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Causality between public wage bill, exports and economic growth in Slovenia

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This article aims to investigate the causal relationship between economic growth, exports and public wage bill spending, using the Johansen cointegration, Granger causality test, variance decomposition (VDC) and impulse response function (IRF). The empirical investigation focuses on the case of a small open and export-oriented Slovenian economy, where public wage bill spending accounts for a sizable share of public expenditure. The results show a significant impact of public wage bill spending on exports. Reduction of public wage bill spending should be adapted to the circumstances in the economy to assure financial consolidation.

Keywords: causality; public wage bill; export; economic growth; cointegration; Granger causality; variance decomposition (VDC); impulse response function (IRF); Slovenia

JEL classification: C32, E62, F43, J38

1. Introduction

During economic and financial crisis countries can have different solutions to achieve economic growth (e.g. Blackburn & Powell, 2011; Tobing, 2011). Fiscal consolidation has become necessary in many countries following the rise in public deficits and public debts, which in many cases can also be an indirect result of unfavourable demographic processes like population ageing (Čepar, 2010). Measures of fiscal consolidation can be designed in a way to minimise the further shrinking in employment and reduce demand. These measures should be neutral to the export sector to remain the main driving force of economic growth of small, open and export-oriented economies.

The export-led growth (ELG) hypothesis with incorporated public wage bill spending is investigated for Slovenia, where export is one of major factors of economic growth. Stricter monitoring of public wage bill spending is one of the necessities for consolidation of public expenditures and budgetary debt positions to achieve steady growth. Consolidations based on cuts of public expenditures are more likely to be less harmful for economic growth than consolidations based on tax increases (Alesina, Ardagna, & Gali, 1998; Ardagna, 2004). Public wage bill spending in Slovenia accounts for around one-fifth of the public expenditure (Ministry of Finance [MoF], 2014), and a sizable consolidation of the public expenditure is hard to achieve without efforts at restraining public wage bill spending.

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The literature argues the possibilities of public expenditure consolidation through the effects of public employment and/or public wages on economic activity (Alesina, Ardagna, Perotti, & Schiantarelli, 2002). On the one hand, a decrease in government employment reduces the probability of finding a job if not employed in the private sector, and a decrease in government wages decreases the civil servants income if employed in the public sector. The reservation utility of the union members in both cases goes down and the wage demanded by the union for private sector workers decreases, increasing profits, investment and competitiveness (Alesina et al., 2002). So, if public wages rise disproportionately and induce spill over effects on wage rises to the private sector, imbalances in the economy may arise since the unit labour costs of the country could increasingly diverge from the global competitors. There might be adverse effects on the country's competitiveness, export performance and economic growth at least in the medium- to long-term (Holm-Hadulla, Kamath, Lamo, Pérez, & Schuknecht, 2010). This possible macro-economic imbalance has motivated our research to incorporate in the ELG hypothesis the public wage bill spending in Slovenia. Therefore, the relationship of exports, economic growth and public wage bill spending (presented in Figure 1) are analysed to tackle the research question of the public expenditure consolidation through the reduction of public wage bill spending. The case of Slovenia is of broader interest because of the existing trade-off between rapidly rising public debt and opposition by public sector unions to reduce public wage bill spending and employment in the public sector.

