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INTERRELATIONS BETWEEN EXTERNAL AND INTERNAL MACROECONOMIC FACTORS: EMPIRICAL EVIDENCE ON SOME OECD COUNTRIES

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Abstract
In this study, using a data set from 12 OECD countries with floating currency and liberal capital regimes, we analyse interactions between real exchange rates, current account balances, bond yield spread, broad money, industrial production growth and inflation in the framework of panel vector autoregression (PVAR) modelling. Our empirical study shows that changes in real exchange rates may well affect current and capital accounts of the countries under investigation. Empirical findings also highlight that factors influencing the relative price of imports and exports may lead to considerable amount of changes in foreign trade, which, in turn, may affect domestic production. It has been found that improvements in current account balance may deteriorate real economic activity due to a fall in high efficiency intermediate and capital goods. PVAR model estimations imply that short-term interest rates can be used as an efficient tool to eliminate real exchange rate misalignments and to alleviate the negative impact of external imbalances by influencing current accounts and capital accounts. Bond yield differences may have opposite impacts on real exchange rate and current account balance in OECD countries compared to short-term interest rates, while short-term interest rates do not have the capacity to control long-term interest rates.

JEL Classification: E44, E52, F32
Keywords: External Factors, Internal Factors, Monetary Policy, PVAR Model

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1. Introduction

Huge current account deficits and persistent exchange-rate misalignments, leading to massive trade deficits in the United States (U.S.) and some European countries, in combination with surpluses in several emerging Asian economies, are regarded by policymakers and researchers as the source of global economic imbalances. Under current economic conditions, monetary policy authorities aiming to maintain price stability have been incorporating in their decision making the role of external and internal economic factors that may lead to macroeconomic imbalances.

In this study, we analyse the interactions between current account dynamics, real exchange rates, interest rates, broad money, industrial production growth and inflation, in parallel to the Taylor rule principle, as Ferrero *et al.* (2008) implied, that targeting domestic inflation provides the optimal stabilization outcome for macroeconomic variables and external imbalances. Similar to the empirical methodology of Yuan and Chen (2015), we employ PVAR modelling to draw implications concerning monetary policy implementation in 12 OECD countries (Australia, Brazil, Canada, the Czech Republic, Iceland, Israel, Korea, New Zealand, Norway, South Africa, Sweden, and the United Kingdom) from 1999:Q1 to 2017:Q2 due to data availability. Countries included in the panel data-set concern both floating currency regimes and capital control regimes that are not classified as "Wall" by the IMF. Another feature pertaining to countries included in the study is their monetary policy frameworks, namely, inflation targeting. On the other hand, the number of countries included in our panel data-set can be increased regardless of their type of currency regime and capital control regime. However, this choice increases the number of OECD countries and, thus, the risk of an enhanced heterogeneity problem. For instance, the panel data-set of countries can be raised by including countries with a pegged exchange rate regime (Hungary and the Slovak Republic). In order to identify our modelling approach, we conducted the Hausman test, which reveals that fixed-effects models can be appropriate. In this study, PVAR models are employed for a sample of 12 OECD countries to determine interactions among real exchange rates, current account balances, short-term interest rates, differences in bond yields, broad money growth, industrial production growth, and inflation. In this respect, Helmert transformation is used as a technique to remove possible panel fixed effects due to our PVAR model. GMM is used as an estimation strategy because it provides more consistent estimates, particularly in fixed time and relatively large cross-section settings.

The main contribution of our study is that we incorporate both external and internal economic factors in our empirical analysis, since changes in monetary policy transmission truly stem from such factors. We regard the Federal Reserve's possible monetary policy change, in terms of raising interest rates, as an external economic development, since this possible policy is expected to lead to both capital outflows

from the emerging markets and fluctuations in macroeconomic aggregates. As another external factor, we include data on current account balances as a significant factor explaining major fragilities in these countries. Similarly to Yuan and Chen (2015), bilateral real exchange rates are included in the empirical study, and, thus, the dynamics of currency markets and inflation are taken into consideration, constituting another contribution of our study. Within this framework, we aim to show the effects of external factors on internal macroeconomic variables and we discuss how monetary policy authorities should respond to these macroeconomic developments by estimating impulse response functions (IRFs) and variance decompositions (VDCs). The main hypothesis of this paper tests whether changes in external macroeconomic variables may lead to a considerable impact on monetary policy and vice-versa. In this study, we intend to address the issue of whether monetary policy can be designed to lower negative consequences of external imbalances for maintaining financial and economic stability in said countries.

