Center for
Economic Theories and Policies
Sofia University St. Kliment Ohridski
Faculty of Economics and Business Administration

ISSN: 2367-7082

Bulgarian Economic Papers

Wage Inequality in Bulgaria: Decomposition by Economic Sectors, Occupational Groups and Districts

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BEP 05-2023
Publication: September 2023

Wage Inequality in Bulgaria:
Decomposition by Economic Sectors, Occupational Groups and Districts

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Abstract: Given the pronounced income disparities in the Bulgarian economy, the paper explores wage inequality across economic sectors, occupational groups and districts in the country between 2008 and 2021. Using the between-group component of the Theil's T Statistic, the analysis reveals an overall upward trend in the evolution of wage inequality across sectors, occupational groups and districts. The largest positive contributor to inter-sectoral wage inequality is the highest paid *information and communication* sector. In terms of the wage disparities between occupational categories, the group of the *managers* has the largest weight. Finally, at a district level, the capital is the greatest positive contributor to between-district wage inequality, due to offering the highest average wage, accounting for around one third of the employment in the country and boasting a concentration of the highest-paid economic activities.

Keywords: income distribution; wage inequality; regional disparities
JEL code: E24; J31; R12

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1. Introduction

Widening income disparities within many advanced and developing countries have received considerable attention among researchers and policy makers in recent years. The large social costs of high and sustained levels of income inequality, as well as their negative implications for growth and macroeconomic stability, have been widely acknowledged (e.g. Stiglitz, 2012; Ostry, Berg and Tsangarides, 2014; Dabla-Norris et al., 2015; Polacko, 2021).

Accounting for income disparities is especially relevant for the Bulgarian economy, as it is not only the country with the most unequal income distribution in the European Union (EU), but also the poorest member state. Growing income inequality was a common trend for many post-socialist economies in Central and Eastern Europe (CEE) during their transition from centrally-planned to market-based economies in the 1990s. However, while in many of the CEE countries income inequality levelled off or declined eventually, in Bulgaria it continued to grow. According to Eurostat, Bulgaria's Gini coefficient of disposable income increased from 26 to 38,4 between 2002 and 2022. Given the substantial income disparities in the Bulgarian economy and the threat they might pose to both its social cohesion and growth prospects, it is worth studying the various dimensions of income inequality in more detail. In particular, the aim of this paper is to explore wage inequality across economic sectors, occupational groups and districts in Bulgaria between 2008 and 2021. The reason we decide to focus on wage inequality is twofold. First, wages constitute more than half of total income and second, they are found to have the largest and also rising contribution to overall income inequality in Bulgaria (Bratoeva-Manoleva, 2021). In our analysis we use the between-group component of the Theil's T Statistic in order to estimate wage inequality across economic sectors, occupational groups and districts. In addition to tracing the evolution of between-group inequality over time, this approach allows us to outline the Theil elements of each sector, occupational group and district and to reveal their changing contributions to wage inequality.

The rest of the paper is organized as follows. Section 2 summarizes the findings of previous empirical research on income and wage disparities in Bulgaria. Section 3 describes the methodology and data used. Section 4 presents the results from the analysis and Section 5 outlines the main conclusions, as well as some policy implications.

2. Income and wage disparities in Bulgaria: literature review

As in most post-socialist economies in CEE, income inequality in Bulgaria experienced an increase during the market transition in the 1990s. This trend was due to a combination of

factors such as the liberalization, deindustrialization and privatization of the economy, the deepening economic crisis, the restrictive social policy, the occurrence of a shadow economy, the substantial migration etc. (cf. Bratoeva-Manoleva, 2017; Stoilova and Krasteva, 2019; Heidenreich, 2022). In the 2000s, after the transition to a market-based economy was completed, the dynamics of income inequality was affected by internal factors, among which the changing sectoral, educational and occupational structure, and the institutional context (Heidenreich, 2022), as well as external ones such as the inflow of foreign direct investment (FDI) and the integration of the economy into European and global value chains. However, while in many of the other CEE countries income inequality has moderated in the 2000s, income disparities in Bulgaria continued to grow and since 2016 the country has the highest income inequality in the EU. According to Eurostat data, in 2022 Bulgaria's Gini coefficient equals 38,4 and the income quintile share ratio S80/S20 is 7,3, while the corresponding values for the EU are 29,6 and 4,7 respectively.

The pronounced income disparities in the Bulgarian economy have motivated researchers to explore their dynamics and sources. While most studies have focused on total income distribution, rather than on wage inequality in particular, it is worth reviewing briefly their findings, as wages constitute more than half of total income and hence income inequality is strongly affected by wage distribution. A study with a focus on the micro-determinants of income inequality in Bulgaria is Boshnakov, Mintchev and Naydenov (2011). Using quantile regression analysis on households' survey data from 2007, they explore the extent to which various household's socio-demographic characteristics, such as ethnicity, type of settlement, household size, number of unemployed, number of children, number of pensioners, etc., could be regarded as sources of income inequality in Bulgaria. Due to larger data availability, a number of researchers have chosen to focus on the macroeconomic determinants of income inequality in Bulgaria. For example, Mihaylova (2014) applies OLS regression on time series data in the period 2000-2012 and finds evidence of inequality-increasing effect of FDI and inflation. Mavrov (2017) focuses on the impact of financial development on income inequality in Bulgaria in the period 1990-2014 and suggests a positive relationship. Exploring the distributional effects of various macroeconomic variables by using OLS regression, Bratoeva-Manoleva (2017) finds that GDP growth and the expansion of the service sector increase income inequality, while government expenditures on social protection tend to mitigate it.

