Considering Potential Bias in Macro-estimates of the Elasticity of Labour Demand

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Bacground report for the Economic Policy Council

1 INTRODUCTION

The Finnish government's competitiveness pact is the key measure by which it aims to raise employment. The objective is to improve cost-competitiveness by lowering labour costs in the private sector, thereby increasing employment. The Ministry of Finance (MoF) estimates (1.3.2016) that the competitiveness pact will reduce unit labour costs by 4.2% compared to the baseline scenario. According to the MoF, this will improve employment by approximately 35,000 persons compared to the baseline scenario by the beginning of the 2020s.

The elasticity of labour demand plays a key role in assessing the employment impacts of the competitiveness pact. Therefore, the elasticity estimate used should be as accurate and reliable as possible. The elasticity of labour demand reflects how responsive labour demand is to changes in labour costs. A point estimate for the elasticity of labour demand indicates the percentage increase in labour demand if labor costs are reduced by 1%. The MoF (29.9.2015) uses an elasticity estimate of -0.7 for the private sector.

The idea of this background report is based on the latest Economic Policy Council Report (2016, p. 86-91), which argued that the government's estimate for labour demand elasticity is very high and predicts overly optimistic employment effects. The majority of studies estimate demand elasticities using aggregate data. Such studies lack exogenous variation in labour costs, which makes it impossible to measure the causal impacts of labour costs on employment in a reliable way.

Lichter et al. (2014) provide an extensive survey of the empirical literature related to the own-wage elasticity of labour demand. They conduct a meta-regression analysis to re-assess empirical studies of labour demand elasticities. Their analysis is based on 924 elasticity estimates obtained from 105 studies. The sample comprises estimates from studies for 37 countries published between 1980 and 2012. The overall mean own-wage elasticity of labour demand in their sample is -0.51, with a standard deviation of 0.77. On the basis of these estimates, the MoF's elasticity of -0.7 does not seem impossibly high. However, Lichter et al. (2014) claim that many estimates of the own-wage elasticity of labour demand given in the literature are unreasonably high and upwardly inflated, and their preferred estimate of constant output elasticity is -0.25.

Estimating labour demand elasticities based on macro-data is likely to produce biased and unreliable estimates. The problems relate in particular to i) the lack of exogenous variation in labour costs, ii) the simultaneity of demand and supply, and iii) the possibility of composition bias. Using aggregate data in estimating labour demand elasticities is problematic since such data lack exogenous variation in labour costs. Wages and employment are both endogenous variables, which constitutes a problem. When the purpose is to make policy analysis and predict the effects of reducing labour costs, it is necessary to have exogenous variation in labour costs. Macro-models also ignore the simultaneity of demand and supply.

This report shows that the estimates used in calculating the employment effects of the competitiveness pact are likely to be severely upward-biased. The empirical analysis in this report estimates labour demand elasticities using different wage variables. Since the same model and the same time period are used for every wage variable, the differences between elasticities provide evidence of potential bias. A relevant elasticity estimate should be based on research containing plausibly exogenous variation in wages. For that reason this report contains a small meta-analysis of micro-studies examining situations where labour costs have been altered exogenously.

2 DATA

When estimating the own-wage elasticity of labour demand, employment is the dependent variable and labour costs the independent variable. In addition to these, an estimation equation may also include output as a control variable. The calculations in this report are based on industry-level data. Twenty-six industries are considered, based on the Standard Industrial Classification (TOL2008). Some industries are combined in order to verify the comparability of the data and results. All the data cover the years 1996–2013, while some data are available since 1975.

Data about working hours are used as the measure of employment. The annual data on hours worked in corporations by industry (1975-2015) are obtained from Statistics Finland's Annual national accounts. Output by industry at basic prices using year 2010 prices is obtained from the same source. The panel data on total labour compensation (W) by industry in 1975-2014 is obtained from Statistics Finland's Productivity surveys. This annual private sector data are in nominal form, and are therefore converted into real form using the Producer price index for manufactured products, the base year being 1949. The real wage variable W/L is formed by dividing total labour compensation W by the number of hours worked (L) in each industry for each year.

