Regional perspective on the relation between urban and demographic transitions in 19th century France and Belgium

Abstract:

This communication is an extension of a paper under revision that reconsiders the relationship between demographic ("vital") transition and urban transition by identifying the migration component of urban transition, accounting for the often neglected reclassification effect. Using 19th and 20th centuries' series on Sweden and Belgium, that paper concluded that migration effect on urban transition doubles that of natural movements. The communication extends the analysis of the components of urban transition to France over the 19th century, and will adopt a regional perspective for French counties (about 80 "départements"). The work on Belgium 9 provinces is yet to be completed.

This macro-spatial analysis is meant to link natural and migration movements with urban economic components and changes that occurred in these different regions along the 19th century. To that effect, the paper makes use of a classification of industries based on two surveys conducted in 1841-1845 and 1861-1865 (Kergoat 1989).

Keywords: Demographic transition; urban transition; migration; economic development.

1 Introduction

Our previous paper on Belgium and Sweden reconsidered the role of migration in urban transition, accounting for the often neglected reclassification effect (Bocquier and Costa forthcoming). Our empirical results showed that in Belgium, natural movements have generally a negative direct effect and a positive indirect (through reclassification) effect, while migration always has a positive effect, whether direct or indirect. Urban transition in Sweden was essentially due to the positive direct effects of migration and the reduction of the negative direct effect of natural movements, essentially mortality. Migration may also have driven part of the natural trends by modifying the population structure of urban areas: this is observed in Belgium but not in Sweden. Finally, before World War I reclassification highly contributed to urban growth in Belgium and explains most of the period-to-period variations, unlike in Sweden.

In both Sweden and Belgium migration was the direct or indirect (through reclassification) engine of urban transition and its contribution *preceded* the onset of vital transition in the mid-19th century. In Sweden reduction in mortality in urban areas (1840-1880) has evidently unleashed urban transition in the 19th century, while lower urban fertility mildly hindered it between the two World Wars. In Belgium higher urban mortality or lower urban fertility only slightly reduced the speed of urban transition respectively before and after the vital transition starting around 1880. The bottom line is that trends in both Sweden and Belgium confer to the vital transition a secondary, unstable, and negative role in the urban transition while migration explain most of it in the long run.

Our analyses on Sweden and Belgium are sufficient to question de Vries' argument (1984) that spatially-differentiated vital transition led to urban transition. After giving a direct and positive role to migration in urban transition, and an indirect and negative role to natural growth, Zelinsky's hypothesis of mobility transition (1971) cannot be so easily dismissed.

Our study on Belgium and Sweden proved that simple but long data series could help identifying the direct role of natural movements, provided that reclassification effect and its natural and migration components is taken into account. In the present paper, we applied the same methodology to French county ("département") data over the 19th century (1821-1891). However our purpose is slightly different: not only we aim at identifying the migration and natural component of urban growth but we would also like to link patterns of growth with non-agricultural economic characteristics of each county. Our hypothesis is that technological and institutional innovations essentially made in urban areas are driving the urbanisation process. France is a sufficiently large country to identify different kinds of industrial innovations and their effect on urbanisation.

2 Methods and data: timing of urban and vital transitions

The following is a summary of the methodology used in the paper on Belgium and Sweden to be published, complemented by some aspects of French data. The basic idea is to use basic aggregated data on population, births and deaths by area of residence, to deduct the migration component of population growth without direct measurement of migrations. Rates of increase in time interval *h* in rural and urban areas are defined as:

$$q_h^u = \frac{B_h^u - D_h^u + M_h^{ru} - M_h^{ur} + M_h^{*u} - M_h^{u*}}{P_t^u} = b_h^u - d_h^u + m_h^u + i_h^u$$

$$q_h^r = \frac{B_h^r - D_h^r + M_h^{ur} - M_h^{ru} + M_h^{*r} - M_h^{r*}}{P_t^r} = b_h^r - d_h^r + m_h^r + i_h^r$$

where the denominator P_t is the mid-interval population. The rates b_h^r, d_h^r, m_h^r, i_h^r, are respectively the crude birth rate, crude death rate, net internal migration rate, and net international migration rate, all in period *h*. Comparing trends of mortality, fertility and migration rates from both areas are of particular interest for the joint analysis of the demographic and urban transitions.

An additional component of urban growth is related to the evolution of urban measurement over time. Whatever the urban definition, a locality may change category just by crossing a relative or absolute threshold or by decision of central authorities. Some urban localities may become rural, but most of the time rural localities become urban. This "movement" although definition-driven is often confused with migration in absence of information on the localities that changed category. Whenever data permit it is better to explicitly account for this component, the urban reclassification growth:

$$c_h^u = \frac{C_h^{ru} - C_h^{ur}}{P_t^u},$$

noting that this component has the opposite sign (but not the opposite value) of the rural reclassification growth:

$$c_h^r = \frac{C_h^{ur} - C_h^{ru}}{P_t^r}$$

where C_h^{ur} is the urban population reclassified rural in period *h*, and C_h^{ru} is the rural population reclassified urban in period *h*. Using all the above equations, we can now derive the urban-rural difference in population growth as:

$$q_h^u - q_h^r = (b_h^u - b_h^r) - (d_h^u - d_h^r) + (m_h^u - m_h^r) + (i_h^u - i_h^r) + (c_h^u - c_h^r)$$

To ease reading of the Figures below, each difference in urban-rural rates can be abbreviated:

$$\Delta G = \Delta CBR - \Delta CDR + \Delta inM + \Delta outM + \Delta R$$

where ΔG stands for urban-rural growth difference, ΔCBR for urban-rural growth difference in crude birth rate, ΔCDR for urban-rural growth difference in crude death rate, ΔinM for urban-rural internal net-migration growth difference, ΔoutM for urban-rural international net-migration growth difference, and ΔR for urban-rural net reclassification growth difference. Rural to urban or urban to rural reclassification may itself occur as a result of cumulated growth over the years through migration, natural growth, or a combination of both. When administrative definition is used for urban areas, authorities often account for real or perceived growth to change the status of localities.

