The wage share and the welfare state
in Sweden, 1900–2013

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Abstract

This study explores the long run relationship between the wage share in the private sector and the extent of the Swedish welfare state in 1900–2013. It uses a novel approach where government intervention in the economy is broken down into three different aspects: government consumption, government investment and residential construction. The construction of dwellings may seem questionable at first glance, since it to a large degree has been carried out by private companies. The fact that housing policy has been an important part of welfare policy through several channels motivates inclusion of the variable however. Government investment in infrastructure as well as house construction as factors influencing the functional income distribution has been neglected in previous research. Through the use of a single-equation cointegration technique, the study finds a positive and robust long run relationship between the private wage share and all three welfare-related variables.
1. Introduction

In mainstream economics, the wage and profit shares of functional incomes have traditionally been considered stable and therefore uninteresting variables (Atkinson 2009; Elsby et al. 2013; and ILO and OECD 2015). This has however changed in recent years, and now there is a lot of evidence suggesting a downward trend in the global wage share since the late 1970s. Attention is also brought to the wage share in a longer perspective, where researchers have observed long swings in the wage and profit shares since the 19th century (e.g. Piketty 2014). The notions that a declining wage share is associated with increasing inequality among households (Piketty 2014; and Bengtsson and Waldenström 2015) and with weaker aggregate demand (ILO 2013) have raised attention for the matter even more.

A number of independent variables have been considered when explaining change in the wage share. One of them is the scope of the welfare state. This study focuses on the impact of this factor in Sweden in 1900–2013, but unlike previous studies it examines different aspects of the welfare state, both disaggregated and aggregated. Special attention is brought to investment in infrastructure and residential housing. The study shows that these have been important aspects of Swedish welfare policy, and that they should be included when discussing the impact of welfare policy on the wage share in Sweden. The period of investigation roughly covers the modern industrial age of Sweden and the rise and demise of the Swedish welfare state – on of the most extensive welfare states in world history. The focus is the long run rather than the short run.

2. Literature review

Government expenses are a powerful tool for redistribution from capital to labor. A number of studies have found a positive relationship between the wage share and government consumption relative to GDP (Kristal 2010; Dünhaupt 2013; Bengtsson 2014a; ILO and OECD 2015; and Stockhammer 2017). Since there is no (net) profit in the public sector, a larger government sector automatically reduces the profit share in the economy. The government can also affect the wage share in the private
sector in a number of ways. The wage bill of the government constitutes the largest part of Swedish government consumption, with an average of about 60 per cent over the studied period (Edvinsson 2005; and Edvinsson 2016a). If there is an ample supply of jobs available in the public sector, the work force may not be as concerned about finding low-paid work in the private sector. Thus, if the government acts as an employer of last resort, as proposed by Minsky (2008, pp. 343–344) and others, the bargaining position of the workers may be strengthened. Additionally, if government wages are relatively high, they may raise the reservation wage, which is the minimum wage which workers accept. This means that both the amount of jobs provided by the government and the wages paid on these jobs may have an impact on private sector wages, although wages in the export industry has also acted as a benchmark for public wages (Bengtsson 2014b), which indicates bidirectional causality. The size of government consumption in general may also stabilize the economy and reduce the perceived risk of unemployment among the work force. Welfare state retrenchment is observed to be one of the most important explanations to the falling wage share in recent decades (Stockhammer 2015).

Other government efforts to maintain full employment may also have an impact on the wage share, for instance through direct government investment, or through stimulation of private investment. For Keynes (Keynes [1936]1964) as well as Kalecki (1943), government investment was crucial for reaching full employment. Kalecki further argued that full employment policy would mean a stronger position for workers versus capitalists. The resulting self-assurance and class consciousness of the working class would lead to higher wages and improved working conditions according to Kalecki. Full employment policy is also considered to be crucial in the power resource approach of Körpi (2002). He saw the functional income distribution, as well as unemployment and other factors, as expressions of the balance of power between labor and capital. Worker-led parties and working class influence in other parties are according to Körpi among the most potent weapons in this class conflict. The economic history of Sweden in the 20th Century shows that investment performed by the government directly, and investment induced by the government indirectly in the form of
house construction, has been part of a deliberate Social democratic policy to reach or maintain full employment.

Union power is yet another factor with a possible positive impact on the wage share. If workers manage to unite their claims they are in a better position at the negotiating table (Fichtenbaum 2009; and Kristal 2010; and Bengtsson 2012). On the other hand, if unions succeed in raising the wages of their members, there is a risk that employers will substitute labor for capital, as argued by Blanchard (2000). Without a government commitment to full employment, such an achievement by unions to push up the wage share may be a Pyrrhic victory, if technological unemployment causes the wage share to rebound downwards. In a similar manner may higher unemployment benefits, minimum wage legislation and high compensation levels of public welfare programs lead to increased unemployment and ultimately a lower wage share if capitalists choose to substitute domestic labor by capital or foreign labor. OECD (2002) estimates implies that this could be the case.

