

# Between Malthus and the industrial take-off: regional inequality in Sweden, 1571–1850<sup>†</sup>

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The causes and extent of regional inequality in the process of economic growth are at the core of historical economic research. So far, much attention has been devoted to studying the role of industrialization in driving regional divergence. However, empirical studies on relatively unequal countries such as Italy and Spain show that inequality was already high at the outset of modern industrialization. Using new estimates of Swedish regional GDP, this article looks for the first time at regional inequality in a pre-industrial European economy. Its findings show that inequality increased dramatically between 1571 and 1750 and stayed high until the mid-nineteenth century. This result discards the classical view that the industrial take-off was the main driver of regional divergence. Decomposing the Theil index for GDP per worker, we find that the bulk of inequality from 1750 onwards was driven by structural differences across sectors rather than different regional productivity within sectors. We show that counties with higher agricultural productivity followed a classic Malthusian pattern when experiencing technological advancement, while those with higher industrial productivity did not. We suggest that institutional factors, such as the creation of the Swedish Empire, Stockholm's trading rights, and a protective industrial policy, amplify this exceptional pattern.

There is much debate about how regional inequality evolves during different stages of economic growth. Scholars have focused on the role of modern industrialization in driving regional inequality, caused by the initial forging ahead of front-running industrial regions.<sup>1</sup> However, more recent contributions to our knowledge of regional GDP from the mid-nineteenth century suggest that regional inequality was already present in many countries before their industrial take-off, calling for further attention to the pre-industrial period to identify the origin of this inequality.<sup>2</sup> This article takes a step forward by analysing for the first time a country's regional inequality over a period of three centuries before its industrialization. To look at pre-industrial inequality and its determinants we use a newly compiled dataset of GDP for the Swedish NUTS-3 regions, which covers every decade in the period 1750–1850 plus an early benchmark for 1571. Connecting our series to the existing ones by Enflo et al. for the period 1860–2010 gives us the longest set of regional GDP series to date for any single country, providing for the first time a picture of overall regional inequality spanning the distance from pre-industrial times to today.<sup>3</sup>

Our findings point to a relatively low level of regional inequality in 1571 but a sharp increase as early as 1750, 100 years before modern industrialization. Decomposing regional inequality in *between*- and *within*-sector components, we find that the inequality arising in the eighteenth century was largely driven by regional specialization (the *between* component), with the secondary sector being far more productive than the primary one. To explain these results, we look at the way in which the policies of the Swedish Crown, especially in terms of labour mobility, trade, and the location of proto-industrial activity, allowed some less agricultural regions to escape the Malthusian adjustments and improve productivity, while the other regions remained trapped at a subsistence level. These different dynamics led to an unexpected level of pre-industrial regional inequality. To formalize our hypothesis, we rely on the regional adaptation of the theoretical framework originally proposed by Strulik and Weisdorf to explain the differences in the timing of the demographic transition across Europe.<sup>4</sup> The authors model differences in population responses

in a two-sector framework comprising agriculture and industry. If fertility is assumed to vary inversely with the price of food, population responses to productivity shocks will then differ depending on whether they occur in agriculture or industry. While agricultural productivity increases income and the survival of children, industrial productivity has the opposite effect, since it increases the alternative cost of agricultural goods. When regions present different specializations in agriculture and industry, large differentials in regional GDP per capita can arise long before the industrial take-off.

In line with earlier research on Malthusian mechanisms in Sweden's pre-industrial agriculture, we find that the productivity gains in agriculture originating from technological advances were crowded out by a population increase.<sup>5</sup> At the same time, the industrial sector responded to technological advancement with less-than-proportional population growth. We believe that regulations on trade and migration in combination with a protectionist industrial policy are key to explaining why Malthusian forces failed in some of the regions of Sweden but not in others.

Our work contributes to the literature in that it is the first to show, for a European country, the evolution of regional inequality over the centuries preceding modern industrialization, and to propose an alternative timing and explanation. It also shows how elements from unified growth theory and institutional factors can interact and initiate regional inequality long before the rise of a classic driver such as modern industrialization. Finally, our work speaks more broadly to a growing literature on pre-industrial dynamism at both sectoral and regional level.

The article is organized as follows. Section I discusses different views on the determinants of regional inequality. Section II presents the relevant literature on pre-industrial Sweden; section III describes the methods and sources used to estimate regional inequality; and section IV illustrates the results, with an analysis of the long-run trends in regional inequality. Section V proposes a theoretical framework in which to interpret these results, and section VI concludes.

## I

In a pioneering article, Williamson proposed the view that regional disparities were mainly driven by modern industrialization.<sup>6</sup> Williamson's hypothesis implies that, in the pre-industrial period, regional inequality was relatively low and that divergence arose as a consequence of industrialization taking off in some front-running regions. His evidence came from several countries, but covered only a relatively short period in the middle of the twentieth century. Using this dataset, Williamson found a peak in regional inequality occurring sometime in the interwar period, and attributed it to the process of industrialization. Since then, economic historians have extended the empirical evidence by calculating regional GDP over longer periods. With today's new datasets, it has become increasingly clear that regional inequality and wide differences in the level of GDP were already present well before industrialization. For instance, recent estimates of regional GDP for Sweden from 1860 to 2010 show that even at the outset of the industrial revolution inequality was high.<sup>7</sup> The same is true for other large European countries such as Italy or Spain.<sup>8</sup> However, due to lack of data, it has been judged virtually impossible to extend most regional GDP series further back than the mid-nineteenth century (see the recent book by Rosés and Wolf with European data that for most countries start around 1900).<sup>9</sup> Since the industrial take-off arguably occurred in most cases in the nineteenth century, how regional inequalities came about in the first place is not made clear from the existing evidence.

Although we still lack a set of comprehensive reconstructions of regional GDP before the mid-nineteenth century, we can rely on an expanding literature on pre-industrial economies. Recent accounts have modified the stylized view of a stagnant pre-industrial economy by using new evidence from national GDP and occupational structures.<sup>10</sup> We can also refer to the growing literature on industrial work before industrialization. The project on the occupational structure of Britain from 1379 to 1911 represents the most comprehensive and advanced study available, which points to peculiarly high shares of workers in the secondary sector before the industrial revolution.<sup>11</sup> It may be contended that the pre-industrial secondary sector is heterogeneous, since it contains workers in proto-industry, subsidized urban manufacture, and mining alike. While the long-term economic impact of proto-industry and manufactories has sometimes been questioned, mining is undoubtedly the most important pre-industrial industry in terms of value added.<sup>12</sup> To account for such differences in the secondary sector, our GDP data allow for a regional breakdown that separates mining from other industries.<sup>13</sup>

## II

In this context, pre-industrial Sweden is often described as a poor and agricultural economy on the periphery of northern Europe. As seen in [figure 1](#), GDP per capita was relatively stagnant throughout the entire period from 1571 to 1850. The picture is one that over the long run seems consistent with the Malthusian pattern, but, like other peripheral economies such as Portugal, Sweden had relatively long periods of deviation from the standard Malthusian model (for example, the growth period during the seventeenth century) and signs of pre-industrial dynamism in several respects.<sup>14</sup> Most prominently, the Swedish population almost quadrupled between 1571 and 1850, but evidence suggests that this was due to the expansion of the frontier, rather than any improvement in agricultural technology.<sup>15</sup> Instead, its stagnating agriculture appears not to have met the needs of a growing population, for net cereal imports increased in importance from 1650 onwards. Recent estimates of agricultural production and population growth in the seventeenth century suggest that as much as a fourth of the population may have depended on imports for their survival.<sup>16</sup> Not even the advent of the potato in the early nineteenth century met this need; it was merely translated into more population growth without improving people's living standards. Taken as a whole, Sweden may have been closer to a Malthusian ceiling at the end of the period than it was at the beginning.<sup>17</sup>

However, although the primary sector showed capacity constraints compared to the growing population, the secondary and tertiary sectors bear witness to increasing dynamism. The extent of proto-industry in Sweden was studied in the 1980s by Isacson and Magnusson, mostly through a case-study approach. The picture that emerged is that 'in the central Swedish farming districts ... as well as in Skåne in the south of Sweden cottage industry did not develop to any appreciable extent' as 'these districts were better suited to crop-growing', while Southern Västergötland, Småland, and Dalarna were the most important proto-industrial areas.<sup>18</sup> Unlike in the English case, Swedish proto-industrialization was not carried on by poor farmers with the goal of alleviating their rural poverty, but appears to have been profitable compared to agriculture. This qualitative analysis pairs well with the higher value added per capita in industry compared to agriculture in the regional GDP series proposed by Enflo and Missiaia.<sup>19</sup>

The mining industry boomed, starting in the seventeenth century, with iron exports from Sweden constituting more than 80 per cent of London's imports and copper (from the Falu copper mine) covering about two-thirds of the European market.<sup>20</sup> Special legislative privileges were offered to hammer works for bar iron production as a first step towards the large-scale organization of industrial production. However, although it demonstrated technological progress, the iron sector was still heavily dependent on the surrounding agricultural community for its supply of energy in the form of charcoal and for simpler services such as transport and on-site chores.<sup>21</sup> In the mining district of Bergslagen these services were part of the local taxation.

