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Wage Inequality Dynamics and Trade Exposure in South Korea

By
Baybars Karacaovali
Chrysostomos Tabakis

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Abstract

South Korea has experienced a great U-turn in its inequality trends during the past few decades. In this paper, we explore the role of international trade in its wage inequality dynamics over the 1998–2012 period, using a unique household panel survey. Our analysis reveals that most of the overall wage inequality occurs within sectors and educational groups rather than between them. However, the share in total inequality of the "between" variation across sectors

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†*Corresponding author:* University of Hawai'i at Mānoa, Department of Economics, Saunders Hall 531, 2424 Maile Way, Honolulu HI 96822, USA. Telephone: +1 808–956–7296. Email: baybars@hawaii.edu

‡KDI School of Public Policy and Management, Korea. Email: ctabakis@kdischool.ac.kr

and educational groups has moderately increased over time. Furthermore, we document that almost the entire aggregate wage inequality in both manufacturing and services occurs within different trade-exposure categories rather than between them, and this pattern is persistent through time. These results suggest that international trade might not be the main driving force behind the rising wage dispersion in South Korea in the last two decades.

Keywords: Wage inequality; trade exposure; South Korea.
JEL Classification: E24; F14; F16; J31.

1 Introduction

Economic inequality has taken center stage in the public policy debate in recent years. From the Occupy Wall Street movement that started out in New York on September 17, 2011 to the anti-austerity protests in Europe, there has been mounting pressure on politicians and policymakers around the globe to decisively address economic inequality. Against this backdrop, the World Bank lately diverted its focus from per capita GDP growth rates to promoting "shared prosperity" by fostering the income growth of the poorest 40% of the population in every country (World Bank, 2013).

In this paper, we focus on South Korea and explore the role of international trade in its wage inequality dynamics over the 1998–2012 period (i.e., right after the 1997 Asian financial crisis). This is an important endeavor as there has been a great U-turn in the inequality trends in South Korea during the past few decades, with the downward trend of inequality in the late 1980s and early 1990s being reversed in the mid-1990s (GINI, 2013). As a result, the middle class has shrunk from 75.4% of the population in 1990 to 67.5% in 2010 (OECD, 2014).[1] It is not surprising then that President Geun-hye Park pledged to rebuild the middle class as part of her (successful) 2012 campaign (Samy, 2014). At the same time, total trade (i.e., imports + exports) as a percentage of gross domestic product (GDP) dramatically increased from 72.9% in 1998 to 109.9% in 2012, suggesting that international trade might have contributed to raising inequality during the period in question. And our focus on wage inequality is particularly relevant for South Korea as although its overall level of income inequality is close to the average of the OECD economies, its wage inequality is severe, making South Korea one of the worst performers among the OECD countries (GINI, 2013).

We exploit a unique household panel survey, Korean Labor and Income Panel Study (KLIPS), containing detailed information on workers' personal and employment characteristics. We conduct our analysis in several steps. We first document that aggregate wage inequality initially increased sharply

[1] The middle class is defined as those with an income between 50% and 150% of the national median.

and then modestly decreased in South Korea over the 1998–2012 period, reaching its peak around the mid-2000s. We subsequently attempt to quantify the relative importance of alternative possible sources of wage inequality. Our analysis reveals that cross-sectoral wage variation and inter-educational wage dispersion both increased substantially between 1998 and the mid-2000s, and moderately decreased thereafter. However, we also find that most of the overall wage inequality occurs *within* sectors and educational groups rather than *between* sectors and educational groups, which is in contrast with the neoclassical theories of international trade (Heckscher–Ohlin and specific factors models).

Next, we restrict our attention to manufacturing industries' and service sectors' trade exposure, as measured by the relative size of their imports and exports. We demonstrate that wage inequality unambiguously increased over our sample period in manufacturing industries characterized by either high exposure to international trade (i.e., having both high import and high export activity) or low trade exposure (i.e., having neither high import nor high export activity). Wage inequality also increased substantially in high-import industries (i.e., industries characterized by high-import only activity) over 1998–2008, but sharply declined thereafter, whereas it remained relatively constant in high-export manufacturing industries (i.e., manufacturing industries having high-export only activity) during the entire 1998–2012 period. Regarding services, we find that wage inequality initially increased sharply within both high- and low-trade-exposure service sectors, but then decreased within the latter, whereas it remained relatively stable within the former. Moreover, we show that almost the entire aggregate wage inequality in South Korea in both manufacturing and services during the 1998–2012 period occurs *within* different trade-exposure categories rather than *between* them, and this pattern is persistent through time, suggesting that international trade might not be the main driving force behind the rising wage dispersion in South Korea in recent years. Finally, we perform numerous robustness checks. It turns out that the conclusions on the contribution of the "within" component to total wage inequality in both manufacturing and services are very robust.

An extensive literature has looked at wage inequality dynamics around the globe. A number of these papers have provided empirical findings suggesting that the neoclassical trade theory can provide at best a partial explanation for the observed wage inequality patterns, which is in line with our findings. For example, many papers have documented that a significant part of the aggregate wage inequality (or the change thereof) can be explained by within-group wage inequality—i.e., wage inequality among workers with the same observable characteristics (for instance, education and labor market experience)—or wage inequality within occupations, sectors, and sector-occupations (see, for example, Juhn et al., 1993; Lemieux, 2006; Autor et al., 2008; Akerman et al., 2013; Helpman et al., forthcoming). Moreover, there is ample evidence that wage inequality increases in both developed and developing countries in the aftermath of trade liberalization (see, for instance, Goldberg and Pavcnik, 2007). This contradicts the Stolper–Samuelson theorem, which predicts that the skilled–unskilled wage ratio should rise in skill-abundant countries but fall in unskilled-abundant countries following trade liberalization.

There is also a limited literature on inequality dynamics in South Korea. For example, Mah (2003) provides evidence that neither changes in the openness ratio nor those in FDI inflows have a significant influence on income distribution in South Korea over 1975–1995. On the other hand, Sato and Fukushige (2009) demonstrate that during the same period (i.e., 1975–1995), the opening of goods markets reduces income inequality in South Korea in both the short run and the long run. We differ from the past literature on inequality dynamics in South Korea in two important respects. First, our focus lies in highlighting that most of the aggregate wage inequality in South Korea occurs within sectors, educational/skill groups, and trade-exposure categories rather than between them. Second, to the best of our knowledge, this is the first paper to exploit the KLIPS dataset.

The remainder of the paper is organized as follows. In Section 2, we introduce our data. In Section 3, we initially present an overview of wage inequality in South Korea over 1998–2012, and then systematically quantify the relative significance of alternative possible sources of wage inequality. Finally, Section 4 concludes.

2 Data

The principal source of the data used in this paper is the KLIPS dataset, Waves 1–15, which is a panel survey of Korean households and individual members of the households living in urban areas. The survey is conducted annually under the supervision of the Korea Labor Institute, and our data cover the 1998–2012 period. The original sample (Wave 1 in 1998) consisted of 5,000 urban households (excluding Jeju island) and all members thereof aged 15 years or more. In 2009 (Wave 12), a sample of 1,415 households was added to improve the national representativeness of the data.[2]

The KLIPS dataset is largely divided into the Household dataset and the Individual dataset. The former uses each household as the unit of analysis, and includes data on household member basic demographics (for example, gender, year of birth, marital status, or educational history), household income and expenditures, assets (both real estate and financial assets) and debts, household accommodation, and children's education. The Individual dataset, which is the one we employ in our analysis, includes information at the household-member (15+) level on basic demographics (see above), state of economic activity, job-searching activities, form of employment (i.e., regular or irregular) and duration of employment contract, type of occupation and industry affiliation, working hours, wages and income, vocational training and certificates, social insurance, job satisfaction, organizational commitment, and other variables (for instance, life satisfaction or state of health).

Our trade data are obtained from two sources. The data on trade in services are extracted from the Extended Balance of Payments Services (EBOPS) 2010 database of the OECD. The rest of the trade data are taken from UN Comtrade, accessed via the WITS software provided by the World Bank.

[2]The retention rate of the originally sampled households was 70.3% in 2012 (Wave 15).

3 Wage Inequality in South Korea over 1998–2012

3.1 Basic Trends

In this subsection, we investigate the basic trends of wage inequality in South Korea over the 1998–2012 period. The focus of our analysis here and throughout the paper is full-time workers, and our earnings measure is the amount of a worker's average monthly pay. Moreover, to avoid noise in our analysis, we restrict our attention to original household members (i.e., individuals surveyed in 1998 for Wave 1) with at least seven years of (wage) observations and who are employed in one of 15 sectors (to be defined below) with sufficient observations in the KLIPS dataset. This gives us individuals with 7–15 observations each, for a total of 15,726 observations.

We first follow Attanasio et al. (2014) and look at two measures of aggregate wage inequality: (i) the standard deviation of the log wages; and (ii) the difference between the 90th and the 10th percentile of the log wage distribution. As Figure 1A illustrates, the standard deviation of the log wages increased sharply over the 1998–2007 period, and decreased moderately thereafter. The 90–10 differential followed a similar pattern, reaching its peak in 2006 (see Figure 1B).

We then attempt to quantify the relative significance of alternative possible sources of wage inequality. Initially, we calculate sectoral wage premia. To this end, we aggregate the 63 divisions of the Korean Standard Industrial Classification (KSIC), Revision 8, into 21 sectors (see Table A1). Due to data considerations, we only use 15 of them in our analysis, as there are too few observations in KLIPS falling under the remaining six sectors. Table 1 lists these 15 sectors and their employment shares in our sample, along with the 1998–2012 average of the mean log wage in each sector relative to the overall mean log wage. Moreover, Figures 2 and 3 report, respectively, the relative mean log wage by sector and the standard deviation of the relative mean log wage across sectors for each year in our sample period. Our analysis reveals that there is substantial variation in average wages across sectors. For exam-

ple, the sectors of electricity, gas and water supply, financial and insurance services, post and communication, or education pay (on average) substantial wage premia in comparison with the sectors of real estate, rental and leasing activities or hotels and restaurants. Furthermore, Figure 3 demonstrates that cross-sectoral wage variation increased substantially between 1998 and 2006, and modestly decreased afterwards.

We subsequently decompose overall wage inequality (T) into a within-sector (W) and a between-sector (B) component, exactly as in Helpman et al. (forthcoming). In particular, we perform the following decomposition:

$$T_t = W_t + B_t, \tag{1}$$

where:

$$T_t = \frac{1}{N_t} \sum_s \sum_{i \in s} \left(w_{it} - \overline{w}_t \right)^2, \tag{2}$$

$$W_t = \frac{1}{N_t} \sum_s \sum_{i \in s} \left(w_{it} - \overline{w}_{st} \right)^2, \text{ and} \tag{3}$$

$$B_t = \frac{1}{N_t} \sum_s N_{st} \left(\overline{w}_{st} - \overline{w}_t \right)^2, \tag{4}$$

where i, t index, respectively, workers and time, s denotes sector, N_t is the total number of workers in year t, N_{st} denotes the number of workers employed in sector s in t, w_{it} is the log wage of worker i in year t, $\overline{w}_{st}$ is the mean log wage within sector s in t, and $\overline{w}_t$ is the overall average log wage in t. Figure 4 depicts the results of this decomposition exercise, while Figure 5 displays the contribution of the within-sector component to total log wage inequality. As the latter figure clearly illustrates, the within-sector component of wage inequality accounts for the lion's share of aggregate wage inequality in South Korea over 1998–2012, but this share fell from around 89% at the beginning of our sample period to about 81% at the end of the sample period. The corresponding rise in the share of the between-sector component suggests that international trade might be playing a role in the wage distribution (in line with the neoclassical theories of international trade).

Next, we focus on educational attainment. We first divide workers into three broad categories based on their education: (i) middle school or less; (ii) more than middle school but less than university (i.e., two-year college or just high school); and (iii) university or more (i.e., graduate school). Figure 6 depicts how wage inequality—as measured by the standard deviation of the log wages—changed within each group during 1998–2012. The basic conclusion that we can draw from the figure is that within-group wage inequality increased for all three groups over the period in question, with the university-educated group exhibiting the smallest increase.

We now use more disaggregated educational categories to obtain deeper insights into the impact of education on wage dispersion in South Korea. More specifically, we distinguish between workers who have completed up to: (i) elementary school (or have no schooling at all); (ii) middle school; (iii) high school; (iv) a two-year college; (v) university studies; and (vi) graduate studies (see Table 2). Figure 7 shows the relative mean log wage for each of the six educational categories over 1998–2012, revealing a substantial increase over time in the university premium relative to not having completed high school. Moreover, Figure 8 reports the standard deviation of the relative mean log wage across the six educational categories during the period in question. It is evident from the figure that inter-educational wage variation increased sharply over 1998–2007, and modestly decreased thereafter.