Technology is often depicted as the most important force repressing the wage share. Both Marx ([1867]1990, pp. 777–794) and Keynes ([1930]2017) warned of the consequences of technological unemployment. Marx claimed that economies of scale in technological advances would generate a tendency towards monopolization, and eventually create an unemployed and growing reserve army of labor ([1867]1990, pp. 777–794). This influenced Kalecki who pictured the profit share as the result of mark-up prices over costs due to the degree of monopoly (Rugitsky 2013). Steindl (1976) went on further and examined how technology economics of scale created monopolistic tendencies. In contrast to this, the neoclassical view has traditionally treated wages and profits as compensation corresponding to the marginal productivity of labor and capital, so that increasing capital intensity automatically leads to a rising profit share (e.g. Bentolila and Saint-Paul 2003). Blanchard (2000), however, shows that this view can be combined with Kalecki. In Blanchard’s model, price mark-ups create rents which are subject to a distributional struggle between labor and capital. The idea of a negative impact of technological advances in production on the wage share is corroborated by most empirical research, at least that covering the period after 1980 (e.g. Driver and Muñoz-Bugarin 2009; Hutchinson and Persyn 2011; Bassanini and Manfredi 2012; Karabarbounis and Neiman 2013; and
Dao et al. 2017). Here it is often found to be the single most important negative factor for the wage (ILO and OECD 2015). In the prosperous post-war period up to the 1970s however, the opposite relationship seems to have prevailed (McCallum 1985; and Guscina 2006). One possible explanation is that, as long as there is full employment policy, increases in productivity lead to general wage gains, and that any job losses due to technology are counteracted by new job opportunities elsewhere. Recently, there have also been studies indicating that increasing monopoly power may have had a negative impact on the wage share (Barkai 2017) as argued by Kalecki, and that this is linked to technology, as argued by Steindl (Autor et al. 2017a; Autor et al. 2017b; and Zhu 2017).

Globalization, mainly in the form of trade openness, foreign direct investment and/or outsourcing, has the same potential effect on the wage share as technology, since it may pit labor in one country against labor in another country. While some researchers (e.g. Freeman 2005) have noted that the entry of China, India and the former Soviet bloc into the capitalist world economy have created a global reserve army of labor, others have noted that trade liberalization has benefited capital, being the most mobile production factor, over labor. This has further heightened global labor competition – not only between developing and advanced countries, but also between advanced countries. The very threat of investment relocation and unemployment may be enough for capital to strengthen its position (Epstein and Burke 2001; and Stockhammer 2013). In the empirical research, globalization in some form usually has a negative association with the wage share in recent decades (Elsby et al. 2013; and ILO and OECD 2015).

A third factor with an assumed negative impact on the wage share is financialization, a process where financial interests and considerations have an increasingly important role in the overall economy (Epstein 2005). The process is often said to lead to short-sighted and risky management behavior (e.g. Tomaskovic-Devey 2015; and Palley 2007) and is sometimes equated with shareholder value orientation of companies, which is detrimental to employees, investment, and aggregate demand (Dünhaupt 2013; and Stockhammer 2017). High debt levels and current account liberalization may also decrease the wage share (Furceri and Loungani 2017). Some scholars argue for the reverse causation however
that it is the declining wage share that gives rise to financialization (e.g. Foster and McChesney 2012). Both may of course be true.

Technology, globalization, financialization and welfare policy are not independent of each other. Technological advances in communication and transportation facilitate globalization and financialization, globalization in financial markets can enhance domestic financialization tendencies, and financial dominance may speed up the globalization process (for instance through international investment). Political actions, such as liberalization of trade and finance, may also increase globalization and financialization. Seen in this context, the abandonment of full employment for price stability and a retrenchment of the welfare state have exacerbated the impacts from these factors. A shrinking welfare state may thus be seen as an expression of a neoliberal regime, working in junction with neoliberal aspects of globalization and financialization (Palley 2007; Kotz 2008; and Duménil and Lévy 2011, pp. 47–50).

A few more factors need to be addressed. One is exchange rate policy. If the export industry experiences low profitability, devaluation will lower wages and other domestic costs that are measured in the country’s exchange rate, while sales will be in foreign currency. This lowers the wage share and increases the profit share. The fact that a high wage share may cause currency devaluation, if profitability is low due to high labor costs, makes the exchange rate questionable as an independent variable however. Moreover, in long term studies it is also common to control for structural change, by including variables such as the size of the agricultural and industrial sectors (Stockhammer 2015; and Bengtsson 2014a).
3. The wage share and the welfare state in 1900–2013

Figure 1. The wage share and the aggregated welfare state

A visual inspection of the development of the private wage share and of the aggregated measure of the welfare state in Sweden reveals very similar paths, but on different levels. It is not hard to discern a common long-term trend between the net profit share and the aggregated welfare state variable. The gross profit share does not display an equally similar development as the net profit share does though. Here, the relationship to the aggregated measure of the welfare state is perhaps more non-linear, although the variables seem to share a co-movement since about the 1970s. A historical account also reveals a connection between the wage share and the development of the Swedish welfare state. The period can be divided into three shorter periods, spanning about forty to thirty years each: the turbulent 1900–1939 period, the expansionist 1940–1979 period, and the 1980–2013 period of contraction.

Sources: See section 4.
3.1. 1900–1939: Turbulence

The first sub-period was a volatile one, both financially, socially and politically, with large institutional changes and one world war occurring during its time-span. The starting position of the distributional struggle between labor and capital in the beginning of the 20th century was to the advantage of capital. This was the dawn of an entrepreneurial age, where new companies were formed around innovations based on electricity and chemistry. The modernized financial system greatly enhanced the new industrial revolution, and after a temporary setback for the entrepreneurial wonder during the financial crash of 1907, it soon picked up pace again.

In the meantime, the living conditions for the growing working class were often harsh. Real wages grew, but real profits grew more. The mechanization and commercialization of agriculture and the industrial expansion in the cities spelled rapid urbanization. The resulting housing shortage was a source of continuing political concern, as was the monotonous and routine work in the factories, long working hours and lack of democracy. The foundation of the workers’ party Sveriges socialdemokratiska arbetareparti (SAP) in 1889, and the trade union confederation Landsorganisationen (LO) in 1898 meant that the working class was a force to be reckoned with. Liberals tried to defuse the socialist movement, for instance by addressing the housing shortage through favorable housing loans (Ramberg 2000, p. 16). Even so, the workers did not have much influence in parliament, and the scope of the welfare state was small. Much of the class struggle was about access to the political power. After the general political strike for universal suffrage in 1902, the employers formed Sveriges Arbetsgivarförening (SAP) in order to coordinate their efforts. The real showdown came with “Storstrejken” in 1909, a general strike and lockout involving 300,000 workers. LO lost the battle, and the wage share continued to decrease. The lowest point in the whole 1900–2013 period was reached in 1916.

