

Economic Commentaries

Has the wage development been affected by changes in the composition of the group of employees?

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Wage increases are measured as the difference in average wages between two points in time, meaning that changes in the composition of the group of employees can affect the measured wage development. The composition of the group changes continually, but two changes since 2006 should be particularly emphasised: both the proportion of those born abroad and the proportion of employees with post-secondary education has increased by a relatively large extent. Using wage and salary structure statistics, which can be adjusted for underlying individual factors such as age, country of birth and education level, this Economic Commentary investigates whether the measured wage development has been affected by changes in composition. The analysis indicates that changes as a whole have had little effect on aggregate wage development over the period 2006 to 2016.

The development of wages is one of several factors affecting inflation and thereby important for monetary policy. Total wage increases depend both on centrally agreed wages, which is to say the wage agreements concluded by the social partners, and on wage increases over and above central agreements.² In turn, how wages over and above agreements develop depends on several factors. Such development is partly affected by the local wage formation that takes place via negotiations between the employer and the local union or individual worker, and partly via individual agreements in new recruitments. As total wage increases are measured as the difference in average wages between the dates of the measurements, the measured wages over and above agreement are also affected by changes in the composition of the group of employees.³ If, for example, personnel with a higher average salary level, such as older or highly educated employees, are replaced between measurements by staff with a lower average salary level, such as younger or less educated employees, this will result in a lower measured wage development in the statistics.

Compared with developments at the end of the 1990s and start of the 2000s, wages over and above central agreements have developed weakly over a longer period (see Figure 1). The average growth rate in wages over and above central agreements over the period 1998–2005 amounted to one percentage point, while the average after 2006 only amounts to 0.4 percentage points. However, large portions of the period after 2006 have been characterised by a persistent downturn following the financial crisis, which has probably meant few possibilities for local wage formation. Even so, development has also continued to be weak in recent years as economic activity has improved and resource utilisation in the economy has risen.⁴ International studies indicate that changes in the composition of the group of employees has contributed towards restraining wage development in recent years.⁵ This explanation could also be valid for Sweden.⁶

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² Other common terms for wage increases over and above central wage agreements are 'wage drift' and 'residual items'.

³ It is also possible that changes in the composition of the group of employees may influence central agreements if, for example, there is a lesser degree of union membership among new employees than there is among those leaving the labour force. However, this is beyond the scope of this commentary.

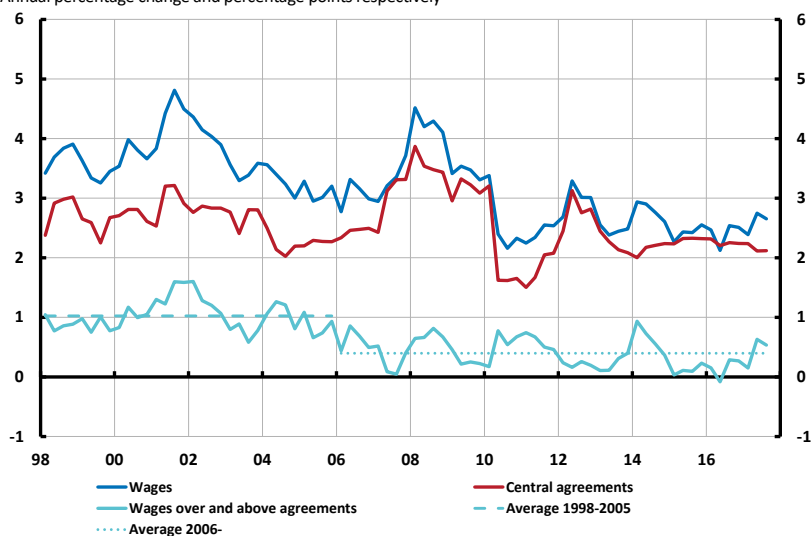
⁴ For an analysis of wage development in relation to economic developments in recent years, see Sveriges Riksbank 2017a.

⁵ See, for example, Bank of England (2016) and Daly, C. M, et al. (2016).

⁶ The result of previous analyses of the composition effects in Sweden point in slightly different directions. The National Institute of Economic Research has previously demonstrated small *positive composition effects*, see National Institute of Economic Research (2015). However, wage growth among persons employed by the same company with the same position, so-called identical individuals, has been significantly higher than the average wage development, which indicates that there may be *negative composition effects*, see for example p.193 in National Mediation Office (2016a). At the same time, it is natural for wage development to be higher for identical

Figure 1. Wages, agreements and wages over and above agreement

Annual percentage change and percentage points respectively



Source: National Mediation Office.