Interestingly, from a computational point of view, it is sufficient to know the urban-rural growth difference (ΔG) and the urban-rural natural growth difference (ΔN=ΔCBR-ΔCDR) to deduct the remaining components (ΔinM+ΔoutM+ΔR) *without* knowing the reclassification

component and the exact migration flows between rural and urban areas, and between these areas and the outside world, both components that are admittedly less often directly measurable:

$$\Delta inM + \Delta outM + \Delta R = \Delta G - (\Delta CBR - \Delta CDR)$$

De Vries (1984) implemented a similar method on 50-year intervals for European countries for the period 1500-1890. More recent applications on census data (usually 10-year intervals) are found in Lerch (2014) for Albania between 1950 and 2011, or in Henderson et al. (2013) for England (1700-1910) and developing countries (1960-2010).

Data on reclassification (ΔR) are usually not readily available from existing databases or statistical year-book but can be collected fairly easily using lists of localities by size. Then, one can isolate the migration component:

$$\Delta inM + \Delta outM = \Delta G - (\Delta CBR - \Delta CDR) - \Delta R$$

When data on birth and deaths is available for the reclassified localities, it is then possible to compute the percentage contribution of migration to the reclassification component:

$$\Delta inM + \Delta outM = \Delta G - (\Delta CBR - \Delta CDR) - (\Delta RN + \Delta RM)$$

and then compute the total direct and indirect (through reclassification) contribution of migration to urban-rural growth difference:

$$\Delta inM + \Delta outM + \Delta RM = \Delta G - (\Delta CBR - \Delta CDR) - \Delta RN$$

$$\Delta Mtotal = \Delta G - \Delta Ntotal$$

Our approach to the urban transition differs from previous ones in that we used series of urban-rural growth differences to identify the components of urban transition including reclassification decomposed in its natural and migratory components.

The population of France was 30.46 million in 1821 and reached about 38.34 million in 1891. The percentage urban rose from 13.8% (4.21 million urban) to 37.3% (14.30 million urban) in this study period. As in most Western European countries, the urban transition really started in the 19th century. French statistical yearbooks that include births and deaths counts were published regularly since the 1820s and most of these historical data are now available online through INSEE website (http://www.insee.fr/fr/bases-de-donnees/default.asp?page=tableaux_sgf.htm). In principle, censuses were available every five years with some exceptions (1826, 1841 and 1876 are not available and the 1871 census was postponed to 1872). Similarly births and deaths by area of residence were not always available for every year (years 1821-1824, 1887, 1889 were missing for urban areas). We collected data on urban areas as defined in the statistical yearbooks, i.e. communes that are "Chefs-lieux" and cities of more than 10,000 inhabitants. However we deducted the "Chefs-lieux" of less than 5,000 inhabitants. The limitation of our data is that we miss cities of 5,000 to 10,000 inhabitants that are not "Chefs-lieux" since they are not identified in the original yearbooks. We limit our study up to 1891 for France: the data for the 1891-1911 period was fragmentary and would need further processing. We were able to count the number of deaths and births for all "Chefs-lieux" that were reclassified (crossing the 5,000 threshold either way) and for all communes that were reclassified as cities by reaching the 10,000 threshold. This enabled us to compute the contribution of migration and natural movements to reclassification as we did for Belgium and Sweden in a previous paper.

3 Results for France

3.1 The contribution of migration, reclassification and natural movements to urbanisation at the national level

Figure 1 depicts the difference in vital transition between urban and rural areas (ΔCBR, ΔCDR, and the resulting ΔN) as well as the trends in urban-rural migration cum reclassification growth difference (ΔRMG=ΔinM+ΔoutM+ΔR). This is for France excluding Paris, the regions of Alsace and Lorraine, as well as the counties of Savoie and Haute-Savoie. For convenience, we will name France so defined as 'provincial France'.

In provincial France urban growth was almost non-existent in the 1821-36 period, with little urban-rural difference in the component of overall growth difference. Generally urban areas experience lower crude birth rate compared to rural areas but also lower crude death rate. Natural growth difference is at the benefit of urban areas when the urban-rural difference in crude birth rate diminishes. The 'urban demographic sink' (when ΔN was at its lowest) is non-existent except in 1861-66, when urban areas experienced an excess mortality. This is different from both Sweden (excess urban mortality with not much difference in births) and Belgium (births compensating excess mortality). There was no 'urban demographic sink' due to urban mortality as in Sweden and lower mortality compensated for lower fertility, the exact opposite to Belgium.

The most important trend depicted in Figure 1 is that migration cum reclassification highly contributed (correlation: 96.4%) to the level and variations of urban-rural total growth difference (ΔG) contrary to the natural component (correlation: 6.1%). Urban growth was mostly positive over the study period with one noticeable exception: 1872-80. Migration cum reclassification bounced back in the 1881-85 period. To note, the variations of total urban-rural growth difference is essentially due to migration cum reclassification.

Figure 2 repeats from Figure 1 total growth difference (ΔG) as well as natural growth difference (ΔNG) but separate the migration component from the reclassification component. Total urban-rural growth difference is highly correlated with both reclassification (58.7%) and migration (89.2%), as compared to natural growth (only 6.1%). The Figure 2 shows that over the 1821-91 period, i.e. at the beginning of the urban transition, reclassification has a positive contribution (+0.32% on average) while migration contribution is nearly twice higher (+0.62% during the same period) but is negative in 1872-81. This was a period following the turmoil of the French-Prussian war (1870-71), various civil insurrections in several cities (the most famous in Paris in 1870), the fall of the Second Empire (Napoleon III), and the instauration of 3rd Republic. The 1881-86 period shows a peak in urban-rural growth difference with high contribution of migration and reclassification. This period is characterised by the return of relative political stability and economic prosperity under the Presidency of Jules Grévy. It can be qualified as a period of economic recovery after a decade of instability.