Political tensions intensified again during World War One and with the Russian revolution in 1917. The revolutionary tide in Russia and Europe meant that the socialist threat was more real than ever, and with the help of liberals in the parliament, the working class parties (which split into two in 1917) finally managed to push forth universal male suf-
frage in 1918. In 1919 the parliament voted for the introduction of the eight hour workday, and in 1921 the women conquered suffrage as well.

The wage share increased rapidly, partly because of worker militancy (Bohlin and Larsson 2007) and the implementation of the eight hour workday (Bengtsson 2014b), but also because of the deep depression of 1921–1922, which shrank profits faster than wages. The unions increased both in strength, measured as union density (Kjellberg 2017), and militancy, measured as strike intensity (Edvinsson 2016b), throughout the 1920s. The votes of SAP also increased in the elections, and in 1932 the party gained government power. The global Great Depression and the associated political turmoil that followed propelled new ideas about economic policy, and Swedish social democracy was quick to pick them up. In 1933, SAP introduced “beredskapsarbeten”, an employer of last resort program with jobs in the state and the municipalities. The growth rate of the ratio of public investments to GDP doubled in the 1930s compared to the 1920s. The government also stimulated house construction through low interest rates and allowances for the residents, both in order to tackle unemployment and to remedy the pressing housing shortage (Johansson and Karlberg 1979, p. 18). Even so, apart from increases in the wage share during the declines in profitability during the economic crises in the early 1920s and 1930s, the functional income distribution was fairly stable between 1920 and 1940.

After decades of economically destructive turf wars in the labor market, LO and SAF met in Saltsjöbaden, Stockholm, in 1938 for an armistice. The immediate consequences of the treaty agreed on are hard to estimate since Second World War Two began the subsequent year, but the long term impact is beyond question. The deal would form the basis for labor market negotiations until at least the mid-1970s (Wennemo 2014, pp. 229–238), and was a prerequisite for the extensive central labor bargaining during that period (Kjellberg 2017). The treaty, Saltsjöbadsavtalet, was an important part of what was to become known as “The Swedish model” – a historical compromise between Swedish capitalists and workers in the political and the economic realms.
3.2. 1940–1979: Expansion

The 1940–1979 period saw a continuous increase in the wage share and the size of the welfare state. Internationally, this period has been referred to as the era of Fordism, hinting at the mass production and consumption, a labor-capital accord, and the dominance of Keynesian economic policy (Jessop 1997).

The massive intervention by the government came already with the outbreak of the war however. In Sweden, capital controls and other regulatory measures were coupled with deficit spending. The efforts went beyond just maintaining employment at pre-war levels. In fact, unemployment among union members dropped from 11 per cent before the war, to only three per cent in 1946 (Molinder 2012). The public sector grew fast in relative size, and private investment also regained vigor during the war, especially house construction. Although the relative size of the public sector shrank after the war, the decline was not as great as the wartime increase. The wage share increased.

Fears of a post-war depression proved to be ungrounded. Sweden was unharmed by the war and was in a good position to take advantage of the increased demand on the European continent. Again, the international fear of socialism, this time through the implementation of the Marshall plan in Europe, helped advance the political power of the working class movement in Sweden. Apart from a drop in 1951, two years after a large devaluation against the dollar, the wage share had entered on a growing trend that would last for about thirty years. The capitalist world entered a “Golden Age” of prosperity (e.g. Marglin et al. 1990) and the rise of the welfare state was one its most prominent hallmarks. In Sweden, this went further than most other capitalist countries.

In a bold modernistic leap, the ruling SAP realized the visionary ideas of social engineering that had emerged in previous decades. The aim was to eradicate poverty and improve the living conditions for the working class, and the efforts in the 1930s paved way for even bolder measures after the war. SAP launched an ambitious welfare program where the municipalities had a central role in providing facilities such as daycare centers, schools, retirement homes, and housing for the general public. Municipality housing companies received beneficial government loans, but cooperatives were also favored, to a lesser extent (Ramberg
Like in the previous decade, housing construction was also seen as important for an accommodating financial policy (Werin [ed.] 1993, pp. 158–159). Expansion of the welfare state services grew hip-to-hip with expansion of the housing sector.

One of the most important instruments in this huge social experiment was financial regulation. Right after the war, government of the financial market was accomplished through oral and voluntary agreements between the Riksbank (central bank) and the commercial banks (Larsson and Söderberg, forthcoming 2016), but in the 1950s, the political will became firmer and took a formal legal form. A range of new regulations, for example obligations for financial institutions to buy government and housing mortgage bonds (Nygren 1985, pp. 84–85; and Werin 1993, pp. 315–338), were introduced in order to steer resources to prioritized areas such as infrastructure and housing. Additionally, the new public pension system founded in 1960 became an important buyer of the issued bonds. The share of state-run financial institutions grew in both direct lending and indirect lending (Hagström 1968, pp. 318–331), though lending of the bank-owned housing mortgage institutes grew rapidly as well (Ahnland 2015). Residential house investment kept growing until the late 1960s. Perhaps the most decisive move was the launch of the plan “Miljonprogrammet”, with a target of one million new homes from 1965 to 1974. Municipalities and non-profit cooperatives accounted for between half and two thirds of all newly built apartments from 1951 to 1975 (Johansson and Carlberg 1979, p. 64).