The article proceeds as follows: Section 2 reviews relevant theoretical and empirical studies. Section 3 presents empirical data and the methodological means proposed here to investigate interactions between real exchange rates, current account balances, bond yield spread, real economic activity and inflation. Section 4 sets out the PVAR models and empirical results. Finally, Section 5 concludes the paper and highlights some issues for further research.

2. Literature Review

In order to examine the relationship between internal and external macroeconomic variables, the Balassa-Samuelson effect proposed by Balassa and Samuelson (1964) can well constitute a theoretical base for researchers and policymakers. More specifically, productivity growth in the tradable sector can be recognised as an internal macroeconomic development that is a critical source of fluctuations in the economic growth rate and the real value of exchange rates. Changes in productivity can have impact on external macroeconomic variables, namely, current account balance, through changes in real exchange rates. Real exchange rates may be assumed as an internal macroeconomic variable due to the role of the domestic price level, while real exchange rates can also be regarded as an external macroeconomic variable due to the impact of foreign prices and of the highly globalised foreign exchange market.

Analysing disequilibrium in the balance of payments has rapidly gained ground in international macroeconomics literature due to persistent exchange-rate misalignments leading to massive trade imbalances in several emerging and advanced countries in the 2000s. Béreau *et al.* (2011) analysed a set of advanced and emerging economies, and showed that real exchange rate overvaluations negatively affected economic growth but improved current balance, whereas real exchange rate under-

valuation depressed current account balance by promoting real economic activity. Sallenave (2010) studied the impact of real effective exchange rate misalignments for the G20 countries over the period 1980–2006 using the behavioural equilibrium exchange rates (BEER). He suggested that the rate of convergence to the estimated equilibrium exchange rates was slower for industrialised countries and, moreover, exchange rate misalignments had a negative effect on economic growth, which, in turn, may lead to an improvement in current account balance. For the case of 22 industrialised countries, Gnimassoun and Mignon (2013) used panel techniques and found that the persistence of current account imbalances arose from currency misalignments, while disequilibria were persistent even for very low overvaluations in the euro area, contrary to non-euro area members. Using the BEER and the fundamental equilibrium exchange rate (FEER) approaches, Jeong *et al.* (2010) had findings partially in line with earlier studies, highlighting the importance of current account imbalances and exchange rate misalignments. By asserting that the impact of current account imbalances and exchange rate misalignments had dropped since the outbreak of the crisis in 2007, Jeong *et al.* (2010) revealed that exchange rate misalignments were important for each individual euro area member. In order to determine the dynamics of current account changes, price elasticity of foreign trade should be estimated. In this respect, real exchange rates can be a useful proxy, although the hypothesis of relative prices constancy has been widely criticised in empirical literature. Most studies in the literature found that relative prices are statistically insignificant, and, even when they are significant, price elasticities are very low when compared to income elasticities (Soukiazis *et al.*, 2014). The implication of Soukiazis *et al.* (2014) was supported by Blecker (2009), who indicated that relative prices are more likely to remain constant and current account balance is more sensitive to income than to price changes.

Just like the effects of internal macroeconomic factors on external economic factors, changes in external macroeconomic variables can also have crucial consequences for internal economic factors. Soukiazis *et al.* (2014) studied the case of Italy's experiencing lack of growth in the last decade and facing serious internal imbalances, which had been driven by high deficit and public debt. The authors implemented a scenario analysis based on their theoretical model and it was found that Italy grew at a slower pace than its potential capacity due to supply constraints. They also suggested that economic policies aimed at increasing external competitiveness and, thus, improvements in current account balance can be effective strategies to promote higher growth. Thirlwall's Law proposed by Thirlwall (1979) suggests that no country can grow faster than its balance of payments equilibrium growth rate, unless it can continuously finance external deficits by capital inflows (Soukiazis *et al.*, 2012). In terms of the analysis of disequilibrium in the balance of payments, Aizenman and Sun (2010) asserted that there were interactions between

