Implicit Contracts, Wage Cyclicality and Import Competition[1]

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Abstract

Using an employer-employee panel comprising data on the wage records of The Confederation of Finnish Industries (*Elinkeinoelämän Keskusliitto*, EK) combined with firm-level data from the Financial Statements data of Statistics Finland and regional unemployment data, we study implicit wage contracts by employing variations of the standard wage curve. We find strong evidence in support for the negative wage-current unemployment elasticity, i.e. support for the standard wage curve. We also find both economically and statistically significant negative wage-start-of-tenure-unemployment elasticity. The wage-current unemployment rate elasticity is roughly -0.02, while wage-start-of-tenure elasticity is about -0.015. Both elasticities are very precisely estimated. The evidence on weakening of the wage-current unemployment elasticity after controlling for the unemployment rate at start-of-tenure is weak. When looking at how changes in the level of import competition alters these elasticities, our results point to a weakening impact on both of the aforementioned wage-unemployment elasticities.

1 Introduction

In the standard macro-labour market models, wage-setting takes place at the spot market, or by Nash bargaining between employers and employees. This "spot market view" suggest that the wages are related only to current labour market conditions, compensation being determined by the worker's marginal product and economic conditions at each point of time. Empirical studies, however, provide unfavorable evidence to such models of wage determination. For instance, wages fluctuate much less than the firms profits, the association between wages and productivity is incomplete, and there seems to be some evidence on differing behavior of the wages of new and continuing matches or the wages of job stayers and job movers.

Alternative view considers the employment relationship as implicit contractual arrangement, where employer shields the worker from changes in the economic conditions These shielding agreements emerge under fairly general conditions as a way for risk-neutral firms to insure risk-averse workers against cyclical fluctuations. Main theoretical result from this view is that risk-sharing wages should be sensitive to the external labor-market conditions at the time that the worker is hired but should not respond to the current state of the labor market. The development of longitudinal employer-employee databases has made it possible to study empirically a relevance of such contractual arrangements, and also in more general, improve our understanding on cyclicality of wages. Beudry and DiNardo (1991) where among the first to study importance of implicit wage contracts by relating wages to current and past unemployment rates[1]. Their estimation methodology therefore involves estimating a modified wage curve with not just current, but also with past unemployment rate as an explanatory variable.

In this paper, we follow the same tradition, but with the following complement. In addition to relating individual wages to regional current and start-of-tenure unemployment rates, we also examine the importance of import competition in shaping the implicit contracts between employer and employee. In the latter part of the analysis, we follow Bertrand (2004). She motivated her analysis by outlining a partial equilibrium model where competitive pressure in general, and in particular import competition, can alter the incentives to engage to wage shielding agreements in the employer-worker relationship. Wage shielding agreements require that firms can commit to insure their workers even at times when the spot-market wage is clearly lower

[1] Empirical studies on implicit contracts include at least Gamber (1988), Beaudry and DiNardo (1991,1995), Weinberg (2001), Devereux (2005), Guiso (2005), Cardoso and Portela (2005) and Katay (2007), Grant (2003), Devereux and Hart (2005).

than the contracted wage. Bertrand (2004) introduces reputational concerns as a rationale to such commitments. Firms will not opportunistically renege on ex ante commitments with their workers because they may face high costs in the future if they do so. Bertrand (2004) shows that firms' ability to commit to implicit wage shielding contracts decreases in more competitive environments. This is based on the claim that increase in import competition reduces firms' earnings and increases the risk of financial distress. An increased risk of financial distress in turn shortens corporate horizons and therefore weakens reputational concerns: the future cost of reneging on implicit contracts goes down when firms face shorter horizons. This implies a shift away from implicit wage agreements towards spot market wage setting. In a heavily unionized country, like the one studied in this paper, a more accurate description of the same tendency would be that the internal labor market breaks down by intensified competition and the wage setting switches increasingly to the external labor market[2]. Empirical implication of Bertrand (2004) model is that current wage-current unemployment elasticity should increase as a result of higher level of import competition and the current wage-start-of-tenure unemployment elasticity should decrease as a result of intensified competition. In order to capture this, we add into modified wage curve interaction terms between current unemployment rate and a measure of import competition, as well as start-of-tenure unemployment rate and a measure of import competition. We use industry level import penetration as a proxy for import competition.