Our last task in this subsection is to decompose overall wage inequality into a within-educational-category and a between-educational-category component, following the same decomposition method as the one described by equations (1)–(4). Our findings are illustrated in Figures 9 and 10. Although the within-educational-category component of wage inequality accounted for an overwhelming share of total wage inequality (almost 79.5%) in 1998, this share gradually declined afterwards achieving a minimum in 2003 (with a value of around 66.5%), and moderately rebounded thenceforth. Therefore, there is some evidence of inter-educational wage variation contributing to the rise in inequality.[3]

[3]Note that in a heterogeneous-firm framework, international trade can contribute to within-sector and/or within-occupation wage inequality, as it induces wage dispersion

3.2 Trade Exposure and Wage Inequality

Given our focus on the role of international trade in wage inequality in South Korea, in this subsection, we restrict our attention to sectors' exposure to international trade. We start by looking at manufacturing. We divide all International Standard Industrial Classification (ISIC), Revision 3, 3-digit manufacturing industries into four categories based on their exports and imports (see Table 3): (1) industries with high imports only; (2) industries with both high imports and high exports; (3) industries with high exports only; and (4) industries with neither high imports nor high exports. More precisely, a high-import (high-export) industry is defined as an industry the average imports (exports) of which over 1998–2012 are above the 50th percentile of the distribution of average imports (exports) of all ISIC 3-digit manufacturing industries during the period in question.[4] The explicit distinction between export activity and import activity is important as they might be expected to have very different implications for wage inequality. For instance, there is ample empirical evidence that exporting firms tend to pay a wage premium relative to non-exporters (see, for example, Bernard and Jensen, 1995; Schank et al., 2007; Baumgarten, 2013). At the same time, there is evidence that import competition tends to depress domestic wages (see, for instance, Revenga, 1992; Autor et al., 2013). Table 4 reports the total number of observations and the 1998–2012 average of the relative mean log wage for each of the four trade-exposure categories of manufacturing.[5]

Carrying out a similar analysis as before, Figures 11–12 display, respectively, the standard deviation of the log wages and the relative mean log wage

between firms, which is related to their trade participation (see, for example, Helpman et al., forthcoming). This is an interesting research avenue to pursue, but it is beyond the scope of this paper.

[4] In our robustness analysis (see Subsection 3.3), we experiment with higher thresholds or categorize industries based on their imports and exports over value added.

[5] There might be concern that industry size is strongly correlated with placement into category (4). In particular, a "small" industry could import most of its inputs and export most of its output, but due to its size, it might still be categorized as an industry with neither high imports nor high exports (using our methodology). However, given that our analysis is at a relatively aggregate level (3-digit ISIC) and that South Korea is an advanced, trade-oriented economy, we believe that this is not a major concern.

by trade-exposure category over 1998–2012, while Figure 13 reports the standard deviation of the relative mean log wage across the four trade-exposure categories over the same period. A number of conclusions can be drawn from Figures 11–13. First, wage inequality unambiguously increased over 1998–2012 in industries with either high exposure to international trade (i.e., with both high imports and high exports—category (2) in our classification) or low trade exposure (i.e., with neither high imports nor high exports—category (4) in our classification). Wage inequality also increased substantially in the high-import industries between 1998 and 2008—especially between 2007 and 2008—but sharply declined thereafter, whereas it remained relatively stable in the high-export industries over the entire 1998–2012 period. Second, the industries with low exposure to trade used to pay a significant wage premium relative to all other industries, but this premium disappeared after 2006.[6] Third, the standard deviation of the relative mean log wage across the four trade-exposure categories decreased over our sample period (as illustrated by Figure 13).

Next, we decompose—along the lines of equations (1)–(4)—total wage inequality in manufacturing into two components: a within-trade-exposure-category component and a between-trade-exposure-category one. Our results are reported in Figures 14 and 15. The "within" component accounts for nearly the entire level of aggregate wage inequality in South Korean manufacturing over 1998–2012, reaching frequently astounding shares in excess of 99%. Moreover, the share of the "between" component remained stable throughout this entire period, implying that international trade may not be the (major) culprit in the rise in wage inequality.

We now turn to the service sectors (of Table 1) and perform the same categorization exercise as above on the basis of their trade exposure. Due to lack of data availability, we are forced to drop the following four sectors: (i) electricity, gas and water supply; (ii) wholesale and retail sale trade; (iii) hotels and restaurants; and (iv) real estate, rental and leasing activities. The classification of the remaining 10 service sectors based on their imports

[6] In fact, it is the high-export industries that tend to pay a wage premium (relative to the rest of industries) in the post-2006 period.

and exports is shown in Table 5, while Table 6 lists the total number of observations and the relative mean log wage averaged over 1998–2012 for each trade-exposure category of services. It should be noted here that there is no service sector that is characterized by high imports but, at the same time, has low export activity (using the 50th-percentile threshold), and vice versa. As a result, the service sectors are divided into only two trade-exposure categories: (1) sectors with neither high imports nor high exports; and (2) sectors with both high imports and high exports.

We carry out the same analysis as for manufacturing and report the results in Figures 16–20. A number of important observations can be made regarding the service sectors in South Korea during the 1998–2012 period. First, Figure 16 shows that wage inequality initially increased sharply within both trade-exposure categories, but then decreased in the low-trade-exposure service sectors (i.e., category (1) in our classification), while it remained relatively stable in the high-trade-exposure ones (i.e., category (2) in our classification). Second, the service sectors with low exposure to trade pay on average a significant wage premium relative to the high-trade-exposure sectors (Figure 17). The premium paid by the former (i.e., the low-trade-exposure sectors) was particularly high during 2001–2003, leading to a surge during these years in the standard deviation of the relative mean log wage across the two trade-exposure categories (as illustrated by Figure 18). Third, the within-trade-exposure-category component of wage inequality accounts steadily for more than 95.5% of total wage inequality in the service sectors of South Korea over our sample period, and apart from a small decline during 2001–2003, the share of the "between" component is again relatively stable through time exactly as in the case of manufacturing (Figures 19 and 20).

In brief, our results so far demonstrate that almost the entire aggregate wage inequality in South Korea in both manufacturing and services during the 1998–2012 period can be explained by wage inequality within different trade-exposure categories rather than between them. Furthermore, the contribution to total inequality of the "between" variation across trade-exposure categories is fairly stable during the period in question. These findings suggest that international trade might not be the main driving force behind the

increase in wage dispersion in South Korea in recent years.

3.3 Robustness

We now carry out a series of robustness checks to assess the generality of the aforementioned conclusions.[7] First, we delve further into the skill premium. More specifically, we divide workers into skilled and unskilled, where the former group includes workers who have attended at least a two-year college. We find that for both groups of workers, wage inequality initially increased substantially and then moderately decreased. Furthermore, the skill wage premium increased significantly over our sample period, reaching its peak in 2006 and then slightly declining. And our usual decomposition exercise reveals that the within-skill-group component of wage inequality typically accounts for more than 80% of total wage inequality in South Korea over the period in question—exhibiting though a U-curve pattern—which is well in line with our previous findings. More importantly, we subsequently decompose aggregate wage inequality in manufacturing and services (separately) into a within-trade-exposure-category-skill-group component and a between-trade-exposure-category-skill-group component. Even allowing for such a degree of disaggregation, our results are very robust. As Figures 21–24 illustrate, the "within" component accounts consistently for more than 82% of total wage inequality in both manufacturing and services over 1998–2012. However, this share has declined to some extent over time for both manufacturing and services, which is consistent with the evolution of the contribution to aggregate inequality of the between-educational-category wage variation as illustrated by Figure 10.

We next restrict our attention to manufacturing and redivide all ISIC 3-digit manufacturing industries into our four (manufacturing) trade-exposure categories but using a 75th-percentile threshold instead of a 50th-percentile one. In other words, a high-import (high-export) industry is now defined as an industry the average imports (exports) of which during the 1998–2012 period are above the 75th percentile of the distribution of average imports

[7] The complete robustness analysis is available from the authors upon request.

(exports) of all ISIC 3-digit manufacturing industries over the period in question. Our qualitative conclusions on the role of trade in wage inequality in South Korea are unchanged as the within-trade-exposure-category component of wage inequality still accounts for 93% or more of total wage inequality in South Korean manufacturing over 1998–2012. The only notable difference is that when using the 75th-percentile threshold for our sorting, the high-export industries tend to pay a wage premium relative to all other industries over our entire sample period rather than only in the post-2006 period.

We also experiment with an even higher threshold (90th percentile) or categorize industries based on their imports and exports over value added (while using a 50th-percentile threshold). Our results regarding the impact of trade on wage inequality are qualitatively unaffected, even though the contribution of the "within" component to total inequality in manufacturing is somewhat lower (but still quite high).[8]

Finally, we turn to the service sectors and redivide them into our two (service) trade-exposure categories while using a 90th-percentile threshold rather than a 50th-percentile one.[9] It turns out that the conclusions we reached previously on the wage premium paid by the low-trade-exposure service sectors and on the contribution of the "within" component to aggregate wage inequality in services are still valid.

4 Conclusions

In this paper, we have explored the role of international trade in the wage inequality dynamics in South Korea over the 1998–2012 period. This is an important endeavor as South Korea has experienced a great U-turn in its inequality trends during the past few decades, while at the same time, its total trade as a percentage of GDP has skyrocketed.

[8]Note here that when looking at imports and exports over value added, it is the industries with both high imports and high exports that tend to pay a wage premium relative to the rest of industries over our sample period.

[9]Note here that no service sector has average imports (exports) between the 75th and 90th percentiles of the distribution of average imports (exports) of all service sectors during 1998–2012.

We have exploited a unique household panel survey containing detailed information on workers' personal and employment characteristics. Our analysis reveals that aggregate wage inequality initially increased sharply and then moderately decreased in South Korea over our sample period, reaching its peak around the mid-2000s. In an attempt to quantify the relative significance of alternative possible sources of wage inequality, we have demonstrated that cross-sectoral wage variation and inter-educational wage dispersion both increased substantially between 1998 and the mid-2000s, and modestly decreased afterwards. However, we have also shown that most of the aggregate wage inequality occurs within sectors and educational groups rather than between sectors and educational groups.

When looking at trade exposure, wage inequality unambiguously increased in manufacturing industries characterized by either high or low trade exposure, as well as in high-trade-exposure service sectors. What is more important, though, is that in both manufacturing and services, (i) almost the entire overall wage inequality occurs within different trade-exposure categories rather than between them; and (ii) the share in total inequality of the "between" variation across trade-exposure categories is relatively stable over the entire sample period. These findings suggest that international trade might not be the main driving force behind rising wage dispersion in South Korea in recent years. Finally, our analysis establishes that the conclusions on the contribution of the "within" component to aggregate wage inequality in manufacturing as well as in services are very robust.

References

[1] Akerman, Anders, Elhanan Helpman, Oleg Itskhoki, Marc-Andreas Muendler, and Stephen Redding (2013). "Sources of Wage Inequality." *American Economic Review: Papers & Proceedings*, 103, 214–219.

[2] Attanasio, Orazio, Pinelopi K. Goldberg, and Nina Pavcnik (2014). "Trade Reforms and Wage Inequality in Colombia." *Journal of Development Economics*, 74, 331–366.

[3] Autor, David H., David Dorn, and Gordon H. Hanson (2013). "The China Syndrome: Local Labor Market Effects of Import Competition in the United States." *American Economic Review*, 103, 2121–2168.

[4] Autor, David H., Lawrence F. Katz, and Melissa S. Kearney (2008). "Trends in U.S. Wage Inequality: Revising the Revisionists." *The Review of Economics and Statistics*, 90, 300–323.

[5] Baumgarten, Daniel (2013). "Exporters and the Rise in Wage Inequality: Evidence from German Linked Employer–Employee Data." *Journal of International Economics*, 90, 201–217.

[6] Bernard, Andrew B., and J. Bradford Jensen (1995). "Exporters, Jobs, and Wages in U.S. Manufacturing: 1976–1987." *Brookings Papers on Economic Activity. Microeconomics*, 1995, 67–119.

[7] GINI (2013). *Growing Inequality and Its Impacts in Korea: Country Report for Korea*. GINI Project.

[8] Goldberg, Pinelopi K., and Nina Pavcnik (2007). "Distributional Effects of Globalization in Developing Countries." *Journal of Economic Literature*, 45, 39–82.

[9] Helpman, Elhanan, Oleg Itskhoki, Marc-Andreas Muendler, and Stephen J. Redding (forthcoming). "Trade and Inequality: From Theory to Estimation." *Review of Economic Studies.*

[10] Juhn, Chinhui, Kevin M. Murphy, and Brooks Pierce (1993). "Wage Inequality and the Rise in Returns to Skill." *Journal of Political Economy*, 101, 410–442.

[11] Lemieux, Thomas (2006). "Increasing Residual Wage Inequality: Composition Effects, Noisy Data, or Rising Demand for Skill?" *American Economic Review*, 96, 461–498.

[12] Mah, Jai S. (2003). "A Note on Globalization and Income Distribution—The Case of Korea, 1975–1995." *Journal of Asian Economics*, 14, 157–164.

[13] OECD (2014). *OECD Economic Surveys: Korea*. Economic and Development Review Committee, OECD.

[14] Revenga, Ana L. (1992). "Exporting Jobs? The Impact of Import Competition on Employment and Wages in U.S. Manufacturing." *The Quarterly Journal of Economics*, 107, 255–284.

[15] Samy, Yiagadeesen (2014). "Globalization, Income Inequality, and Deindustrialization: The Case of South Korea." Korea Economic Institute of America (KEI) Academic Paper Series.

