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Cyclical Reaction of Fiscal Policy and its Relationship with the Current Account Balance

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Abstract

Previous empirical studies aiming to verify the relationship between the current account (CA) and government expenditures have produced mixed results across regions and countries. In this study, we investigate whether cyclicality affects this relationship, based on a sample of 51 countries and using quarterly and annual data from 2002Q1 to 2018Q4. We use a structural panel vector autoregression model (Pedroni, 2013) to analyze the relationship between the CA and aggregate and disaggregate government expenditures for different groups of countries. Our findings indicate that a negative impact on the CA due to aggregate government spending is only visible in countercyclical economies, suggesting the importance of cyclicality in explaining the dynamics of the present value model. However, cyclicality is not sufficient for explaining the link between disaggregate fiscal policy and the CA, due to substantial heterogeneity. A time-series approach shows that subsidies play a significant role in the CA of Austria, Croatia, Spain, and Bolivia and that property income is a major CA determinant in countries with large external debts. Conversely, the largest components of public spending (compensation of employees, intermediate consumption, and social benefits) play a minor role.

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1 Introduction

Among the issues related to the decreasing fiscal space in many economies, the expected effect on the current account (CA) balance is one of the most ambiguous and difficult to understand in macroeconomic analysis . On the one hand, the theoretical literature suggests that fiscal deficits are accompanied by CA deficits if the relationship between private savings and investment is constant. On the other hand, large budget deficits reduce the ability to borrow in international markets and, thereby, running CA deficits to ensure consumption-smoothing during economic downturns is less feasible. Understanding the relationship between fiscal policy and the CA is important since many countries have suffered from both fiscal and CA deficits simultaneously, and have highly prioritized improving these deficits by formulating appropriate economic policies.

The main focus of this study is the interaction between government spending and the CA in 51 countries. Using the intertemporal model of the CA as a theoretical basis, our empirical analysis includes a correlation coefficient analysis, the Pedroni (2013) structural panel vector autoregression (VAR) model, and a time-series Bayesian VAR analysis. Although previous studies have attempted to uncover the relationship between the CA and fiscal policy, the main novelty of our approach lies in two features: (1) the use of quarterly disaggregate fiscal data instead of aggregate fiscal variables, while accounting for fiscal cyclicality, and (2) the adoption of a fully structural VAR that decomposes impulse responses into common and idiosyncratic components, while accounting for the underlying heterogeneity within our sample.

Our findings indicate that the ability of fiscal policy to affect the CA depends on its relationship with the business cycle, as the expected negative impact of aggregate government spending only appears in countercyclical economies. However, accounting for cyclicality is not sufficient for explaining the dynamics between disaggregate fiscal data and the CA. This results from a substantial heterogeneity within our different subsamples, reflected in quartile impulse responses and the decomposition into idiosyncratic and common shocks. We de-

rive the main trends by country from a time-series Bayesian VAR approach, based on two different prior specifications (an independent normal-Wishart and a Litterman-Minnesota approach), using variance decomposition and orthogonalized impulse response functions. We find that subsidies play a significant role in the CAs of Austria, Croatia, Spain, and Bolivia. Property income is a major determinant of the CA in countries with high levels of external debt, such as Italy, Spain, and Armenia. Although compensation of employees, intermediate consumption, and social benefits are the largest components of public spending in most countries in our sample, they do not strongly contribute to the determination of the CA.

The remainder of the paper is organized as follows: In the next section, a literature review on the relationship between the CA and fiscal policy is provided. In Section 3, we describe the dataset and methodology. The main stylized facts and a preliminary correlation analysis are provided in Sections 4 and 5, respectively . Section 6 presents the main findings of the empirical study based on the Structural panel and time-series VAR analyses. Finally, the last section summarizes the main points of the paper.

2 Literature review

There are numerous literatures and theories on CA determination. Traditionally, it has been assumed that the CA moves in the same direction as the fiscal balance (as in the twin deficits hypothesis[1] or the Mundell-Fleming framework[2]). However, the link between the CA and both taxes and government expenditures is not considered to be equivalently strong. The Ricardian Equivalence Hypothesis (Barro, 1974) implies that there is no relationship between a CA deficit and Taxes because tax changes have no impact on private consumption.[3]

[1]Formally, the relationship between the CA and the fiscal balance is clear based on the identity $S^p - I + FB = CA$, derived from national income identities, where S^p represents private savings, I national investment, and FB is the fiscal balance, with $FB = T - G = S^g$ (which is government savings). G is government expenditures on goods and services and T is tax revenues.

[2]This model shows that a budget deficit leads to a CA deficit through an increase in interest rates, in addition to other transmission channels that depend on the exchange rate regime and the nature of capital mobility (these channels include the exchange rate, money supply, and private investment).

[3]A cut in taxes increases current wealth but this increase is used in extra savings as individuals will expect future tax increases. On the other hand, private consumption affects the CA, as shown by Eq. 2.

Conversely, the relationship between the CA and government expenditures is assumed to be strong and negative, as implied by the intertemporal model of the CA, based on the following expression:

$$\begin{aligned} CA_t &= (r_t - \tilde{r}_t)A_t + (Y_t - \tilde{Y}_t) - (G_t - \tilde{G}_t) - (I_t - \tilde{I}_t) \\ &+ \left[1 - \frac{1}{(\widetilde{\beta/R})^{\sigma}}\right]\left(\tilde{r}_t A_t + \tilde{Y}_t - \tilde{G}_t - \tilde{I}_t\right), \end{aligned} \tag{1}$$

where A_t is the economy's stock of net foreign claims at the end of period $(t-1)$, Y_t is the net domestic product, G_t is government consumption, and I_t is net investment. The letters with a tilde represent the permanent level of the variables and $(\widetilde{\beta/R})^{\sigma}$ is the weighted average ratio of the $(s-t)$ period's subjective and market discount factors $(\widetilde{\beta/R})^{\sigma} \equiv \frac{\sum_{s=t}^{\infty} R_{t,s}\left(\beta^{s-t}/R_{t,s}\right)^{\sigma}}{\sum_{s=t}^{\infty} R_{t,s}}$, where the market discount rate for consumption at time s is $R_{t,s} = \frac{1}{\prod_{v=t+1}^{s}(1+r_v)}$. This model, provided by Obstfeld and Rogoff (1995), constitutes the prevalent theoretical framework for studying the dynamics of the CA. It is derived from two elements: the national income identity and the permanent income hypothesis. According to the latter, the permanent level of consumption is determined by the permanent levels of the net domestic product, investment, and government expenditures.[4]

Empirically, the link between fiscal policy and the CA has been analyzed in different strands of the literature. The first strand focuses on the relationship between fiscal and CA balances (see Appendix I). The lack of consensus in this literature results from underlying structural forces in the sample countries that may lead to different correlations and also to the different methodologies used (Litsios and Pilbeam, 2017). The second strand of the literature attempts to uncover the main determinants of the CA from a set of variables (e.g., chosen from the literature on the determinants of savings and investment), which includes the

[4]The last term of the equation reflects consumption tilting due to differences between world interest rates and the domestic rate of time preference $(1-\beta)/\beta$. When the home country is, on average, more impatient than the rest of the world, $(\widetilde{\beta\backslash R})^{\sigma} < 1$ as β is lower than future world interest rates, inducing a tendency toward CA deficits, increasing foreign debt and reducing consumption. If, on the other hand, the rest of the world is more impatient, consumption's time path will have an upward tilt. The tilting effect is stronger when σ (expressing intertemporal substitution in consumption) increases (Obstfeld and Rogoff, 1995).

fiscal balance. For instance, Chinn and Prasad (2003) attempted to study the medium-term determinants of the CA for a large sample of economies over the period 1971–1995. They confirmed a positive relation between the CA, fiscal balances, and net foreign assets. Finally, the third strand of the literature uses the intertemporal model for the CA as a theoretical background. In that case, the permanent level of consumption can be expressed as

$$\tilde{C}_t = rB_t + r(1+r)^{-1} \sum_{i=0}^{\infty} (1+r)^{-i} E_t \left\{ Y_{t+i} - I_{t+i} - G_{t+i} \right\},$$

where Y_t, I_t, G_t and B_t denote the output, investment, government spending, and net domestic ownership of foreign assets, respectively. The non-stochastic world real interest rate r is assumed to be positive. Using the total income identity leads to the following expression for the CA (see Nason and Rogers, 2006).[5]

$$CA_t = -\sum_{i=1}^{\infty} \left(\frac{1}{1+r} \right)^i E_t \Delta NO_{t+i}, \tag{2}$$

where the net output NO_t is given by $NO_t = Y_t - I_t - G_t$ and $\Delta NO_{t+i} = NO_{t+i} - NO_{t+i-1}$. The commonly used approach to verify this present value model (PVM) is the methodology of Campbell (1987) and Campbell and Shiller (1987), which rests on the assumption that the CA and the first difference of net output are unrestricted bivariate VAR processes.

Some authors succeeded in verifying this intertemporal model through empirical data (Campa and Gavilan, 2011; Hoffmann, 2013). However, more frequently, empirical studies based on the PVM model led to the rejection of the model (Ghosh, 1995; Milbourne and Otto, 1992; Otto, 1992; Sheffrin and Woo, 1990). Usually, the modeled CA exhibits less volatility than the actual data. To solve this issue, Nason and Rogers (2006) attempted to verify whether the fit of the model could be improved if "the usual suspects"[6] causing the

[5] The national income identity can be expressed as $Y_t = I_t + G_t + NX_t + rB_t + r(1+r)^{-1} \sum_{i=0}^{\infty} (1+r)^{-i} E_t \{Y_{t+i} - I_{t+i} - G_{t+i}\}$, where the net exports NX_t are the difference between the CA and income from net foreign assets: $NX_t = CA_t - rB_t$.

[6] Namely, non-separable preferences, fiscal policy, real interest rate shocks, external imperfect international capital mobility, and internalized risk premium

empirical rejection of the PVM were taken into account. They concluded that the failure of basic PVM in explaining CA variation resulted from the absence of exogenous shocks on the world real interest rate.

The intertemporal model (Eq. 1) shows that the interaction between the CA and government expenditures involves other key variables, namely the de-trended net domestic product, national investment, and the interest rate. Consequently, the expected negative relationship between government spending and the CA may be altered by the diverging effects of these other variables. In the case of net domestic product, if we assume that the CA is positively correlated with the business cycle, then the link between the CA and government expenditures would be negative only if fiscal policy is assumed to be countercyclical. According to Kaminsky et al. (2004), the CA would be procyclical in the standard model, since borrowing from abroad should be countercyclical to ensure consumption-smoothing.[7] They provided the following explanations to a counter-cyclical CA: a procyclical investment that dominates the savings effect, distortions in consumption induced by temporary policies leading to countercyclical savings (since consumption increases in prosperous times), and residents' dissaving as capital inflows increase in prosperous times.

On the other hand, expectations regarding fiscal cyclicality in the literature vary based on the theoretical framework. The traditional Keynesian view is based on the idea that public expenditures should move in a countercyclical fashion and act as a catalyst for aggregate demand in times of recession. In contrast, the neoclassical framework precludes any countercyclical role for fiscal policy and often considers that government expenditures follow an exogenously given process (see Lucas and Stokey, 1983).[8]

Empirical studies on fiscal cyclicality have led to mixed results. The most common findings indicate that policy tends to be less countercyclical than what the theory suggests. More specifically, several empirical studies have found that as opposed to industrial economies,

[7] Changes in the CA can be explained by the capital account if the impact of international reserves is ignored

[8] Lane (2003) noted that, in the neoclassical framework, government consumption would be expected to be countercyclical if public and private consumption were substitutes in utility, and procyclical if they were complements.

fiscal policy in developing countries is procyclical (Gavin and Perotti, 1997; Talvi and Vegh, 2005; Braun, 2001; Lane, 2003; Thornton, 2008). The evidence for OECD countries is mixed, but most studies reported acyclical or slightly countercyclical fiscal policy (Lane, 2003; Wyplosz, 2002).

In this study, we investigate the relationship between government spending and the CA for a sample of countries while accounting for fiscal cyclicality. Fiscal cyclicality is measured using government spending in domestic currency in line with Kaminsky et al. (2004). They argued that the concept of fiscal policy cyclicality should be defined based on policy instruments, that is, government consumption and tax rates,[9] as opposed to endogenously determined outcomes (the fiscal balance or tax revenues). Further, they demonstrated how the use of any variable expressed as a percentage of gross domestic product (GDP), or the fiscal balance or tax revenues could be misleading.

3 Data and Methodology

We use data in domestic currencies for a sample of 51 high- and middle-income countries. We describe the data in Appendix II. The data are used on a per capita basis, in real terms or deflated through a GDP deflator. Variables are de-trended using the Hodrick-Prescott (HP) filter. After a general examination of the HP-de-trended data for the period 1995Q1–2019Q2, from which we draw the main stylized facts, we introduce disaggregate fiscal data into the analysis.

Disaggregate data of government expenditures are from the Government Finance Statistics database of Eurostat and the IMF. The Eurostat database is based on the ESA 2010 accounting standards. Government expenditures are defined as the sum of 12 ESA categories[10] (see the definitions provided in Appendix III). Data are available for the 28 European Union (EU) countries, starting from 2002. The values match those of the Government

[9] Data on tax rates are more difficult to obtain.
[10] ESA 2010 Manual, p. 274.

Finance Statistics of the IMF (except that the latter excludes the categories of tax expenses and transfers). We deflate the series using a price deflator calculated from nominal and real government consumption expenditures and divide by population size. For non-EU countries, we use data extracted from the IMF Government Finance Statistics database. Our subsample consists of 23 non-EU countries (i.e., 6 countries are excluded from our initial sample). Additional adjustments to the data are reported in Appendix II.

Since the period of data availability is not the same for all countries, the sample period is set to 2002Q1–2018Q4. In a first step, we use a correlation analysis to study the relationship between cyclical components of disaggregate fiscal data and both the CA and GDP. Then, based on Eq. 1, we estimate the following linear expression for the CA:

$$CA_{it} - \widetilde{CA}_{it} = \beta_1 \left(NFA_{it} - \widetilde{NFA}_{it} \right) + \beta_2 \left(G_{it} - \tilde{G}_{it} \right) + \beta_3 \left(I_{it} - \tilde{I}_{it} \right) + \beta_4 \left(r_{it} - \tilde{r}_{it} \right) + \varepsilon_{it}, \tag{3}$$

where NFA_{it} represents the net financial assets of country i, G_{it} is government consumption, I_{it} is net investment, and r_{it} is the short-term interest rate. The variables are expressed as a percentage of GDP. We apply Pedroni's (2013) structural heterogeneous panel VAR approach using Goes's (2016) algorithm to study the impact of changes in government spending on the CA, for groups based on fiscal cyclicality measures (terciles). The unique feature of this approach is that it decomposes the different responses into responses to idiosyncratic and common shocks. In a subsequent step, we complete our study by a time-series analysis based on a Bayesian VAR approach (more details are provided in Appendix IV).

We briefly summarize Pedroni's (2013) approach. Consider a panel composed of $i = 1, \ldots, N$ individual members, each of which consists of an $M \times 1$ vector of observed endogenous variables y_{it}. The data are assumed to be observed over T time periods $(t = 1, ..., T)$ for each member and used after de-meaning, where the $M \times 1$ vector of de-meaned data is $z_{it} = y_{it} - \bar{y}_i$. Structural composite white noise shocks ϵ_{it} may be cross-sectionally dependent as expressed by the relation $\epsilon_{it} = \Lambda_i \bar{\epsilon}_t + \tilde{\epsilon}_{it}$, where $\bar{\epsilon}_t$ and $\tilde{\epsilon}_{it}$ represent common white

noise shocks shared by all members and member-specific idiosyncratic white noise shocks, respectively, and Λ_i is an $M \times M$ diagonal matrix with the loading coefficients. The two types of shocks are assumed to be orthogonal to each other. The moving average representation of the model is as follows: $R_i(L)\,\Delta z_{it} = \mu_{it}$, where $R_i(L) = I - \sum_{j=1}^{P_i} R_{ij} L^j$, with P_i the lag truncation value, which can differ from one cross section to the other. The associated structural form model is $\Delta z_{it} = A_i(L)\,\epsilon_{it}$ or $B_i(L)\,\Delta z_{it} = \epsilon_{it}$, where $B_i(L) = A_i(L)^{-1}$. Short-run restrictions can be imposed on the $B_i(0)$ matrix. In the special case of recursive restrictions, this is equivalent to the Cholesky orthogonalization.

In our data analysis, the identification strategy is based on a scenario of an exogenous fiscal policy and an endogenous CA balance. Thereby, in the Cholesky ordering, government expenditures are placed first and the CA last. The ordering for the disaggregate variables is based on Granger causality tests. The first step of the methodology is to estimate the reduced-form VAR through ordinary least squares (OLS) . Initially, the model is estimated separately for each cross section. Then, to capture the common dynamics, the $M \times 1$ vector of common time effects $\Delta \bar{z}_t = N_t^{-1} \sum_{i=1}^{N_t} \Delta z_{it}$ is calculated and the corresponding reduced-form VAR model $\bar{R}(L)\,\Delta \bar{z}_t = \bar{\mu}_t$ is estimated. Then, the appropriate identifying restrictions are used to obtain the structural shock estimates $\epsilon_{it} = B_i(L)\,R_i(L)^{-1}\mu_{it}$ and $\bar{\epsilon}_t = \bar{B}(L)\,\bar{R}(L)^{-1}\bar{\mu}_t$. Moreover, to obtain the elements of the loadings matrix Λ_i, $N \times M$ OLS regressions of ϵ_{it} on $\bar{\epsilon}_t$ are run, based on the relation $\epsilon_{it} = \Lambda_i \bar{\epsilon}_t + \tilde{\epsilon}_{it}$. At this stage, we report the median impulse responses for our subsamples along with bootstrap confidence intervals from 100 repetitions.