Our findings can be summarized as follows. We find evidence in support for the negative wage-current unemployment elasticity, i.e. support for the standard wage curve. We also find both economically and statistically significant negative wage-start-of-tenure-unemployment elasticity. However, the evidence on lowering of the wage-current unemployment elasticity after controlling for the unemployment rate at start-of-tenure is moderate. We interpret this as only weak evidence on wage shielding in the Finnish labour markets. The wage-current unemployment rate elasticity is roughly -0.02, while wage-start-of-tenure elasticity is about -0.015. Both elasticities are very precisely estimated. The wage-current unemployment rate elasticity is somewhat lower than typically found in the standard wage curve literature. This is partly explained by the fact that we control for both individual and industry effects, and thus eliminate the composition bias. When looking at how changes in the level of import competition alters these elasticities, our

[2]For a recent study of on the co-existence of internal and external labor markets in a heavily unionized institutional setting, see Lazear and Oyer (2003).

results point to a weakening impact on both the aforementioned negative wage-unemployment elasticities. This is partly in contrast to the previous literature on implicit contracts in wage setting, in particular to the findings of Bertrand (2004). She finds that import competition strengthens the importance of the current labor market conditions relative to the labor market conditions at the start-of-tenure. Our results, however, show that import competition has statistically and economically significant negative effect on the level of wages.

Rest of the paper is organized as follows. Section 2 discusses the theoretical underpinnings and section 3 presents the empirical model to be estimated. Section 4 describes the data and section 5 presents the empirical results. Section 6 concludes.

2 Theoretical issues

Influence of labour market conditions on wages is central for understanding the transmission of various shocks to macroeconomic outcomes. In the standard macro-labour market models, wage-setting takes place at the spot markets, or at Nash-bargain between employer and employee. These theories suggest that wages are related only to current labour market conditions with a proportional relationship between wage changes and changes in workers' outside options. Empirical studies however, provide evidence that is not supportive to such models of wage determination. For instance, wages fluctuate much less than the firms profits and association between productivity and wage movements is imperfect. Shimer (2005) has suggested that the standard search models tend to under-predict volatility of vacancies and unemployment due to spot market wage setting. Further indirect evidence against spot market models of wage setting is provided in the literature which concentrates on the differing behavior of wages of new and continuing matches. Pissarides (2007) reviews this empirical literature and finds that the elasticity of wages of new hires with respect to a change in the unemployment rate is quite high: a one percentage point rise in the unemployment rate is associated with wages for new matches that are around 3% lower. Pro-cyclicality of wages of continuing matches is more moderate. Also Carneiro et al. (2008) find that wages of new hires are significantly more pro-cyclical than wages of continuing matches.

Alternative to sport market view, which has got some support from empirical studies, considers the employment relationship as an implicit contractual arrangement, where employer shields the worker from changes in

the economic conditions at points in time. This literature on insurance contracts at the labour markets dates back to Azariades (1975) and Baily (1974). They show that if an insurance contract is fully binding on both parties (employee and employer), real earnings are insensitive to idiosyncratic shocks. In these models, employees are regarded as risk-averse and employers risk-neutral. Employees utility is thus a negative function of the variance of their wages, such that firms have an incentive provide a form of insurance against expected fluctuations in market conditions. Firms risk-neutrality is motivated by their access to complete financial markets which allows them to insure themselves against idiosyncratic market risk. Main theoretical result from this view is that risk-sharing wages should be sensitive to the external labor-market conditions at the time that the worker is hired but should not respond to the current state of the labor market.

Bertrand (2004) outlines a model according to this tradition with special emphasis on the effect of competition on implicit wage agreements. She develops a partial equilibrium model where competitive pressure in general, and in particular import competition, can alter the incentives to use wage shielding agreements in the employer-worker relationship. Without going into details of the formal model, the rationale behind why competition pressure in the product markets has an impact on wage shielding is as follows. Wage shielding agreements require that firms can commit to insure their workers even at times when the spot-market wage is clearly lower than the contracted wage. Bertrand (2004) introduces reputational concerns as a rationale to such commitments. Firms will not opportunistically renege on *ex ante* commitments with their workers because they may face high costs in the future if they do so. Bertrand (2004) shows that firms' ability to commit to implicit wage shielding contracts decreases in more competitive environments. This is based on the claim that increase in import competition reduces firms' earnings and increases the risk of financial distress. An increased risk of financial distress in turn shortens corporate horizons and therefore weakens reputational concerns: the future cost of reneging on implicit contracts goes down when firms face shorter horizons. This implies a shift away from implicit wage agreements towards spot market wage setting. Survey evidence (survey collected by the Wage Dynamics Network including 15 European countries) studied in Galuscak et al. (2008) provide some evidence to this direction. Based on the questionnaire, they conclude that "the more intense the competition the more likely are firms to take external labour market conditions into account".