During the transitional period Slovenia was the most successful transitional economy from the former Yugoslavia. Slovenia has avoided larger war destruction and entered into closer institutional and economic relations with EU countries. As the most developed former Yugoslav republic, it has experienced GDP growth and stability of main
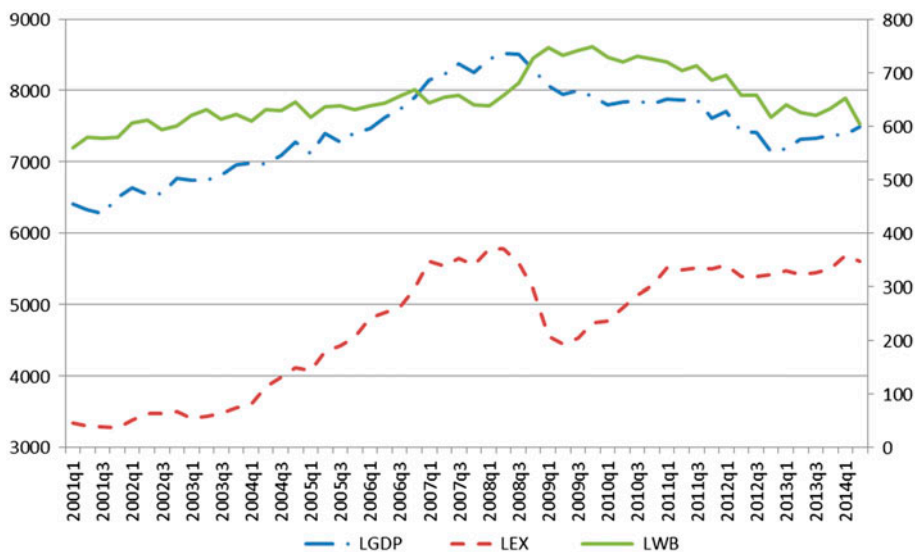

Figure 1. GDP, Export of goods and services and public wage bill spending in the 2001:1–2014:2 period (mio EUR, quarterly data).
Source: Statistical Office of the Republic of Slovenia (SORS) (2014), Ministry of Finance (MoF) (2014).

macroeconomic aggregates such as prices. The economic development gap between Slovenia and some other parts of the former Yugoslavia has remained (Štiblar, 2012).

From Figure 1 we can see a relatively high amount for public wage bill spending, which has overshot GDP in a period when GDP and exports started to fall or the economic crisis in Slovenia began. This public wage bill spending is a consequence of wage negotiation between public sector trade unions and the government. The public wage bill spending increases during the economic crisis coincides with the implementation of wage corrections to eliminate wage disparities between occupational groups in the public sector.

Slovenia joined the EU in 2004 and has gained a better chance of intense economic, cultural and political cooperation with the EU countries that has given the Slovenian economy trade creation dimension in the enlarged EU markets. Slovenia's accession to the EU recorded strong export growth to the markets of Germany, Italy, Austria, France and some other EU markets. In addition, a strong export orientation was maintained on traditional markets in the countries of the former Yugoslavia such as in neighbouring Croatia, which joined the EU in 2013, and in Bosnia and Herzegovina (Institute for macroeconomic analysis and development (IMAD), 2013). Since the beginning of the economic and financial crisis in 2009, exports and other macro-economic indicators in Slovenia are accompanied by a large drop. Decline of the export was first recorded in the first half of 2008, while the biggest drop was in the early 2009. The Slovenian predominant export specialisation is on the EU and former Yugoslav markets, which are recovering more slowly in a time of crisis. Exports reorientation to other markets is constrained due to deterioration in competitiveness of the Slovenian economy. Nevertheless, export is still a major factor of economic activity or of modest economic growth. This is empirically tested for the Slovenian with the ELG hypothesis with incorporated public wage bill spending.

2. Overview of the current empirical research

The ELG theory as a basis of our research has been analysed in many studies. Presumptions go back to the classical economic theories by Adam Smith and David Ricardo, who argued that international trade plays an important role in economic growth and that there are economic gains from specialisation. A body of literature has been developed to tackle different variables and various assumptions are used to better explain the ELG theory. In our research we incorporate in the ELG hypothesis the public wage bill spending.

A body of empirical research examines cyclical patterns of broad government spending variables as well as its certain sub-items, such as government investment. However, the empirical evidence on public wage expenditure is rarely integrated in the ELG models. For example Egbetunde and Fasanya (2013) analyse the impact of public expenditure on economic growth in Nigeria during the 1970–2010 period. The article employs the Autoregressive Distributed Lag (ARDL) modelling approach to cointegration analysis to examine the long-run and short-run relationships between public expenditure and economic growth. Findings indicate the impact of total public spending on growth to be negative. Recurrent expenditure, however, was found to have little significant positive impact on growth.

In the case of Nigeria Appah and Ateboh-Briggs (2013) investigate the cointegration patterns of public expenditure and growth for the 1961–2010 period. The time series data were analysed using relevant econometric models: Augmented Dickey-Fuller (ADF) test, Diagnostic tests, Johansen Co-integration and Vector Error Correction

models (VECM). The results reveal that the patterns of public expenditures on administration, social and community services, economic services, and transfers significantly affect the economic growth of Nigeria.