As explained in the method section, we were able to separate further natural and migration components of reclassification. Actually reclassification (0.32% on average over the study period) is very much more explained by migration (0.31%) than by natural movements (0.01%). Therefore, indirect contribution (through reclassification) of natural movements adds very little to the direct contribution (+0.09%) of natural movements to overall urban-rural growth difference, and is actually slightly negatively correlated with it (-23.0%). By contrast the migration

component of reclassification is fairly correlated (+34.8%) to the direct contribution of migration.

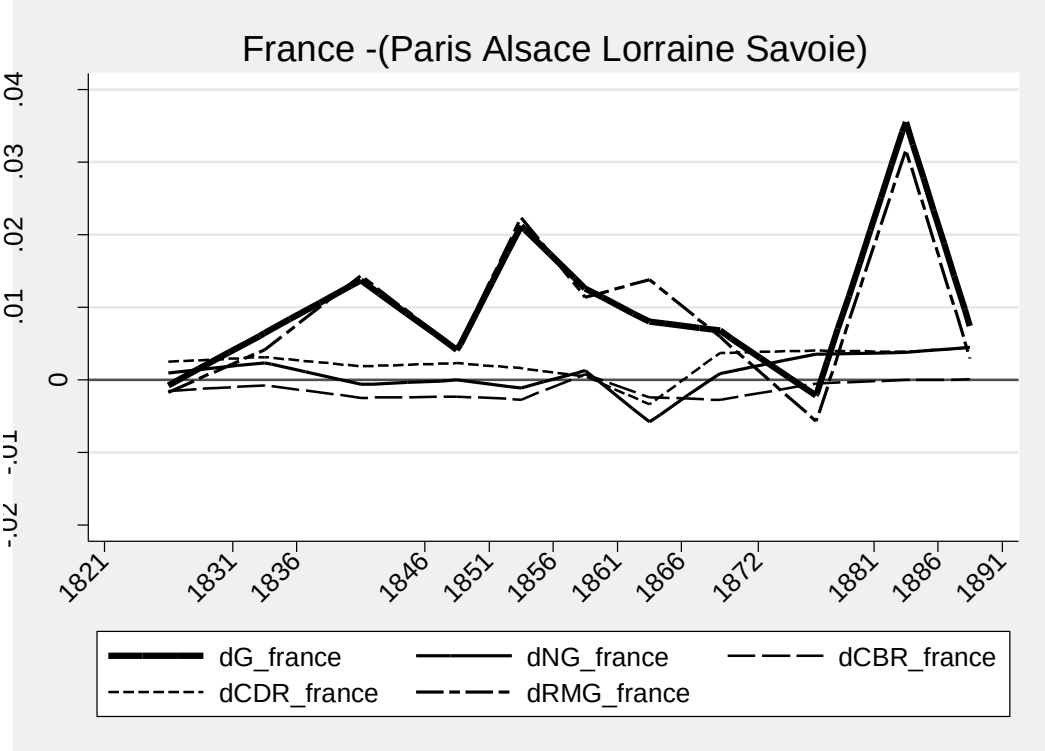

Figure 1: Urban-rural difference in mortality (dCDR), fertility (dCBR), migration cum reclassification (dRMG), and total growth (dG) in France (1821-1891)

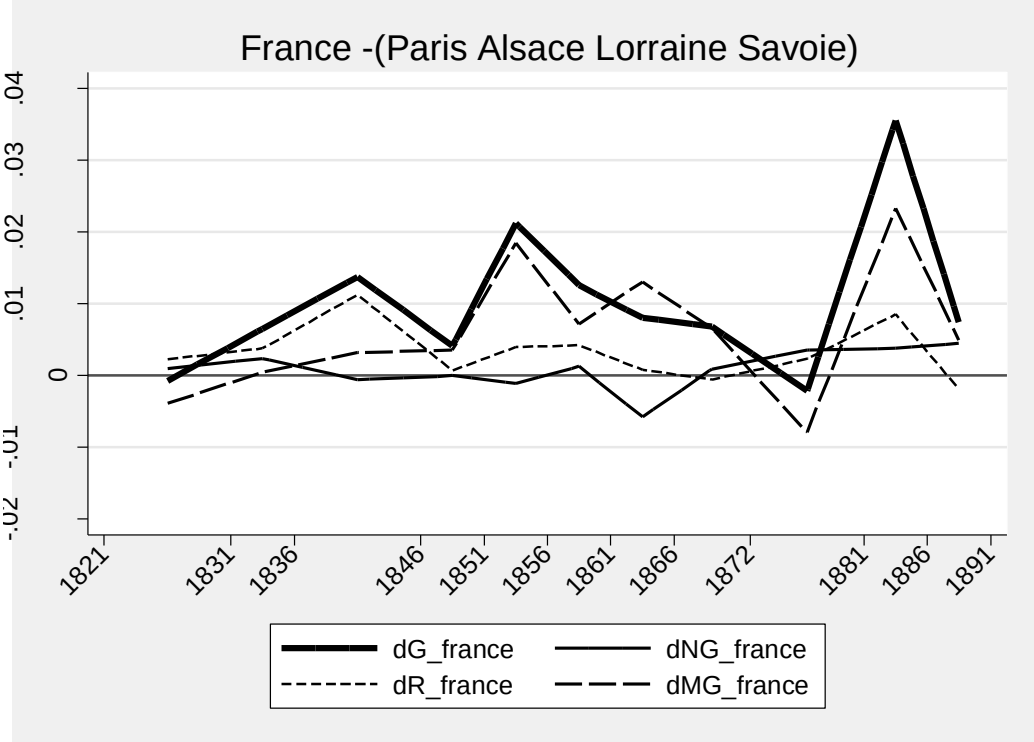

Figure 2: Urban-rural difference in direct natural (dNG), direct migration (dMG), reclassification (dR) and total growth (dG) in France (1821-1891)

Adding the indirect and direct contributions in two separate trends for natural and migration growth (Figure 3) shows quite clearly that in provincial France the overall level and variations of the urban-rural growth difference is determined by migration. The natural component sometimes dampens this difference (1846-66), sometimes it compensates for a migratory deficit as in 1821-30 or in 1872-81. The correlation of natural movements with urban-rural growth difference over the whole study period is weak (2.6%) compared to the migration component (96.6%). The French data shows that migration was the main contributor of urban transition in the nineteenth century.