3 Empirical strategy

3.1 Specification

Our estimation strategy is related to the standard wage curve literature that has its start in the empirical studies by Blanchflower and Oswald (1994) and Card (1995). In these studies the observation of a negative wage-current regional unemployment elasticity is obtained with wage data from a number of countries with varying institutional settings. As our focus is on wage shielding contracts between the firm and the worker we employ a variation of the basic wage curve where we control for the job market conditions at start of tenure. Specifically, the negative relationship between current log of wage w_{ijrt} and the log of current unemployment rate u_{rt} is expected to be weakened when controlling for unemployment rate at tenure start. Using individual level panel data, we first estimate the following variation of the basic wage curve equation:

$$\log(w_{ijrt}) = \beta_1 u_{rt} + \beta_2 u^0_{irt} + \gamma_r + \eta_t + \mu_j + \delta_i + x'_{ijrt}\varphi + \epsilon_{ijrt}, \qquad (1)$$

where i, j, r, t, index individual, industry, region and time respectively; w_{ijrt} is the wage rate for individual i; u_{rt} is the current local unemployment rate in region r at time t; u^0_{irt} is the unemployment rate of region r that was prevailing in the year that individual i started working for her present (at time t) employer; γ_r is a vector of regional fixed effects; η_t is a vector of time fixed effects; μ_j is a vector of industry fixed effects; δ_i is a vector of individual fixed effects;x_{ijrt} is a vector of individual characteristics; and ϵ_{ijrt} is the residual.

The coefficient of interest in equation (1) is β_2, which we, based on the findings of Beaudry and Di Nardo (1991) and Bertrand (1999), expect to be weakened when controlling for unemployment rate at the time of tenure start relative to the coefficient obtained from estimations where explaining the log of wages with only current unemployment rate.

The following step is to include interactions of the two unemployment variables, u_{rt} and u^0_{irt} with industry-level import competition imp_{jt} to account for for the possibility that import competition affects the both wage-unemployment elasticities. The estimating equation becomes as follows:

$$\begin{aligned}\log(w_{ijrt}) = {} & \beta_1 u_{rt} + \beta_2 imp_{jt} + \beta_3 \left(imp_{jt} \times u_{rt}\right) + \beta_4 u^0_{irt} \\ & + \beta_5 \left(imp_{jt} \times u^0_{irt}\right) + \gamma_s + \eta_t + \mu_j + \delta_i + x'_{ijrt}\varphi + \epsilon_{ijrt},\end{aligned} \qquad (2)$$

The coefficients of interest in equation (2) are β_3 and β_5. According to the predictions of the model by Bertrand (2004), β_3 is expected to be negative and β_5 is expected to be positive. A negative value for β_3 implies that intensified import competition increases the current wage-current unemployment elasticity. A positive value for β_5 implies that import competition weakens the effect of unemployment at start of tenure on the current wage. In fact the basic wage curve of equation (1) implicitly imposes $\beta_2 = \beta_3 = \beta_5 = 0$.

3.2 Econometric issues

3.2.1 Level of disaggregation

The following concerns that arise when employing the standard wage curve framework and should be dealt with taking the appropriate measures suggested by e.g. Card (1995) that by now already are standard to the literature: First, even if our data allows us to run estimations with up to over 900,000 observations both the unemployment and import penetration measures rely on aggregate (industry) level variation. As Card (1995) has pointed out, the use of aggregate level key explanatory variables in wage curve estimations implies that the actual "degrees of freedom" involved in the estimation of the elasticities is far less than the number of observations. The relevant dimension for the estimations of our elasticities is the number of regions times the number of years times the number of industries. In our case we should be on the safe side with 74 different regions observed during a period of 15 years in 22 industries yielding roughly 8,000 "observations" on local labor markets in different industries in different years. The second concern relates to the use of individual-level data even though the source of variation exploited operates at the aggregate, in this case industry-region-year, level. The well known problem is that individuals in the same industry-region-year cells may share some common component of variance that neither the individual level variables nor the aggregate level variables are able to capture. In this case the error components in the equation (1) are correlated across individuals from the same within-industry local labor market. This leads to downward biased standard errors for the OLS estimates.[3] The standard errors should be corrected for these group effects in the estimations. A third point worth highlighting is that the use of panel data mitigates the bias related to re-shuffling of the workforce over the business cycle. Despite having been pointed out already by Solon et. al (1994)

[3] See Moulton (1986)

this potential composition bias has been a prevalent problem in the wage curve studies that use repeated cross-sections.

3.2.2 Endogeneity

The OLS estimates might be biased and inconsistent both due to the reverse causality problem caused by the fact that wage setting affects the firms competitive position on the market and due to the fact that firms more willing to shield their workers wages from the external labor market might be exposed to recessions and more vulnerable to foreign competition. We attempt to deal with the first issue by applying the identification strategy proposed by Revenga (1992) and Bertrand (2004). They extract purely exogenous fluctuations in import competition by using an instrument that is exogenous to the wage setting policy of firms. The instrument is measure on industry-specific import-weighted real exchange rates. The weights of the bilateral exchange rates between the Finland and its main trading partners are the average proportion in total imports from each country during the period 1997-2000. The real exchange rate variable correlates positively with import competition and is arguably exogenous since exchange rates are determined in international financial markets and therefore are uncorrelated with the behavior of a certain industry in a certain period, at least conditional on controlling for common macroeconomic shocks.