A number of studies focus exclusively on the impact of public policy on income inequality in Bulgaria. For example, Dochev et al. (2011), using different inequality measures, find that taxation policies contribute to some extent to inequality reduction in Bulgaria. As for

social transfers, the income inequality decomposition reveals that unemployment benefits and child allowances are the main social payments reducing inequality between 1992 and 2006. Tzanov et al. (2013) explore the distributional effect of taxation by comparing the Gini indices of gross and net income inequality, as well as the impact of social transfers by examining the values of various inequality measures before and after transfers. The authors find evidence of substantial inequality-decreasing effect of social transfers, which is also considerably stronger than the impact of taxation. Undertaking income inequality decomposition by factor components, Mihaylova and Bratoeva-Manoleva (2017) confirm the important role of social transfers in mitigating income inequality, with pensions exerting the strongest influence. Tanchev (2021) studies the redistributional impact of proportional income taxation in Bulgaria between 2008 and 2019, using OLS regression and correlation. The results confirm a positive relationship between the Gini index and the growth rates of GDP per capita, the gross average income and net average income, inferring that proportional taxation increases inequality in Bulgaria.

While public policy has its role in shaping income distribution, it is wages that have the most significant and also rising contribution to income inequality in Bulgaria. This is due to both the increasing differentiation of wages and their rising share in total income over time. This is one of the main findings in the study of Bratoeva-Manoleva (2021), which uses data from the Household Budget Survey of the National Statistical Institute (NSI) in the period 1993-2019 in order to decompose income inequality by the different income sources. Peshev et al. (2022) explore wage inequality in Bulgaria in the period 2010-2019, using data from the National Revenue Agency on the actual incurred income of taxpayers, as well as survey data on wage income from the Household Budget Survey of the NSI. The comparison of key indicators of inequality, derived under both approaches, shows that the NSI survey data underestimate the share of income in the highest income deciles and percentiles, and overestimate the income of the lower-income groups, i.e. wage inequality in Bulgaria is much higher than the NSI data suggest.

A number of studies have also examined various factors that impact wage inequality in Bulgaria, such as the role of minimum wage, gender, education, occupation, inter-sectoral and inter-regional disparities etc. For example, Tzanov (2010) focuses on the impact of minimum wage and concludes that its development to some extent has contributed to the changes in the relative wage structure between economic sectors. While in sectors financed by the state budget (education, health and public administration), the increase in the minimum wage can be regarded as a factor that raises average wages, no such effect is observed in low-paid economic

activities such as agriculture, manufacturing, construction, trade, and hotels and restaurants. It is also found that wage inequality across sectors has fallen between 2003 and 2007. Another finding is that the gender pay gap has declined in the period 1996-2006 and that the minimum wage has contributed to this trend. Stoilova, Simeonova-Ganeva and Kotzeva (2012) analyse two types of determinants of gender pay gap in Bulgaria, using data from the Structure of Earnings Survey conducted by the NSI in 2002 and 2006. The first one refers to job characteristics, such as sector, occupational status, and unionization, while the second one includes human capital, gender, experience and age. Among other findings, the study reveals that men are better paid in regard to most determinants. The only advantage women have is higher returns to education. Staneva and Andel-Latif (2015) also focus on the returns to education in Bulgaria, using data from household surveys between 1986 and 2012. The authors find a steady rise in returns to education for both males and females until 2003, with the most prominent increase in the wage premium occurring at the top end of the distribution. Furthermore, the estimated returns are higher for women than for men. The upward trend in the returns to education takes an inverted-U-shape after 2003 and according to the authors the lower levels between 2007 and 2010 could be due to the increased relative supply of educated work force and the decreased relative demand for labour because of the recession at the time.

Some studies explore wage inequality in Bulgaria against the backdrop of the structural changes taking place in the economy. For example, Mihaylova and Bratoeva-Manoleva (2018) estimate wage inequality in the period 2000-2016 by using inequality decomposition method and then taking into consideration the sectoral shifts in the economy, analyse wage disparities depending on economic activity, region and educational attainment. The results from the decomposition show that wages are the most significant source of income inequality in the country and that their contribution to overall inequality rises significantly over time. Furthermore, the descriptive analysis reveals that the growing role of the service sector at the expense of agriculture and industry is associated with increasing wage disparities across economic sectors, regions and levels of education. The more recent study of Heidenreich (2022) expands further the analysis of wage inequality in Bulgaria by exploring not only the sectoral shifts in the economy but also the changes in the educational and occupational structures. The conducted decomposition analysis leads to the conclusion that the increasing wage disparities in Bulgaria can be interpreted mostly as the result of a polarizing evolution of the sectoral, qualificational and educational structures of the society. In particular, the falling shares of manufacturing and construction and the increasing shares of the IT industry and professional services have contributed to this upward trend. Another finding is that the

increasing wage inequality in the upper part of the wage distribution reflects the rising importance of highly educated workers and more demanding jobs. On the other hand, wage inequality decreases in the lower part of the wage distribution, which is due to various factors such as the lower gender pay gap and the increasing inclusion of women and low-skilled workers in the labour market.