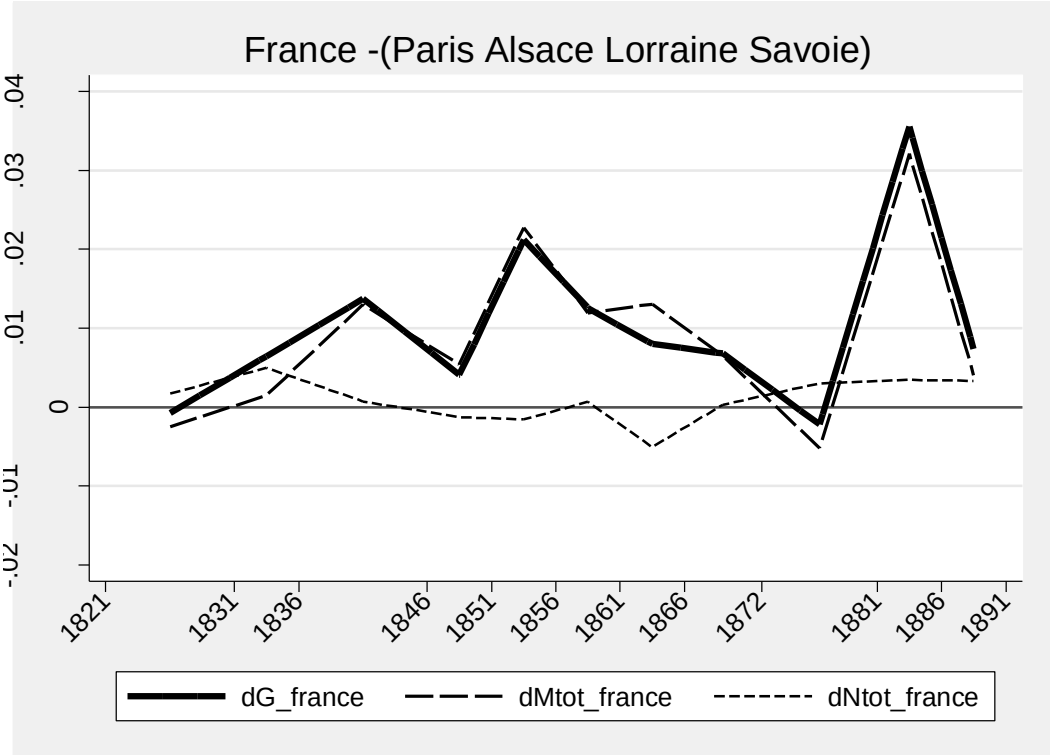

Figure 3: Urban-rural difference in total natural (dNtot), total migration (dMtot), and total growth (dG) in France (1821-1891)

Trends in France compare interestingly with those of Belgium and Sweden. The 'urban demographic sink' is not universal. In Sweden, this sink is observed prior to 1850, resorbed in 1850-1880 and was essentially due to excess mortality in urban areas. In Belgium, there is no evidence of pre-urban transition 'urban demographic sink': a slight urban excess mortality was compensated by excess fertility in urban areas up to 1900. If there was a sink it was rather weak and occurred after urban transition started and was mainly due to a birth deficit in urban areas in the first half of the 20th century. In France, there was no prolonged 'urban demographic sink' and urban areas experienced both lower mortality and lower fertility.

As for reclassification, in Belgium it contributed more than twice as much to urban-rural growth difference as the migration component over the 19th century, and about half of this reclassification was due to migration. In Sweden, the contribution of reclassification is positive but low before World War I. In France, reclassification contributed half as much as the migration component and was largely due to migration thus adding to its direct effect.

Replicating the analysis on historical demographic series of France has confirmed the conclusion drawn from Belgium and Sweden. At the national level of the three countries, the direct and indirect (through reclassification) role of migration was prominent in the urban transition that started in the 19th century. In particular, variations of urban-rural growth difference are quite sensitive to the migration component. Our analyses confirm that mortality and fertility effects on urban transition are not constant in history and are generally either weak or negative, while migration has a higher and sustained effect. Therefore, urbanization is not an inevitable outcome of the vital transition as hypothesized by De Vries (1990) and Dyson (2011). Although data from other countries would be necessary to generalise to Europe, our results on France, Belgium and Sweden seem to confirm two hypotheses made in a previous paper (Bocquier and Costa forthcoming) that "mobility transition is a necessary and underlying condition for urban transition" and that "vital transition is an unnecessary contribution to urban transition".

3.2 The contribution of migration and natural movements to urbanisation for different types of industrial development

In this previous paper, we made another proposition as to the relationship between demographic and economic transitions: "a change in the mode of production (notably through human capital development that brings about disease control, energy surplus and economic growth) is the necessary and underlying condition for the vital and mobility transitions". Our contention is that the change in the mode of production over the 19th century was not homogenous. It should therefore lead to different population dynamics according to the type of production change. If the economic transition to capitalism in the 19th century in Europe is really the underlying cause of the vital and urban transitions then the shift of human capital observed through migration in sub-national territories should be very sensitive to the industrial characteristics of each county and to the change in economic environment of these industries.

This section presents provisional results based on a classification of industrial employment done by Michelle Kergoat (1989) using two employment surveys conducted in 1845 and 1865. Unfortunately, the original datasets were not available to us at the time of writing. In the near future, we hope to be able to account for more precise indicators of employment structure changes through census data, albeit employment data are only available from the 1851 census. In the following, we identify which industries influenced most the national trends by comparing the graphs for each group of counties (classified according to their industrial profile) with the general pattern for provincial France (Figure 3) for two large periods: 1821-1860 in relation to industrial characteristics according to the 1845 survey; 1856-90 in relation to the 1865 survey. We are focusing our comments mainly on the migration component since the natural component shows rather flat trends with few exceptions.