Since the preferred wage variables are available only as changes, W/L is converted into Δ(W/L), which represents wage changes. This logarithmic percentage change in real wages is calculated using natural logarithms and the following formula:

$$\Delta(W/L)_t = ln(\frac{(W/L)_t}{(W/L)_{t-1}}) = ln(W/L)_t - ln(W/L)_{t-1}$$

TABLE 1 Summary of the data

Variable	Label	Obs	Mean	Std. Dev.	Min	Max
W	Total labour compensation by industry, 1,000,000 €	468	2310.84	2418.366	173	12 305
L	Total working hours by industry, 1,000,000 h	468	87.81	96.00	8.2	489.7
Y	Total output by industry (2010 prices), 1,000,000 €	468	8412.34	6819.10	817	31 301
P	Producer price index	468	0.888	0.069	0.796	1.013
W/L	"Real wage" by industry	468	30.190	7.091	16.815	59.462
ΔL	Logarithmic % changes in working hours	442	0.0028	0.0526	-0.237	0.204
ΔY	Logarithmic % changes in output	442	0.0200	0.0817	-0.324	0.332
Δ(W/L)	Logarithmic % changes in “real wage”	442	0.0196	0.0448	-0.110	0.317
RAGR	Real aggregate wage growth	468	0.0323	0.0401	-0.189	0.387
RWHR	Real wage growth of job stayers	468	0.0312	0.0372	-0.199	0.343

When estimating the own-wage elasticity of labour demand, the dependent variable is working hours, which represents employment. The wage variable is used as an independent variable. Since the working hour variable is also a component of the wage variable Δ(W/L), there will inevitably be some bias in the elasticity estimates. In many studies, however, earnings are simply summed and divided by worker-hours to yield the wage rate. Hamermesh (1996) questions studies that take published aggregates and analyse elasticities for them. In his opinion any such study will generate biased elasticity estimates in equations relating worker-hours to real wages.

Hamermesh (1996, 60-71) criticizes estimates of parameters describing employers’ labour demand. He points out that there should be enough exogenous variation in factor prices to allow one to infer the demand elasticities of interest. There should be exogenous variation in wage data or working hours. The simultaneity of demand and supply should also be taken into account. This is because the supply of labour is generally neither perfectly elastic nor inelastic.

Consequently, estimating elasticities without a complete system including supply is unsatisfactory.

In order to demonstrate the significance of the bias in labour demand elasticities, it is important to find a valid measure for the price of labour. The panel data on the wage variables AGR and WHR is obtained from Mika Maliranta, and the calculation methods are described in Kauhanen and Maliranta (2012). They study the dynamics of the standard aggregate wage growth in macro statistics using micro data, focusing on how job and worker restructuring influence aggregate wage growth and its cyclicality. Using comprehensive longitudinal employer–employee data, they measure the growth rate of average wages (the standard aggregate growth rate, AGR) and the average wage growth rate of job stayers (WHR).

These data cover the years 1996–2013, and the 26 industries are based on the Standard Industrial Classification (TOL2008). The original wage data were obtained from the Confederation of Finnish Industries (EK), being based on an annual survey of employers which forms the basis of the private sector wage structure data maintained by Statistics Finland. The data include detailed information on wages, job titles, and unique person and firm identifiers and form a linked employer–employee panel that allows people to be followed over time (Kauhanen & Maliranta 2012).

Since AGR and WHR are originally in nominal form, they are converted into real form so that the estimation results are comparable to the previous real wage data. The conversion is performed using the producer price index for manufactured products.