Given that the sectoral shifts in the Bulgarian economy are also accompanied by substantial changes in the geographical distribution of economic activity, some studies focus exclusively on the income and wage differences across regions and districts. For example, Shopov and Tzanov (2015) explore the territorial disparities between the six regions and between the 28 districts in Bulgaria in terms of various dimensions of living standard, such as: income and expenditure, inequality in income and social inclusion, education, social services, health care system, migration and overall living standard. The ranking of the regions and districts based on the scores of the analysed indicators leads to the overall conclusion that between 2007 and 2012, the territorial disparities in living standard show an upward trend, with the most pronounced increase in two dimensions - income and expenditure, and social services. Kosuliev (2018) also explores regional income inequality in Bulgaria, focusing on the period 2008 to 2016. The structural decomposition of households' incomes reveals the leading importance of wages for overall income levels, while the regression analysis shows that regional income disparities are affected by differences in the districts' rates of employment and average wages.

Based on the literature review it can be concluded that wage inequality, as the main driver of income disparities in the Bulgarian economy, is a significant economic and social problem that merits further research. In particular, it is worth exploring the evolution of wage inequality across different sectors, occupational groups and districts and reveal how each of them contributes to its dynamics. The following section describes the methodology and data used.

3. Methodology and data

In the analysis of wage inequality in the Bulgarian economy we use the between-group component of the Theil's T Statistic, a generalized-entropy-based measure, which is especially useful when the underlying data are presented in mutually exclusive and completely exhaustive groups. A main advantage of the Theil index is that, compared to other inequality measures, it not only allows the decomposition of inequality into the sum of between-group and within-

group component, but it also has less stringent data requirements and can be applied in cases when group data is available instead of individual survey data (Zhang, 2016). These properties of the Theil's T Statistic have made it the preferred measure in a number of studies on inequality in different countries such as Costa Rica (Obando, 2006), Argentina and Brazil (Galbraith, Spagnolo and Pinto, 2007), the United States (Galbraith and Hale, 2007), Taiwan (Wang, 2007), Chile (Spagnolo, Quezada and Salinas, 2008), Turkey (Elveren, 2010) or China (Zhang, 2016). To the best of our knowledge, this approach has not been applied in the Bulgarian context, which makes it an appropriate choice for our research methodology.

Theil's T statistic has two components, the between-group (T^B) and the within-group component (T^W): $T = T^B + T^W$

The within-group component of wage inequality is unobserved because we use aggregated data. However, in this case the between-group component provides the lower-bound estimate of overall wage inequality (Theil, 1972). The main disadvantage of the Theil index is that its values are not comparable across different groups, because if the number and the sizes of the groups differ, the limit of the index will also differ (Elveren, 2010). Nevertheless, focusing only on the between-group component of Theil's T Statistic still allows us to outline the general trend of wage inequality, as what is important in the interpretation of the results is not the magnitude of the values of the index, but their evolution over time. Moreover, this approach allows us to isolate the changing contribution of each economic sector, occupational group and district to overall between-group wage inequality.

The between-group component of Theil's T Statistic can be stated as:

$$T^B = \sum_{i=1}^{n} \left\{ \left(\frac{p_i}{P}\right) * \left(\frac{y_i}{\mu}\right) * ln\left(\frac{y_i}{\mu}\right) \right\}$$

where i indexes the groups, p_i is the population of group i, P is the total population, y_i is the average wage of group i, and μ is the average wage of the entire population. The individual terms within the summation are known as "Theil elements" and show the contribution of each group to overall between-group wage inequality.

Wage inequality between sectors, occupational groups and districts is a function of each group's relative size and relative wages. An increase in between-group wage inequality can be caused by high wage groups expanding their employment share or experiencing an increase in wages relative to the mean, or by low wage groups either increasing their employment share

or experiencing falling wages relative to the mean. Likewise, a decrease in the between-group wage inequality can be a result of high wage groups losing employment or falling back toward the mean wage, or of low wage groups experiencing shrinking employment share or increasing relative wages. In addition to tracing the evolution of between-group wage inequality, computing Theil's T Statistic allows us to isolate the contribution of each sector, occupational group or district to total wage inequality between groups. The Theil element of a sector, occupational group or district is positive or negative, depending on whether its average wage is greater or lower than the national average. By construction, the sum of the positive elements must exceed the sum of the negative elements, so that the total is positive.

