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Unveiling the Cyclical Patterns of Historical Wage Inequality among European Building Laborers

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Abstract. This scholarly investigation examines the historical wage disparities between skilled and unskilled building laborers, as well as gender-based disparities among unskilled male and female workers in major European metropolises including Vienna, Warsaw, Krakow, and Istanbul. While exploring inequality, the study reveals that significant events such as wars, pandemics, and economic fluctuations have a cyclical impact on wage and gender inequality throughout history. However, it should be noted that gender inequality was only examined in the UK. By delving into the dynamics of wage and gender inequality during the medieval and early modern eras of Europe, this study provides a deeper understanding of the complexities of these social issues.
Keywords: Wage Inequality; Gender Inequality; Building Laborers; Europe.

1. Introduction

Throughout human history, inequality has been a pervasive and persistent theme in social and economic life. As Smith, Kohler, and Feinman (2018) note, economic and social classes have existed for tens of thousands of millennia. Inequality has been shaped by significant historical events, such as the fall of the Roman Empire, the Black Death, the debt crisis, and the September eleventh attacks (Galbraith, 2011, p. 15), which have had a profound impact on social and economic structures. Despite efforts to address inequality, it remains a defining feature of human societies, highlighting the need for continued research and policy interventions to address this pervasive issue.

Indeed, inequality has been a prevalent issue throughout human history, dating back to the earliest societies. From the Stone Age to modern times, archaeologists have found evidence of social stratification through differences in the quality of housing, burial sites, and

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possessions. These material markers provide insight into the wealth and status of individuals and groups in ancient communities (Price & Bar-Yosef, 2012). Despite the passage of time, inequality remains a persistent problem in modern society, with significant disparities in income, education, and access to healthcare and other resources. Addressing these inequalities remains a critical challenge for governments and societies around the world.

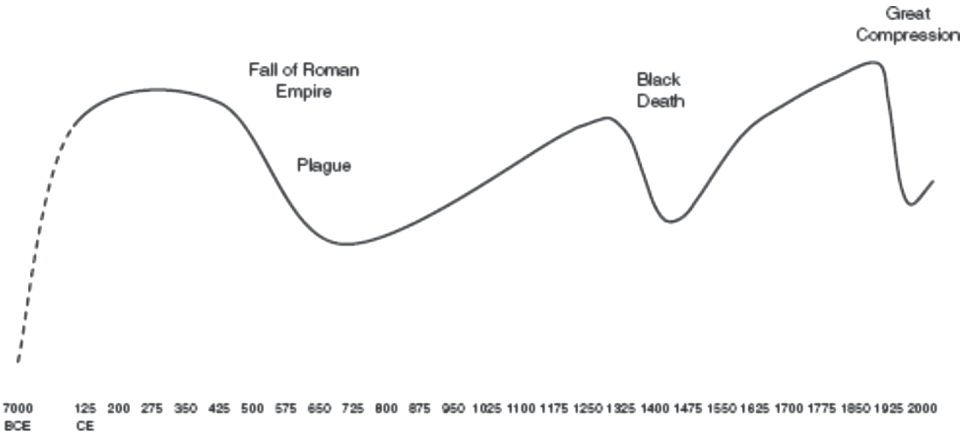

Figure 1. Inequality trends in Europe in the long run
Source: (Scheidel, 2017)

According to Kohler and Ellyson (2018), in the classical periods (800–300 BCE), the Greek city-states were economically more prosperous and less unequal than the Roman empire. However, in the Roman empire, inequality was twice as high as in other horticultural societies. Scheidel (2017) notes that with the fall of the Roman empire, inequality in Europe decreased significantly. Additionally, Roland (2021) suggests that catastrophes, such as wars, outbreaks, revolutions, and state downfall, have historically led to a reduction in inequality.

According to Scheidel (2017), the European economy had already recovered from the fall of the Roman empire, and the first plague before the Black Death reached Europe. In fact, the economy was more advanced, and inequality was higher than during the Roman era. However, the arrival of the Black Death caused widespread devastation in Europe, leading to the collapse of the economy and the disappearance of half of the population. The disease killed a significant portion of the labor force, resulting in a sudden increase in wages in Europe (Pamuk, 2007).

Allen (2001) explains that after the Black Death, the European population declined significantly and took a long time to recover. As the population grew and land transfer laws changed, wages across Europe began to decline, except in northwestern Europe where wages remained relatively constant. This trend continued for about three centuries until the industrial revolution, after which wage scales changed drastically. The industrialized part of Europe offered higher salaries and better living standards compared to the rest of the continent.

During the 16th century, the impact of the plague subsided in Europe, leading to an economic upturn. However, this recovery also led to a significant rise in inequality. According to Christian (2004), various regulations such as taxation, debt, and land ownership were altered to benefit the wealthy aristocrats, intensifying inequality in European society (p. 477). Moreover, northwestern European cities like Amsterdam, London, and Antwerp progressed more rapidly than other European cities like Istanbul, becoming the wealthiest cities in Europe.

During the Ottoman Empire, the majority of the population consisted of peasants and building workers, and the empire was primarily agricultural. The empire had a well-established bureaucratic system and was one of the largest and most populated countries in Europe (Özmucur & Pamuk, 2002; Quataert, 2001; Özel, 2004). Real wages, measured in silver, increased after the Black Death, similar to Europe. The real wages in the Ottoman Empire were comparable to many European cities except for northwestern Europe, where the wages were higher than in Istanbul during the sixteenth century (Özmucur & Pamuk, 2002, pp. 305, 316). Despite the increase in real wages, Istanbul experienced a 40 percent decline in real wages during the same period.

The Ottoman Empire recorded wage data exclusively for many years, from the 15th century to the 19th century. We know that between the 15th and 17th centuries, the Ottoman Empire flourished and distributed its income more reasonably than many other European states. However, after the 17th century, due to overpopulation, agricultural failure, elite society, social unrest, and high inflation, economic conditions deteriorated, which induced an increase in inequality. Inequality rose from 0.54 in the 1500s to 0.66 in the 1820s (Canbakal & Filiztekin, 2013).

The purchasing power of wages, which was primarily measured in silver, was highly volatile over time owing to factors such as plagues, wars, reduced state control over land, industrialization, and Europe's 17th-century little ice age crisis. Additionally, the economic growth of European nations varied, resulting in significant inequality. While cities in southern Europe, such as Florence and Venice, were wealthier than those in northwestern Europe, including Amsterdam, Antwerp, and London, the latter's societies thrived after the 17th century, leading to a rise in real wages for workers. This trend is evident in the increase in English workers' wages as reported by Humphries and Weisdorf (2015).

The purpose of this investigation is to explore the recurring pattern of wage and gender inequality over time, specifically in correlation to significant historical events such as pandemics, wars, and economic circumstances. Focusing on major European cities such as Vienna, Warsaw, and Krakow, this study analyzes the wage discrepancy between skilled and unskilled building laborers. Additionally, gender inequality is also studied between unskilled male and female laborers in England.

