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By Kristian Orsini and Vukašin Ostojić

Summary

In the years before the global financial crisis, expectations of rapid income convergence led to increases in wages and prices in Croatia, which eroded the competitive position of the country's already thin tradable sector. The labour market adjusted more slowly to the fall in economic activity than in other EU Member States from Central and Eastern Europe. This lack of flexibility in nominal and real wages led to a significant surge in unemployment.

We develop an empirical model to test alternative hypotheses concerning the process of wage formation in the private and in the public sector, differentiating between the tradable and the non-tradable sector in the broader private sector; and between the government and the non-market services (i.e. mainly education and health) in the public sector.

We find evidence that wages in Croatia tend to follow a common dynamic, though we do not observe full wage adaptability, meaning that the ratio of wages in different sectors changes over time. Moreover, we find evidence that wage dynamics in the private sectors (tradable and non-tradable) may have been driven by demonstration effects from non-market public sectors – specifically from rising wages in the fast-growing education and health sector. We also find evidence that in the short run, different spillover effects are at play, even though the tradable sector appears to be wage follower in both the short- and long-run.

From a policy perspective, the findings of this analysis emphasise the importance of responsible public wage setting and control of public sector employment for overall wage and competitiveness developments. The magnitude and direction of wage spillover effects may to a large extent be affected by labour market institutions and wage bargaining practices. Reform options to limit the influence of public sector wages on the overall economy and anchor them to wage growth in non-sheltered economic sectors could be explored. Improving the governance structure of state-owned enterprises, could also help mitigate the transmission of wage shocks from the public to the private sectors.

Introduction

Most EU Member States from Central and Eastern Europe (EU-10)[1] saw their Unit Labour Costs (ULCs) rise significantly in the years leading up to the crisis (see Graph 1). Growth in real wages was in some cases accompanied by significant inflation differentials vis-à-vis main trading partners, which resulted in real effective exchange rate appreciations. These developments have been often explained in terms of the Balassa-Samuelson effect: as productivity growth in the tradable sector exceeds that in the sheltered sector and labour mobility ensures some degree of wage equalisation across sectors, faster productivity growth in the tradable sector pushes up wages in all sectors, leading to an increase in the relative prices of non-tradable goods. Yet, if wage growth outpaces productivity growth, external competitiveness is negatively affected, and the appreciation of real effective exchange rates goes hand-in-hand with competitiveness losses which can potentially undermine external equilibrium, through a widening of the current account deficit. This seems to have been the case in several EU-10 economies, where large current account deficits were registered in the years before the crisis.

In the wake of the 2008 financial crisis, real wages generally fell, productivity was restored and current account deficits began to narrow. Unemployment, which had risen in the aftermath of the crisis, gradually stabilised. The pace of the adjustment was nevertheless affected by the institutional set-up, with countries enjoying exchange rate flexibility

Graph 1: Unit Labour Costs (ULC), Unemployment and Current Account (CA) in Croatia and in the EU10.
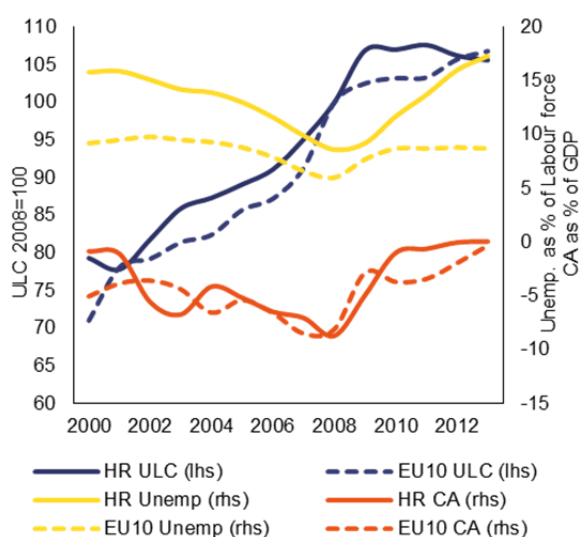
Source: AMECO

experiencing a swifter and less painful adjustment (Atoyan, 2011).

