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Abstract

There is considerable controversy in the economic literature concerning whether particular government expenditures have an impact on economic growth. This study analyzes the macroeconomic magnitude of government expenditures in Armenia and Spain and evaluates whether there exists a causal relationship between government expenditures and economic growth and vice versa (Keynesian hypothesis and Wagner's Law). The study employs VAR tests to analyze annual data for the years 1996-2014. Furthermore, by utilizing Granger causality tests, the study reveals whether the government expenditures are a significant factor in economic growth in short-term perspective. Finally, IRF and FEVD tests are applied to estimate the effect of a change in particular government expenditures on GDP for twelve year time horizon. This study validates the hypothesis that some public expenditures by the Armenian and Spanish public sectors positively contribute to the growth of their economies, while social protection is negatively related to GDP.

Keywords: *government expenditures, economic growth, Granger causality analysis, Augmented Dickey-Fuller test*

JEL Clasification: H30, H5, H50

1. Introduction

The discussion of the role of public expenditures on economic growth has a long history and it is still an extensive topic of discussion for public economists and policymakers. Economic thought on the macroeconomic effect of public expenditures is widely divided. Economists argue about the degree of freedom that an economy should have from government interference, the composition of expenditures that may lead to positive effects on national income and the specifics of fiscal policy adjustments based on a level of the economic development of a particular country. The economists also have a divided approach on whether an improvement of national income leads to an increase in public expenditures or a converse effect is more useful for defining this phenomenon where rise of public expenditures boosts national economy.

Thus, the emphasis on the importance of institutions to economic prosperity goes back at least to Adam Smith (1776) and has been found in the more recent works of Solow (1956), Olson (1982), Scully (1988), North (1990), Barro (1996), Hall and Jones (1999), and Acemoglu et al. (2001). The extent of government participation is one of the most fascinating topics in social science and economists have had different approach to analyzing this phenomenon through well-defined economic models mainly derived from the theories introduced by Solow. Another approach take Gwartney and Lawson (2008) who quantify the level of economic freedom on a scale from 0 to 10. They use the Economic Freedom of the World (EFW) index which rates the degree at which policies and institutions of a country are supportive of the economic freedom. The authors of the EFW annual index analyze forty-two variables that attribute to the five main qualifiers: (1) size of government, (2) legal structure and security of property rights, (3) access to sound money, (4) freedom to trade internationally, and (5) regulation of credit, labor and business. The study uses data from 102 nations and the countries are grouped into quintiles. The

study reveals a strong correlation between high EFW index and economic growth. Thereby, the countries in the top quintile of the EFW index (the average EFW score is 6.65 out of 10 (2008 report)) enjoy more sound economic growth. Accordingly, for comparison the nations in the top quartile have higher average per capita GDP of USD31,480 in 2006 in comparison with USD 3,882 in countries representing bottom quartile, a higher economic growth rate of 2.31% versus 0.5% for those in the bottom quartile, the average income of poorest 10% is USD 8,730 compared to USD 961 for those in the bottom quartile over the period from 1990 to 2006 (Gwartney and Lawson 2008).

The impact of appropriate fiscal adjustments on long-term sustainable growth is a central topic of many economists. Thus, studies of Alesina et al. (1998), Von Hagen et al. (2001) focus on industrial countries and they conclude that higher and more sustainable growth can be achieved in the long-term through increasing public wages and transfers, rather than through higher government revenues and lower public investments.

Sanjeev Gupta et al. (2005) in their study of thirty-nine low income countries suggest that fiscal consolidation was not harmful for growth in the period 1990-2005. Further, the study finds a connection between the specific composition of public expenditures and economic growth. Thus, the countries that allocate large share of expenditures on public wages have lower growth, while the countries investing in capital and non-wage goods and services experience more rapid growth in national income.

Isabel Ortiz and Matthew Cummins (2013) in their study focus on public expenditures and the effect of fiscal adjustment measures in 181 countries. Their research covers four specific periods: 2005-2007 (pre-crisis), 2008-2009 (crisis phase I: fiscal extension), 2010-2012 (onset of fiscal contraction) and 2013-2015 (crisis phase III: intensification of fiscal contraction). The

research finds that contractions are most severe in the developing world and they mainly affect vulnerable groups of population in almost one hundred countries. The public expenditure cuts are targeting subsidies, wage bills of public workers, safety net programs, pension reforms and increasing consumption taxes (such as VAT). Their analysis addresses the issue of whether fiscal consolidation and austerity measures can be expected to accentuate employment and have a negative macroeconomic effect. Clements et al. (2007) in their study suggest that, while renewed political systems tend to decrease state intervention, a wide range of social rights and effective enforcement mechanisms is enshrined, demanding a significant increase in current government spending, especially in social spending.

Further, there are two opposing views on the role of government spending on economic growth. On the one hand, there is the notion that government activity by means of government spending increases as a result of economic growth with a long-term trend, which was proposed by Wagner, in the late nineteenth century (Wagner, 1890). This notion, known as the Wagner's law, is summarized in the sense that government growth is due to a growing demand for public goods and control of externalities and therefore causality running from the national income to the government spending. On the other hand, in the Keynesian short-term perspective, an active fiscal policy, such as increasing government spending, has effects on demand, increasing in turn, through the multiplier and accelerator effects, the income or economic activity in a country. Wagner's rule argues that public expenditures are an endogenous factor or an outcome and not a cause of growth in national income. While Keynesian hypothesis considers government spending as an exogenous policy instrument that can affect economic growth. In order to evaluate these hypotheses the Granger causality tests are used in application to developed and developing

countries. In some cases the studies reveal unidirectional causality from public expenditures to national income (or vice versa), in other cases they do not detect causal relationship between variables, and very rarely they determine bidirectional causality between the two variables (Khan, 1990, Singh and Sahni, 1984, Beck, 1979, 1981, Ansari et al., 1997).

Although, the debates about the effect of government expenditures on economic growth are everlasting; however, it is always beneficial for public economist or policy makers to employ available tools and be aware of those indicators that might have a significant impact on the national growth of a country.

The aim of this paper is to determine which public expenditures have a significant effect on economic growth, and conversely, and the study addresses two very different countries: Armenia and Spain. These sample countries are chosen for determining if there are any similarities in the causal effect of particular public expenditures on the national growth for unalike economies and through the perspective of the two theories considered: Wagner's law and Keynesian hypothesis. Economic literature provides evidence that VAR tests are usually applied to studies of single country data to determine causal relations of public spending and economic growth. Economists use other than VAR tests statistical technics to study panel data of several countries. If the current study of two very different countries detects similarities in the causal relation of particular public expenditures and GDP, it will be further extended to a larger sample of countries, where similar VAR methodology will be applied with a possibility of a more detailed investigation of the causal effect in studied variables. The differences of sample countries is in the history, structure and the level of economic development, geographic location, focus of targeted

government programs and level of public expenditures. The novelty of this study is twofold. First, the analysis lies on a new perspective of comparison of two countries representing two different economic unions: Armenia being member of the Eurasian Economic Union and Spain being member of the European Union. Second, the analysis of the relationship between economic growth and government spending is made by its components, i.e., following the functional disaggregation of the government spending in each country, according to the literature.

Thus, Armenia is a low income developing country and member of the Eurasian Economic Union (EEU). The country has officially started transition to the market economy from a centrally planned system in the end of 1991. Spain is an economically developed country and member of the Organization for Economic Cooperation and Development (OECD) and 5th largest economy in the European Union (EU). Unlike Armenia, Spain has been a well-operating market economy since liberalization initiatives starting 1950th. Furthermore, there is a large discrepancy in the focus of targeted programs and level of government spending. Thus, in Spain the total government expenditures achieve roughly 50 percent of national income of which about 35 percent is spent on social protection programs. Unlike Armenia, where the ratio of total public expenditures to GDP is in the range of 25-30 percent and the main expenses were attributed to defense and maintenance of public order until 2008 when the social protection programs have become a government priority. (Figures 1, 2 and 3)

This study is focused on the context of government expenditures, which is the first component of the EFW index. Armenia is scored 6.26 and ranked #76 in this index, and Spain is scored 6.69 and ranked #59. In the overall summary of the EFW index Armenia is ranked #67 with a score 6.83 and Spain is ranked #32 with a score 7.38 in the 2008 report (Gwartney et al. 2008).

Both countries have better performance in other components and underperform in the component associated with the size of government: expenditures, taxes and enterprises.

This study estimates the causal effect of public expenditures on GDP, and conversely; Gross Domestic Product (GDP) in constant prices is used as a measurement of economic growth in Armenia and Spain. The data used is publicly available information and can be found on the webpages of the statistical services of each country and it includes periods from 1996 to 2013 for Spain and from 1996 to 2014 for Armenia.

The initial comparative study of public expenditures in both countries reveals interesting specifics. As shown in Figure 1, the ratio of public expenditures to GDP is much higher in Spain than in Armenia across all periods of the analysis. Additionally, the vast proportion of public expenditures is spent on social protection in Spain, while in Armenia a sharp increase in social protection costs was observed starting 2008. Another interesting difference is a high disparity in the proportion of expenditures on security. Armenia spends about 15 percent of its total expenditures on defense and 8 percent on maintenance of public order. Meanwhile Spain allocates less than 5 percent on each of these expenditures.

For our empirical analysis only those public expenditures that exceed 5% of total government spending are included in the analysis. As seen in Figure 2, for Armenia these expenditures include: General Public Services (GPS), Defense (DEF), Maintaining Public Order (MPO), Healthcare (HTH), Education (EDU) and Social Protection (SP). As shown in Figure 3, for Spain the expenditures are as follows: General Public Services, Economic Affairs (EA), Healthcare, Education and Social Protection.