Simultaneously, state capacity grew. When Sweden entered a turbulent period of warfare and imperial expansion (sometimes described as the Great Empire Era, 1611–1718), the fiscal and military functions of the economy had to be modernized. Sweden developed an authoritarian economy, implementing policies that would be effective in expanding its territory but were less amenable to internal checks and balances. An administration empowered to tax households was set up under the influence and supervision of the Crown and the reformed Lutheran Church. In fact, many of our underlying sources for estimating regional GDP are the detailed tax records of individuals and households held by these institutions.<sup>22</sup>

However, simple direct taxation was not enough to generate a sufficient surplus for the state and it therefore imposed mercantilist policies to control and tax the increasing revenues from trade. The prime instruments of these mercantilist policies were tariff protection to promote exports and the creation of industrial privileges to promote urbanization.<sup>23</sup> The view of the Crown was that commerce, shipping, and craftsmen should be confined to towns, where it was easier to tax and control income. Consequently, rural trade was prohibited and strict regulations guided the conferring of market privileges on towns. Most towns were granted the right to trade only in the domestic market. In order to trade abroad, specific staple rights had to be granted. However, a few towns held the right to trade on the foreign market; Stockholm in particular was given an extremely favourable position in this regulated trading system. In order to concentrate tax revenues from the lucrative trade in iron, the Botnian trading restriction stipulated that all trade coming from north of Stockholm had to pass through its harbour before it could be exported abroad. Yet the extreme plan to make Stockholm the only town equipped with the right to export was never fully executed, ensuring that a handful of towns south of Stockholm also enjoyed international trading rights, Gothenburg being the second most important. The tendency to favour the capital remained until the trading restrictions were reformed in 1765.

Another field of policy was the regulation of the craft guilds and the support of some manufacturing industries. Early on, the Crown tried to encourage industrial production in the so-called manufactories. These production units, founded through generous state support, focused on textiles, sugar, tobacco, and various metal works and were strictly regulated. However, no prominent role has been acknowledged for these manufactories, either in the subsequent industrialization or more broadly in the success of the

Swedish economy.<sup>24</sup> Their failure is often attributed to production that was too rigid and directed into industries where Sweden lacked long-run comparative advantage (such as the cultivation of tobacco, or mulberry trees for silk production).

The labour market was relatively regulated, in the sense that many relations were still marked by more coercive labour arrangements on the manors. However, cash wages and short-term notice were starting to replace payment in kind. Gradually a more modern labour market was created, with individual employment contracts between two equal parties.<sup>25</sup> However, internal migration was limited and internal passport laws in combination with local poverty charters restricted the free movement of labour between counties. Taken altogether, Sweden in the pre-industrial period was an economy deeply regulated according to mercantilist principles. However, in terms of economic outcomes, Heckscher deems the fruits of its policies ‘few and insignificant’.<sup>26</sup> The economy gradually liberalized during the nineteenth century, during which the passport laws were repealed and industry was deregulated. By 1860, the economy had broken from its mercantilist past. At this time, coinciding with the onset of the industrial revolution, the economy exhibited high regional inequality.

The effect of these policies on overall regional inequality has been observed in previous studies focusing on the mid-nineteenth century. Enflo et al. produced GDP per capita estimates for 10-year benchmarks from 1855 to 2000, showing that Swedish counties experienced modern industrialization without an increase in regional inequality.<sup>27</sup> Enflo and Rosés used the same series to inquire into the drivers of regional inequality in the very long run, finding that structural change was the main driver behind this convergence process.<sup>28</sup> The present article seeks to extend the long-term picture of the regional inequality of Sweden, covering for the first time both the century preceding industrialization (1750–1850) and the very early benchmark of 1571. The next section illustrates the sources and the methodology used for this purpose.

### III

A major challenge in estimating historical regional GDP figures before the mid-nineteenth century is the availability of reliable and homogeneous regional statistics. Sweden stands as the exception among European countries: labour force statistics from population censuses at the regional level are available from the mid-eighteenth century onwards. These can be used to allocate to regions the national estimates of agriculture, industry, and services recently produced by Schön and Krantz.<sup>29</sup> The methodology, introduced by Geary and Stark, is standard practice for historical GDP estimates and is considered the most reliable when direct measures of output are not a viable option.<sup>30</sup> GDP in county  $i$ , ( $Y_i$ ) is defined as:

$$Y_i = \sum_j y_j \beta_j \left( \frac{w_{ij}}{w_j} \right) \times L_{ij} \quad (1)$$

where  $y_{ij}$  is the average value added per worker in county  $i$ ; sector  $j$ ,  $w_{ij}$  is the level of wages in county  $i$  in sector  $j$ ;  $L_{ij}$  the number of workers in county  $i$ ; and industry  $j$ .  $\beta_j$  is a scalar that will reflect regional relative differences but ensures that the total of each sector  $j$  sums to the national. Geary and Stark, using UK data, show that their method yields results of promising precision. For the Swedish counties, Enflo et al. demonstrate that the method produces reasonable results for the second half of the nineteenth century and the whole of the twentieth.<sup>31</sup> This is the method used by Enflo and Missiaia to produce GDP estimates for the period 1750–1850 for Sweden’s 24 counties (corresponding to NUTS-3 level). The series produced cover five sectors: agriculture, manufacturing, mining, private services, and public services.<sup>32</sup>

Enflo and Missiaia, using a different methodology, also provide estimates for the benchmark year 1571: the main source is a one-off wealth tax called the ‘Älvsborgs ransom’. Between 1563 and 1570 Sweden and Denmark engaged in one of many wars for the control of the Baltic Sea. During the war, the castle of Älvsborg fell under Danish control. The castle was of strategic importance because it granted Sweden access to the Nordic Sea. In order to regain it, Sweden paid 150,000 silver coins. To pay this ransom, a special wealth tax comprising a tenth of all cattle, surplus agriculture, and metal goods was imposed. The data from this source have already been used by scholars and are considered of exceptionally good quality for the period. Between 1872 and 1883 the historian Hans Forsell was the first to organize the data at parish level.<sup>33</sup> The source covers about 84,000 households and 500,000 taxed individuals, ranging over some 1,100 parishes from Sweden at its historical borders. The ransom is the main source

used by Enflo and Missiaia to derive regional GDP series for 1571 Sweden at its current borders.<sup>34</sup> The series produced apply to three sectors: agriculture, industry, and services.

There are general considerations in using historical GDP to measure growth performance that also apply to the case of regional GDP: a widespread concern is that the productive capacity captured by GDP will not be the same in all the benchmark years representing different periods. In particular, the concern is that the further back we go, the less market production is representative of overall production. Edvinsson suggests that the incidence of home consumption was indeed substantial in pre-industrial Sweden and proposes a correction to the series by Schön and Kranz, who prefer to keep home production separate from market production.<sup>35</sup> Enflo and Missiaia follow the approach of the latter scholars, relying on the assumption that even if home production were included, it would have shifted the level of all regional GDP in a reasonably balanced way, not changing the overall picture of regional inequality.<sup>36</sup> This article therefore relies on the new estimates by Enflo and Missiaia to produce evidence of Sweden's long-run regional inequality from 1571 to 1850. Since the datasets of existing regional GDP mentioned above are all estimated to be consistent with the Swedish historical accounts, summing all the regional GDP will result in the same level of national GDP as reported by Schön and Kranz.<sup>37</sup> It is therefore straightforward to connect the newly produced series for 1571 and 1750–1850 to the existing ones from 1860 onwards.<sup>38</sup> Thus, a very long-run overview of regional inequality until today can be given.

After illustrating the patterns of regional inequality in our series through the use of a standard coefficient of variation, we propose a further indicator of regional divergence: the Theil index of inequality. Following Martínez-Gallaraga et al., we define the Theil index  $T$  as:

$$T = \sum_j^5 \sum_i^n \left( \frac{Y_{ji}}{Y} \right) \log \left( \frac{\frac{Y_{ji}}{E_{ji}}}{\frac{Y}{E}} \right) = \sum_j^5 \sum_i^n (\log(x_{ji}) - \log(\bar{x})) \frac{Y_j}{Y} \quad (2)$$

where  $Y$  is the per capita GDP,  $E$  is employment,  $\bar{x}$  is GDP per worker,  $j$  indexes the sectors, and  $i$  indexes the counties.<sup>39</sup>

The index can be disaggregated into two components, the within component  $T_w$  (the weighted average of regional inequalities of labour productivity within each sector across regions) and the between component  $T_b$  (the weighted average of regional inequalities of labour productivity between our five sectors).

$$T = T_w + T_b = \sum_{j=1}^5 \left( \frac{Y_j}{Y} \right) T_j + \sum_{j=1}^5 \left( \frac{Y_j}{Y} \right) \log \left( \frac{\frac{Y_j}{E_j}}{\frac{Y}{E}} \right) \quad (3)$$

where:

$$T_w = \sum_{j=1}^5 \left( \frac{Y_j}{Y} \right) \sum_i^n \left( \log(\bar{x}_{ji}) - \log(\bar{x}_j) \right) \frac{Y_{ji}}{Y} \quad (4)$$

$$T_b = \sum_{j=1}^5 \left( \frac{Y_j}{Y} \right) \log \left( \frac{\frac{Y_j}{E_j}}{\frac{Y}{E}} \right) = \sum_{j=1}^5 (\log(\bar{x}_j) - \log(\bar{x})) \frac{Y_j}{Y} \quad (5)$$

The decomposition of the index identifies two different sources of labour productivity differentials across regions: *within-sector* inequality describes the inequality originating from the different productivity levels in different regions of the same sector, whereas *between-sector* inequality describes the inequality originated by sectors, with different overall productivity affecting the

regions to a different extent (basically this is inequality arising from structural change). The next section shows the empirical results and proposes a theoretical framework in which to interpret them.

## IV

In this section, we present the empirical results. We start with some general comments on the long-run trends in GDP per capita; we then move to analysing in further detail the forces driving pre-industrial regional inequality in the period 1750–1850.