We then report the quartile impulse responses and analyze the decomposition of responses between those to common and those to idiosyncratic shocks. The composite impulse response functions calculated from the individual structural VAR estimation can be decomposed into common and idiosyncratic shocks as follows: First, a re-scaling of the responses to idiosyncratic shocks is required, based on the following argument: The variances for the structural shocks can be expressed as $E\left[\epsilon_{it}\epsilon_{it}'\right] = E\left[\left(\Lambda_i \bar{\epsilon}_t + \tilde{\epsilon}_{it}\right)\left(\Lambda_i \bar{\epsilon}_t + \tilde{\epsilon}_{it}\right)'\right] = \Omega_{i,\epsilon} = \Lambda_i \Omega_{i,\bar{\epsilon}} \Lambda_i' + \Omega_{i,\tilde{\epsilon}}$. By setting $\Omega_{i,\bar{\epsilon}} = \Omega_{i,\epsilon} = I$, we obtain $\Omega_{i,\tilde{\epsilon}} = I - \Lambda_i \Lambda_i'$. This

implies that responses to common shocks for unity-sized shocks would correspond to responses to idiosyncratic shocks for shocks of size $1 - \Lambda(m,m)^2$, where $m = 1, ..., M$. To perform the re-scaling, we can rewrite the expression for composite structural shocks as $\epsilon_{it} = \Lambda_i \bar{\epsilon}_t + (I - \Lambda_i \Lambda_i')^{1/2} \tilde{\epsilon}_{it}^*$. Finally, this re-scaled form can be used to decompose the impulse responses such that $A_i(L)\,\epsilon_{it} = A_i(L)\left(\Lambda_i \bar{\epsilon}_t + (I - \Lambda_i \Lambda_i')^{\frac{1}{2}} \tilde{\epsilon}_{it}^*\right)$, leading to the decomposition $A_i(L) = \bar{A}_i(L) + \tilde{A}_i(L)$ where $\bar{A}_i(L) = A_i(L)\,\Lambda_i$ and $\tilde{A}_i(L) = A_i(L)\,(I - \Lambda_i \Lambda_i')^{\frac{1}{2}} = A_i(L) - \bar{A}_i(L)$. The sample distribution of estimated responses can be used to describe the properties of the sample (with the median, and the 1st and 3rd quartiles used as confidence intervals) or to create fitted values for member-specific impulse responses.

4 Stylized facts

This section presents an overview of the main stylized facts discovered through a general examination of the collected data. We split our sample in different ways, comparing OECD with non-OECD countries, as well as different regional and income groups .

> Stylized fact 1: The correlation between the CA and aggregate government consumption expenditure is weak and differs across countries and time periods.
>
> The correlation coefficients between the CA and general government expenditures (Table 1) are small in most cases. By region, the correlation coefficients between the CA and general government expenditures is negative or close to zero in almost all cases (except in North America—specifically, in the United States).

> Stylized fact 2: Generally, the fiscal policy of OECD countries is either countercyclical or acyclical. Conversely, in developing countries, it is procyclical in most cases.
>
> In line with the results of previous empirical studies, we find that the fiscal policy in OECD countries is, in most cases, either acyclical or countercyclical whereas in developing economies, and particularly Latin American countries, it is procyclical (Table

1).

Stylized fact 3: The CA tends to behave acyclically or countercyclically.

As opposed to our expectations, for most groups in our sample, the CA does not appear to be procyclical during the studied period. Countries with the most procyclical CA include Croatia (0.77), Canada (0.56), Norway, Sweden, and Singapore (correlation close to 0.29) . According to the permanent income hypothesis, there will be a deficit in the CA if consumers expect a future increase in income. Therefore, we can consider that the data behave in line with the theory only if we suppose that a positive evolution of GDP in the short run leads to positive expectations about future income.

5 Correlation analysis of disaggregate fiscal data

In this section, we examine the correlation of disaggregate government expenditures data with the CA and GDP. Using disaggregate fiscal data, we first calculate the share of each component in the overall government expenditures (Table 2). We note that the most significant components are "Compensation of employees," "Social benefits," and "Intermediate consumption of goods and services," with a total share of 75% in all expenditures. We also note that the shares for "Compensation for employees" and, especially, "Intermediate consumption of goods and services" are relatively larger for non-OECD/ middle-income economies compared to OECD/high-income economies. The opposite is true for social benefits. Examining the fiscal cyclicality measures for these categories (Tables 3 and 4), we note that the procyclicality of non-OECD/middle-income is more notable in "Compensation of employees" and "Intermediate consumption." Overall, the relationship between the cyclical components of the CA and disaggregate expenditures is weak in both income and OECD groups .

6 The CA model: A heterogeneous panel VAR analysis

6.1 Structural VAR analysis: Median impulse responses

We use Pedroni's (2013) structural panel VAR approach to analyze the relationship between the CA and disaggregate government expenditures in different groups of countries. This approach controls for country fixed effects and allows for full heterogeneity of dynamics across countries, as opposed to the standard panel VAR approaches based on average estimates. The estimation is performed after the decomposition of shocks into idiosyncratic and common components. Our identification strategy is based on a scenario of exogenous fiscal policy and an endogenous CA. Thereby, in the ordering of the variables, government expenditures are placed first and the CA last.

The median composite response of the CA to one-unit composite shocks in other variables is shown in Figure 1, with confidence intervals based on 100 bootstrap repetitions. This preliminary result shows that the relationship between the CA and total government expenditures is not substantially significant. On the other hand, the CA responds positively and significantly to a change of a relatively strong magnitude in net foreign assets and negatively to a change in gross fixed capital formation.

To check whether fiscal cyclicality affects the relationship between the CA and fiscal policy, we divide the sample into terciles based on the measure of fiscal cyclicality, that is, the correlation between cyclical components of GDP and government expenditures (as in Table 1). The aim is to separate the sample into countercyclical, acyclical, and procyclical countries. We obtain the following groups:

> Group 1: countercyclical countries, corresponding to the 1st tercile group in terms of measures of fiscal cyclicality (correlation with GDP $<$ -0.09)
>
> Group 2: countries in the 2nd tercile group, with a fiscal cyclicality measure between -0.09 and 0.05

Group 3: group of procyclical countries (3rd tercile group) with a fiscal cyclicality measure > 0.05

The median composite impulse response function for Group 1 (Figure 2) shows a negative and significant response of the CA to government expenditures in the first period, followed by a positive response in the second period. The opposite is observed for Group 2, where a positive response to government expenditures in the first period is followed by a negative response in the second period. For Group 3, the resulting response is only weakly significant. These results clearly indicate that the ability of fiscal policy to affect the CA depends on its interaction with the business cycle. Provided that the CA is positively affected by the business cycle, then a negative relationship between government spending and the CA would only be visible in countercyclical economies. In other cases, the relationship would be less predictable, as confirmed by the impulse responses. Finally, in the procyclical group, we note that the relationship between the CA and net foreign assets is the most robust one whereas the negative response to gross fixed capital formation is not significant .[11]

6.2 Quartile impulse response functions

Next, we analyze the properties of the individual composite responses' distribution by plotting their median, average, and the 1st and 3rd quartiles as confidence intervals. Since this approach shows the response of most of the sample, it is more informative than the median with bootstrap confidence intervals or the traditional averaging methods used for panels.

For countercyclical economies (Figure 3), we observe a negative response to total government spending in the first period.[12] However, in the second period, the response becomes positive in 9 out of 17 countries. Although the impact of government expenditures on shocks to other variables does explain part of this sign change, the main reason for it appears to be a direct lagged positive effect from total government spending to the CA. We then replace

[11] Responses to net foreign assets, gross fixed capital formation and the interest rate are not reported in the remaining part of the study because they are similar to those in Figures 1 and 2.

[12] Except for 2 countries: Chile and Latvia.

total government expenditures in the model by disaggregate fiscal data.[13]

Responses to disaggregate government spending (Figure 4a) are much less significant due to larger standard errors. Such a heterogeneous response would not have been visible if we had relied solely on the average or median responses. In acyclical economies, the response to total government spending is positive in most of the sample in the first period and becomes negative immediately after that (Figure 3). None of the government spending components induces a homogeneous response in this group, except for a positive contemporaneous response to social benefits (Figure 4b). In procyclical economies, responses to total government spending are not very significant as the median lies close to zero (Figure 3). The CA responds negatively to social benefits in the first period but all other responses are disparate (Figure 4c).

6.3 Decomposition into idiosyncratic and common shocks

The heterogeneity noted in the quartile impulse response functions is confirmed by the decomposition of composite shocks into idiosyncratic and common shocks. Figure 5 reveals that most composite responses are characterized as idiosyncratic rather than common shocks. Further, responses to common shocks are opposite in direction to responses to idiosyncratic shocks in some cases. This is because the groups contain countries that do not respond in a similar way to global shocks.[14] For instance, the 2007 financial crisis led to a deterioration of the fundamentals of some countries (a negative shock, especially in 2008Q4), but countries that have been able to weather the crisis do not exhibit a significant change in the variables (the changes in the error terms are small). Consequently, in the latter group of countries, common shocks and composite shocks are negatively related. Another possible cause of this negative correlation could be an opposite feedback effect from variables affected by the crisis

[13] As it is difficult to order disaggregate expenditures based on economic logic, we use Granger causality tests as a reference. The following ordering of the variables is obtained: property income, subsidies, compensation of employees, intermediate consumption, social benefits, other expenditures, interest rate, net foreign assets, gross fixed capital formation, and the CA.

[14] While decomposing individual composite shocks, the term of the loading matrix corresponding to common shocks is negative, implying a negative correlation between individual and common shocks.

on government expenditures in some countries.

Figure 6 provides an example based on the decomposition of the median composite response to property income in the fiscal cyclicality group 1.[15] In this case, the reason common and composite shocks are negatively correlated is that the average property income for the countries in the group received a negative shock in 2008Q4, but at the individual level, many countries were either not affected or received this fiscal shock on a different date in 2008 or 2009.[16]

7 A time-series analysis of the CA model

The heterogeneity of responses to disaggregate government spending shocks suggests the absence of a strong and robust relationship between a particular component and the CA. As it is difficult to find a homogeneous response of the CA to disaggregate fiscal data among the different fiscal cyclicality groups, we run a time-series analysis for each country. We use a Bayesian VAR model (see Appendix IV) based on an independent normal-Wishart prior with Gibbs sampling to derive the orthogonalized impulse response functions and report the main responses with 95% confidence bands as well as a variance decomposition of the CA by country (Table 5). The choice of this method is justified by the need to account for the uncertainties related to the determination of model and parameter values. As a robustness check, we also estimate the same model with a different prior specification based on the Litterman-Minnesota approach (Table 6). In a few countries (e.g., Hong Kong and Singa-

[15] In Figure 6, we separate group 1 into two subgroups: subgroup (a), with countries for which responses to common shocks and those to composite shocks have opposite signs; and subgroup (b), in which both responses have the same direction. We find that, at the time of the crisis, the interest rate is the main driving factor behind property income shocks in almost all countries. In most countries in the group, this variable was negatively affected in 2018Q4, as a result of governments' intervention at the time. However, while in countries of subgroup (a) the resulting structural shock to property income is positive due to a negative effect from interest rates, in subgroup (b), the resulting structural shock is negative.

[16] We express the structural shock to the variable s at time t as $\epsilon_{st} = {\beta_s}^{-1}\mu_t$, where μ_t is a vector of reduced-form shocks at t and β_s a vector of contemporaneous effects on s from the Cholesky factor. The main element in μ_t in the example is the interest rate (in 2018Q4) with a significant negative shock. However, in subgroup (a), the corresponding factor in ${\beta_s}^{-1}$is also negative, leading to an overall positive structural shock, while in subgroup (b), this term is positive

pore), the two approaches yield substantially different outcomes but for most of the sample, the results are consistent.

The variance decomposition (values in the 8^{th} quarter) clearly indicates that the relationship between disaggregate government spending and the CA differs among countries. We note that the share of subsidies is notably higher in two countercyclical economies: Austria and Croatia. This could be the result of export subsidies. In the particular case of Croatia, the government still plays a significant role in the economy, which results in overall high government expenditures (over 40% of the GDP in total). Interestingly, for this economy, the impulse response functions show that subsidies have a negative impact on the CA. Subsidies are also significant in the case of Bolivia. In this economy, hydrocarbons (especially natural gas) account for approximately half of the total exports and are managed by state-owned enterprises. Although the natural gas sector was privatized in the 1990s, it was re-nationalized in 2006.

We note the importance of property income (comprising payable income such as interests and dividends) in high-income countries characterized by high net borrowing from abroad, such as Italy, Spain, and Portugal, in which more than 30% of public debt is held by non-resident investors. We note that in Spain, subsidies are also relatively significant in explaining the CA variation. Among middle-income economies, the contribution of property income to the CA variation is also notable in Armenia and Indonesia. Armenia exhibits a CA deficit with an exports structure that relies essentially on minerals and precious and non-precious metals, and top imports that include oil and natural gas. The country's deficit is financed by external borrowing and net foreign direct investment. Most of its external debt was obtained through multi-country credit programs but there is also a significant share of non-resident investments in government bonds. It is also worth mentioning that the country is known to have a large diaspora spread globally, resulting in the large and important impact of remittances on the Armenian economy. The impulse response functions show a positive response of the CA to a shock in property income for all these countries , with wide

confidence bands.

The three largest components of government expenditures (compensation of employees, intermediate consumption, and social benefits), although representing a higher percentage of total spending, play a less significant role in the determination of the CA. Exceptionally, the share of government compensation of employees in the cases of Estonia and Slovenia is higher than that of all other variables. We also notice that the overall value of compensation of employees in the Estonian CA balance has significantly increased after 2004, which may be an indication that joining the EU had an impact on the non-resident labor in the country. The impulse response functions show a positive response of the CA in both Estonia and Slovenia.

Unsurprisingly, net foreign assets strongly affect the CA of Luxembourg, Belgium, and the United Kingdom. We can see that this component exhibits, on average, less weight in middle-income economies, except in Turkey, which has emerged as a significant capital investor abroad in recent decades. Gross fixed capital formation generally plays a small role in CA determination, with the exception of Ireland, the Netherlands, and, to a much lesser extent, Lithuania, Belarus and Croatia. Finally, in both estimated models, the highest level of CA persistence is noted in the cases of France and Colombia.

8 Concluding remarks

Using various statistical methods, we have investigated the relationship between the CA and government expenditures. Our findings confirm previously reported difficulties in obtaining strong empirical evidence in favor of the PVM for a panel of advanced and developing countries. Further, our findings explain why previous studies often showed mixed results about this relationship.

First, to explain the underlying heterogeneity in our sample, we account for fiscal cyclicality. As reported in previous empirical studies, the cyclicality analysis shows that fiscal policy tends to be procyclical in middle-income economies and acyclical in high-income

economies. This procyclicality most notably emerges in two categories of public spending: "Compensation of employees" and "Intermediate consumption." Our findings confirm that cyclicality does affect the relationship between aggregate government expenditures and the CA since the expected negative impact of a fiscal shock appears only in the countercyclical group. Still, cyclicality is not sufficient for explaining the link between disaggregate fiscal policy and the CA, due to substantial heterogeneity, even within groups with similar cyclicality measures.

Second, we use a time-series approach and uncover the main public expenditures contributors to CA determination through a variance decomposition analysis. We find that subsidies play a significant role in Austria, Croatia, Spain, and Bolivia. In contrast, property income is the most significant contributor in countries with high levels of external debt such as Italy, Spain, and Armenia. However, the main components of aggregate public spending (compensation of employees, intermediate consumption, and social benefits) do not strongly affect the CA.

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TABLES

TABLE 1

Correlation coefficient between detrended current account and fiscal variables and cyclicality of the current account and government expenditures by group of countries

	Correlation of the Current Account with		**Cyclicality Measures**	
	Government Expenditures	Fiscal Balance	Current Account	Government Expenditures
All	**-0.07**	**0.00**	**-0.13**	**0.08**
OECD	-0.04	-0.03	-0.09	0.04
non-OECD	-0.11	0.04	-0.18	0.14
Income groups				
High Income	-0.06	-0.01	-0.12	0.07
Middle-Income	-0.10	0.02	-0.14	0.12
Regions				
East Asia	0.00	-0.05	-0.13	0.01
Eastern Europe	-0.16	0.09	-0.22	0.09
Latin America	-0.01	-0.02	-0.18	0.20
North America	0.24	0.01	-0.05	-0.27
Pacific	-0.02	-0.09	-0.23	0.19
South-East Asia	-0.18	0.05	-0.13	0.14
Southern Africa	-0.16	-0.10	-0.19	0.28
West and Central Asia	-0.01	0.08	-0.08	0.08
Western Europe	-0.06	-0.06	-0.04	0.05

Notes: All variables are in real terms per capita, detrended using the Hodrick Prescott filter. The values in the table represent average correlation coefficients over groups (calculated on a country by country basis). Cyclicality measures correspond to the correlation coefficients with GDP.