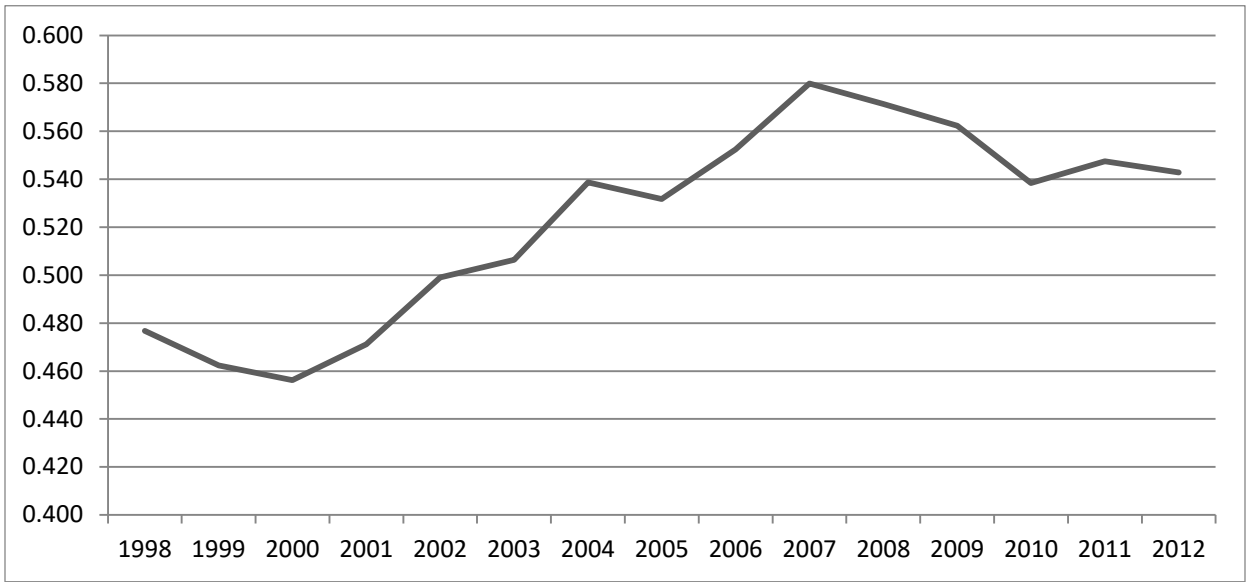
[16] Sato, Sumie, and Mototsugu Fukushige (2009). "Globalization and Economic Inequality in the Short and Long Run: The Case of South Korea 1975–1995." *Journal of Asian Economics*, 20, 62–68.

[17] Schank, Thorsten, Claus Schnabel, and Joachim Wagner (2007). "Do Exporters Really Pay Higher Wages? First Evidence from German Linked Employer–Employee Data." *Journal of International Economics*, 72, 52–74.

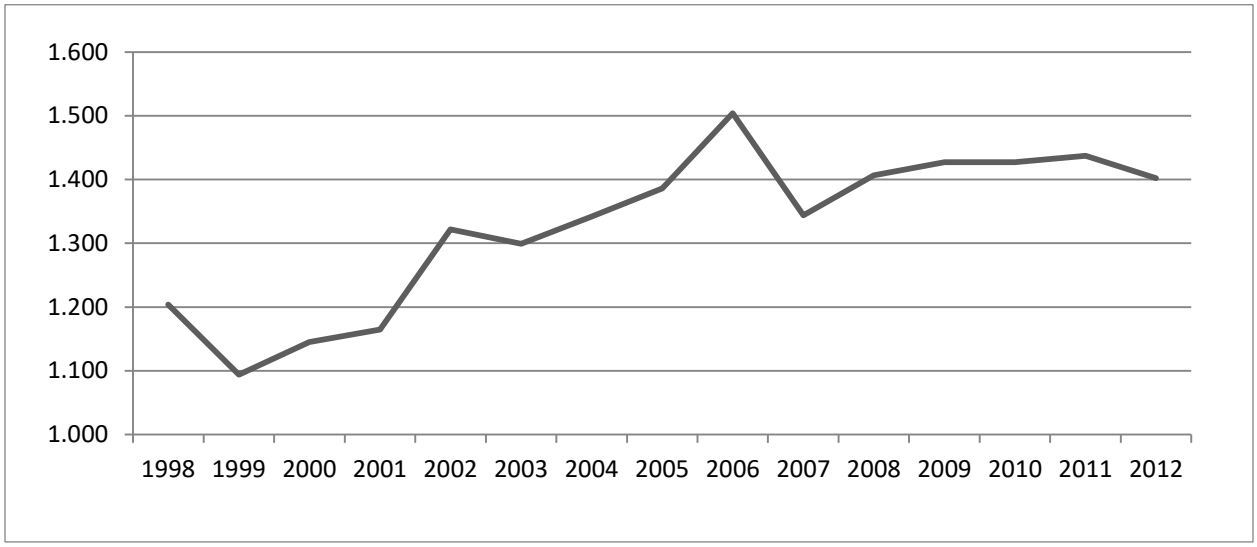
[18] World Bank (2013). *Inequality in Focus*, Vol. 2, No. 3. Poverty Reduction and Equity Department, World Bank.

FIGURE 1. AGGREGATE WAGE INEQUALITY (1998–2012)

PANEL A. Standard Deviation of Log Wages



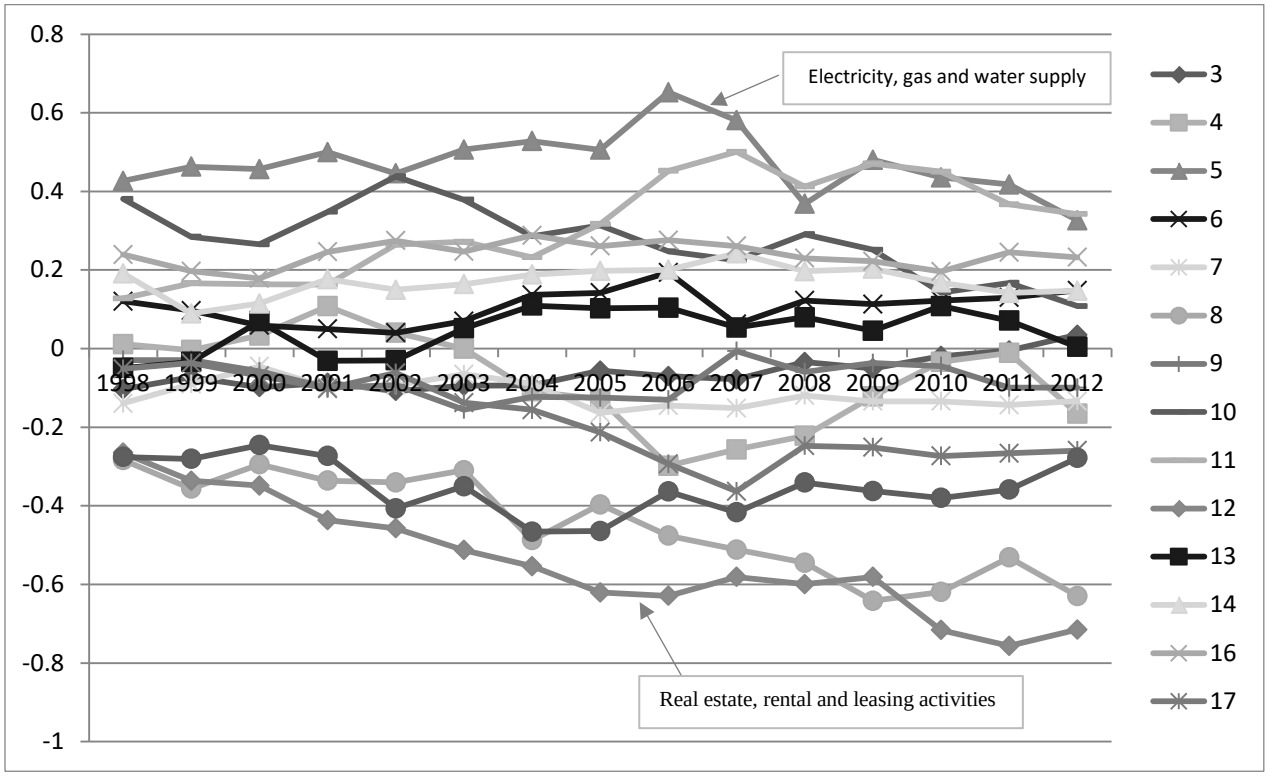
PANEL B. Difference between 90th and 10th Percentiles of Log Wages



Source: Authors' calculations using Korean Labor and Income Panel Study (KLIPS)

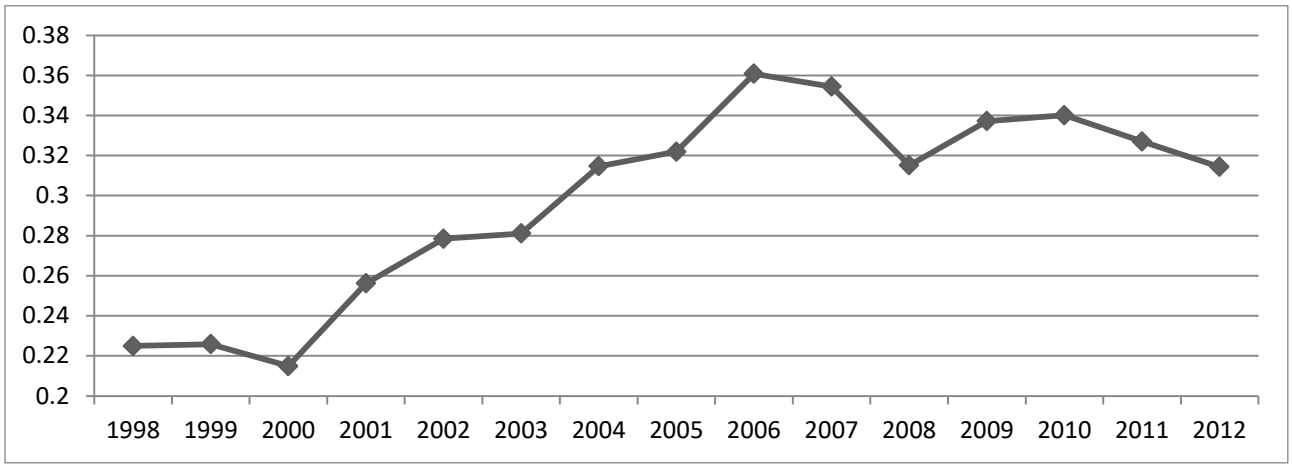
Note: KLIPS is the main source of data in all figures and tables unless otherwise noted.

FIGURE 2. RELATIVE MEAN LOG WAGE BY SECTOR



Notes: 1. The sectors are described in Table 1.
2. The difference between average log wage for each sector relative to overall average log wage for the whole sample.

FIGURE 3. STANDARD DEVIATION OF RELATIVE MEAN LOG WAGE ACROSS SECTORS



Note: Standard deviation of the difference between average log wage for each sector relative to overall average log wage for the whole sample.