In Croatia, the fact that wages have historically been higher than in peer EU-10 countries, limited the scope for rapid wage convergence (European Commission, 2015). Yet, in the years before the crisis, wages not only increased at a similar pace to the EU-10, they also adjusted more slowly to the contraction of economic activity, as ULCs continued to grow substantially in 2009 and more moderately thereafter. The negative shock was absorbed mainly via quantities through a process of labour shedding that pushed the unemployment rate from 8.6 % to 17.3 % in five years. External adjustment was swifter, but relied mostly on import compression.

Understanding the process of wage formation is crucial for conducting macroeconomic policy and addressing both internal and external disequilibria. The purpose of this Economic Brief is to contribute to the understanding of wage dynamics in Croatia.

Labour market institutions and wage leadership

Theoretical models of wage setting generally assume that wages are set in the tradable sector (due to its higher labour productivity dynamics) and that labour mobility ensures wage equalisation in the sheltered sectors (i.e. the public sector or the service sector which is less exposed to international competition). In other words, the tradable sector is the wage 'leader' and the sheltered sectors are 'followers'. This assumption, lies at the heart of the Balassa-Samuelson model. Full labour mobility is nevertheless not the only channel for wage equalisation. In institutional settings characterised by high coverage of collective agreements, wage equalisation can follow directly from trade unions' wage equalisation strategies in the bargaining process.

It has also been argued that wage setting in the 'softly constrained' non-tradable sector or in highly unionised public sectors can produce spillover effects to the tradable sector. In the latter case, the sheltered sectors act as wage leaders, whereas the tradable sector is a follower. Recent research suggests than in the EU, wages in the private and public sectors tend to move together, but the impact of public wages on private wages is stronger that the other way around (European Commission, 2014). This is more often the case in less open economies, with relatively large public sectors.

Broadly speaking, wage setting in the public sector tends to be less dependent on market forces and

productivity dynamics. The higher degree of unionisation, the political objectives of the state as an employer, the difficulties of measuring labour productivity in the public sector, the specificities of the employment contract and the different constraints faced by decision-makers all contribute to a specific wage setting behaviour (ECB, 2008 and European Commission, 2014). Public sector wage leadership may therefore represent a threat to external competitiveness, if the government sector pursues or allows wage setting above productivity dynamics in the non-sheltered sector.

There is, nevertheless, no available evidence that a large and highly-unionised public sector systematically affects the tradable sector in a negative way. In the Nordic economies, wage setting policies in the public sector are typically aligned with the competitiveness imperative of the tradable sector. This outcome is often ascribed to the highly centralised wage bargaining system in Nordic countries and the explicit recognition of wage leadership in the private sector (Lindquist and Vilhelmsson, 2006).

In practice, few EU Member States have a fully centralised or fully decentralised wage setting system. In most Member States, the wage bargaining process between unions and employers takes place at several levels (national, industry or sector and company level) and is staggered over time. In times of crisis, such systems may make it difficult to trade wage concessions with employment security, so that the adjustment process weighs on employment rather than wages, while wage increases in one industry can generate demonstration effects to other industries and determine temporary misalignments with productivity dynamics. The magnitude and persistence of spillover effects nevertheless vary across EU Member States, on account of different institutional settings and practices. Even more decentralised settings, in fact, can be consistent with wage leadership in the tradable sector, when wage bargaining is coordinated via pattern-setting by the exposed sector, as it is the case, for example in Germany and Austria (European Commission, 2014).