4 The data

We link employee data from the The Confederation of Finnish Industries (Elinkeinoelämän keskusliitto, EK) to employer data at Statistics Finland and regional data on unemployment from Ministry of Labor over the period 1989-2003. Each year EK conducts a wage survey among it's member firms by which detailed information on wages and working hours for the last quarter of the year is collected. Each employee of a member firm who has turned 15 years is obliged to file the information for this survey. Our data set consists of complete data of blue collar workers in EK's member firms in manufacturing industries over the period 1989-2003. This wage data is then linked to the corresponding firms' accounting data at Statistics Finland using the firms' and individuals' identification codes. In addition, we link the resulting employee-employer panel to regional unemployment rates from the Ministry of Labour in order to obtain a measure for external labour market conditions. In order to calculate the regional unemployment rates we use the regional entity that most likely represents the realistic go-to-work area for

the average individual, i.e. the unemployment rate of the worker's working county. Finland is divided into 88 counties during the period of observation, of which 75 are represented in our data.

We are able to link roughly 1'101'000 individual observations from the EK wage survey to accounting data on firms and regional unemployment data. One of our variables of interest, regional unemployment rate at the start-of-tenure can only be constructed from 1987 onwards due to availability of county level unemployment data. This shrinks our sample down to 912'962 observations with non-missing values on the variables included in the regressions and cleaned of extreme values in the variables.[4]

The resulting longitudinal panel is then merged by industry (2-digit ISIC level) and year with an import competition variable and a real exchange rate index. We construct the import competition measure using data on industry-level import, production and export volumes from the OECD Structural Analysis (STAN) data base. Our measure of import competition is defined as the ratio of imports over imports plus domestic production minus exports in a given industry and a given year. This measure of import competition captures the extent to which domestic demand is saturated by imports. The real exchange rate index is defined at industry level, as a weighted geometric average of the real exchange rates of the source countries of the imports. The weights for a given industry are the shares of imports from each foreign country in the total imports of that industry in a base period (1997-2000). The bilateral trade data needed for the construction of this index comes from the Finnish Customs office database.

Table 1 finally presents the summary statistics for the main variables of interest in our sample. Most of the blue collar workers are men, with mean age of 32 years and with about 7.6 years of work experience. Average tenure of blue collar worker man is 4.3 years. Mean age in the whole sample, where also women are included is about 33.5 years, indicating that the average age of a blue collar woman is somewhat higher, as expected. Wage is higher while current unemployment rate is lower in the male sub-sample when compared to the whole sample with women included. Somewhat curiously, unemployment rate at the start-of-tenure is higher in the male sub-sample. This may reflect the fact that women has less stable labour-force participation rates when compared to men. Indeed, tenure in slightly lower in the whole sample, when compared with male sub-sample. Mean import penetration

[4] We remove observations for which the deflated hourly wage is less than one or more than 100. We additionally exclude observations with a negative working experience or a working experience above 50 years.

is roughly 0.34, also a reasonable number. The mean unemployment rates (calculated at the counry level) are high, since our data sample includes the 1990s recession years, when unemployment rates in some counties rose well above 20%.

Table 1. Summary statistics

	All		Male	
Variable	Mean	Std	Mean	Std
Individual worker characteristics:				
Female dummy	0.288	0.453	...	...
Age	33.500	9.874	32.354	9.327
"Work in shifts" dummy	0.530	0.500	0.531	0.499
Tenure	4.284	3.890	4.300	3.868
Experience	7.666	7.113	7.639	7.041
Hourly compensation (wage)	10.013	2.521	10.533	2.519
Log hourly compensation (wage)	2.274	0.243	2.330	0.232
Base wage (excluding supplements)	9.387	2.036	9.803	2.010
Log base wage	2.217	0.212	2.262	0.202
Labour market characteristics:				
Unemployment rate	14.175	5.626	12.322	7.134
Log unemployment rate	2.545	0.517		
Unemployment rate at start-of-tenure	12.054	7.108	14.289	5.589
Log unemployment rate at start-of-tenure	2.256	0.754		
Industry characteristics:				
Export adjusted import penetration	0.343	0.249	0.334	0.248
Sample size	912'962		650'872	

Source: The Confederation of Finnish Industries (Elinkeinoelämän keskusliitto, EK) wage survey for individual characteristics; Ministry of Labour regional database for unemployment rates; OECD Structural Analysis (STAN) data base for import penetration, Finnish Customs office database for computing the real exchange rate; The wage variable is (base wage+complements)/hours, deflated to 1995 prices by the consumer price index. The sample sizes for the "Work in shift" dummy are 912,962 and 650,872 respectively. Note: The construction of variables and definitions are contained in Appendix C.