Most analysts, including the Riksbank, expect that the strong economic activity, with increased difficulties for companies to recruit staff will mean that wage increases will successively rise over the years ahead.⁷ If wage development in Sweden has been affected by a changed composition of the group of employees and if these changes continue, this may also be significant for wage development in the period ahead. This Economic Commentary investigates whether the wage increases measured in recent years have been affected by a change in the composition of the group of employees.

Wage and salary structure statistics can be used as a complement to short-term wage statistics.

Short-term wage statistics (STWS), which show the aggregate wage development in both the economy as a whole and in a number of sub-sectors, are published on a monthly basis subject to a relatively short delay and are used by both the Riksbank and other forecasters to analyse wage development. However, sometimes it can be interesting to dig deeper into the underlying causes for how wages have developed. If, for example, personnel with a higher average salary level, such as older or highly educated employees, are replaced between measurements by staff with a lower average salary level, such as younger or less educated employees, this will result in a lower measured wage development. It is, however, not possible to analyse questions of this type using STWS, as these statistics mainly are gathered aggregated for blue-collar workers and white-collar workers and thereby lack information on underlying individual factors such as age and education.

On the other hand, wage and salary structure statistics (WSSS), aimed at illuminating wage levels and wage structures, collect data on the individual level and can thereby be used to analyse any composition effects on the wage growth measured. However, WSSS is less suitable for cyclical analyses as it is annual data published once a year, about six months after the year it is gathered, meaning that, at present, outcomes are only available up to the end of

individuals than for the average in the economy as a whole, as an average for the economy as a whole continuously is affected by older departures (with a higher salary level) being replaced by young new employees (with a lower salary level).

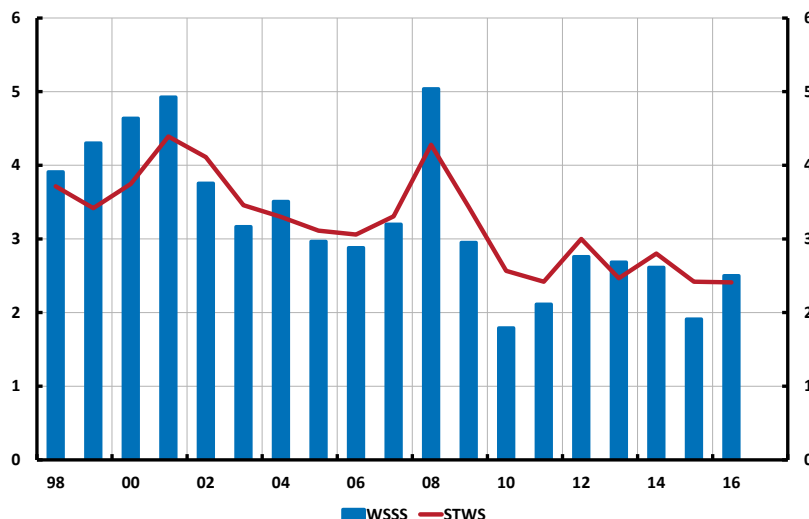
⁷ See, for example, National Institute of Economic Research (2017b) and Sveriges Riksbank (2017b).

2016.⁸ There are also certain differences in sample and in what is included in the concept of wages between the sources of statistics.⁹

Due to these differences, wage development according to STWS and WSSS may differ for individual years (see Figure 2). However, regarded over a longer period of time, wage growth has been relatively concordant and, over the entire period in Figure 2, both wage measures show the same average wage development.

Figure 2. Wage development in the entire economy according to WSSS and STWS

Annual percentage change



Sources: The National Mediation Office and Statistics Sweden

Expected pay differentials between different groups according to wage and salary structure statistics

For the average measured wage development to be affected by changes in composition, groups with a lower or higher wage level than the average have to increase or decrease as a proportion of the group of employees. WSSS includes data on wage levels for various groups.¹⁰ There are relatively substantial differences in wage level between different groups in the population. In general, young individuals with less work experience have a lower average wage level than older people, those with shorter education have a lower average wage level than highly educated people, women have a lower average wage level than men, and people born in Europe¹¹ and outside Europe have a lower average wage level than those born in Sweden and other Nordic countries (see Figure 3). Wage differences have also been

⁸ Wage statistics for the business sector and central government are gathered in September, while wage statistics for municipalities and county councils are gathered in November. The date they are gathered may mean that the current year's pay review is not always included for all parts of the economy.