Dritsaki and Dritsaki (2010) investigate the causality relation between government expenditures and national income by testing for the Wagner's hypothesis and Keynesian approach for Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, and Slovenia. They use the Johansen cointegration method to detect a long-term relationship between national income and government expenditure, and the Granger causality test. They obtain mixed results. For Cyprus, Poland, and Romania, the causal relation runs from real per capita income to real per capita government expenditure, while for some other (Bulgaria and Cyprus) the direction of causality runs from real per capita government expenditure to real per capita national income. But interestingly, in some countries considered in the study (Czech Republic, Malta, and Slovenia), real per capita government expenditures do not play a significant role in promoting economic growth. Estonia, Hungary, Lithuania, Latvia, and Slovakia variables were not integrated either in their levels or in their first differences, and were not examined hereinafter.

Some other studies have also empirically examined the relationship between public expenditure and national income, but results are significantly inconsistent, and particularly mixed on the causal relation (Dogan, 2006; ur Rehman et al., 2010; Loizides & Vamvoukas, 2005).

Benazić (2006) investigated possible stimulus of fiscal policy on economic activity in Croatia. The cointegration and VECM analysis of variance decomposition (VDC) and impulse response function (IRF) were used to examine the relationship between GDP, budget revenues and budget expenditures in Croatia in the period from January 1995 to April 2004. The study suggests that a positive shock of fiscal spending leads to an increase in GDP and a positive shock of fiscal-conversions revenues lead to reduction of GDP. The study argues that to maximise the impact of public expenditures on economic activity it is necessary to pay more attention to the efficiency of public investments, with the considered use of subsidies, transfers and grants. Similar methodological approach has also been used by Caporale and Škare (2014) and Erjavec and Cota (2003). The former study analysed the linkages between output growth, inflation and employment growth for 119 countries during the 1970–2008 period using a panel vector autoregression (VAR) approach. The latter study analysed the causal relationships between money supply and other macroeconomic variables such as output, interest rate, prices and exchange rate in Croatia. They applied Granger causality analysis, performed in a VAR model, to test whether past values of monetary variables help to explain current values of output. The techniques, such as VDCs and IRFs were used to unveil Granger causality in macroeconomic activity in a dynamic context. The causal relationships detected among the variables indicate that money supply is neutral in the short-run.

The question of wage setting and wage formation has been studied for more than a century (Blažević, 2013). A special focus of the research has been on cyclicality in fiscal policy in association with public wage expenditure. The findings are mixed. Lane (2003)finds a strong pro-cyclicality in the level of government wages in the sample of the OECD countries over the 1960–1998 period. Hallerberg and Strauch (2002), in contrast, find the cyclical pattern of public finances in Europe. They detect weak counter-cyclical patterns of government wage expenditures for the sample of EU Member States over the 1970–1997 period. Holm-Hadulla et al. (2010) address the role of government wages as a determinant of macroeconomic stability and competitiveness in the euro

area. Their findings suggest that governments should be cautious with wage-setting and employment policies to avoid negative repercussions on fiscal and economic performance. They argue for a need to strengthen fiscal discipline and to reduce the risk of pro-cyclicality in government wage expenditures.

Gupta, Clements, Baldacci, and Mulas-Granados (2005) cross-country study of 39 low-income countries in the 1990–2000 period, using feasible generalised least square estimator, shed light on the relationship between fiscal policy adjustment, expenditure composition and economic growth in low-income countries. They found that countries where public spending is concentrated on wages tend to have lower growth. They pointed out that reallocating government expenditures to more productive uses is correlated with more persistent fiscal consolidation episodes.

When investigating fiscal consolidations, Von Hagen, Hallett, and Strauch (2001) confirm that consolidations are more likely to be successful, if governments achieve them by way of reducing expenditures instead of raising additional revenues, and if governments tackle politically sensitive issues such as transfers, subsidies, and government wages. They also found that in a good domestic economic environment and under pressures from high levels of public debt the likelihood of governments undertaking fiscal adjustments is higher.