The crux of this inquiry is to gain a comprehensive understanding of the progression of wage and gender disparity among European building laborers throughout the ages. By delving into the intricacies of wage and gender inequality dynamics during the medieval and early modern eras in Europe, this exploration strives to reveal the historical framework of inequality between skilled and unskilled workers prior to the twentieth century. The

rationale behind examining this historical period is to highlight the distinctions between skilled and unskilled individuals in the European market during the medieval epoch.

2. Data, Methodology, and Limitations

The paper investigates wage inequality in three sections employing the well-known Gini[1] and Lorenz[2] calculation methods. By utilizing these established inequality measurement tools, this study provides insights into the wage disparities between skilled and unskilled workers in medieval Europe, an area that has received limited attention in the existing literature. Furthermore, the study aims to understand the influence of historical events, such as the Black Death and wars, on inequality, particularly in instances where economic growth had minimal impact. While the Gini and Lorenz methods offer valuable insights into wage inequality trends, we acknowledge the need for further research that would capture the multifaceted nature of historical events and their nuanced relationship with inequality. This would contribute to a more comprehensive understanding of the complexities involved in wage inequality during the medieval period.

The examination of the Gini coefficient allows for a nuanced understanding of the cyclical nature of inequality, revealing how societal and economic factors interact with wage disparities and gender-based inequities. Furthermore, by exploring the dynamics of wage and gender inequality during the medieval and early modern eras in Europe, this study sheds light on the historical evolution of these social issues.

Regarding confidence limits, it is important to note that the Gini coefficient itself does not possess inherent confidence limits. As a deterministic measure based on observed income or wealth distributions, it provides a precise value that indicates the level of inequality within a population. However, it is advisable to consider statistical uncertainty when estimating the Gini coefficient using sampling techniques or conducting comparative analyses. In such cases, confidence intervals can be employed to account for statistical variability and provide a measure of the reliability of the findings.

By explaining the significance of the Gini coefficient in this study, the researchers highlight how changes in its value can impact the conclusions drawn regarding wage disparities and gender-based inequities among skilled and unskilled laborers in major European metropolises. Additionally, by addressing the presence of confidence limits when applicable, the study ensures a comprehensive evaluation of the reliability and robustness of the results obtained.

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[1] In this paper, Gini index (following Sen (1997)) is measured to observe inequality between skilled and unskilled laborers and between unskilled women and men laborers. To calculate the Gini coefficient, the following equation is used:

$$Gini = \left(1/2\, n^2 \mu\right) \sum_{i=1}^{n} \sum_{j=1}^{n} |y_i - y_j| \quad (1)$$

Income over persons is denoted by y_i, where y is income, i is person, and μ denotes the average level of income.

[2] Lorenz curve is the graphical version of the Gini index. It shows how equal or unequal society is in a given country. If the curve is diagonal, the society is in perfect equality, and income is distributed among people equally. Income is allocated among people unfairly and unequally when the curve moves away from the egalitarian line (perfect inequality line (45 degrees) (Taylor & Lybbert, 2020, p. 99).

The reliability of the datasets used in this research is paramount to ensuring the credibility and validity of the findings. The first dataset employed in the analysis of wage inequality among skilled and unskilled building workers in Istanbul is sourced from Özmucur and Pamuk's (2002) paper. This dataset is widely acknowledged in academic circles for its meticulous data collection and robust methodology, which lend credibility to the results derived from it. Similarly, Allen's (2001) paper provides the dataset used in the second section, which examines daily wages of skilled and unskilled building laborers in major European cities. Allen's dataset is regarded as an authoritative source of information on historical wage disparities, as it has been peer-reviewed and scrutinized by experts in the field. Lastly, the dataset from Humphries and Weisdorf's (2015) paper is employed to investigate gender inequality between unskilled English women and men laborers in the final section. This dataset is widely recognized for its rigorous methodology and comprehensive data collection, which have been verified by multiple independent sources. Overall, the use of these datasets in this research highlights the scrupulous attention paid to sourcing reliable and trustworthy data, which is crucial for generating credible and meaningful conclusions.

The three papers mentioned above use historical datasets to analyze wages and living standards in different regions during different time periods. While the reliability, accuracy, and confidence limits of each dataset may vary, the authors have taken measures to ensure the validity of their findings. Özmucur and Pamuk (2002) used Ottoman tax registers to estimate real wages and standards of living, and conducted sensitivity analyses to test the robustness of their results. Allen (2001) relied on a combination of wage and price data from various sources, and addressed potential bias by using regression analysis. Humphries and Weisdorf (2015) utilized a variety of sources, including household budgets and wage bills, and validated their findings through cross-checking and comparison with other studies. Overall, these papers demonstrate the importance of utilizing reliable datasets and rigorous analysis techniques to produce accurate and informative historical research.

Determining the wages of laborers and workers during the medieval period is a challenging task. Despite some countries having detailed records of wages for various workgroups, accessing such records may be difficult due to factors like wars, state collapses, and other challenges. Even when records are available, bureaucratic processes and language barriers may hinder access to them. Therefore, this study uses previously published articles that focus on medieval wages and prices of goods to overcome these challenges. By drawing on these sources, this study provides valuable insights into the wages paid to medieval laborers and workers.

This study posits that wage inequality between skilled and unskilled building laborers in major European cities and gender inequality between unskilled male and female laborers in England follow a cyclical pattern over time. The study expects to find that historical events, such as wars, pandemics, and economic conditions, impact the level of inequality. While persistent throughout history, the study anticipates that these inequalities have fluctuated corresponding to historical events. By examining the dynamics of wage and gender inequality across time, this study provides a better understanding of the cyclical nature of inequality in historical Europe.

In this study, the examination of gender inequality is limited to unskilled English women and men laborers. The rationale behind this decision is the availability of a reliable and robust gender wage dataset from Humphries and Weisdorf's (2015) paper. While the investigation of gender inequality across various European cities could provide valuable insights, the lack of reliable data sources precludes a comprehensive analysis of gender wage gaps in these areas. Therefore, the focus is on English unskilled laborers in this study, where the dataset is reliable and has undergone extensive scrutiny and verification. By concentrating on this dataset, the research can provide an accurate and credible analysis of gender wage inequality, which is crucial for promoting social and economic equality.

3. Wage and Gender Inequality in Europe

3.1. Wage Inequality in Istanbul, 1480–1914

Istanbul's rich history as a center of trade can be attributed to its strategic location and historical significance. It was a bustling hub of economic activity, attracting Ottoman and non-Ottoman merchants and traders who brought their goods to sell. Additionally, Istanbul played a crucial role as a transit center for trade between Europe and India. Among the goods exported from Istanbul's ports was the highly sought-after Bursa silk textile, which was one of the highest quality silks available (Inalcik & Quataert, 1994, pp. 180-182). This silk was in high demand in many countries, including Poland, Sweden, and Muscovy. In addition to merchants, the construction of numerous Ottoman-style architectural works, such as those designed by Sinan, required the labor of building workers in Istanbul (Inalcik & Quataert, 1994, pp. 180-182). This historical context illuminates how Istanbul's trade and architecture created a demand for labor and contributed to the city's economic significance.