$$\text{RAGR} = \text{AGR} + \ln\left(\frac{P_{t-1}}{P_t}\right)$$

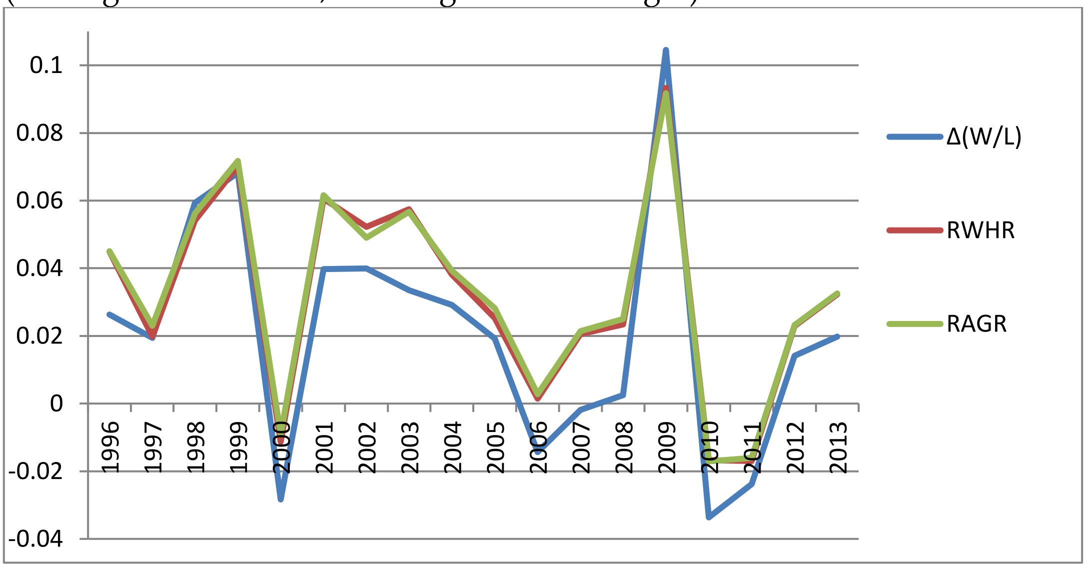
The aggregate growth rate (AGR) is based on Statistics Finland's wage structure statistics. AGR measures the growth rate of average wages by industry, and using it instead of the original wage variable Δ(W/L) corrects a major problem in the elasticity estimates. The cause of the problem is that working hours are simultaneously both dependent variable but also a component of the wage variable. Using the independent wage variable RAGR is a step towards more reasonable elasticity estimates.

Even if using the real aggregate growth rate RAGR as a wage variable is less prone to produce biased elasticity estimates than Δ(W/L), there might still be composition bias. When using aggregate wage data, the hour shares of different groups vary with business cycles. The work hours of low-wage groups tend to be more cyclically variable than those of high-wage groups. Thus aggregate wage statistics give more weight to low-wage workers during expansions than during recessions. This composition effect biases aggregate wage statistics in a countercyclical direction and is likely to obscure the real wage procyclicality that a typical worker in any group really faces (Solon et al 1994).

If aggregate wage statistics are biased due to composition bias, there is reason to believe that elasticity estimates based on such data are also biased. Since the source of the problem is cyclically shifting weights, the most direct solution is to construct a wage statistic without cyclically shifting weights. By following the exact same workers over time, one can keep the composition constant, which results in a wage statistic without cyclically shifting weights (Hamermesh 1986). Comparing the elasticity estimates provides information on the importance and magnitude of the composition bias.

The wage growth measure WHR represents the nominal change in hourly wages for people who continue in the same firm. Kauhanen and Maliranta (2012) decompose aggregate wage growth into the wage growth of job stayers and job and worker restructuring. A job stayer is an employee who stays in the same firm for two consecutive years. Such calculations of WHR allow for change of profession because the profession data were not available on an annual basis before 2004. Since the composition remains the same, this average wage growth rate of job stayers is free of composition bias. Kauhanen & Maliranta (2012) find that the aggregate wage growth rate is lower than the wage growth rate of job stayers, so the wages of job stayers increase more rapidly than aggregate wages. Figure 1 shows clearly that Δ(W/L) is much lower than either of these.

FIGURE 1 Real wage change measures 1996-2013
(Average of industries, working hours as weight)



Statistics Finland, Maliranta.

The procyclicality of real wages means that real wages rise during expansions and fall during recessions. This means that real wages increase at the same time as output and employment increase. During recessions the proportion of low-wage workers decreases, meaning that the conventional real wage measure might even rise during a cyclical downturn. On the other hand, employment falls during recessions. This particularly affects low-wage workers. Thus, in a cyclical downturn, the aggregate average real wage rises while employment decreases. On the other hand, when employment increases at business cycle peaks, the aggregate real wage can even fall as the proportion of low-wage workers increases. As a result, aggregate data are likely to produce excessively negative elasticity estimates.