Before proceeding with the estimation of causal effects, it is essential to clarify that high positive correlation of some of the public expenditures with GDP should not be viewed as an indicator of positive effect on GDP, because the positive changes in both variables may be generated by some other factors. For example, a low crime rate in the country may attract more families from the diaspora to move back and it may lead to an increase in the national income, because new residents will be investing in the country. Additionally, an increase in public expenditures on education may be observed, since public schools will be admitting more children. Therefore, while both variables experienced an increase; however, the positive effect was driven by an external factor. Furthermore, we observe a much higher positive correlation in the change of annual government expenditure to annual GDP change in Spain, almost all expenditures have positive correlation above 0.5 except social protection (SP) and economic affairs (EA). General public expenditure (GPS) has a negative correlation with GDP. In Armenia, the correlation coefficient for annual change of public expenditure to GDP change is much lower, which is mainly below 0.5 point, but it is positive across all expenses. Economic affairs (EA) has a strong negative correlation. (Table 1a.) .

2. Literature review

A large number of empirical studies have been devoted to estimating the effect of public expenditures on economic growth. Some economists test only the impact of a specific public expense on the economic growth. Other economists test whether there is an empirical trade-off between defense spending and social welfare expenditures such as healthcare and education. The economists who study defense expenditure are divided into two main groups: those whose studies find trade-off effects and those who report no empirical evidence of the trade-off between

defense and social welfare expenditures. Empirical studies of Heo et al. (2012); Russett (1982); Mintz (1989); Stein (1980); Barro 1990, 2001; Weede 1983 identified a trade-off effect between defense expenditure and social welfare expenditures. Their main argument is that increases in defense expenditures require greater levels of financial support. This support often comes at the cost of the civilian sector, unless the total gross national product increases, thus bringing in greater government revenue (Heo and Bohte, 2012). In contradiction, the studies of another group of economists advocates for no empirical evidence for trade-off between expenditures for defense and social welfare except for the Reagan era. However, they do find a significant indirect delayed trade-off between defense spending and private investment. Empirical studies of Clayton (1976); Domke, Eichenberg, and Keller (1983); report no empirical evidence of a trade-off (Heo and Bohte, 2012).

There is an economic literature that analyzes the impact of government expenditure in connection with the level of economic development of countries. It is mainly associated with Wagner's Law (Wagner, 1883, 1890) which emphasizes economic growth as the fundamental determinant of public sector growth. In this context, Bha Rat et al. (2000) examine the relationship between the growth of government expenditure and the growth of national income using time-series data drawn from the seven industrialized countries (the G7) and estimate that government expenditures in industrialized countries tend to be national income elastic in the long-run. Other group of economists focuses their study on the impact of public expenditures on national income in thirty developing countries over a ten year time-horizon (1970-1980) (Bose et al., 2007). Their study suggests that investing in education has long-lasting effects on economic prosperity in developing countries. Additionally, the same study suggests that aggregate current expenditure has no effect on growth, whereas aggregate capital expenditure has a positive effect.

In contradiction to this study Devarajan S. et al (1996) use data on forty-three developing countries over the twenty-year time horizon and estimate that an increase in the share of current expenditure has positive and statistically significant growth effect on the economy. By contrast, the relationship between the capital component of public expenditure and per-capita growth is negative.

3. Methodology

The technical analysis is performed by using the Vector Autoregression test (VAR) followed by VAR specific diagnostics and tests used for multivariate time series analysis. Before conducting VAR, the Augmented Dickey-Fuller (ADF) unit-root test is performed to identify the stationary nature of the variables, since Stock and Watson (1989) argue that the causality tests are very sensitive to the stationarity of the time series, while Nelson and Plosser (1982) add that many macroeconomic time-series are non-stationary. The first specification is an ADF-based test, where the given test statistics are estimated. The statistics given in the first category are based on estimators combining, in an effective manner, the autoregressive coefficients over diverse elements in the unit root tests with respect to estimated residuals.

The VAR model is a multi-equation system where all the variables are treated as endogenous. There is thus one equation for each variable as dependent variable. Each equation has lagged values of all the included variables as dependent variables, including the dependent variable itself. The main characteristic of a vector autoregressive (VAR) model is that several time series

are modeled in terms of their past. For two series X_t and Y_t a vector autoregression consists of the following equations:

$$X_t = \delta_0 + \alpha_1 X_{t-1} + b_1 Y_{t-1} + \alpha_2 X_{t-2} + b_2 Y_{t-2} + \cdots \quad \text{and} \quad (1)$$

$$Y_t = \eta_0 + c_1 X_{t-1} + d_1 Y_{t-1} + c_2 X_{t-2} + d_2 Y_{t-2} + \cdots$$

Where each equation contains an error that has zero expected value given past information on X and Y. The equations are estimated by OLS, provided that the model includes enough lags of all variables and the equation satisfies the homoscedasticity assumption for time series regression. For setting up the VAR model for Armenia the t periods include $t_A = [1996; \ldots; 2014]$ and for Spain the t periods include $t_S = [1996; \ldots; 2013]$. Since the obtained data is annually distributed the $lag = 2$ is used for the VAR models of both countries. Developed VAR models for both countries are initial steps for further forecasting the causal reletaionship between public expenditures and economic growth.

The VAR model itself does not allow us to make statements about causal relationships. Therefore, the effect between public expenditures and economic growth is obtained by performing a Granger causality test. The main idea of Granger causality is as follows: a variable Y Granger-causes X, if X can be better predicted using the past values of both X and Y than it can be using the history of X alone. The simple causal model can be written as:

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t \quad (2)$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \mu_t$$

Where X_{t-j} and Y_{t-j} are stationary time series.

The expected outcome of the Granger causality test can be as follows: a) y does not Granger cause x, b) y Granger causes x, but not vice versa, c) x Granger causes y, but not vice versa and d) y Granger causes x and vice versa.

The definition of causality given above implies that Y_t is causing X_t provided some b_j is not zero. It similarly implies that X_t is causing Y_t provided some c_j is not zero. If both of these events occur, there is said to be a feedback relationship between X_t and Y_t (Granger, 1969 page 431). The null hypothesis of the test is that all the lag variables of Y do not cause X. If the probability$\rho\ value < 5\ percent$, we can reject the null hypothesis which would mean there is a short-run causality from Y to X.

Further, the Lagrange-multiplier (LM) test is applied to analyze the autocorrelation of residuals of the model and Breusch-Pagan/ Cook-Weisberg test determines the heteroscedasticity of the VAR model. Finally, the impulse-response analysis (IRF) and FEVD tests are applied, as Sims (1980) proposed them as essential part of VAR methodology.

The impulse-response function and the forecast error variance decomposition (FEVD) method analyses are essential tools in interpreting the studied VAR model. These tests track the evolution of the shock through the VAR system (N. R. Swanson and C.W.J. Granger2012). IRF identifies the dynamics among the variables and specifically it is a response or unit change in a studied variable in the system to a unit value of a shock in the previous period. The forecast error variance decomposition (FEVD) method estimates how much of the forecast error variance of each of the variables can be explained by exogenous shocks to other variables in the VAR system. For both tests the forecast horizon is 12 periods applied to both countries.

The main idea of the impulse response function (IRF) is to find out the response of a studied variable to a unit change, which can be described as shock or innovation, in the value of one of the VAR errors. Assuming that all other errors are zero, then the studied VAR error would return to zero in further periods. More formally, if a VAR system presented below is considered with a time-lag $(t - i)$ the IRF identifies the responsiveness of the endogenous variables in the system when a unit shock or impulse is applied to the error terms $\varepsilon_1$and ε_2.

$$X_t = \alpha_1 + \alpha_2 X_{t-i} + \alpha_3 Y_{t-i} + \varepsilon_1 \qquad \text{and} \quad (3)$$

$$Y_t = \beta_1 + \beta_2 X_{t-i} + \beta_3 Y_{t-i} + \varepsilon_2$$

4. Results

Before conducting Granger causality tests, the ADF unit-root test was used to determine if the available data for both countries was stationary. The test determined that the data was not stationary at its level but it turned stationary in second differences. A variable is stationary if its mean and variance are constant over time. As shown in Table 2, the results of an ADF unit root test for levels, first and second differences show that the majority of variables appear to be stationary or, in other words stable, either at the first or second degree difference. The absolute value of the ADF test statistics outcome per each variable should be higher than the critical value. For instance, real GDP of Armenia is statistically significant at 10% at first difference and real GDP of Spain is statistically significant at 5% at second difference or, in other words, stationary. For further study the degree of difference when all data first turns stationary is used and it is second differenced.

The results of Granger causality test performed for both countries are presented in Table 3 for Armenia and Table 4 for Spain. As seen in Table 3, defense, healthcare and education exhibit short-run causality, since $\rho\ value < 5\ percent$ in relation to real GDP of Armenia. The outcome suggests these public expenditures have a significant impact on economic growth in Armenia. Additionally, real GDP has a causal effect on GPS, DEF, MPO, HTH, EDU and SS. A bi-directional causality hypothesis is observed in the cases of defense, healthcare and education. Finally, some public expenditures also attribute causal effects on each other (e.g. DEF and GPS and vice versa).

As shown in Table 4, healthcare and at some degree economic affairs expenses have a significant impact on the economic growth of Spain, since $\rho\ value < 5\ percent$ in relation to real GDP. Additionally, real GDP has a causal effect on GPS, HTH and SS. Therefore a bidirectional causality hypothesis is observed in the case of healthcare. Finally, some public expenditures also have a causal effect on each other (e.g. EA and GPS, but not vice versa).

If referred to the terms of Wagner's Law vs Keynesian hypothesis, the causal relationship of real GDP on government spending in Armenia confirms the existence of Wagner's law in short-term perspective. In Spain, a strong evidence of Wagner's Law is not determined. Additionally an evidence of Keynesian hypothesis is observed as defense, healthcare and education expenditures have a significant impact on national income in Armenia and so do healthcare and economic affairs in Spain. The relationship is also bidirectional in the case of certain components of public expenditures on economic growth differentiated by countries.

Next, the Lagrange-multiplier (LM) test is used to determine the autocorrelation of the residuals of the model. The null hypothesis of the LM test is H_0: there is no autocorrelation. H_0:

cannot be rejected if $\rho\ value < 5\ percent$, rather it would be accepted that there is no autocorrelation. The results of the LM test for autocorrelation of residuals at 10 lags are presented in Tables 5 and 6. The outcome of the LM test shows there is no residual autocorrelation and the model is well-specified.