According to the World Bank, union density in Croatia is high in comparison to regional peers. However, there are large differences between the weakly unionised private sector (17 %) and highly unionised public sector and state-owned enterprises (SOEs) (70 %). Wage bargaining can take place at different levels (national, industry/sector, and firm level), though in practice the bargaining system is decentralised and uncoordinated. Collective agreements formally cover up to 60 % of all

employees, most of them being signed at company level, and a few (especially in the public sector) at sector level. The central public administration has almost 100 % coverage, while the wider public sector (including SOEs) has more than 70 % coverage. Wage bargaining in the public sector is, however, multi-layered. Whereas two basic collective agreements cover all public employees, a number of supplementary branch agreements, mainly in the education and health sectors, top-up the basic agreements in public services (Bagić, 2014).[2] Employment in SOEs, which operate both in the market and non-market sectors, is always covered by collective agreement, but SOEs have separate wage bargaining processes. In the private sector, formal coverage of collective bargaining is estimated at 45 %, part of which is primarily due to administrative decisions by the minister of labour to extend the validity of agreements to non-signatory parties. However, due to enforcement issues and the fact that numerous agreements are signed for an indefinite term, which often makes them obsolete (World Bank, 2011), the effective coverage in the private sector is estimated at a low 10 % (Bagić, 2010).[3]

A recent study by Eurofund shows that wage increases agreed for the public sector in Croatia provide important information which influence wage bargaining in the private sector (Eurofund, 2012). The employees in the Croatian public sector are entitled to an automatic increase of 0.5 % per each year of tenure, meaning there is an in-built wage drift in the public sector which could spillover to other sectors. However, given the complexity of the overall bargaining system and the strong sector heterogeneity, it is difficult to determine a priori whether a sector is likely to behave as a 'wage leader' and significantly influence dynamics in other sectors.

In recent literature, the assessment of sector wage leadership is essentially empirical and to a large extent departs from the analysis of the institutional setting. Wage dynamics are modelled by means of Vector Error Correction Models (VECM) and the hypothesis of wage leadership is empirically tested on data.

The data and the econometric model

The analysis relies on monthly data on employee wages collected by the Croatian Bureau of Statistics (CBS) by means of surveys between 2000 and 2013. We aggregate monthly average gross wages for four broadly defined sectors: the tradable sector (TR) including manufacturing and accommodation and

food service, public administration (GOV), the non-market non-tradable sector (NMNT) covering the bulk of public services (education and health) and the market non-tradable sector (MNT) including the bulk of services and construction.[4] Note that we follow Funda et al. (2007) and include subsector 'I' (accommodation and food service activities) in the tradable sector, on account of the share of travel services (tourism) in the overall export of goods and services in Croatia. Other authors tend to exclude tourism from the tradable sector, arguing that prices (and hence wages) are mainly determined by domestic factors. Given the controversial nature of tourism services we also test our results with a specification that includes tourism in the non-tradable sector and find that the alternative definition does not qualitatively alter our results.

Graph 2: Employment and real (CPI deflated) wages by sector (moving average)
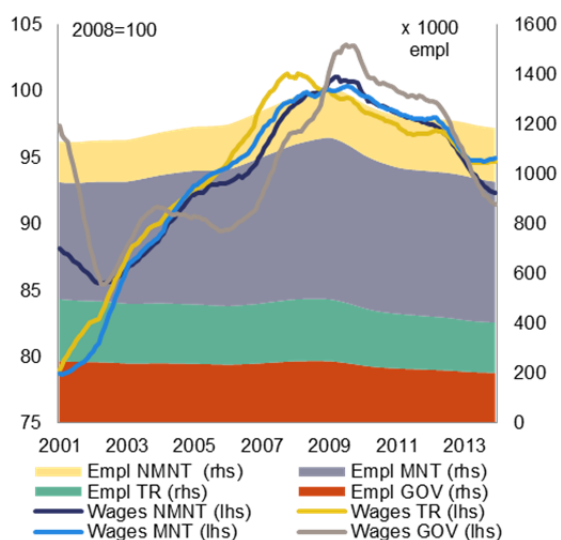
Source: European Commission

The reason for separating the public from the market non-tradable sector is due to the specificities of the public sector as described above. We further opt for a disaggregation of the public sector in the sub-sectors of (i) public administration (GOV) and (ii) public services (NMNT). This choice is motivated not only by the aforementioned differences in timing and duration of collective bargaining within the broader public employees, but also by the empirical observation that the two sub sectors have undergone different dynamics in terms of employment and wages (Graph 2).