For the purposes of the analysis, we use annual data on average wages and employment across sectors, occupational groups and districts in the period 2008-2021. The data is published by the National Statistical Institute of Bulgaria. The sectoral data, covering 19 economic activities, is established in accordance with the Classification of Economic Activities (NACE.BG 2008), which is the Bulgarian version of the Statistical Classification of Economic Activities in the EU (NACE Rev.1.1). The data across occupational groups covers 9 groups and complies with the National Classification of Occupations and Duties, which is comparable with ISCO-08 (the International Standard Classification of Occupations). The regional data includes 28 districts and is in accordance with the Unified Classification of Administrative-Territorial and Territorial Units in Bulgaria.

4. Results

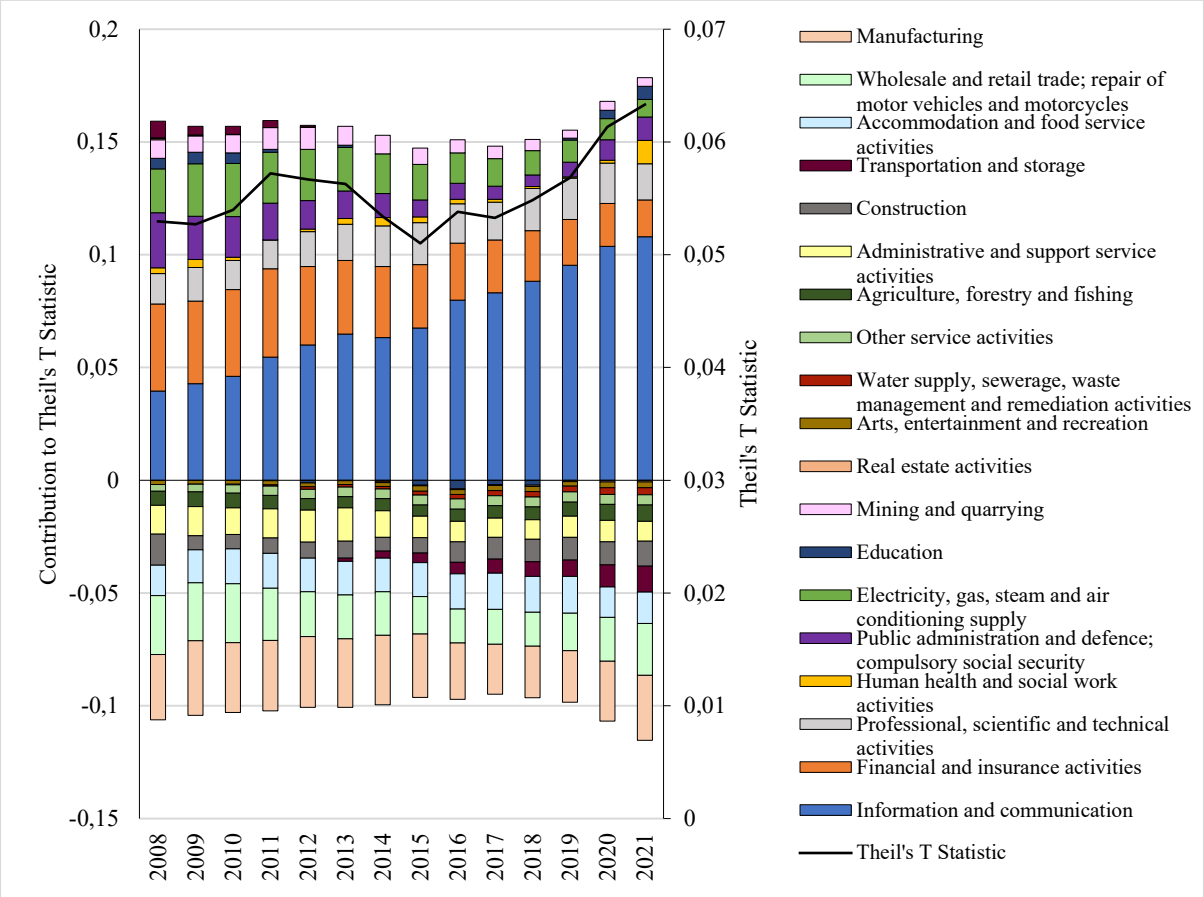
In order to trace its evolution over time, we first present the estimations of Theil's T Statistic for wage inequality across sectors, occupational groups and districts in the period 2008 to 2021. Furthermore, by outlining the Theil elements of the different groups, we show their changing contributions to wage inequality. The results are portrayed in stacked bar graphs, in which those sectors, occupational groups or districts with average wages higher than the country average appear above the zero line and are positive contributors to wage inequality. Conversely, those sectors, occupational groups or districts with wages below the national average appear below the zero line and are negative contributors to the Theil's T Statistic.

4.1 Wage inequality between economic sectors

The overall trend in wage inequality between economic sectors is illustrated by the black line in Figure 1. As it can be observed, the Theil index experienced an increase in the period

2009-2011, followed by a decline until 2015 and then an overall upward trend, which lasted until the end of the examined period. This resulted in a Theil index equal to 0,063 in 2021, compared to 0,053 in 2008.