The ambitious strive to build a new society did not just come from ideology, but also out of necessity. The late 1950s was the breakthrough for the urban consumption society. While agriculture went through a period of radical rationalization and mechanization, the export industry expanded and experienced a shortage of labor. The use of machinery and equipment intensified throughout the economy. Between 1955 and 1975, the population of the countryside shrank from 2.5 million to one million, while the cities grew from four to seven million inhabitants (Ramberg 2000, pp. 131–133). The biggest contributions to GDP came from expansion of the public sector and investment in infrastructure and housing. However, The workforce grew rapidly as many women entered the labor market.
In the 1970s, this growth model ran into problems. The stagflation that followed after of the breakdown of the Bretton Woods currency system and the oil crises opened up a breach in Keynesian theory and policy. The close connection between Keynesian ideas and the concept of the welfare state meant that both were challenged by new (or recycled old) economic thinking, globally as well as in Sweden (e.g. Erixon 2010). This also applied the Rehn-Meidner model, an economic policy model that had been used successfully since the 1950s. It emphasized low wage dispersion, low profit margins, and an active labor market policy with the goals of full employment and high productivity (Erixon 2010).

3.3. 1980–2013: Contraction

The crisis of Keynesianism paved the way for a new growth regime based on neoliberalism, globalization, and financialization which lasted from about 1980 throughout the rest of the investigated period (e.g. Hein et al. 2014). From a trending increase since World War One, the increase in the wage share stopped and reversed in end of the 1970s. Likewise, the size of the public sector relative to the economy had grown since the 1920s, but began to shrink from about 1980. The profitability of Swedish enterprise was alarmingly low in the late 1970s (Edvinsson 2010) and the succeeding devaluations of the Krona in 1977, 1981 and 1982 must be regarded as emergency acts. Nevertheless, they managed to invigorate not just the export industry, but the private sector in general, while the public sector stagnated. Profits rebounded, and the wage share declined. Much of the institutional laissez-faire reforms came later however. The financial markets were mostly deregulated in the latter half of the 1980s, and the goal of full employment was abandoned in favor of price stability in the early 1990s (Jonung 2017). The Rehn-Meidner model was gradually weakened in the new environment of wage competition among unions, new economic ideas and institutional changes – particularly the deregulation of the credit market in 1985 (Erixon 2010).

House construction increased rapidly after the credit deregulation, only to decline even more after the housing market crash in the early 1990s. As automatic stabilizers in the social security system drove the finances of the state into deep deficits and the public sector was down-
sized drastically. The process continued throughout the 1990s. The crisis pushed open unemployment up from 1.7 per cent in 1990 to 9 per cent only three years later, and Sweden entered the kind of mass unemployment that other OECD countries had entered in the preceding two decades (Erixon 2010). Both household and functional income inequality increased fast (Ahnlund 2017). Partly due to the floating of the Krona three years earlier, the private wage share shrank to levels last seen during World War Two. It remained more or less stagnant for the remainder of the period, or increased slightly.

The public debt put a straight-jacket on government consumption, which never recovered. During the mass unemployment in 1994, SAP – the party that called forth the Keynesian revolution in Sweden – introduced an extremely restrictive fiscal policy, and by 1997 it had enforced both a ceiling for government expenditures and a surplus target on the public budget (Erixon 2010). House construction suffered long term losses too. As part of the efforts to “sanitize the state budget” the subsidised government house loans were scrapped, and the interest rate subsidies were lowered (Boverket 2007; and Andersson 1997). Housing prices grew rapidly, as did the housing shortage in the cities. The conditions got more similar to that of the first decades of the 20th century. Meanwhile, globalization increased in strength. The importance of trade grew, with imports plus exports even outgrowing GDP in 2007. But the small deficit in the trade balance of the late 1970s had transformed into a massive surplus that persisted from the mid-1990s. In this sense, it was Sweden that out-competed other nations on the global marketplace. At the same time, the strong growth in capital intensity in the post-World War Two era weakened from about 1970, and continued to do so until the end of the studied period.

4. Variables

Since the aim of the study is to assess the impact of the Swedish welfare state on the wage share, it is necessary to exclude government wages from the wage share. Hence, the dependent variable is the wage share of the private sector. It is computed as the ratio of labor income, including employer-financed social benefits, of employees and self-employed relative to the total private factor income. Both the net- as well as the gross
wage shares are used in the study, as there are drawbacks and advantages with both measures. The gross profit share is suitable since many of the other measures in the study are measured against GDP. The net profit share, on the other hand, has a higher validity (though somewhat lower reliability\textsuperscript{1}). Also, the use of both measures provides better robustness to the study as a whole. The data is obtained from Edvinsson for 1900–2000 (2005; and 2016a) and Statistics Sweden (2016d), adjusted to the earlier series, from 2001–2013.

As discussed in the previous section, government policy can impact the wage share through several channels. Rather than just measuring the size of the welfare state as government consumption to GDP, this study uses a novel approach where each of these channels are analyzed individually, as well as at the aggregate level. Government consumption is measured as the sum of government expenses relative to GDP. It captures both the number of public servants employed, their wage level and government purchases of consumption goods. Government investment equals gross government investment, divided by GDP, and includes the construction of infrastructure such as roads and railroads, and of official buildings such as schools, hospitals, and military facilities, etcetera. Housing construction, measured as fixed investment in residential services divided by GDP, is not part of the public sector, at least not all of it. Even so, housing policy has very much been a part of Swedish welfare policy, especially so in the post-World War Two era. Allocation of resources has been carried out both by the market and the state (Niva 1989), and housing construction has been carried out by a mixture of private businesses, non-profit cooperatives and municipalities. The government has controlled the flow of funds to the sector either directly through state loans or indirectly through extensive credit regulations. Policy has been guided by either labor market considerations and/or more direct social concern regarding living conditions of the general public. Data on all welfare state-related variables are from Edvinsson for 1900–2000 (2005; and 2016a) and Statistics Sweden (2016a), adjusted to the earlier series, from 2001–2013.