Further, a Breusch-Pagan/Cook-Weisberg test for determining heteroscedasticity of the results is performed and the results are shown in Table 7. Based on the test results, an issue of heteroscedasticity is not revealed by the outcome.

The results of forecast error variance decomposition (FEVD) analysis are presented in Tables 8 – 11. Tables 8-9 present FEVD outcomes for Armenia and Tables 10-11 for Spain respectively. The forecast horizon for FEVD is 12 periods for both countries. For example in Armenia, the variance of the forecast error in GDP can be attributed mainly to powers of defense (DEF), general public services (GPS), slightly healthcare (HTH), as well as to itself (Table 8). The self-explanatory power of GDP sharply increases in the period two after which it continues to decline for the whole observed time-horizon. The variance of the forecast error in GDP can be attributed to the sharp increase in powers of DEF and GPS in the period two and the slight increase continues for the all following periods. Finally, the variance of forecast error of GDP can also be determined by a slight increase in power of HTH in the period three, then it declines and remains close to zero .

Moreover, the power of GDP attributed to the variance of the forecast errors in all studied variables is positive in Armenia (Table 9). The strongest power of GDP determines variance decomposition errors in MPO, DEF, SS and GPS. For instance, the power of GDP sharply

increases in the variance decomposition of the forecast error of MPO and achieves its pick in the period two, then it slightly declines and remains positive for the whole observed time-horizon.

As seen in Table 10 for case of Spain the variance of the forecast error in GDP can be positively attributed to the insignificant power in EA, strong power in GPS and itself. The most significant effect on variance of the forecast error in real GDP is determined by the power in general public services (GPS). The attributable power of GPS on the forecast error variance decomposition increases starting period two and it growth until period four and remains strongly positive for the whole observed time-horizon. The insignificant power of economic affairs (EA) determines variance of forecast error in GDP in period two, which remains unchanged moving onward.

Meanwhile, similar to Armenia, the power of GDP is attributed to the forecast error variance decomposition of all public expenditures in Spain and the power of GDP is strong (Table 11). The strongest power of GDP determines variance decomposition in HTH, SS and EDU.

If the terms of Wagner's Law vs Keynesian hypothesis are used, the FEVD results for both countries suggest evidence of Wagner's Law, since the power of GDP strongly determines the forecast error variance decomposition of all public expenditures. There is also evidence of Keynesian hypothesis where public expenditures on defense and general public services in Armenia and general public services in Spain attribute significantly to the forecast error variance decomposition of GDP.

The results of impulse response function (IRF) analysis are presented in Tables 12-15, where Tables 12-13 present information associated with IRF results for Armenia and Tables 14-15 present similar results for Spain. IRF tables 12 and 14 analyze situations when a unit shock or

impulse is given to the error terms in the VAR system, and the corresponding response received by real GDP as a measurement of the economic growth. The situation when GDP responds to the unit shocks in the endogenous variables of the VAR system is presented on Table 12 for Armenia and Table 14 for Spain. Moreover, the situation where a unit shock is given to GDP and the response of endogenous variables to that shock in the VAR system is presented on Table 13 for Armenia and Table 15 for Spain. The first variable on the title of the graph is impulse and the second variable is a response to the unit shock. The forecast horizon for IRF is 12 periods for both countries.

Thus, for Armenia, the most significant response the national income will experience if a shock or innovation is given to healthcare (HTH) and maintenance of public order (MPO) Table 12, graphs: HTHD1-RealGDPD and MPOD1-RealGDPD1. In case of a unit innovation in HTH the national growth reacts in period 1 with a sharp increase then it slowly declines but stays positive including period 3, in the period 4 the response is negative. In case of a unit impulse or innovation given to MPO the national income increases and achieves its pick in the period 3, then it slowly declines but stays positive until period 8. Another interesting observation is real GDP first response to the unit impulse given to defense (DEF), social security (SS) and education (EDU) expenditures is negative then it fluctuates in the range close to zero.

If a unit impulse is given to GDP then in the period 1 GDP will increase and then it will sharply decline over two periods and in period 3 be negative. Then it will fluctuate in the $(-0.2: 0.2)$ range Table 13 graph: RealGDPD1-RealGDPD1. Based on the same table the most significant response to a unit shock in GDP is observed by SS (social protection) over three year horizon. Additionally, first response of all public expenditures to a unit innovation in real GDP is positive. In case of general public services (GPS), defense (DEF) and maintenance of public

order (MPO) these expenditures after the first strong hike in response to a unit change in real GDP continue fluctuation in the $[0: 0.1]$ positive range.

The impulse response function for Spain has a significantly different shape than for Armenia. Table 14 represents response of real GDP to a unit innovation in public expenditures in Spain. Thus, a unit impulse in healthcare has the most significant effect on national growth (see graph: HTHD1-Real GDPD1). Real GDP sharply increases achieving its pick in the period 2, then it slightly declines but stays positive until period 7. Additionally, real GDP responds negatively to a unit impulse in general public services (GPS), education (EDU) and social protection (SS) expenditures.

Table 15 represents response of endogenous variables to a unit shock or innovation in real GDP. While the irf regression line for all endogenous variables over 12 period time horizon lapses with the primary horizontal axis, the confidence interval significantly changes over time. In other words, the impulse in real GDP has no significant impact on public expenditures. Comparatively more notable is the IRF regression line for economic affairs. Based on the RealGDPD1-EAD1 graph the economic affairs (EA) responds to the unit change in real GDP in period 4, fluctuates in the range close to zero and the magnitude of response increases over time.

The following similarities are observed from the studies of both countries: Armenia and Spain. Over time the governments of both countries have prioritized public programs related to social protection. In short-term, expenditures on healthcare have a bidirectional causal effect, where increase in spending on healthcare leads to a boost in national income and, conversely, an expansion in national income accelerates expenditures on healthcare programs. If used FEVD tests results, there is an evidence that expansion in national income leads to an improvement in

all public expenditures and this finding is consistent with Wagner's Law. Moreover, general public services (GPS) has an impact on GDP in both countries and it is consistent with Keynesian hypothesis. If used IRF tests outcomes, healthcare has a long-term positive effect on GDP; however, the time horizon of the effect is different: in Armenia three years and in Spain seven years. This outcome is consistent with Keynesian hypothesis. Additionally, the study identified instances, where a positive innovation in public expenditures, such as social security (SS) and education (EDU), results in a negative response in GDP. In Armenia a negative response in GDP to a positive impulse in education has a significant character; however, the negative response in Spain lasts for one period and is less significant.

The overview of comparing current study results to those obtained in the previous literature for single countries and for cross country panel data reflecting similar objectives is as follows. As we have seen, the most relevant channels through which fiscal policy can affect national growth are, apart from taxation, public expenditures (Tanzi and Zee, 1997; Fu et al., 2003). The effect of public investments on growth in forty-eight OECD and non-OECD countries during 1960-2001 was conducted by Arslanalp S. et al. (2010), where the level of output was calculated as a function from public capital. The authors derived that the initial level of public capital in GDP is essential and after controlling for that factor an increase in public capital is positively correlated with growth in national income. Additionally they estimated that in OECD countries this positive effect is stronger in the short-term perspective. The study of non-OECD countries showed stronger positive correlation in the long-term perspective. Overall, this current study shows that, indeed, improvement in public investments leads to a positive change in national income in both countries. However, in short-term all public expenditures in

Armenia, a non-OECD country, show a stronger causal effect than in Spain, an OECD country, where causal effect runs only from three public expenditures (general public services, healthcare and social protection) to GDP. In the long-term perspective and if FEVD tests are considered and consistent with the results of Arslanalp S. et al. findings there is an evidence of positive causal effect running from sectors of defense in Armenia and general public services to GDP in both countries. Investing in more effective governments in Armenia and Spain may be more able to invest in general research and development, which are important determinants of growth (Barro, 1990; Romer, 1990). The IRF tests' long-term results are more challenging, since they determine variability of causal relation and identify some periods of positive and negative relation between some public expenditures and national income. Thus, while healthcare has a positive effect, social protection has a negative effect on national income in both countries and education has a long-term negative effect in Armenia.

Additionally, in the 1990s the studies of the theory of growth rate in an economy estimated that public expenditures may have a more significant impact and the changes in expenditure composition, tax design and deficit financing may directly affect economic growth (World Bank, 2007). Based on the same report the studies identified those public expenditures that tend to be growth oriented and they defined them as "productive". The report divided studied countries into two groups: high income, and low and middle income countries. It analyzed the specific impact of public expenditures on economic growth in these two groups and identified that in high income countries public expenditures, such as education, health, transport and communication are "productive" and contribute to the positive growth. In low and middle income countries the following sectors are "productive": transport and communication, education and health, and they have significant positive long-run growth effects. Overall, based

on the literature, the effect of public expenditures especially associated with so-called "productive" sectors seems to be fairly positive for growth and poverty reduction (Barro (1990), Barro and Sala-i-Martin (1992), Futagami et al. (1993), and Devarajan et al. (1996), Canavire-Bacarreza et al. (2013)). Our results confirm this statement in both countries since healthcare has a positive impact on GDP short-term and long-term, consistent with Keynesian hypothesis, additionally this is a bi-directional causal effect (also consistent with Wagner's Law). However, the positive causal effect was not observed for education in long-term (a negative impulse has a shorter duration in Spain), probably due to the inefficiency of this public spending in both countries (Lago Peñas and Martínez-Vázquez, 2016).