In [figure 2](#) we present the long-run coefficients of variation obtained by connecting our new pre-industrial GDP series to the existing figures from 1860 onwards. As the figure shows, regional inequality was low in 1571 but increased substantially by 1750. It remained high for about 100 years until the onset of industrialization, when it started to decline. Thus, we observe a long-run inverted U-shape of regional inequality, which is quite unlike the famous inverted U-shape hypothesis defined by Williamson.<sup>40</sup>

[Figure 2](#) suggests that regional inequality was already sizeable 100 years before the modern industrialization of Sweden. The coefficient of variation fluctuates around an average of 0.27, which is a relatively high level of regional inequality. Studies of Spain and Italy report similar levels of inequality for the late nineteenth century.<sup>41</sup> Thus, the counties of Sweden appear to have experienced relatively wide inequality. If we compare this with the evidence collected by Bengtsson et al. on interpersonal wealth inequality, we observe that although the levels of both kinds of inequality were high by today's standards 100 years before the industrial take-off, the dynamics differ.<sup>42</sup> Wealth inequality increased up to the early twentieth century, while regional inequality remained high until 1850 and then declined. It is interesting to see how both inequalities contradict the view that industrialization constitutes their prime driver, but nevertheless they evolved in very different ways. It should be recalled in studying this discrepancy that the existing empirical evidence for Sweden in the period 1750–1850 is based on wealth, which does not necessarily follow the same dynamics of GDP per capita.

[Table 1](#) reports the GDP per capita estimates for all years from [Enflo and Missiaia](#), indexed to the national average (Sweden = 100), plus the estimates for 2010 from Enflo et al., to provide a current benchmark.<sup>43</sup> The results are shown in the maps of [figure 3](#). We observe how compressed regional inequality was in 1571. The counties of the south and the mining district of central Sweden stand out as relatively rich, their best relative position (especially those in the parts that were then Danish). Stockholm was close to average in 1571 but emerged as the county with the uncontested highest regional GDP per capita (171 against a national average of 100) by 1750. An analysis of the first two centuries of our sample shows an important upswing in regional inequality in Sweden that took place long before industrialization. Nevertheless, the picture that emerges is of a relatively equal country in 1571, succeeded by a much more unequal one in 1750. Comparing the maps for 1571 and 1750, in the left-hand panels of [figure 3](#), two main issues stand out: the relative collapse of the southern and western counties (that is, the counties that were incorporated into Sweden in the seventeenth century) and the remarkable relative increase of Stockholm's GDP per capita. As the underlying sources differ between 1571 and 1750 a natural concern arises regarding the extent to which these large shifts could be spuriously produced by differences in the way GDP is constructed. It is therefore worthwhile to take some time to explain and corroborate these findings with alternative sources and narratives, first by focusing on the collapse of the former Danish regions and thereafter the relative rise of Stockholm.

In 1571, the Swedish borders were substantially different from the current ones. After the peace treaty of Roskilde in 1658, Sweden incorporated the counties of Malmöhus, Kristianstad, Blekinge, and Bohuslän from Denmark (which at the time was in a union with Norway).<sup>44</sup> After 1675, the new counties became a stable part of Sweden and a policy of 'Swedification' began to be implemented in the region. In 1658, the Swedish monarchy imposed a tax on all ships crossing the sound. In addition, export taxes and a prohibition on grain exports were imposed. Denmark was a more advanced economy in the seventeenth century and a vigorous trader across the Öresund; these counties went from integration in Denmark to a peripheral position in Sweden, their poorer new home. Previous research by Skansjö has documented the negative economic impact on the region in terms of the loss of market access when medieval trading routes across the Öresund were distorted after the annexation.<sup>45</sup> In addition, the recent work by Gary and Radu in collecting detailed wage records for Danish and Swedish regions confirms a significant drop in Scania wages after the annexation.<sup>46</sup>

The role of Stockholm in driving regional inequality over the long run is illustrated in [figure 4](#), where the position of the capital in relation to the national average over the period 1750–2010 can be seen. From 1750 on, the relative GDP per capita of Stockholm county was almost twice as large as the GDP of Sweden as a whole. Stockholm's formidable position was sustained

until the outset of industrialization around 1860, when it gradually lost out to other parts of the country as they took off into modern economic growth.

The growth of Stockholm is related more closely to its geographical suitability for trade than any natural conditions such as agricultural suitability or the availability of iron ore. Thus, Stockholm's GDP per capita in 1571 did not stand out from the rest of Sweden. Instead, other areas such as the mining district of Bergslagen (especially the counties Västmanland and Örebro) exhibited the highest GDP per capita of all the counties of old Sweden in 1571. The relative strength of the mining counties is evident in the historical outcries against the monarchy from medieval times to the sixteenth century (that is, Dala-upproren).

Institutional factors, especially Stockholm's protected position as the capital, main foreign trading port, and home to the lion's share of protected manufactories, may explain the pre-industrial upswing in regional inequality. In any event, by 1750 Stockholm had emerged as the richest part of the country. Unfortunately, our dataset does not allow for a detailed analysis of the dynamics in the centuries between 1571 and 1750, but historical accounts confirm the dramatic expansion, first and most evidently in the ten-fold increase of the population of the town itself between 1570 and 1750, from about 6,000 to 60,000 inhabitants. One of the few accounts that allows for a harmonized and continuous follow-up of Stockholm's expansion is the real wages of builders from Stockholm collected by Söderberg.<sup>47</sup> Like our findings, builders' wages show a dramatic increase from the onset of the seventeenth century to 1750. During this period, Stockholm became the home for a number of national institutions and a growing public bureaucracy. The trend in Stockholm is surprising given the troublesome national evolution, characterized by continuous wars and a stagnating agricultural sector in the rest of the country. However, as we show in our data, trends from Stockholm are likely to be different from the rest of the country. The rise of Stockholm was due to the high demand there for building and shipbuilding in the burgeoning capital of a centralized state such as the Swedish Empire (1611–1721). In addition, the gains from foreign trade were channelled through Stockholm by regulations such as the Botnian trade regulation. Ades and Glaeser in this context talk about urban primacy, meaning a dominant share of the nation's largest or capital city, and they relate the phenomenon to protectionist trade policies and non-democratic institutions in the world's developing nations today.<sup>48</sup> We find that pre-industrial Sweden fits remarkably well into this pattern.

From the more general picture of long-run regional inequality we have thus been able to distinguish three main periods: an upswing in regional inequality in 1571–1750; constant relatively high regional inequality in 1750–1850; and long-term convergence in 1850–2010. Thus, surprisingly, relative inequality was high some hundred years before the industrial take-off. The next section qualifies the above statement through a sectoral decomposition for the period 1750–1850 and proposes some hypotheses about the drivers of regional inequality.

It should, however, be noted that in spite of the prominent role of Stockholm in shaping post-1750 regional inequality, not all of the increase can be ascribed to the capital. The coefficient of variation when excluding the capital fluctuates around an average of 0.19, while in 1571 it stays around 0.15. The first step in identifying the determinants of this increase is to decompose regional inequality into *within* and *between* sectoral components.<sup>49</sup> [Table 2](#) shows the results.

The decomposition of the Theil index suggests that the between-sectors component accounts for most of Sweden's pattern of regional inequality throughout the period, explaining around 90 per cent of the total variation in all years.<sup>50</sup> The interpretation of this result is simple: although productivity differentials in the same sector existed across regions, the bulk of the inequality was represented by variations in the shares of the five sectors of the economy: economic activity was unevenly distributed regionally and structural change in the eighteenth century became a driving force for regional divergence. To confirm this, in [figure 5](#) we see the regional distribution of industrial workers mapped for 1750, 1800, and 1850.

Throughout the period, Stockholm stands out in its exceptionally large share of industrial workers. More than 60 per cent of Sweden's manufacturing workers in 1750 were located in Stockholm.<sup>51</sup> Some of these workers were part of the protected manufactories, where, thanks to regulations and subsidies, wages and value added per worker were clearly higher than in other sectors of the economy. However, apart from Stockholm's exceptional and somewhat artificially supported position, early industry shows substantial regional variation over time and space. In 1750, the industrial belt was concentrated around the mining district of Bergslagen, which appears as a C-shaped formation around Stockholm county in the left-hand panel of [figure 5](#). Over the period, the industrial district grew in geographical scope and extended further from the mines. The county of Värmland was deliberately given a prominent role in iron-making under the policies of the Crown. It is known that rising industrial production brought additional pressure on energy resources and vast forest reserves were needed to obtain the fuel for both the extraction and the production of pig and bar iron as well as metal goods.<sup>52</sup> In order to reserve the forests for mining and pig iron production to the

counties closest to the mines, the Crown, through the Bergskollegium, required that new production of bar iron should be located outside the administrative region of Bergslagen.<sup>53</sup> Western Värmland, still close enough to the mines and also richly endowed with fuel reserves, thus rapidly evolved into one of the major iron-making counties. Shortage of energy (that is, wood) in the traditional mining district provides the main explanation for the growth of the industrial district, showing how the location of early industry was limited by organic land constraints before coal could be substituted for wood as a source of energy.

However, early industry was not confined to the rural mining counties alone. Gradually it spread to the urbanized areas around Gothenburg, Malmö, and Uppsala. In 1850, the counties close to Stockholm and to the very south had industrialized more in terms of employment share than the former mining counties had. Towards the end of the eighteenth century, it can also be observed that Stockholm had started to stagnate. One of the reasons is that mercantilist policies were gradually being lifted. In 1765, the Botnian trade restriction was abolished and Stockholm's favoured position began to wane while other towns began to expand. One such town was the western port of Gothenburg, which gradually increased its population at the same time as its GDP per capita. Between 1750 and 1850, according to our calculations, the county of Gothenburg moved from a position of average GDP per capita to 50 per cent above the average. The stagnating trend of Stockholm in terms of population and industrial employment has been noted by Söderberg et al. Population dynamics show how a much smaller town such as Gothenburg grew more quickly throughout the period 1730–1850.<sup>54</sup> In the next section we provide an interpretative framework within the unified growth theory.