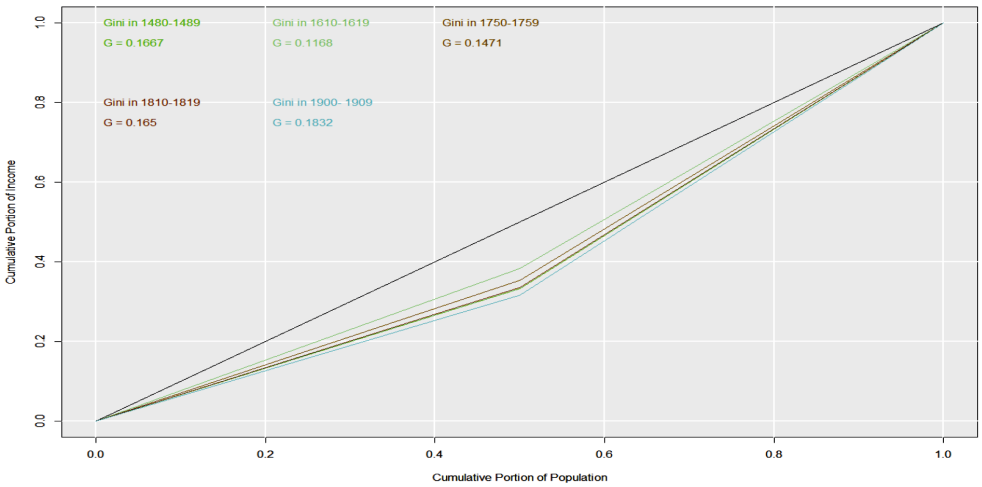

Figure 2. Lorenz Curve of Wage Inequality in Istanbul

Source: Own calculation based on the dataset of Özmucur and Pamuk (2002)

Istanbul, as the capital of the Ottoman Empire until 1922, never experienced a devastating war after 1453. The city was home to many skilled and unskilled building laborers who received daily wages in silver for centuries, resulting in an extensive archive of probate records (i.e., inflation, wages, economic growth, and trade volume) that still provide valuable insights into various social sciences. Özmucur and Pamuk (2002) utilized the Ottoman archives to obtain the wage dataset, which is the most comprehensive wage dataset available for Istanbul. This dataset includes the daily wages of unskilled and skilled building laborers in silver between 1480 and 1914. By utilizing this rich dataset, this study provides a unique opportunity to understand wage inequality in Istanbul over the centuries.

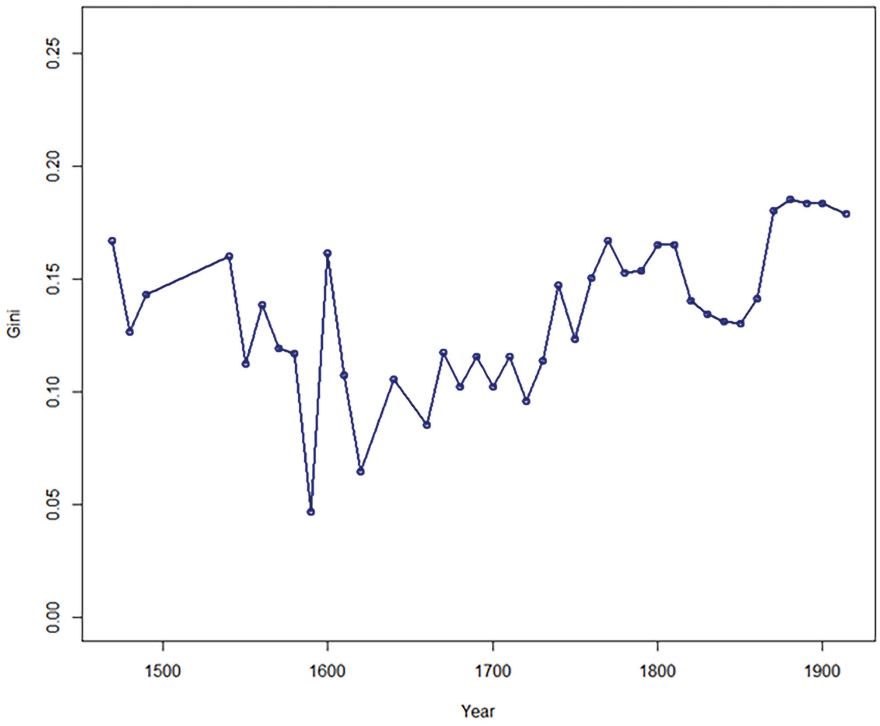

Figure 3. Gini Coefficient of Wage Inequality in Istanbul in 1480–1914 between skilled and unskilled building labors

Source: Own calculation based on the dataset of Özmucur and Pamuk (2002)

During the 15th to 17th centuries, the Ottoman Empire witnessed a period of economic expansion and societal advancement. Concurrently, there was a notable reduction in the wage disparity between skilled and unskilled building laborers, as evidenced by a decline in the Gini coefficient from 0.17 to 0.06, as depicted in Figure 2. This reduction can be attributed to equitable income distribution practices and the repercussions of the Black Death. Pleijt and Zanden (2021) emphasize the significant role played by the Black Death in shaping wages, with real wages experiencing an overall increase across the

entirety of the European continent. Our study builds upon these findings by contributing the observation that wages for unskilled building workers in Istanbul experienced a more rapid ascent than their skilled counterparts, consequently mitigating inequality within this specific occupational sector.

However, it is crucial to note that the decline in wage inequality was not sustained below the threshold of 0.10 Gini point, and subsequently rebounded. From 1690 to 1768, a period marked by the Ottoman Empire's continued territorial control, political stability, and inflation management (Özmucur & Pamuk, 2002), real wages exhibited a sharp decline. This decline can be attributed to factors such as corruption, agricultural setbacks, the commercialization of land, and a lack of political stability. These circumstances collectively contributed to the exacerbation of inequality from the 17th century onward. Additionally, the limited progress in industrial development and the privatization of agricultural land further exacerbated existing disparities.

These findings collectively indicate that the socio-economic and political regression witnessed during this era engendered a notable increase in wage inequality between skilled and unskilled building laborers in Istanbul. As illustrated in Figure 3 (and Table 1A), the Gini coefficient trend exhibited a persistent upward trajectory, indicative of a sustained and significant rise in wage inequality over an extended period.