TABLE 2

Breakdown of government expenses by category

Government Expenses categories	**All subsample**	**Income group**		**OECD group**	
		High Income	**Middle income**	**non-OECD**	**OECD**
Compensation of employees	**27%**	**27%**	**29%**	**30%**	**26%**
Intermediate consumption	**19%**	**17%**	**23%**	**24%**	**15%**
Interest expenses	6%	5%	8%	6%	7%
Subsidies	4%	4%	5%	5%	4%
Social benefits	**34%**	**38%**	**25%**	**27%**	**40%**
Other expenses	10%	9%	10%	10%	9%

Notes: The share of each component is calculated based on the average values per country (based on variables in real terms per capita). The obtained shares per country are then averaged over groups of countries. For EU countries, data for government expenses are extracted from the Government Finance Statistics database of Eurostat (based on ESA 2010 standards). For non EU countries, data are extracted from the Government Finance Statistics database of International Financial Statistics (IMF). Highlighted values correspond to shares above 10%.

TABLE 3

Cyclicality measures, correlation of government expenses categories with the current account

Government expenses	All	Income group		OECD group	
		High Income	Middle income	non-OECD	OECD
		Correlation with GDP			
Compensation of employees	*0.17*	*0.02*	*0.51*	*0.38*	*0.03*
Intermediate consumption	*0.15*	*0.03*	*0.41*	*0.34*	*0.02*
Interest expenses	0.12	0.05	0.27	0.15	0.09
Subsidies	0.02	-0.08	0.27	0.19	-0.09
Social Benefits	*0.00*	*-0.16*	*0.34*	*0.18*	*-0.13*
Other expenses	-0.01	-0.07	0.12	0.03	-0.04
		Correlation with the Current Account			
Compensation of employees	*0.04*	*0.05*	*0.02*	*0.04*	*0.05*
Intermediate consumption	*-0.03*	*-0.01*	*-0.09*	*-0.06*	*-0.01*
Interest expenses	0.03	0.03	0.04	0.02	0.03
Subsidies	0.00	0.02	-0.05	-0.10	0.07
Social Benefits	*0.07*	*0.08*	*0.05*	*0.07*	*0.06*
Other expenses	-0.05	-0.02	-0.10	-0.08	-0.02

Notes: the values in the table represent average correlation coefficients (calculated on a country by country basis). The underlying data correspond to cyclical components of the variables per capita, in real terms.

TABLE 4

Correlation of disaggregate government expenditures with the current account (by region)

	Compensation of employees	Intermediate consumption	Interest expenses	Subsidies	Social Benefits	Other expenses
East Asia	0.04	0.11	-0.03	0.07	0.003	-0.12
Eastern Europe	0.08	-0.18	0.15	-0.05	0.21	-0.12
Latin America	0.04	0.10	0.03	-0.01	0.07	-0.04
North America	0.06	0.09	0.15	-0.04	-0.01	0.24
Pacific	-0.02	-0.13	-0.28	0.07	-0.09	-0.04
South-East Asia	0.07	0.06	-0.17	-0.26	-0.02	-0.03
Southern Africa	0.24	-0.09	-0.12	-0.17	-0.17	-0.35
West and Central Asia	0.02	-0.02	0.00	0.04	0.11	0.08
Western Europe	0.03	0.01	0.01	0.08	0.02	-0.01
Total	**0.05**	**-0.03**	**0.03**	**0.00**	**0.07**	**-0.05**

Notes: the values in the table represent average correlation coefficients (calculated on a country by country basis). The underlying data correspond to cyclical components of the variables per capita, in real terms.

TABLE 5

Variance decomposition of the CA by country after 8 quarters (Independent Normal-Wishart prior)

a. Group 1 (countercyclical)

Countries	pi	sub	comp	ic	sb	oth	rate	nfa	gfcf	ca
High-Income										
Austria	0.03	0.33	0.14	0.09	0.02	0.04	0.03	0.15	0.06	0.11
Belgium	0.04	0.06	0.07	0.04	0.05	0.06	0.05	0.45	0.03	0.15
Canada	0.08	0.16	0.12	0.08	0.09	0.08	0.05	0.06	0.03	0.26
Chile	0.07	0.05	0.06	0.10	0.05	0.03	0.23	0.09	0.03	0.30
Croatia	0.05	0.52	0.06	0.02	0.03	0.03	0.02	0.04	0.13	0.10
Denmark	0.07	0.08	0.07	0.10	0.08	0.03	0.10	0.24	0.08	0.15
Finland	0.14	0.07	0.07	0.10	0.03	0.09	0.05	0.17	0.02	0.26
France	0.04	0.06	0.11	0.08	0.05	0.03	0.03	0.04	0.05	0.51
Germany	0.09	0.14	0.08	0.11	0.06	0.02	0.03	0.17	0.03	0.26
Japan	0.15	0.39	0.06	0.07	0.02	0.03	0.02	0.01	0.03	0.23
Latvia	0.05	0.15	0.05	0.08	0.04	0.04	0.14	0.10	0.04	0.29
Luxembourg	0.07	0.07	0.05	0.06	0.03	0.03	0.04	0.39	0.03	0.22
Slovakia	0.08	0.07	0.08	0.16	0.05	0.04	0.02	0.05	0.03	0.43
South Korea	0.15	0.09	0.05	0.06	0.08	0.05	0.16	0.09	0.02	0.26
Sweden	0.05	0.05	0.06	0.07	0.02	0.04	0.10	0.36	0.02	0.22
Switzerland	0.06	0.10	0.07	0.08	0.06	0.04	0.07	0.23	0.03	0.26
United States	0.08	0.51	0.02	0.04	0.05	0.13	0.03	0.04	0.02	0.08
Average	**0.08**	**0.17**	**0.07**	**0.08**	**0.05**	**0.05**	**0.07**	**0.16**	**0.04**	**0.24**
Standard Deviation	**0.04**	**0.16**	**0.03**	**0.03**	**0.02**	**0.03**	**0.06**	**0.13**	**0.03**	**0.11**

b. Group 2 (acyclical)

Countries	pi	sub	comp	ic	sb	oth	rate	nfa	gfcf	ca
High-Income										
Czech Republic	0.07	0.13	0.14	0.12	0.03	0.06	0.04	0.29	0.02	0.11
Estonia	0.08	0.14	0.26	0.05	0.03	0.08	0.01	0.07	0.08	0.19
Greece	0.17	0.10	0.07	0.03	0.08	0.04	0.04	0.03	0.06	0.37
Hong Kong	0.33	0.14	0.02	0.03	0.03	0.05	0.05	0.04	0.02	0.30
Italy	0.36	0.04	0.11	0.06	0.04	0.07	0.04	0.07	0.03	0.18
Lithuania	0.11	0.10	0.05	0.07	0.05	0.03	0.02	0.11	0.20	0.25
Netherlands	0.06	0.06	0.05	0.04	0.05	0.06	0.05	0.22	0.31	0.11
New Zealand	0.09	0.10	0.06	0.05	0.03	0.05	0.20	0.24	0.04	0.16
Portugal	0.25	0.10	0.05	0.05	0.09	0.05	0.10	0.07	0.05	0.20
Singapore	0.45		0.06	0.05	0.03	0.03	0.05	0.09	0.02	0.23
Slovenia	0.11	0.04	0.21	0.04	0.03	0.02	0.04	0.16	0.07	0.27
Spain	0.16	0.26	0.11	0.03	0.04	0.04	0.11	0.04	0.14	0.08
United Kingdom	0.06	0.05	0.03	0.04	0.17	0.08	0.04	0.30	0.02	0.20
Average	**0.18**	**0.10**	**0.09**	**0.05**	**0.05**	**0.05**	**0.06**	**0.13**	**0.08**	**0.20**
Standard Deviation	**0.13**	**0.06**	**0.07**	**0.02**	**0.04**	**0.02**	**0.05**	**0.09**	**0.08**	**0.08**
Middle-Income										
Bulgaria	0.13	0.19	0.11	0.13	0.11	0.03	0.10	0.04	0.01	0.15
Colombia	0.11	0.08	0.04	0.04	0.03	0.03	0.04	0.07	0.06	0.49
Indonesia	0.19	0.04	0.07	0.06	0.04	0.06	0.05	0.16	0.05	0.29
Romania	0.09	0.14	0.09	0.07	0.17	0.03	0.01	0.02	0.10	0.28
Thailand	0.17	0.06	0.06	0.02	0.09	0.02	0.03	0.12	0.06	0.36
Average	**0.14**	**0.10**	**0.07**	**0.06**	**0.09**	**0.03**	**0.05**	**0.08**	**0.06**	**0.31**
Standard Deviation	**0.04**	**0.06**	**0.02**	**0.04**	**0.05**	**0.01**	**0.03**	**0.05**	**0.03**	**0.11**

c. Group 3 (procyclical)

Countries	pi	sub	comp	ic	sb	oth	rate	nfa	gfcf	ca
High-Income										
Australia	0.03	0.12	0.08	0.05	0.19	0.03	0.14	0.07	0.02	0.28
Hungary	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.03	0.03	0.69
Iceland	0.10	0.20	0.04	0.07	0.05	0.10	0.07	0.18	0.12	0.08
Ireland	0.04	0.04	0.03	0.04	0.04	0.03	0.04	0.03	0.65	0.06
Norway	0.10	0.06	0.07	0.08	0.03	0.04	0.05	0.16	0.05	0.38
Average	**0.06**	**0.09**	**0.05**	**0.05**	**0.07**	**0.04**	**0.06**	**0.09**	**0.18**	**0.30**
Standard Deviation	**0.03**	**0.06**	**0.02**	**0.01**	**0.06**	**0.03**	**0.04**	**0.06**	**0.24**	**0.23**
Middle-Income										
Armenia	0.22	0.07	0.07	0.07	0.03	0.03	0.06	0.19	0.10	0.17
Belarus	0.03	0.05	0.09	0.04	0.10	0.08	0.04	0.13	0.24	0.19
Bolivia	0.05	0.14	0.06	0.03	0.04	0.04	0.04	0.04	0.07	0.49
Brazil	0.14	0.06	0.05	0.04	0.04	0.05	0.20	0.09	0.17	0.15
Georgia	0.19	0.04	0.06	0.09	0.04	0.03	0.17	0.03	0.05	0.31
Kazakhstan	0.13	0.10	0.05	0.04	0.07	0.04	0.13	0.04	0.02	0.38
Mexico	0.09	0.09	0.05	0.08	0.04	0.05	0.06	0.25	0.02	0.27
Moldova	0.10	0.06	0.19	0.03	0.03	0.04	0.05	0.17	0.02	0.32
Peru	0.05		0.04	0.11	0.05	0.05	0.06	0.10	0.16	0.38
South Africa	0.06	0.05	0.04	0.13	0.08	0.09	0.04	0.10	0.06	0.35
Turkey	0.10	0.05	0.06	0.09	0.06	0.09	0.05	0.15	0.11	0.23
Average	**0.10**	**0.07**	**0.07**	**0.07**	**0.05**	**0.05**	**0.08**	**0.12**	**0.09**	**0.30**
Standard Deviation	**0.06**	**0.03**	**0.04**	**0.03**	**0.02**	**0.02**	**0.06**	**0.07**	**0.07**	**0.10**

Notes: ca= current account balance, pi= property income , sub= subsidies, comp= compensation of employees, ic= intermediate consumption, sb= social benefits, oth= other expenditures, rate= interest rate, nfa= net foreign assets, gfcf= gross fixed capital formation. Data in domestic currency divided by GDP. Group 1 includes countries of the 1st tercile in terms of measures of fiscal cyclicality defined as the correlation between cyclical components of GDP and government expenditures (corresponding to a fiscal cyclicality ¡ -0.09). Group 2 is the group of countries of the 2nd tercile in terms of measures of fiscal cyclicality (fiscal cyclicality measure between -0.09 and 0.05). Group 3 is the group of countries of the 3rd tercile in terms of measures of fiscal cyclicality (fiscal cyclicality measure above 0.05). Values above 0.2 are highlighted. Cholesky ordering: pi, sub, comp, ic, sb, oth, rate, nfa, gfcf, ca

TABLE 6

Variance decomposition of the CA by country after 8 quarters (Litterman-Minnesota prior)

a. Group 1 (countercyclical)

Countries	pi	sub	comp	ic	sb	oth	rate	nfa	gfcf	ca
High-Income										
Austria	0.01	0.18	0.12	0.02	0.04	0.05	0.00	0.19	0.16	0.23
Belgium	0.02	0.04	0.03	0.03	0.03	0.04	0.03	0.44	0.03	0.32
Canada	0.08	0.02	0.02	0.01	0.02	0.00	0.03	0.02	0.00	0.78
Chile	0.02	0.01	0.05	0.02	0.06	0.00	0.06	0.02	0.06	0.69
Croatia	0.02	0.23	0.12	0.04	0.01	0.04	0.02	0.02	0.17	0.33
Denmark	0.05	0.09	0.06	0.03	0.07	0.03	0.03	0.23	0.08	0.33
Finland	0.05	0.07	0.03	0.02	0.01	0.04	0.00	0.20	0.01	0.58
France	0.00	0.01	0.01	0.04	0.00	0.00	0.00	0.02	0.01	0.90
Germany	0.04	0.10	0.05	0.08	0.03	0.00	0.01	0.07	0.02	0.61
Japan	0.03	0.06	0.02	0.01	0.06	0.03	0.00	0.01	0.04	0.74
Latvia	0.00	0.08	0.07	0.01	0.01	0.02	0.13	0.18	0.02	0.49
Luxembourg	0.05	0.02	0.01	0.01	0.02	0.01	0.01	0.49	0.03	0.36
Slovakia	0.03	0.01	0.09	0.11	0.05	0.01	0.00	0.07	0.01	0.61
South Korea	0.03	0.05	0.03	0.01	0.01	0.01	0.07	0.08	0.03	0.70
Sweden	0.01	0.01	0.02	0.08	0.00	0.03	0.01	0.28	0.01	0.56
Switzerland	0.01	0.04	0.02	0.01	0.01	0.00	0.00	0.25	0.01	0.65
United States	0.01	0.02	0.00	0.01	0.10	0.18	0.05	0.09	0.11	0.43
Average	**0.03**	**0.06**	**0.04**	**0.03**	**0.03**	**0.03**	**0.03**	**0.16**	**0.05**	**0.55**
Standard Deviation	**0.02**	**0.06**	**0.04**	**0.03**	**0.03**	**0.04**	**0.03**	**0.14**	**0.05**	**0.18**

b. Group 2 (acyclical)

Countries	pi	sub	comp	ic	sb	oth	rate	nfa	gfcf	ca
High-Income										
Czech Republic	0.08	0.08	0.11	0.06	0.01	0.02	0.00	0.32	0.03	0.29
Estonia	0.00	0.09	0.16	0.01	0.07	0.04	0.01	0.13	0.01	0.47
Greece	0.07	0.05	0.14	0.01	0.00	0.00	0.01	0.00	0.02	0.69
Hong Kong	0.00	0.00	0.02	0.00	0.00	0.02	0.02	0.02	0.01	0.90
Italy	0.27	0.02	0.07	0.02	0.08	0.02	0.02	0.10	0.01	0.39
Lithuania	0.04	0.05	0.02	0.05	0.01	0.00	0.02	0.09	0.18	0.54
Netherlands	0.02	0.05	0.03	0.01	0.03	0.02	0.02	0.20	0.35	0.28
New Zealand	0.10	0.02	0.01	0.03	0.00	0.03	0.08	0.29	0.08	0.35
Portugal	0.09	0.05	0.12	0.01	0.14	0.02	0.02	0.04	0.12	0.38
Singapore	0.01	0.00	0.01	0.02	0.00	0.00	0.01	0.09	0.04	0.81
Slovenia	0.02	0.01	0.22	0.04	0.02	0.00	0.00	0.18	0.02	0.49
Spain	0.24	0.15	0.12	0.02	0.06	0.00	0.06	0.00	0.08	0.26
United Kingdom	0.00	0.00	0.04	0.02	0.05	0.01	0.02	0.34	0.00	0.51
Average	**0.07**	**0.04**	**0.08**	**0.02**	**0.04**	**0.01**	**0.02**	**0.14**	**0.07**	**0.49**
Standard Deviation	**0.09**	**0.04**	**0.06**	**0.02**	**0.04**	**0.01**	**0.02**	**0.11**	**0.09**	**0.20**
Middle-Income										
Bulgaria	0.09	0.12	0.04	0.10	0.11	0.01	0.01	0.01	0.01	0.48
Colombia	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.05	0.03	0.87
Indonesia	0.15	0.02	0.05	0.00	0.01	0.01	0.04	0.05	0.00	0.66
Romania	0.02	0.04	0.07	0.05	0.05	0.01	0.00	0.06	0.05	0.66
Thailand	0.04	0.04	0.00	0.00	0.04	0.00	0.00	0.14	0.05	0.68
Average	**0.06**	**0.05**	**0.03**	**0.03**	**0.04**	**0.01**	**0.01**	**0.06**	**0.03**	**0.67**
Standard Deviation	**0.05**	**0.04**	**0.03**	**0.04**	**0.04**	**0.00**	**0.02**	**0.04**	**0.02**	**0.12**

c. Group 3 (procyclical)