Figure 1. Between-sector wage inequality (2008-2021)



Source: Author's calculations based on data from the NSI

In addition to showing the evolution of wage inequality between economic sectors, Figure 1, allows us to also examine each sector's contribution to wage inequality. It is evident that *information and communication* has the largest positive contribution to the Theil index. This is due to the fact that, while the average employment share in this sector is just 4%, its wages are not just above the national average, but are also the highest, exceeding the latter around 2,3 times on average. Moreover, *information and communication* is the sector which saw the largest increase in its Theil element over time due to the pronounced upward trend in both its relative wage and employment share. This means that the sector has contributed the most to the increase in between-sector wage inequality. Figure 1 indeed shows that the periods

of an increase in the Theil index coincide with rising contribution of the *information and communication* sector.

The sector with the second largest positive contribution to between-sector wage inequality is *financial and insurance activities*. However, while in the beginning of the examined period its Theil element was similar to the one of *information and communication*, over time the financial sector's contribution to between-sector wage inequality diminished due to falling relative wages. This is especially noticeable between 2011 and 2015, when the decrease in the financial sector's Theil element was accompanied by a decline in the Theil index. The third place in terms of positive contribution to between-sector wage inequality until 2013 was mostly occupied by *electricity, gas, steam and air conditioning supply* but after that due to decreasing relative wages, its role diminished and was overtaken by *professional, scientific and technical activities*, whose employment share experienced an increase. As one could expect, the high-wage sectors that contribute the most to between-sector pay inequality are also those that employ the most educated workforce. In 2021 the share of employees with tertiary education was 76,9% in *information and communication*, 77% in *financial and insurance activities* and 85,6% in *professional, scientific and technical activities*.

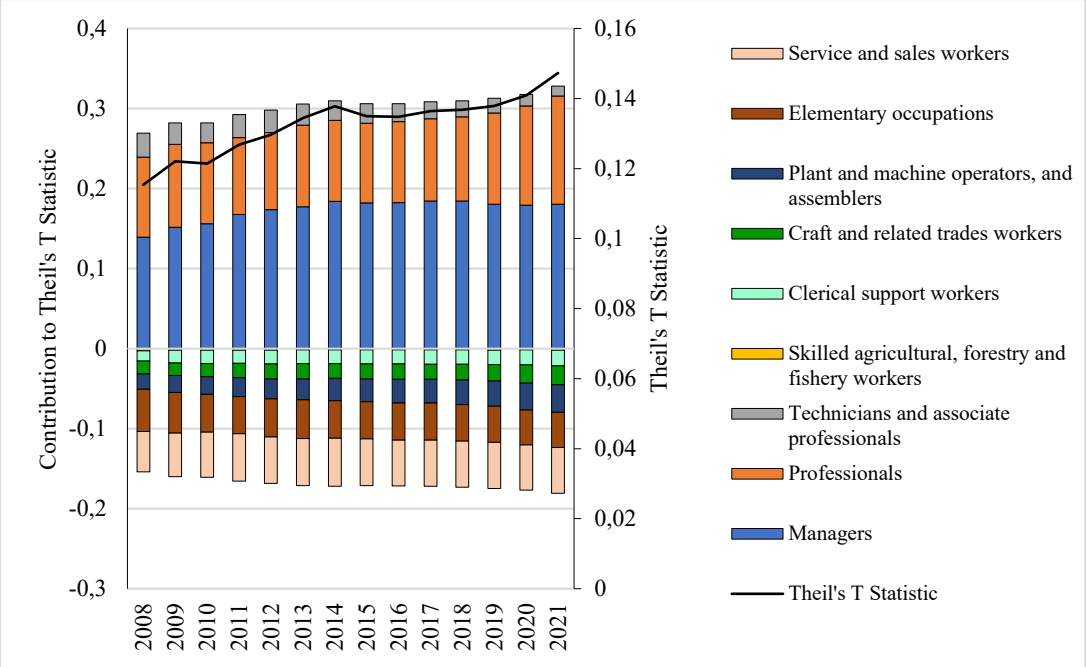
Among the sectors with wages below the national average (and a position in Figure 1 below the zero line) the one with the largest weight in determining wage inequality is *manufacturing*, followed by *wholesale and retail trade; repair of motor vehicles and motorcycles*, and *accommodation and food service activities*. In the case of manufacturing and trade the significant negative contributions to between-sector pay inequality are due to the combination of wages below the average (around 86% of the national average for both) and large employment shares, which rank first and second (respectively 22% and 17% on average). On the contrary, the negative contribution of *accommodation and food service activities* is explained mostly by the fact that wages in this sector remain the lowest over the entire period. While this sector's Theil element remained stable over time, the changes in the Theil elements of manufacturing and trade are reflected in the evolution in between-sector wage inequality. For example, in the last four years of the examined period the negative contributions of manufacturing and trade became more pronounced because of falling relative wages, which added to the rising wage inequity between sectors.