With the fall of global trade barriers, the Ottoman industry was unable to keep pace with the changing economic landscape, resulting in deindustrialization that began in the 1800s (Pamuk & Williamson, 2011). These economic changes weakened the Ottoman economy and led to rising poverty and inequality, which affected workers, individuals, and households (Karpat, 1985). The deteriorating economic conditions were not a coincidence, as they contributed to these social challenges. The resulting widespread poverty and economic difficulties also prompted mass emigration from the Ottoman Empire to countries like Latin America and the United States, further weakening Ottoman society (Karpat, 1985). By examining the causes and consequences of these economic changes, this study provides valuable insights into the factors that contributed to the weakening of the Ottoman Empire.

Canbakal and Filiztekin (2013) conducted a study examining inequality in four major Ottoman Anatolian cities: Bursa, Kayseri, Diyarbekir, and Manisa. Their findings revealed that inequality in these cities fluctuated greatly between 1500 and 1840 due to varying levels of economic development. The Gini coefficient ranged from 0.50s to 0.70s across the cities. However, in all cities, the Gini coefficient rose significantly after the 17th century, which is consistent with the section's findings. These findings shed light on how economic development and historical events impacted inequality in Ottoman Anatolian cities, providing an understanding of the complex nature of inequality in the Ottoman Empire.

3.2. Wage Inequality in Europe, 1500–1913

In the Roman Empire era, southern European cities experienced economic and political development, resulting in higher wages than in their northern counterparts. However, this prosperity also led to significant inequality among people (see Figure 1). With the fall of

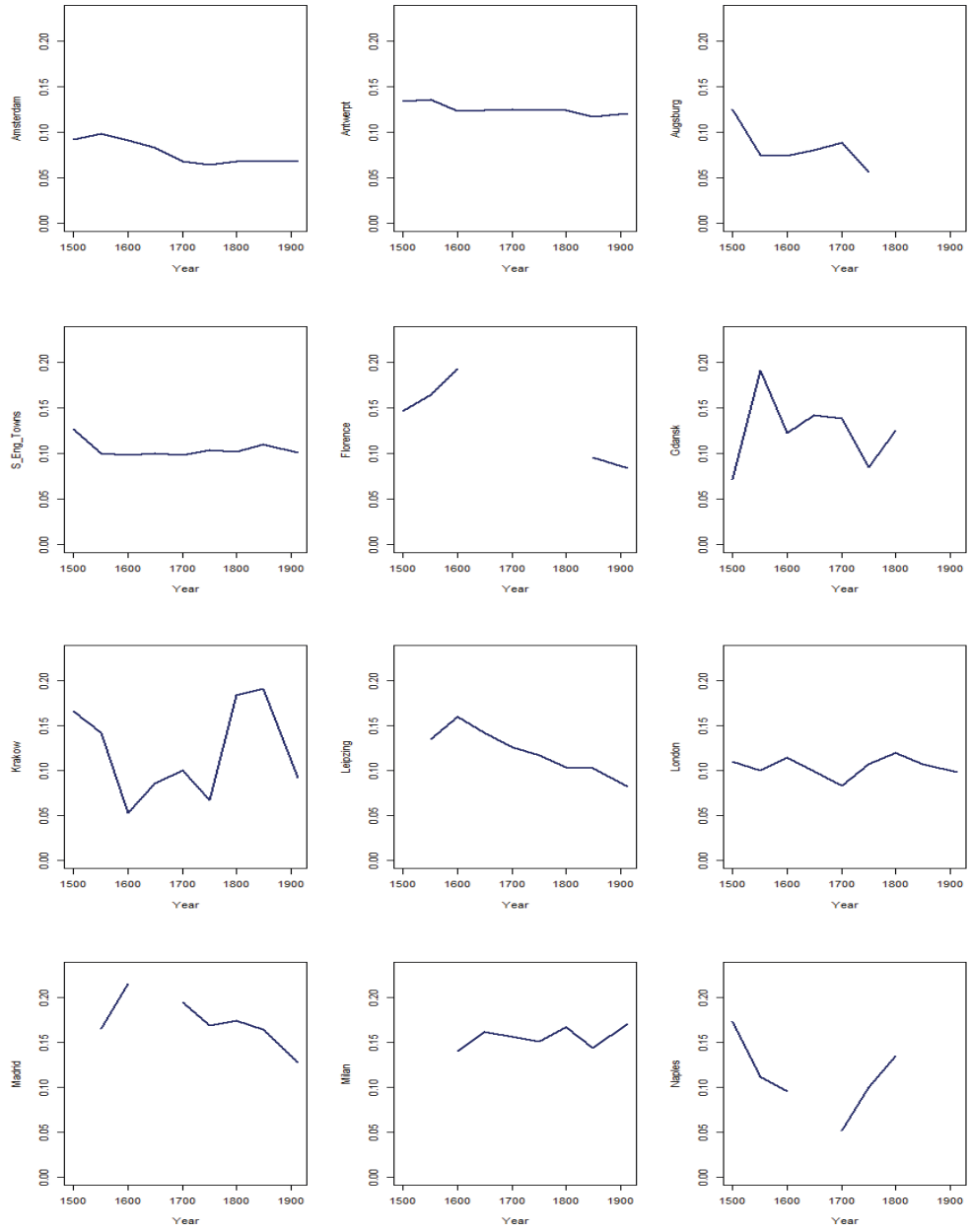

Figure 4. Gini Coefficient of Wage Inequality in Europe in 1500–1913 between skilled and unskilled building laborers.

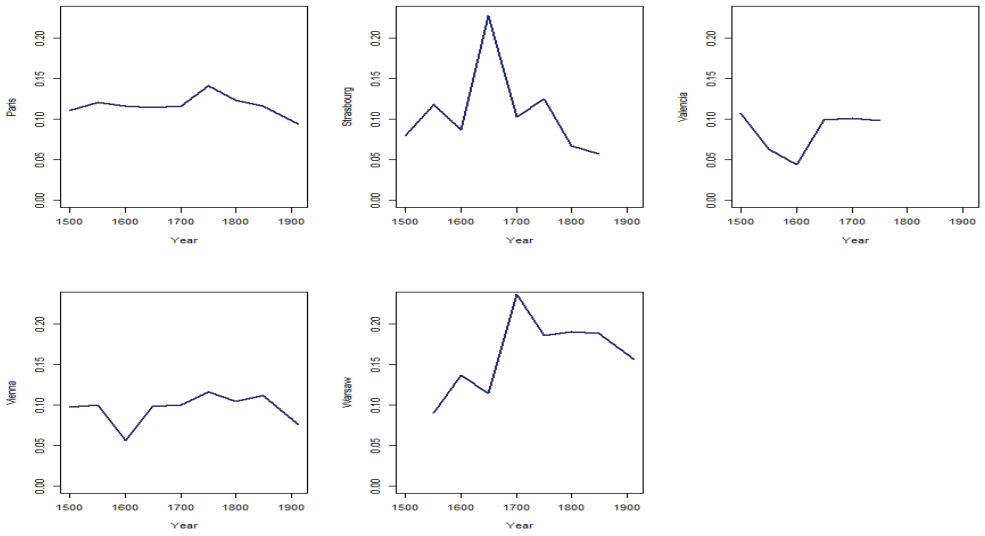

Figure 4 (Continuation). Gini Coefficient of Wage Inequality in Europe in 1500–1913 between skilled and unskilled building laborers.