Countries	pi	sub	comp	ic	sb	oth	rate	nfa	gfcf	ca
High-Income										
Australia	0.00	0.02	0.07	0.01	0.13	0.04	0.04	0.05	0.00	0.64
Hungary	0.15	0.00	0.08	0.04	0.01	0.02	0.00	0.02	0.06	0.61
Iceland	0.13	0.05	0.01	0.08	0.04	0.11	0.07	0.15	0.10	0.27
Ireland	0.01	0.00	0.01	0.01	0.02	0.00	0.00	0.02	0.72	0.20
Norway	0.05	0.01	0.03	0.01	0.00	0.04	0.01	0.25	0.01	0.59
Average	**0.07**	**0.02**	**0.04**	**0.03**	**0.04**	**0.04**	**0.02**	**0.10**	**0.18**	**0.46**
Standard Deviation	**0.06**	**0.02**	**0.03**	**0.03**	**0.05**	**0.04**	**0.02**	**0.09**	**0.27**	**0.19**
Middle-Income										
Armenia	0.19	0.02	0.04	0.00	0.01	0.00	0.04	0.09	0.27	0.33
Belarus	0.00	0.07	0.05	0.00	0.03	0.01	0.00	0.16	0.18	0.49
Bolivia	0.03	0.13	0.09	0.00	0.02	0.00	0.00	0.00	0.00	0.73
Brazil	0.07	0.01	0.00	0.01	0.02	0.04	0.09	0.13	0.10	0.52
Georgia	0.03	0.01	0.02	0.08	0.01	0.00	0.11	0.02	0.01	0.71
Kazakhstan	0.08	0.05	0.01	0.01	0.01	0.01	0.07	0.00	0.00	0.76
Mexico	0.01	0.03	0.02	0.01	0.00	0.01	0.01	0.15	0.04	0.74
Moldova	0.06	0.02	0.13	0.01	0.01	0.00	0.01	0.05	0.02	0.69
Peru	0.04	0.00	0.03	0.01	0.01	0.02	0.01	0.09	0.10	0.70
South Africa	0.00	0.00	0.01	0.01	0.02	0.03	0.03	0.04	0.01	0.82
Turkey	0.07	0.03	0.01	0.08	0.02	0.04	0.08	0.23	0.14	0.31
Average	**0.05**	**0.03**	**0.04**	**0.02**	**0.01**	**0.02**	**0.04**	**0.09**	**0.08**	**0.62**
Standard Deviation	**0.05**	**0.04**	**0.04**	**0.03**	**0.01**	**0.01**	**0.04**	**0.07**	**0.08**	**0.17**

Notes: ca= current account balance, pi= property income , sub= subsidies, comp= compensation of employees, ic= intermediate consumption, sb= social benefits, oth= other expenditures, rate= interest rate, nfa= net foreign assets, gfcf= gross fixed capital formation. Data in domestic currency divided by GDP. Group 1 is the sample's 1st tercile in terms of measures of fiscal cyclicality (¡ -0.09). Group 2 is the 2nd tercile (between -0.09 and 0.05). Group 3 is the 3rd tercile (above 0.05). Values greater than 0.2 are highlighted. Cholesky ordering: pi, sub, comp, ic, sb, oth, rate, nfa, gfcf, ca

Figures

FIGURE 1: Median response of the current account to one unit composite shocks for the whole sample with bootstrap confidence intervals based on 100 repetitions (aggregate fiscal data)

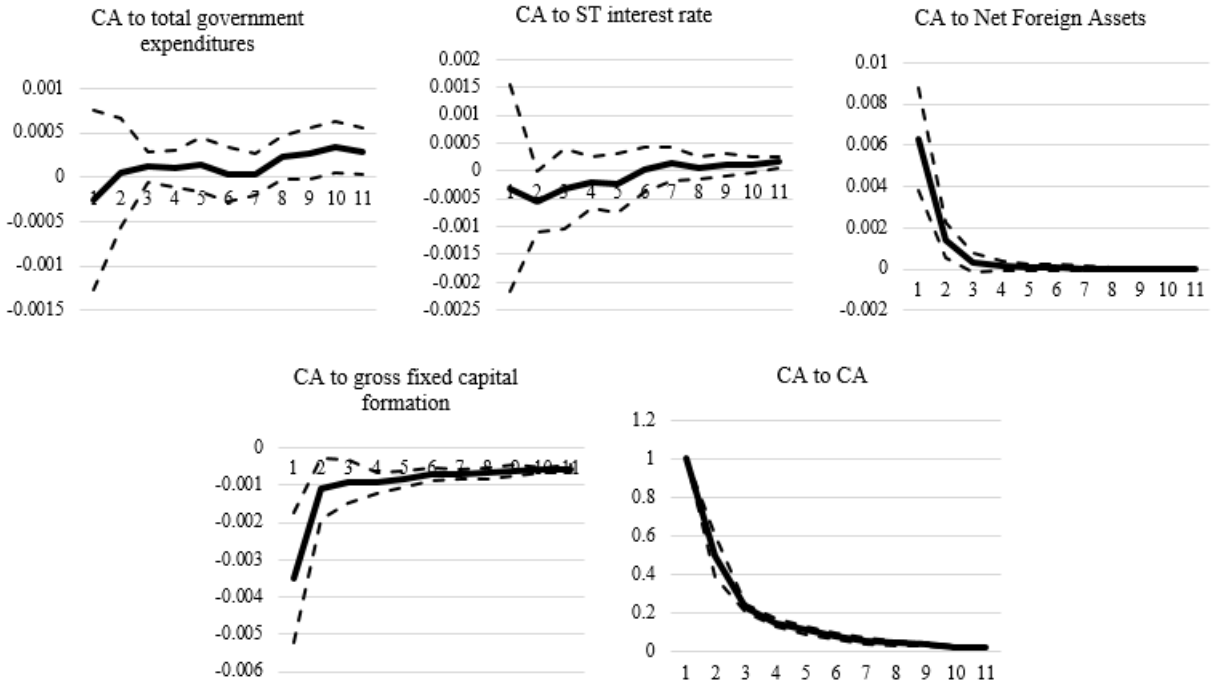
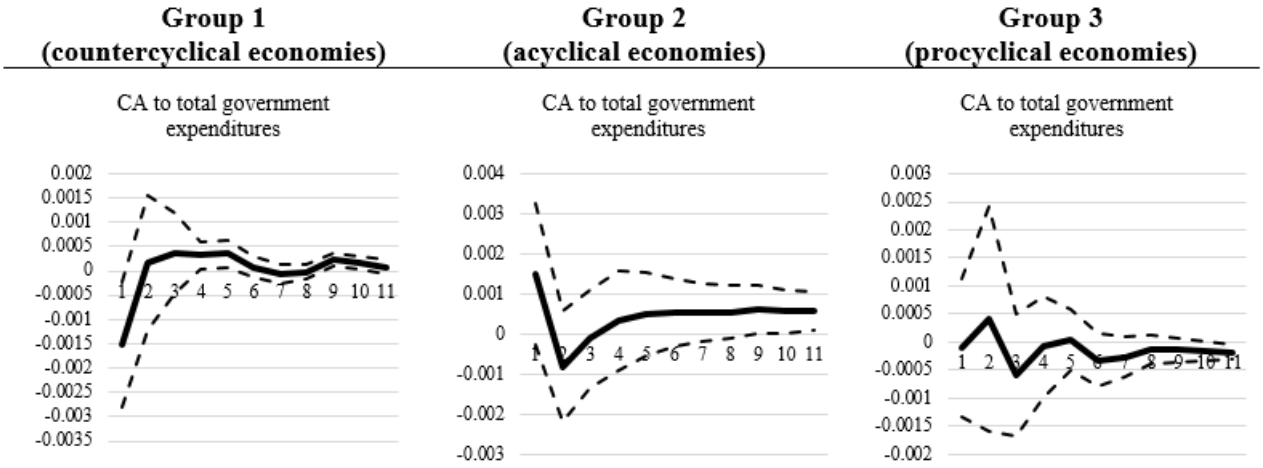
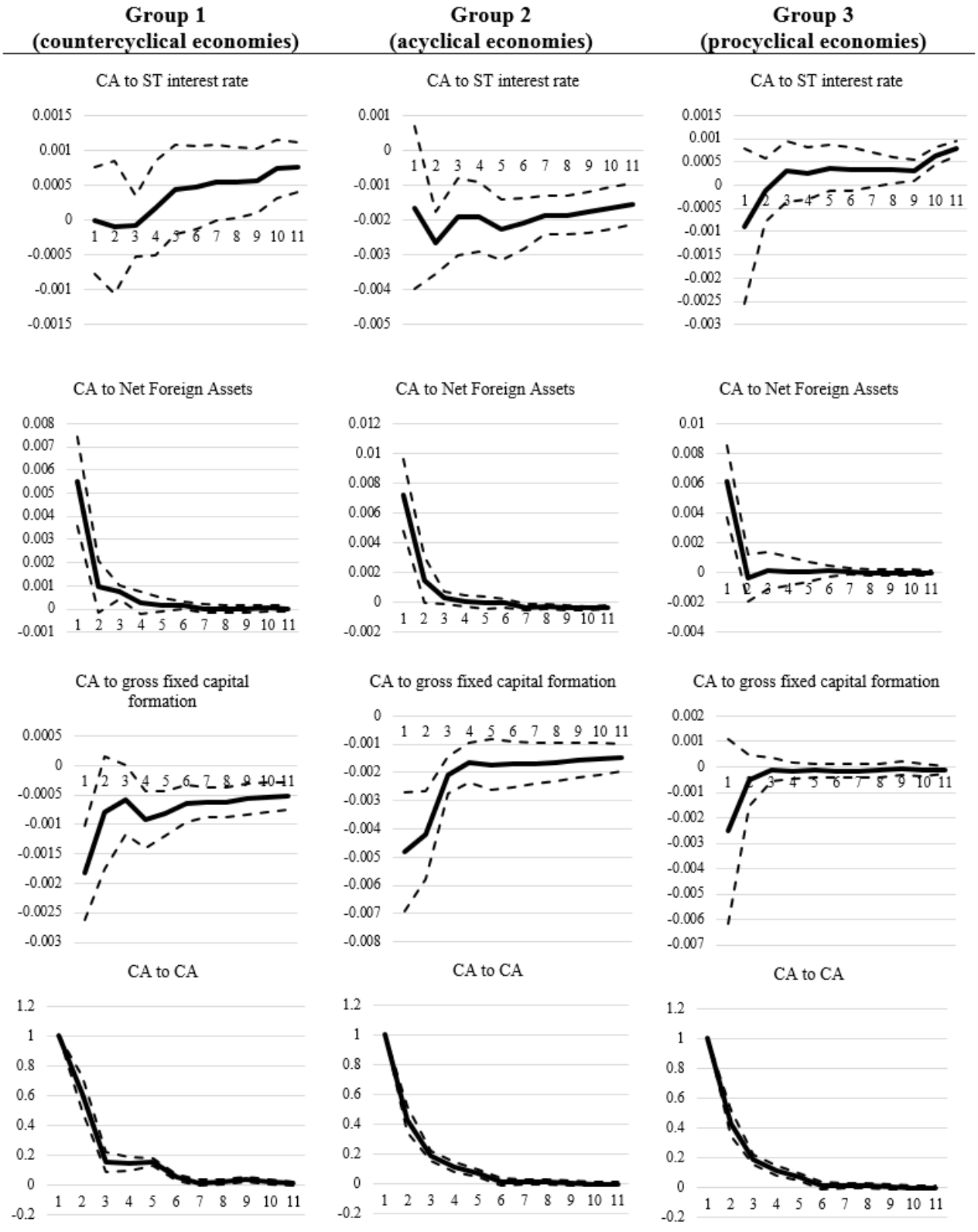


FIGURE 2: Median response of the current account to one unit composite shocks by fiscal cyclicality groups with bootstrap confidence intervals based on 100 repetitions (aggregate fiscal data)





Notes: Group 1 is the group of countries of the 1st tercile in terms of measures of fiscal cyclicality defined as the correlation between cyclical components of GDP and government expenditures (corresponding to a fiscal cyclicality $<$ -0.09). Group 2 is the group of countries of the 2nd tercile in terms of measures of fiscal cyclicality (fiscal cyclicality measure between -0.09 and 0.05). Group 3 is the group of countries of the 3rd tercile in terms of measures of fiscal cyclicality (fiscal cyclicality measure above 0.05).

FIGURE 3: Quartile impulse responses of the current account to a one-unit composite shock to aggregate government expenditures (by fiscal cyclicality group)

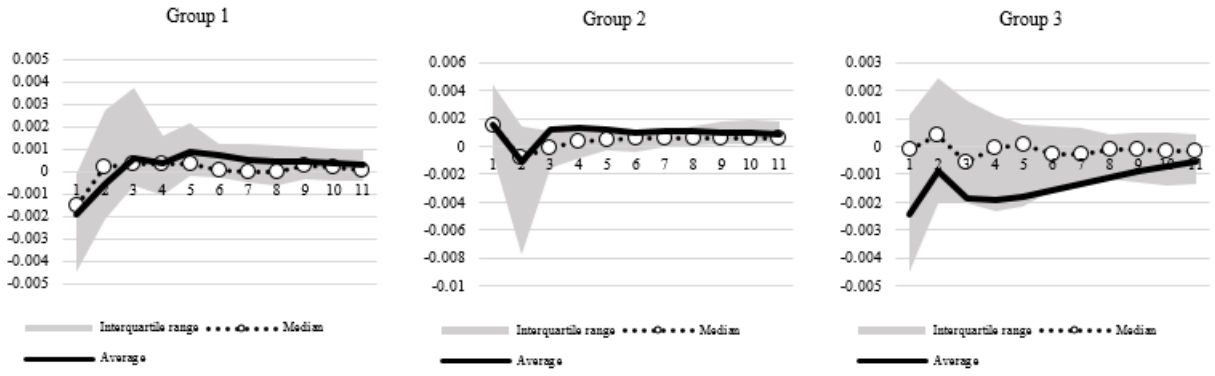
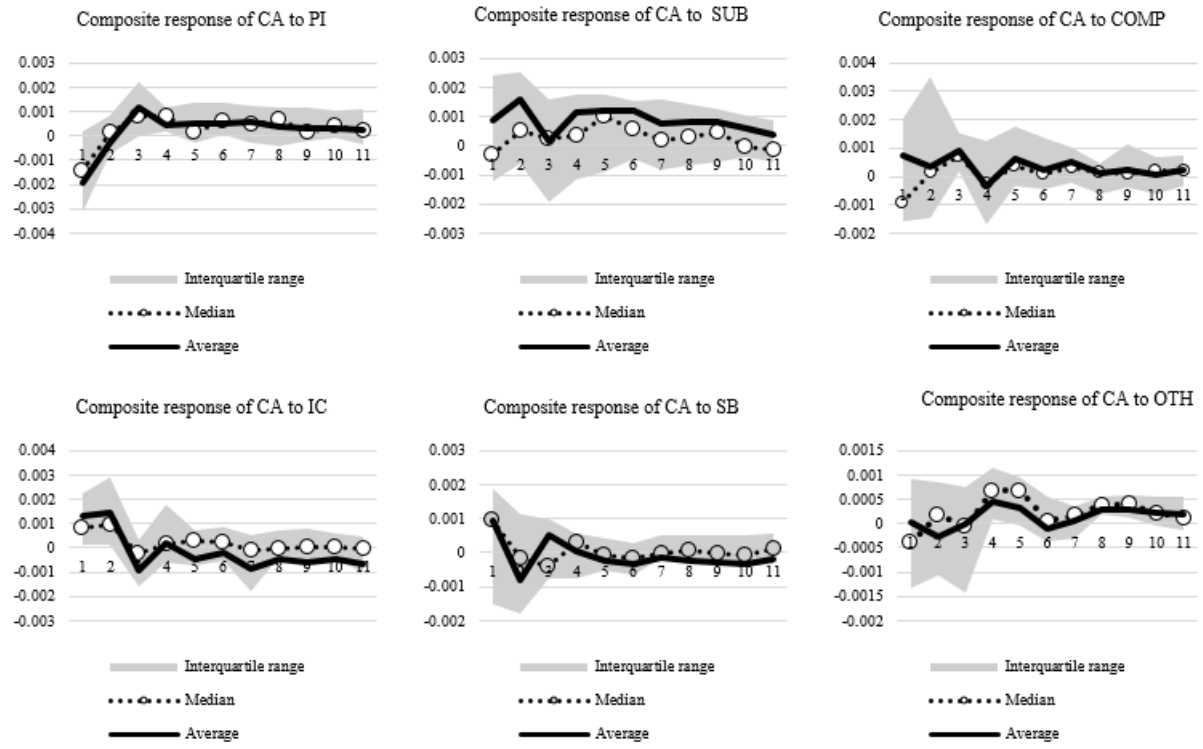