The econometric specification relies on the following VECM:

$$
\begin{bmatrix} dw_{tr,t} \\ dw_{nmt,t} \\ dw_{gov,t} \\ dw_{nmnt,t} \end{bmatrix} = \alpha\beta' \begin{bmatrix} w_{tr,t-1} \\ w_{nmt,t-1} \\ w_{gov,t-1} \\ w_{nmnt,t-1} \end{bmatrix} + \sum_{1=1}^{n} \Gamma_i \begin{bmatrix} dw_{tr,t-i} \\ dw_{nmt,t-i} \\ dw_{gov,t-i} \\ dw_{nmnt,t-i} \end{bmatrix} + \begin{bmatrix} \varepsilon_{tr,t} \\ \varepsilon_{nmt,t-1} \\ \varepsilon_{gov,t-1} \\ \varepsilon_{nmnt,t-1} \end{bmatrix}
$$

where dw_t is a 1x4 vector of *first order differences* in the wages of the four sectors, which is a function of the product of the *co-integration matrix β* (which represents the long-term equilibrium between wages in the different sectors *in levels*) and the so-called *loading matrix α* which captures the speed of adjustment (if any) of wages in a particular sector to disequilibria between wages across sectors. Γ_{t-n} with *n=1,..,N*, is a vector of coefficients on the *lagged first order differences*, and ε_t a vector of disturbances.

According to recent literature on wage leadership, changes in the level of the (real) wage in the sector acting as the leader cause changes in the same direction in the wage level in other sectors. These changes need not be proportional, and the adjustment across sectors will ultimately depend on the degree of cross-sectoral labour mobility and on the extent of wage equalisation pursued by bargaining actors. Furthermore, in the short-run, wage spillovers may affect some sectors, but not others. Accordingly, we follow recent literature (D'Adamo, 2014) and distinguish between three different interrelations affecting wage dynamics, namely (i) **wage adaptability**, (ii) **long-run wage leadership** and (iii) **short-run wage leadership**.

Wage adaptability occurs when wage increases in one sector i completely translate to sector j, i.e. if we cannot reject the hypothesis of a one-to-one relationship between each pair of sectors in the co-integration matrix β. If the test is rejected, wages move in the same direction (since they are co-integrated), but changes are not strictly proportional, meaning that the ratio of wages in different sectors is free to change over time.[5] This hypothesis can be extended to test full wage adaptability for sub-sets of sectors.

Long-run wage leadership is the most important concept in our context, since dynamics in the long-run leading sector determine the wage dynamics of the whole system. It is also the most relevant in terms of the structural adjustment needs of the economy, in particular the need to enhance the competitiveness of the exporting sector. Long-run wage leadership occurs when one or more sectors do not adjust to the long-run relationship between wages in other sectors. In other words, wages in sector i are leading and not following the long-run relations between wages in different sectors. The coefficients in the loading matrix α represent the rate of adjustment of wages in each sector to the long-run dynamics. If a sector is found not to adjust, then it can be concluded that it is a wage leader. Statistically, this means that we cannot reject the null hypothesis that the relevant adjustment

coefficients in the loading matrix α are equal to zero.[6]

Finally, **short-run wage leadership** in a sector i occurs if previous changes in wages in sector i affect wage dynamics in sector j, but not vice-versa, i.e. if we cannot reject the hypothesis that for sector i, the coefficients in $\Gamma_1 dw_{j,t-1} = \cdots = \Gamma_n dw_{j,t-n} = 0$.