Source: Own calculation based on the dataset of Allen (2001).

the Roman Empire and the impact of the Black Death, inequality decreased sharply. The Black Death caused a massive loss in the European population, with almost half of the continent's populace losing their lives. This catastrophe resulted in a substantial decrease in the labor force, causing real wages to rise and inequality to decrease across the entire continent for a while (Scheidel, 2017; Pamuk, 2007). These findings provide valuable insights into the factors that have historically influenced inequality levels in Europe and highlight the significant impact of demographic changes on economic conditions.

European economies experienced ups and downs for many years during the pre-industrial revolution. Economic growth and shrinkages, developments in art and science, and political reforms impacted the GDP per capita of Europeans (Vries & Woude, 1997). For decades, southern cities, such as Venice and Florence, were prosperous, yet Northwestern cities, such as Amsterdam, Antwerp, and London, caught up with southern towns and even overtook them. This means that economic growth in those cities was faster than in the rest of Europe. In short, major western and eastern European cities experienced economic growth and economic downturn at different times with different levels (Fouquet & Broadberry, 2015, pp. 228, 299, 232), and economic conditions directly influenced the pattern of real wages.

This section examined the living standards of Europeans before and after the industrial revolution, using wage data records from seventeen major European cities collected by Allen (2001). The dataset included wages of skilled and unskilled building laborers from 1500 to 1913, with the author calculating the Gini coefficient of wage inequality between these groups. Although the dataset is not as extensive as the one used for Istanbul, it still

provides valuable insights into the historic wage inequality in these cities. By examining the changes in wage inequality over time, this study sheds light on the factors that contributed to the evolution of living standards in Europe during this period.

This study calculated the Gini index between skilled and unskilled building laborers in major European cities in Western and Eastern Europe to analyze the evolution of inequality and observe the trend of wage inequality. The results showed that wage inequality did not significantly differ over time in some cities, even as their economic conditions changed. For example, despite flourishing and substantial increases in GDP per capita in Amsterdam and Antwerp, wage inequality between skilled and unskilled laborers did not fall below certain Gini points (e.g., 0.1175 in Antwerp). This suggests that inequality has a strong structure that does not change significantly with economic growth alone. However, in some cities (e.g., Istanbul), wage inequality fluctuated between 0.06 to 0.20 due to economic downturns or nongrowth, harmful economic reform, and conditions. By examining the factors that contributed to wage inequality, this study provides valuable insights into the complex nature of inequality in European cities.

Based on Allen's (2001) research, harmful economic conditions caused real wages to decrease throughout Europe, except in Northwestern Europe, where wages increased slowly. While the distribution of the increase in real wages in Amsterdam and Antwerp was relatively fair, the distribution in London was not as fair between skilled and unskilled laborers (as seen in Figure 3 and Table 2A). Before and during the industrial revolution, the gap between skilled and unskilled laborers widened, with a Gini coefficient of about 0.12 between 1800 and 1849. However, this gap narrowed slightly at the end of the 1800s and beginning of the 1900s. The Gini coefficient for London and some English towns was initially similar, but it began to differ after the industrial revolution. These findings contradict Scheidel's (2017) suggestion that income and wages were distributed more unequally in cities than in towns. By examining the changes in real wages and the factors that influenced them, this study provides valuable insights into the evolution of wage inequality in Europe.

The study found that some Eastern European cities, including Warsaw, Gdansk, Krakow, and Istanbul, had higher wage inequality between skilled and unskilled building laborers (around 0.20 on the Gini coefficient scale) compared to other European cities. This is surprising because economic growth was not a major factor in inequality during the Middle Ages. While wage inequality did not decrease significantly in some Western European cities, such as Amsterdam and Antwerp, despite flourishing economic conditions, it increased steeply in these Eastern European cities, and the reason for this remains unclear. Various factors, such as wars and political instability, could contribute to this trend, as documented in studies by Agoston & Masters (2009) and Kamiński & Korkuć (2016), which highlight significant economic and social challenges faced by both the Poland-Lithuania Commonwealth and the Ottoman Empire during the 1700s. These findings provide valuable insights into the complexity of historical wage inequality in Europe and highlight the importance of examining the broader social and political context.

In summary, this study highlights that while wage inequality between skilled and unskilled building laborers improved over time in many European cities, the pattern and structure of this improvement varied across different cities, influenced by varying economic conditions and reforms. This research supports Kuznets' hypothesis that factors such as urbanization, industrialization, and political reform can impact income disparity and the evolution of inequality. Moreover, the trend of inequality was downward between the 15th and 20th centuries, which aligns with the findings of Persson's research. By examining the factors that contributed to the evolution of wage inequality, this study provides valuable insights into the complex nature of inequality in European cities over time.

3.3. Gender Inequality in 1260–1850, the case of England

Historical gender inequality has been a persistent issue in Europe, with available wage datasets often focusing on physically demanding jobs that were predominantly performed by men. To address this gap, Humphries and Weisdorf (2015) compiled a large wage dataset from archives in England that included daily wages for both male and female workers in pence. This dataset provides a foundation for analyzing the wages of both unskilled men and women, enabling a deeper understanding of historical gender inequality. The study calculated the Gini coefficient and Lorenz curve (see Figure 5) to analyze the dataset and investigate the evolution of gender inequality in Europe from the 11th to the 19th century. By providing insights into gender inequality over time, this study contributes to a broader understanding of the complex nature of inequality in European societies.

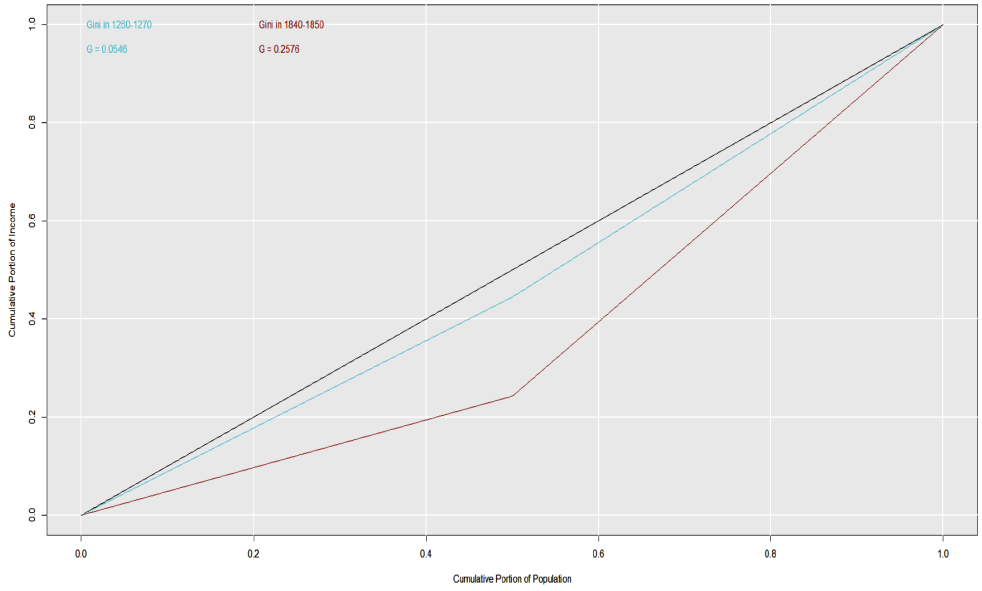

Figure 5. Wage Inequality Between Men and Women in England

Source: Own calculation based on the dataset of Humphries and Weisdorf (2015).