current account balances among countries and that these interactions were related to differences in growth. They showed that large current account/GDP surpluses of countries might be constrained by the limited sustainability of larger current account deficits/GDP of countries with a slower growth rate. Lane and Pels (2012) revealed that real economic activity, more precisely lower savings and higher construction investment, rather than investment in productive capital, could help examine the dynamics of current account imbalances across Europe. Freund's (2005) study made a major contribution to relevant literature, indicating that current account reversals in industrial economies were accompanied by depreciation of real exchange rates, a decline in GDP growth, investment and imports and a rise in exports. Algieri and Bracke (2011) stated that current account balance adjustments could be driven by relative prices (expenditure switching), suggesting that quantity- and price-driven adjustment cases could be discerned, and, moreover, that the exchange rate regime and the level of economic development did not have significant predictive power for current account imbalances. Additionally, Fratzscher *et al.* (2010) employed a bayesian structural VAR (SVAR) model considering the role of asset prices in the U.S., and obtained outcomes similar to those by Algieri and Bracke (2011). More specifically, Fratzscher *et al.* (2010) found that equity market and housing price shocks were the major determinants of U.S. current account, while shocks to real exchange rates were less relevant for current account changes. Fratzscher *et al.* (2010) suggested that large exchange rate movements might not necessarily be a key element in the adjustment of large current account imbalances, whereas relative global asset price changes might impact the adjustment of current account imbalances. According to Duarte and Schnabl's (2015) study, which identified adjustment channels for global imbalances, it can be asserted that, besides domestic foreign measures, foreign economic developments may trigger current account adjustments, particularly in countries with a high level of openness. More specifically, Debelle and Galati (2005) found that global developments might trigger current account adjustments in industrial countries due to their impact on unwinding domestic imbalances. The authors implied that the bulk of *ex post* financial account adjustment occurred in private sector flows, primarily on the part of foreign investors.

Changes in the monetary policy stance may be recognised as an important factor influencing the relationship between the goods and foreign exchange markets and the current account balance. According to the concept of "overshooting," the implementation of a contractionary monetary policy causes a large initial appreciation in both nominal and real exchange rates followed by subsequent depreciations. More specifically, it is assumed that the short-run effect of a monetary shock on the exchange rate is greater than the long-run effect of the shock on the price of goods and services, which leads to exchange rates overshooting in the short-run. Possible changes in the monetary policy stance of the U.S.,

in terms of raising interest rates, are also expected to result in capital flows across countries, which, in turn, may have deleterious impact on the developing countries' economies, in parallel to the implications of Valente (2009), Bluedorn and Bowdler (2011), Barakchian (2015) and Yuan and Chen (2015). On the other hand, it can be asserted that interest rate differences can be highly influenced by external factors due to increased international capital mobility over the last decade. More specifically, the difference in yield between the bond and a benchmark US Treasury bond of similar maturity can be influenced by external macroeconomic variables. Banerji *et al.* (2014) employed the Structural Vector Autoregression (SVAR) model for China, Indonesia, Malaysia, and the Philippines using monthly data up to September 2009. Banerji *et al.* (2014) found that variations in sovereign spreads are mainly driven by external shocks, with term structure of US interest rates and global risk aversion having the most important direct effect on sovereign spread.