3 RESULTS

The AGR and WHR data cover the years 1996–2013. Therefore it makes sense to use the same period in all regressions in order to ensure the comparability of the elasticity estimates. In the literature, estimates of the constant-output elasticity of labor demand clearly outnumber estimates of total demand elasticity (Lichter et al. 2014). The difference between these two is that output is used as a control variable when estimating constant-output elasticities. When estimating the elasticity of labour demand, employment is the dependent variable and labour costs the independent variable. Let us estimate the following level model where L is log total working hours by industry, Y is log output by industry (at 2010 prices), and W is log real labour compensation by industry.

(1) $$ln(L_{it}) = \alpha + \eta_{L,w|Y} ln\left(\frac{W_{it}}{L_{it}}\right) + \beta ln(Y_{it}) + \varepsilon_{it}$$

Since the estimation equation includes output as a control variable, the coefficient $\eta_{L,w|Y}$ is interpreted as the constant-output elasticity of labor demand. The resulting parameter estimate from model M1 is -0.55, with a standard error of 0.15. When fixed effects are included (M2), the elasticity estimate is -0.65. Extending the time interval to cover the years 1975-2013 leads to an even greater elasticity estimate, as high as -0.77, with a standard error of 0.085. These results suggest that the elasticity of labour demand may be high, and the Ministry of Finance's elasticity estimate of - 0.7 for the private sector is not far from these results. However, this way of estimating labour demand elasticities suffers from some sources of bias.

In the context of the competitiveness pact, it is a little confusing to use constant-output elasticity instead of total demand elasticity, which also includes the scale effect. When the wage rate decreases, the cost of producing a given output decreases too. As a result, the price of the product will fall, which increases the quantity of output sold. Thus the scale effects must be added in order to obtain the total labour demand elasticity. According to Hamermesh (1986), a direct approach to estimate the total labour demand elasticity would be to estimate an equation like (1) but with output (Y) deleted.

(2) $$ln(L_{it}) = \alpha + \eta_{L,w} ln\left(\frac{W_{it}}{L_{it}}\right) + \varepsilon_{it}$$

The elasticity estimates of models M3 and M4 are lower and closer to zero than the first estimated constant-output elasticities. Both including and omitting the fixed effects produce statistically insignificant coefficients, and the coefficients of determination (R^2) are also extremely low. It should be noted that all the elasticity estimates in table 2 are biased, since working hours L is on both sides of the equation. To correct this problem, the variables RAGR and RWHR are used as a proper independent measure of wages.

TABLE 2 Elasticities resulting from the level model (1996-2013)

Variable	M1 ln L	M2 ln L	M2b (1975-) ln L	M3 ln L	M4 ln L
ln W/L	-0.55***	-0.65***	-0.77***	-0.27	0.025
	(0.15)	(0.12)	(0.085)	(0.17)	(0.23)
ln Y	0.84***	0.73***	0.75***		
	(0.027)	(0.094)	(0.11)		
constant	-1.36**	-0.11	0.12	4.95***	3.96***
	(0.47)	(0.81)	(0.80)	(0.58)	(0.79)
Fixed effects	no	yes	yes	no	yes
N	468	468	1014	468	468
R^2	0.666	0.653	0.659	0.004	0.000

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Since the wage variables RAGR and RWHR are available only in changes over time, it makes sense to compare different wage variables using the change model. Using the same estimation equation and the same time period helps to control all the other factors to keep them exactly the same. Because of this W/L is converted into Δ(W/L), which represents the logarithmic percentage change in real wages. The elasticity estimates using the wage variable Δ(W/L) are directly comparable to the elasticities that are estimated based on RAGR and RWHR. The logarithmic percentage change in working hours is the dependent variable and the only explanatory variable is the logarithmic percentage change in real wages.

(3) $$\Delta(L_{it}) = \alpha + \eta_{L,w}\Delta(W/L)_{it} + \varepsilon_{it}$$

During the time period 1996-2013, the resulting total labour demand elasticity $\eta_{L,w}$ is -0.31, with a standard error of 0.087. Since the variables represent percentage changes, fixed effects do not need to be added to the equation. However, it makes sense to include year-dummies in the equation, because the remaining differences in the wage changes are dominated by the annual variation. When year-dummies are included, the total labour-demand elasticity $\eta_{L,w}$ is -0.24 with a standard deviation of 0.12. The results are similar when the time interval is extended to cover the years 1975-2013.