FIGURE 4. WAGE INEQUALITY DECOMPOSITION: WITHIN VERSUS BETWEEN SECTORS

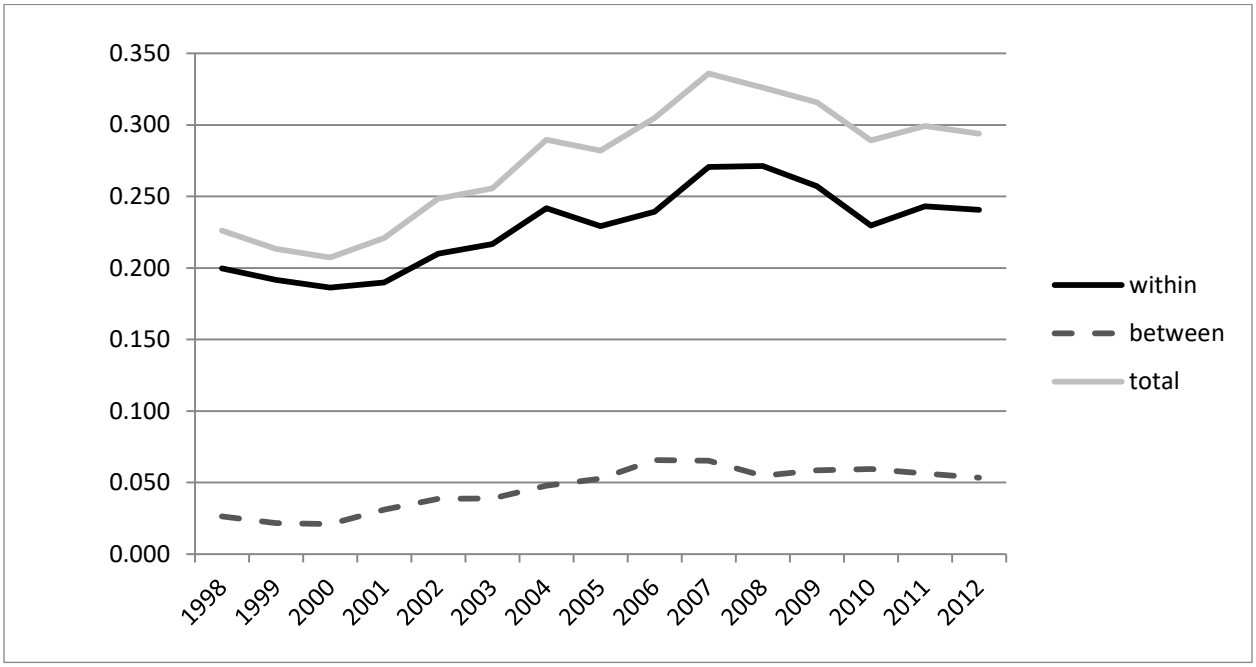


FIGURE 5. SHARE OF WITHIN-SECTOR WAGE INEQUALITY IN TOTAL INEQUALITY

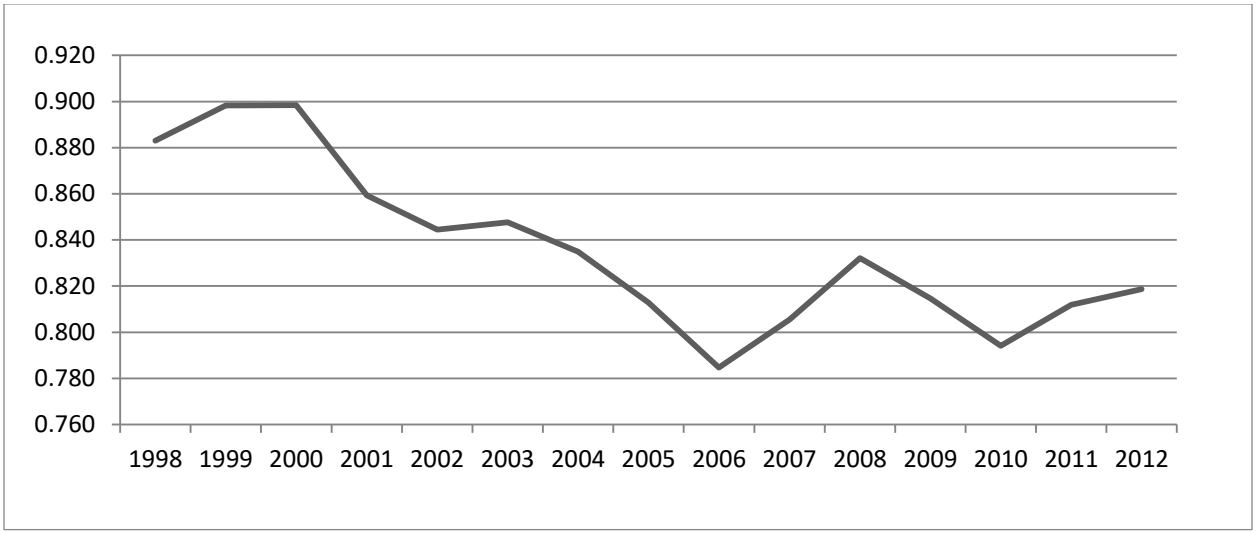
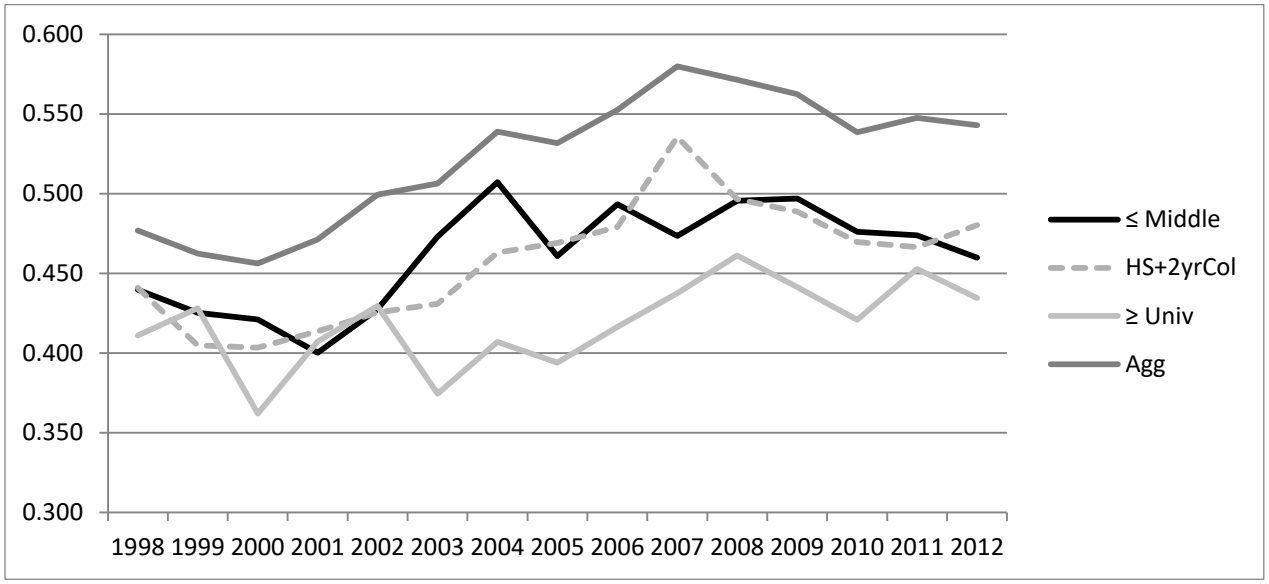
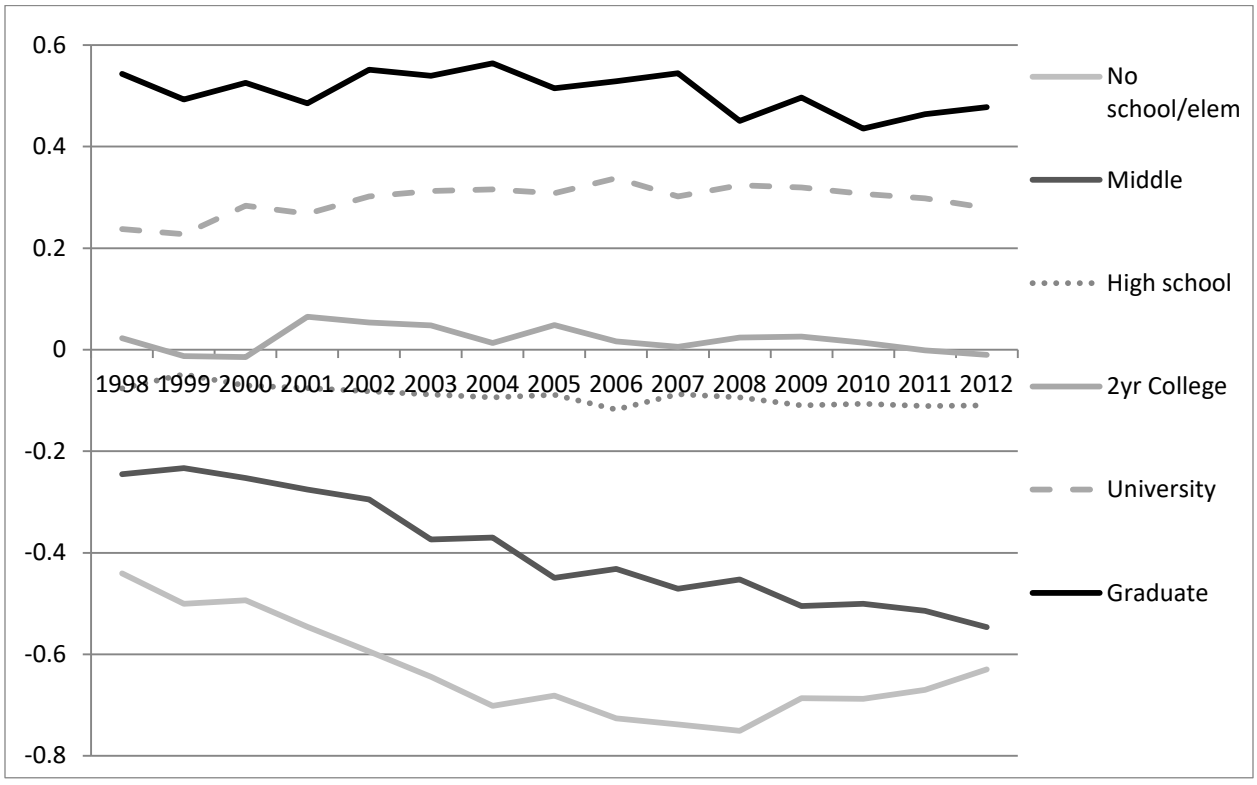


FIGURE 6. WAGE INEQUALITY WITHIN BROAD EDUCATIONAL CATEGORIES



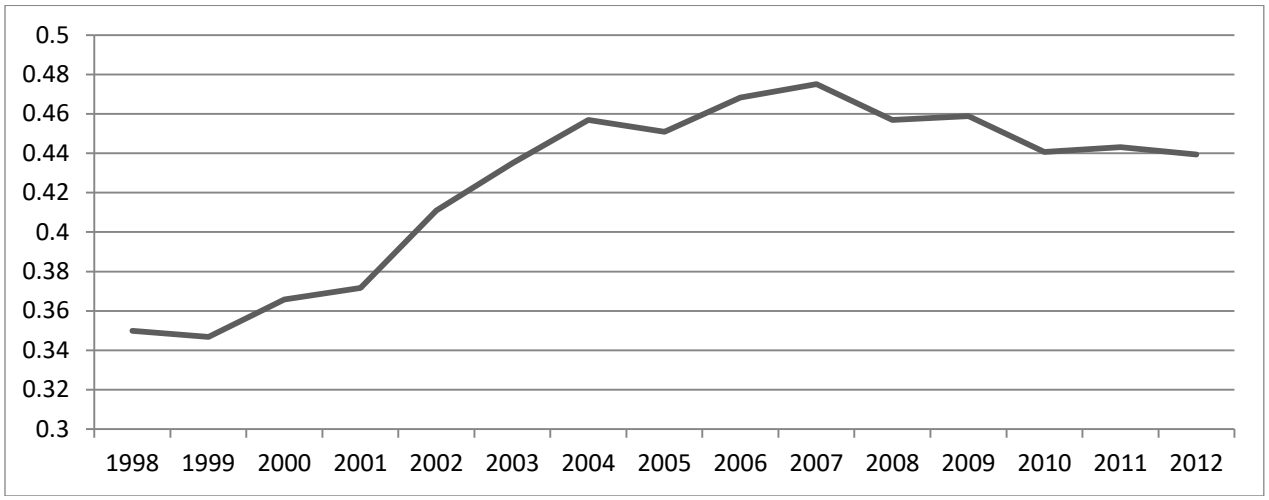
Note: Standard deviation of log wages within each broad educational category.

FIGURE 7. RELATIVE MEAN LOG WAGE BY EDUCATIONAL ATTAINMENT



Note: The difference between average log wage for each educational category relative to overall average log wage for the whole sample.

FIGURE 8. STANDARD DEVIATION OF RELATIVE MEAN LOG WAGE ACROSS EDUCATIONAL CATEGORIES



Note: Standard deviation of the difference between average log wage for each educational category relative to overall average log wage for the whole sample.