Moreover, the expenditure side of the budget (and, more specifically, what can be accomplished with it) must be taken into account when politicians make decisions on how to tax and how much to tax and those decisions, in turn, may allow larger amounts of productive public expenditure in the country (Liu and Martinez-Vazquez, 2015). In this sense, Martinez-Vazquez et al. (2012) analyze the impact of expenditure policies on income distribution for a panel of 150 countries during 1970-2009. Additionally, one of the papers focuses specifically on public spending in Asia and comparison of findings with the rest of the world. The four categories of public spending are considered (social protection, education, health, and housing) and all appear as being progressive; however, their impact has been different depending on how their share changed with GDP fluctuations. Thus, the increases in social protection expenditures led to a reduction of the Gini (0.22) and this is even significantly larger in the case of healthcare expenditures (1.46). However, the reduction in the share of education in public expenditures led to increase in inequality (0.12). Given this positive connection between public spending and poverty reduction, the same identification could also be in line with the results obtained in this

paper related to all three public expenditures in Armenia and of those to healthcare and social protection in Spain in short-term perspective. In long-term there is an evidence of the effect of education on GDP only in Armenia if FEVD tests are used and if IRF tests are used there is an evidence of long-term positive effect of healthcare on GDP in Armenia and Spain; however, the social protection spending has a negative effect on GDP in both countries. The findings for Asia seem more consistent with the current study in long-term perspective, since they identify negative relation of social protection and inequality and estimate that one percentage point increase in social protection expenditure raises income inequality in Asia by 0.49 percentage points.

According to above, the intensity of these effects are not always equal when we observe the changes in the shares of public spending by GDP. Divergence results obtained in both countries are partially explained due to the initial degree of development since most studies establish the generally higher social welfare expenditures in the 15 old European Union members (Spain) as a control variable in comparison with other developing countries (Armenia) (Martinez-Vazquez and Vulovic, 2014). However, the shares of each component has been changing over the time. In case of Armenia, greater efforts in social protection modified the share of those expenditures over GDP and then reveal a bidirectional short-run causality between this expenditure and economic growth (and probably in income distribution), unlike in Spain where short-term positive causal effect on social protection is a result of economic growth (consistent with Wagner's Law).

5. Conclusions

The economics literature does not include a common idea about the role of the state in the economy; and the necessity to redefine the concepts of "economic functions of state" and "social state" and to restructure the state are accepted by nearly every section, especially international organizations, such as the European Union. This paper shows the role of public expenditure policy within that framework, at the same time, the focus of economic growth which places the components of public spending as generators of wealth is reconsidered.

This study employed the VAR estimation and Granger causality test approach to ascertain the availability and direction of the relationship between public expenditures and economic growth in Armenia and Spain between 1996 and 2014. Further impulse response function and forecast error variance decomposition analyses were conducted as tools of VAR tests in interpreting estimated linear multivariate time series models for both countries over 12 period time horizon. The results of VAR analysis and Granger causality tests suggest that there is a relationship between certain public expenditures and economic growth in both countries, further it was determined that public expense healthcare has causal effect on GDP in both countries. The results of Granger causality tests also assert that, on the one hand, public expenditures: defense, healthcare and education have a strong impact on economic growth in Armenia and, on the other side, healthcare and at some degree economic affairs expense have a significant impact on the economic growth in Spain. Additionally, real GDP has a strong impact on all public expenditures in Armenia and on general public services, healthcare and social protection in Spain. In case of defense, healthcare and education expenses in Armenia and healthcare expense in Spain the finding supports the "bi-directional causality hypothesis". In

other words, analysis shows that these expenses can promote economic growth and the economic growth promotes these expenses in return. Moreover, the study employs impulse response function (IRF) and forecast error variance decomposition (FEVD) analysis as VAR tools to access the long-term effect of public expenditures on GDP and the twelve-year forecast horizon is used.

The FEVD analysis for both countries defines that real GDP has a strong power in the forecast error variance decomposition of all public expenditures. Additionally, the power of defense (DEF), general public services (GPS) and negligibly healthcare (HTH) attributes to the variance decomposition of real GDP in Armenia. In Spain the power of general public services (GPS) and negligibly economic affairs (EA) attribute to real GDP. In the FEVD analysis we observe two similarities for both countries: a) real GDP has a strong power in the forecast error variance decomposition of all public expenditures and b) the strong power of general public services (GPS) expenditure attributable to the variance decomposition of real GDP.

The IRF analysis for Armenia defines that a unit innovation or shock in maintenance of public order (MPO) and healthcare (HTH) will have a significant long-term effect on national growth. In Spain similar test defines that a unit shock in healthcare (HTH) spending will have a significant long-term effect on national income in this country. Further, there is an evidence that a unit innovation in social protection will have a long-term negative response in GDP. Similarly, a unit impulse in education will have a negative response on GDP and notably in Armenia. Moreover, if a unit shock is given to real GDP it will impact all public expenditures in Armenia with the strongest effect in social protection (SS). While in Spain the similar shock in real GDP will not have an impact on public expenditures in long-tem, except for economic affairs which will have a lagged response starting in the period 4.

Additionally, based on the study the public policies will benefit if there is a defined time-horizon for implementation of government programs. Thus, if a public policy has a short-term objective of improving national growth, there is an evidence from both countries that healthcare oriented government programs would have a significant positive effect on GDP. Additionally, while evidence from Armenia supports the fact that an increase in national income would automatically cause increase in public expenditures in short-term perspective, we did not find a similar evidence from Spain and here an increase in GDP may cause an increase only in some of the expenditures.

In long-term perspective, if the IRF tests results are used, there is an evidence from both countries that public expenditures on healthcare programs have a positive effect on national growth. Meanwhile, the impact horizon is different: in Armenia it is 3 periods, in Spain the horizon is somewhat longer and it is 7 periods. Additionally, in the long-term perspective an improvement in GDP does not necessarily cause increase in public expenditures and in some cases it causes them to decline, as it is observed in case of Armenia, where healthcare and education oriented government spending turn negative in period 4 and social protection turns negative in period 5. In this context in addition to defining the most appropriate public policies the time horizon for implementation of those programs also becomes essential.

Further, the results are relevant to the period from 1996 to 2014 and availability of more long-term data will allow more refined public policy recommendations specifically related to the government spending that target long-term public benefits, such as social protection and education. This research can serve as guidelines to the Public Budget Management in Armenia and Spain and also to reorient the European funds into the more potential shares of government spending on neighboring economies.

Abbreviations used

AFAC	- Agriculture, forestry and aquaculture, fishing
ADF	- Augmented Dickey-Fuller test
DEF	- Defense
EA	- Economic affairs
EDU	- Education
FEC	- Fuel and energy complex
FEVD	- Forecast errors variance decomposition
GDP	- Gross Domestic Product (in constant prices)
GPS	- General public services
HCS	- Housing and communal services
HTH	- Healthcare
INFR	- Transport, communication and roads (infrastructure)
IRF	- Impulse-response function
LM test	- Lagrange multiplier test
MIMF	- Mining industry and mineral fossils (excluding fuel), manufacturing industry, construction and nature protection
MPO	- Maintenance of public order, security and judicial activities
PENV	- Preservation of environment
RESF	- Expenditures (reserve funds) non classified under the main groups
RCR	- Recreation, culture, sport, information and religion
SP	- Social protection
TEXP	- Total expenditures

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ANNEXES

Figure 1. Total government expenditures as a percent of GDP

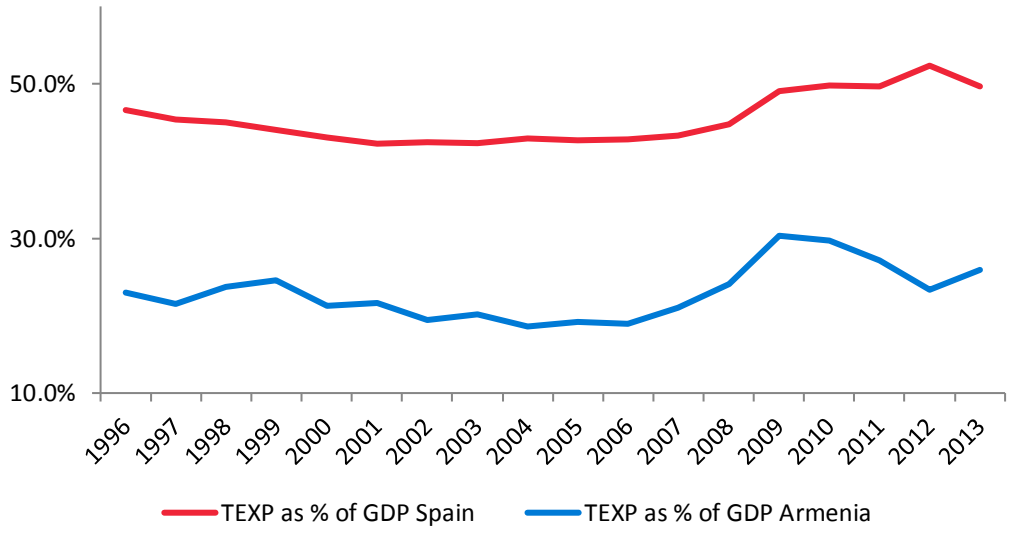
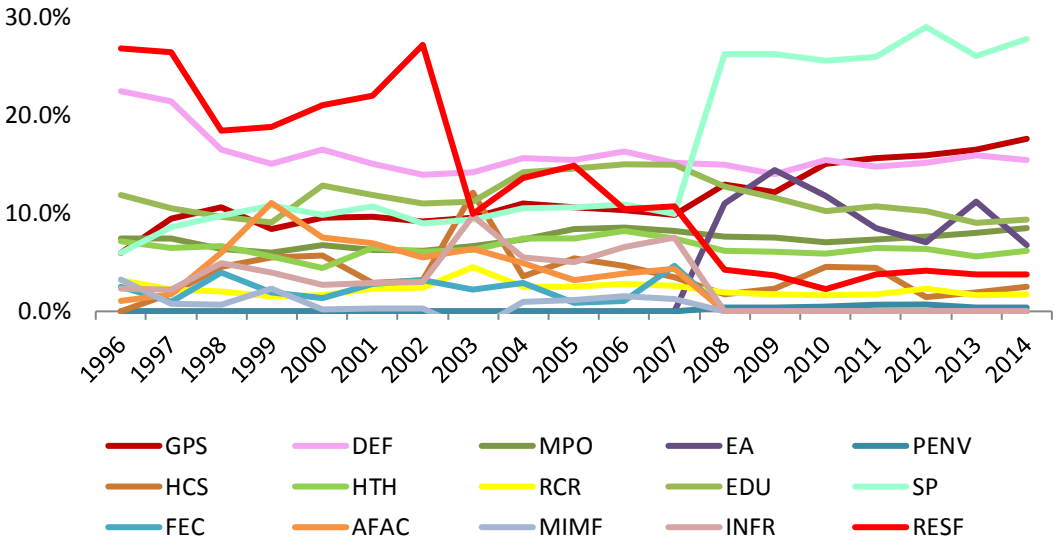