5 The results

5.1 Wage-shielding and wage cyclicality

We start by presenting the results from standard wage curve estimation (see Table 2) to test for possible evidence on wage shielding and cyclicality of wages. We then look whether our measure of import competition interacts with unemployment variable. Our preferred measure of hourly compensation is computed as base wage and wage complements divided by individual hours, and deflated by the consumer priced index. This wage measure is standard to the literature[5], but we have also experimented with alternative measures such as fixed base wage, defined as the sum of time-rate, piece-rate, performance based compensation, shift premiums and bonuses based on working conditions (i.e. excluding overtime and Sunday premiums). For instance Böckerman et al. (2006) argue that this is the most appropriate measure when studying downward rigidity of wages.

Each regression includes 14 year dummies, 74 regional dummies and 21 industry dummies. The demographic controls available are a quadratic in age, a quartic in experience, a female dummy and a "work in shift"-dummy. These individual control variables capture observable changes in the work-force demographics and mitigates a possible compositional biases. Within transformation employed to control for individual fixed effects eliminates possible compositional problems caused by unobserved time-invariant characteristics.

Columns I and II in Table 2 reports the standard wage curve regressions for the whole sample and for the sub-sample of males respectively. We look separately at the male sub-sample because male's labor force participation is not interrupted by events typical for women such as child bearing. There is thus reason to believe that males are more likely to reach implicit agreements with the employer on their wage.

[5] See e.g. Card and de la Rica (2005).

Table 2 Basic wage curves

Dependent variable: $\log(w_{ijrt})$				
Specification: OLS				
	All	Male	All	Male
	I	II	III	IV
u_{rt}	-.0227***	-.0213***	-.0213***	-.0195***
	(.001)	(.001)	(.001)	(.001)
u^0_{irt}			-.0148***	-.0166***
			(.000)	(.001)
Obs.	912'962	650'872	912'962	650'872
R^2	.49	.49	.49	.49

Note: The dependent variable $\log(w_{ijrt})$ is the real hourly employee compensation. u^c_{rt} is log current unemployment at the level of county and u^{st}_{rt} is log unemployment rate at the start-of-tenure at the county level. The construction of variables and definitions are contained in Appendix C. Time effects are controlled for in each regression. Individual effects are controlled for by employing within transformations of the variables around their individual means and additionally 74 regional dummies and 21 industry dummies. The other covariates included in each regression are a quadratic in age, a quartic in experience, a female dummy, a "work in shift" dummy. p-values based on robust standard errors in parenthesis. The superscripted asterisks denote significance as follows: ***=p $<$ 0.01,**=p $<$ 0.05,*=p $<$ 0.1.

In both cases, the estimated elasticities are negative and highly significant (robustified standard errors are reported in the parenthesis) but relatively small. These elasticities are however in the same ball park as the ones obtained by Pekkarinen (2001). Pekkarinen (2001) obtains unemployment elasticities of wages roughly equal to -0.04. Our estimated elasticities are somewhat lower since we control for both individual and industry effects, in contrast to more standard wage curve estimations. Individual effects are controlled in order to eliminate compositional problems caused by unobserved time-invariant characteristics. We control for industry effects in order to make the results more comparable with the ones obtained from the regressions including interaction terms of unemployment and a measure of import competition.

In column III and IV we report the evidence on wage shielding, ie. that the wage-current local unemployment rate elasticity should be weakened when we control for local unemployment rate at the start of tenure. Based on Table 2, column I and III, one-standard deviation (≈ 0.75) increase at the current unemployment rate reduces wages about 1.2 percent when start-of-tenure unemployment rate is not controlled for and 1. 1 percent after controlling for start-of-tenure unemployment rate. For males, the corresponding

numbers are 1.1 and 1 percent. For male sub-sample, start-of-tenure unemployment rate matters relatively more than in the whole sample with women included.

Evidence of wage shielding is however considerably much weaker than the one found by Bertrand (1999), who obtain a switch in the sign of the wage-current local unemployment rate elasticity when unemployment at the start-of-tenure is included in the wage curve regression. However, our results still show that wages are not only determined by current labour market conditions, also start-of-tenure unemployment rate matters for the determination of wages.