TABLE 3 Elasticities resulting from the change model

Variable	M5 (1996-) ΔL	M6 (1996-) ΔL	M5b (1975-) ΔL	M6b (1975-) ΔL
Δ(W/L)	-0.31***	-0.24*	-0.27***	-0.31***
	(0.087)	(0.12)	(0.048)	(0.086)
Year-dummies	no	yes	no	Yes
constant	0.0094***	0.015	0.0040	0.018
	(0.0025)	(0.0080)	(0.0021)	(0.011)
N	468	468	988	988
R^2	0.07	0.28	0.045	0.37

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The problem in using the wage variable Δ(W/L) is that working hours are simultaneously both the dependent variable but also a component of the wage variable. The real aggregate growth rate (RAGR) measures the growth rate of average wages by industry, and using it corrects this major problem in the elasticity estimates. Since RAGR already represents percentage change, the estimation equation is:

(4) $$\Delta(L_{it}) = \alpha + \eta_{L,w} RAGR_{it} + \varepsilon_{it}$$

When estimating equation (4) using the real aggregate wage growth (RAGR) as the wage variable, the total labour demand elasticity $\eta_{L,w}$ is statistically insignificant with a point estimate of -0.12. Adding year-dummies results in a positive elasticity estimate of 0.22. with a standard error of 0.068. Since the independent wage variable RAGR results in lower elasticity estimates, it signals that previous models were biased.

However, the aggregate real wage growth measure RAGR is likely to suffer from the standard sort of composition bias, because aggregate wage statistics give more weight to low-wage workers during expansions than during recessions. The magnitude of composition bias can be detected by comparing the estimated elasticities based on the aggregate real wage measure RAGR to the results of a wage statistic without cyclically shifting weights. RWHR, the real average wage growth rate of job stayers, represents the change in hourly wages among persons who continue in the same firm. This composition bias-free wage growth data is utilized in models M9 and M10.

(5) $$\Delta(L_{it}) = \alpha + \eta_{L,w} RWHR_{it} + \varepsilon_{it}$$

Using RWHR as the wage variable, the total labour demand elasticity $\eta_{L,w}$ is statistically insignificant at -0.17. Adding year-dummies results in a positive elasticity estimate of 0.33. Thus these results are very similar to the elasticity estimates of the same equation where RAGR is used as the wage variable. This suggests that composition bias is not very significant after all. However, there are some factors that may blur composition bias. The concept of job stayers refers to employees who work for the same firm as they did in the previous year. These calculations, therefore, allow for change of profession. This is because the profession data were not available on an annual basis before 2004. In addition, when assessing these elasticity estimates, the wage changes experienced by persons in the panel for a given pair of years should be comparable to the potential wage changes for persons for whom the data are missing (Abraham & Haltiwanger 1995).

TABLE 4 Elasticities of different wage growth measures

Variable	M5 ΔL	M6 ΔL	M7 ΔL	M8 ΔL	M9 ΔL	M10 ΔL
Δ(W/L)	-0.31*** (0.087)	-0.24* (0.12)				
RAGR			-0.12 (0.083)	0.22** (0.068)		
RWHR					-0.17 (0.090)	0.33** (0.12)
Year-dummies	no	yes	no	yes	no	yes
constant	0.0094*** (0.0025)	0.015 (0.0080)	0.0068* (0.0030)	0.034*** (0.0099)	0.0080* (0.0031)	0.032** (0.01)
N	468	468	442	442	442	442
R^2	0.07	0.28	0.0093	0.28	0.015	0.29

Standard errors in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

To sum up these calculations, using aggregate data in estimating labour demand elasticities is problematic since such data lack exogenous variation in labour costs. Wages and employment are both endogenous variables, which constitutes a problem. When the purpose is to make policy analysis and predict the effects of reducing labour costs, it is necessary to have exogenous variation in labour costs. Macro-models also ignore simultaneity of demand and supply. Macro-data reveal only realized outcomes, which are combinations of prices and the amount of working hours. One cannot know whether a decline in wages is due to a change in supply or demand. All in all, using aggregate data does not produce estimates of causal effects.

4 ELASTICITY ESTIMATES OF MICRO-STUDIES

Whereas elasticity estimates based on aggregate data suffer from a lack of exogenous variation in labour costs, there are some studies that avoid this problem. In order to predict what happens to employment when labour costs are reduced, one can study cases where labor costs are reduced in reality. Studying a policy change reveals the source of variation in the explanatory variables. Therefore using policy-induced variation in labour costs as quasi-experiments means that there is exogenous variation in labour costs. Such studies include exogenous variation in the price of labour, and therefore provide more reliable elasticity estimates. The resulting elasticities can be interpreted to be causal effects of reducing labour costs on employment.