FIGURE 9. WAGE INEQUALITY DECOMPOSITION: WITHIN VERSUS BETWEEN EDUCATIONAL CATEGORIES

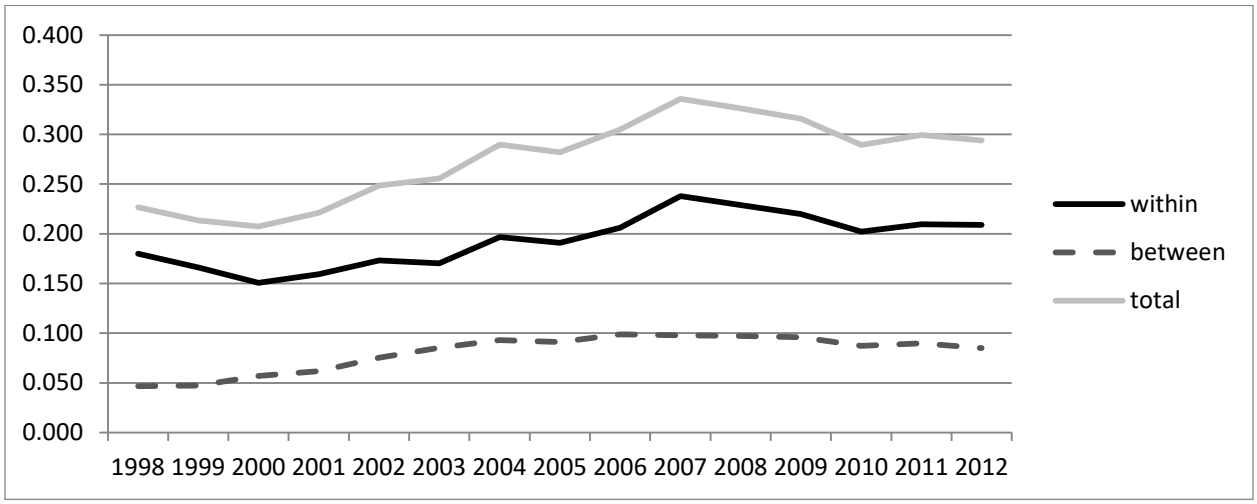


FIGURE 10. SHARE OF WITHIN-EDUCATIONAL-CATEGORY WAGE INEQUALITY IN TOTAL INEQUALITY

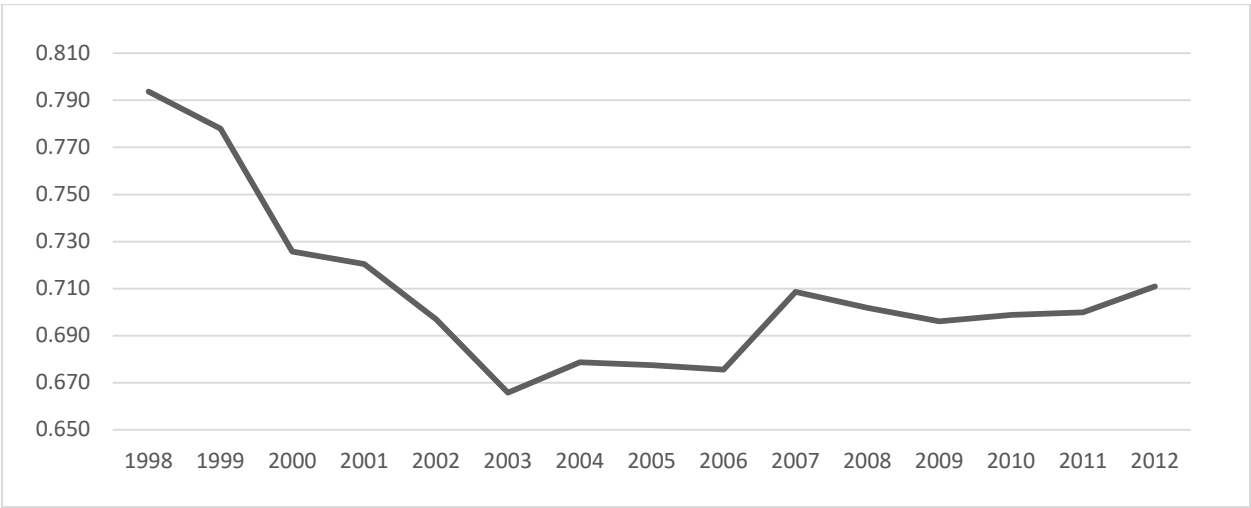
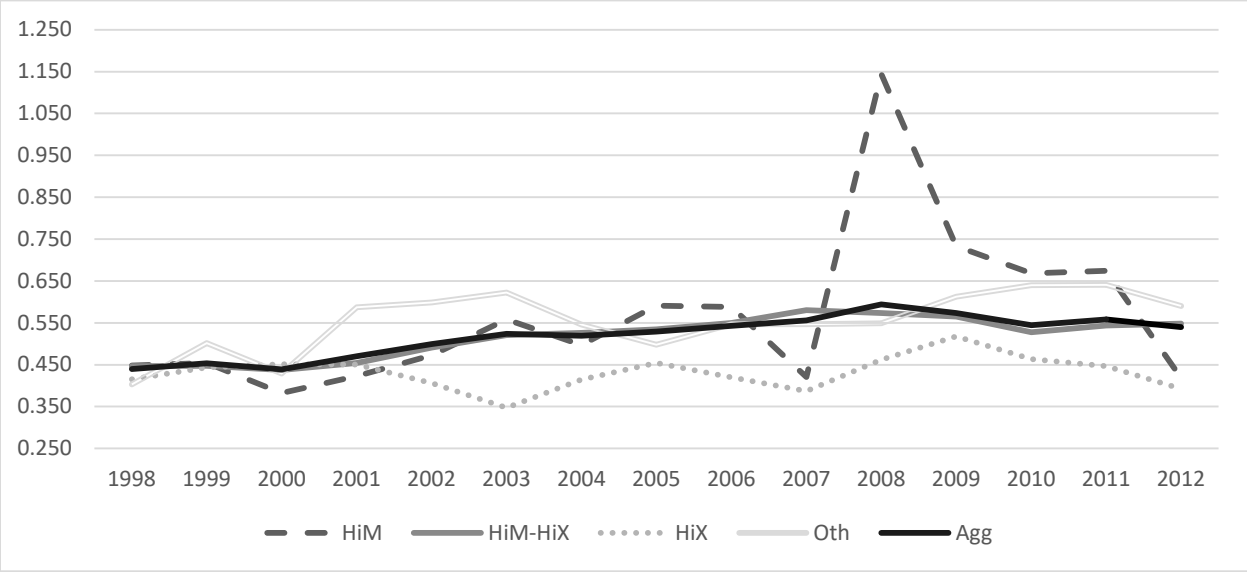
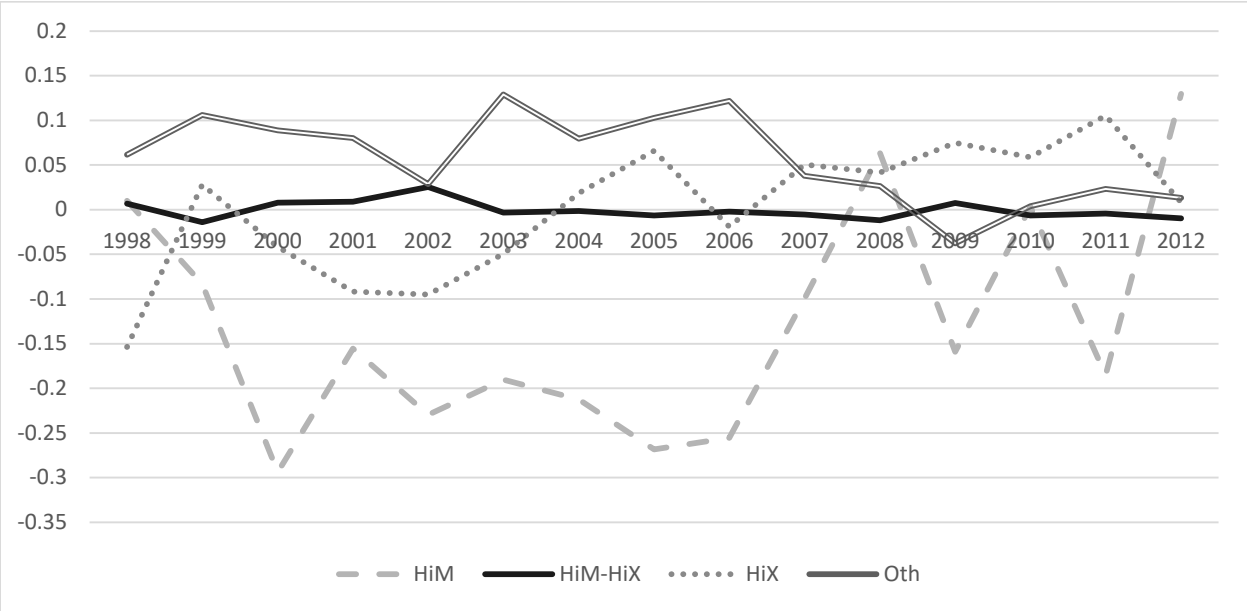


FIGURE 11. WAGE INEQUALITY WITHIN MANUFACTURING SECTORS BY TRADE EXPOSURE



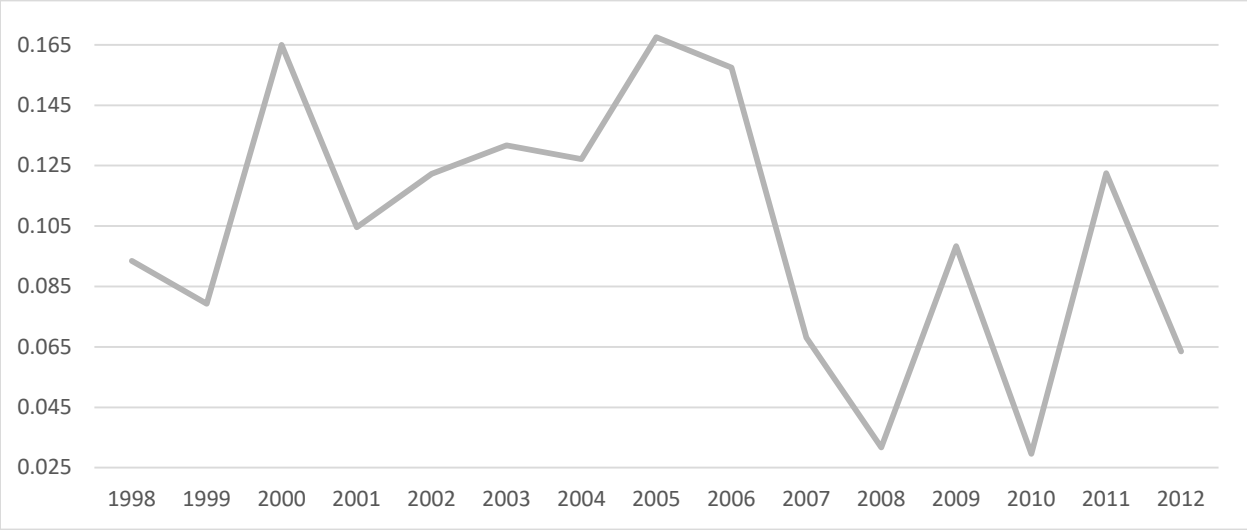
Notes: 1. Standard deviation of log wages within each trade-exposure category in manufacturing.
2. The trade exposure of manufacturing sectors is indicated in Table 3.

FIGURE 12. RELATIVE MEAN LOG WAGE BY TRADE EXPOSURE IN MANUFACTURING



Note: The difference between average log wage for each trade-exposure category relative to overall average log wage for the whole sample of manufacturing sectors.

FIGURE 13. STANDARD DEVIATION OF RELATIVE MEAN LOG WAGE ACROSS TRADE-EXPOSURE CATEGORIES IN MANUFACTURING



Note: Standard deviation of the difference between average log wage for each trade-exposure category relative to overall average log wage for the whole sample of manufacturing sectors.