In addition to these measures of the scope of the welfare state, a number of control variables, discussed at length in the literature section,

\textsuperscript{1} Capital depreciation, which is subtracted from gross values, is hard to estimate for Sweden before 1950, according to Edvinsson (2005).
are used in the study. The bargaining strength of unions is defined as 
union density, and consists of the share of union members of the 
employed workforce. Data is obtained from Kjellberg (2017). Globalization 
is measured as trade openness, which is exports plus imports divided by 
GDP. The series are from Edvinsson (2005; and 2016a) up to 2000, and 
Statistics Sweden (2016a) thereafter. Technology is measured as total 
factor productivity (TFP) an index that is gathered from two different 
sources – Molinder (2012) from 1900 to 1960 (accumulated changes) 
and AMECO (2017) from 1960 to 2013 (the AMECO series is adjusted 
to the Molinder series). It has not been possible to estimate shareholder 
value orientation for the period as a whole, and it does not appear in the 
study.\(^2\) Further so, in line with Neo-Marxian theory, shareholder value 
orientation may be regarded as an outcome of the distributional struggle, 
rather than a cause. The exchange rate is equal to a currency index of the 
Krona, adjusted for the hyperinflation of the German Deutch Mark in the 
1920s. The data is obtained from Bohlin (2014). The share of agriculture 
and industry are additional control variables, with data from Edvinsson 
(2005; and 2016a) and Statistics Sweden (2016c), with the latter adjusted 
to the former.

5. Methodology

When comparing non-stationary variables in the long term, the primary 
interest is in comparing the levels of the variables. Yet, simply running a 
regression with non-stationary variables will lead to biased \(t\)-statistics if 
the variables are not cointegrated – that is if they are not sharing a common 
trend. Such a trend can be detected if the residuals are stationary, 
which can be determined by a modified unit root tests of residuals. This 
study utilizes the Phillips-Ouliaris method, a single-equation cointegra-
tion test where one variable is assumed to be dependent and others are 
regarded as independent, as in traditional regression testing. The ad-

\(^2\) A usual measure of this is the net dividend plus net interest payments of businesses 
relative to the real capital stock of businesses. However, the dividend index of the Stock-
holm Stock Exchange cannot be compared to the capital stock of companies, since much 
fewer companies, for which data on the capital stock is available, were listed there in the 
beginning of the period. Moreover, it has not been possible to retrieve data on net interest 
payments to businesses.
vantage of this particular test over other single-equation tests is that it uses Newey-West standard errors to account for serial correlation and heteroscedasticity. The alternative method of the Johansen cointegration test is used in robustness test, but the lack of normality in the residuals of the underlying vector autoregression (VAR) make this method problematic. The Phillips-Ouliaris test and the FMOLS method used with it are not as sensitive to non-normality (see below). Also, the possibility of detection of multiple cointegrating relationships with this methodology, relies heavily on theory. Such theory is not supported in this study, since the focus is on one dependent variable only – the wage share.

Both tau- and z-statistics are reported for the The Phillips-Ouliaris cointegration tests, with critical values from McKinnon (1996). For estimation of long run coefficients when cointegration is detected, this study uses fully modified OLS (FMOLS) rather than regular OLS. This is a non-parametric technique which modifies least squares to account for serial correlation and for the endogeneity in the regressors stemming from cointegrating relationships (Phillips and Hansen 1990).

Before engaging in cointegration testing, it is however necessary to examine the order of integration of the individual variables. The Phillips-Ouliaris method requires the variables to be non-stationary in levels and stationary in first differenced form. Two complementary unit root tests are used for this purpose – the ADF-GLS test with the null hypothesis of non-stationarity, and the KPSS test, with the null hypothesis of stationarity. For further robustness, two different maximum lag lengths are used for the ADF-GLS test: Six and 12 lags, and the final lag lengths are chosen via the modified Akaike criterion. The KPSS test utilizes four lags.

\[ \text{Long run covariance estimate with Bartlett kernel, Newey-West fixed bandwidth} = 5.0000. \]

\[ \text{These maximum lag lengths are derived using the Schwert rule} (A [T/100]^{1/4}), \text{with two different bases} (A=6 \text{ and } A=12). \]
Table 1. Unit root tests