Econometric results

Before testing these three hypotheses, we must determine if the system of equations is co-integrated and the number of co-integration relations (i.e. the dimension of the co-integration matrix β). In loose econometric language, this means determining: (i) if wages in the four sectors actually move together (or at least if sub-sets thereof do) and (ii) the number of degrees of freedom of the system. If the system does not co-integrate, then the VECM is not an adequate representation of the dynamics and sub-sequent testing would become meaningless. The difference between the number of sectors (in our case 4) and the number of co-integration relations, on the other hand, determines the number of independent stochastic trends. With three co-integration relations, for example, there would be only one 'degree of freedom' and all wages would follow a single stochastic trend. With two co-integration vectors, on the other hand, the system would have an additional degree of freedom and there would be two independent stochastic trends. This could be the case, for example, in relatively segmented labour markets, where wages in two sectors would follow one trend and in the other two sectors a separate trend.

Table 1: Johansen test of co-integration

Hypothesized no. of CE(s)	Trace statistic	Prob.*
None	63.10411	0.0064
At most 1	38.80483	0.0195
At most 2	18.80375	0.0783
At most 3	6.731102	0.1413

*MacKinnon-Haug-Michelis (1999) p-values

Source: CBS, European Commission

The Johansen test of co-integration (Table 1), reveals that the system is co-integrated and there are three co-integration vectors, since this is the only hypothesis that cannot be rejected at any meaningful confidence level. This result is consistent with the analysis of Vukšić (2014) who finds that the dynamics of the average wage is the core factor explaining sector wage dynamics. The analysis of the institutional setting would have suggested a higher degree of segmentation between the broader private and public sector, which in principle could

have resulted in different trends. Yet, the high segmentation between the private and the public sector is likely to be mitigated by the widespread presence of SOEs which could work as transmission channels between the public and the private sectors.[7] We now move on to test the nature of wage inter-relations across sectors.

Table 2: Tests of wage adaptability

Wage adaptability:	Restrictions on CEs in β	LR-statistic	p value
Test (a): full wage adaptability across TR, MNT, GOV, NMNT	[1,0,0,-1] [0,1,0,-1] [0,0,1,-1]	9.235	0.026
Test (b): Pairwise adaptability between TR, MNT and GOV, NMNT	**[1,-1,0,0] [0,0,1,-1]**	**0.968**	**0.616**
Test (c): Pairwise adaptability between TR, GOV and MNT, NMNT	[1,0,-1,0] [0,1,0,-1]	7.691	0.021
Test (d): Pairwise adaptability between TR, NMNT and MNT, GOV	[1,0,0,-1] [0,1,-1,0]	4.633	0.099

Variables are introduced in the following order TR, MNT, GOV NMNT. No restrictions were imposed on the third vector in pairwise tests (b, c, d).

Source: CBS, European Commission

In a **first step**, we test for wage adaptability across sectors. Wage adaptability occurs when wage increases in one sector are matched by a proportional increases in all other sectors. In its most restrictive formulation, full wage adaptability implies a unitary elasticity between wages in all pairs of sectors. The latter condition can be translated into appropriate restrictions by testing the restriction on simultaneous one-to-one relationships in all three co-integration vectors. Full wage adaptability across all four sectors is excluded (Table 2, Test a). A less restrictive version of wage adaptability occurs when this one-to-one relationship applies to some, but not all of the subsectors. For example, one could assume that the wage adaptability applies within the broader public sector (GOV and NMNT) and the broader private sector (TR and MNT), as imitation effects can be stronger across sub-sectors of the economy. We test this hypothesis by imposing such restrictions on two of the three co-integration vectors, leaving the third vector unconstrained. Indeed, we cannot reject the hypothesis of wage adaptability between TR and MNT on the one hand and GOV and NMNT on the other (Table 2, Test b). Pairwise adaptability among

other sectors can be excluded with a confidence level of 10 % (Table 2, Test c and d).

The econometric results therefore suggest that wages in the Croatian labour market do not fully equalise across sectors. Wages move in the same direction, but the ratio across wages tends to change with time. This can be linked both to imperfect labour mobility and to changes in skill composition across sectors.