4.2 Wage inequality between occupational groups

The results from the calculations of Theil's T Statistic for wage inequality by occupation are portrayed by the black line in Figure 2. Except for the very slight decreases in 2010, 2015

and 2016, one can observe an overall upward trend in the evolution of wage inequality between occupational groups. In particular, Theil's T Statistic increased from 0,115 in 2008 to 0,147 in 2021.

Figure 2. Wage inequality between occupational groups (2008-2021)



Source: Author's calculations based on data from the NSI

Figure 2 allows us to also outline the contributions of the different occupational groups to wage inequality. The largest positive contributor is the group of the *managers*. This is due to the fact that while the average employment share of this group is just 6%, it enjoys the highest average earnings over the entire period (around 2,8 times higher than the country average). Due to its rising relative wages until 2014, this group's weight in determining overall wage inequality was increasing and as seen in Figure 2, Theil's T statistic shows an upward trend in this period. After that, its contribution has been stable, while the weight of the group of the *professionals* has started to rise. This is the group with the second largest positive contribution to wage inequality. It can be explained by the fact that in addition to having the second highest relative wages (1,5 on average), this group also has the second largest employment share (17% on average). The latter also increased substantially over time, which in combination with the rising relative wages after 2016, explains the growing contribution of this group and the upward trend of Theil's T Statistic in the last several years of the examined period. The third positive contributor to wage inequality by occupation is the group of

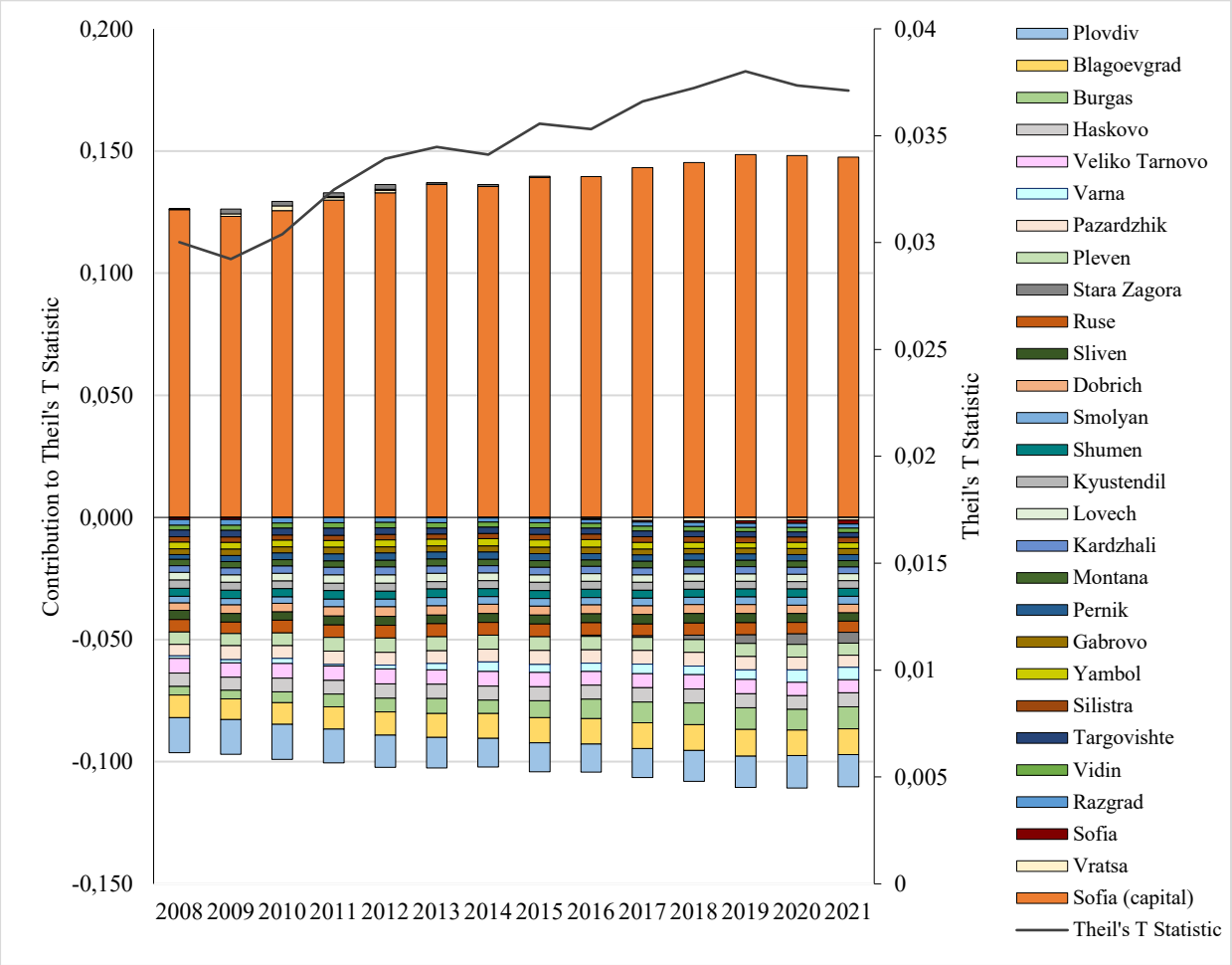
technicians and associate professionals. However, as seen in Figure 2, its weight in shaping wage inequality has been diminishing over time, which is due to falling relative wages. It is logical to suggest that the above-average wages of the three occupational groups with positive contribution to wage inequality reflect their higher educational attainment. Eurostat data for 2021 indeed show that the groups of the *managers*, *professionals*, and *technicians and associate professionals* have the largest shares of employees with tertiary education (71%, 94% and 57% respectively). It is also worth mentioning that the relative positions of these three occupational groups are closely related to the economic sectors which their employees belong to. Not surprisingly, their total employment share is the largest in the information and communication sector, which, as previously outlined, enjoys the highest average earnings and has the largest contribution to between-sector wage inequality.

