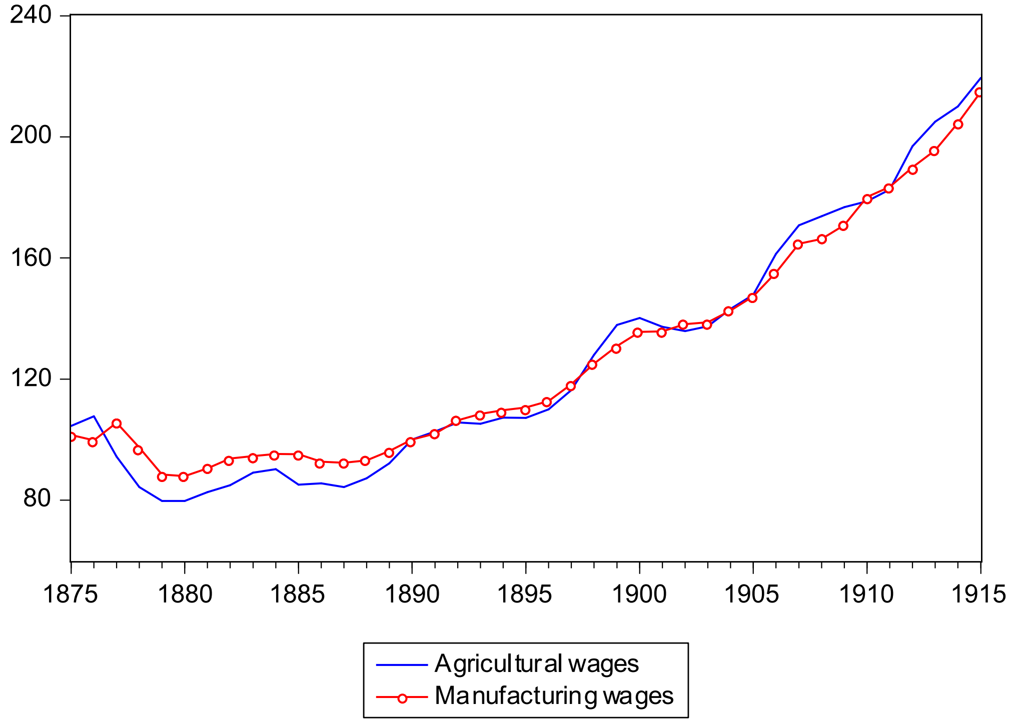
Sources: See Figure 3.

Figure 9. Net emigration and internal net migration per thousand inhabitants in Stockholm, Gothenburg and Malmö, 1875-1915



Source: BISOS A 1875–1910, SOS In- och utvandring 1911-1915, SOS Befolkningsrörelsen 1911–1915.

Figure 10. Male agricultural and manufacturing wages, 1875-1915



Source: Prado (2010); Lundh and Prado (2015)

Table 1. Growth rates in GDP during business cycles, 1869–1909

	Average yearly growth rates, %
1869–1879	3.6
1879–1887	1.2
1887–1893	2.4
1893–1901	3.4
1901–1909	2.8
1879–1893	1.7
1893–1909	3.1

Source: Edvinsson (2014)

Table 2.

	Dependent variable: internal net outmigration per thousand inhabitants in agrarian parishes (Netmig_agr, $_t$),1883–1913					
	All		Men		Women	
	coefficient	standard error	coefficient	standard error	coefficient	standard error
Netmig_agr, $_{t-1}$	0.75***	0.11	0.71***	0.12	0.74***	0.13
$\log(W_M/W_A)$, $_t$	12.16*	6.38	14.50*	7.40	9.28	6.63
Δ log GDP, $_t$	33.10***	10.05	41.80***	11.89	23.92	10.19
Δ log GDP, $_{t-1}$	31.40***	10.28	36.95***	12.11	26.54	10.47
Constant	0.00	1.07	–0.14	1.13	0.57	1.18
Adj. R^2	0.69		0.61		0.58	
Breuch-Godfrey serial correlation test ; Prob. Chi^2	0.32		0.59		0.39	
Long-run estimates						
	coefficient	standard error	coefficient	standard error	coefficient	standard error
$\log(W_M/W_A)$	48.41	37.53	49.15	34.70	35.43	34.72
Δ log GDP	256.69*	136.09	266.98**	128.97	192.64	113.77
Constant	0.02	4.23	–0.47	3.99	2.16	3.60

Table 3.

	Dependent variable: net internal in-migration per thousand inhabitants to the three largest cities (Netmig_3cities, $_t$), 1883–1913					
	All		Men		Women	
	coefficient	standard error	coefficient	standard error	coefficient	standard error
Netmig_3cities, $_{t-1}$	–0.13	0.15	0.02	0.16	–0.25	0.18
log(W_M/W_A), $_t$	123.66**	43.97	147.28	62.78**	78.85**	36.53
log(W_M/W_A), $_{t-1}$	–140.47**	52.46	–119.78	74.45	–55.36	44.13
log(W_M/W_A), $_{t-2}$	170.83***	43.90	191.68***	63.76	136.54***	37.90
Δ log GDP, $_t$	123.65***	38.31	149.48**	54.74	100.52***	32.25
Δ log GDP, $_{t-1}$	81.60*	40.92	80.10	59.09	42.42	34.85
Emigration per 1000, $_t$	–1.31**	0.48	–1.55**	0.63	–1.41**	0.50
Emigration per 1000, $_{t-1}$					0.75	0.45
Trend	–0.46*	0.26	–0.53	0.35	–0.48*	0.24
Constant	27.47***	9.53	27.38**	12.42	28.39***	0.52
Adj. R^2	0.71		0.70		0.79	
Breuch-Godfrey serial correlation test ; Prob. Chi^2	0.46		0.81		0.68	
Long-run estimates						
	coefficient	standard error	coefficient	standard error	coefficient	standard error
log(W_M/W_A)	136.44***	42.25	222.44***	68.90	127.52***	31.40
Δ log GDP	181.83***	59.22	232.99**	98.94	113.90**	43.28
Emigration per 1000	–1.16***	0.38	–1.58**	0.59	–0.53	0.33
Trend	–0.41*	0.20	–0.54	0.32	-0.38**	0.17

Archival sources and Official statistics

Primary forms for *De summariska folkmängdsredogörelserna*

Bidrag till Sveriges officiella statistik A, Befolkning, 1875–1910

Bidrag till Sveriges officiella statistik F, Utrikes handel och sjöfar, 1875–1910

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