FIGURE 14. WAGE INEQUALITY DECOMPOSITION: WITHIN VERSUS BETWEEN CATEGORIES OF TRADE EXPOSURE IN MANUFACTURING

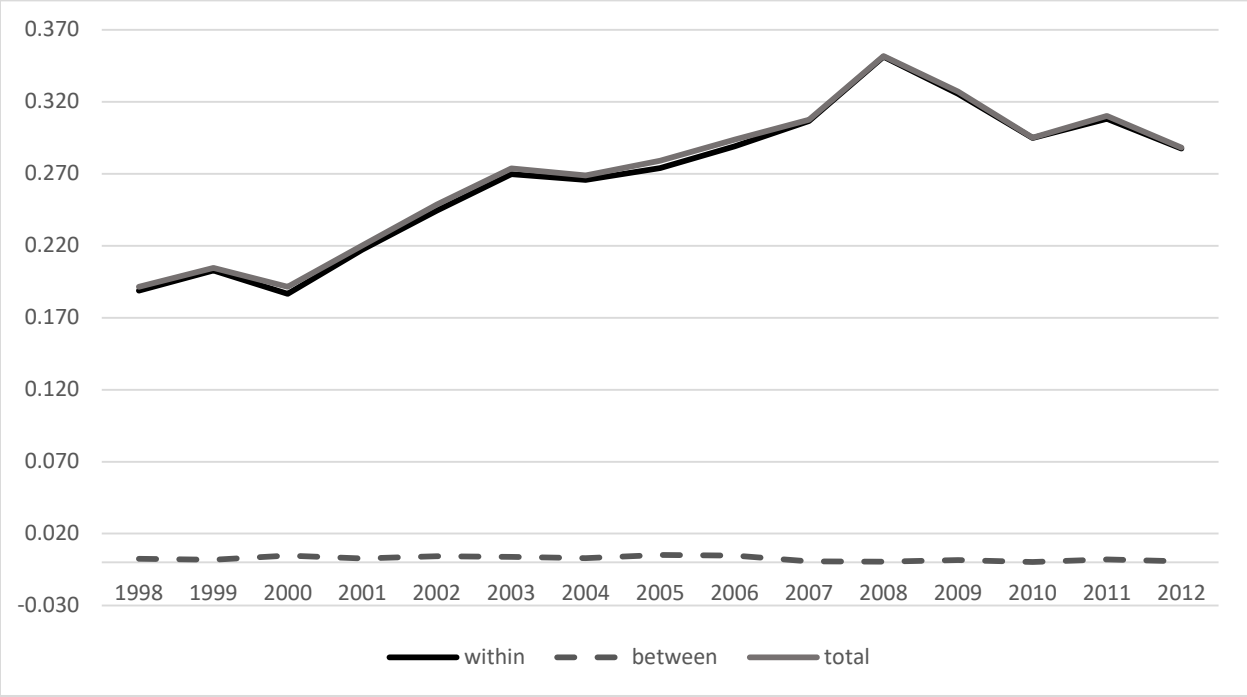


FIGURE 15. SHARE OF WITHIN-TRADE-EXPOSURE-CATEGORY WAGE INEQUALITY IN TOTAL INEQUALITY IN MANUFACTURING

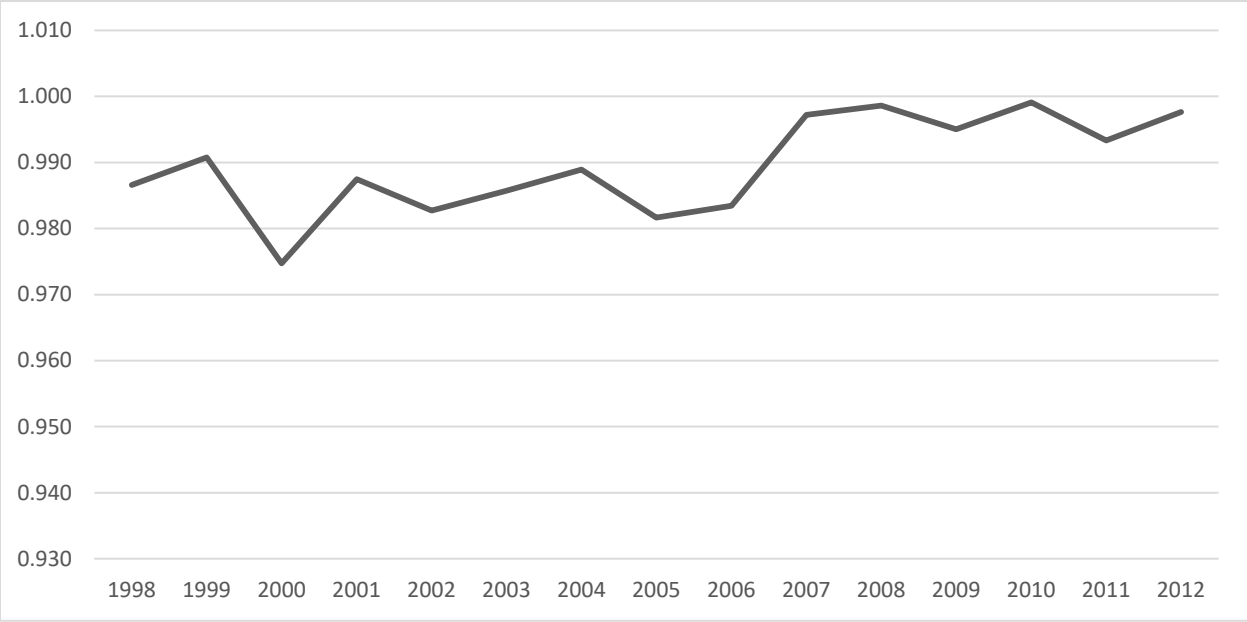
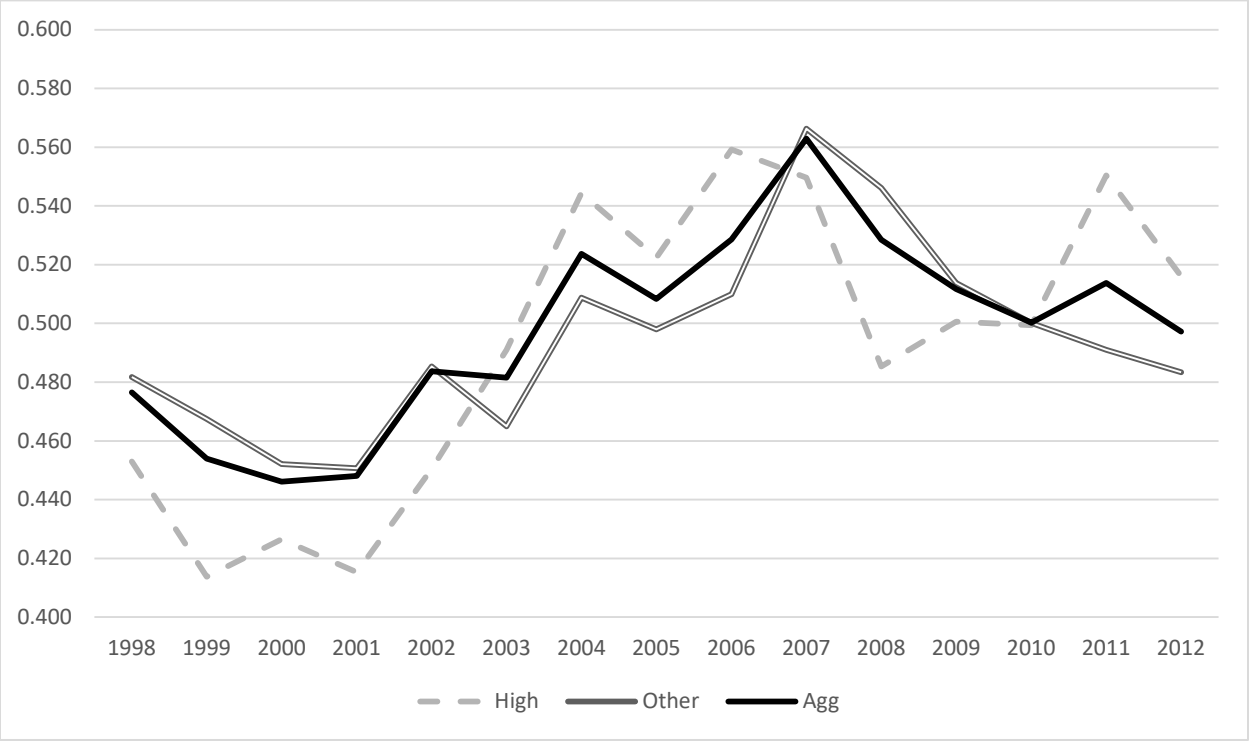
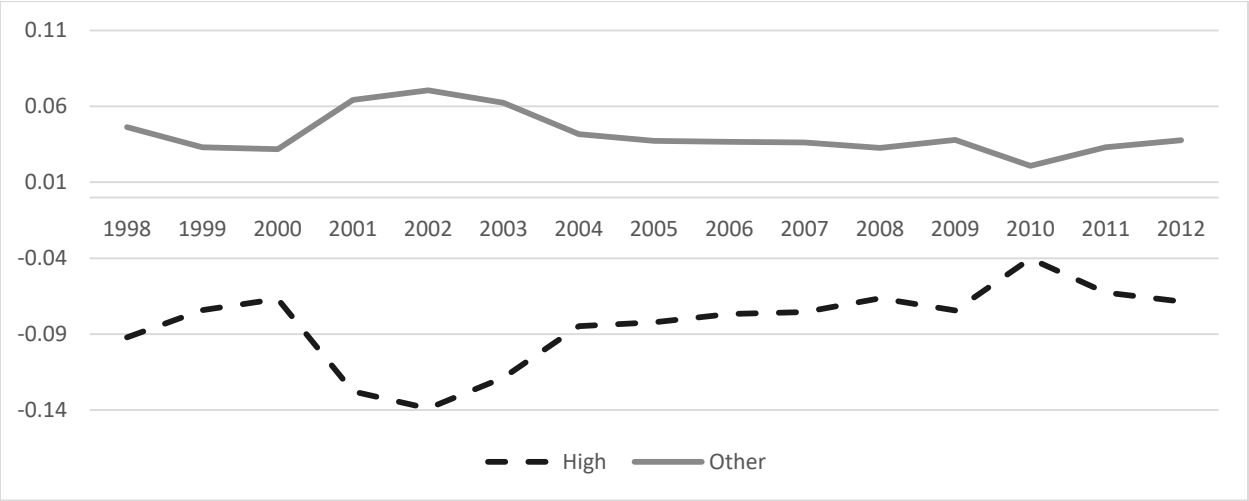


FIGURE 16. WAGE INEQUALITY WITHIN SERVICE SECTORS BY TRADE EXPOSURE



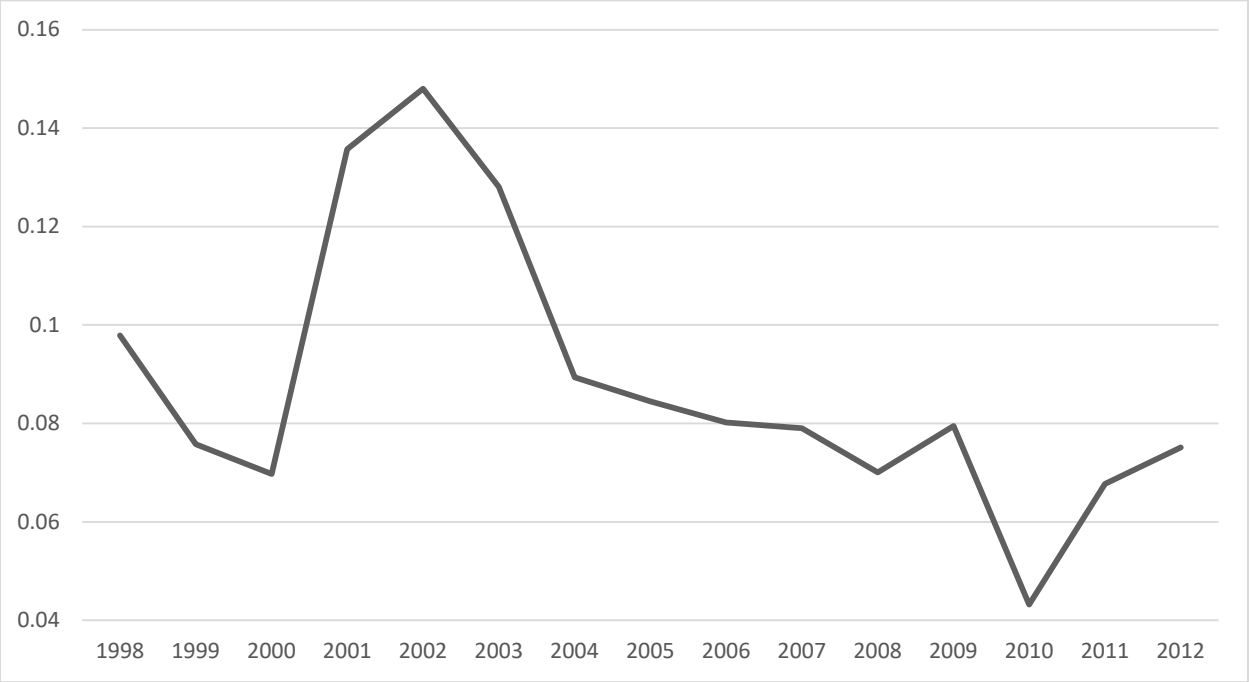
Notes: 1. Standard deviation of log wages within each trade-exposure category in services.
2. The trade exposure of service sectors is indicated in Table 5.

FIGURE 17. RELATIVE MEAN LOG WAGE BY TRADE EXPOSURE IN SERVICES



Note: The difference between average log wage for each trade-exposure category relative to overall average log wage for the whole sample of service sectors.

FIGURE 18. STANDARD DEVIATION OF RELATIVE MEAN LOG WAGE ACROSS TRADE-EXPOSURE CATEGORIES IN SERVICES



Note: Standard deviation of the difference between average log wage for each trade-exposure category relative to overall average log wage for the whole sample of service sectors.