A possible impact of public wage bill spending on economic growth has motivated our research. The public wage bill spending is integrated in the ELG hypothesis in a case of Slovenia, where a strong presence of public unions prevents reduction of public wage bill spending.

3. Research methodology

3.1. Unit root tests

It is important for the time series that they are stationary, i.e., integrated of order zero I (0). The data is said to be stationary if its mean, variance and covariance remain constant over time or:

$$E|y_t| \ = \ \mu_y \text{ for all } t \ \in \ T \tag{1}$$

$$E|(y_t - \mu_y)(y_{t-h} - \mu_y)| \ = \ \gamma_h \text{ for } t \ \in \ T \text{ and } \text{ all } \text{ integers } h, \text{ such that } (t - h) \ \in \ T \tag{2}$$

The first condition written in equation (1) means that the time series have constant average value. The second condition that is defined in equation (2), says that variances are also independent of the time trend. If they are not stationary, we can try to achieve it with a simple transformation. The best way to get stationary time series is to transform them in natural logarithm and then use the first differences:

$$D(\ln(y_t)) \ = \ \ln(y_t) \ - \ \ln(y_{t-1}) \tag{3}$$

In this article both the ADF test statistic and Phillips-Perron (PP) tests were applied to find the existence of unit root in each of the time series.

3.2.   *Cointegration test*

The empirical fact that time series are integrated of order 1 or I(1) allows searching for the linear combinations of them, which would satisfy the conditions of stationary I(0). If we are able to confirm the terms of stationary linear combination of I(0), then we say that the time series are in cointegration. Stationary linear combination is called cointegration equation and can be interpreted as a long-run equilibrium relationship between the time series. The basic idea behind cointegration is that if, in the long-run, two or more series move closely together, even though the series themselves are trended, the difference between them is constant. It is possible to regard these series as defining a long-run equilibrium relationship, as the difference between them is stationary (Hall & Henry, 1989). The maximum likelihood approach of Johansen (1988) and Johansen and Juselius (1990) approach for testing cointegration are used in this study. The Johansen's system-based procedure treats all variables as potentially endogenous and thus avoids the problem of normalising the cointegrating vector on one of the variables (Herzer, Nowak-Lehmann, & Siliverstovs, 2006).

3.3.   *Granger Causality Test based on VECM*

When series are cointegrated, model has to contain residuals from previous period. The appropriate model for such estimation is VECM. A VECM is a restricted VAR designed for use with non-stationary time series that are known to be cointegrated and VECM is the only model which avoids the quasi-regression. The form of the VECM is as follows:

$$\Delta Y_t = \alpha + \beta \Delta X + \gamma \Delta Z + \delta u_{t-1} + \varepsilon \tag{4}$$

where: u_{t-1} – is the error correction term lagged one period, and: ε – white noise error term.

The causal relationship between the variables is tested with Granger causality test. When we analyse the causality between the two variables, we say that the first variable *causes* another included variable. The Granger test shows whether a variable causes another variable in the statistical sense, but not necessarily in a general (economic) sense (Granger, 1969).

3.4.   *Impulse response function and variance decomposition*

The VECM tests can indicate only the Granger causality of the dependent variable within the sample period and provide little evidence on the dynamic properties of the system. The VDCs, by partitioning the variance of the forecast error of a certain variable into the proportions attributable to innovations (or shocks) in each variable in the system including its own, can provide an indication of these relativities and may be termed as out-of-sample causality tests (Kling & Bessler, 1985). The variable that is optimally forecast from its own lagged values will have all its forecast error variance explained by its own disturbances (Sims, 1982). Furthermore IRFs show the effects of shocks on the adjustment path of the variables.

4. Results and discussion

4.1. Data

To test the ELG hypothesis with integrated public wage bill spending, the study explores the relation among three main time series variables: exports (EX), public wage bill spending (WB) and economic growth, which is represented by BDP growth. The time span of the time series data for the Slovenian economy is for the period 2001:1–2014:2 using the quarterly data. These nominal time series data are deflated by the consumer price index (CPI, average 2005 = 100) to obtain real data at constant 2005 prices. Data on GDP and EX are obtained from the Statistical Office of the Republic of Slovenia. Data on CPI are taken from the Eurostat. Data on WB are obtained from the Ministry of Finance of Slovenia. To sum up, real GDP, real EX and real WB time series data are measured at constant 2005 prices in million EUR, which are transformed into natural logarithmic (L) form and seasonally adjusted (with Moving Average Method). In addition, dummy variables for the Slovenian economic crisis in the 2008:4–2014:2 period is included in the empirical model.