The difference-in-differences (DiD) method exploits policy changes as natural experiments. This strategy presupposes that one can define two groups, a treatment group and a control group, which share the same trend. When using the DiD method, one assumes that employment trends would be the same in both groups without the treatment, and that any deviation from this common trend is caused by the policy change (Angrist & Pischke 2009). When using this quasi-experimental method, one compares the growth in employment in the treated group to that of a control group. This kind of analysis offers more reliable results about how a reduction in labour costs affects employment (Johansen & Klette 1997).

The relevant studies, their study designs and results are reported in table 5. Such studies provide the best available evidence of the effect on employment of reducing labour costs. The average labour demand elasticity of these studies is only -0.22. This is a significantly lower estimate than the result of the extensive meta-analysis of Lichter et al. (2014), which consisted of studies without exogenous variation. Studies containing exogenous variation in wages provide preferable estimates for policy analysis.

Wage subsidies are an active labour market programme that create exogenous variation in labour costs. Kangasharju (2007) evaluates the effects of wage subsidies at the firm level in Finland during 1995- 2002. The analysis is based on the difference-in-differences method. The main finding is that wage subsidies seem to have stimulated employment in subsidized firms. According to the results, the estimated labour demand elasticity is -0.09 (with a t-value of 11.6).

Payroll taxes in Finland include employer contributions to the employees' pension scheme, national pension insurance, unemployment insurance, national health insurance and employment accident insurance. Payroll tax cuts induce exogenous variation in labour costs, so they provide promising opportunities to estimate labour demand elasticities, which can be used to make causality interpretations.

Egebark and Kaunitz (2013) use difference-in-differences (DiD) to investigate whether payroll tax cuts increase youth employment. The policy change examined was enacted in 2007, when the Swedish employer-paid payroll tax rate was lowered by 11 percentage points for employees who at the start of the year had turned 18 but not 25 years of age. Their treatment group therefore consisted of people aged 19-25, while the control group consisted mainly of 26-year-olds. The estimated elasticity is -0.31.

TABLE 5 Elasticity estimates of micro-studies

Study	Information	Elasticity (s.e.)
Skedinger (2014)	Sweden, 2000-2011. 13,000 firms with a total of 300,000 employees. Large payroll tax cuts for young workers, two reforms in 2007 and 2009. DiD. Treatment group: workers aged 21-25. Control group 27-29-year-olds.	**-0.19** (0.085)
Huttunen et al (2013)	Finland, a targeted low-wage subsidy experiment in 2006-2010. DiD. Eligible for the subsidy: workers over 54 years old, earning between €900 and €2,000 per month and working full-time. Control group: similar groups which were not eligible for the subsidy.	**-0.13** (0.107)
Egebark & Kaunitz (2013)	Sweden, 2001-2010. Large payroll tax cut for young workers in 2007. DiD. Treatment group: workers aged 19-25. Control group: 26-year-olds.	**-0.31**
Korkeamäki & Uusitalo (2009)	Finland, 2003-2009. A regional experiment that reduced payroll taxes by 3–6 percentage points for 3 years. Treatment group: firms in the 20 target municipalities in northern Finland. Control group: similar firms in a comparison region of Eastern Finland.	**-0.6**
Bennmarker et al (2009)	Sweden, 2001-2004. 10 percentage point reduction in payroll tax in 2002 in northern Sweden. DiD. Annual firm-level data. Control group: similar firms operating in nearby regions.	**+0.01** (0.1)
Bennmarker et al (2009)	Extending the analysis to include entry and exit of firms.	**-0.38** (0.27)
Kangasharju (2007)	Finland, 1995-2002. Wage subsidy of 430-770€/month. Unbalanced panel of 31,000 firms. DiD. Subsidized firms vs. non-subsidized.	**-0.09** (0.0078)
Kramarz & Philippon (2001)	France, 1990-1998. Tax subsidies. Workers directly affected by the changes vs. control group. Transition probabilities from non-employment to employment.	**-0.03**
Average elasticity		**-0.215**

Elasticity estimates obtained this way are useful for policy analysis because they are based on data that contain exogenous variation in labour costs. Unfortunately, the number of relevant micro-studies appears to be very limited. Another problem is that the experiments investigated were only temporary. In addition, there are grounds to doubt whether the results of these experiments can be generalized to the overall economy. However, many of these experiments are aimed at groups in which the elasticities should, in fact, be higher than on average.