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF-GLS(6)</th>
<th>ADF-GLS(1:KPSS)</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net wage share</td>
<td>-2.37</td>
<td>1.11</td>
<td>0.37 **</td>
</tr>
<tr>
<td>Net wage share, 1D</td>
<td>-9.27 **</td>
<td>-9.27 **</td>
<td>0.04</td>
</tr>
<tr>
<td>Gross wage share</td>
<td>-1.69</td>
<td>-1.13</td>
<td>0.40 **</td>
</tr>
<tr>
<td>Gross wage share, 1D</td>
<td>-9.19 **</td>
<td>-9.19 **</td>
<td>0.04</td>
</tr>
<tr>
<td>Gov. cons.+gov.inv.+house</td>
<td>-1.86</td>
<td>-1.86</td>
<td>0.31 **</td>
</tr>
<tr>
<td>Gov. cons.+gov.inv.+house, 1D</td>
<td>-5.76 **</td>
<td>-5.76 **</td>
<td>0.08</td>
</tr>
<tr>
<td>Gov. consumption</td>
<td>-1.66</td>
<td>-1.66</td>
<td>0.19 *</td>
</tr>
<tr>
<td>Gov. consumption, 1D</td>
<td>-5.08 **</td>
<td>-5.08 **</td>
<td>0.06</td>
</tr>
<tr>
<td>Gov. investment</td>
<td>-1.11</td>
<td>-1.11</td>
<td>0.47 **</td>
</tr>
<tr>
<td>Gov. investment, 1D</td>
<td>-7.90 **</td>
<td>-7.90 **</td>
<td>0.09</td>
</tr>
<tr>
<td>House construction</td>
<td>-1.49</td>
<td>-1.49</td>
<td>0.40 **</td>
</tr>
<tr>
<td>House construction, 1D</td>
<td>-7.95 **</td>
<td>-7.95 **</td>
<td>0.03</td>
</tr>
<tr>
<td>Union density</td>
<td>-0.46</td>
<td>-0.68</td>
<td>0.48 **</td>
</tr>
<tr>
<td>Union density, 1D</td>
<td>-6.96 **</td>
<td>-1.62</td>
<td>0.08</td>
</tr>
<tr>
<td>Trade openness</td>
<td>-1.13</td>
<td>-0.60</td>
<td>0.48 **</td>
</tr>
<tr>
<td>Trade openness, 1D</td>
<td>-9.91 **</td>
<td>-9.91 **</td>
<td>0.03</td>
</tr>
<tr>
<td>Productivity</td>
<td>-1.59</td>
<td>-1.59</td>
<td>0.34 **</td>
</tr>
<tr>
<td>Productivity, 1D</td>
<td>-6.12 **</td>
<td>-6.12 **</td>
<td>0.08</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>-1.04</td>
<td>-1.04</td>
<td>0.27 **</td>
</tr>
<tr>
<td>Exchange rate, 1D</td>
<td>-2.62 **</td>
<td>-2.29</td>
<td>0.07</td>
</tr>
<tr>
<td>Agriculture</td>
<td>-1.42</td>
<td>-1.42</td>
<td>0.41 **</td>
</tr>
<tr>
<td>Agriculture, 1D</td>
<td>-4.94 **</td>
<td>-4.94 **</td>
<td>0.04</td>
</tr>
<tr>
<td>Industry</td>
<td>-0.62</td>
<td>-0.62</td>
<td>0.55 **</td>
</tr>
<tr>
<td>Industry, 1D</td>
<td>-10.44 **</td>
<td>-10.44 **</td>
<td>0.04</td>
</tr>
</tbody>
</table>

+ = ps0.10, * = ps0.05, ** = ps0.01

The results of most unit root tests show that all variables are non-stationary in levels and stationary in first differenced form. However, when 12 is the maximum lag length, the ADF-GLS tests cannot rule out the possibility of unit roots in the first differences of two of the variables – the exchange rate of the Krone, and union density. On the other hand, this may be regarded an unnecessarily long lag length, which reduces the power of the test. At a maximum lag length of six, the ADF-GLS test rejects the null of a unit root in all variables. A visual inspection of correlograms corroborates this fact (not reported). In conclusion, even if one of the ADF-GLS test specifications is unable to reject the null hypothesis of unit root, the other ADF-GLS test as well as the KPSS test and inspection of the correlograms speak in favor of stationarity. Thus, all variables will be treated as stationary when in first difference form.
Moving along with cointegration tests, the Pantula principle is used in the test order. In a single-equation cointegration framework it starts with the inclusion of a constant and a trend. If cointegration is undetected in the model, the trend is dropped, and if there is no cointegration at this step either, the constant is dropped (Sjö 2011). The ten percent significance level is used as a threshold (due to the low power of cointegration tests in general). If no cointegration is detected with a specific model, the trend specification used in those models where cointegration is found is reported. This facilitates comparison between the models. In the stepwise regression procedure where control variables are introduced, variables enter step-by-step and one at a time until no more variables are significant, starting with those variables with the highest t-values when appearing as sole control variables.

The disaggregated and aggregated models are calculated with both net- and gross wage share versions, and versions with different significant control variables (C-D Models). Test regressions containing insignificant variables are not reported. Models 1 and 2 contain the welfare variables in disaggregated form, and Models 3 and 4 contain the welfare variables as a sum. It is possible to use the variables in aggregated form since they are all different and mutually exclusive parts of GDP from the user side.
Table 2. Model overview

<table>
<thead>
<tr>
<th>Model</th>
<th>Dependent variable</th>
<th>Independent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A.</td>
<td>NWS</td>
<td>GOVCONS, GOVINV, HOUSE</td>
</tr>
<tr>
<td>1B.</td>
<td>NWS</td>
<td>GOVCONS, GOVINV, HOUSE, EXCHNGE</td>
</tr>
<tr>
<td>2A.</td>
<td>GWS</td>
<td>GOVCONS, GOVINV, HOUSE</td>
</tr>
<tr>
<td>2B.</td>
<td>GWS</td>
<td>GOVCONS, GOVINV, HOUSE, EXCHNGE</td>
</tr>
<tr>
<td>3A.</td>
<td>NWS</td>
<td>WEL</td>
</tr>
<tr>
<td>3B.</td>
<td>NWS</td>
<td>WEL, EXCHNGE</td>
</tr>
<tr>
<td>3C.</td>
<td>NWS</td>
<td>WEL, TRADE</td>
</tr>
<tr>
<td>3D.</td>
<td>NWS</td>
<td>WEL, INDU</td>
</tr>
<tr>
<td>4A.</td>
<td>GWS</td>
<td>WEL</td>
</tr>
<tr>
<td>4B.</td>
<td>GWS</td>
<td>WEL, EXCHNGE</td>
</tr>
<tr>
<td>4C.</td>
<td>GWS</td>
<td>WEL, TRADE</td>
</tr>
<tr>
<td>4D.</td>
<td>GWS</td>
<td>WEL, INDU</td>
</tr>
</tbody>
</table>

In the model specifications, NWS equals the net private wage share of net factor incomes in the private sector, GWS equals the gross private wage share of gross factor incomes in the private sector, GOVCONS equals government consumption out of GDP, GOVINV equals government investment out of GDP, HOUSE equals residential construction out of GDP, EXCHNGE equals the exchange rate of the Krona, WEL equals the sum of GOVCONS, GOVINV and HOUSE, TRADE equals the sum of imports plus exports, divided by GDP, INDU equals the value added of industry as a share of GDP.