The counties where textile industries were dominant in 1845 show more urban attraction in 1851-55 (Figure 4) while the counties with dominant agribusiness, mining, and ship industries explain most of the urban attraction of the 1836-45 period (Figure 5). The relative fall in urban attraction in 1846-50 is linked to agribusiness, construction, printing, metal, mining and generally textile industries (Figures 4 and 5).

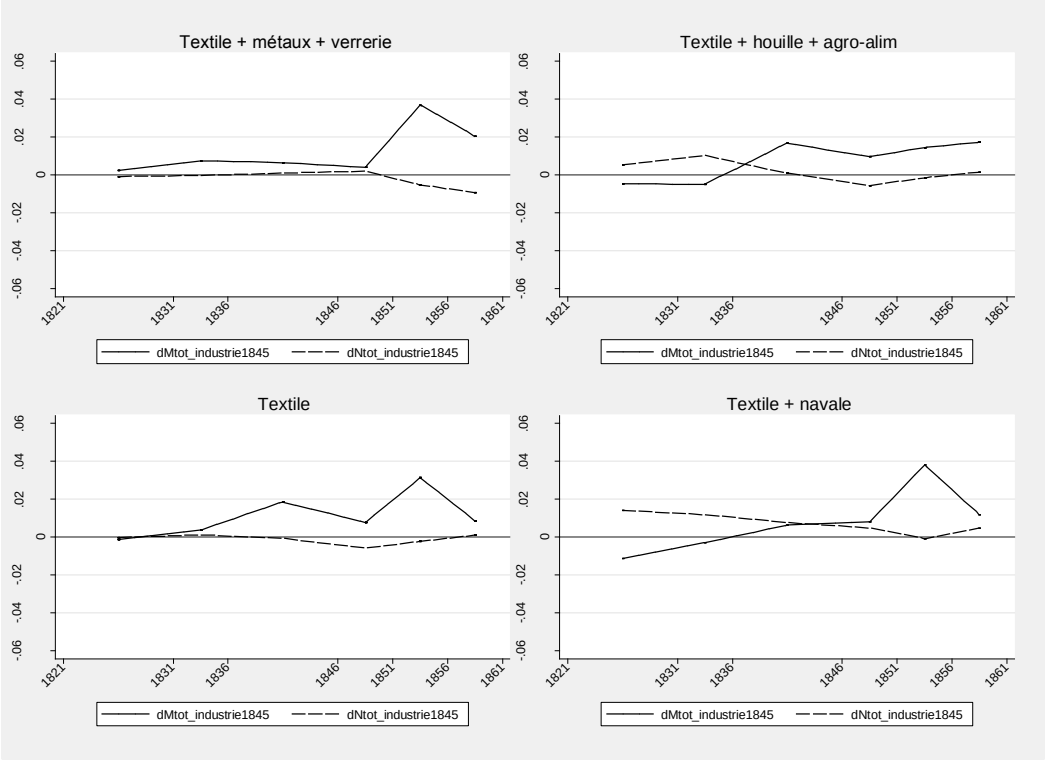

Figure 4: Urban-rural difference in total natural growth (dNtot) and total migration growth (dMtot) by type of industrial employment in France: textile dominant industries (1821-1855)

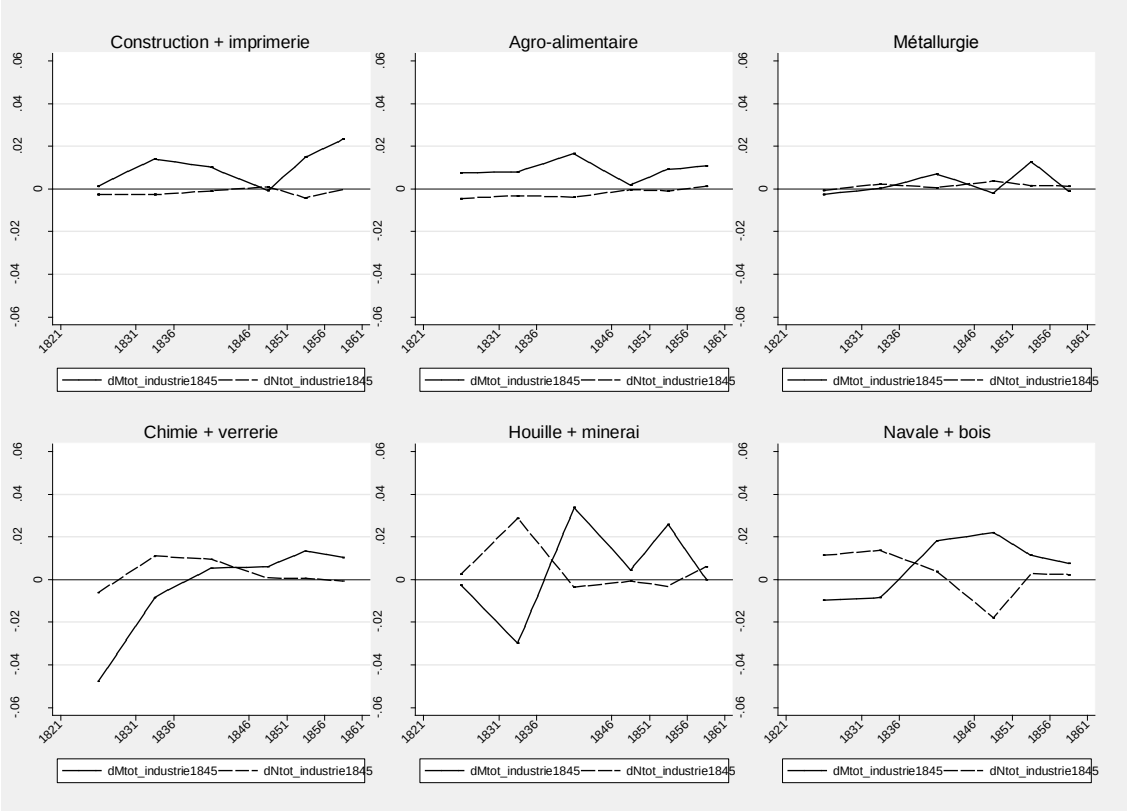

Figure 5: Urban-rural difference in total natural growth (dNtot) and total migration growth (dMtot) by type of industrial employment in France: non-textile dominant industries (1821-1855)