In terms of determining the effects of economic policies on the current account balance, credit volume, which is an internal macroeconomic variable, is critically important as an adjustment mechanism for current account imbalances along with monetary policy and exchange rate changes (Schnabl and Wollmershäuser, 2013). In their study, Schnabl and Wollmershäuser (2013) considered alternative institutional monetary arrangements (floating exchange rates, the European Monetary System, and the European Monetary Union [EMU]), estimating panel regressions for 15 Western European countries. They found that the impact of fiscal policy on current account balances was highly dependent on monetary policy stance, and more so than the exchange rate regime. Yuan and Chen (2015) employed a PVAR model to empirically examine the relationship between monetary policy, fiscal policy, exchange rates and external balances and their effects on GDP growth and price stability in BRICS countries. Due to low level of financial openness, nominal rigidity in the exchange rate and lack of price flexibility, Yuan and Chen (2015) found the impact of fiscal policy on current account balance to be weak. Conversely, it was implied that a rise in interest rates might have improved current account in BRICS countries and an extended loose monetary policy (mainly in the U.S.) would severely exacerbate massive global imbalances. While stressing the importance of interest rate decisions in the U.S. and emerging economies, it was implied that strengthening the trade-weighted real effective rates worsened BRICS countries' overall external positions. Yuan and Chen (2015) also revealed that shocks leading to weaker bilateral exchange rates (vis-à-vis the U.S. dollar) did not help improve these countries' trade balance against the U.S. Along with fiscal policy measures, the determination of the monetary policy framework can be an independently important factor in lowering negative impact in countries with current account deficits.

In this study, we employ similar theoretical and empirical methodology to that of Yuan and Chen (2015) for the analysis of external and internal macroeconomic

variables in 12 OECD countries with PVAR modelling. However, our approach differs from that of Yuan and Chen's (2015) in that we take into account real exchange rate misalignments and current account imbalances, bearing in mind that these external imbalances have had important consequences for economies, particularly in the last decade. Our study also differs from that of Yuan and Chen's (2015) because we analyse the effects of external macroeconomic factors and internal macroeconomic variables and discuss how monetary policy should respond to changes in external macroeconomic variables. Accordingly, what are also studied are possible effects of changes in monetary policy stances that are reflected in interest rate spread on external variables.

3. Research Methodology

3.1 Empirical Model

As for the empirical exercise, we address the relationship between real exchange rates, current account balances, long-term interest rates, credit volume, real economic activity and inflation, based on the estimation of a PVAR model for a sample of 12 countries over the period 1999:Q1 to 2017:Q2, taking into account data availability. We include real exchange rates ($rexch_t$) as a variable in the PVAR model based on the formula $rexch_t^x = p_t^x - p_t^{usa} - nexch_t^{usd/y}$, where $nexch_t^{usd/y}$ is defined in units of currency of country x (y) per unit of the currency of the U.S. (usd) in logarithms, while p_t^x and p_t^{usa} are the price levels of a country under investigation and of the U.S., in logarithms, respectively. The real exchange rate series incorporated into our model specification are based on the CPI, the base year being 2010=100); thus, the dynamics of inflation in the U.S. and the countries under investigation are considered in conjunction with the variations in currency markets.

Real exchange rate misalignments and current account imbalances are incorporated in the model by computing deviations from their long-run equilibrium values. For this purpose, the Hodrick-Prescott Filter is employed to remove the cyclical component of a time series from raw data and to derive the equilibrium real exchange rate series. Following a similar approach, long-run equilibrium values of current account balances are computed and current account imbalances are taken into account by subtracting current account series from their long-run equilibrium value. The Hodrick-Prescott filter is used with a smoothing factor of 1,600, which is what Hodrick-Prescott recommended for quarterly data. Alternative filtering techniques were also used to compute long-run equilibrium values for the series and they provided outcomes supporting the robustness of the Hodrick-Prescott filter implemented in our empirical exercise. The gap of the real exchange rate from its equilibrium value is denoted as ($drexch$), while ($dcur$) refers to the gap between the actual current account balance series (cur) from its long-run equilibrium value.

More precisely, the filtered current account series is the structural part of the current account and contains a deterministic or stochastic trend. The gap between the actual current account series and the filtered series reflects the cyclical component of the current account balance series. By subtracting 10-year U.S. government bond yields ($lyie_t^{usa}$)from the 10-year government bond yields of each country ($lyie_t^x$), differences in 10-year government bond yields ($dlyie$) are obtained. Short-term interest rates ($sirt$) reflecting the monetary policy stance of the OECD countries are proxied by call money/interbank rates. Growth rates of broad money ($brog$) and industrial production ($indg$) are expressed in percentage changes over the previous period. This is why we include inflation ($infl$), referring to the change in CPIs over the previous period of the current year. To include the consequences of the financial crisis 2007–2009 for the relations between variables, we investigate dummy variables taking the value of 1 for the period from 2007:Q1 to 2009:Q4. The ordering of variables in PVAR models are; $indg$, $infl$, $brog$, $sirt$, $dlyie$, $drexch$, $dcur$, respectively.