Nevertheless, within the broader public and private sectors, the hypothesis of wage adaptability is confirmed. This result is not surprising since collective agreements in both sectors rely heavily on a system of base wages and coefficients (Bagić, 2014 and Nestić et al., 2014). If shocks transmit primarily through changes in the basic wage, they would transmit proportionally across the whole wage distribution.

Table 3: Tests of long run wage leadership

Wage leadership of:	Restrictions on loading matrix α	LR-statistic	p value
Test (a): TR	$[0, 0, 0]$ $[\alpha_{mnt1}, \alpha_{mnt2}, \alpha_{mnt3}]$ $[\alpha_{gov1}, \alpha_{gov2}, \alpha_{gov3}]$ $[\alpha_{nmnt1}, \alpha_{nmnt2}, \alpha_{nmnt3}]$	15.366	0.009
Test (b): MNT	$[\alpha_{tr1}, \alpha_{rt2}, \alpha_{rt3}]$ $[0, 0, 0]$ $[\alpha_{gov1}, \alpha_{gov2}, \alpha_{gov3}]$ $[\alpha_{nmnt1}, \alpha_{nmnt2}, \alpha_{nmnt3}]$	20.690	0.001
Test (c): GOV	$[\alpha_{tr1}, \alpha_{rt2}, \alpha_{rt3}]$ $[\alpha_{mnt1}, \alpha_{mnt2}, \alpha_{mnt3}]$ $[0, 0, 0]$ $[\alpha_{nmnt1}, \alpha_{nmnt2}, \alpha_{nmnt3}]$	14.675	0.012
Test (d): NMNT	$\mathbf{[\alpha_{tr1}, \alpha_{rt2}, \alpha_{rt3}]}$ $\mathbf{[\alpha_{mnt1}, \alpha_{mnt2}, \alpha_{mnt3}]}$ $\mathbf{[\alpha_{gov1}, \alpha_{gov2}, \alpha_{gov3}]}$ $\mathbf{[0, 0, 0]}$	**5.922**	**0.314**

Variables are introduced in the following order TR, MNT, GOV NMNT. aij signals the adjustment coefficient for sector i on cointegration vector j.

Source: CBS, European Commission

In **a second step**, we test wage leadership in the long-run. In particular, we test whether we cannot reject the null hypothesis that all the three α coefficients — representing the rate of adjustment to the three long-run relations — can be set to zero. The only sector that indisputably passes a test where the relevant coefficients are set to zero is NMNT (see Table 3, Test d). We therefore conclude that the NTNM is the long-run wage leader in Croatia. This is possibly related to the steady expansion of employment in this sector over the whole period and to the evidence presented by Nestić et al. (2014)

showing that in the period 2004-2012, the government adopted differentiated (and uncoordinated) measures by sub-sector of the public sector, with the education and heath sectors experiencing the highest wage increases in comparative terms. It is indeed possible that envy effects generated spillovers to other sectors. These results also confirm previous evidence of public sector wage leadership found by Vukšić (2012), though — possibly owing to the higher degree of aggregation in the public sector — results in the latter study are only weakly significant.[8]

Table 4: Tests of short run wage leadership

Test (a): TR dependent			Test (b): GOV is dependent		
Excluded	Chi-sq	Prob.	Excluded	Chi-sq	Prob.
MNT	6.882	0.032	TR	2.344	0.310
GOV	5.365	0.068	MNT	0.558	0.757
NMNT	1.872	0.392	NMNT	1.042	0.594
All	15.708	0.015	**All**	**6.771**	**0.343**
Test (c): MNT dependent			Test (d): NMNT dependent		
Excluded	Chi-sq	Prob.	Excluded	Chi-sq	Prob.
TR	7.648	0.022	TR	7.948	0.019
GOV	0.516	0.773	MNT	4.890	0.087
NMNT	0.262	0.877	GOV	20.264	0.000
All	**9.824**	**0.132**	All	36.008	0.000

Null hypothesis that sector j, k, l individually and jointly do not affect sector i in the short-run.