One possible explanation for our results is that an extensive unemployment insurance system already provides for the workers insurance against cyclical fluctuations. This may make the workers less risk averse than in the countries with weak employment protection. However, it should still be reasonable to expect that the unemployment affects the workers' wages indirectly through e.g. foregone experience and thus any worker is risk averse to some extent even in the most generous unemployment insurance system. Alternative explanation could be that employment contracts are not fully binding. As shown by Beaudry and DiNardo (1991), if the contract is non-binding on the worker, then the real wage should be constant unless it becomes too low relative to the market conditions to prevent separation. The wage should be determined by the best economic conditions that occurred after the match begins. Using the unemployment rate as a proxy for the market conditions, they find strong evidence that the minimum unemployment rate is strongly negatively associated with current wages, the other unemployment rates being less important. We will check the relevance of this argument in later on.

5.2 Import competition

In Table 3 we turn to analyses the impact of import competition on the two wage-unemployment elasticities and the level of wages. We run both OLS and IV regressions using the county level log unemployment as explanatory variable. In Table 3, in columns labelled as IV, the endogenous variables are instrumented using current and one-year lagged industry real exchange rate indices as well as the interaction of each of these indices with the regional log unemployment rates. The first stage results of IV regressions are presented in the Appendix B. The dependent variables employed in the first stage regressions of column I of Table 3 are import competition imp_{jt} and the interaction of import competition with the log regional current unemployment

rate $imp_{jt} \times u_{rt}$. The dependent variables employed in the first stage regressions of column II of Table 3 are import competition imp_{jt}, the interaction of import competition with the log unemployment rate $imp_{jt} \times u_{rt}$ and the interaction of import competition with the log unemployment rate at the start-of-tenure $imp_{jt} \times u_{rt}^{0}$ .IV estimation is employed in order to avoid the possibility that import competition measure correlates with the error term.

The results (both OLS and IV) show clear evidence that intensified import competition has a negative effect on the level of wages when regional unemployment rate (both current and the rate prevailing at start-of-tenure) is controlled for. However, a negative effect of import competition on level of wages does not necessarily imply a change in the wage setting practices(such as declining wage mark-ups). It may just reflect a downward shift in the labour demand curve due to a negative shock to demand shock to firm's products.

Our instrumental variable regression results (see column labeled as IV in Table 3) suggest that import competition weakens the wage-start-of-tenure unemployment elasticity significantly, as suggested by the theory. In the IV regression, the point estimate is also economically significant. The same is not true for the OLS regression, indicating that instrumentation of import competition measure is successful. Another sign that instrumentation works well is that instrumental variable estimation leads much stronger effect of import competition on the wage levels when compared to OLS regression. However, quite surprisingly, at the same time also the effect of wage-current unemployment is weakened due to intensified import competition. This result is in contrast to theoretical prediction.

In order to check the robustness of these results, we ran OLS and IV regression for males only (see Table A1 in the Appendix A). Furthermore, we used alternative wage measure (see Table A2 in the Appendix A). In both cases, the results point to the same direction: although intensified import competition weakens the impact of start-of-tenure unemployment rate on wages, there is no evidence on increasing importance of current unemployment rate, as suggested by the theory. In fact, the evidence seems to point to the direction that intensified product market competition makes wages even less flexible to current unemployment rates, away from spot market transactions. It is hard to reconcile this result within the implicit wage contracting framework.

Table 3 Effect of import competition

Dependent variable: $\log(w_{ijrt})$				
Estimation method: OLS and IV				
	I		II	
	OLS	IV	OLS	IV
imp_{jt}	-.0681***	-1.656***	-.0716***	-1.631***
	(.004)	(.050)	(.006)	(.061)
u_{rt}	-.0283***	-.151***	-.0268***	-.109***
	(.001)	(.005)	(.001)	(.005)
u^0_{irt}			-.0156***	-.0718***
			(.001)	(.009)
$imp_{jt}\times u_{rt}$	.0129***	.299***	.0128***	.217***
	(.001)	(.010)	(.001)	(.009)
$imp_{jt}\times u^0_{irt}$			.0017	.144***
			(.002)	(.020)
Obs.	912'962	660'912	912'962	660'912
R^2	.49	.45	.49	.45

Note: The dependent variable $\log(w_{jirt})$ is real hourly employee compensation. imp_{jt} is a measure of import competition, u_{rt} is log current unemployment at the level of county and u_{irt} is log unemployment rate at the start of the tenure at the county level. The construction of variables and definitions are contained in appendix. Time effects are controlled for in each regression. Individual effects are controlled for by employing within transformations of the variables around their individual means and additionally 74 regional dummies and 21 industry dummies are included. Other covariates included in each regression are a quadratic in age, a quadratic in work experience, a female dummy, a "work in shift" dummy. p-values based on robust standard errors in parenthesis. The superscripted asterisks denote significance as follows: ***=p $<$ 0.01, **=p $<$ 0.05, *=p $<$ 0.1.