The rest of the occupational groups have average wages below the national average, which is why they appear below the zero line in Figure 2. The largest negative contributor to wage inequality is the group of *service and sales workers*. Its position is due to the fact that this group has the second lowest relative wages and in the same time ranks first in terms of employment share (18% on average). As one could expect, the sectors in which this occupational group has the largest shares, include *accommodation and food service activities* and *wholesale and retail trade; repair of motor vehicles and motorcycles* (59% and 45% in 2021 respectively). As previously outlined, these are the sectors with wages below the national average and among the largest negative contributors to between-sector wage inequality. Second in terms of its negative contribution to earnings inequality is the group of *elementary occupations*, followed by *plant and machine operators, and assemblers*. While the weights of the first two groups remain relatively stable over time, the contribution of *plant and machine operators, and assemblers* to wage inequality increases over time. This is explained by the fact that this group's relative wages experience a continuous decline throughout the examined period.

4.3 Wage inequality between districts

The evolution of wage inequality between districts is displayed in Figure 3. The black line, showing the values of Theil's T Statistic, suggests an overall upward trend, with two periods, 2009-2013 and 2016-2019, of more pronounced increases. The estimated Theil index in 2021 is 0,037, compared to 0,030 in 2008, suggesting growing wage disparities between districts during the examined period.

Figure 3. Between-district wage inequality (2008-2021)



Source: Author's calculations based on data from the NSI

When looking at the contributions of each district to wage inequality in Figure 3, the difference between the capital Sofia and the other regions is noticeable, which is expected given the substantial regional disparities in Bulgaria. The capital ranks first in terms gross domestic product per capita, exceeding more than twice the country average. Sofia as a capital city also boasts high concentration of institutions and businesses, including affiliates of many multinational enterprises, as it alone attracts half of the FDI in the country. During the examined period 31% of the employees on average were concentrated in the capital, earning wages which exceeded 1,4 times the country average. This combination of high above-average earnings and significant employment share explains the fact that the capital has the largest positive contribution to between-district wage inequality. Furthermore, this contribution has become more pronounced over time mostly due to an expanding employment share. The significant role of the capital in shaping between-district wage inequality can be observed in Figure 3, as the upward trends in the Theil's T Statistic (such as 2009-2013 and 2016-2019)

are accompanied by an increase in the capital's Theil element. The capital's role in increasing wage inequality between districts stems from its economic profile. In particular, the high-wage sectors contributing the most to inter-sectoral pay inequality (*information and communication*, *financial and insurance activities* and *professional, scientific and technical activities*) have the largest employment shares exactly in the capital city. They equal respectively 9%, 6% and 7% on average during the examined period, while the average corresponding values on a district level vary between 1% and 2%. Besides the capital city, there are several other districts which have contributed positively to between-district wage inequality during a part of the examined period. Vratsa and Stara Zagora were positive contributors to Theil's T Statistic until 2014 and 2015 respectively, but after that they turned into negative contributors because of their average wages falling below the national average. Sofia (district) had a positive contribution to between-district pay inequality only in 2011 and 2012, as only in those two years its average wage slightly exceeded the country average.

All the rest of the districts have wages below the country average during the entire period and therefore are negative contributors to between-district wage inequality. Among them Plovdiv has the largest weight in determining between-district wage inequality. This is due to the fact that while the average wage in Plovdiv is around 85 % of the national average, being second in terms of population, it has the second largest employment share after the capital (9 % on average). Next in terms of its negative contribution to between-district wage inequality is Blagoevgrad. This is mostly explained by the fact that the average wage in Blagoevgrad is the second lowest in the country (around 69% of the country average). It is important to note that in both Plovdiv and Blagoevgrad the sector that employs the largest amount of people (respectively 33% and 36% on average) is manufacturing, which, as previously discussed, offers wages below the country average and has the largest negative contribution to inter-sectoral pay inequality. Third in terms of its negative contribution to between-district wage inequality is Burgas, which is the fourth largest district in the Bulgaria. Its relative position is due to the combination of wages what are around 86% of the national average and employment share which is 5% on average for the examined period. What is more, as seen in Figure 3, the role of Burgas for increasing Theil's T Statistic has become much more pronounced over time, which is due to the district's continuously falling relative wages. As in the other districts, the relative position of Burgas is related to the structure of its employment. The three sectors with the largest employment shares are trade, manufacturing, and accommodation and food service activities (17%, 16% and 12% on average). As the previous analysis revealed, employees in

these sectors earn wages below the national average, which also results in the sectors' negative contribution to inter-sectoral pay inequality.