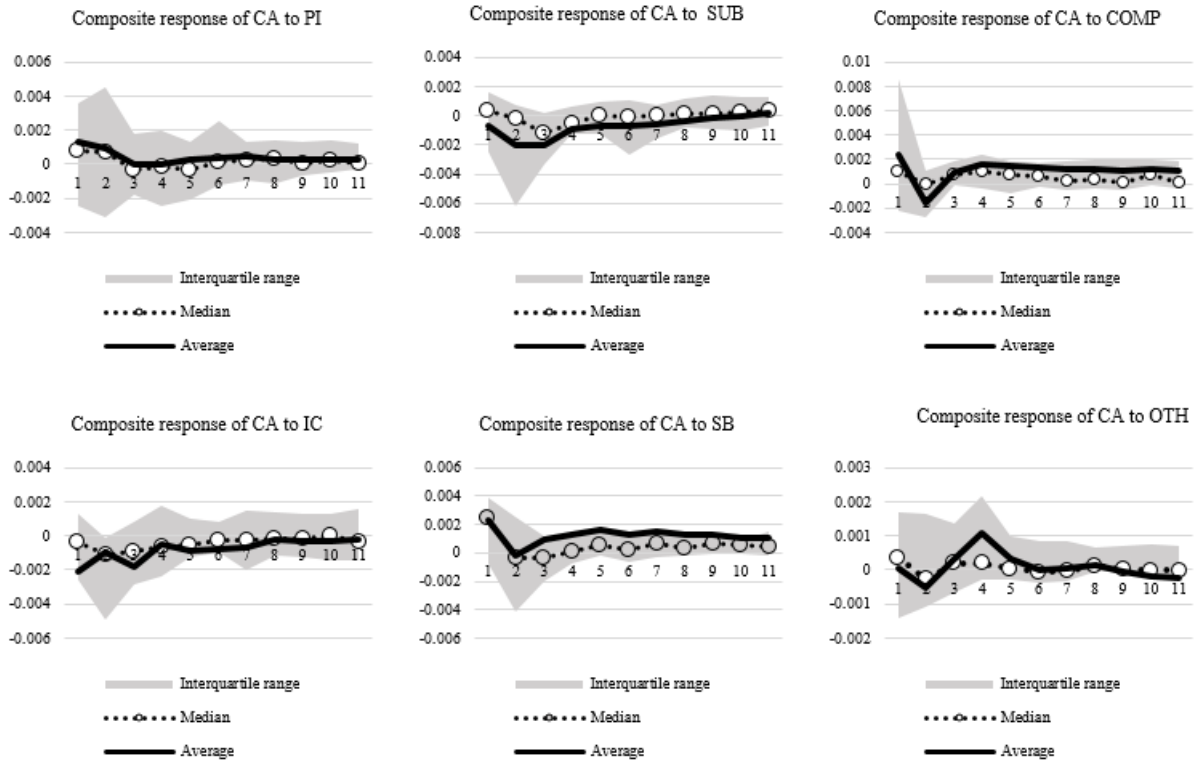
FIGURE 4: Quartile impulse responses of the current account to a one-unit composite shock to disaggregate government expenditures (by fiscal cyclicality group)

a. Group 1 (countercyclical)



Notes: CA= current account balance, PI= property income, SUB= subsidies, COMP= Compensation of employees, IC= intermediate consumption, SB= social benefits, OTH= Other expenditures. Data in domestic currency divided by GDP. Group 1 contains countries of the 1st tercile in terms of fiscal cyclicality (measure $<$ -0.09). Group 2 is the second tercile (acyclical economies with measure between -0.09 and 0.05) and Group 3 is the third tercile (procyclical economies with measure $>$0.05)

b. Group 2 (acyclical)



c. Group 3 (procyclical)

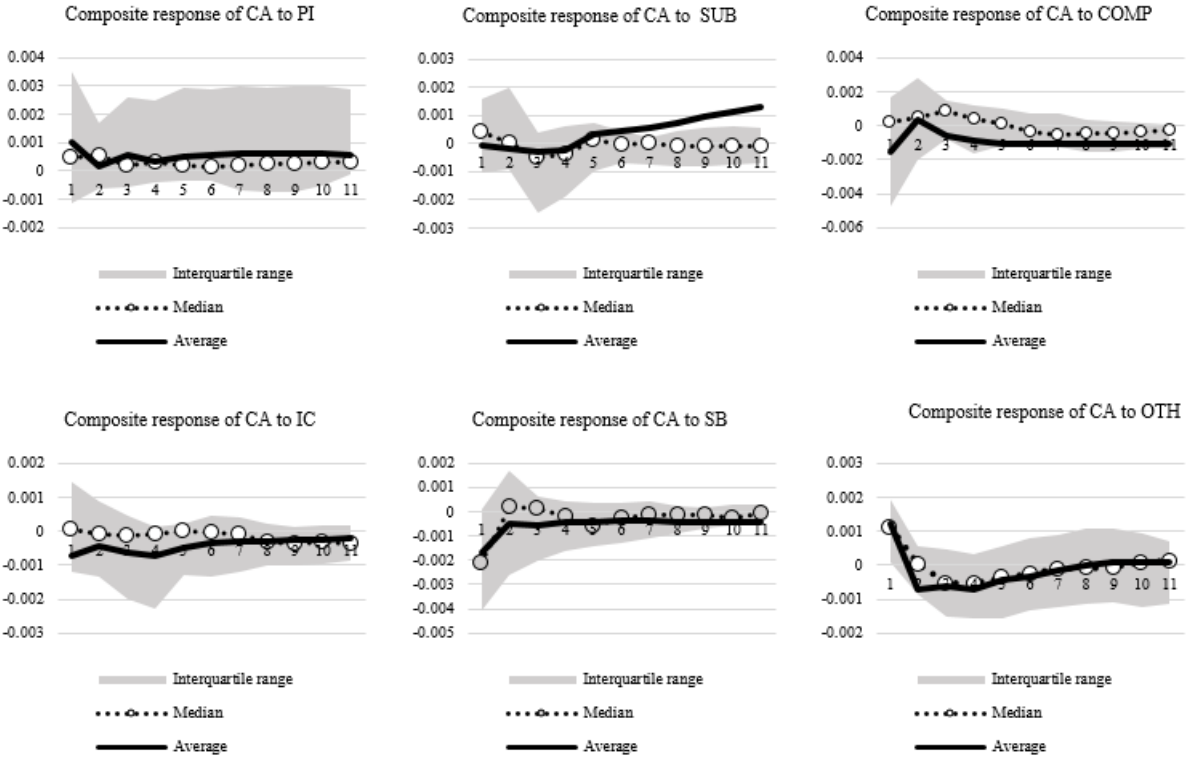
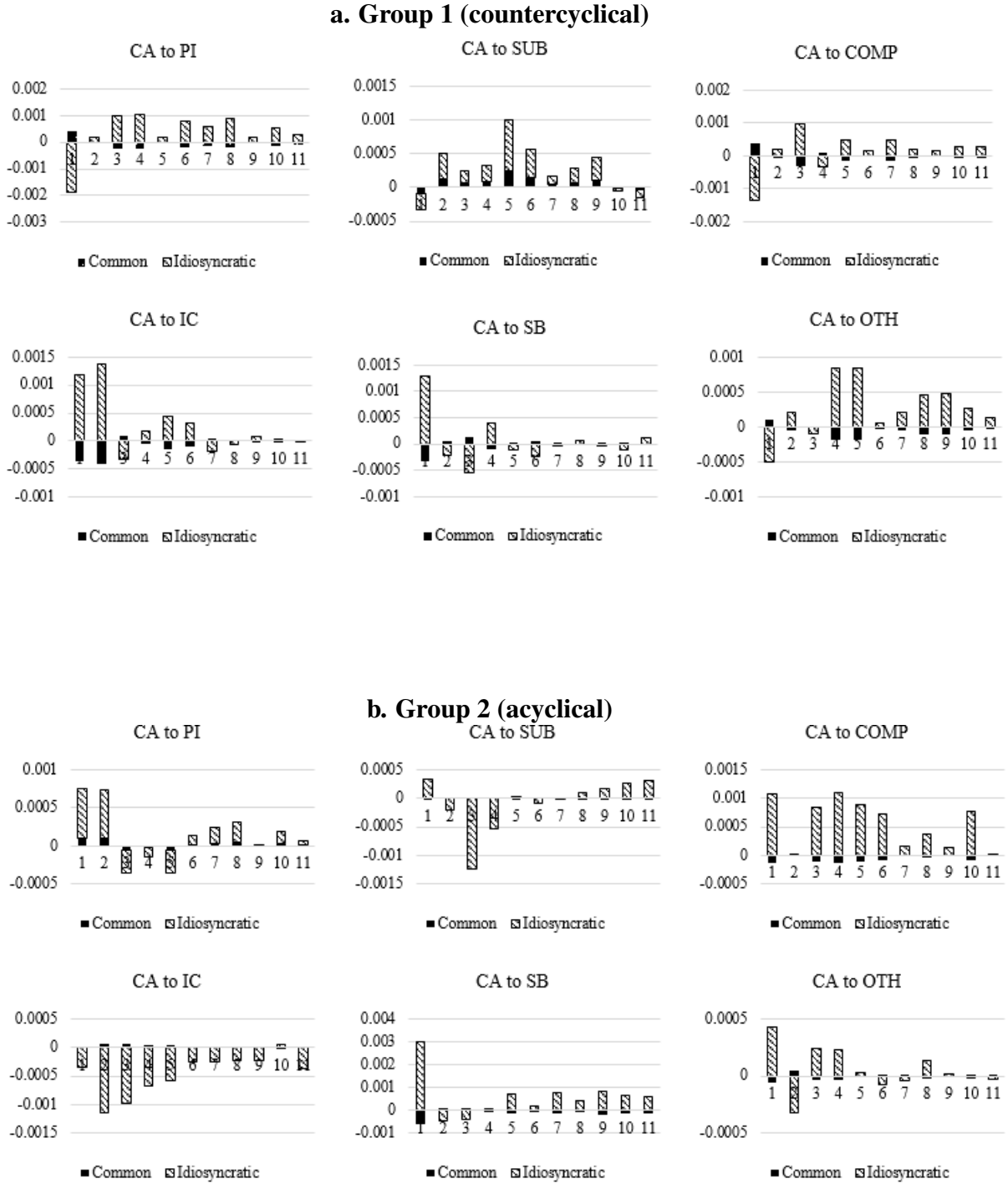
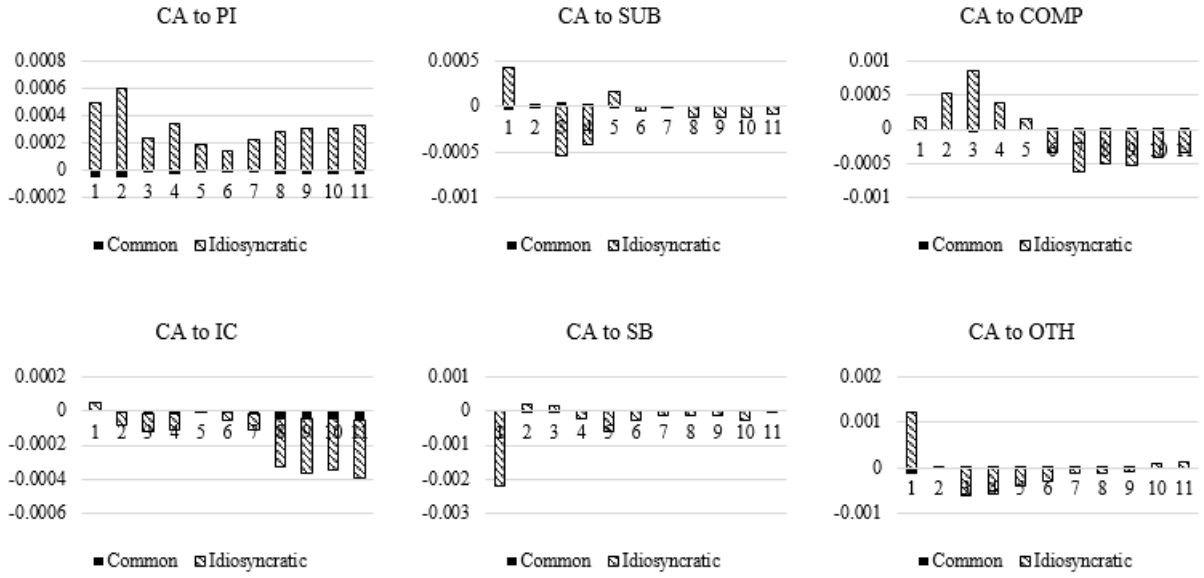


FIGURE 5: Decomposition of the median composite response of the current account to a one-unit composite shock to disaggregate government expenditures between common and idiosyncratic responses (by fiscal cyclicality group)

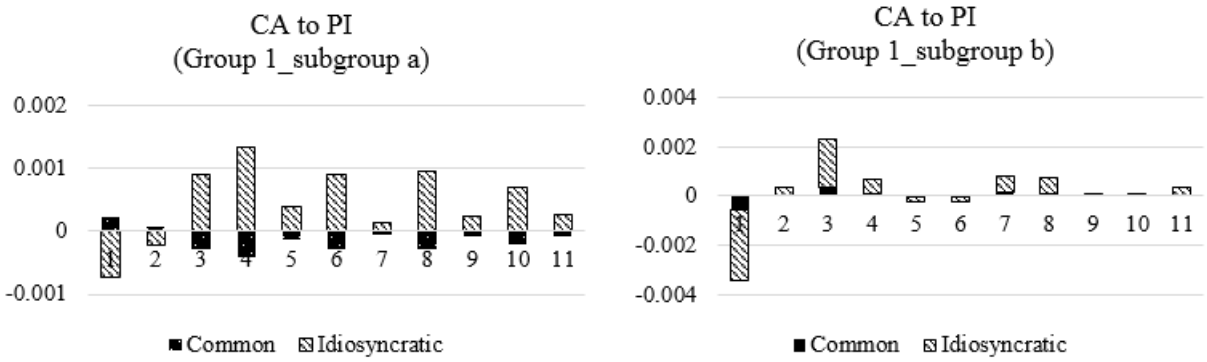


c. Group 3 (procyclical)



Notes: CA= current account balance, PI= property income, SUB= subsidies, COMP= Compensation of employees, IC= intermediate consumption, SB= social benefits, OTH= Other expenditures. Data in domestic currency divided by GDP. Group 1 is the group of countries of the 1st tercile in terms of measures of fiscal cyclicality defined as the correlation between cyclical components of GDP and government expenditures ($<$ -0.09). Group 2 is the group of countries of the 2nd tercile (between -0.09 and 0.05). Group 3 is the the 3rd tercile (fiscal cyclicality measure above 0.05).