6 Conclusions

In this paper, we have related individual wages to regional current and start-of-tenure unemployment rates as suggested by implicit contract theories of wage setting. We have also examined the importance of import competition on cyclicality of wages. We find both statistically and economically significant negative wage-current unemployment elasticity, and also significant negative wage-start-of-tenure-unemployment elasticity. The wage-current unemployment rate elasticity is roughly -0.02, while wage-start-of-tenure elasticity is about -0.015. Both elasticities are very precisely estimated.

However, the evidence on weakening of the wage-current unemployment elasticity after controlling for the unemployment rate at start-of-tenure is weak suggesting that wage shielding arrangements may not be characteristic to the Finnish labour markets. As for the importance of import competition, our results point to a weakening impact on both of the aforementioned wage-unemployment elasticities. Wweakening of the wage-start-of-tenure unemployment elasticity along more intense import competition is in accordance with the predictions of Bertrand (2004) model. At the same time, we find that wages become less flexible also with respect to current local unemployment rates as import competition intensifies. This result is hard to reconcile within implicit wage contracting framework.

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Appendix

A Estimations using males only and alternative wage measure

Table A1. Effect of import competition - males only

Dependent variable: $\log(w_{ijrt})$				
Estimation method: OLS and IV				
	I		II	
	OLS	IV	OLS	IV
imp_{jt}	-.0637***	-1.579***	-.0653***	-1.628***
	(.006)	(.053)	(.008)	(.073)
u_{rt}	-.0275***	-.147***	-.0258***	-.107***
	(.002)	(.006)	(.002)	(.005)
u^0_{irt}			-.0168***	-.0751***
			(.002)	(.009)
$imp_{jt} \times u_{rt}$	.0143***	.297***	.0146***	.215***
	(.002)	(.0124)	(.002)	(.011)
$imp_{jt} \times u^0_{irt}$			.000	.164***
			(.003)	(.023)
Obs.	650'872	477,709	650'872	477,709
R^2	.49	.45	.49	.45

Note: The dependent variable $\log(w_{jirt})$ is real hourly employee compensation. imp_{jt} is a measure of import competition, u_{rt} is log current unemployment at the level of county and u_{irt} is log unemployment rate at the start of the tenure at the county level. Time effects are controlled for in each regression. Individual effects are controlled for by employing within transformations of the variables around their individual means and additionally 74 regional dummies and 21 industry dummies are included. Other covariates included in each regression are a a quadratic in age, a quadratic in work experience, a female dummy, a "work in shift" dummy. p-values based on robust standard errors in parenthesis. The superscripted asterisks denote significance as follows: ***=p$<$0.01, **=p$<$0.05, *=p$<$0.1.

Table A2. Effect of import competition - alternative wage measure

Dependent variable: log base wage (excl. Sunday and over time premiums) Estimation method: OLS and IV			
	OLS		IV
	I	II	III
imp_{jt}	-.068***	-.083***	-1.451***
	(.004)	(.005)	(.051)
u_{rt}	-.025***	-.023***	-.0794***
	(.001)	(.001)	(.004)
u^0_{irt}		-.019***	-.0651***
		(.001)	(.007)
$imp_{jt} \times u_{rt}$	.011***	.010***	.158***
	(.001)	(.001)	(.008)
$imp_{jt} \times u^0_{irt}$		.008***	.132***
		(.002)	(.017)
Obs.	912'962	912'962	660'912
R^2	.56	.56	.53

Note: The dependent variable $\log(w_{jirt})$ is real hourly employee compensation. imp_{jt} is a measure of import competition, u_{rt} is log current unemployment at the level of county and u_{irt} is log unemployment rate at the start of the tenure at the county level. (The first stage results of the IV regression in column III are available from the authors). Time effects are controlled for in each regression. Individual effects are controlled for by employing within transformations of the variables around their individual means and additionally 74 regional dummies and 21 industry dummies are included. Other covariates included in each regression are a a quadratic in age, a quadratic in work experience, a female dummy, a "work in shift" dummy. p-values based on robust standard errors in parenthesis. The superscripted asterisks denote significance as follows: ***=p$<$0.01, **=p$<$0.05, *=p$<$0.1.