⁹ Wages in municipalities and county councils are completely investigated in both statistics sources. Wages in central government are also completely investigated in WSSS, while STWS only investigates a restricted population of those receiving monthly wages and working at least 40 per cent. Wages in the business sector are based on a sample survey in both WSSS and STWS. STWS uses a selection of companies with at least five employees and all companies with more than 200 employees are completely investigated. In total, the selection amounts to about 6,000 companies. WSSS uses a selection of companies with at least one employee, while all companies with more than 500 employees are investigated completely. In 2016, the selection in WSSS amounted to about 9,000 companies. For workers in the business sector, STWS reports hourly wages, while WSSS also reports monthly salaries in which wages for part-time work are recalculated to full-time equivalents. For white-collar workers in the business sector and public sector employees, both STWS and WSSS measure monthly wages including variable supplements, but the wages in WSSS include slightly more salary supplements such as remuneration for on-call duty or public relief work. For a more detailed description of both statistical products, see chapter 12 of National Mediation Office (2016a).

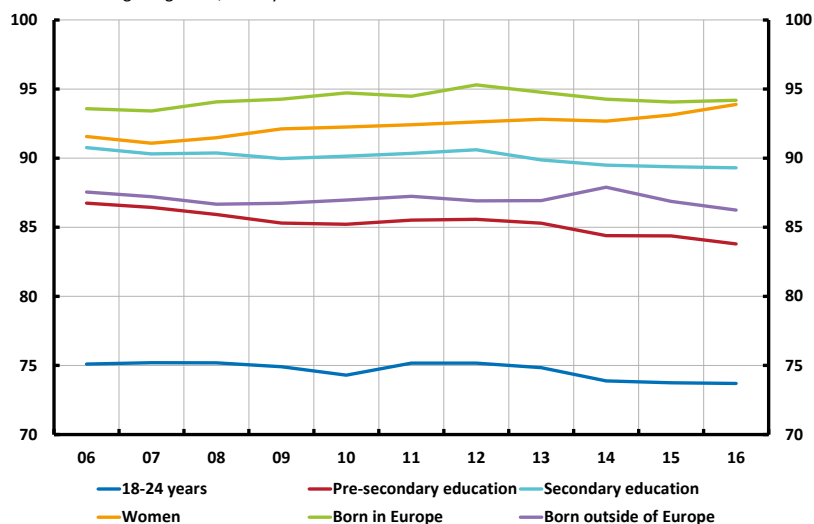
¹⁰ All data reported below has been produced and processed by Statistics Sweden on behalf of the Riksbank.

¹¹ Here and hereafter, 'Europe' refers to Europe excluding the Nordic region.

relatively stable over time. All else being equal, this means that, if the proportion of employees in any of these groups increases, this will mean that the measured wage development will be lower due to a direct composition effect.

Figure 3. Wage levels for various groups according to WSSS (overlapping groups)

Per cent of average wage level, 18-64 years



Source: Statistics Sweden.

An individual can, of course, be included in several of these groups at the same time, for example be born in Europe and be a woman, and, in addition to factors such as age, sex, education and country of birth, wage levels are also affected by the individual's profession. For example, most of the wage differential between men and women can be explained by factors such as education and profession, but even after consideration is taken of measurable factors, a wage differential remains.¹² Another example is people born abroad, who are over-represented in professions requiring only a short education or introduction, where the wage level is also lower. This over-representation can, in turn, be assumed to be due to several factors. Among other things, education and previous experience may be less useful and/or difficult for employers to evaluate in a new country. It also takes time to learn a new language and a country's specific cultural codes. The human capital specific to Sweden increases with the number of years spent in the country and the wage differential against those born in Sweden thereby decreases with the number of years spent here. However, this is a very slow process and, even after 30 years, wage differentials remain.¹³ Those born abroad also face discrimination on the Swedish labour market, for example they are not called for interviews to the same extent as people born in Sweden with the same qualifications.¹⁴

There are also groups with a higher average wage level where the reverse applies, which is to say that, all else being equal, if the proportion of employees over the age of 25, highly-

¹² See National Mediation Office (2016b). The wage differential is unexplained in a statistical sense, which means that it cannot be explained by the factors captured by the statistics. However, this does not mean that it is thereby possible to draw the conclusion that the remaining wage differential is due to discrimination.