6. Regression results

In the following section, the results of the regressions are first presented in tables, to be discussed and analyzed in the subsequent part. Models 1A to 2B, with disaggregated welfare state-related variables are presented in table 3. Models 3A to 3E, with aggregated welfare state-related variables, are presented in table 3, and Models 4S to 4E, also with aggregated welfare-related variables, are presented in table 4.
Table 3. Models 1A–2B, net and gross wage share, disaggregated welfare variables

<table>
<thead>
<tr>
<th>Model 1A.</th>
<th>Model 1B.</th>
<th>Model 2A.</th>
<th>Model 2B.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. Var:</td>
<td>Var: NWS</td>
<td>Var: GWS</td>
<td>Var: GWS</td>
</tr>
<tr>
<td>NWS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GOVCONE</td>
<td>0.560 ***</td>
<td>0.618 ***</td>
<td>0.178 **</td>
</tr>
<tr>
<td></td>
<td>0.078</td>
<td>0.063</td>
<td>0.062</td>
</tr>
<tr>
<td>GOVINV</td>
<td>2.587 ***</td>
<td>1.317 *</td>
<td>2.151 ****</td>
</tr>
<tr>
<td></td>
<td>0.668</td>
<td>0.584</td>
<td>0.530</td>
</tr>
<tr>
<td>HOUSE</td>
<td>1.155 **</td>
<td>0.797 **</td>
<td>0.891 **</td>
</tr>
<tr>
<td></td>
<td>0.404</td>
<td>0.301</td>
<td>0.320</td>
</tr>
<tr>
<td>EXCHANGE</td>
<td>-0.001 ***</td>
<td>0.000 ***</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.569 ****</td>
<td>0.677 ****</td>
<td>0.557 ****</td>
</tr>
<tr>
<td></td>
<td>0.022</td>
<td>0.029</td>
<td>0.017</td>
</tr>
<tr>
<td>N</td>
<td>113</td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>Adj. R2</td>
<td>0.81</td>
<td>0.85</td>
<td>0.70</td>
</tr>
<tr>
<td>PO-coint.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tau-stat</td>
<td>-4.35 *</td>
<td>-4.82 *</td>
<td>-4.34 *</td>
</tr>
<tr>
<td>Z-stat</td>
<td>-33.72 *</td>
<td>-39.36 *</td>
<td>-33.86 *</td>
</tr>
</tbody>
</table>

\( += ps0.10, \ast = ps0.05, \text{**} = ps0.01, \text{***} = ps0.001, \text{****} = ps0.0001\)

Table 4. Models 3A–3D, net wage share, aggregated welfare variables

<table>
<thead>
<tr>
<th>Model 3A.</th>
<th>Model 3B.</th>
<th>Model 3C.</th>
<th>Model 3D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. var:</td>
<td>Var: NWS</td>
<td>Dep. var:</td>
<td>Var: NWS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dep. var:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NWS</td>
<td></td>
</tr>
<tr>
<td>WEL</td>
<td>0.714 ****</td>
<td>0.647 ****</td>
<td>0.871 ****</td>
</tr>
<tr>
<td></td>
<td>0.081</td>
<td>0.045</td>
<td>0.075</td>
</tr>
<tr>
<td>EXCHANGE</td>
<td>-0.001 ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRADE</td>
<td></td>
<td>-0.134 ****</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INDU</td>
<td></td>
<td></td>
<td>0.526 ***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>0.599 ****</td>
<td>0.717 ****</td>
<td>0.631 ****</td>
</tr>
<tr>
<td></td>
<td>0.022</td>
<td>0.019</td>
<td>0.019</td>
</tr>
<tr>
<td>N</td>
<td>113</td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>Adj. R2</td>
<td>0.69</td>
<td>0.84</td>
<td>0.79</td>
</tr>
<tr>
<td>PO-coint.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tau-stat</td>
<td>-3.18 +</td>
<td>-4.72 **</td>
<td>-3.74 +</td>
</tr>
<tr>
<td>Z-stat</td>
<td>-19.12 +</td>
<td>-37.53 **</td>
<td>-25.98 *</td>
</tr>
</tbody>
</table>

\( += ps0.10, \ast = ps0.05, \text{**} = ps0.01, \text{***} = ps0.001, \text{****} = ps0.0001\)

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Table 4. Models 4A–4D, gross wage share, aggregated welfare variables

<table>
<thead>
<tr>
<th>Model 4A</th>
<th>Model 4B</th>
<th>Model 4C</th>
<th>Model 4D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dep. var: GWS</td>
<td>Dep. var: GWS</td>
<td>Dep. var: GWS</td>
<td>Dep. var: GWS</td>
</tr>
<tr>
<td>WEL 0.337 ****</td>
<td>0.279 ****</td>
<td>0.493 ****</td>
<td>0.329 ****</td>
</tr>
<tr>
<td>0.075</td>
<td>0.040</td>
<td>0.064</td>
<td>0.059</td>
</tr>
<tr>
<td>EXCHANGE</td>
<td>-0.001 ****</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>TRADE</td>
<td>-0.135 ****</td>
<td>0.028</td>
<td></td>
</tr>
<tr>
<td>INDIU</td>
<td>0.591 ****</td>
<td>0.702 ****</td>
<td>0.624 ****</td>
</tr>
<tr>
<td>0.020</td>
<td>0.017</td>
<td>0.016</td>
<td>0.039</td>
</tr>
<tr>
<td>C</td>
<td>N 113</td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>Adj. R2</td>
<td>0.37</td>
<td>0.71</td>
<td>0.61</td>
</tr>
<tr>
<td>PO-coint.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tau-stat</td>
<td>-2.82</td>
<td>-4.46 **</td>
<td>-3.50</td>
</tr>
<tr>
<td>Z-stat</td>
<td>-15.20</td>
<td>-34.00 **</td>
<td>-23.11 +</td>
</tr>
</tbody>
</table>

When the wage share is defined in net form, all models are cointegrated according to both statistics (Models 1A–1B and 3A–3D). When the wage share is in gross form however, the main model is only cointegrated in disaggregate form (Model 2A). The main aggregate model with the gross wage share (Model 4A) is not cointegrated. When the exchange rate is included however, the aggregated model with the gross wage share also displays significant cointegration (Model 4B). Among all models, those including the exchange rate are the ones with the highest fit (adjusted R2). Overall, in all models where the wage share appears in net form rather than gross form, the model fit is a lot higher. The variance in the dependent variable can thus to a larger degree be explained by the independent ones. For instance when the welfare variables are summed up, and control variables are included, the adjusted R2 in the model with the net wage share (Model 3A) is almost the double (0.69 versus 0.37) compared to the model with the gross wage share (Model 4A).