B First stage regressions

Table B1. Effect of import competition -First stage regressions

First stage regressions for column II in Table 3		
Dependent variable:	imp_{jt}	$imp_{jt} \times u_{rt}$
	I	II
xrt_{jt}	.323***	2.091***
	(.009)	(.031)
u_{rt}	.055***	.986***
	(.002)	(.007)
$xrt_{jt} * u_{rt}$	.008***	-.221***
	(.002)	(.007)
xrt_{jt-1}	.003	-.284***
	(.008)	(.027)
$xrt_{jt-1} * u_{rt}$	-.041***	-.140***
	(.002)	(.007)
Obs.	660'912	660'912
R^2	.63	.68

Note: The dependent variables employed in the first stage regression of the IV-regressions of column II of Table 3 are import competition imp_{jt} and the interaction of import competition with the log unemployment rate $imp_{jt} \times u_{rt}$. Time effects are controlled for in each regression. Individual effects are controlled for by employing within transformations of the variables around their individual means and additionally 74 regional dummies and 21 industry dummies are included. Other covariates included in each regression are a a quadratic in age, a quadratic in work experience, a female dummy, a "work in shift" dummy. Columns I,a report results using import competition measure that controls for exports. p-values based on robust standard errors in parenthesis. The superscripted asterisks denote significance as follows: ***=p$<$0.01, **=p$<$0.05, *=p$<$0.1.

Table B2. Effect of import competition -First stage regressions

First stage regressions for column IV in Table 3			
Dependent variable:	imp_{jt}	$imp_{jt}\times u_{rt}$	$imp_{jt}\times u^0_{rt}$
	I	II	III
xrt_{jt}	.317***	2.096***	.913***
	(.009)	(.031)	(.022)
u_{rt}	.0696***	1.129***	.131***
	(.002)	(.008)	(.006)
$xrt_{jt}*u_{rt}$	.001***	-.270***	-.0297***
	(.002)	(.007)	(.006)
u^0_{rt}	-.0152***	-.130***	.476***
	(.001)	(.004)	(.004)
$xrt_{jt}*u^0_{rt}$	-.001	.0507***	-.0472***
	(.001)	(.002)	(.002)
xrt_{jt-1}	.0138*	-.237***	.0124
	(.008)	(.027)	(.019)
$xrt_{jt-1}*u_{rt}$	-.054***	-.204***	-.069***
	(.002)	(.007)	(.005)
$xrt_{jt-1}*u^0_{rt}$	.012***	.062***	.017***
	(.000)	(.002)	(.002)
Obs.	660'912	660'912	660'912
R^2	.63	.68	.61

Note: The dependent variables employed in the first stage regression of the IV-regressions of column IV of Table 3 are import competition imp_{jt}, the interaction of import competition with the log unemployment rate $imp_{jt}\times u_{rt}$ and the interaction of import competition with the log unemployment rate at start of tenure $imp_{jt}\times u^0_{rt}$. Time effects are controlled for in each regression. Individual effects are controlled for by employing within transformations of the variables around their individual means and additionally 74 regional dummies and 21 industry dummies are included. Other covariates included in each regression are a a quadratic in age, a quadratic in work experience, a female dummy, a "work in shift" dummy. Columns I,a and II,a reportes results using import competition measure that controls for exports. p-values based on robust standard errors in parenthesis. The superscripted asterisks denote significance as follows: ***=p$<$0.01, **=p$<$0.05, *=p$<$0.1.

C Construction of the variables

Wage: Our wage data come from the annual wage survey by The Confederation of Finnish Industries (Elinkeinoelämän keskusliitto, EK) in which detailed information on wages and working hours for the last quarter of the year is collected. We measure the hourly wage as base wage including fixed-rate, piece-rate pay, performance based compensation and wage complements including seniority, shift and bonuses based on working conditions, overtime pay and Sunday pay. This sum is divided by total amount of hours worked. The hourly wage is deflated by the CPI to 1995 year euros. We use an alternative measure that excludes overtime, evening, night and Sunday pay and correspondingly the hours allocated to these activities. We remove observations for which the deflated hourly wage is less than one or more than 100.

Unemployment: Our regional unemployment data come from the annual reports of the Ministry of Labor. We use the annual average unemployment rate of the worker's working county, which is the regional entity that most likely represents the realistic go-to-work area for the average individual. Finland is divided into 88 counties during the period of observation, of which 75 are represented in our data. We need regional unemployment data at tenure start but data is only available 1987 at county level, which right-truncates our data with respect to tenure and working experience somewhat.

Import penetration: Our import competition measure is based on import penetration. Import penetration is defined as the ratio of imports to domestic consumption (domestic production plus imports minus exports). The data for imports, exports and gross domestic production in euros is obtained from the OECD Structural Indicators data base. The data is available for the period 1989-2003.

Exchange rate index: The real exchange rate index at the industry level is based on bilateral real exchange rates from the main trading partners. We consider the bilateral real exchange rates for the largest trading partners and assign the exchange rate in dollars for the residual share of trade in each industry. We calcualte the weighted average of the log real exchange rates of source countries of imports. The static weights are calculated as the share of each source country's imports of total imports within each industry in a base period (1997-2000). The data on country level import volumes is obtained from the Finnish Customs data base.