FIGURE 19. WAGE INEQUALITY DECOMPOSITION: WITHIN VERSUS BETWEEN CATEGORIES OF TRADE EXPOSURE IN SERVICES

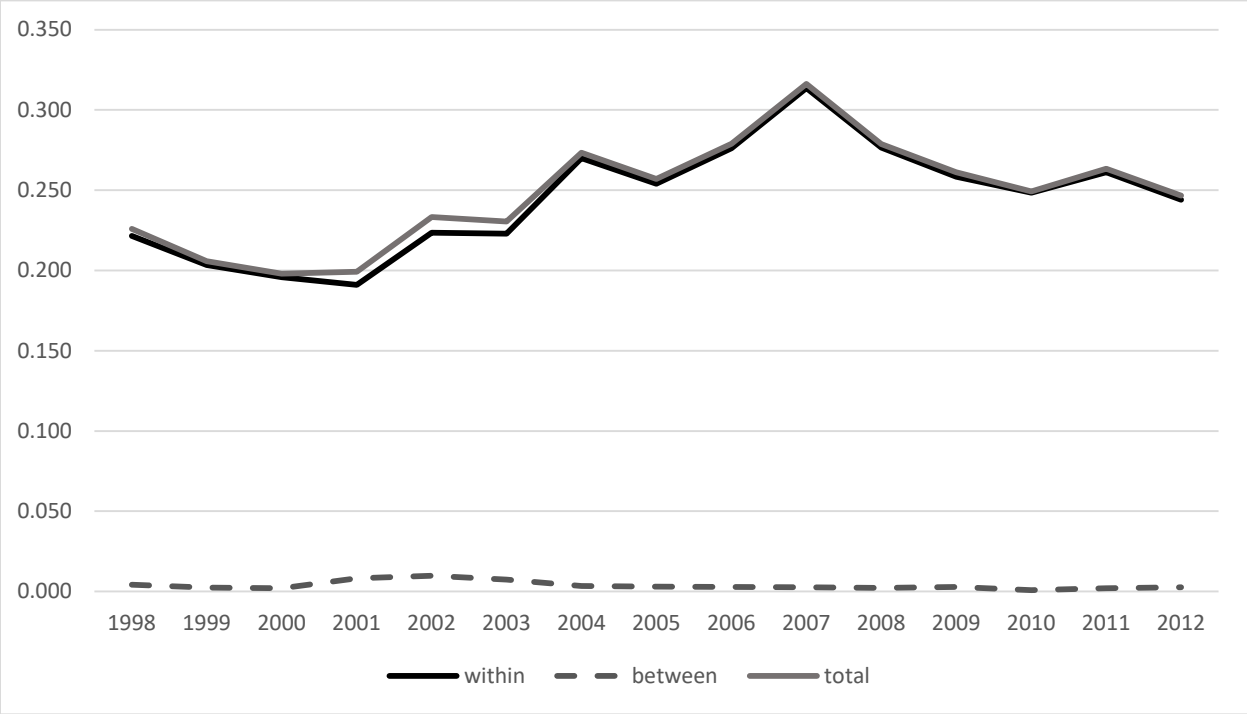


FIGURE 20. SHARE OF WITHIN-TRADE-EXPOSURE-CATEGORY WAGE INEQUALITY IN TOTAL INEQUALITY IN SERVICES

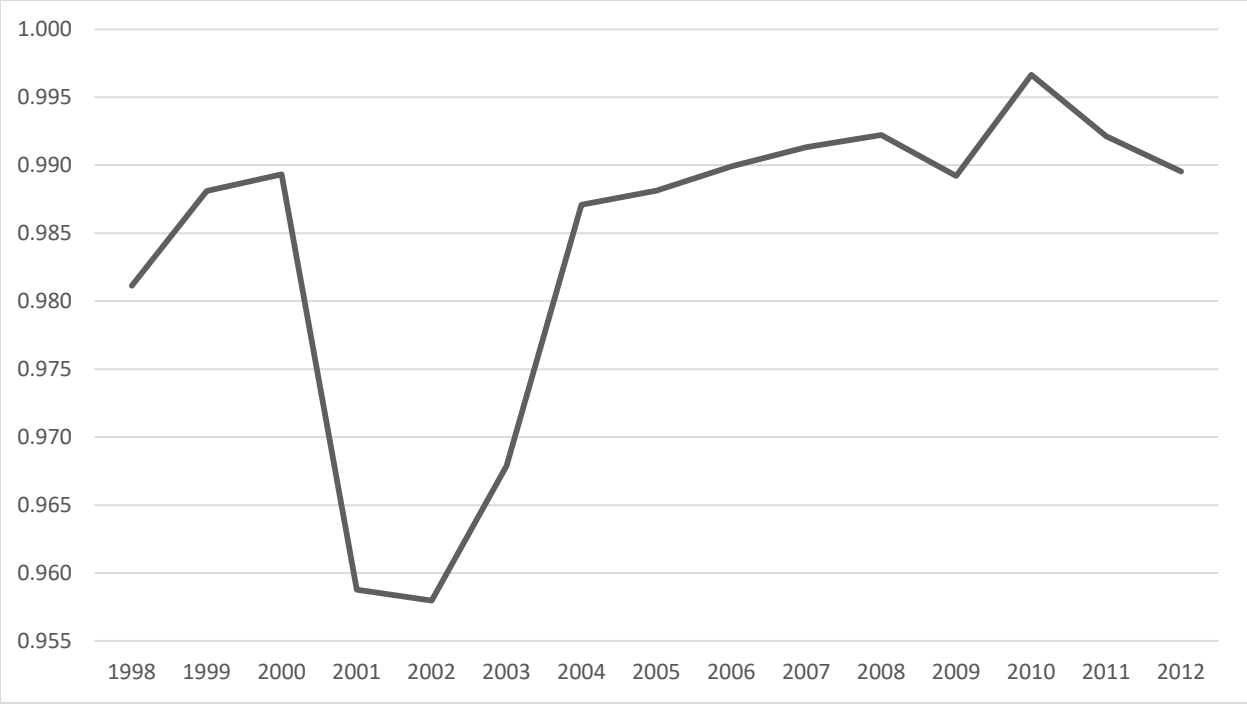


FIGURE 21. WAGE INEQUALITY DECOMPOSITION: WITHIN VERSUS BETWEEN CATEGORIES OF TRADE EXPOSURE–SKILL GROUP IN MANUFACTURING

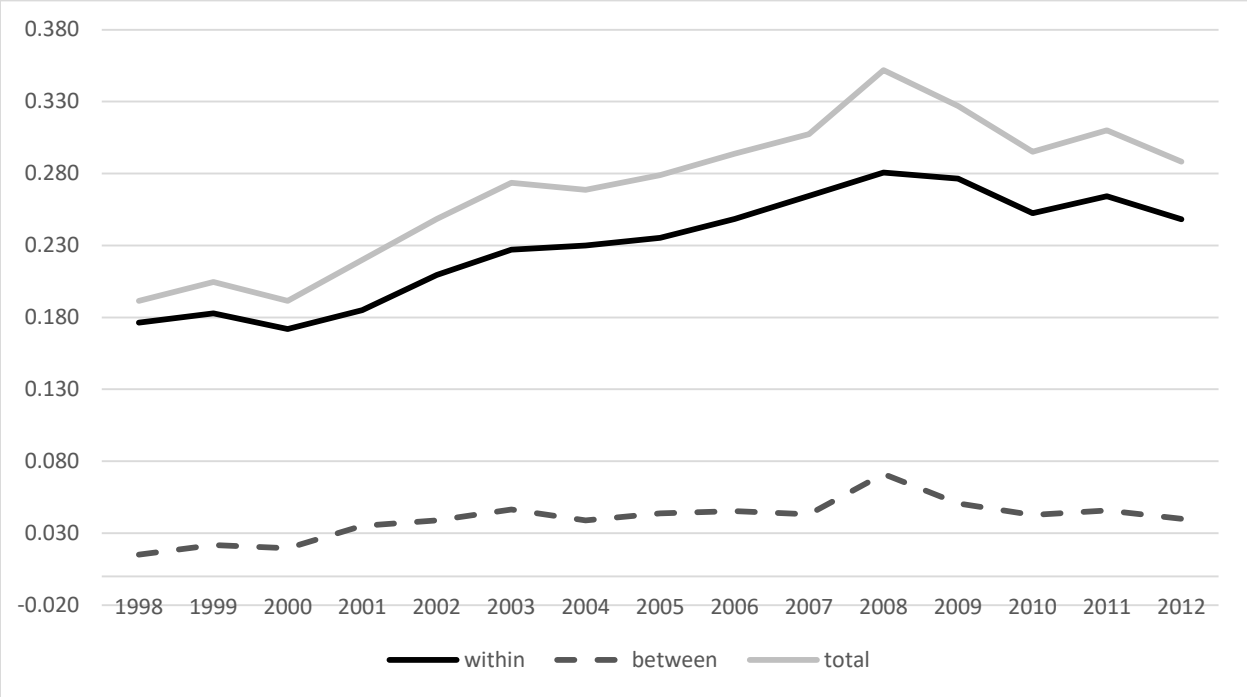


FIGURE 22. SHARE OF WITHIN-TRADE-EXPOSURE-CATEGORY-SKILL-GROUP WAGE INEQUALITY IN TOTAL INEQUALITY IN MANUFACTURING

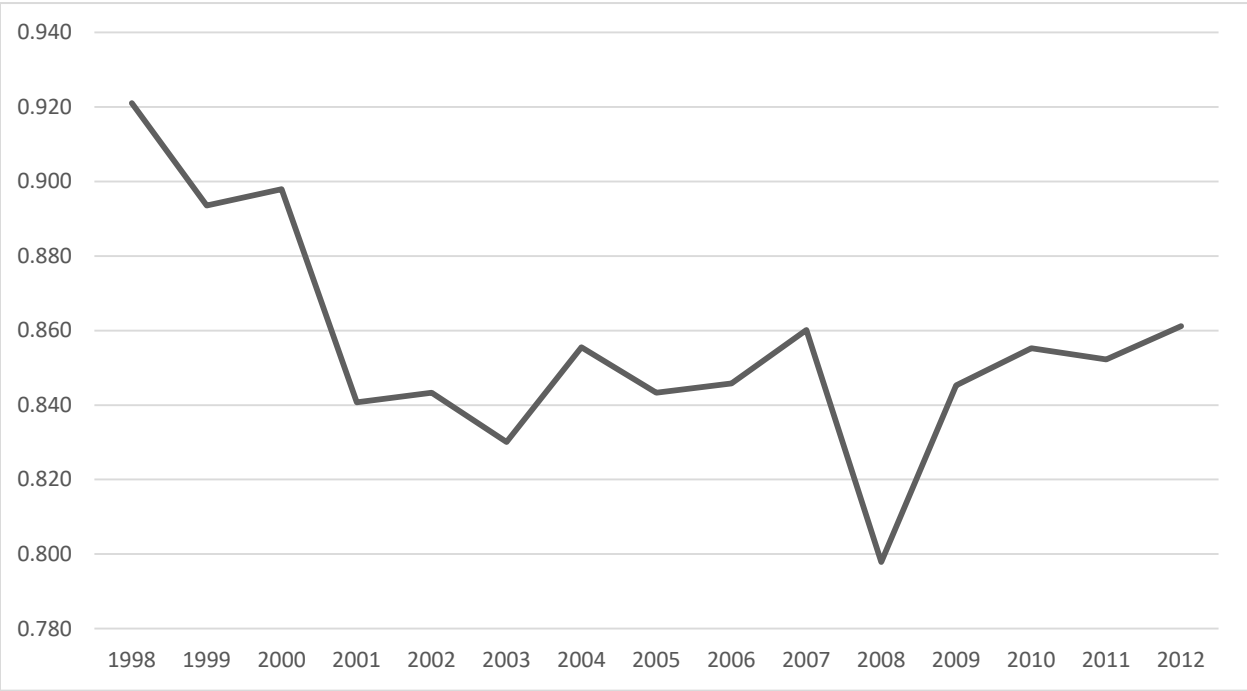


FIGURE 23. WAGE INEQUALITY DECOMPOSITION: WITHIN VERSUS BETWEEN CATEGORIES OF TRADE EXPOSURE–SKILL GROUP IN SERVICES

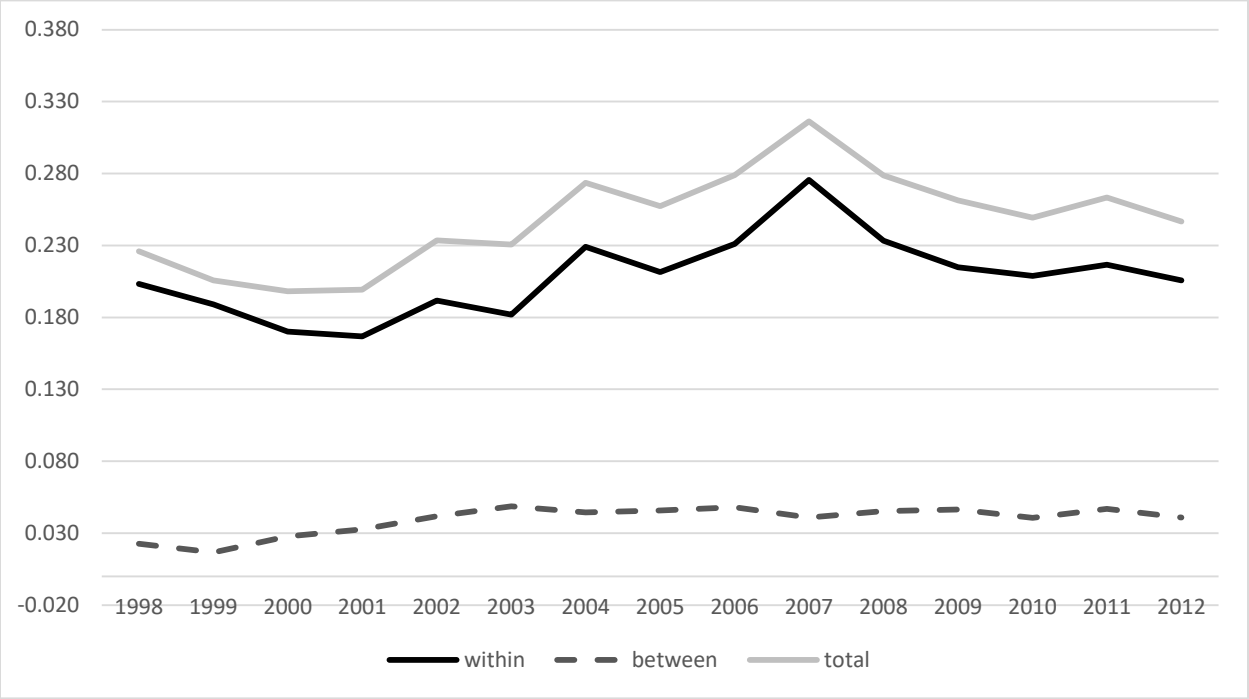


FIGURE 24. SHARE OF WITHIN-TRADE-EXPOSURE-CATEGORY-SKILL-GROUP WAGE INEQUALITY IN TOTAL INEQUALITY IN SERVICES

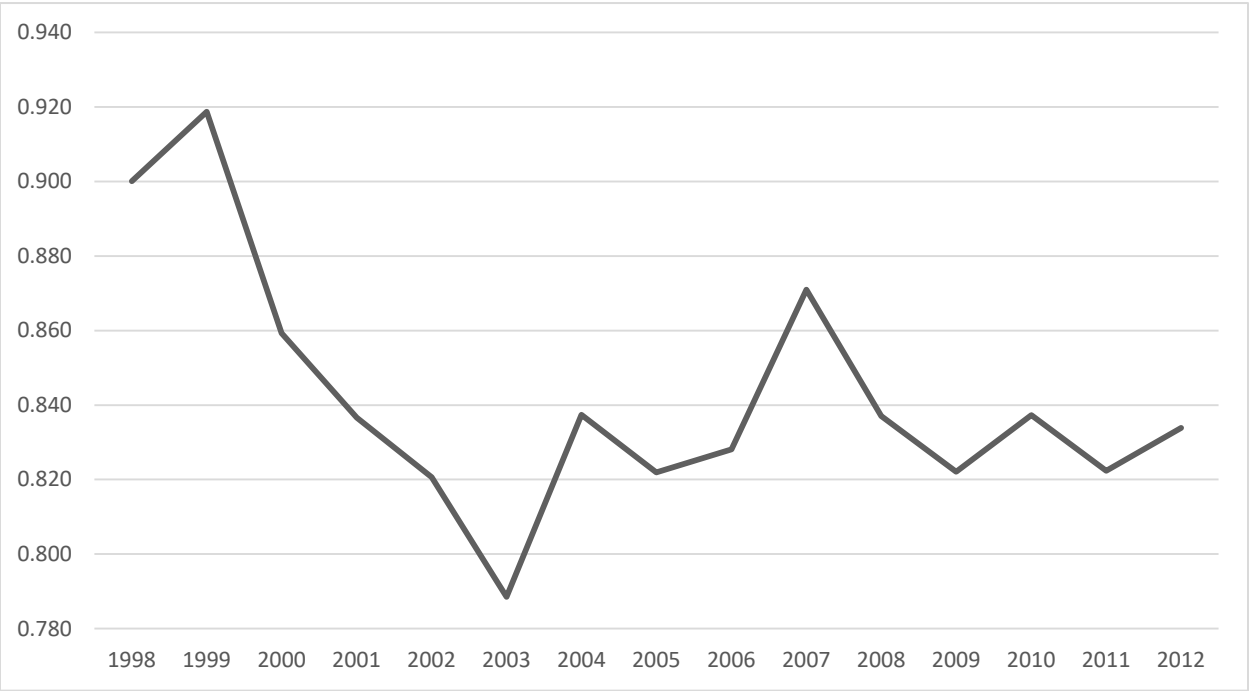


TABLE 1. RELATIVE MEAN LOG WAGE BY SECTOR

Sector	Description	Freq.	Share	1998–2012 Average Rel. Mean Log Wage
3	Manufacturing	4,822	0.307	–0.062
4	Repair and maintenance services	246	0.016	–0.077
5	Electricity, gas and water supply	164	0.010	0.473
6	Construction	762	0.048	0.107
7	Wholesale and retail sale trade	1,124	0.071	–0.116
8	Hotels and restaurants	360	0.023	–0.451
9	Transport	1,157	0.074	–0.079
10	Post and communication	384	0.024	0.275
11	Financial and insurance services	1,013	0.064	0.313
12	Real estate, rental and leasing activities	517	0.033	–0.541
13	Professional, scientific and technical services	971	0.062	0.044
14	Public admin. and defense; compulsory soc. sec.	1,439	0.092	0.171
16	Education	1,749	0.111	0.240
17	Health and social services	673	0.043	–0.185
19	Other community and personal services	345	0.022	–0.351
	TOTAL	15,726	1.000	

Notes: 1. The difference between average log wage for each sector relative to overall average log wage for the whole sample averaged over 1998–2012.
2. The relative mean log wages by sector and year are presented in Figure 2.