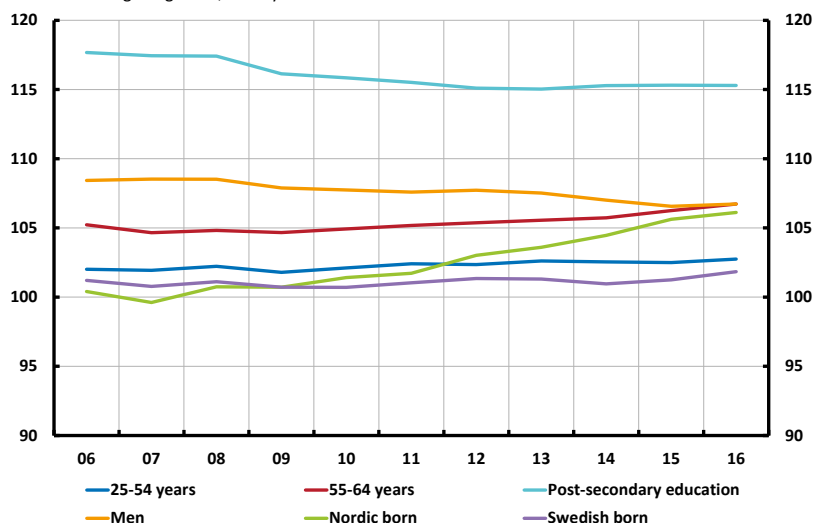
¹³ This refers to people born outside the western world. Relative wage increases can primarily be explained by higher wage growth within workplaces and professions. It could be interpreted as employers initially assigning a low value to the competence of those born abroad but then, with time, gaining a better understanding of their actual productivity level and thereby raising their wages (see Eliasson, T. (2013)).

¹⁴ For an overview of the research, see Ahmed, A. (2015).

educated, male, Swedish or Nordic born increases, this will mean that the measured wage development will be higher as a result of a direct composition effect (see Figure 4).¹⁵

Figure 4. Wage levels for various groups according to WSSS (overlapping groups)

Per cent of average wage level, 18-64 years



Source: Statistics Sweden

The proportion of those born abroad and the proportion of employees with post-secondary education has increased relatively strongly since 2006

A relatively large change on the Swedish labour market since 2006 is that the *proportion of the population* of working age who were born outside the Nordic region has increased.¹⁶ Between 2006 and 2016, the proportion of those born in Europe and outside Europe increased by 2 and almost 6 percentage points respectively to about 7 and about 12 per cent respectively of the working age population. All in all, these groups made up almost 1.2 million people or 20 per cent of the total working age population in 2016, compared with almost 700,000 people or just over 12 per cent in 2006.

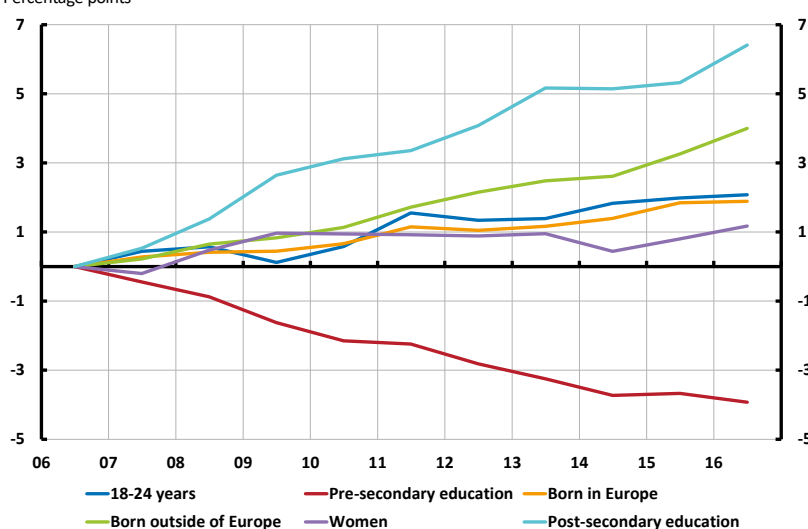
There are relatively large differences in education level between people born in Europe and outside Europe and many of those born outside Europe came to Sweden as refugees and not for labour market-related reasons. Among people born in Europe, the proportion with pre-secondary and secondary education has decreased in the working age population, while the proportion with post-secondary education has increased. In 2016, the proportion of people born in Europe with post-secondary education was on a higher level than among those born in Sweden. On the other hand, the proportion of people born outside Europe without secondary education is relatively high compared to other groups and has increased. The proportion of those born outside Europe with post-secondary education has also increased, but was slightly lower in 2016 than the corresponding proportion among those born in Sweden.