4.2. Unit root test

The ADF and PP tests were applied to find the existence of unit root in each of the time series. Table 1 reveals that all the variables LGDP, LEX and LWB (where L represents natural logarithm) were not stationary in levels. It is sufficient to conclude that there is a presence of the unit root in the variables at levels. In addition, all the variables were analysed in the first difference. The ADF and PP tests reveal that each of the analysed variables was stationary at the first difference or integrated of order one, i.e. I(1).

4.3. Cointegration test

The hypothesis of cointegration was examined by the Johansen co-integration test. In order to determine cointegration between variables, the constant term, and the constant and trend term, respectively, are included in the model. Test was made using JMulTi software. The number of lags two was adapted to Akaike information criteria, so 4 lags are used. Table 2 presents the cointegration results. Test indicates a single cointegrating equation between natural logarithms of the variables exports, economic growth and public wage bill spending. In addition, a structural break in 2008q4 is used. The cointegration analysis provides evidence of long-run relationship between the included variables.

Table 1. Unit root test.

	ADF (constant)	ADF (constant and trend)	PP (constant)	PP (constant and trend)
LGDP	−2.30 (0.17)	−0.87 (0.95)	−1.76 (0.39)	−0.90 (0.95)
LEX	−1.60 (0.47)	−2.01 (0.58)	−1.30 (0.62)	−1.71 (0.73)
LWB	−1.92 (0.32)	−1.00 (0.94)	−1.87 (0.34)	−0.76 (0.96)
D(LGDP)	−3.72 (0.00)*	−4.28 (0.00)*	−7.18 (0.00)*	−7.65 (0.00)*
D(LEX)	−4.46 (0.00)*	−4.47 (0.00)*	−4.51 (0.00)*	−4.46 (0.00)*
D(LWB)	−7.99 (0.00)*	−8.43 (0.00)*	−7.98 (0.00)*	−8.43 (0.00)*

Notes: L denotes natural logarithm and D the first difference;
Figures without parenthesis indicate t-statistics and in parenthesis are p-values;
Significance at 1% level.
Source: Research results.

Table 2.   Results of Johansen Cointegration Test (2001:1–2014:2).

	Testing of cointegration rank				
H0: r<=	LR	*p*-value	90%	95%	99%
0	51.97	0.012	43.19	46.4	52.84
1	23.83	0.159	25.73	28.29	33.54
2	5.34	0.6728	12.02	13.89	17.87

Source: Research results.

4.4.   *Granger causality test based on VECM*

Since the relationship between the analysed variables is confirmed, the reduced VECM and the Granger causality test were evaluated to confirm whether there is a causal relationship between the first difference of the logarithms of the variables export (D(LEX)), public wage bill spending (D(LWB)) and economic growth (D(LGDP)). Firstly, from Table 3 we can see that the model is appropriate, because all the diagnostic tests are

Table 3.   Diagnostic tests.

	Tested order	Test statistic (*p*-value)
Portmanteau test	16	91.72 (0.99)
LM-Type test for autocorrelation	5	37.40 (0.78)
Test for nonnormality		9.87 (0.13)
Multivariate ARCH-LM test	5	195.04 (0.21)
Jarque-Bera test (16 lags)		

Variable	*p*-value (χ^2)	Skewness	Kurtosis
u1	0.93	−0.11	2.84
u2	0.71	0.12	3.54
u3	0.29	−0.12	4.08

ARCH-LM test (16 lags)

Variable	*p*-value (χ^2)	*F*-statistic	*p*-value (*F*)
u1	0.72	1.23	0.34
u2	0.59	1.53	0.2
u3	0.92	0.75	0.72

Source: Research results.

Table 4.   Results of Granger Causality Test based on VECM (2001:1–2014:2).