During the 1851-90 period (using categories constructed from the 1865 industrial survey), a fall of urban attraction in 1872-80 is observed, contrasting with a rise in 1881-86. The group of counties where textile industries were prominent as well as metal and ship industries (Figure 6), and leather industry (Figure 7) are explaining this fall in attraction and subsequent catch-up during the recovery in 1881-1885. The counties where other industries (transport, wood, printing, construction and agribusiness) did not experience the fall and subsequent rise (Figure 7): they were still attractive during the troubled period of 1872-80. The counties where agribusiness prevailed actually experienced a fall during the recovery period 1881-85 (Figure 7).

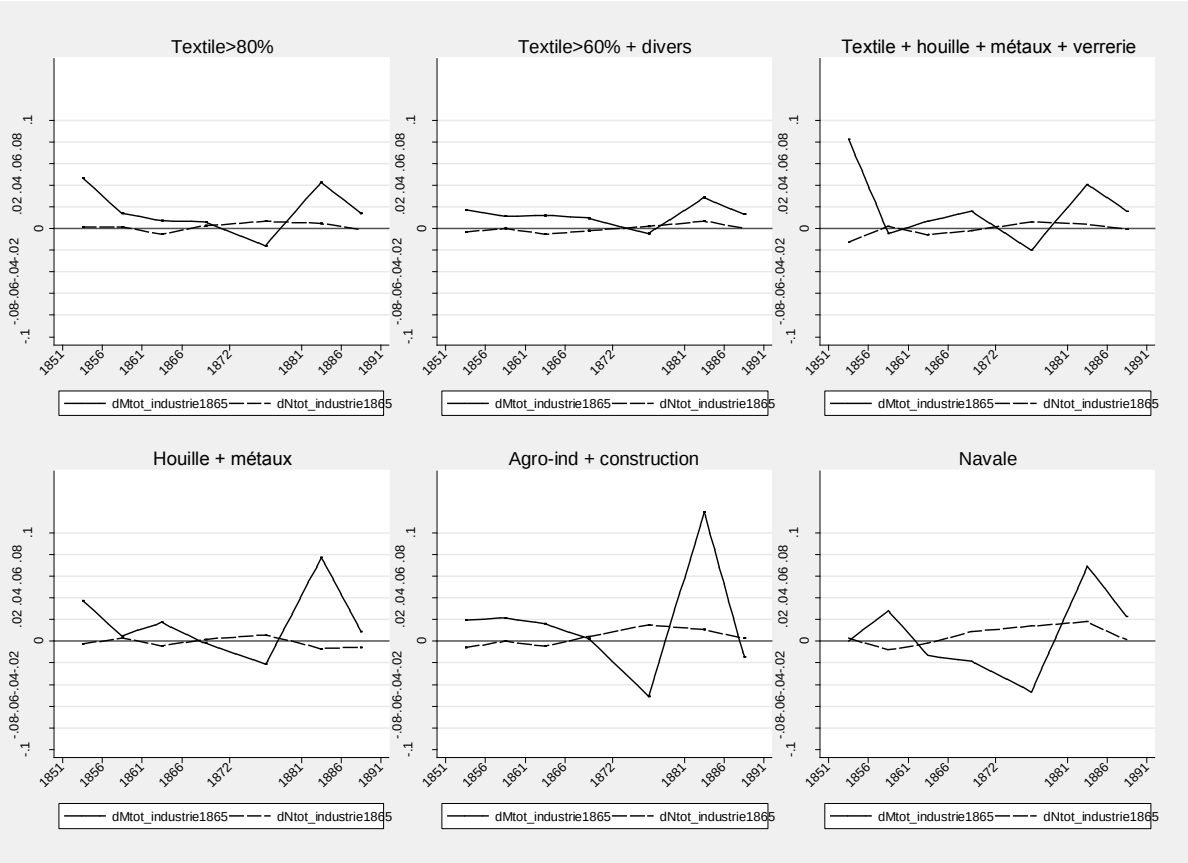

Figure 6: Urban-rural difference in total natural growth (dNtot) and total migration growth (dMtot) by type of industrial employment in France: textile dominant industries and ship industry (1851-1890)