FIGURE 6: Decomposition of the median composite response of the current account to a one unit composite shock to property income expenditures between common and idiosyncratic responses (by subgroups of group 1)



Notes: CA= ratio of current account balance/GDP, PI= property income/GDP. Group 1 contains countries of the 1st tercile in terms of fiscal cyclicality (value $<$ -0.09). Subgroup (b) includes the countries of Croatia, Denmark, Finland, Luxembourg and Switzerland and subgroup (a) the remaining 11 countercyclical economies

Appendices

Appendix I

Previous empirical studies on the twin deficits hypothesis (part 1)

Study	Countries	Period	Methodology	Conclusion
Abell (1990)	USA	1979-1985 (monthly)	VAR (multivariate extension), Granger causality tests, impulse response functions	Twin deficits are connected through the transmission mechanisms of interest rates and exchange rates
Alkaswani (2000)	Saudi Arabia	1970-1999	Cointegration analysis, error correction models, granger causality tests	CAB causes FB
Altintas & Taban (2011)	Turkey	1974-2010	ARDL, cointegration analysis, Granger causality	Twin deficits co-moving together in the long-run
Anoruo & Ramchander (1998)	5 southeast-Asian developing economies	1960-1993 (unbalanced)	VAR model, causality tests	CAB causes FB, bi-directional causality for Malaysia
Bernheim (1988)	USA, Canada, Japan, Mexico, UK, Germany	1960-1984	OLS	1$ increase in fiscal deficit leads 0.30$ decline in CA surplus
Campa & Gavilan (2011)	10 euro area countries	1977Q1-2005Q4 (unbalanced)	Estimation based on an intertemporal model for the CA, VAR, Granger causality tests, volatility, decomposition, tests for structural breaks	Model accepted for 6 countries + Derivation of expectations of future income and relative prices underlying the CAB
Chihi, Normandin (2013)	24 developing countries	1960-2005 (unbalanced)	VAR models, covariance analysis	Positive co-movement between the external and budget deficits
Chinn & Prasad (2003)	18 industrialized + 71 developing economies	1971-1995	Cross-section and panel regression techniques	CAB positively correlated with FB and initial shocks of net foreign assets
Darrat (1988)	USA	Quarterly data from 1960 to 1984	Granger multivariate causality tests + Akaike error criterion	Bi-directional causality
Enders and Lee (1990)	USA	Quarterly data from 1947Q3 to 1987Q1	VAR	Temporary increase in budget deficit worsens CA deficit
Engel & Wang (2011)	25 OECD countries	1973Q1 to 2006Q3	Volatility, correlation analysis, simulations based on a RBC two-sector model including durables and nondurables	Volatility of imports and exports 3x higher than GDP, imports and exports are pro-cyclical, and positively correlated with each other, net exports are counter-cyclical
Ghosh & Ostry (1995)	5 industrialized + 45 developing countries	quarterly unbalanced data from 1960 to 1991	VAR (consumption-smoothing approach)	Hypothesis of full consumption smoothing accepted for 2/3 of developing economies
Glick & Rogoff (1995)	G7 countries	1961-1990	Regression analysis using different models for investment and the current account and global/ country-specific productivity shocks	Positive response of investment to shocks, negative response of the CAB only in country-specific shocks
Hoffmann (2013)	China	1982-2007	VAR GMM , structural shocks, and FEVD, based on an estimated present-value model with non-tradable goods	Model explains more than 70% of the CA variation, importance of the consumption titling and smoothing adjustment channel based on prices expectations, factors related to China's domestic financial development are key in understanding global imbalances
Holmes (2011)	US	1960Q1-2008Q4	Markov-switching regimes regression analysis	Long-run positive relationship between FB and CAB
Hutchison & Pigott (1984)	USA	1973-1983	Heuristic, nontechnical analysis based on a theoretical framework linking FB to CAB	Causality from FB to CAB through exchange rates (affected by interest rates)

Previous empirical studies on the twin deficits hypothesis (part 2)

Study	Countries	Period	Methodology	Conclusion
Kearney and Monadjemi (1990)	8 countries	Quarterly data from 1972Q1–1987Q4	VAR	Validation of the twin deficits hypothesis, bi-directional causality
Kumhof & Laxton (2013)			Simulation of an increase in fiscal deficits in a derived open economy business cycle model with finite-horizon households	Higher fiscal deficits lead to a short-run and long-run deterioration of the current account balance. Permanently higher fiscal deficits increase interest rates.
Lane (2003)	22 OECD countries	1960–1998	OLS+Weighted LS	Countries with volatile output and dispersed political power are the most likely to run pro-cyclical fiscal policies
Leachman & Francis (2002)	USA	Quarterly data 1974 Q1-1992 Q2	Co-integration and multicointegration	Causality from FB to CAB, no co-integration
Litsios & Pilbeam (2017)	Greece, Portugal, Spain	1980Q2- 2015 Q2	ARDL bounds cointegration test	CAB contains unit root after joining Euro zone + presence of statistical association between FB and CAB
Miller & Russek (1989)	USA	Quarterly, 1946Q1-1987Q3	Deterministic + stochastic techniques for separating the secular components from the cyclical components of the twin deficits, + cointegration analysis	Absence of co-integration, short-run causality from budget deficit to trade deficit
Normandin (1999)	USA, Canada	Quarterly data 1950 Q1-1992 Q3	VAR, causality tests, GMM estimations,unit root tests, cointegration tests	Twin deficits hypothesis confirmed + taking into account the stochastic properties of the budget deficit is crucial.
Otto (1992)	USA + Canada	Quarterly data, USA 1950Q1 to 1988Q4 and Canada 1950Ql to 1987Q4.	VAR estimation based on a life-cycle model	Rejection of the consumption-smoothing hypothesis
Ratha (2012)	India	1998-2009 (quarterly and monthly)	A bounds- testing approach to cointegration and error-correction modelling	Twin deficit hypothesis in the short-run, REH in the long-run
Saeed, Khan (2012)	Pakistan	1972 to 2008	Cointegration analysis, Granger causality	the twin deficit hypothesis is accepted by rejecting REH, CAB granger causes FB
Trachanas, Katrakilidis (2013)	Portugal, Ireland, Italy, Greece, Spain	1971-2009	Linear and asymmetric cointegration tests, allowing for structural breaks	No linear cointegration, existence of asymmetric long-run effects from FB to CAB
Tufail, Anwar, Raza & Abbas (2014)	Pakistan	1972 to 2011	Cointegration analysis, VECM and causality tests	Bi-directional causality between FB and CAB, long-run effect of FB on CAB
Vamvoukas (1999)	Greece	1948-1993 (annual data)	Cointegration analysis, error correction models, Granger causality tests	Causality from FB to CAB in short and long-run
Winner (1993)	Australia	1948-1989	OLS regression	Rejection of the twin deficits hypothesis, REH holds for the Australian case
Zamanzadeh, Mehrara (2011)	Iran	1959-2007	Cointegration analysis, Vector error correction model (VECM)	Twin deficits hypothesis accepted, REH rejected
Zietz & Pemberton (1990)	USA	Quarterly data, 1972-1987	2SLS for a structural simultaneous equation framework including three different transmission channels	Budget deficit does not explain the 1980s CA deficit. Transmission channels from FB to CAB are more likely to be revenues and consumption than interest and exchange rates

Appendix II: Data description

Data have been extracted from the following sources, in millions of domestic currency, used in real terms and divided by the population (population data from the IFS)

Variable	Data source	Adjustment
Gross Domestic Product	Data in real terms from the IMF's International Financial Statistics (IFS) database	Gaps completed using nominal series and GDP deflator calculated from annual series, or using growth rate of annual real series (in absence of nominal quarterly data)
Net Foreign Assets	IMF- Balance of Payments and International Investment Position database	
Current account balance	Data in nominal terms from Datastream (DS mnemonic = "country code" & CURBALA)	Deflated using calculated GDP deflator. For data only available in US dollars, data for other variables converted to US dollars based on PPP (from the World Bank database)
General government consumption expenditure	Data in real terms from Datastream (DS mnemonic: "country code" & XGCSA.D, if absent data without seasonal adjustment taken instead, DS mnemonic: "country code" & XGCSA.C)	
Gross fixed capital formation	Data in current prices from Datastream ("country code" & GFCF.C), or from the IFS	Converted to real terms using a deflator calculated based on annual nominal and real series from IFS
Private consumption	Data in current prices from Datastream ("country code" & CNPER.D), or from the IFS	
Short-term interest rates	Short-term interest rates from IFS (IMF)	Gaps completed based on Short-term interest rates from Datastream (OECD: "country code" & OCFISTR, Oxford economics: "country code" & XRCB..R) or the Policy rate (Datastream: "country code" & PRATE.) or the Money Market rates (IFS)

Variable	Data source	Adjustment
Fiscal balance	Data in current prices from Datastream (”country code” & GOVBALA) or from the IFS	Deflated using calculated GDP deflator
Disaggregate fiscal data (European Union)	Government Finance Statistics (Eurostat) http://ec.europa.eu/eurostat/data /database (access from website: General and regional statistics >>Economy and Finance >>Government Statistics)	Deflator calculated from real Government consumption expenditures series and nominal series extracted from IFS (when unavailable, calculation is made from annual data)
Disaggregate fiscal data (non-EU countries)	Government Finance Statistics (IMF), ”Expense” dataset http://data.imf.org/?sk= 3C005430-5FDC-4A07-9474-64D64F1FB3DC	Deflator calculated from real Government consumption expenditures series and nominal series extracted from IFS, averaged yearly (when unavailable, calculation is made from annual data)

Additional adjustments

For disaggregate fiscal data of non EU countries which were available on an annual basis, we estimated quarterly data using the tool of temporal disaggregation from JDemetra+ software[17](provided by Eurostat). The quarterly values were estimated using quarterly GDP as the higher frequency indicator series. The chosen approach was the Chow-Lin method (Chow and Lin,1971), based on an autoregressive model of order 1 for the error vector. After those adjustments, the resulting dataset is a balanced panel of 51 countries over the period 2002Q1-2018Q4.

Appendix III: Description of government expenses categories

Government expenditure comprises the following ESA categories. These definitions have been taken from the ESA 2010 manual (Chapters 3 and 4).

- **P2 Intermediate consumption**: intermediate consumption consists of goods and services consumed as inputs by a process of production, excluding fixed assets whose consumption is recorded as consumption of fixed capital. The goods and services are either transformed or used up by the production process.
- **P5 Gross capital formation**: includes in addition gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables
- **D1 Compensation of employees**: defined as the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during an accounting period. It includes wages and salaries in addition to social contributions such as pensions

[17]http://ec.europa.eu/eurostat/cros/content/download_en (replacing old Ecotrim)

- **D29 Other taxes on production, payable**: consist of all taxes that enterprises incur as a result of engaging in production, independent of the quantity or value of the goods and services produced or sold.
- **D3 Subsidies, payable**: current unrequited payments which general government or the institutions of the European Union make to resident producers.
- **D4 Property income, payable**: property income (D.4) accrues when the owners of financial assets and natural resources put them at the disposal of other institutional units. The income payable for the use of financial assets is called investment income, while that payable for the use of a natural resource is called rent. Property income is the sum of investment income and rent (e.g. interests and dividends).
- **D5 Current taxes on incomes, wealth, etc.**: "current taxes on income, wealth, etc." (D.5) cover all compulsory, unrequited payments, in cash or in kind, levied periodically by general government and by the rest of the world on the income and wealth of institutional units, and some periodic taxes which are assessed neither on that income nor that wealth.
- **Social benefits**: social benefits include the following:
  - D62 Social benefits other than social transfers in kind: made up of:
  - Social security benefits in cash: social security benefits in cash are social insurance benefits payable in cash to households by social security funds. Reimbursements are excluded and treated as social transfers in kind (D.632).
  - Other social insurance benefits: other social insurance benefits correspond to benefits payable by employers in the context of other employment related social insurance schemes. Other employment-related social insurance benefits are social benefits (in cash or in kind) payable by social insurance schemes other than social security to contributors to the schemes, their dependents or their survivors.
  - Social assistance benefits in cash: social assistance benefits in cash are current transfers payable to households by government units or NPISHs to meet the same needs as social insurance benefits but which are not made under a social insurance scheme requiring participation usually by means of social contributions.
- **D632 Social transfers in kind- purchased market production**: individual goods and services in the form of reimbursements by social security funds of approved expenditures made by households on specific goods and services; or provided directly to the beneficiaries by market producers from which general government purchases the corresponding goods and services.
- **D7 Other current transfers**: include net non-life insurance premiums, non-life insurance claims, Current transfers within general government, Current international cooperation, miscellaneous current transfers and VAT- and GNI-based EU own resources.

- **D8 Adjustment for the change in pension entitlements**: the adjustment for the change in pension entitlements (D.8) represents the adjustment needed to make appear in the savings of households the change in the pension entitlements on which households have a definite claim. The pension entitlement change comes from contributions and benefits recorded in the secondary distribution of income account.
- **D9 Capital transfers, payable**: capital transfers require the acquisition or disposal of an asset, or assets, by at least one of the parties to the transaction. Whether made in cash or in kind, they result in a commensurate change in the financial, or non-financial, assets shown in the balance sheets of one or both parties to the transaction.
- **NP Acquisitions less disposals of non-produced assets**: non-produced assets consist of assets that have not been produced within the production boundary, and that may be used in the production of goods and services. This includes acquisitions of natural resources, contracts/leases/licenses, goodwill and marketing assets.

Appendix IV: Methodology for estimating individual Bayesian VAR models by country

The time-series Bayesian VAR approach used on the paper is based on independent normal-Wishart priors with Gibbs sampling, from which we derive orthogonalized impulse response functions and the corresponding variance decomposition. The independent normal-Wishart priors set for β and Σ (respectively the vector of parameters and the residual variance-covariance matrix) are

$\beta \sim N(\beta_0, V_0)$

$\Sigma \sim \text{IW}(S_0, \alpha_0)$

β_0 is a vector of nearly all zeros except the diagonal elements corresponding to coefficients of a variable's first own lag (hyper-parameter μ_1) that can be set to a different value, usually 1 for a random walk or less for a AR(1) process. In the present case, we set the prior means to zero. For V_0, we use the following hyperparameters $\lambda_1 = 0.1$, $\lambda_2 = 0.5$, $\lambda_3 = 1$ and $\lambda_4 = 100$, common in the literature. The residual standard deviations of the variables are calculated based on an unrestricted least square estimate. Conditional posterior distributions for the dataset y are

$(\beta|y, \Sigma) \sim \text{N}\left(\bar{\beta}, \bar{V}\right)$

$(\Sigma|y, \beta) \sim \text{IW}\left(\bar{S}, \bar{\alpha}\right)$

where

$\bar{V} = \left({V_0}^{-1} + \left(\hat{\Sigma}^{-1} \otimes (X'X)^{-1}\right)\right)^{-1}$

$\bar{\beta} = \bar{V}\left({V_0}^{-1}\beta_0 + \left(\hat{\Sigma}^{-1} \otimes X'\right)y\right)$

$\bar{S} = S_0 + E'E$

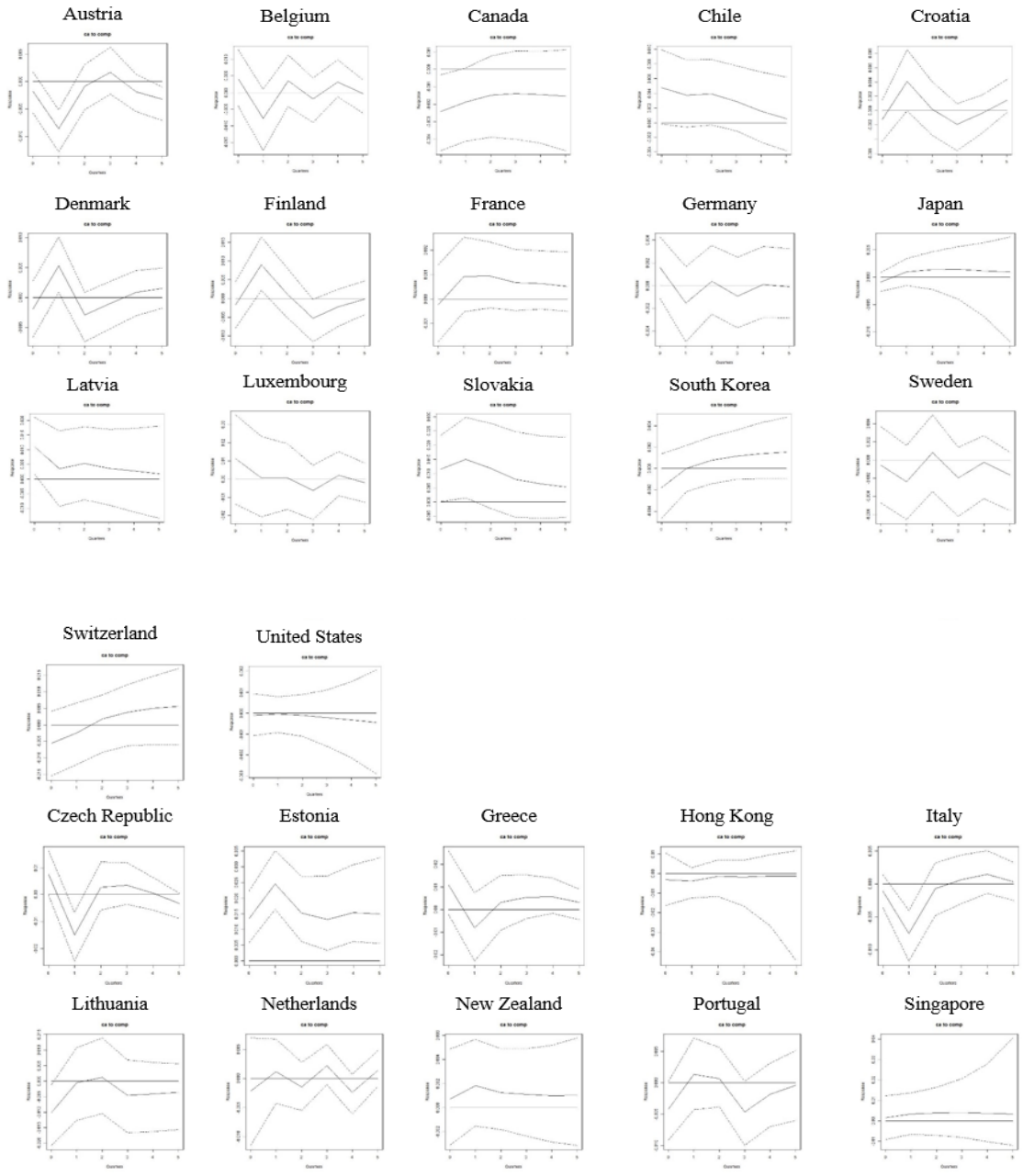
$\bar{\alpha} = \alpha_0 + T$

where $S_0^{-1} = \lambda_1 I$, ${V_0}^{-1} = \lambda_2 I$, and $\alpha_0 = \lambda_3$. With the residual matrix $E = Y - XB$ for $\beta = vec\,(B)$, $y = vec\,(Y)$ and X the regressors matrix. The scale matrix $\bar{S}$ and the degrees of freedom $\bar{\alpha}$ are calculated based on prior error variance of endogenous variables ${S_0}$[18] and prior degrees of freedom of the error-term α_0. We set the scale to be equal to 0.00001 and the prior degrees of freedom to be equal to 10 (number of endogenous variables). Based on an initial estimate of Σ, a Gibb's sampler is used to obtain properties of the unconditional posteriors with 10000 iterations and 200 burn-in draws. As a robustness check, we also estimate the same model using the Litterman-Minnesota prior based on hyper-parameters $\lambda_1 = 0.1$, $\lambda_2 = 0.99$, $\lambda_3 = 1$ and determination of the residual variance-covariance matrix from univariate autoregressive estimates.