3.2 Identification of the PVAR Model

VAR models can be estimated in conjunction with fixed effects or independently of fixed effects after some transformation with OLS.

$$Y_{i,t} = Y_{i,t-1}A_1 + Y_{i,t-2}A_2 + Y_{i,t-p+1}A_{p-1} + Y_{i,t-p}A_p + X_{i,t}B + u_{i,t} + e_{i,t} \quad (1)$$

In equation (1), p refers to the lag length of the PVAR model, while Y_{it} denotes an $(1\times k)$ vector of dependent variables, and $X_{i,t}$ refers to an $(1\times l)$ vector of exogenous covariates. Dependent variable-specific fixed effects and idiosyncratic errors are represented by $(1\times k)$ vectors u_i and $e_{i,t}$, respectively. Finally, the $(k\times k)$ matrices $A_1, A_2, ..., A_{p-1}, A_p$ and the $(l\times k)$ matrix B are parameters of the model (Abrigo and Love, 2015: 2). Lags of all endogenous variables of all units are included in the model for cross-section i, while $e_{i,t}$ is accepted as correlated across i, and the intercept, the slope, and the variance of shocks $e_{1,i,t}$ may be cross-section specific (Canova and Ciccarelli, 2004: 8).

The model specified in (1) can be estimated using various methods based on the generalised method of moments (GMM); however, these estimations may be inconsistent, particularly in fixed N and T settings. To improve the efficiency of the PVAR with the GMM method, a longer set of lags can be used as instruments and, thus, equation-by-equation, GMM estimation may lead to consistent estimates of the PVAR model. If a number of $L \geq kp + l$ instruments are included in vector $Z_{i,t}$, the transformation of the model in (1) can be specified as follows:

$$Y_{i,t}^* = \overline{Y_{i,t}^*}A + e_{i,t}^* \quad (2)$$

In equation (2), the asterisk denotes the transformations of relevant variables. Thus, we have: $Y_{i,t}^{*}=[y_{i,t}^{1*},y_{i,t}^{2*},...,y_{i,t}^{k-1},y_{i,t}^{k*}]$ and $\overline{Y_{i,t}^{*}}=[Y_{i,t-1}^{*},Y_{i,t-2}^{*},...,Y_{i,t-p+1}^{*},Y_{i,t-p}^{*},X_{i,t}^{*}]$, $e_{i,t}^{*}=[e_{i,t}^{1*},e_{i,t}^{2*},...,e_{i,t}^{k-1*},e_{i,t}^{k*}]$ and $A^{'}=[A_1^{'},A_2^{'},...,A_{p-1}^{'},A_p^{'},B^{'}]$ (Abrigo and Love, 2015: 2–3). PVAR adopts an infinite order vector moving average (VMA) representation to compute impulse response functions and forecast error variance decompositions when the stability condition holds. Thus, the simple impulse response function Φ_i can be expressed by rewriting the model as an infinite VMA as follows:

$$\Phi_i=\sum_{j=1}^{i}\Phi_{t-j}A_j \tag{3}$$

where $I_k=\Phi_0$ and a shock to one variable is accompanied by shocks to other variables, since innovations $e_{i,t}$ in model (1) are correlated contemporaneously. In view of this, a matrix P can be used to orthogonalise innovations as $e_{i,t}P^{-1}$ and to transform the VMA parameters into the orthogonalised impulse responses $P\Phi_i$ (Abrigo and Love, 2015: 6). In addition, Cholesky decomposition determines the structure of the PVAR model and its impulse response estimates. In VAR-type models, VDC is also a crucial tool showing the proportion of movements in dependent variables due to their own shocks, as opposed to shocks to the other variables.