	LEX do not Granger-cause 'LGDP, LWB'	LGDP do not Granger-cause 'LEX, LWB'	LWB do not Granger-cause 'LEX, LGDP'
Test statistic (*p*-value)	2.17 (0.03)	1.13 (0.35)	3.48 (0.00)
	Rejection	Cannot be rejected	Rejection

Source: Research results.

Table 5.   VECM forecast error VDC.

Proportions of forecast error in 'LEX' Forecast horizon (quarterly)	LEX	LGDP	LWB
1	1	0	0
2	0.97	0	0.03
3	0.98	0	0.02
4	0.97	0.01	0.02
5	0.94	0.02	0.04
6	0.91	0.02	0.07
7	0.85	0.02	0.13
8	0.81	0.02	0.17
9	0.76	0.02	0.22
10	0.72	0.02	0.26
12	0.65	0.02	0.33
14	0.59	0.02	0.39
18	0.53	0.02	0.45
22	0.50	0.02	0.48
25	0.49	0.02	0.49

Proportions of forecast error in 'LGDP' Forecast horizon (quarterly)	LEX	LGDP	LWB
1	0.37	0.63	0
2	0.41	0.54	0.05
3	0.52	0.46	0.02
4	0.57	0.41	0.02
5	0.59	0.4	0.01
6	0.6	0.39	0.01
7	0.6	0.37	0.03
8	0.6	0.36	0.04
9	0.6	0.36	0.04
10	0.6	0.35	0.05
12	0.59	0.34	0.07
14	0.57	0.34	0.09
18	0.56	0.33	0.11
22	0.55	0.32	0.13
25	0.54	0.32	0.14

Proportions of forecast error in 'LWB' Forecast horizon (quarterly)	LEX	LGDP	LWB
1	0.01	0.04	0.95
2	0.02	0.05	0.93
3	0.04	0.05	0.91
4	0.05	0.06	0.89
5	0.07	0.07	0.86
6	0.09	0.09	0.82
7	0.12	0.1	0.78
8	0.16	0.11	0.73
9	0.19	0.12	0.69
10	0.23	0.13	0.64
12	0.29	0.15	0.56
14	0.34	0.16	0.5
18	0.4	0.18	0.42
22	0.43	0.19	0.38
25	0.45	0.19	0.36

Source: Research results.
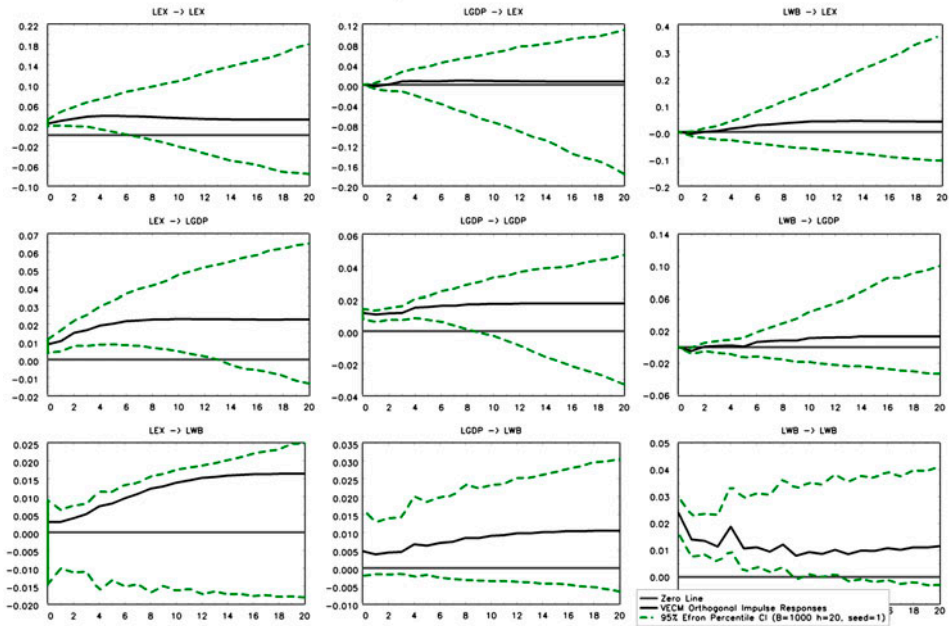
Figure 2(a).   Impulse response function.
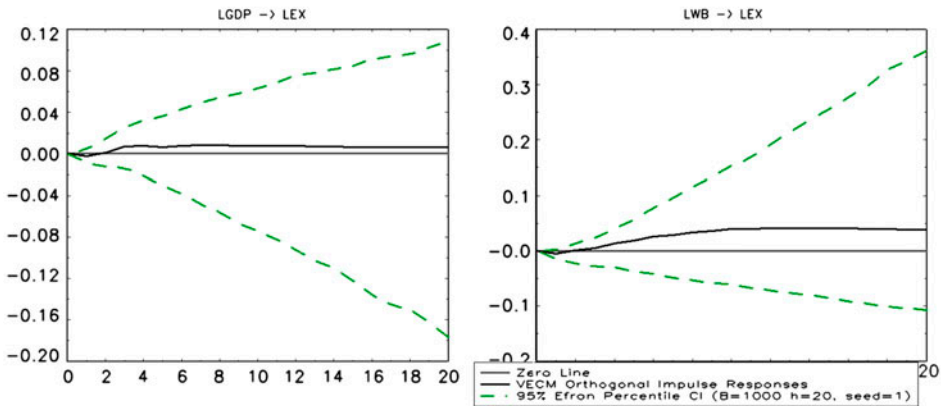Source: Research results.