## V

How do we reconcile increasing regional inequality in the early modern period with stagnant GDP per capita? If we are to believe the central hypothesis of the Malthusian theory in its stronger form—that is, that technological improvements generate only temporary gains in income per capita before the take-off into modern economic growth—there should not be room for persistent pre-industrial inequality in regional GDP per capita.<sup>55</sup> Instead, any improvement in generating increased GDP per capita would soon result in a larger population which absorbed the improvements. The result has previously been shown to hold broadly for land productivity (a proxy for technological improvements in agriculture) and population density in several countries before 1500 (as shown by Ashraf and Galor).<sup>56</sup>

Contrary to expectation, our estimates show a persistent gap in GDP per capita between counties, arising well before the industrial take-off. We argue that two factors could have made this outcome possible. First, we claim that Sweden in 1571 cannot have been stretched to its Malthusian point of equilibrium. Since the increase in regional inequality that we observe between 1571 and 1750 translated into decreasing GDP per capita for the poorest counties over the centuries, we cannot assume that people were already living at subsistence level in 1571. However, there is ample evidence of a relatively satisfactory living standard even for the poorest in the sixteenth century, a finding corroborated by Heckscher's comments on the sufficient food supply.<sup>57</sup> It is possible that the population had still not recovered from the losses of the Black Death of the fourteenth century and the subsequent waves of plague. Gradually, however, population increased, causing the documented decline in living standards over the seventeenth century.<sup>58</sup> Our findings suggest that the burden of gradually declining living standards was unevenly distributed across space, with some counties falling behind while Stockholm was forging ahead.

To explain this different behaviour by the counties, we argue that the sectors play some part in the pattern. We have already shown, using the Theil index, that sectoral specialization explains much of the observed regional inequality, and that counties specializing in non-agricultural production managed to sustain higher GDP levels per capita than the rest of the country. The simple two-sector model proposed by Strulik and Weisdorf can help to make sense of the Swedish experience.<sup>59</sup> In a closed economy with two sectors (agriculture and industry), productivity growth in agriculture relative to industry makes food, and therefore children, relatively less expensive, raising human fertility and speeding up population growth. When all regions are agricultural, we have a Malthusian equilibrium over the long run, leaving no room for differences in per capita production. Some regions may, however, specialize in industry, even in pre-industrial times. This could be due to an early transition originating in sustained productivity increases in agriculture in combination with Engel's Law, which allows more workers to transfer out of agriculture than other sectors. This is the mechanism proposed by Strulik and Weisdorf to explain the industrial revolution in England. Relative specialization can also occur due to differences in natural resources, or mercantile restrictions and subventions that compel industries to move to certain locations. According to Strulik and Weisdorf's model, productivity improvements in industry increased the relative cost of children, with weaker fertility in response. In addition, in the case of Sweden the organic constraint on land may have further hampered population growth in industrial regions, since the increasing demands on forestry from the energy-



intensive metal-producing sectors competed with agriculture for land use. Local food shortages from a constrained agricultural sector, in combination with trade regulations and poor infrastructure, could therefore have further hampered population growth in the more industrialized regions. Eventually, the effects of learning by doing in both agriculture and industry, combined with Engel's Law directing less consumption to agricultural goods, shifted labour out of agriculture. The process of transferring labour out of agriculture may persist over hundreds of years, before ultimately translating into modern economic growth and demographic transition.

While Strulik and Weisdorf's model was originally developed to explain how England gradually shifted from Malthusian to modern growth, we adapt some of the key elements of the model to explain how regional inequality could be sustained for centuries within this greater transition. Our stylized model relies on the idea that autarky allowed for regional price differentials between regions and labour market regulations impeded any migration response to the higher living standards enjoyed by industrial regions. After some time, the mercantile system in place in Sweden amplified the differences.

Our stylized model predicts that regions with a higher share industry in value added will experience higher GDP per capita levels. In [figure 6](#) we show a positive correlation between the industrial share of GDP per capita and the share of GDP from industry for three benchmark years.

Moreover, we expect to see the presence of Malthusian forces in agriculture similar to those described by Ashraf and Galor.<sup>60</sup> [Figure 7](#) shows how population and land productivity in agriculture were positively correlated and how any improvements in pre-industrial agricultural productivity (proxied by land productivity) translated into a higher population density in the Swedish counties between 1571 and 1850. Over the entire period there is a strong positive correlation between the two variables.

Finally, our stylized model claims that dynamics with respect to fertility should differ between regions where different rates of specialization in agriculture and industry can be shown. In [figure 8](#), we contrast the births per 1,000 inhabitants with the agricultural and industrial shares of GDP. While the expected correlation (from a Malthusian point of view) between births and specialization in agriculture is evident in panel A of [figure 8](#), we are unable to detect any pattern in panel B where counties specializing in industry are listed.<sup>61</sup>

While agricultural specialization correlates with higher fertility, suggesting a long-run equilibrium around the Malthusian limit, there is no correlation with fertility in the more industrial counties. Industrial counties appear to have enjoyed a higher level of GDP per capita, due to a weaker response from fertility to productivity improvements. Our results are in line with the literature emphasizing the link between structural change and the fertility transition, recently tested empirically by Ager and Herz.<sup>62</sup> We find less support for the 'horsemen effect' of increasing death rates to explain income growth in a Malthusian model, suggested by [Voigtländer and Voth](#), since the county with the highest GDP per capita and urbanization rate, namely Stockholm, exhibits modest death rates throughout the period.<sup>63</sup> Thus, while previous research on income inequality in Malthusian economies has emphasized that population dynamics explain the largest part of steady state incomes in a pre-industrial framework, we suggest looking into the role of sectoral specialization and early productivity growth in industry.

Finally, in order to test the relative importance of birth and death rates compared to sectoral specialization in determining GDP per capita, we run a simple regression. The estimating equation is the following:

$$\log(GDP\ per\ capita)_{it} = \alpha + \beta_1 * Ind\ share_{it} + \beta_2 * Birthrate_{it} + \beta_3 * Deathrate_{it} + e_{it} \quad (6)$$

where  $i$  refers to the counties and  $t$  to 10-year intervals between 1750 and 1850. The results of the regressions are displayed in [table 3](#). Column 1 refers to pooled ordinary least squares (OLS), and columns 2 and 3 to panel models with random and fixed effects, respectively. All specifications confirm our earlier results: fertility is negatively correlated with GDP per capita, while mortality shows a positive correlation. In addition, the effect on the industrial share is positive and significant, suggesting that sectoral specialization adds explanatory power to the standard Malthusian factors.

## VI

This article provides the first long-run picture of regional inequality for a European country stretching over three centuries. Our results show that regional inequality in 1571 was relatively contained but that it roughly doubled in the two centuries that

followed. This means that regional inequality was already wide and persistent a hundred years before Sweden's take-off into modern economic growth. Although eighteenth-century Sweden was predominantly agricultural, wide differences in GDP per capita can be noted across its counties. Moreover, there was substantial dynamism in the industrial sector long before the modern industrial take-off. Industry was at this point concentrated in the mining district and the protected manufactories. As industry generated a substantial share of national value added, its concentration drove regional inequality. Another element that explains the high level of pre-industrial inequality is that the capital city of Stockholm was highly favoured by the mercantilist policies pursued by the Crown, leading to a high concentration of services and industry in the capital. Between 1750 and 1850, as some of the mercantilist restrictions were gradually relaxed, the county of Stockholm stagnated.

The decomposition of inequality into its within and between components suggests that structural change was the main driver of the overall inequality, which declined in the mid-nineteenth century when counties other than Stockholm started to industrialize. In spite of the wage differentials observed in agriculture and industry, the role of the within component was quite limited. This result can be explained by looking at the Malthusian mechanisms in both agriculture and industry. We find that, in regions with a higher share of GDP in agriculture, technological advancements led to higher productivity improvements and also led to a proportional increase in population, impeding the growth in GDP per capita. However, the same was not true for the counties with a higher share of GDP in industry. Here, instead, population growth was limited due to the increasing relative cost of children, leading to a higher level of GDP per capita. This difference in the power of the Malthusian mechanism in the two sectors, further amplified by the particular institutional arrangements imposed by the Crown, explains the upswing in regional inequality.

Our findings on the pre-industrial period, along with the previous results on the decline of inequality during industrialization by Enflo et al. and [Enflo and Rosés](#), provide a very distinctive picture of Sweden that contrasts with the classic view of regional inequality dynamics.<sup>64</sup> Moreover, we believe that pre-industrial Sweden can be considered representative of a centralized European state that experienced prolonged warfare. Our results therefore speak to other possible cases of pre-industrial economies characterized by high levels of regional inequality.