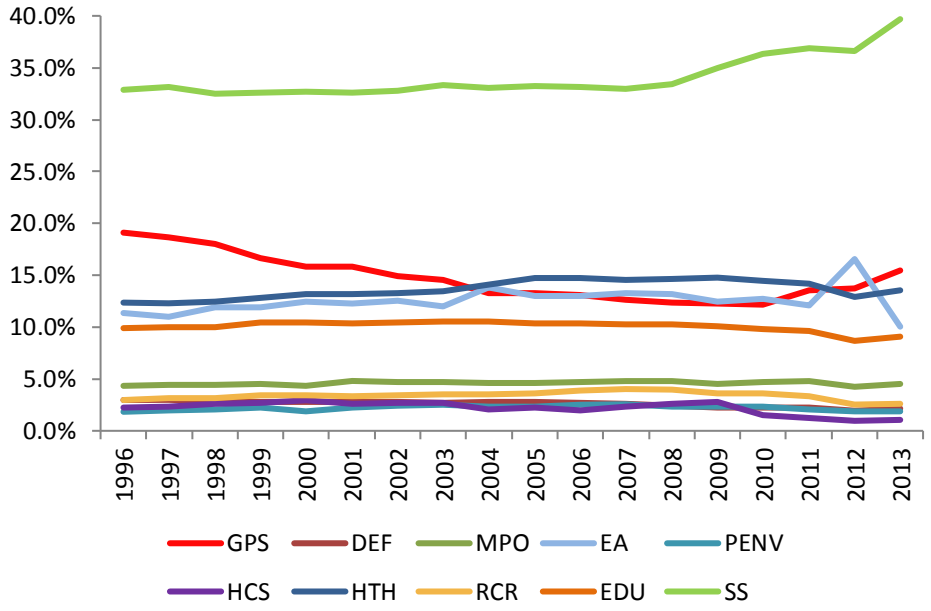
Figure 2. Share of expenses by functions in total government expenditures in Armenia



General public services**	GPS	Education**	EDU
Defense**	DEF	Social protection**	SP
Maintenance of public order, security and judicial activities**	MPO	Expenditures (reserve funds) non classified under the main groups	RESF
Economic affairs	EA	Agriculture, forestry and aquaculture, fishing	AFAC
Preservation of Environment	PENV	Fuel and energy complex	FEC
Housing and communal services	HCS	Transport, communication and roads (infrastructure)	INFR
Healthcare**	HTH	Recreation, culture, sport, information and religion	RCR
Mining industry and mineral fossils (excluding fuel), manufacturing industry, construction and nature protection	MIMF		

** variables are included in VAR and further tests

Figure 3. Share of expenses by functions in total government expenditures in Spain



General public services**	GPS	Healthcare**	HTH
Defense	DEF	Recreation, culture and religion	RCR
Maintenance of public order, security and judicial activities	MPO	Education**	EDU
Economic affairs**	EA	Social protection**	SP
Preservation of Environment	PENV	Housing and communal services	HCS

** variables are included in VAR and further tests

Table 1. Correlation coefficients between annual change in a particular government spending and GDP (1996-2014)

Armenia (1996-2014)	Correl. coefficient	Spain (1996-2013)	Correl. coefficient
AF/GDP	0.50	RCR/GDP	0.85
TEXP/GDP	0.41	EDU/GDP	0.82
FEN/GDP	0.38	HTH/GDP	0.78
MPO/GDP	0.37	DEF/GDP	0.69
GPS/GDP	0.36	TEXP/GDP	0.69
EDU/GDP	0.35	PENV/GDP	0.59
TRINF/GDP	0.30	HCS/GDP	0.52
THT/GDP	0.24	SS/GDP	0.42
RESF/GDP	0.23	EA/GDP	0.22
RCR/GDP	0.21	GPS/GDP	-0.15
SS/GDP	0.16		
DEF/GDP	0.13		
MIN/GDP	0.13		
HCS/GDP	0.11		
EA/GDP	-0.65		

Table 2. Augmented Dickey-Fuller test results

	test statistics level	test statistics 1st difference	test statistics 2nd difference	test statistics level	test statistics 1st difference	test statistics 2nd difference	1% Critical Value	5% Critical Value	10% Critical Value
		Armenia			**Spain**			**Critical Value**	
GDP	0.826	-2.85		-2.072	-0.835	-3.222	-3.750	-3.000	-2.630
TEXP	1.499	-2.29	-4.516	-0.976	-0.754	-3.260	-3.750	-3.000	-2.630
GPS	2.668	-2.774		2.105	-3.637		-3.750	-3.000	-2.630
DEF	1.814	-2.929		-1.474	-3.074		-3.750	-3.000	-2.630
MPO	2.618	-1.899	-5.787	-1.251	-2.217	-5.007	-3.750	-3.000	-2.630
EA	-1.182	-3.538		-1.752	-12.216		-3.750	-3.000	-2.630
PENV	-0.603	-3.184		-1.671	-2.167	-5.112	-3.750	-3.000	-2.630
HCS	-2.904	-5.385		-1.778	-3.534		-3.750	-3.000	-2.630
HTH	1.057	-3.734		-1.252	-1.361	-3.784	-3.750	-3.000	-2.630
RCR	-0.746	-6.526		-1.477	-1.660	-3.501	-3.750	-3.000	-2.630
EDU	-0.224	-2.882		-1.557	-1.356	-3.805	-3.750	-3.000	-2.630
SP	0.571	-3.495		0.377	-1.638	-3.068	-3.750	-3.000	-2.630
FEC	-3.777	-6.441					-3.750	-3.000	-2.630
AFAC	-1.962	-4.655					-3.750	-3.000	-2.630
MIMF	-2.992	-5.233					-3.750	-3.000	-2.630
INFR	-2.346	-5.049					-3.750	-3.000	-2.630
RESF	-3.378	-6.263					-3.750	-3.000	-2.630

Table 3. Granger Causality Test for Armenia:

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
RealGDPD1	GPSD1	4.4407	2	0.109
RealGDPD1	DEFD1	11.328	2	0.003
RealGDPD1	MPOD1	1.5236	2	0.467
RealGDPD1	HTHD1	18.483	2	0.000
RealGDPD1	EDUD1	10.827	2	0.004
RealGDPD1	SSD1	.91577	2	0.633
RealGDPD1	ALL	434.07	12	0.000
GPSD1	RealGDPD1	386.2	2	0.000
GPSD1	DEFD1	92.134	2	0.000
GPSD1	MPOD1	185.94	2	0.000
GPSD1	HTHD1	34.622	2	0.000
GPSD1	EDUD1	12.796	2	0.002
GPSD1	SSD1	443.52	2	0.000
GPSD1	ALL	1160.5	12	0.000
DEFD1	RealGDPD1	414.79	2	0.000
DEFD1	GPSD1	44.604	2	0.000
DEFD1	MPOD1	13.849	2	0.001
DEFD1	HTHD1	83.698	2	0.000
DEFD1	EDUD1	11.211	2	0.004
DEFD1	SSD1	370.66	2	0.000
DEFD1	ALL	2965.9	12	0.000
MPOD1	RealGDPD1	13.205	2	0.001
MPOD1	GPSD1	1.4701	2	0.479
MPOD1	DEFD1	.10378	2	0.949
MPOD1	HTHD1	1.4107	2	0.494
MPOD1	EDUD1	.09642	2	0.953
MPOD1	SSD1	3.0726	2	0.215
MPOD1	ALL	120.76	12	0.000
HTHD1	RealGDPD1	8.3647	2	0.015
HTHD1	GPSD1	8.8765	2	0.012
HTHD1	DEFD1	7.4951	2	0.024
HTHD1	MPOD1	16.457	2	0.000
HTHD1	EDUD1	10.577	2	0.005
HTHD1	SSD1	3.0695	2	0.216
HTHD1	ALL	89.707	12	0.000
EDUD1	RealGDPD1	57.866	2	0.000
EDUD1	GPSD1	22.043	2	0.000
EDUD1	DEFD1	5.8455	2	0.054
EDUD1	MPOD1	57.618	2	0.000
EDUD1	HTHD1	4.0573	2	0.132
EDUD1	SSD1	110.39	2	0.000
EDUD1	ALL	624.44	12	0.000
SSD1	RealGDPD1	43.046	2	0.000
SSD1	GPSD1	8.9186	2	0.012
SSD1	DEFD1	11.054	2	0.004
SSD1	MPOD1	39.941	2	0.000
SSD1	HTHD1	7.8873	2	0.019
SSD1	EDUD1	6.7945	2	0.033
SSD1	ALL	176.3	12	0.000