Within PVAR modelling, we examine the effects of real exchange rates and current account balances on monetary policy implementation and economic activity in parallel with the analysis of the monetary policy transmission mechanism in Yuan and Chen (2015). Our paper also contributes to the literature by considering the differences between interest rate policies of monetary authorities reflected in long-term government bond yields. As reflected in the ordering of variables in PVAR models, critical importance is given to the real exchange rates in the models, since real exchange rate misalignments may have considerable impact on current account balance via changes in international competiveness. Within our Cholesky decomposition, we assume that changes in international competiveness, referring to the change in real exchange rates, affect current account balances, which, in turn, affects the capital account and monetary policy stances. Accordingly, it is assumed that monetary policy influences broad money, real economic activity and inflation.

4. Results and Discussion

4.1 Panel Unit Root Analysis

For our empirical analysis, all series required are obtained from the database of the Federal Reserve Bank of St. Louis and databases of relevant central banks. In this regard, we use plausible techniques to generate the series included in our empirical model. The appropriate type of panel data model is determined by employing panel unit root tests based on different assumptions.

Table1. Panel Unit Root Test Results

	Levin, Lin and Chu		Im, Pesaran and Shin		Fisher-ADF		Pesaran	
	Statistic	Prob.	Statistic	Prob.	Statistic	Prob.	Statistic	Critical values at 5%
indg	-13.5107	0.0000	-15.1379	0.0000	439.9242	0.0000	-6.184	-2.09
infl	-13.6783	0.0000	-15.8595	0.0000	524.4702	0.0000	-5.806	-2.09
brog	-5.9470	0.0000	-8.6143	0.0000	179.7746	0.0000	-4.761	-2.09
sirt	-16.3701	0.0000	-17.2000	0.0000	575.1656	0.0000	-6.190	-2.09
dlyie	-1.9046	0.0284	-3.1536	0.0008	62.6254	0.0000	-3.041	-2.09
drexch	-18.1858	0.0000	-14.1437	0.0000	379.1853	0.0000	-6.350	-2.09
dcur	-1.4481	0.0738	-3.7327	0.0001	66.2064	0.0000	-2.971	-2.09

Source: Authors' Computation.

We use the Levin–Lin–Chu (LLC) panel unit root tests (Levin *et al.*, 2002), assuming that persistence parameters are common across cross-sections, whereas we apply the panel unit root tests of Im *et al.* (2003) and Fisher-ADF, based on the assumption that persistence parameters vary across cross-sections. We also take into consideration cross-sections by using Pesaran's (2007) panel unit root test. In Table 1, panel unit root tests indicate that the variables can be accepted as stationary. In this case, it is not possible to explore potential cointegration relationships among variables. Accordingly, variables are included into our empirical model in levels and we apply PVAR modelling due to theoretically accepted interactions among the variables in the study.

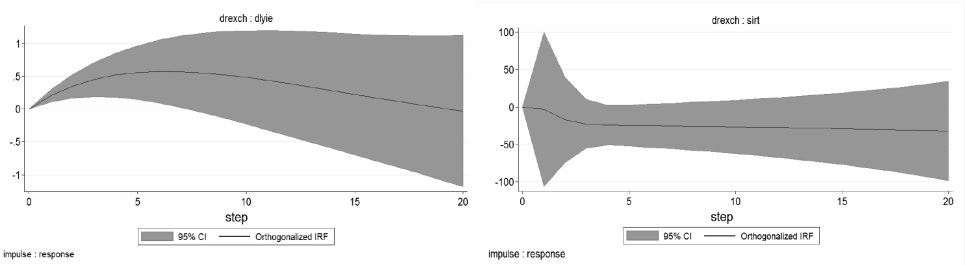
4.2 Empirical Analysis

PVAR models can be used for macroeconomic policy research because they are suitable for the analysis of macroeconomic variables without the need of imposing constant prior on the relationship between variables. In this study, we employ the Stata code written by Abrigo and Love (2015) to estimate our PVAR model and its IRFs and VDCs. We identify the PVAR model similarly to Abrigo and Love (2015) and Canova and Ciccarelli (2004); however, Nickell (1981) states that fixed effects estimators in autoregressive panel data models may be inconsistent. More precisely, Nickell (1981) suggested that fixed effects could be correlated with regressors due to lags in the dependent variable. Following Gnimassoun and Mignon (2013) and Abrigo and Love (2015), we apply the Helmert procedure to remove fixed effects, which allows us to use lagged regressors as instruments and estimate coefficients using the GMM procedure. The PVAR analysis is performed by choosing the optimal lag order in the PVAR specification and the moment condition. We employ the moment and model selection criteria (MMSC) proposed by Andrews and Lu (2001), whereupon VDC and impulse response analysis are conducted based on a PVAR (1) model.