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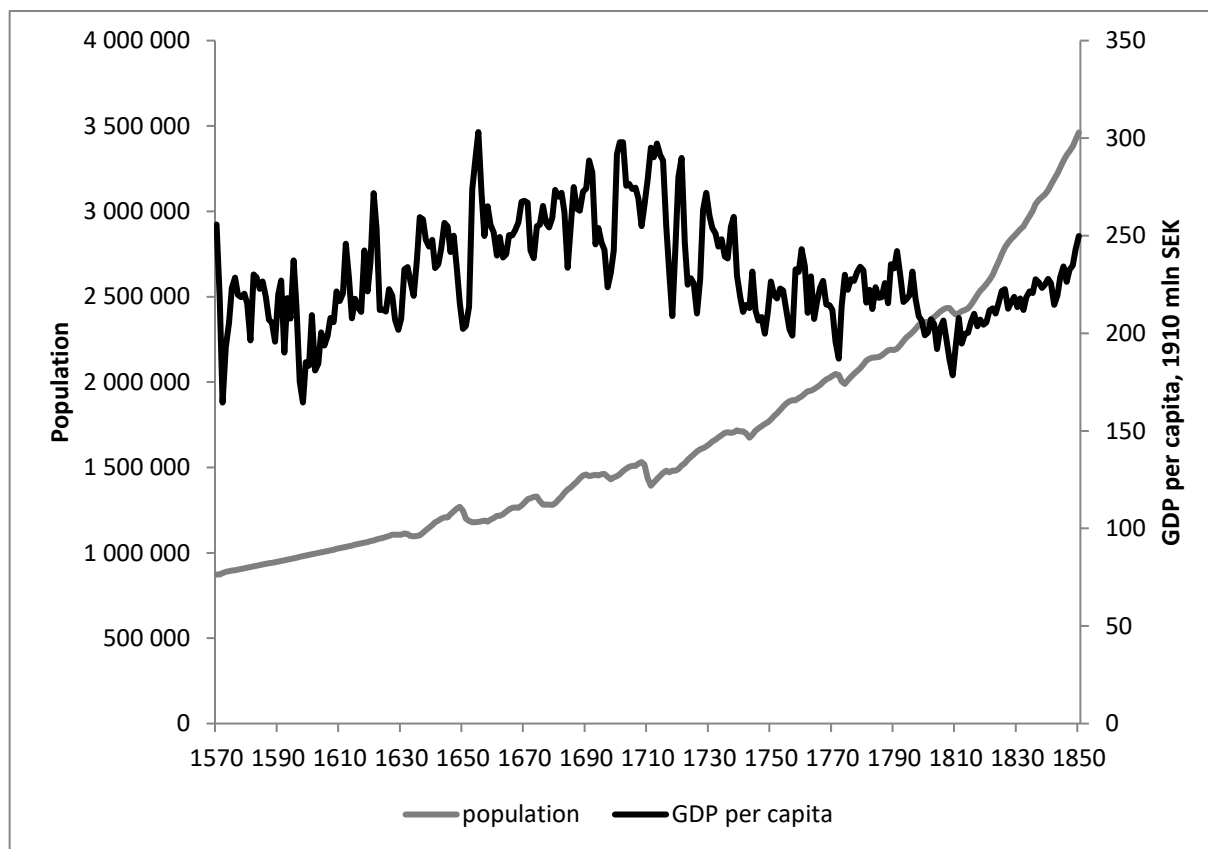
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Figure 1. GDP per capita and population in Sweden, 1570–1850

Source: Schön and Krantz, 'New Swedish historical national accounts'.

Figure 1. *GDP per capita and population in Sweden, 1570-1850.*

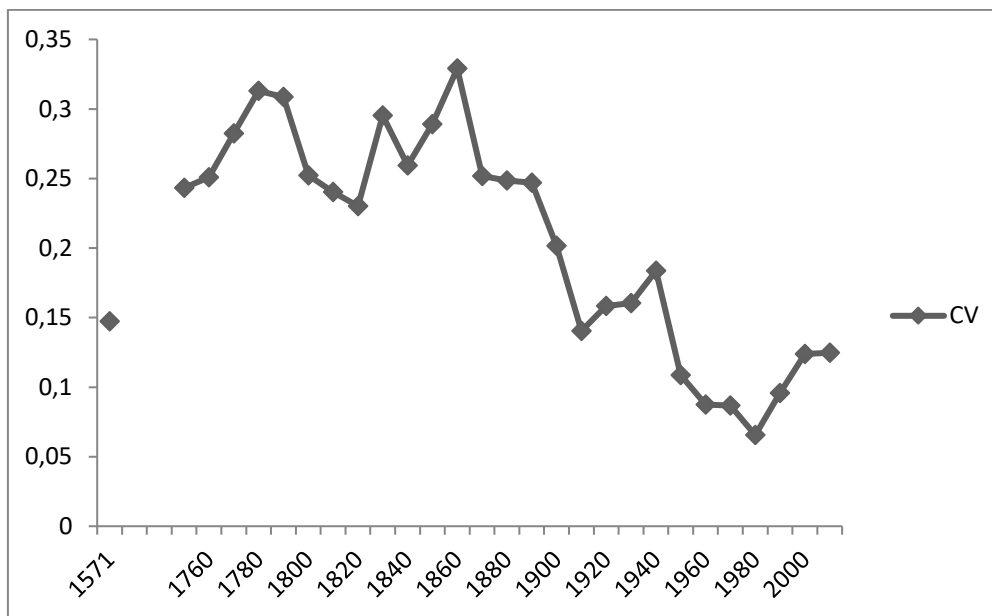


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Figure 2. Coefficient of variation of GDP per capita across Swedish counties, 1571–2010

Sources: 1571–1850: Enflo and Missiaia, 'Regional GDP estimates'. 1860–2010: Enflo et al., 'Swedish regional GDP 1855–2000'; Rosés and Wolf, eds., *Economic development*.

Figure 2. Coefficient of variation of GDP per capita across Swedish counties, 1571-2010.

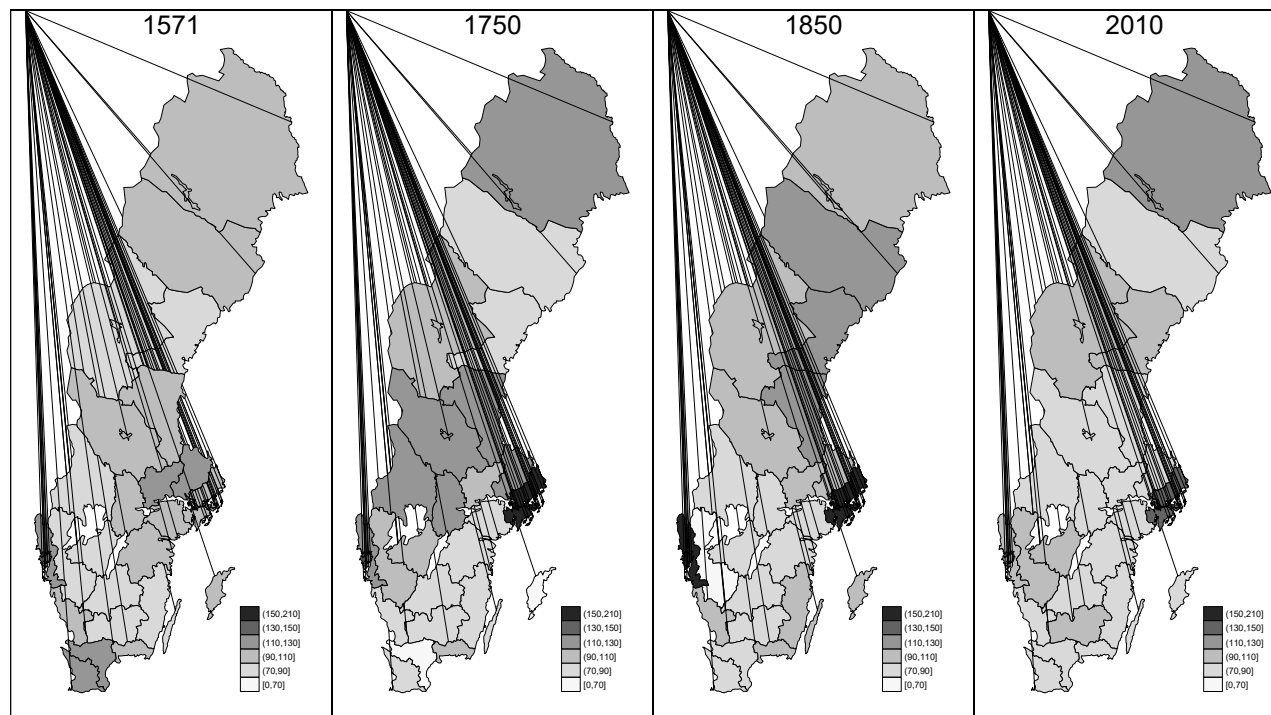


Sources: 1571-1850: Enflo and Missiaia, 'Regional GDP estimates for Sweden, 1571-1850'; 1860-2010: Enflo et al., 'Swedish regional GDP 1855-2000 and Rosés and Wolf, 'The Economic Development of Europe's Regions'.

Figure 3. The relative evolution of GDP per capita, 1571–2010 (Sweden = 100)

Sources: 1571–1850: Enflo and Missiaia, ‘Regional GDP estimates’. 2010: Rosés and Wolf, eds., *Economic development*.

Figure 3. *The relative evolution of GDP per capita, 1571-2010 (Sweden=100).*

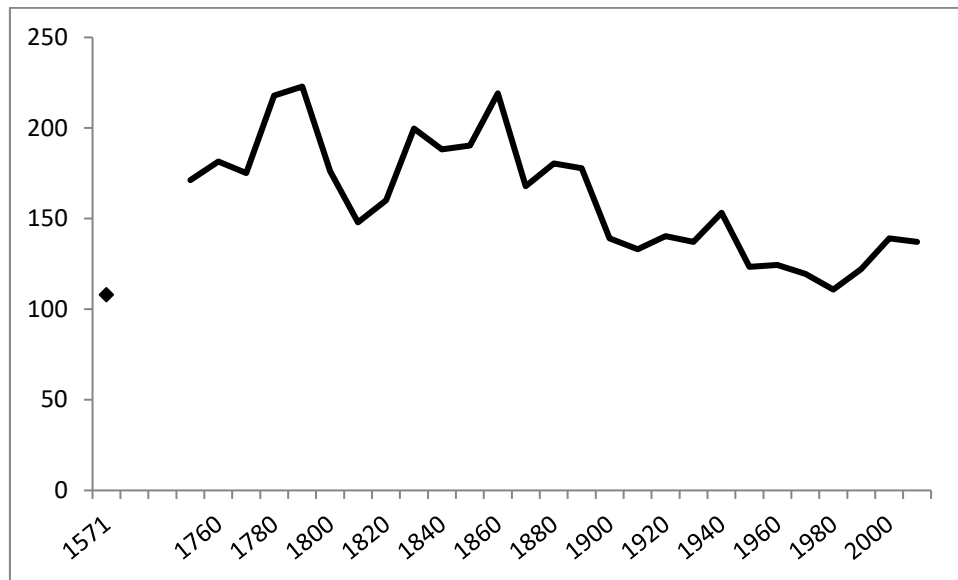


Sources: 1571-1850: Enflo and Missiaia, ‘Regional GDP estimates for Sweden, 1571-1850’; 2010: Rosés and Wolf, ‘The Economic Development of Europe’s Regions’.