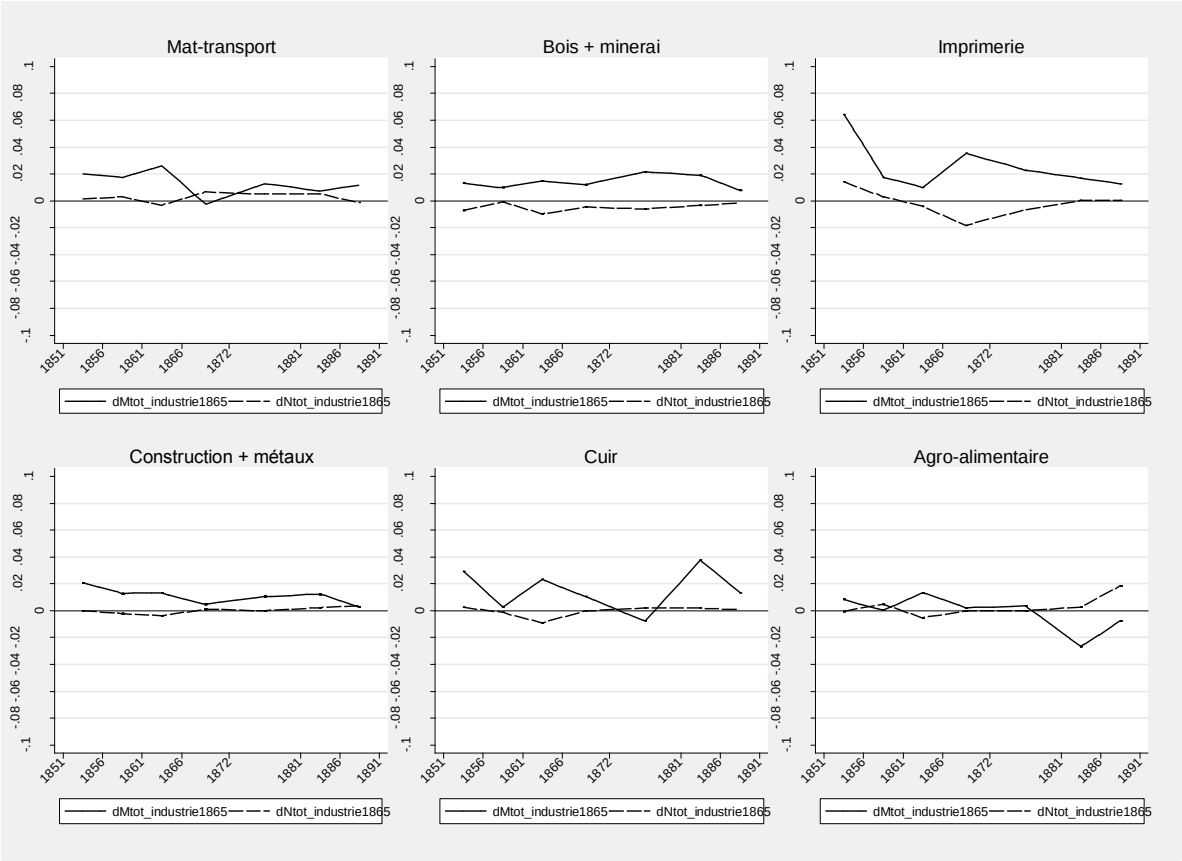

Figure 7: Urban-rural difference in total natural growth (dNtot) and total migration growth (dMtot) by type of industrial employment in France: non-textile dominant industries (1851-1890)

4 Discussion: to be written

At this stage of writing, our analysis is not sufficiently mature to draw meaningful and affirmative conclusions. Comments and suggestions are most welcome.