4.2.1 Results of Impulse Response Analysis

Changes in real exchange rates may influence the monetary policy stance, which, in turn, leads to spreads in bond yields between the government bonds of the countries we investigate and those of the U.S. The IRFs reveal that appreciation in the real exchange rates of these countries may increase the spread of bond yields in the short-run; this finding is compatible with that of Fratzscher *et al.* (2010), but inconsistent with uncovered interest rate parity (UIRP) condition. Since net domestic assets are related to net foreign assets, we can assert that appreciation of the currencies of the countries under investigation may cause an outflow of funds from the bond market, which, in turn, negatively affects monetary aggregates and leads to financial and economic instability in the long run.

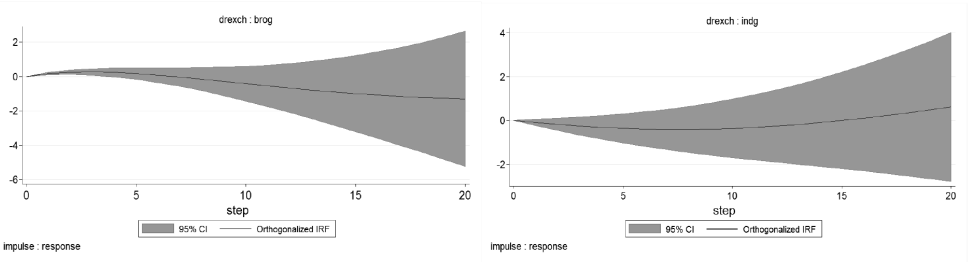
Figure1. Responses of *dlyie* and *sirt* to a *drexch* Shock



Source: Authors' Computation.

Our findings in regard to all the countries we have studied can also be interpreted as demonstrating that appreciation of their currencies against the U.S. dollar makes production factors and investment more expensive in terms of the U.S. dollar. Accordingly, this phenomenon may lower foreign direct investment and the flow of funds from the countries under investigation, leading to an increase in interest rates in these countries over long horizons. In order to avoid capital outflow, monetary policy authorities may use their tools, particularly by raising policy interest rates. On the other hand, as a result of the appreciation of home currencies of the 12 OECD countries against the US dollar, no statistically significant impact on call money/interbank rates has been detected. Thus, it is implied that the dynamics of the interbank money market cannot be influenced by real exchange rate fluctuations or monetary policy decisions in the OECD countries investigated.

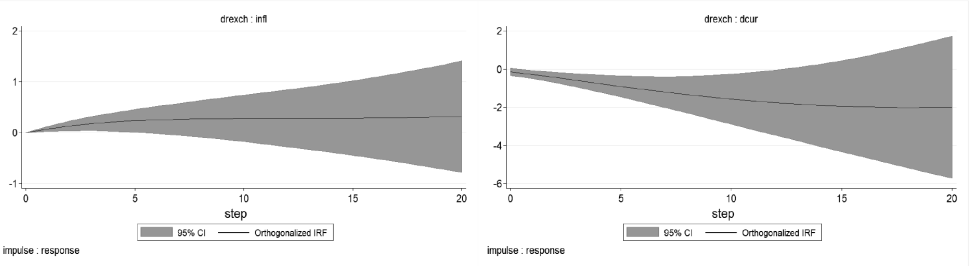
Figure 2. Responses of *brog* and *indg* to a *drexch* Shock



Source: Authors' Computation.

In terms of effects on monetary aggregates, IRFs reveal that real exchange rate appreciation in these countries does not lead to changes in growth rates of real broad money, indicating that channels through which real exchange rates affect broad money may not have a significant impact on other monetary aggregates and aggregate demand. Positive shocks in real exchange rates, namely, the appreciation of currencies of the countries under investigation against the U.S. dollar, influence economic activity in said countries. Contrary to Yuan and Chen (2015), we find that appreciation of real exchange rates may negatively affect industrial production growth, while inflation may increase in the short run. However, responses of industrial production growth and inflation to a positive shock in real exchange rate differences are not statistically significant.