Figure 4. Stockholm's GDP per capita in relation to the Swedish average, 1571–2010 (Sweden = 100)  
Sources: 1571–1850: Enflo and. Missiaia, 'Regional GDP estimates'. 1860–2010: Enflo et al., 'Swedish regional GDP 1855–2000'; Rosés and Wolf, eds., *Economic development*.

Figure 4. *Stockholm's GDP per capita in relation to the Swedish average, 1571-2010 (Sweden=100).*

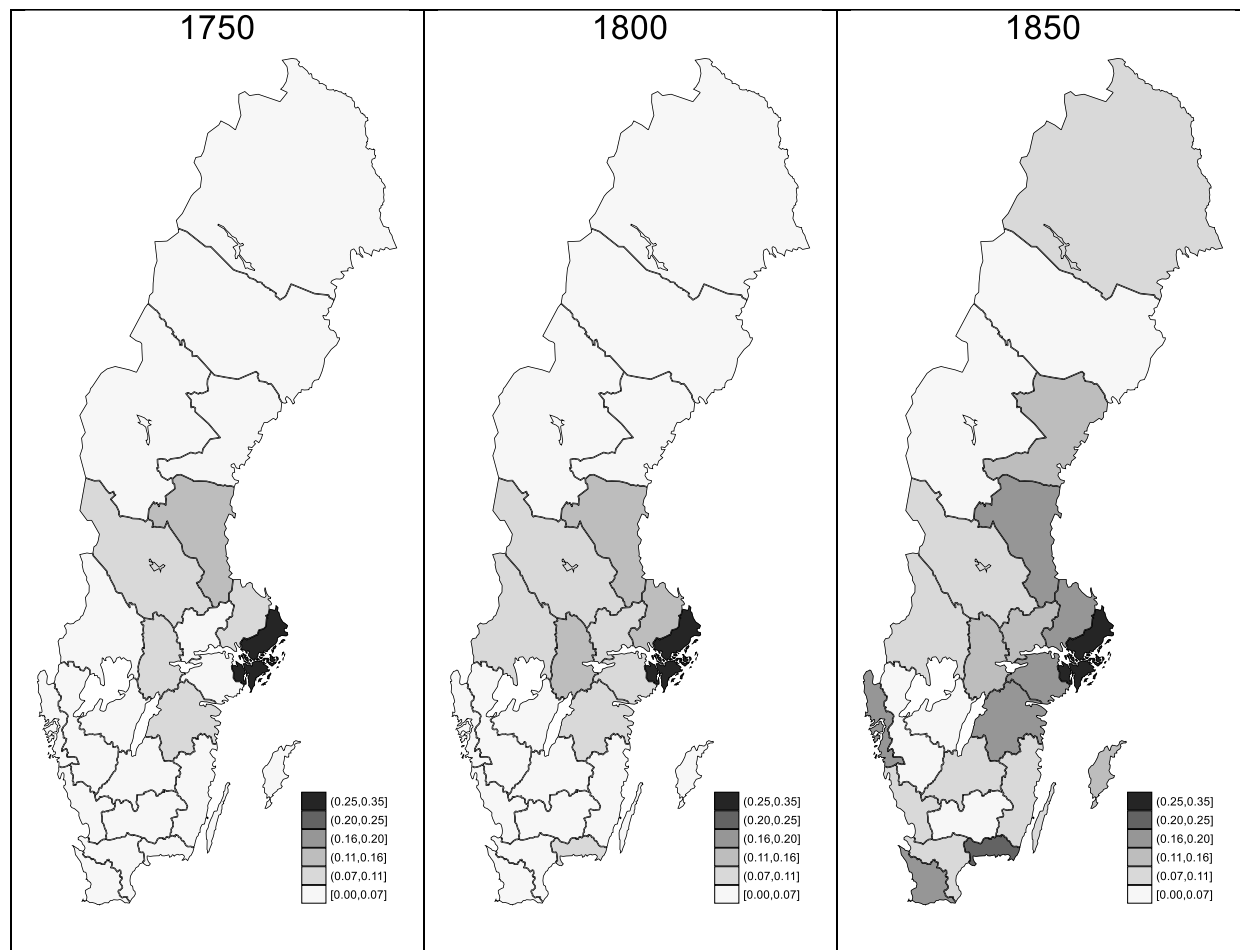


Sources: 1571-1850: Enflo and. Missiaia, 'Regional GDP estimates for Sweden, 1571-1850'; 1860-2010: Enflo et al, 'Swedish regional GDP 1855-2000 and Rosés and Wolf, 'The Economic Development of Europe's Regions'.

Figure 5. Share of industrial workers in the Swedish counties, 1750–1850

Sources: Enflo and Missiaia, 'Regional GDP estimates'.

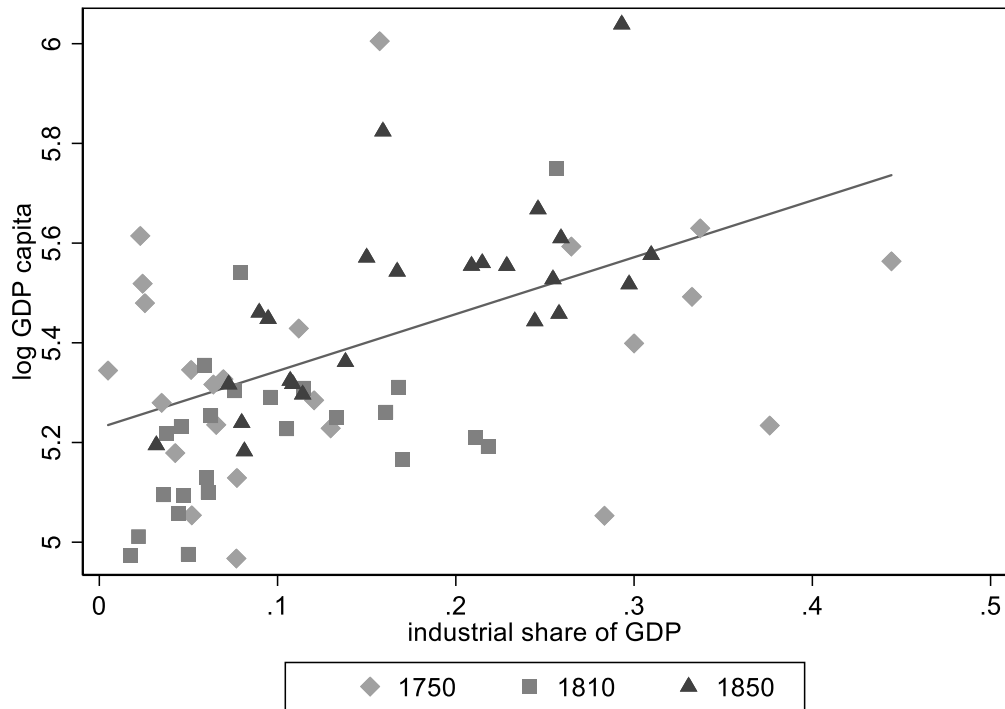
Figure 5. Share of industrial workers in the Swedish counties, 1750-1850.



Sources: Enflo and. Missiaia, 'Regional GDP estimates for Sweden, 1571-1850'.

Figure 6. The logarithm of GDP per capita and the industrial share of value added, 1750–1850  
Sources: 1571–1850: Enflo and Missiaia, ‘Regional GDP estimates’, for value added and population.

Figure 6. *The logarithm of GDP per capita and the industrial share of VA, 1750-1850.*

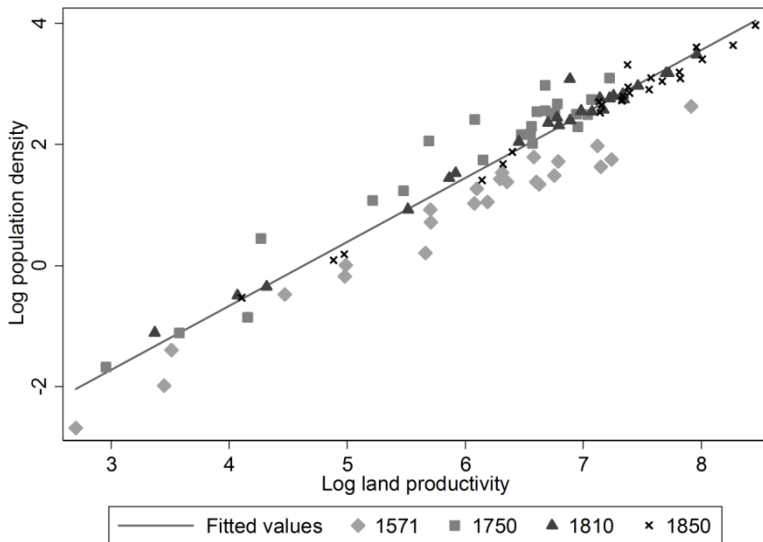


Sources: 1571-1850: Enflo and. Missiaia, ‘Regional GDP estimates for Sweden, 1571-1850’ for value added and population.