Figure 2(b).   Impulse response function (LGDP and LWB on LEX).
Source: Research results.

statistically significant. Secondly, from the estimated test in Table 4, it can be seen that there exists a causality from public wage bill spending to economic growth and exports and from exports to economic growth and public wage bill spending, but there is no causality from economic growth to export growth and public wage bill spending.

4.5.   Variance decomposition and impulse response function

LGDP accounts for 2% of the variation in the forecast error of LEX, while LWB contributes for additional 49% (Table 5). Moreover, about 54% of LGDP forecast error VDC is explained by the LEX and 14% by the LWB. LEX and LGDP contribute 45% and 19% for the variation in the forecast error of LWB, respectively. We can conclude that the highest impact on change of export has public wage bill spending, while GDP and public wage bill spending are caused by exports.

From Figure 2(a) and 2(b), where orthogonal IRF is presented, we can see one-standard deviation shock. Because macro-economic aggregates are used, this deviation shock is not very high. The reaction is present for a short time period (a year), but after that it stabilises. In all cases the impact is positive, which means that the shock in one variable makes positive reaction to the other one. Exceptions are shocks in LGDP and LWB to LEX where the first reaction is negative, but in the second quarter became positive. The similar reaction is with the shock from LWB to LGDP.

5.   Conclusion

This article integrated the public wage bill spending and dummy variable for a recession period into the ELG model in the case of the Slovenian economy. The variables were found to be non-stationary in levels, but stationary in the first differences and integrated of order one I(1). The Johansen cointegration approach confirmed the existence of one cointegration relation among the tested variables. The result of the Granger causality test shows an existence of a causality from public wage bill spending to economic growth and exports and from exports to economic growth and public wage bill spending. The VDC shows that the highest impact on change of exports has public wage bill spending and the IRF confirmed a short-run impact on LEX as it stabilises after a short time, while impact of LGDP on LEX is very small. However, the causation results show that the public wage bill spending plays an important role on the Slovenian economic activities. Reduction of public wage bill spending should be adapted to the circumstances in the economy to assure financial consolidation. This could be achieved by reducing of the number of public employments and/or by reducing of public wage bill spending per employee. A strong presence of public unions should be refocused towards public sector efficiency and its positive contribution to ELG.

Among the issues for future research, the developed model could be extended in a way to include appropriate additional explanatory macroeconomic variables such as investment in fixed assets and capital stock. Testing the ELG hypothesis could be analysed also through the framework of the production function. It will also be interesting to undertake research for other former Yugoslav republics that have some historical similarities with Slovenia, but have also some economic and non-economic differences such as in geography, surface and climate, culture and religion.

Disclosure statement

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