Since the general picture is that of cointegration, it is possible to assess the individual long run coefficients of each variable. In disaggregated form, all models come up with significant positive coefficients for the government consumption ratio, the government investment ratio, and
the house construction ratio, which is in line with the hypothesized relationships. The only additional variable, besides the mentioned welfare state-related variables, to come up as significant with the stepwise regression procedure is the exchange rate of the Krona (Models 1B and 2B). On the other hand, since the exchange rate may be a consequence of the wage share, it remains an open question whether or not it should be included. The fact that the FMOLS method used is supposed to mitigate such endogeneity speaks for the inclusion of the exchange rate.

All models with the aggregated welfare state variable come up with this variable being highly significant, although cointegration cannot be established in Model 4A, where the wage share is measured in gross form and there are no control variables. The exchange rate of the krona is also highly significant in the aggregate models (Models 3B and 4B), much like it is in the disaggregated models. If this variable is dropped, trade is the next variable to have highest t-statistic (Model 4C). The significance is high and the sign is negative, as suggested by theory. Cointegration is not detected with the tau-statistic when the gross wage share is used as the dependent variable in this model. In a stepwise regression, no further variables besides trade are significant. Even so, industrialization come up as significant when entering the model as the sole control variable, without the influence of trade. The sign is positive, indicating that industrialization may have had a positive impact on the wage share, and that deindustrialization since the late 1960s may have had a negative effect on the wage share – when trade is not accounted for.

The robustness tests with the Johansen cointegration method\(^5\) shows that all results, except for the inclusion of trade as a control variable, are robust with this method as well, although some models (all disaggregated models for instance), have more than one possible long run relationship. This is not hard to imagine. The interdependence between the welfare state related variables has already been addressed at length. Even so, the fact that all of them are significant according to the Phillips-Ouliaris method, as well as the theoretical and historical support, is an indication that neither of them should be excluded as independent varia-

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\(^5\) BIC and HQC information criteria indicate that the optimal lag length (with six as maximum) should be set to one. The occurrence of autocorrelation at this lag length justifies one additional lag. Two is also the lag length suggested by the AIC information criterion.
bles. Because all of the models have non-normal residuals in the underly-
ing VAR models, and subsequently display skewed t-statistics due to this
fact, long run coefficients estimated via the Johansen method are not
reported.

In general, this study only addresses long run relationships for the
period as a whole. For shorter periods, the relationships may very well
have been different. Nevertheless, a long term view spanning over a
hundred years of economic history in Sweden provides a useful insight
into the mechanisms determining the private wage share in Sweden.

7. Concluding discussion

In conclusion, this study implies that expansion and contraction of the
welfare state has been the most important factor for the long term move-
ment in the private wage share in Sweden in the past hundred years plus.
Government consumption, government investment in infrastructure, and
house construction, all relative to GDP, are all very important for the
long term changes in the wage share in the country. The significance of
infrastructure and housing policy in this regard highlights neglected as-
pects of government activity in relation to the wage share in the litera-
ture.

Much of the advances in the wage share in Sweden in the 20th
Century can be seen as concessions to the working class during periods
of social unrest and fear of socialism. Such was the case, at least partly,
when a program for affordable housing was launched around 1900, when
universal suffrage and the eight hour work day were implemented around
1920, to some extent when accommodating fiscal policy was introduced
in the 1930s, and when the Marshall plan boosted European demand after
World War Two. The strength of the Swedish working class can be seen
both in the increases in the wage share, and in the expansion of the wel-
fare state. Both grew in tandem for a long period of time, especially so
from World War Two. All in all, the success of the Swedish welfare state
meant that the revisionist dream of taming capitalism for the benefit of
the working class seemed to work for a long time in Sweden. The re-
trenchment of the Swedish welfare state from about 1980 was corre-
spondingly associated with a decline in the wage share. This means that
three periods of co–movement between the wage share and the aggregate
welfare state can be discerned during the 1900–2013 period: the turbulent 1900–1939 period, the expansionistic 1940–1979 period, and the 1980–2013 period of contraction.

Among the other factors examined in the study, the exchange rate of the Krona also seems to have been important. The devaluations around 1980 and in 1992 hit the wage share hard, and it has only recovered slightly since then. On the other hand, if changes in the exchange rate are regarded as the consequence of movements in the wage share, inclusion of this variable may be dubious, though the FMOLS method may mitigate the problem. If this variable is removed, trade openness comes up as a significant negative variable. In line with the literature, globalization of trade may thus have had a negative impact on the wage share in Sweden during the investigated period. While union power seems to have had an insignificant impact on the Swedish wage share during the studied period, the extent of the welfare state seems to have been the only countermeasure from any negative effects. In terms of power resource theory, this implies that the working class has been more successful in increasing the wage share through political means rather than by economic means on the labor market.
References


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Appendix A

Final independent variables. For sources: See section 4.

Figure A1. Aggregated welfare state

Figure A2. Government consumption
Figure A3. Government induced investment

Figure A4. The Krona exchange rate index
Figure A5. Trade openness

Figure A6. Industrialization