Gender inequality in the job market is a persistent issue globally, with varying degrees of severity across countries due to cultural perspectives that assign gender roles in society. Male employees often receive more on-the-job training hours than female employees, with the assumption that female employees will drop out of the labor market sooner and are less likely to return. This leads to a perpetuation of the gender wage gap, as employers fail to recognize the longer experience and better training of female employees, as noted by Goldin (2014). By examining the factors that contribute to gender inequality in the job market, this study sheds light on the need for greater awareness and action to address this longstanding issue.

According to Persson's (2010) research, knowledge of gender inequality during the Middle Ages and early modern Europe is limited. However, available data suggests that even before the 19th century, females were substantially paid less than males. Figure 6 (Table 3A) shows that unskilled female workers in England always earned less than their male counterparts. Given that wage inequality between skilled and unskilled building laborers was similar throughout Europe, it's reasonable to assume that gender inequality in other European countries was comparable to English gender inequality. Moreover, as the trend of wage inequality was downward in many European countries, it's likely that gender inequality in England reflected the gender inequality in Europe. These findings provide valuable insights into the extent of gender inequality in historical Europe.

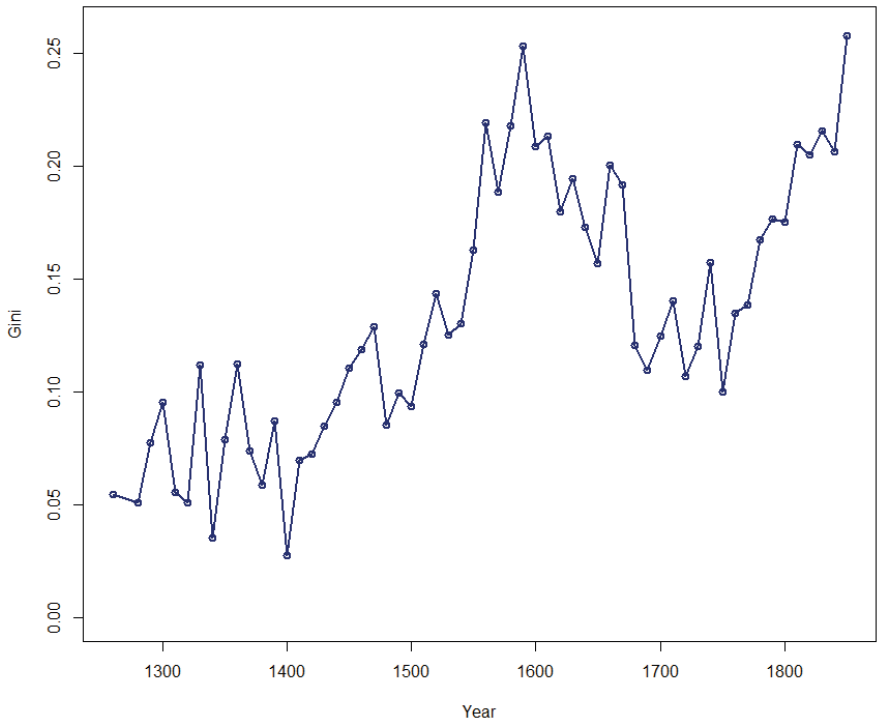

Figure 6. Gini Coefficient of Gender Inequality in England in 1260–1850 between unskilled female and male workers.

Source: Own calculation based on the dataset of Humphries and Weisdorf (2015).

The Black Death had a profound impact on the labor market in Europe. With the vast population loss, the wage gap remained low, and female workers quickly found jobs that were previously reserved for men. Women were able to work in various sectors, such as textiles, commercial services, and household service, which gave them a high degree of economic independence (Goldberg, 1986). However, as the population began to recover from the end of the 14th century to the mid-16th century, wage inequality between men and women increased significantly. Although the Black Death induced an increase in real wages in Europe and created opportunities for women in the labor market, the need for female laborers lessened after 1500, and the increase in female wages slowed down as male wages increased at a faster rate (Pamuk, 2007, p. 298-299; Humphries & Weisdorf, 2015, p. 417). These findings highlight the complex factors that contribute to wage inequality and the importance of examining historical trends in the labor market.

The Black Death had a positive impact on women's position in the labor market, resulting in improved female wages. Additionally, declining fertility rates and restrictions on fertility helped keep population growth low, which was advantageous for female laborers in the Malthusian setting and helped maintain high wages (Voigtländer & Voth, 2013, pp. 2259, 2260). However, by the end of the sixteenth century, the wage increase for male laborers outpaced that of female laborers, leading to a widening wage gap and greater male power in the job market. This trend was short-lived, as the Anglo-Spanish war induced a decrease in inequality between 1600 and 1750, with male wages falling faster than female wages (Milanovic, 2016, 2016a). These findings demonstrate the complex interplay between historical events, population dynamics, and gender inequality, and highlight the importance of examining the broader context to understand the evolution of wage inequality over time.

Furthermore, the present study's findings bear resemblance to the research conducted by Pleijt and Zanden (2021), wherein they acknowledge the impact of the Black Death on enhancing the bargaining power of female laborers, subsequently bolstering their positions within the labor market. Regrettably, as the population gradually rebounded from the devastating aftermath of the Black Death, the gains made by female laborers eroded, leading to a resurgence of gender disparities in wages and a widening wage gap favoring male counterparts. In support of these assertions, Figure 7 and the aforementioned work by Pleijt and Zanden (2021) underscore the scarcity of comprehensive data pertaining to women's wages. Consequently, this study endeavors to synthesize a comprehensive portrayal based on the available dataset, aiming to shed light on the subject.