Table 4. Granger causality test for Spain

Granger causality Wald tests

Equation	Excluded	chi2	df	Prob > chi2
RealGDPD1	GPSD1	3.4404	2	0.179
RealGDPD1	EAD1	5.9947	2	0.050
RealGDPD1	HTHD1	23.694	2	0.000
RealGDPD1	EDUD1	3.2536	2	0.197
RealGDPD1	SSD1	3.0062	2	0.222
RealGDPD1	ALL	56.036	10	0.000
GPSD1	RealGDPD1	28.194	2	0.000
GPSD1	EAD1	17.794	2	0.000
GPSD1	HTHD1	9.0721	2	0.011
GPSD1	EDUD1	7.9707	2	0.019
GPSD1	SSD1	17.175	2	0.000
GPSD1	ALL	186.1	10	0.000
EAD1	RealGDPD1	.89086	2	0.641
EAD1	GPSD1	2.4833	2	0.289
EAD1	HTHD1	6.281	2	0.043
EAD1	EDUD1	4.8275	2	0.089
EAD1	SSD1	4.9399	2	0.085
EAD1	ALL	120.86	10	0.000
HTHD1	RealGDPD1	11.68	2	0.003
HTHD1	GPSD1	4.9204	2	0.085
HTHD1	EAD1	1.1085	2	0.574
HTHD1	EDUD1	1.3524	2	0.509
HTHD1	SSD1	2.6407	2	0.267
HTHD1	ALL	169.05	10	0.000
EDUD1	RealGDPD1	3.6116	2	0.164
EDUD1	GPSD1	9.0021	2	0.011
EDUD1	EAD1	2.2296	2	0.328
EDUD1	HTHD1	9.6263	2	0.008
EDUD1	SSD1	10.812	2	0.004
EDUD1	ALL	300.08	10	0.000
SSD1	RealGDPD1	11.332	2	0.003
SSD1	GPSD1	1.632	2	0.442
SSD1	EAD1	28.74	2	0.000
SSD1	HTHD1	27.059	2	0.000
SSD1	EDUD1	9.1047	2	0.011
SSD1	ALL	292.92	10	0.000

Table 5. Autocorrelation LM test Armenia

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	1.4397	1	0.23019
2	3.8543	1	0.04962
3	12.4162	1	0.00043
4	0.1487	1	0.69976
5	0.0716	1	0.78899
6	0.6295	1	0.42753
7	0.0362	1	0.84902
8	2.0316	1	0.15405
9	2.1316	1	0.14429
10	7.9942	1	0.00469

H0: no autocorrelation at lag order

Table 6. Autocorrelation LM test Spain

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	0.0698	1	0.79170
2	0.3571	1	0.55013
3	1.2502	1	0.26351
4	2.6929	1	0.10080
5	3.8671	1	0.04924
6	0.0145	1	0.90423
7	0.2419	1	0.62285
8	1.5066	1	0.21966
9	1.1594	1	0.28158
10	3.7962	1	0.05137

H0: no autocorrelation at lag order

Table 7. Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Variables: fitted values of RealGDPD1

Spain	Armenia
chi2(1) = 0.10	chi2(1) = 1.10
Prob > chi2 = 0.7475	Prob > chi2 = 0.2951

Ho: Constant variance

Table 8. Forecast error variance decomposition Armenia. Real GDP is a response variable.

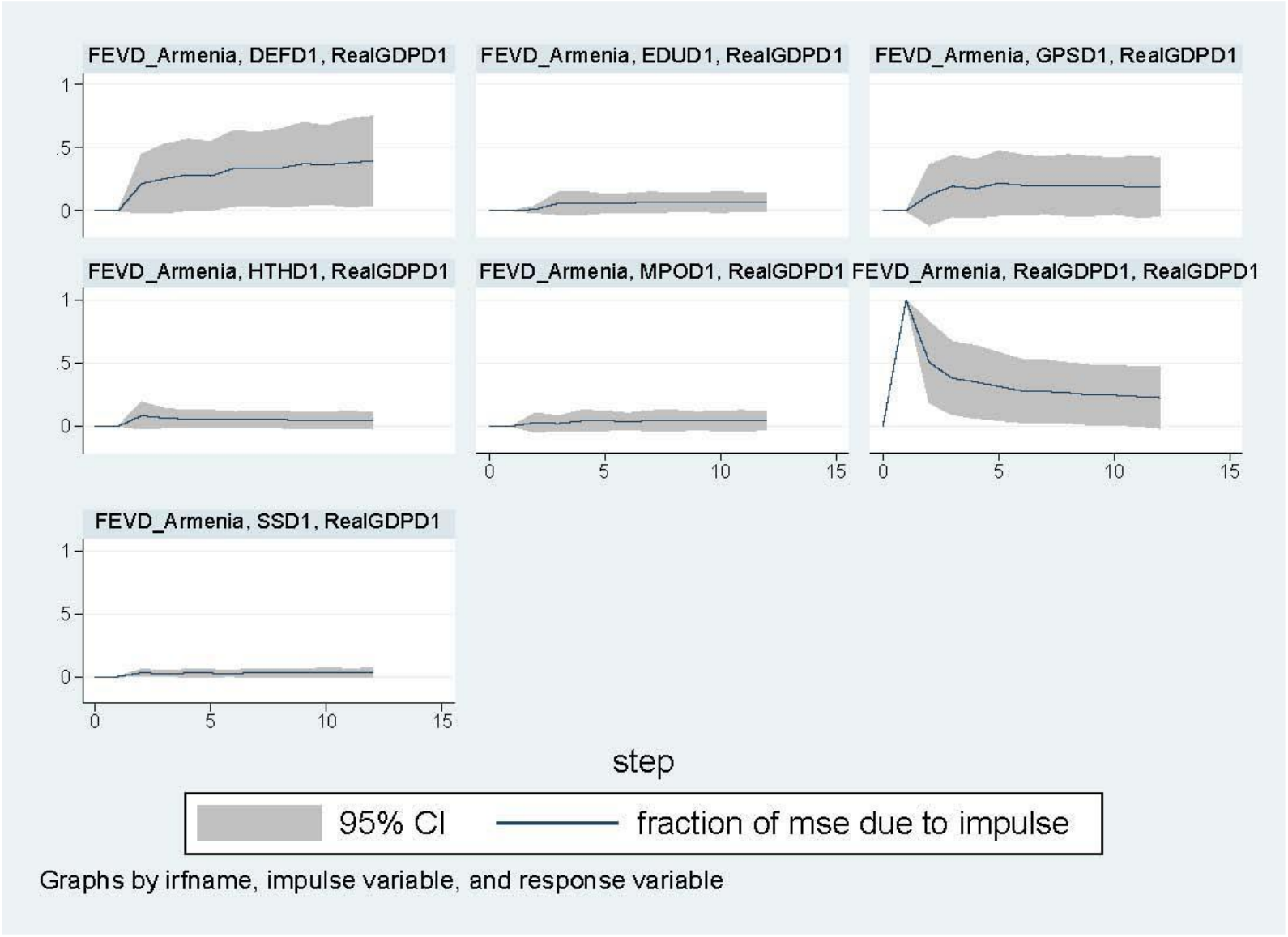


Table 9. Forecast error variance decomposition Armenia. Real GDP is an impulse variable.

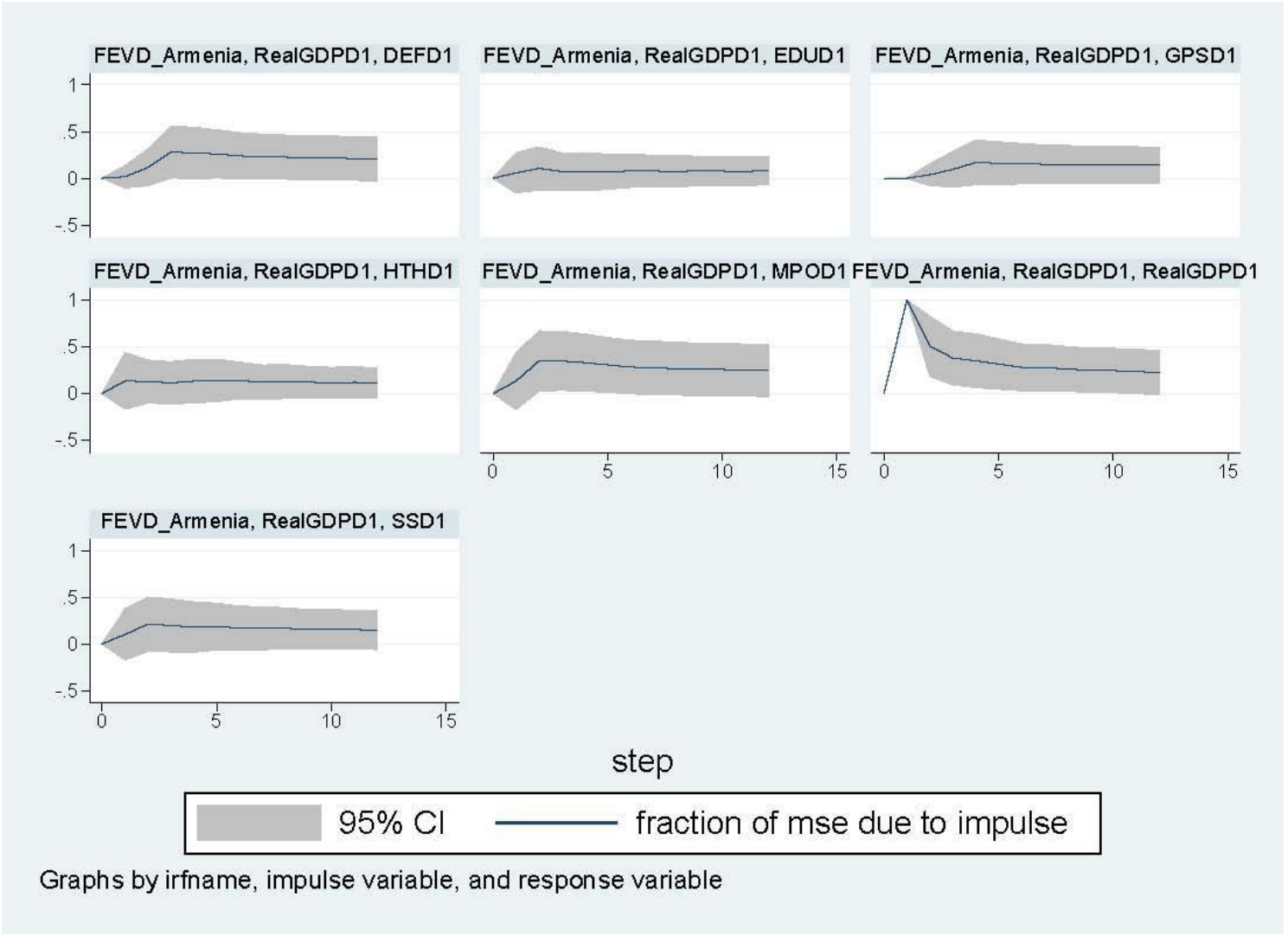


Table 10. Forecast error variance decomposition Spain. Real GDP is a response variable.