[18]Following Karlsson (2012), S_0 can be set to be the diagonal variance covariance matrix obtained from individual AR regressions.

Appendix V: Orthogonalized impulse response functions by country

I. Response of the CA to a shock to Compensation of employees



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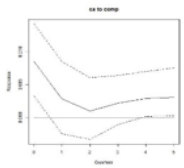
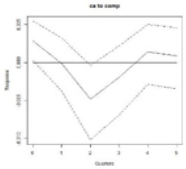
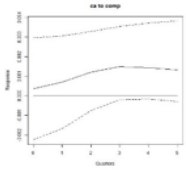


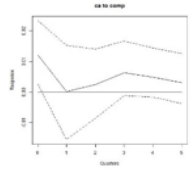
Spain



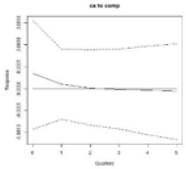
United Kingdom



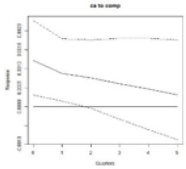
Bulgaria



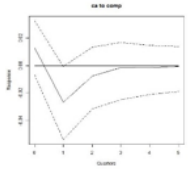
Colombia



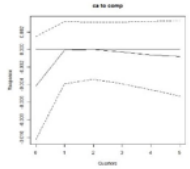
Indonesia



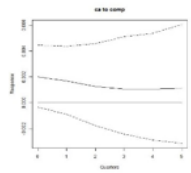
Romania



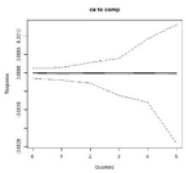
Thailand



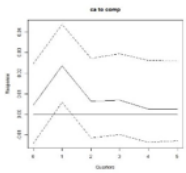
Australia



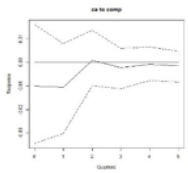
Hungary



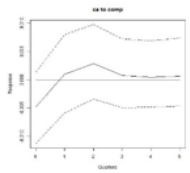
Iceland



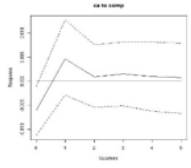
Ireland



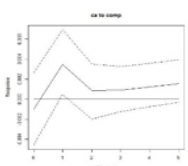
Norway



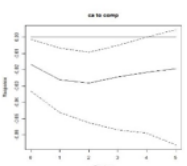
Armenia



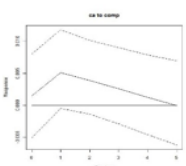
Belarus



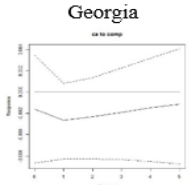
Bolivia



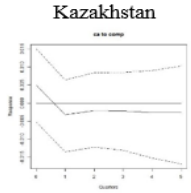
Brazil



Georgia



Kazakhstan



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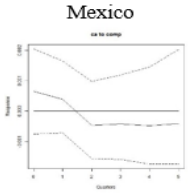
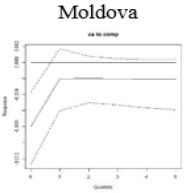
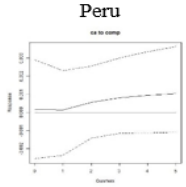


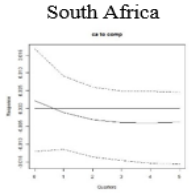
Moldova



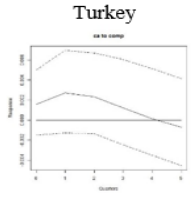
Peru



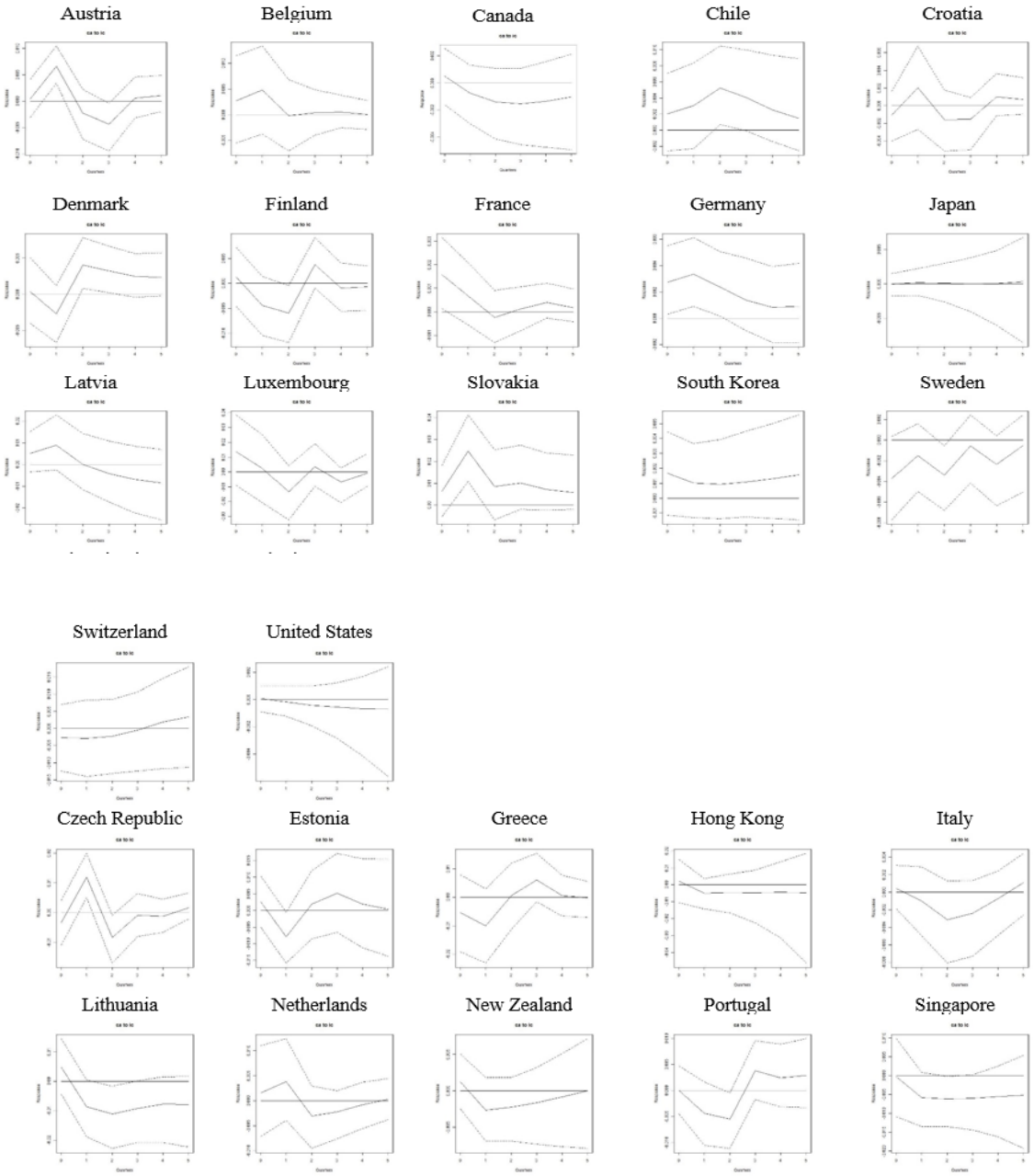
South Africa



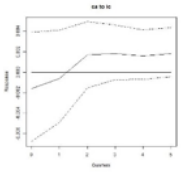
Turkey



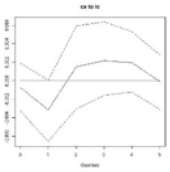
II. Response of the CA to a shock to Intermediate Consumption



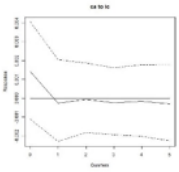
Slovenia



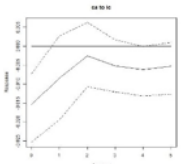
Spain



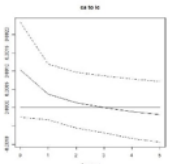
United Kingdom



Bulgaria



Colombia



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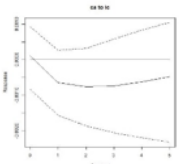
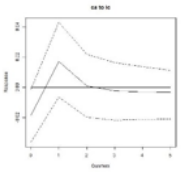
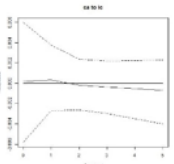


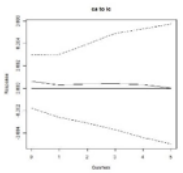
Romania



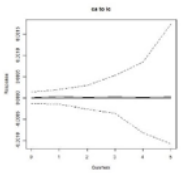
Thailand



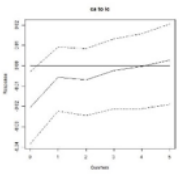
Australia



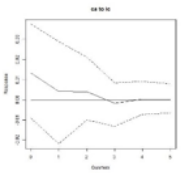
Hungary



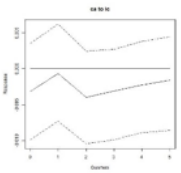
Iceland



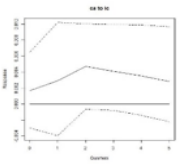
Ireland



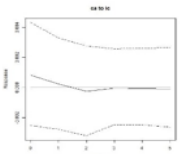
Norway



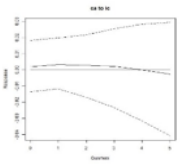
Armenia



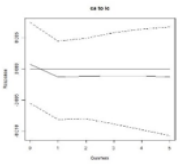
Belarus



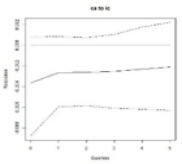
Bolivia



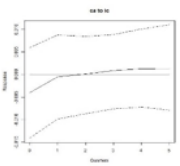
Brazil



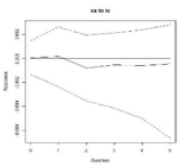
Georgia



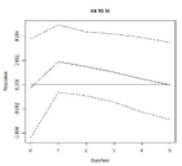
Kazakhstan



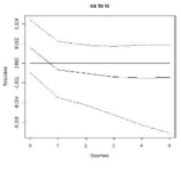
Mexico



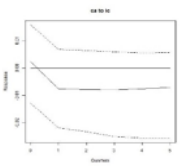
Moldova



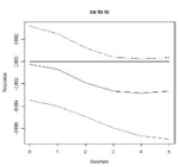
Peru



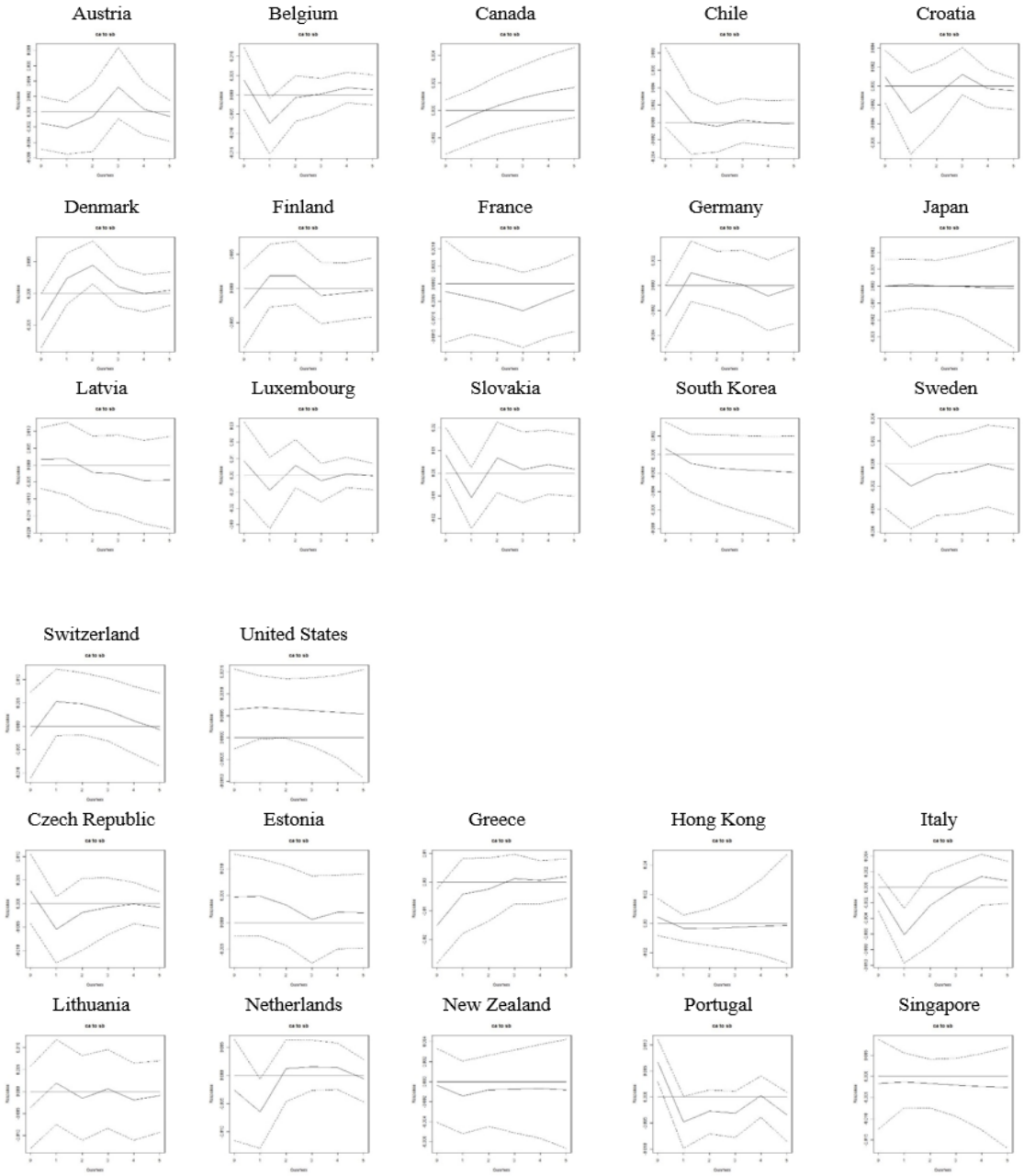
South Africa



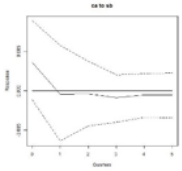
Turkey



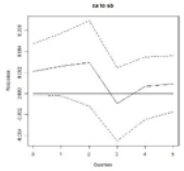
III. Response of the CA to a shock to Social Benefits