The industrial revolution brought significant changes to the job market, and women lost some of their jobs to men during and after this period. For example, men dominated the spinning job after the introduction of spinning machines that replaced hand-spinning yarn. Additionally, as the factory system expanded, there was an increasing demand for unskilled, physically strong workers, which favored men (Muldrew, 2012, p. 500). Figure 6 shows that the shift in production systems worsened gender inequality, with the wage gap reaching a record high of 0.2576 in 1840–1850. The industrial revolution and mass production exacerbated gender inequality from the late 1700s to the mid-1800s as the supply of physically demanding jobs grew, as depicted in Figure 6 (Table 3A). These findings underscore the impact of technological and economic changes on gender inequality in the job market.

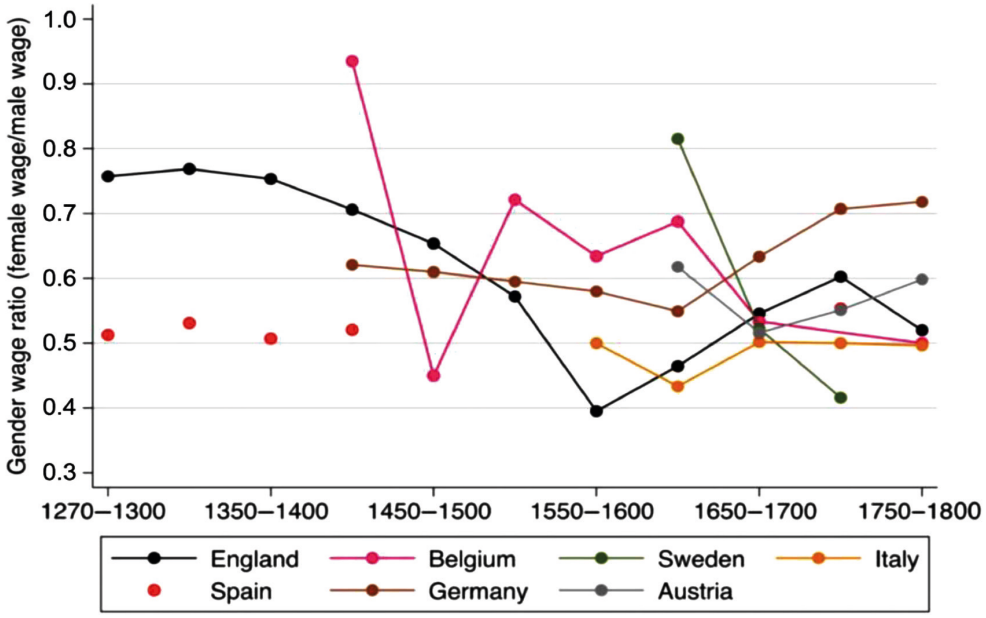

Figure 7. Two Worlds of female labor: gender wage inequality in Western Europe, 1300–1800
Source: Pleijt and Zanden (2021).

Milanovic (2016, 2016a) notes that there is a cyclical pattern of waxing and waning in inequality, primarily driven by epidemics and wars between 1350 and 1850 in Spain. Similarly, my investigation of historical gender inequality in England reveals a similar pattern of periodic rises and falls in gender inequality in the pre-modern era. This finding reinforces the idea that the pattern of inequality is not just limited to overall inequality but also extends to gender inequality, highlighting the cyclical nature of inequality over time.

4. Conclusion

This study delves into the wage and gender inequality that existed in major European cities from the 15th to the 19th century. Specifically, the study looks at the wage gap between skilled and unskilled laborers, and gender inequality in England using a dataset spanning the 13th to 19th century. The Gini coefficient and Lorenz curve were used in all three sections to calculate inequality. By examining historical trends in inequality, this study aims to shed light on the evolution of inequality over time and emphasize the importance of studying historical inequality, which has been a persistent issue throughout human history. These findings can help inform policies and interventions aimed at reducing inequality and promoting greater equity in contemporary society.

The Black Death in the 14th century had a significant impact on the European labor market, resulting in a substantial loss of population and a shortage of labor. However, this shortage led to an increase in real wages for workers. According to the study, the Black

Death had the effect of reducing wage inequality between skilled and unskilled building laborers in both Europe and the Ottoman Empire, and between unskilled male and female laborers in England (the United Kingdom). This suggests that the pandemic acted as an external shock[3] that helped to mitigate wage and income inequality in European cities. These findings highlight the complex relationship between historical events, labor markets, and inequality, emphasizing the need for a more nuanced understanding of the factors that shape inequality over time.

The study reveals that the Black Death, a pandemic that ravaged Europe in the 14th century, led to a temporary reduction in wage inequality in the Ottoman Empire due to labor shortages and improved economic conditions. However, by the early 1700s, wage inequality between skilled and unskilled laborers in the Ottoman Empire had increased, with agricultural failures, corruption, and war costs contributing to poverty and inequality. Conversely, economic growth in many major European cities brought about a reduction in wage inequality between skilled and unskilled laborers. These findings underscore the significant influence of economic factors on wage inequality, both positively and negatively. This study highlights the importance of considering the broader context and historical factors that contribute to inequality, which can inform policies and interventions aimed at reducing inequality in contemporary societies.

The study has found that in eastern European cities during the medieval period, wage inequality was primarily driven by wars and political instability, contributing to a significant increase in wage disparity in cities such as Warsaw, Krakow, and Gdansk. These findings underscore the impact of external factors, such as pandemics, social unrest, and political instability, on wage inequality. Additionally, the study revealed that wage inequality was generally higher in Eastern European cities than in other European cities, even during the medieval period. This suggests that wage inequality differed between Eastern and Western European cities, even in the medieval era. These findings highlight the importance of considering historical context and external factors when examining wage inequality and can inform efforts to address wage disparities in contemporary society.

Despite economic growth over time, this study reveals that gender inequality did not significantly decrease. Although the labor shortage caused by the Black Death led to job opportunities and higher wages for female workers, gender inequality worsened as the population recovered from the pandemic, reaching a peak in the late 16th century. While gender inequality briefly decreased between 1600 and 1750 due to a decline in real wages and the Anglo-Spanish war, it increased again during and after the Industrial Revolution. The study suggests that changes to the work structure during the Industrial Revolution

[3] The relationship between institutional change and inequality is evident after the shocks. It is widely recognized among social scientists that institutional change can have a significant impact on inequality. In particular, when institutions change abruptly or unexpectedly, such as after a political or economic shock, the effects on inequality can be especially pronounced. This is because institutions play a critical role in shaping the distribution of resources, opportunities, and power within a society. When these institutions are disrupted, it can lead to significant shifts in the social hierarchy and the distribution of wealth and resources. So, as I calculate the inequality between building laborers in the medieval period, it is important to consider how changes in the institutions of that time may have contributed to that inequality (Alfani, 2021).

favored male workers in many sectors, contributing to a rise in gender inequality. These findings highlight that economic growth may not have the same positive impact on gender inequality as it does on wage inequality.