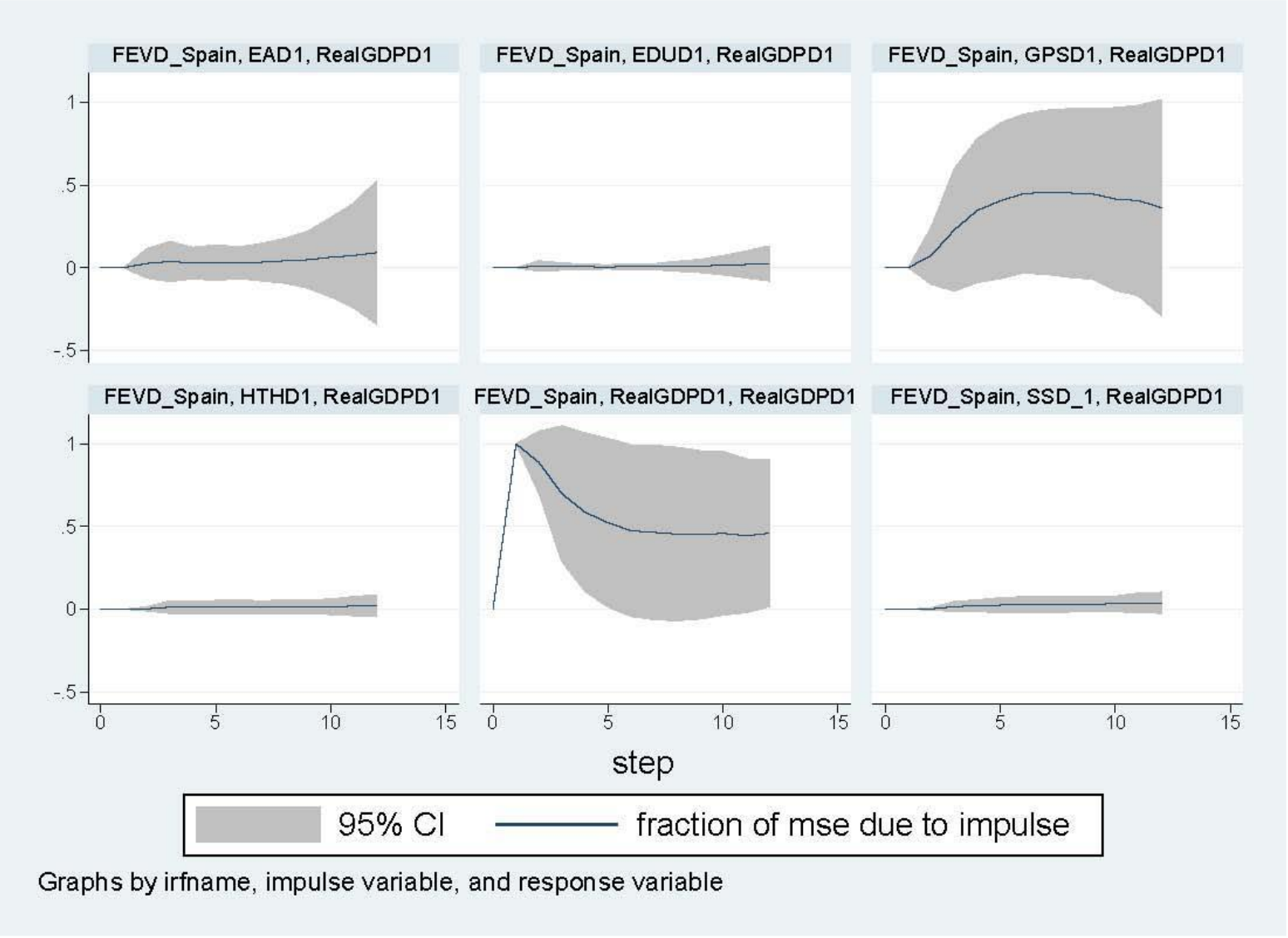


Table 11. Forecast error variance decomposition Spain. Real GDP is an impulse variable.

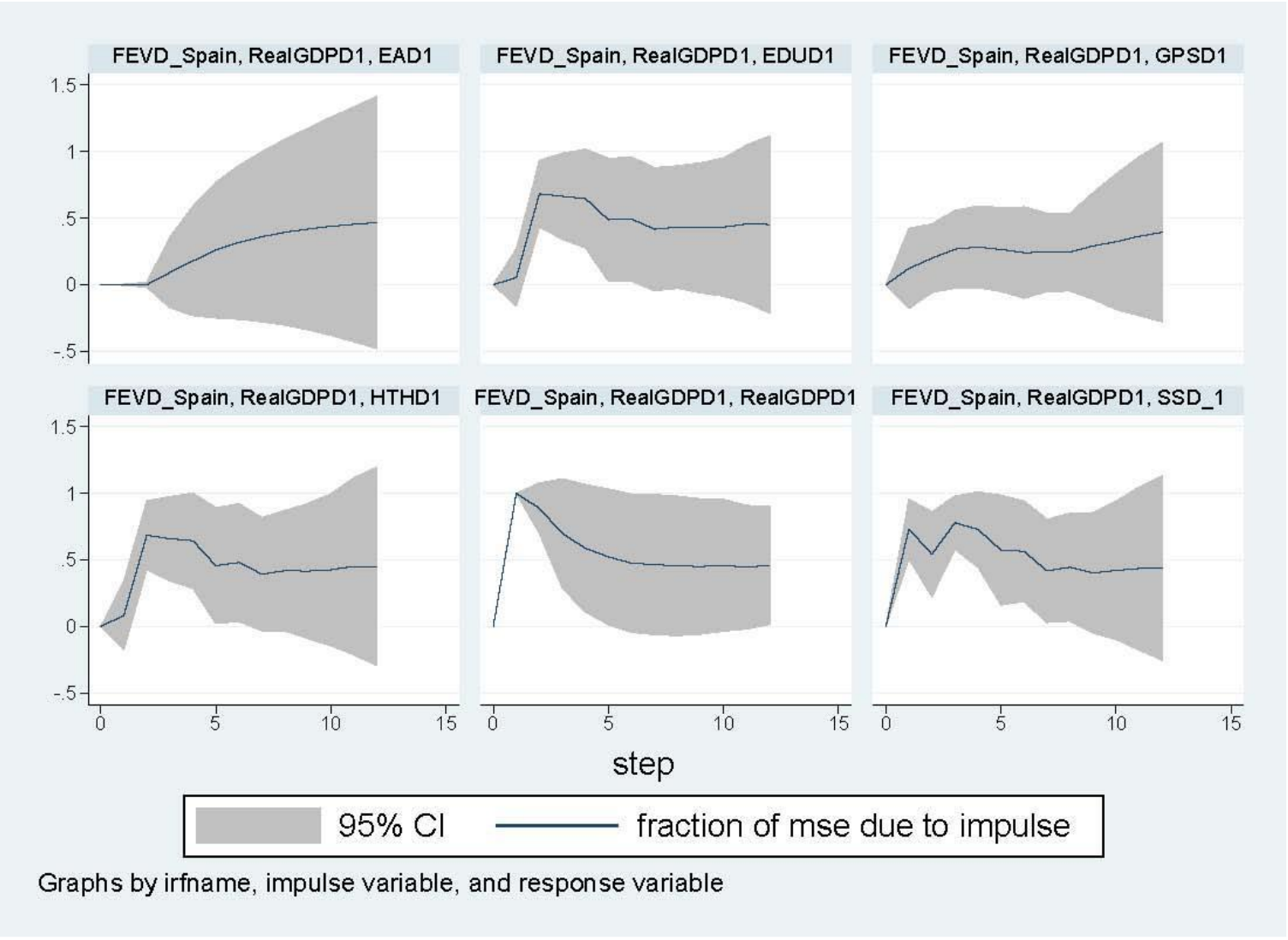


Table 12. Impulse response function Armenia. Real GDP is a response variable.