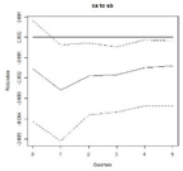
Slovenia



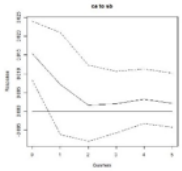
Spain



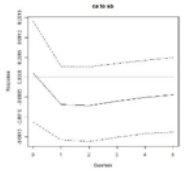
United Kingdom



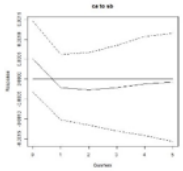
Bulgaria



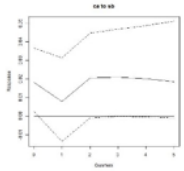
Colombia



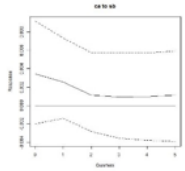
Indonesia



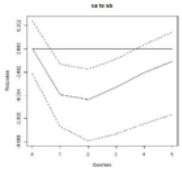
Romania



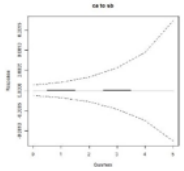
Thailand



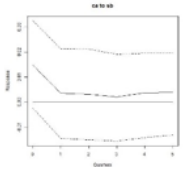
Australia



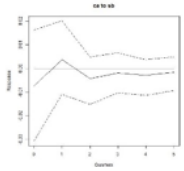
Hungary



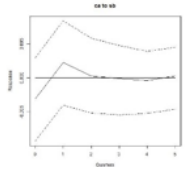
Iceland



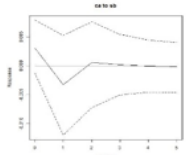
Ireland



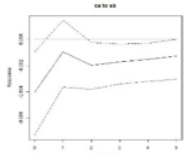
Norway



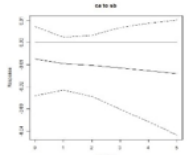
Armenia



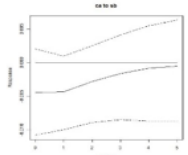
Belarus



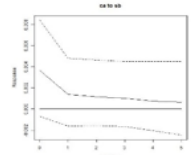
Bolivia



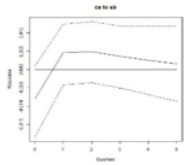
Brazil



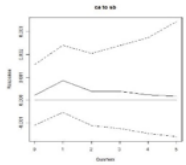
Georgia



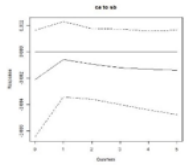
Kazakhstan



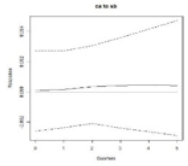
Mexico



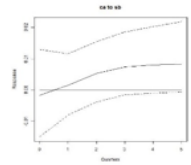
Moldova



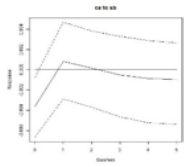
Peru



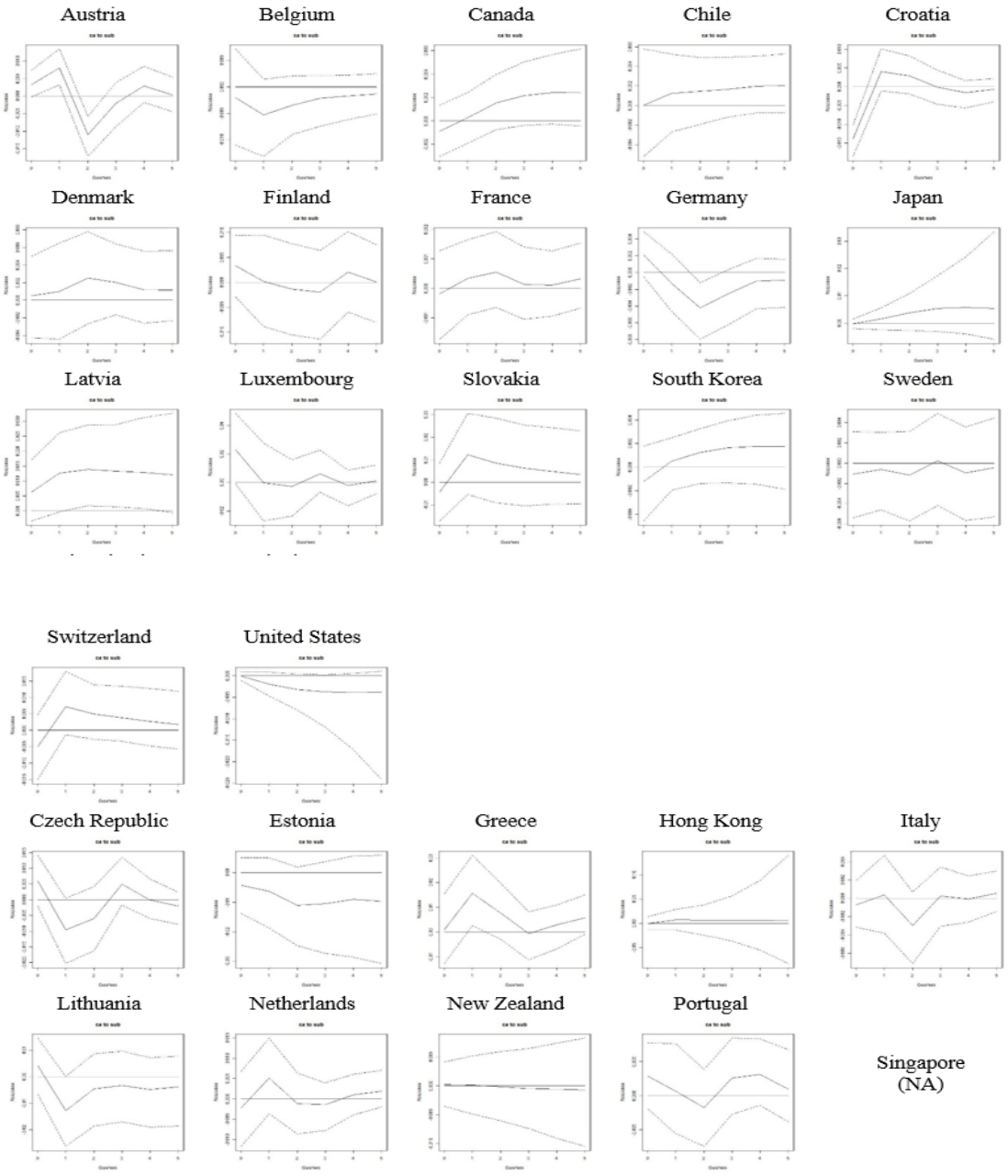
South Africa

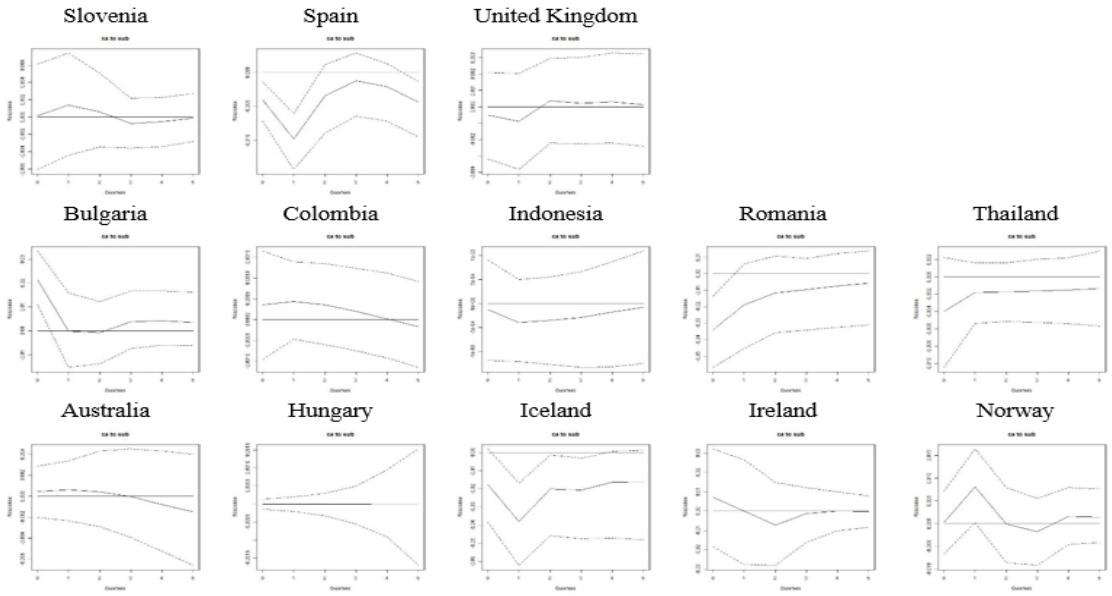


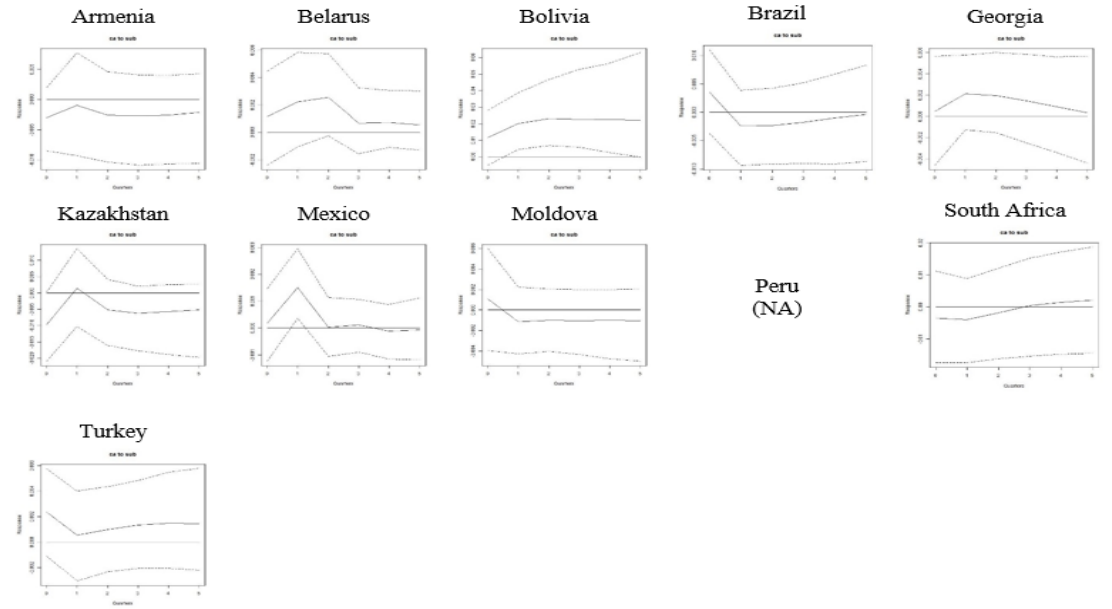
Turkey



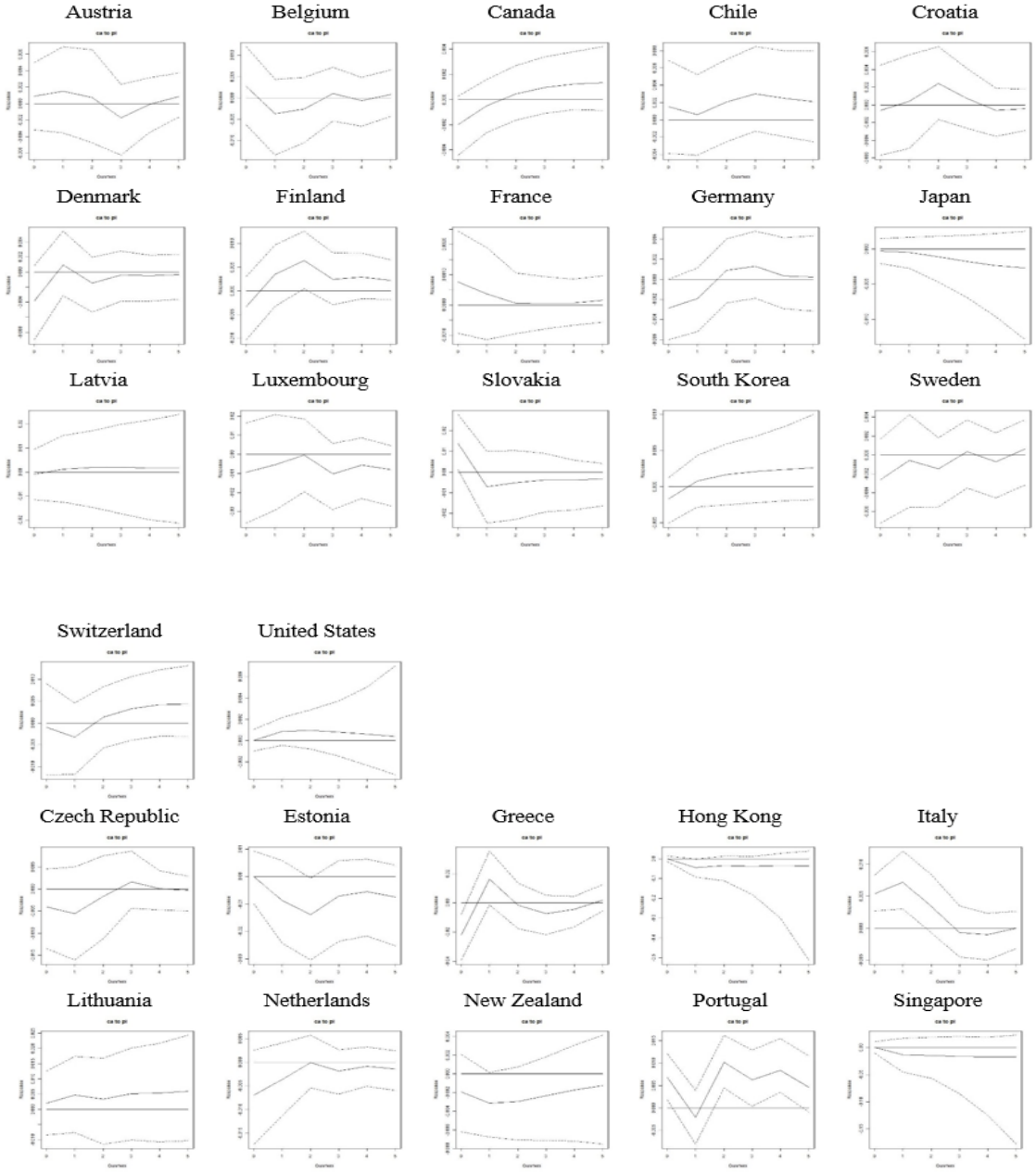
IV. Response of the CA to a shock to Subsidies

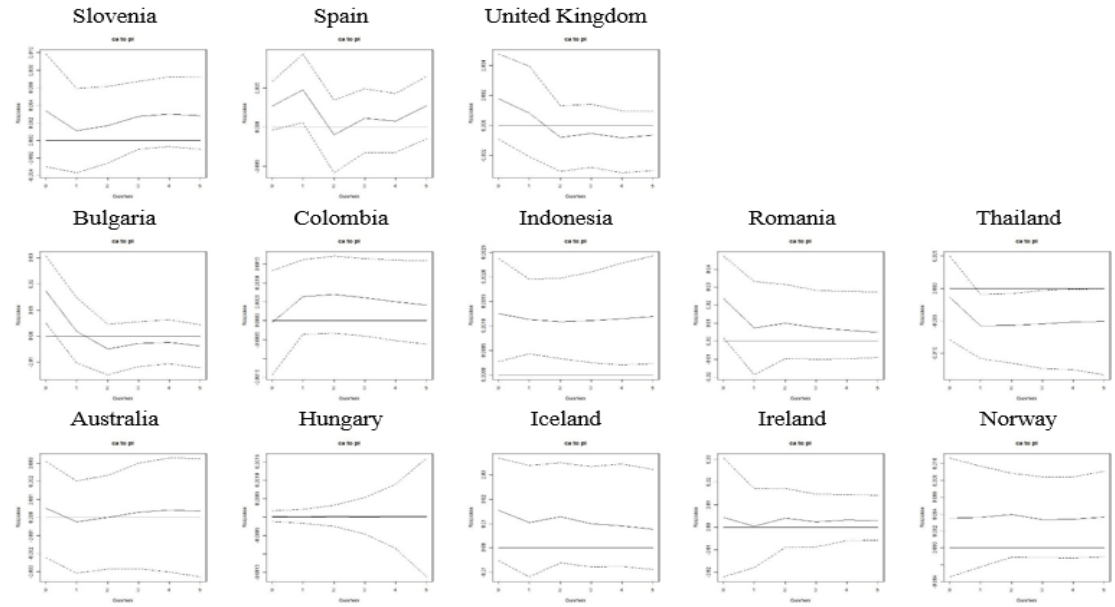


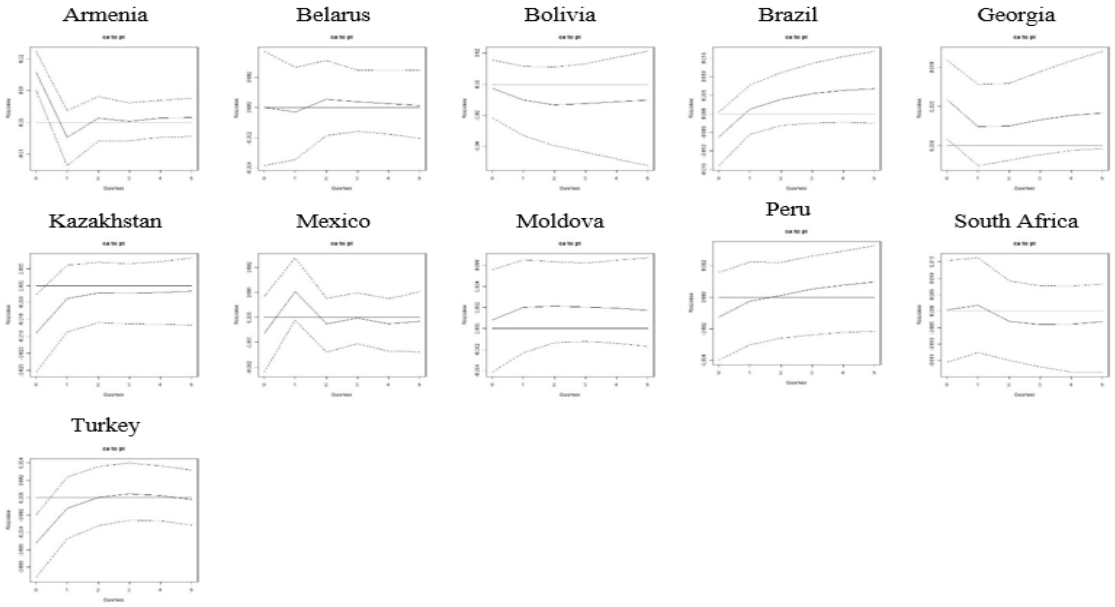

Slovenia
Spain
United Kingdom
Bulgaria
Colombia
Indonesia
Romania
Thailand
Australia
Hungary
Iceland
Ireland
Norway


Armenia
Belarus
Bolivia
Brazil
Georgia
Kazakhstan
Mexico
Moldova
South Africa
Peru
(NA)
Turkey

V. Response of the CA to a shock to Property Income




Slovenia
Spain
United Kingdom
Bulgaria
Colombia
Indonesia
Romania
Thailand
Australia
Hungary
Iceland
Ireland
Norway


Armenia
Belarus
Bolivia
Brazil
Georgia
Kazakhstan
Mexico
Moldova
Peru
South Africa
Turkey