This study highlights that economic growth, economic reforms, and the Industrial Revolution had varying effects on wage and gender inequality. While economic growth had a positive impact on reducing wage inequality between skilled and unskilled laborers in major European cities, it had a different effect on gender inequality. The study found that gender inequality remained low and steady during the 14th century but increased after the population recovered from the Black Death and during the Industrial Revolution. These findings suggest that economic growth can have a positive impact on wage inequality but may exacerbate gender inequality. This study underscores the need for a more nuanced understanding of the factors that influence inequality, which can inform policies and interventions aimed at reducing inequality and promoting greater equity in contemporary society.

This study's most significant finding is that the pattern of overall wage inequality and gender inequality follows a cyclical pattern of decrease and increase over time. This aligns with the conclusions of previous research by Milanovic (2016). The study offers valuable insights into the evolution of wage and gender inequality over centuries in Europe and how they respond differently to economic and external shocks. However, to gain a more comprehensive understanding of inequality's evolution, future studies should analyze more detailed and extensive datasets. These findings highlight the importance of continued research into the complex and dynamic nature of inequality, which can inform policies and interventions aimed at reducing inequality and promoting greater equality in contemporary society.

Note

This study provides data on the wage inequality between skilled and unskilled building laborers and on the wage inequality between unskilled male and female building laborers. The data can be found below in Appendix.

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Appendix

Table 1A. Gini Coefficient of Wage Inequality in Istanbul between skilled and unskilled building laborers. (Numerical Version of Figure 3)

Year	Gini
1469-1479	0.1667
1480-1489	0.1265
1490-1499	0.1429
1540-1549	0.1598
1550-1559	0.1122
1560-1569	0.1383
1570-1579	0.119
1580-1589	0.1168
1590-1599	0.04667
1600-1609	0.1613
1610-1619	0.1071
1620-1629	0.06471
1640-1649	0.1053
1660-1669	0.08537
1670-1679	0.1173
1680-1689	0.1024
1690-1699	0.1154
1700-1709	0.1024
1710-1719	0.1154
1720-1729	0.09574
1730-1739	0.1139
1740-1749	0.1471
1750-1759	0.1234
1760-1769	0.1505
1770-1779	0.1667
1780-1789	0.1525
1790-1799	0.1536
1800-1809	0.165
1810-1819	0.165
1820-1829	0.1403
1830-1839	0.1341
1840-1849	0.1313
1850-1859	0.1303
1860-1869	0.1413
1870-1879	0.1803
1880-1889	0.1853
1890-1899	0.1833
1900-1909	0.1832
1910-1914	0.1786

Source: Own calculation based on the dataset of Özmucur and Pamuk (2002)

Table 2A. Gini Coefficient of Wage Inequality in Europe between skilled and unskilled building laborers. (Numerical Version of Figure 4)

	1500–1549	1550–1599	1600–1649	1650–1699	1700–1749	1750–1799	1800–1849	1850–1899	1900–1913
Amsterdam	0,0921	0,0983	0,0909	0,0833	0,0680	0,0640	0,0681	0,0676	0,0688
Antwerp	0,1341	0,1358	0,1238	0.1243	0.125	0.125	0.1244	0.1175	0.1211
London	0,1098	0,1000	0,1141	0,0992	0,0833	0,1075	0,1202	0,1075	0,0981
S. Eng. towns	0,1269	0,1000	0,0980	0,1000	0,0977	0,1029	0,1011	0,1092	0,1007
Florence	0,1463	0,1637	0,1928	NaN	NaN	NaN	NaN	0,0955	0,0833
Milan	NaN	NaN	0,1402	0,1612	0,1559	0,1506	0,1667	0,1439	0,1701
Naples	0,1733	0,1111	0,0954	NaN	0,0514	0,1000	0,1346	NaN	NaN
Valencia	0,1075	0,0629	0,0440	0,0988	0,1014	0,0984	NaN	NaN	NaN
Madrid	NaN	0,1649	0,2153	NaN	0,1946	0,1687	0,1735	0,1644	0,1275
Paris	0,1111	0,1207	0,1163	0,1145	0,1165	0,1414	0,1236	0,1165	0,0938
Strasbourg	0,0796	0,1180	0,0865	0,2281	0,1027	0,1250	0,0668	0,0571	NaN
Augsburg	0,1250	0,0753	0,0745	0,0804	0,0882	0,0567	NaN	NaN	NaN
Leipzig	NaN	0,1346	0,1602	0,1422	0,1263	0,1173	0,1036	0,1032	0,0822
Vienna	0,0970	0,1000	0,0556	0,0977	0,1000	0,1154	0,1038	0,1111	0,0760
Gdansk	0,0714	0,1912	0,1217	0,1417	0,1381	0,0843	0,1250	NaN	NaN
Krakow	0,1667	0,1420	0,0526	0,0857	0,1000	0,0672	0,1842	0,1913	0,0922
Warsaw	NaN	0,0902	0,1364	0,1143	0,2361	0,1852	0,1899	0,1884	0,1558

Source: Own calculation based on the dataset of Allen (2001).

Table 3A. Gini Coefficient of Gender Inequality in England in 1260–1850 between unskilled female and male workers. (Numerical Version of Figure 6)

Year	Gini
1260–1270	0,05462
1270–1280	0,05085
1280–1290	0,07759
1290–1300	0,09556
1300–1310	0,05556
1310–1320	0,05094
1320–1330	0,112
1330–1340	0,03546
1340–1350	0,07895
1350–1360	0,1125
1360–1370	0,07367
1370–1380	0,05846
1380–1390	0,08692
1390–1400	0,0273
1400–1410	0,06979
1410–1420	0,07262
1420–1430	0,08456

Table 3A (Continuation). Gini Coefficient of Gender Inequality in England in 1260–1850 between unskilled female and male workers. (Numerical Version of Figure 5)

Year	Gini
1430–1440	0,09547
1440–1450	0,1104
1450–1460	0,1187
1460–1470	0,1288
1470–1480	0,08541
1480–1490	0,09966
1490–1500	0,09344
1500–1510	0,1211
1510–1520	0,1437
1520–1530	0,125
1530–1540	0,13
1540–1550	0,1629
1550–1560	0,2191
1560–1570	0,1882
1570–1580	0,2179
1580–1590	0,2531
1590–1600	0,2085
1600–1610	0,2133
1610–1620	0,1795
1620–1630	0,1946
1630–1640	0,1729
1640–1650	0,1567
1650–1660	0,2004
1660–1670	0,1915
1670–1680	0,1205
1680–1690	0,1095
1690–1700	0,1245
1700–1710	0,1401
1710–1720	0,1069
1720–1730	0,1199
1730–1740	0,1573
1740–1750	0,09989
1750–1760	0,1348
1760–1770	0,1385
1770–1780	0,1672
1780–1790	0,1766
1790–1800	0,1752
1800–1810	0,2094
1810–1820	0,2049
1820–1830	0,2157
1830–1840	0,2063
1840–1850	0,2576

Source: Own calculation based on the dataset of Humphries and Weisdorf (2015).