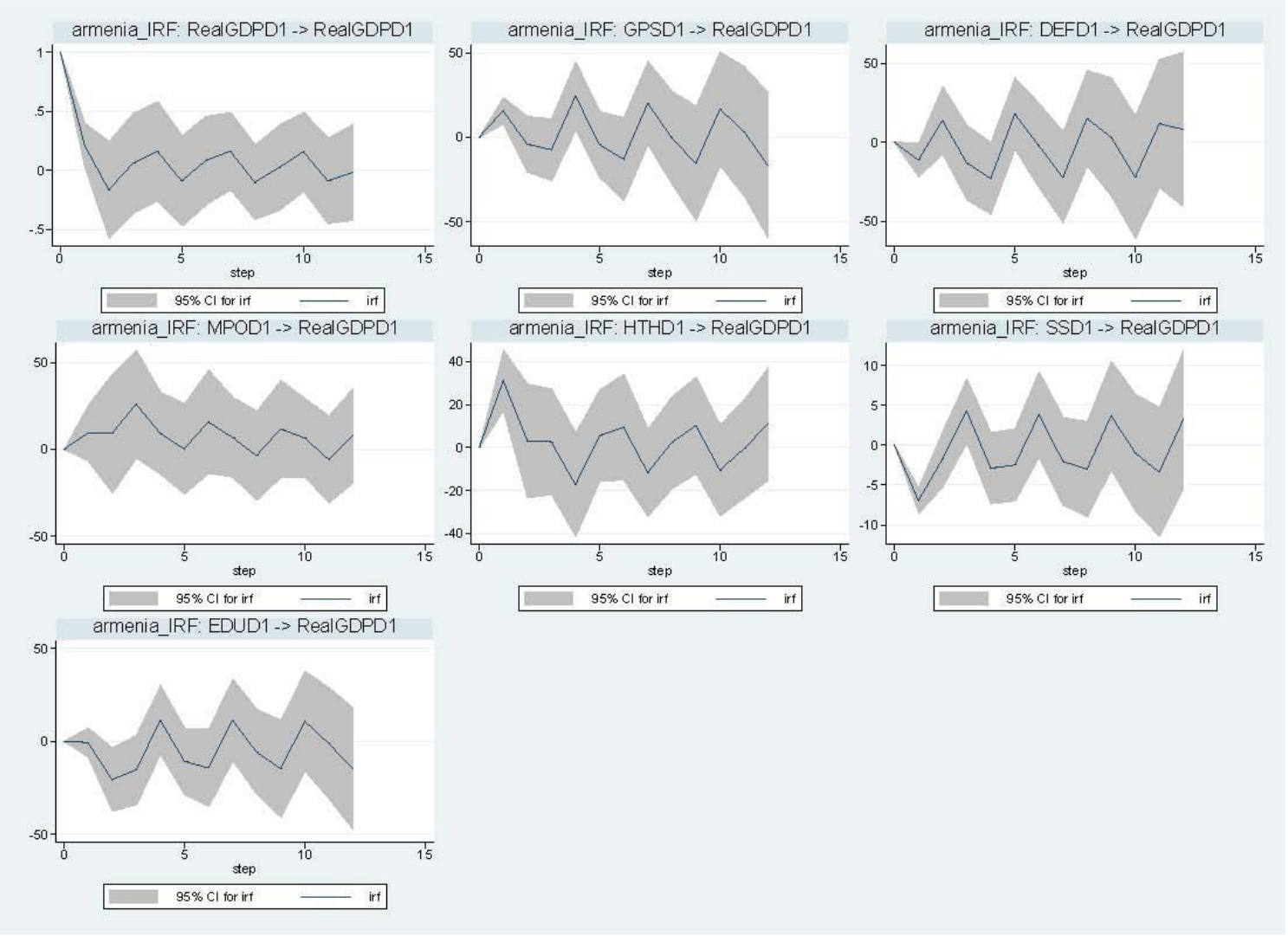


Table 13. Impulse response function Armenia. Real GDP is an impulse variable.

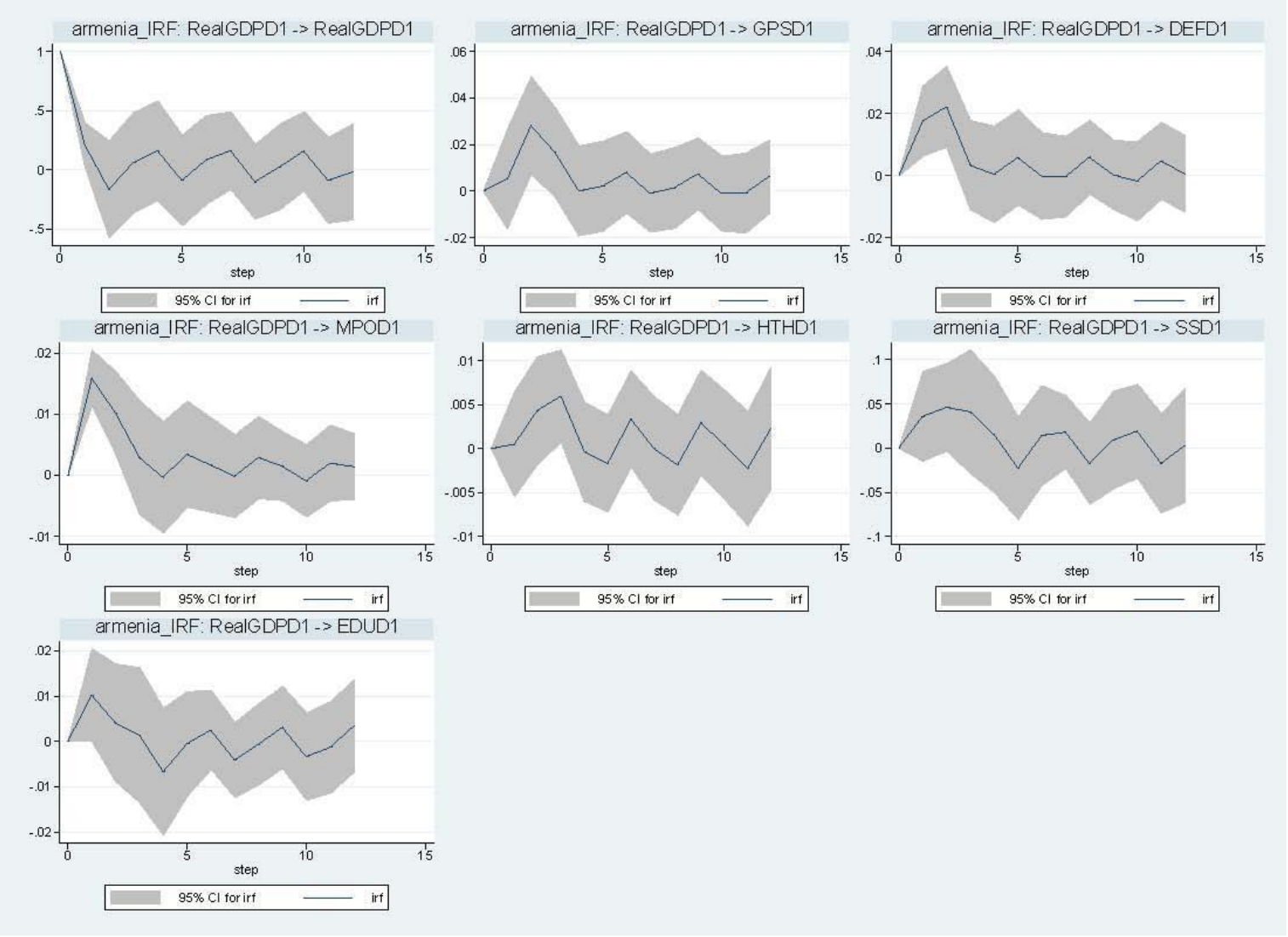


Table 14. Impulse response function Spain. Real GDP is a response variable.

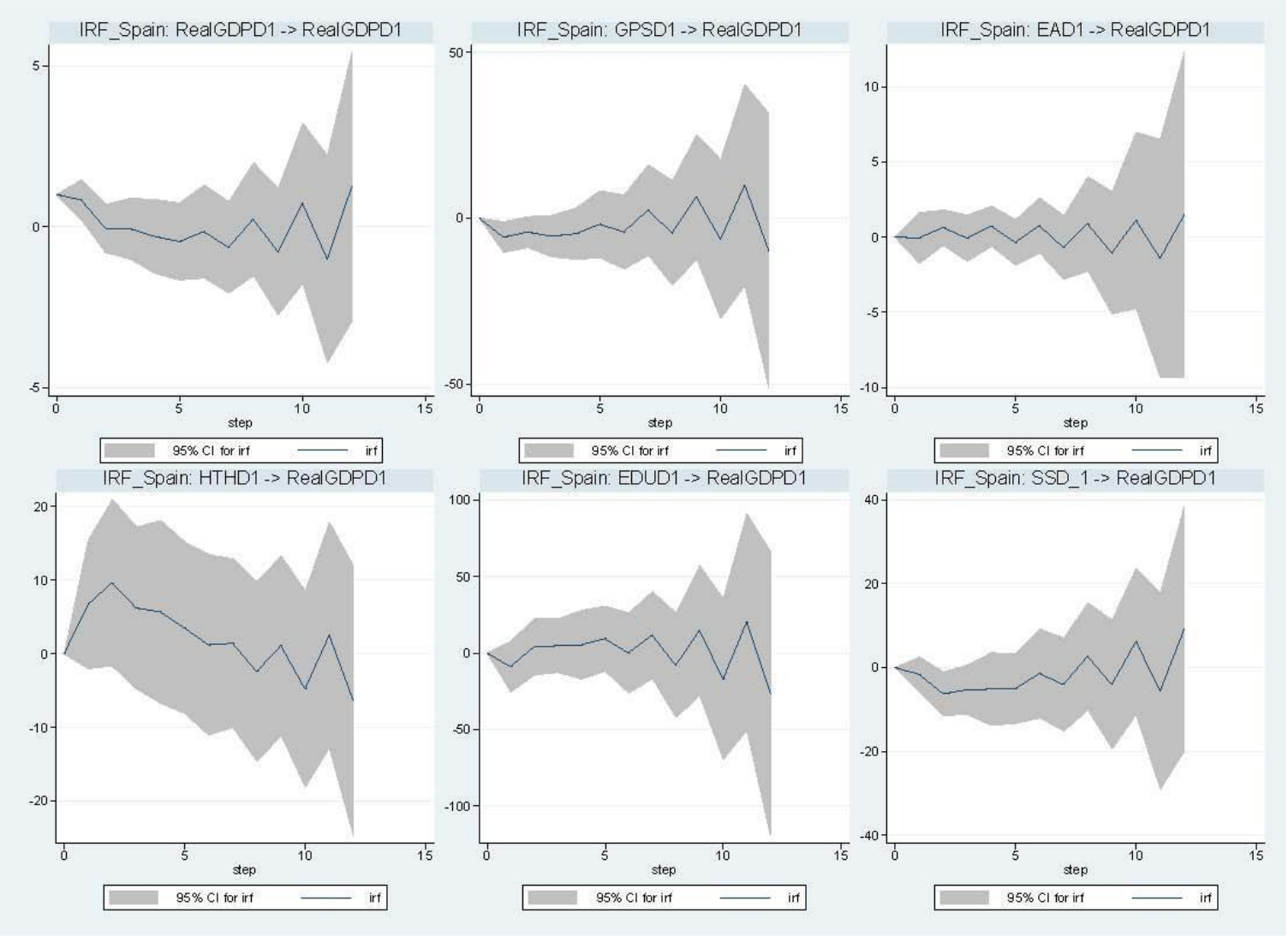


Table 15. Impulse response function Spain. Real GDP is an impulse variable.