¹⁵ The higher wage level among people born in the Nordic region, outside Sweden, can be explained by this group being older on average. However, this group only makes up two per cent of the total number of employees, meaning that the individuals in the sample may have a relatively strong effect on the results, so this should be interpreted with caution.

¹⁶ To match the age grouping in WSSS, working age population here refers to the age group 18–64 years according to the labour market surveys.

At the same time, the *proportion of employees* born in Europe and outside Europe increased by 2 and 4 percentage points respectively between 2006 and 2016 (see Figure 5). In 2016, people born outside the Nordic region all in all thereby made up about 14 per cent of the total number of people in employment, compared with 8 per cent in 2006. The proportions of employees aged 18-24 years and women also increased slightly over the period. The proportion of women above all increased in conjunction with the financial crisis of 2009 and, since then, has remained on a relatively stable level. The explanation for this is probably that women work within service industries and public services to a greater extent than men, while it was primarily the goods-producing industries, the manufacturing sector in particular, that were impacted in conjunction with the financial crisis.

Figure 5. Change of proportion of employees in various groups since 2006 according to WSSS
Percentage points



Source: Statistics Sweden.

Another relatively large change over the time period studied here is that the level of education among employees has increased. The figure for employees with post-secondary education increased by just over 6 percentage points between 2006 and 2016 (see Figure 5).¹⁷ Above all, this is due to the level of education being higher among those born in Sweden, but also because the proportion of those in employment born outside the Nordic region with post-secondary education has increased. At the same time, the proportion with at best pre-secondary and secondary education has decreased by 4 and just over 2 percentage points respectively.

Figures 3, 4 and 5 above, however, do not show *whether* or *how* these changes in the composition of the group of employees have affected the measured average wage growth in recent years. The changes that have taken place also seem to have been in the opposite direction. The increasing proportion of employees born outside the Nordic region and the proportion of young people could suggest that changes in the composition of the group of employees have dampened the measured average wage growth, but the increasing proportion of employees with post-secondary education suggest, at the same time, that changes in composition have raised it. For example, neither does Figure 5 say anything about

¹⁷ This result differs from the labour force surveys, where the proportion *in employment* with secondary education decreased significantly more and the proportion with post-secondary education increased significantly more than according to WSSS. However, the nonresponse bias in the labour force surveys is large as regards education (see Statistics Sweden (2017)).

profession, education and/or age among the young people or people born abroad who have been employed in recent years.

The measured wage development has not noticeably been affected by the changed composition of the group of employees

If the individuals in WSSS are grouped according to different characteristics and are given the same weights as the preceding year, the structure becomes identical across consecutive years and it thereby becomes possible to develop a measure of wage development that is unaffected by possible changes in the composition of the group of employees. Table 1 presents an example calculation in which the proportion of young employees increases over two years (t and $t+1$). The example calculation assumes that both younger and older people receive a wage increase of 2.5 per cent between the years. However, the calculated average wage growth for all of them is only 2.2 per cent, as the proportion of young people, with a lower average wage level, has increased.

Table 1. Example calculation – Composition effect on average wage growth
Percentage, SEK per month and percentage change

	t	$t+1$	Wage development
Proportion 18-24 years	0.10	0.11	
Proportion 25-64 years	0.90	0.89	
Wage level 18–24 years	24,000	24,600	2.5
Wage level 25-64 years	34,000	34,850	2.5
All	33,000	33,723	2.2

Source: The Riksbank.

In the following analysis, the composition of the employees in terms of profession¹⁸, age, working hours, education, sex and country of birth have been held unchanged over two consecutive years.¹⁹ All data has been taken from WSSS, except for data on country of birth and education, which has been taken from the Total Population Register and the register Educational attainment of the population. The difference between the calculated wage growth and the actual measured figure according to WSSS can be said to form a composition effect. If the composition effect is positive (negative), it may have contributed towards raising (lowering) actual measured wage growth.²⁰

The result shows that the measured wage growth overall is affected very little by the changed composition of the group of employees (see Figure 6). Some years there appears to be a certain effect, but on average over the period 2006-2016, the composition effect has been neutral.

Divided up into the public sector and the business sector, the analysis shows that the composition effect on average has been marginally positive in the public sector, while it has been neutral in the business sector as a whole. The greatest effect in the business sector can

¹⁸ Profession is included on the single-digit level, according to the Swedish Standard Classification of Occupations (SSYK). However, due to a time series break in the profession variable, profession is not included in the calculated wage development between 2013 and 2014.