Source: CBS, European Commission

In a **third step**, we test for wage leadership in the short run by performing a series of tests on the coefficients representing the short-run dynamics of the system. The results show that the TR sector is affected by wage dynamics in other sectors — particularly the GOV and the MNT sectors. The TR sector therefore comes out as the wage follower both in the short and in the long run (Table 4, Test a). The wage leading NMNT sector is also affected in the short-run — probably due to the staggering in time of branch-specific collective agreements (Table 4, Test d). Finally, the short-run wage leadership in the GOV sector is not highly surprising as wage bargaining processes tend to be less frequent and last longer in the GOV sector — which most likely explains the fading out of the wage leadership role in the long-run. The MNT sector likewise appears to be only somewhat affected by wage dynamics in other sectors in the short-run (Table 4, Test b and c).

Policy conclusions

We find strong evidence that wages across sectors follow a common dynamic. Such co-movement is stronger within the broader private and public sectors and somewhat weaker if sectors are considered jointly. The lack of a one-to-one long-run relationship between wages indicates some degree of

segmentation across the private and public sectors. Co-movement in wage dynamics is often associated with the presence of a 'wage leader' — i.e. a sector setting the pace for wage increases for the whole economy. The analysis suggests that in Croatia, a sub-sector of the public sector, namely the NMNT (which essentially includes health and education), appears to lead long-run wage dynamics — since wages in this sector are independent from wage dynamics in other sectors, while exerting an attraction force on wages in other sectors. This does not mean that in the short-run deviations from this long-run relationship are not possible.

Indeed the same NMNT sector is affected by wage spillovers from other sectors in the short-run. The combination of long-run wage leadership and short-run spillovers from other sectors could imply that wages in public services absorb short-run shocks, amplify and transmit them back in the long-run to other sectors — feeding the mismatch between productivity and wage dynamics. The TR sector, on the other hand, is affected by spillovers in both the short and the long-run. This risks affecting the competitiveness of the Croatian economy, given the high price sensitivity of exports (Stojčić et al, 2012). Our results were robust to the inclusion of the tourism-related sector in the MNT sector — which suggests a limited role of this sector in determining wage dynamics.

These results are to some extent in line with previous findings for other EU Member States. More specifically, the impact of changes in public sector wages on the private sector tends to be stronger in countries that feature a relatively high wage bill, a high unionisation of the public sector and a relatively small tradable sector (EC, 2014). In this context, Croatia differs in several respects with the characteristics of most other EU-10 economies, which are characterised by relatively smaller public sectors and particularly low union density (European Commission, 2014). Therefore results for Croatia differ from evidence on wage dynamics in other new EU Member States over the past decade. D'Adamo (2014) applies the same methodology to all Central and Eastern European new Member States, but Croatia. The author finds that in most countries, the private sectors (TR and MNT) are the long-run wage leaders. In some countries (like Poland and Hungary) the public sector did not follow wage setting in the private sector, but a different trend, signalling a strong segmentation and lack of spillover effects. It is interesting to note that the only other country featuring public sector wage leadership, according to D'Adamo (2014), is

Romania. Despite the relatively small public sector, in terms of employment, this country is — like Croatia — characterised by a relatively high degree of unionisation. Moreover, public wages grew by 20-30 % between 2005 and 2008, which given the tight labour market, spilled over to the private sector (IMF, 2012). These results suggest that the structural and institutional characteristics of the economy do play a role in determining wage dynamics.

From a policy perspective, the findings of our analysis emphasise the importance of responsible wage setting by public decision makers. Policies aimed at enforcing a stricter control on public sector employment and wages, including at local level (related to the large share of the growth in employment in education and health) appear warranted. The latter should aim to generate wage dynamics that are attuned to productivity dynamics in the TR sector and that reflect prevailing conditions on the labour market. This could be achieved by, for example, removing elements that promote automatic upward pressures on wages in the public sector, as well as by ensuring higher homogeneity and coordination in the wage bargaining process across the different sub-sectors of the public administration. Other approaches to weaken spillover effects from the public sector could include adopting mechanisms that take into consideration developments in the private sector when setting wages in the public sector, along the lines of the established practice in the Netherlands (European Commission, 2014). Indeed all these reform avenues could be addressed in the frame of the reform of the wage setting system which Croatian authorities have committed to undertake, in line with the 2015 country-specific recommendations. Reinforced control over expenditure and improved governance in SOEs, which were also recommended by the Council, would also likely limit the transmission of wage shocks from the public to the private sectors.