There are many similar studies that are unable to estimate labour demand elasticities. Findings from many studies in Finland, Sweden and Norway show that a payroll tax cut is likely to push wages up. Johansen and Klette (1997) examine the effects of regional differences in payroll taxes in Norway, and find that changes in payroll taxes are for the most part shifted to wages. Bohm and Lind (1993) evaluate the employment effects of regional wage subsidies in Northern Sweden. Bennmarker, Mellander and Öckert (2009) and Korkeamäki and Uusitalo (2009) evaluate the effects of regional wage subsidies in Sweden and Finland. They all share the same finding that changes in payroll taxes are partly shifted to wages with little effect on employment. Such studies do not provide elasticity estimates since labour costs remained unchanged.

5 CONCLUSIONS

The calculations in this report show that estimating labour demand elasticities based on aggregate data has a tendency to produce biased and excessively large elasticity estimates. Using aggregate data in estimating labour demand elasticities is problematic since such data lack exogenous variation in labour costs. This makes it impossible to measure the causal impacts of labour costs on employment. When the purpose is to conduct policy analysis and predict the effects of reducing labour costs, there should be exogenous variation in labour costs.

In order to predict what happens to employment when labor costs are reduced one can study cases where labor costs are reduced in reality. Using policy-induced variation in labour costs as quasi-experiments means that there is exogenous variation in the price of labour. This provides more reliable elasticity estimates that can be interpreted as causal effects of reducing labour costs on employment. This report contains a brief meta-analysis of micro-studies that examine situations where labour costs have been changed exogenously. Unfortunately, the number of relevant micro-studies appears to be very limited. However, such studies provide the best available evidence of the effect on employment of reducing labour costs. The average labour demand elasticity of these studies is -0.22.

The estimated employment effects of the competitiveness pact are sensitive to the elasticity estimate used in it. The elasticity estimate used appears to be very high, predicting overly optimistic employment effects. The Ministry of Finance's estimate of 35,000 new jobs is based on an elasticity estimate of -0.7. However, as this report shows, this high elasticity appears to be upwards-biased. Unfortunately, this in turn suggests that the real employment effects are likely to be below expectations.

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APPENDIX

Industries in calculations

Standard Industrial Classification TOL 2008		Average of annual total working hours by industry (1975-2014) (1 000 000 h)
05-09	Mining and quarrying	9.2
10-12	Manufacture of food products, beverages, and tobacco products	64.0
13-15	Manufacture of textiles, wearing apparel, and leather and related products	22.5
16	Manufacture of wood and of products of wood and cork	44.5
17	Manufacture of paper and paper products	50.6
18	Printing and reproduction of recorded media	21.3
23	Manufacture of other non-metallic mineral products	25.7
24	Manufacture of basic metals	26.1
25	Manufacture of fabricated metal products, except machinery and equipment	68.5
26-27	Manufacture of computer, electronic and optical products; Manufacture of electrical equipment	92.6
28	Manufacture of machinery and equipment n.e.c.	76.3
29-30	Manufacture of motor vehicles, trailers and semi-trailers Manufacture of other transport equipment	28.9
31-32	Manufacture of furniture Other manufacturing	28.9
33	Repair and installation of machinery and equipment	32.2
35-39	Electricity, gas, steam and air conditioning supply Water supply; sewerage, waste management and remediation activities	38.9
41-43	Construction	240.6
45-47	Wholesale and retail trade; repair of motor vehicles and motorcycles	459.6
49-53	Transportation and storage	221.3
55-56	Accommodation and food service activities	119.6
58-63	Information and communication	143.6
64-66	Financial and insurance activities	70.8
68	Real estate activities	35.1
69-75	Professional, scientific and technical activities	143.1
77-82	Administrative and support service activities	124.9
84-88	Public administration and defence; compulsory social security; Education; Human health and social work activities	73.8
90-93	Arts, entertainment and recreation	20.4