Figure 7. The logarithm of value added in agriculture divided by land area (land productivity) and the logarithm of population density, 1571–1850

Sources: 1571–1850: Enflo and Missiaia, 'Regional GDP estimates', for value added and population. Land productivity for a given county is the GDP from agriculture divided by the land area (excluding lakes) from Statistics Sweden, [http://www.statistikdatabasen.scb.se/pxweb/en/ssd/START\\_\\_MI\\_\\_MI0802/Areal2012/](http://www.statistikdatabasen.scb.se/pxweb/en/ssd/START__MI__MI0802/Areal2012/)

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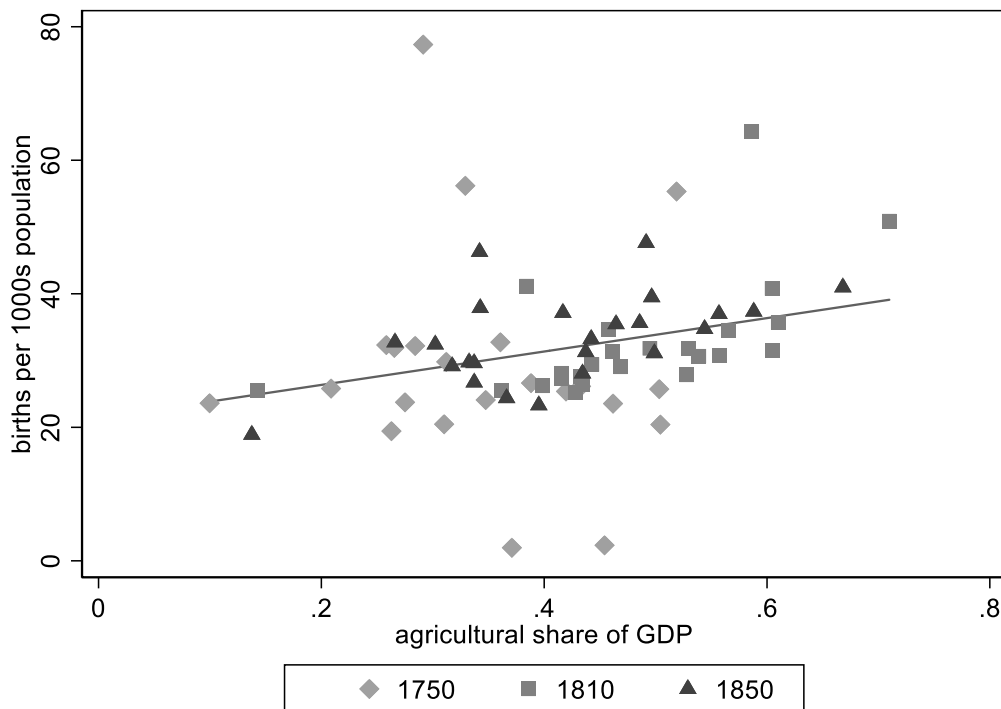
Sources: 1571-1850: Enflo and Missiaia, 'Regional GDP estimates for Sweden, 1571-1850' for value added and population. Land productivity for a given county is the GDP from agriculture divided by the land area (excluding lakes) from Statistics Sweden.

Figure 8. Specialization and births in agriculture (panel A) and industry (panel B) in the Swedish counties, 1750–1850

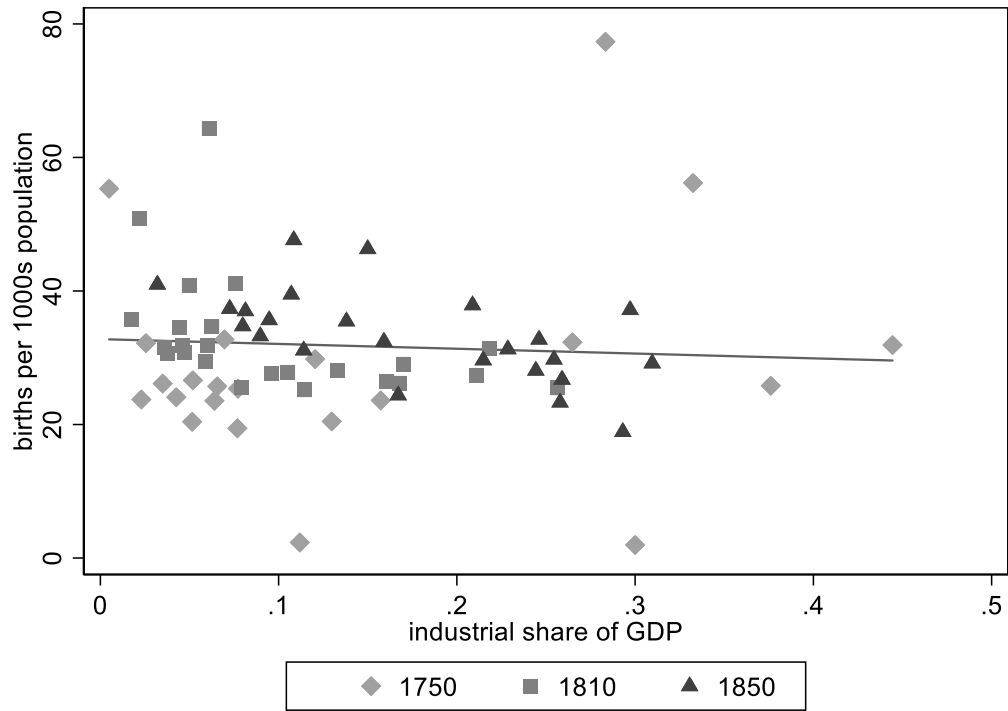
Sources: Our elaborations on Enflo and Missiaia, ‘Regional GDP estimates’, for value added and population. Birth and death rates from Centre for Demographic and Ageing Research (CEDAR), Umeå University, Demographic Data Base, <https://www.umu.se/en/centre-for-demographic-andageing-research/databases/tabverk/>

Figure 8. *Specialization and births in agriculture (panel A) industry (panel B) in the Swedish counties, 1750-1850.*

*Panel A*



*Panel B*



*Sources:* our elaborations on Enflo and Missiaia, 'Regional GDP estimates for Sweden, 1571-1850' for value added and population. Birth and death rates from CEDAR Umeå Demographic database.

Table 1. GDP per capita in the Swedish counties, 1571–2010 (Sweden = 100)

	1571	1750	1760	1769	1780	1790	1800	1810	1820	1830	1840	1850	2010
Stockholms <i>län</i>	108	171	182	175	218	223	176	148	160	200	188	190	137
Uppsala <i>län</i>	112	121	112	151	112	111	119	112	123	119	117	105	86
Södermanlands <i>län</i>	96	70	75	67	93	98	90	81	88	83	93	87	80
Östergötlands <i>län</i>	99	81	83	99	83	99	98	90	89	91	94	87	84
Jönköpings <i>län</i>	90	74	78	71	72	80	76	84	85	81	79	81	87
Kronobergs <i>län</i>	86	81	69	78	70	71	66	82	78	70	76	72	93
Kalmar <i>län</i>	79	90	90	77	96	94	95	106	97	97	95	95	85
Gotlands <i>län</i>	98	64	65	89	77	87	91	80	96	91	93	91	77
Blekinge <i>län</i>	98	103	115	101	109	121	103	162	128	111	109	110	82
Kristianstads <i>län</i>	111	58	62	61	61	63	57	77	86	71	73	77	85
Malmöhus <i>län</i>	118	76	79	64	69	81	107	86	79	79	84	89	88
Hallands <i>län</i>	106	85	82	89	89	86	82	95	80	93	97	94	88
Göteborg/bohus <i>län</i>	130	120	119	119	139	125	148	146	141	160	149	170	96
Älvsborgs <i>län</i>	78	92	88	73	77	76	81	92	77	67	65	67	96
Skaraborgs <i>län</i>	74	93	93	106	82	81	74	84	72	79	79	77	96
Värmlands <i>län</i>	77	118	104	84	92	85	86	75	86	92	94	88	81
Örebro <i>län</i>	106	127	111	114	96	90	97	77	85	98	96	86	88
Västmanlands <i>län</i>	116	94	109	113	106	105	116	108	103	109	109	101	87
Kopparbergs <i>län</i>	99	119	101	122	92	88	98	94	116	111	110	105	88
Gävleborgs <i>län</i>	110	116	125	117	117	112	114	111	121	121	118	121	87
Västernorrlands <i>län</i>	90	75	89	105	93	89	109	117	110	112	113	125	96
Jämtlands <i>län</i>	76	96	93	103	98	95	106	113	109	101	96	90	98
Västerbottens <i>län</i>	106	88	84	94	93	88	99	105	98	91	110	124	89

Norrbottnens län	102	111	101	110	104	96	103	110	107	99	97	102	114
Sweden	100	100	100	100	100	100	100	100	100	100	100	100	100

Sources: 1571–1850: Enflo and Missiaia, ‘Regional GDP estimates’. 2010: Rosés and Wolf, eds., *Economic development*.

**Table 2. Theil inequality index of GDP per worker in the Swedish counties, 1750–1850**

	1750	1760	1770	1780	1790	1800	1810	1820	1830	1840	1850
Within	0.025	0.016	0.024	0.009	0.006	0.008	0.012	0.011	0.013	0.012	0.014
Between	0.240	0.252	0.168	0.188	0.221	0.098	0.067	0.092	0.095	0.089	0.086
Overall	0.265	0.269	0.192	0.197	0.227	0.106	0.078	0.103	0.109	0.101	0.101
Within %	9	6	12	5	3	8	15	10	12	12	14
Between %	91	94	88	95	97	92	85	90	88	88	86
	100	100	100	100	100	100	100	100	100	100	100

Sources: Enflo and Missiaia, ‘Regional GDP estimates’, using five sectors: agriculture, manufacturing, mining, private services, and public services.