From a structural point of view, short-run wage spillovers represent less of a threat. Yet lowering the impact of short-run disturbances would facilitate and accelerate the adjustment process. Measures aimed at promoting enhanced competition in the MNT sector would increase the resistance of the sector to wage pressures and weaken short-run transmission channels to other sectors, particularly the TR sector, via prices. Sound price policies in network and utility companies — often SOEs — would also help make wage setting more responsive to market forces.

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[1] Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia.

[2] Two basic agreements (one for civil servants and employees and one for public services) regulate joint rights of all employees. Five additional branch collective agreements regulate in more detail the rights of employees in certain public service activities (e.g. education, social welfare and health), and a number of collective agreements for individual institutions. Public employees working for local administration (about 15% of total public employees) are not covered by basic agreements, and only a few are covered by collective agreements.

[3] Union density is higher in large companies, companies established before 1990 and among older workers, and lower among those with fixed-term contracts. Trade unions are highly fragmented: there are around 550 registered trade unions, most of them operating at the company level, others in particular sectors. On the other hand there is only one important employer association (Croatian Employers' Association) which is the only one involved in tripartite dialogue at the national level. Most collective agreements do not depart greatly from the minimum-standards guaranteed by the national Labour Law (also in terms of minimum-wage), which hollows out their actual significance.

[4] Our classification corresponds to NACE codes C and I for the tradable sector, NACE code O for government and NACE codes P, Q and R for non-market non-tradable. The residual non-tradable sector includes utilities (NACE codes D, E), construction (NACE code F) and the residual services (NACE codes G, H, J, K, L, M and N N). Wages in the four sectors are constructed by aggregating wages at industry level weighted by the share of employment in each industry. The obtained

time series are then seasonally adjusted and nominal wages converted in real wages by dividing them by the monthly consumer price index.

[5] In technical terms, wage adaptability occurs when the hypothesis that the co-integration equation is homogeneous of degree one cannot be rejected.

[6] In technical terms, this corresponds to testing that the variable is weakly exogenous. A variable is considered strongly exogenous if not only the coefficients in the loading matrix, but also the coefficients of lagged changes in other sectors are not significantly different to zero. In other words, strong exogeneity would result from a sector being both a long run and a short run leader.

[7] The proposed disaggregation disregards the issue of state-owned enterprises (SOEs), since these cannot be accounted for in a meso-level sector analysis. Although SOEs typically tend to concentrate in the non-tradable sectors (utilities, transport construction), SOEs also employ a significant share of workers in the tradable sector. According to some estimates based on ORBIS, the share of workers employed by SOEs is as high as 70 % in utilities and about 30 % in the transport sector. The share of employment in the manufacturing sector is about 6 %. These figures nevertheless must be taken with caution, given the partial coverage of the ORBIS database and the discretionary definition of SOEs (in this case all firms where direct or indirect state ownership is above 50 %). Institutionally, wage-setting in SOEs is not linked to the government, but it is likely that envy effects are stronger and budget constraints softer in SOEs. This could entail that public sector wage developments feed into those in SOEs which in turn influence private wages.

[8] Vukšić (2012) analyses wage dynamics in Croatia through a panel of industry wages over the period 1998-2007, but does not reach conclusive evidence on wage leadership since results are only weakly significant. The author does not distinguish between different sub-sectors and finds only weak evidence of long run wage leadership. Indeed it is possible that the lower degree of confidence in the results of Vukšić (2012) is caused by a too broad definition of the aggregate.

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