TABLE 2. RELATIVE MEAN LOG WAGE BY EDUCATIONAL ATTAINMENT

Highest Degree	Freq.	Share	1998–2012 Average Rel. Mean Log Wage
1. No school/elementary	985	0.063	–0.633
2. Middle school	1,506	0.096	–0.394
3. High school	5,812	0.370	–0.091
4. 2-year college	2,510	0.160	0.020
5. University	4,014	0.255	0.295
6. Graduate school	897	0.057	0.508
TOTAL	15,724	1.000	

Notes: 1. The difference between average log wage for each educational category relative to overall average log wage for the whole sample averaged over 1998–2012.
2. The relative mean log wages by educational attainment and year are presented in Figure 7.

TABLE 3. TRADE-EXPOSURE CATEGORIES IN MANUFACTURING

ISIC3	Definition	Trade Exposure
11	Growing of crops; market gardening; horticulture	1
12	Farming of animals	4
20	Forestry, logging and related service activities	4
50	Fishing, aquaculture and service activities incidental to fishing	4
101	Mining and agglomeration of hard coal	1
111	Growing of cereals and other crops not elsewhere classified (n.e.c.)	1
120	Mining of uranium and thorium ores	4
131	Mining of iron ores	1
132	Mining of non-ferrous metal ores, except uranium and thorium ores	1
141	Quarrying of stone, sand and clay	4
142	Mining and quarrying n.e.c.	4
151	Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats	2
152	Manufacture of dairy products	4
153	Manufacture of grain mill products, starches and starch products, and prepared animal feeds	4
154	Manufacture of other food products	1
155	Manufacture of beverages	4
160	Manufacture of tobacco products	4
171	Spinning, weaving and finishing of textiles	2
173	Manufacture of knitted and crocheted fabrics and articles	3
172	Manufacture of other textiles	3
181	Manufacture of wearing apparel, except fur apparel	2
182	Dressing and dyeing of fur; manufacture of articles of fur	4
191	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness	3
192	Manufacture of footwear	4
201	Sawmilling and planing of wood	4
202	Manufacture of products of wood, cork, straw and plaiting materials	4
210	Manufacture of paper and paper products	2
221	Publishing	4
222	Printing and service activities related to printing	4
231	Manufacture of coke oven products	4
232	Manufacture of refined petroleum products	2
233	Processing of nuclear fuel	4
241	Manufacture of basic chemicals	2
242	Manufacture of other chemical products	2
243	Manufacture of man-made fibres	3
251	Manufacture of rubber products	3
252	Manufacture of plastics products	2

TABLE 3. TRADE-EXPOSURE CATEGORIES IN MANUFACTURING (CONT.)

ISIC3	Definition	Trade Exposure
261	Manufacture of glass and glass products	1
269	Manufacture of non-metallic mineral products n.e.c.	1
271	Manufacture of basic iron and steel	2
272	Manufacture of basic precious and non-ferrous metals	2
281	Manufacture of structural metal products, tanks, reservoirs and steam generators	3
289	Manufacture of other fabricated metal products; metal working service activities	2
291	Manufacture of general purpose machinery	2
292	Manufacture of special purpose machinery	2
293	Manufacture of domestic appliances n.e.c.	3
300	Manufacture of office, accounting and computing machinery	2
311	Manufacture of electric motors, generators and transformers	2
312	Manufacture of electricity distribution and control apparatus	2
313	Manufacture of insulated wire and cable	3
314	Manufacture of accumulators, primary cells and primary batteries	3
315	Manufacture of electric lamps and lighting equipment	4
319	Manufacture of other electrical equipment n.e.c.	2
321	Manufacture of electronic valves and tubes and other electronic components	2
322	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraph	2
323	Manufacture of television and radio receivers, sound or video recording or reproducing apparatus	2
331	Manufacture of medical appliances and instruments and appliances for measuring, checking, testing	2
332	Manufacture of optical instruments and photographic equipment	2
333	Manufacture of watches and clocks	4
341	Manufacture of motor vehicles	2
342	Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	4
343	Manufacture of parts and accessories for motor vehicles and their engines	2
351	Building and repairing of ships and boats	2
352	Manufacture of railway and tramway locomotives and rolling stock	4
353	Manufacture of aircraft and spacecraft	1
359	Manufacture of transport equipment n.e.c.	4
361	Manufacture of furniture	4
369	Manufacturing n.e.c.	2
401	Production, collection and distribution of electricity	4
402	Manufacture of gas; distribution of gaseous fuels through mains	4

Note: Manufacturing trade-exposure categories are: 1 = High imports only (above 50th percentile of average imports over 1998–2012 of all ISIC 3-digit manufacturing industries); 2 = Both high imports and high exports; 3 = High exports only (> 50th percentile); 4 = Other.

TABLE 4. RELATIVE MEAN LOG WAGE BY TRADE EXPOSURE IN MANUFACTURING

Trade Exposure	Freq.	Share	1998–2012 Average Rel. Mean Log Wage
1. HiM	190	0.046	–0.1284
2. HiM-HiX	3,099	0.742	–0.0006
3. HiX	345	0.083	0.0001
4. Oth	541	0.130	0.0577
TOTAL	4,175	1.000	

Notes: 1. The difference between average log wage for each trade-exposure category relative to overall average log wage for the whole sample of manufacturing sectors averaged over 1998–2012.
2. The relative mean log wages by trade exposure and year in manufacturing are presented in Figure 12.

TABLE 5. TRADE-EXPOSURE CATEGORIES IN SERVICES

Sector	Description	Trade Exposure
4	Repair and maintenance services	1
6	Construction	2
9	Transport	2
10	Post and communication	1
11	Financial and insurance services	1
13	Professional, scientific and technical services	2
14	Public admin. and defense; compulsory soc. sec.	1
16	Education	1
17	Health and social services	1
19	Other community and personal services	1

Notes: 1. Services trade-exposure categories are: 2 = Both high imports and high exports (above 50th percentile of average imports and average exports over 1998–2012 of all service sectors); 1 = Other.
2. There are no service sectors in which imports are above the 50th percentile while exports are not, and vice versa.

TABLE 6. RELATIVE MEAN LOG WAGE BY TRADE EXPOSURE IN SERVICES

Trade Exposure	Freq.	Share	1998–2012 Average Rel. Mean Log Wage
1. Other	5,849	0.669	0.041
2. High	2,890	0.331	–0.083
TOTAL	8,739	1.000	

Notes: 1. The difference between average log wage for each trade-exposure category relative to overall average log wage for the whole sample of service sectors averaged over 1998–2012.

2. The relative mean log wages by trade exposure and year in services are presented in Figure 17.

TABLE A1. CORRESPONDENCE BETWEEN KSIC 2-DIGIT INDUSTRIES AND AGGREGATE SECTORS

KSIC 2dig	KSIC 2-Digit Industry Definition	Sector	Sector Definition
1	Agriculture	1	Agriculture, hunting, forestry and fishing
2	Forestry	1	Agriculture, hunting, forestry and fishing
5	Fishing	1	Agriculture, hunting, forestry and fishing
10	Mining of Coal, Crude Petrol. and Natural Gas, Uranium and Thorium Ores	2	Mining and quarrying
11	Mining of Metal Ores	2	Mining and quarrying
12	Mining of Non-metallic Minerals, except Fuel	2	Mining and quarrying
15	Manufacture of Food Products and Beverages	3	Manufacturing
16	Manufacture of Tobacco Products	3	Manufacturing
17	Manufacture of Textiles, except Sewn Wearing Apparel	3	Manufacturing
18	Manufacture of Sewn Wearing Apparel and Fur Articles	3	Manufacturing
19	Tanning and Dressing of Leather, Manufacture of Luggage and Footwear	3	Manufacturing
20	Manufacture of Wood and of Products of Wood and Cork, except Furniture	3	Manufacturing
21	Manufacture of Pulp, Paper and Paper Products	3	Manufacturing
22	Publishing, Printing and Reproduction of Recorded Media	3	Manufacturing
23	Manufacture of Coke, Refined Petroleum Products and Nuclear Fuel	3	Manufacturing
24	Manufacture of Chemicals and Chemical Products	3	Manufacturing
25	Manufacture of Rubber and Plastic Products	3	Manufacturing
26	Manufacture of Other Non-metallic Mineral Products	3	Manufacturing
27	Manufacture of Basic Metals	3	Manufacturing
28	Manufacture of Fabricated Metal Products, except Machinery and Furniture	3	Manufacturing
29	Manufacture of Other Machinery and Equipment	3	Manufacturing
30	Manufacture of Computers and Office Machinery	3	Manufacturing
31	Manufacture of Electrical Machinery and Apparatuses n.e.c.	3	Manufacturing
32	Manuf. of Electr. Components, Radio, TV and Communication Equip.	3	Manufacturing
33	Manuf. of Medical, Precision and Optical Instruments, Watches and Clocks	3	Manufacturing
34	Manufacture of Motor Vehicles, Trailers and Semitrailers	3	Manufacturing
35	Manufacture of Other Transport Equipment	3	Manufacturing
36	Manufacture of Furniture; Manufacturing of Articles n.e.c.	3	Manufacturing
92	Maintenance and Repair Services	4	Repair and maintenance services
40	Electricity, Gas, Steam and Hot Water Supply	5	Electricity, gas and water supply
41	Collection, Purification and Distribution of Water	5	Electricity, gas and water supply

TABLE A1. CORRESPONDENCE BETWEEN KSIC 2-DIGIT INDUSTRIES AND AGGREGATE SECTORS (CONT.)

KSIC 2dig	KSIC 2-Digit Industry Definition	Sector	Sector Definition
45	General Construction	6	Construction
46	Special Trade Construction	6	Construction
50	Sale of Motor Vehicles and Motorcycles; Retail Sale of Automotive Fuel	7	Wholesale and retail sale trade
51	Wholesale Trade and Commission Trade, exc. of Motor Vehic./Motorcycles	7	Wholesale and retail sale trade
52	Retail Trade, except Motor Vehicles and Motorcycles	7	Wholesale and retail sale trade
55	Hotels and Restaurants	8	Hotels and restaurants
60	Land Transport; Transport via Pipelines	9	Transport
61	Water Transport	9	Transport
62	Air Transport	9	Transport
63	Supporting and Auxiliary Transport Activities; Activities of Travel Agencies	9	Transport
64	Post and Telecommunications	10	Post and communication
65	Financial Institutions, except Insurance and Pension Funding	11	Financial and insurance services
66	Insurance and Pension Funding, except Compulsory Social Security	11	Financial and insurance services
67	Activities Auxiliary to Financial Intermediation	11	Financial and insurance services
70	Real Estate Activities	12	Real estate, rental and leasing activities
71	Renting of Mach./Equip. w/o Operator and of Personal and HH Goods	12	Real estate, rental and leasing activities
72	Computer and Related Activities	13	Professional, scientific and technical services
73	Research and Development	13	Professional, scientific and technical services
74	Professional, Scientific and Technical Services	13	Professional, scientific and technical services
75	Business Support Services	13	Professional, scientific and technical services
76	Public Administration and Defense; Compulsory Social Security	14	Public admin. and defense; compulsory soc. sec.
37	Recycling	15	Water supply; sewage, waste manag./remed.
90	Sewage and Refuse Disposal, Sanitation and Similar Activities	15	Water supply; sewage, waste manag./remed.
80	Education	16	Education
85	Human Health and Veterinary Activities	17	Health and social services
86	Social Work Activities	17	Health and social services
87	Motion Picture, Broadcasting and Performing Arts Industries	18	Arts, entertainment and recreation
88	Other Recreational, Cultural and Sporting Activities	18	Arts, entertainment and recreation
91	Membership Organizations n.e.c.	19	Other community and personal services
93	Other Services Activities	19	Other community and personal services
95	Private Households with Employed Persons	20	Private households with employed persons
99	Extra-Territorial Organizations and Bodies	21	Extra-territorial organizations and bodies