**Table 3. The determinants of regional GDP per capita, 1750–1850**

	(1)	(2)	(3)
Variables	Pooled OLS	Panel random effects	Panel fixed effects
Industrial share	0.917 <sup>***</sup> (0.135)	0.600 <sup>***</sup> (0.165)	0.453 <sup>**</sup> (0.184)
Birth rate	-0.011 <sup>***</sup> (0.002)	-0.004 <sup>***</sup> (0.001)	-0.004 <sup>***</sup> (0.001)
Death rate	0.013 <sup>***</sup> (0.003)	0.005 <sup>***</sup> (0.002)	0.004 <sup>***</sup> (0.002)
Constant	5.253 <sup>***</sup> (0.055)	5.270 <sup>***</sup> (0.047)	5.288 <sup>***</sup> (0.038)
Observations	236	236	236
R <sup>2</sup>	0.374	0.459	0.461
Year fixed effects	YES	YES	YES
County fixed effects	NO	NO	YES
No. of counties	24	24	24

Notes: Standard errors in parentheses. \*\*\*p<0.01; \*\*p<0.05, \*p<0.1.



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- <sup>1</sup> [Williamson](#), ‘Regional inequality’
- <sup>2</sup> Enflo, Henning, and Schön, ‘Swedish regional GDP 1855–2000’; [Felice](#), ‘Roots’; Rosés, Martínez-Galarraga, and Tirado, ‘Upswing’.
- <sup>3</sup> Enflo et al., ‘Swedish regional GDP 1855–2000’. The second-longest regional GDP series, starting in 1819, have been estimated for Belgium by [Buyst](#), in ‘Causes of growth’.
- <sup>4</sup> Strulik and Weisdorf, ‘Population, food and knowledge’.
- <sup>5</sup> [Utterström](#), *Jordbrukets arbetare*; Olsson and Svensson, ‘Agricultural growth’; [Gadd](#), ‘Agricultural revolution’; [Berger](#), ‘Adopting a new technology’
- <sup>6</sup> [Williamson](#), ‘Regional inequality’.
- <sup>7</sup> [Enflo et al.](#), ‘Swedish regional GDP 1855–2000’
- <sup>8</sup> [Felice](#), ‘Roots’; [Rosés et al.](#), ‘Upswing’.
- <sup>9</sup> [Rosés and Wolf](#), eds., *Economic development*
- <sup>10</sup> [Fouquet and Broadberry](#), ‘Seven centuries’; [Shaw-Taylor and Wrigley](#), ‘Occupational structure’; Wallis, Colson, and Chilosì, ‘Structural change’
- <sup>11</sup> [Keibek](#), ‘Male occupational structure’
- <sup>12</sup> [Heckscher](#), *Economic history of Sweden*; [Krantz](#), ‘Estimate’
- <sup>13</sup> Enflo and Missiaia, ‘Regional GDP estimates’
- <sup>14</sup> [Palma and Reis](#), ‘From convergence to divergence’, looks at the case of Portugal
- <sup>15</sup> [Cerneño and Enflo](#), ‘Can kings create towns that thrive?’
- <sup>16</sup> [Andersson-Palm](#), ‘Sweden’s 17th century’
- <sup>17</sup> [Berger](#), ‘Adopting a new technology’.
- <sup>18</sup> Isacson and Magnusson, *Proto-industrialization*, p. 33.
- <sup>19</sup> Enflo and Missiaia, ‘Regional GDP estimates’.
- <sup>20</sup> [Olsson-Spjut](#), ‘Järnhanteringsens dynamik’
- <sup>21</sup> [Schön](#), *Sweden’s road to modernity*, p. 82.
- <sup>22</sup> Local bailiffs conducted the collection of the Älvsborgs ransom, from which we construct our 1571 benchmark; we then use the church registers reporting the population in the Tabellverket data for the 1750–1850 benchmarks.
- <sup>23</sup> [Heckscher](#), *Economic history of Sweden*, p. 112.
- <sup>24</sup> *Ibid.*, p. 184.
- <sup>25</sup> Prado, Collin, Enflo, and Lundh, ‘Regional wage convergence’.
- <sup>26</sup> *Ibid.*
- <sup>27</sup> Enflo et al., ‘Swedish regional GDP’
- <sup>28</sup> [Enflo and Rosés](#), ‘Coping with regional inequality’.
- <sup>29</sup> Schön and [Krantz](#), ‘Swedish economy’. There are alternative GDP series from 1620–1800 supplied by [Edvinsson](#), ‘New annual estimates’. We have however chosen to work with the SHNA series by Schön and Krantz since they are the only ones to offer sectoral data from 1560 onwards. The Edvinsson series do not provide the same breakdown into sectors on an annual basis.

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Moreover, the latter series start in 1620, which does not allow us to construct our 1571 benchmark starting from the same national series of 1750–1850. It should however be noted that our regional labour force shares and wages can be applied to any national series

<sup>30</sup> [Geary and Stark](#), ‘Examining’

<sup>31</sup> Ibid.; [Enflo et al.](#), ‘Swedish regional GDP 1855–2000’

<sup>32</sup> Enflo and Missiaia, ‘Regional GDP estimates’.

<sup>33</sup> [Forsell](#), *Sverige 1571*.

<sup>34</sup> Ibid. Additional sources have been used in the estimation to refine the estimates as well as to add the seven current Swedish counties that at the time belonged to Denmark. Detailed information regarding sources and estimation methods can be found in the article by Enflo and Missiaia. The estimates are reported for consistent geographical borders corresponding to the EU NUTS-3 level, or similarly the Swedish counties (*län*). The database refers to the counties of Sweden using their current borders, so in our early 1571 benchmark we add the seven incorporated counties of south and west Sweden that were ceded in 1658 from Denmark-Norway. Despite the addition of new counties in the mid-seventeenth century, Sweden has kept a stable geographical division of counties over the centuries, making this part of the GDP calculation relatively straightforward.

<sup>35</sup> [Edvinsson](#), ‘New annual estimates’; [Schön and Krantz](#), ‘New Swedish historical national accounts’

<sup>36</sup> A more detailed discussion on this is included in Enflo and Missiaia, ‘Regional GDP estimates’

<sup>37</sup> [Schön and Krantz](#), ‘New Swedish historical national accounts’

<sup>38</sup> We are aware that the production boundary might well be defined in a very different way than that used by [Schön and Krantz](#), ‘New Swedish historical national accounts’, where the non-marketed part of production is not included. An alternative is represented by [Edvinsson](#), ‘New annual estimates’; idem, ‘Swedish GDP 1620–1800’. However, the historical national account series for Sweden provide a sectorial disaggregation that is unique and allows us to apply the widely used Geary-Stark method with the highest level of precision. For a more detailed discussion, see Enflo and Missiaia, ‘Regional GDP estimates’; [Enflo et al.](#), ‘Swedish regional GDP 1855–2000’

<sup>39</sup> Martínez-Galarraga, Rosés, and Tirado, ‘Long-term patterns’

<sup>40</sup> [Williamson](#), ‘Regional inequality’.

<sup>41</sup> [Rosés et al.](#), ‘Upswing’; [Felice](#), ‘Roots’.

<sup>42</sup> Bengtsson, Missiaia, Olsson, and Svensson, ‘Wealth inequality in Sweden’

<sup>43</sup> Enflo and Missiaia, ‘Regional GDP estimates’; [Enflo et al.](#), ‘Swedish regional GDP 1855–2000’<sup>}}</sup>

<sup>44</sup> The counties of Halland, Jämtland, and Gotland had already been incorporated in 1645 but continued to shift between Sweden and Denmark for some decades.

<sup>45</sup> [Skansjö](#), *Skånes historia*

<sup>46</sup> [Gary and Radu](#), ‘Impact’

<sup>47</sup> [Söderberg](#), ‘Long-term trends’

<sup>48</sup> [Ades and Glaeser](#), ‘Trade and circuses’.

<sup>49</sup> Unfortunately, we are unable to include the year 1571 since evidence on employment per sector/county for this year does not exist.

<sup>50</sup> Here we present the Theil index with mining and manufacturing as separate. We have also repeated the exercise with industry as one unique sector, as in [Martínez-Galarraga et al.](#), ‘Long-term patterns’. The within component roughly doubles in share in the first three benchmarks, while it stays around the same share in the later benchmarks. This suggests that in the first decades of our sample, mining was far more productive than manufacturing. Since the Swedish mining sector continued to decline in the second

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half of the eighteenth century and the manufacturing sector started up in new counties (that is, on the west coast), regional inequality decreased.

<sup>51</sup> Söderberg, Johansson, and Persson, ‘Stagnating metropolis’, [tab. 1](#).

<sup>52</sup> Kander, Malanima, and Warde, *Power to the people*, p. 84.

<sup>53</sup> [Heckscher](#), *Economic history of Sweden*, p. 96.

<sup>54</sup> [Söderberg et al.](#), ‘Stagnating metropolis’. It should be noted that although the population stagnated in Stockholm, Söderberg et al. claim that productivity may not have fallen to the same extent as employment.

<sup>55</sup> The weaker version of the Malthusian model, as outlined in n. 3, focuses on the existence of an equilibrating mechanism, rather than outcomes; see [Mokyr and Voth](#), ‘Understanding growth’, for a discussion.

<sup>56</sup> [Ashraf and Galor](#), ‘Dynamics and stagnation’.

<sup>57</sup> [Heckscher](#), *Economic history of Sweden*, p. 70.

<sup>58</sup> [Myrdal and Morell](#), *Agrarian history of Sweden*

<sup>59</sup> [Strulik and Weisdorf](#), ‘Population, food and knowledge’

<sup>60</sup> [Ashraf and Galor](#), ‘Dynamics and stagnation’.

<sup>61</sup> The patterns are similar for death rates. We omit the graphs for reasons of space.

<sup>62</sup> Ager and Herz, ‘Structural change’.

<sup>63</sup> [Voigtländer and Voth](#), ‘Three horsemen of riches’

<sup>64</sup> [Enflo et al.](#), ‘Swedish regional GDP 1855–2000’; [Enflo and Rosés](#), ‘Coping with regional inequality’.