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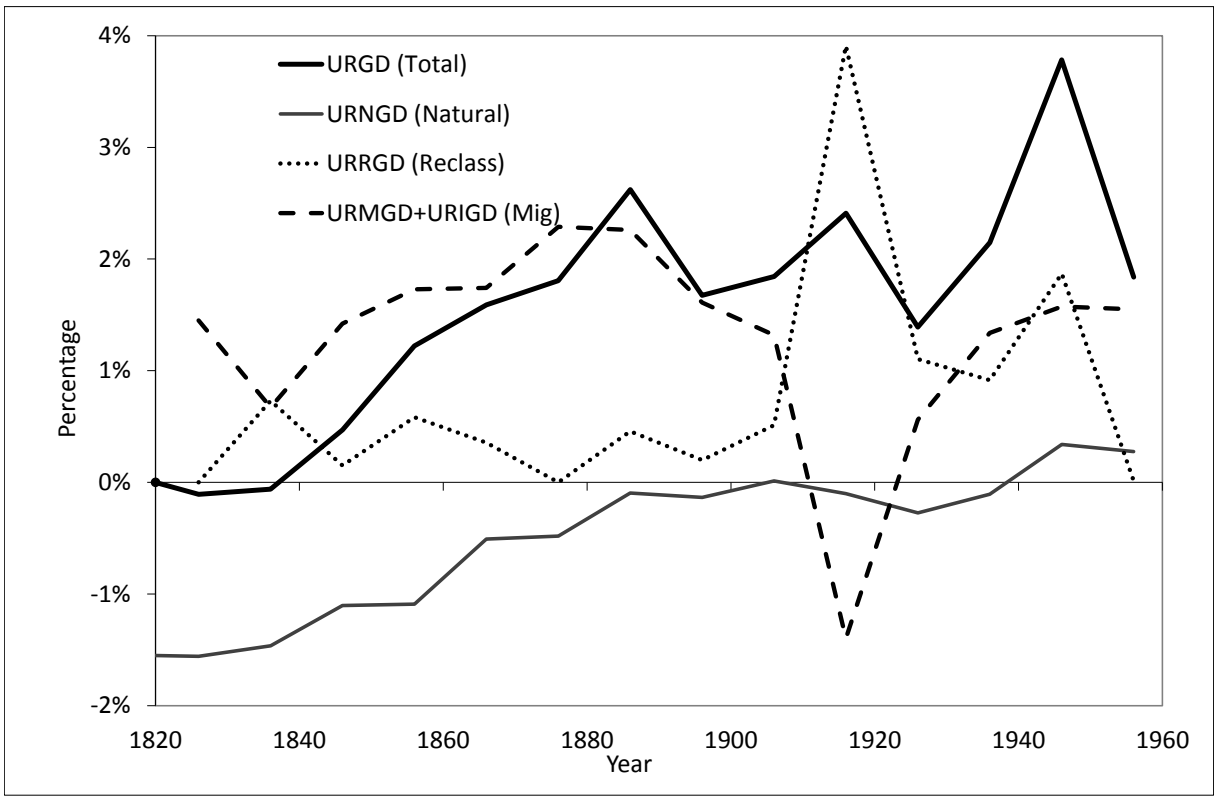
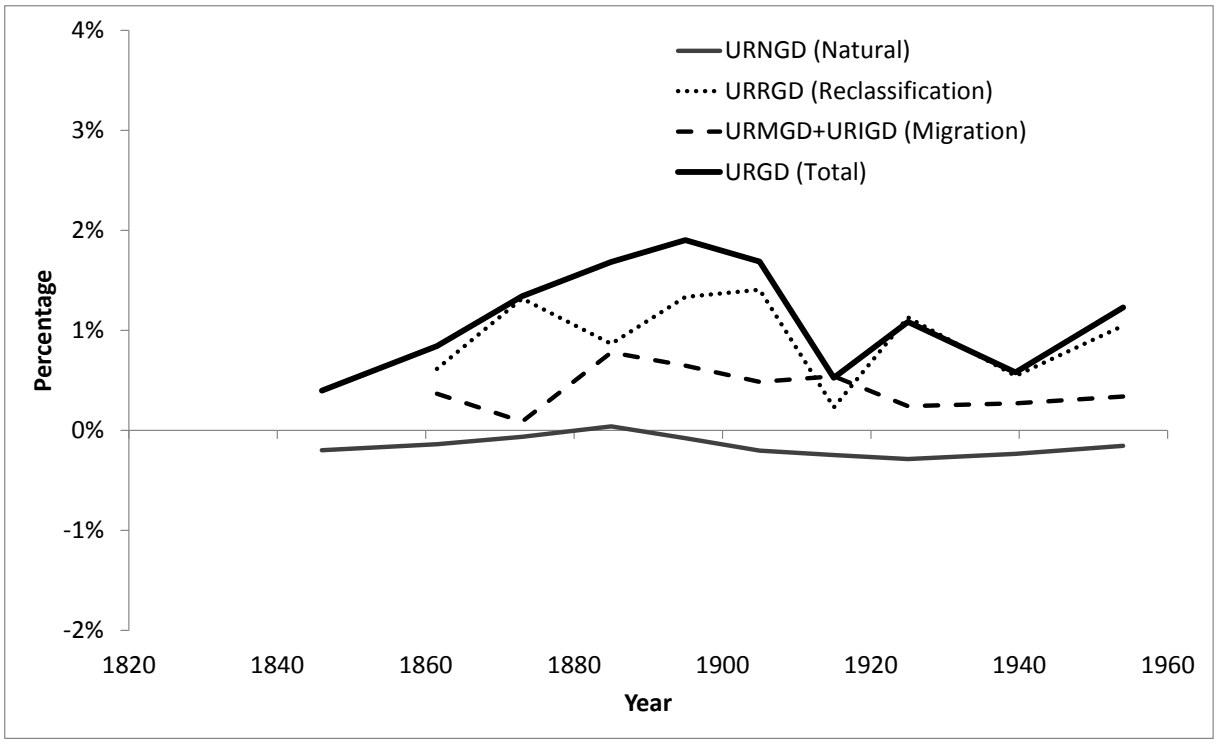
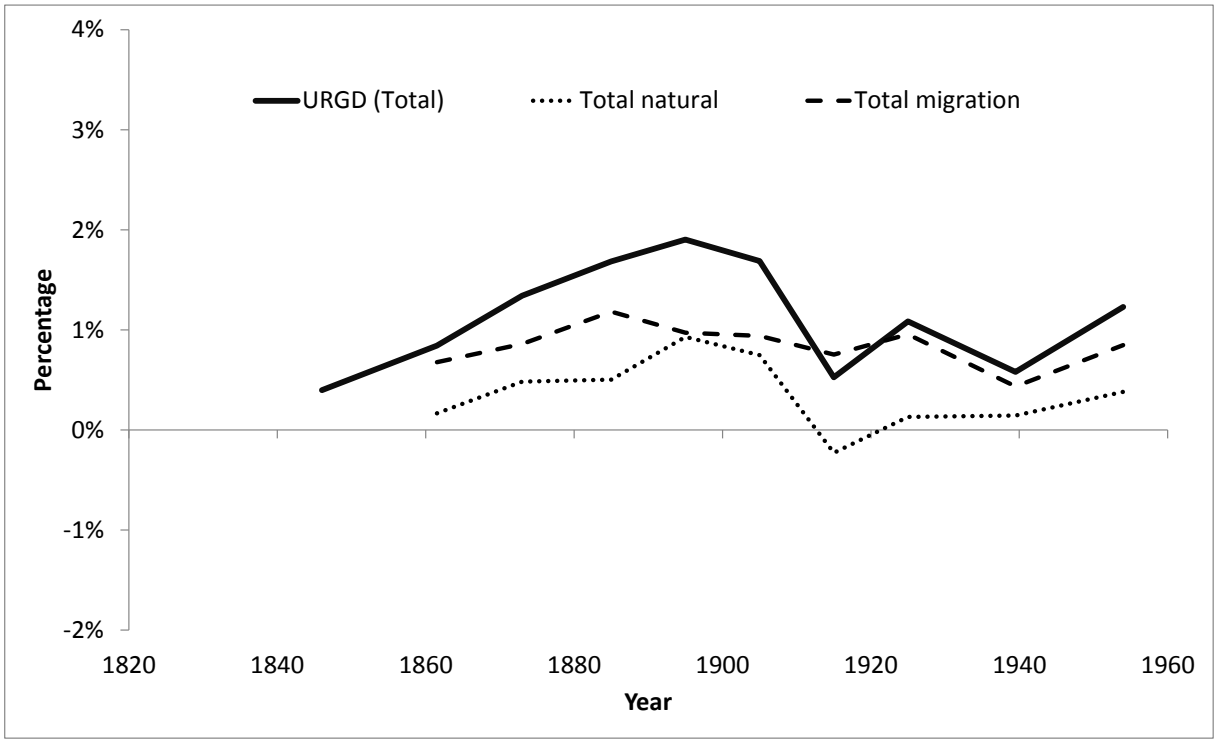
Annexes



Annex 1: Urban-rural difference in direct natural, direct migration, reclassification and total growth in Sweden (1820-1960) Source: our own computation using original crude birth and death estimates by urban and rural areas compiled by Dyson (2011) and historical series of population in cities and boroughs (Statistiska Centralbyrån 1969: Table 12).



Annex 2: Urban-rural difference in direct natural, direct migration, reclassification and total growth in Belgium (1844-1961) Source: our own computation using original crude birth, death and reclassification estimates by urban and rural areas



Annex 3: Urban-rural difference in total natural, total migration, and total growth in Belgium (1844-1961) Source: our own computation using original crude birth, death and reclassification estimates by urban and rural areas