When discussing wage inequality between districts against the backdrop of their employment's sectoral structure, it is worth noting that manufacturing has the largest employment share in all districts, with the exception of Sofia (capital), Varna and Burgas, where trade ranks first. In particular, manufacturing's average employment share on a district level during the examined period is 28%, the lowest being in the capital (9%) and the highest - in Gabrovo (49%). Moreover, in 21 out of the 28 analyzed districts more than 25% of the employees work in this sector. When it comes to manufacturing's average wages, it must be noted that their level is closely related to the level of technological intensity of the sector. Although there has been a decrease in the employment share of low-technology manufacturing with ten percentage points during the examined period, according to Eurostat, as of 2021, it still employs 50% of the workers in the sector, which is much higher compared to the EU-average (35%). Around one fourth of the sector's employees are involved in medium low-technology manufacturing, 18% - in medium high-technology manufacturing, while just 6% work in high-technology manufacturing. The prevalence of low and medium low-technology activities has implications for the sector's average wage, which remains below the national average during the entire period. Manufacturing's below-average wages, as well as the difference between the sector's employment share in the capital and most of the other districts, are clearly reflected in the previously discussed wage disparities between them.

5. Conclusion

Using the between-group component of the Theil's T Statistic, the paper explored wage inequality across economic sectors, occupational groups and districts in the Bulgarian economy in the period 2008-2021. The findings from the analysis can be summarized as follows. First, between-sector wage inequality shows an overall upward trend, especially pronounced since 2015. The sector with the largest positive contribution, which also rises significantly over time, is the highest-paid sector of *information and communication*. The most pronounced negative contributor to inter-sectoral wage inequality is *manufacturing*, which is due to the combination of its below-average wage level and largest employment share. Second, wage inequality between occupational groups experiences an increase over time. Among the groups with wages above the average, the highest-paid group of the *managers* has the largest weight in determining between-group wage inequality, while the group of *service and sales workers* is

the biggest negative contributor due to having the second lowest relative wages and the largest employment share. Third, wage disparities between districts widen over time. The greatest and in most of the time the only positive contributor to this trend, is the capital Sofia, which offers the highest average wage, accounts for one third of the employment in the country and boasts concentration of the highest-paid economic activities. This creates sharp contrast with the majority of the other districts, where manufacturing has the largest employment share and wages are below the national average.

The findings of the paper lead to some policy implications, which despite of being previously addressed in both academic research and political discourse, are still relevant and worth emphasizing. First, given the important role of manufacturing for employment, there is a need to promote further the technological modernization and innovation in enterprises and the expansion of high- and medium-high tech manufacturing industries so that an improvement with regard to the sector's overall productivity and wage level can be achieved. This can not only contribute to a reduction of between-sector wage inequality, but can also mitigate the between-district wage disparities, as manufacturing has the largest employment share in most districts. Second, such technological advancement of the sector has to be accompanied by continued efforts to improve the quality of education so that the skills of the labor force are better aligned with the needs of the business. Among the various measures needed to achieve this, of key importance are expanding the scope and quality of dual training, promoting education in the field of science, technology, engineering and mathematics, enhancement of digital skills etc. With regard to digitalization, Bulgaria ranks 26th of the 27 EU Member States in the European Commission Digital Economy and Society Index in 2022. Despite the progress in recent years, in terms of digital skills of the population, as well as proportion of ICT specialists in the workforce, Bulgaria performs below the EU average. Improvement in this area will not only benefit businesses overall, but it can also alleviate between-sector wage disparities by mitigating the shortage of ICT specialists, which has been putting an upward pressure on the average wages in the fast developing and highest-paid information and communication sector. It has to be noted that the above-mentioned policy implications with regard to enhancing the technological intensity and innovation environment, as well as improving education and skills, have been outlined among the priorities in some recent strategic documents such as the National Development Programme Bulgaria 2030, the Innovation strategy for smart specialisation (2021-2027) and the Strategic framework for the development of education, training and learning in the Republic of Bulgaria (2021-2030). What will be the outcome of the measures specified in these strategic documents, however, is too

early to discuss. Last but not least, the increasing between-district wage inequality in the country calls for further efforts on the part of the regional development policy. Recognizing the importance of reducing the substantial inter-regional disparities and the insufficient role of past regional policy measures in this area, a new integrated territorial approach has been adopted in 2022. In particular, integrated territorial development strategies of the country's six planning regions were approved, taking into consideration the local potential, needs and challenges and aiming to foster the competitiveness and sustainable development of regions. This new approach is also expected to improve the effectiveness of resource allocation for regional development under the programmes co-funded by the EU and other sources of funding. To what extent the goals of this new approach will be attained can be assessed mostly based on whether a reduction in inter-regional inequalities is achieved in the forthcoming years.

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