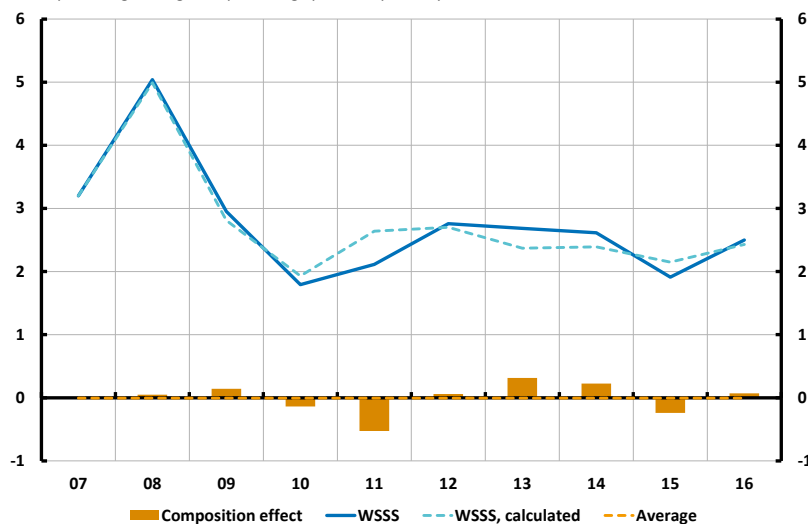
¹⁹ Without the occurrence of unexplained wage differentials between men and women, the other variables could be assumed to capture the effects that an increased proportion of women would entail. As wage levels for those born abroad depend on the number of years these people have lived in Sweden, it can reasonably be assumed that the other variables cannot capture the effects that an increased proportion of people born abroad would entail.

²⁰ The analysis resembles one previously made by the National Mediation Office (NMO) and the National Institute of Economic Research (NIER), with the difference that NMO does not include sex, education and country of birth and NIER does not include sex and country of birth. See National Mediation Office (2014) and National Institute of Economic Research (2015).

be found in the construction industry, where the actual measures wage development has been restrained by an average of 0.5 percentage points due to a change in the composition of the group of employees.²¹ In contrast, within the manufacturing sector, the composition effect has contributed towards raising actual measured wage growth by an average of 0.2 percentage points.²² To a certain extent, this is due to a very large positive composition effect in conjunction with the financial crisis in 2009. Over this year, employment within the manufacturing sector decreased by almost 9 per cent. The composition effect is probably a result of those being laid off being younger on average and thereby having lower wages than those who managed to keep their positions, which also meant that the measured wage growth became high. At the same time, demands for post-secondary education have increased within the manufacturing sector over the period, which could contribute towards the composition effect on average having been positive.²³

Figure 6. Wage development in the entire economy according to WSSS

Annual percentage change and percentage points respectively



Source: Statistics Sweden.

Sweden's wage structure is a factor that can explain why the measured wage development in the economy has not been affected more by composition effects. The collectively-agreed lowest wages in Sweden are high and, from an international perspective, the wage structure is very compact, which is to say there is a relatively small difference between the lowest and highest wages. This could contribute towards explaining why more comprehensive composition effects may occur in certain countries, but not in Sweden. It is also important to point out that WSSS, like STWS, is a sample survey and that the results thereby are surrounded by a certain degree of uncertainty. The effects from the changed composition of the group of employees that are calculated here are based on a specific set of individual characteristics (profession, age, working hours, education, sex and country of birth) and another set of individual characteristics could give a different result.

²¹ In this context, it is important to point out that the construction industry is an industry with many small and medium-sized companies, meaning that the sample rotation within the business sector between individual years may have major effects on the measured wage changes.

²² The manufacturing sector here refers to Swedish Standard Industrial Classification B-E.

²³ See National Institute of Economic Research (2017a).

Summary

In Sweden, wages over and above central agreements have developed surprisingly weakly for a longer period, in particular in recent years as economic activity has strengthened and resource utilisation on the labour market has increased. Wage increases are usually measured as the difference in average wages between two years. This means that changes in the composition of the group of employees between two years may affect the actual measured development of wages. If, for example, personnel with a higher average salary level, such as older or highly educated employees, are replaced between two years by staff with a lower average salary level, such as younger or less educated employees, this will result in a lower measured wage development. Using individual data, this commentary has investigated whether wage development has been affected by changes in the composition of the group of employees. The results indicate that the overall effect over the period 2006 to 2016 is small.

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