Figure 3. Responses of *infl* and *dcur* to a *drexch* Shock

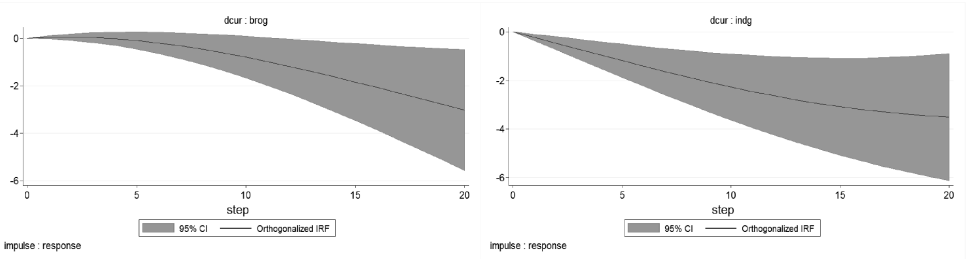


Source: Authors' Computation.

According to Kilian and Vigfusson (2011), the actual difference between these two responses seems small and, thus, it is not easy to make a case for using the asymmetric model on economic grounds, even though differences between positive and

negative shocks may exist in VAR-type models. Accordingly, it can be inferred that the appreciation/depreciation of the currencies of the countries under investigation does not lead to a considerable amount of changes in foreign trade, which, in turn, leads to deterioration/expansion in real economic activity due to potential decrease/increase in domestic production. More specifically, IRFs imply low price elasticity of foreign trade in all countries studied. Figure 3 shows that real exchange rate appreciation in the countries under investigation leads to increased current account deficits in the short-run. However, according to the IRFs, the impact of real exchange rate appreciation on current account balance is not statistically significant after the ensuing 10th quarter, revealing the opposite effects of real exchange rates on imports of final goods and imports of intermediate and capital goods for the countries we examined. It can be implied that current account balance adjustments may have expenditure switching features. More specifically, there may be real shocks (productivity shocks, labour supply shocks, government spending shocks, etc.) that are specific to one country. In this respect, nominal exchange rate changes may also allow for adjustment of relative international prices in the OECD countries under investigation.

Figure 4. Responses of *brog* and *indg* to a *dcur* Shock

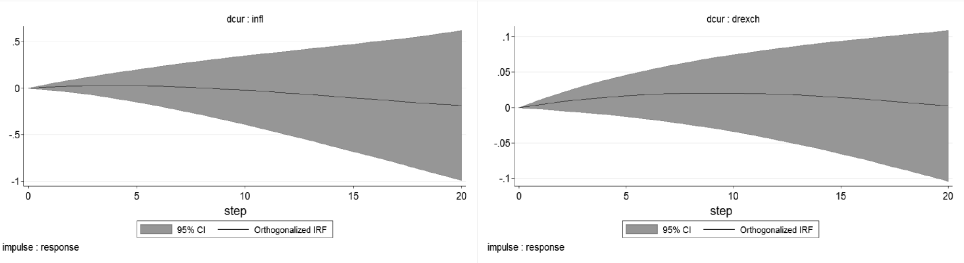


Source: Authors' Computation.

Changes in current account deficit reflect the need for foreign resources that have to be borrowed to fund investments. Current account deficit is also a major factor in terms of influencing risk perception, and, thus, may cause global imbalances. Our impulse response analysis shows that improvements in current account balance lead to a decrease in real broad money growth in all 12 countries. More precisely, we may infer that improvements in current account balance may eventually lead to a fall in capital account and, thus, growth rates of broad money decrease, as net domestic assets are related to net foreign assets. As a result of improvements in current account balance in the countries under investigation, we detect that industrial production growth rate falls in the ensuing periods, while no statistically significant impact on

inflation has been found. Accordingly, our impulse response exercise highlights that imports of relatively high efficiency intermediate and capital goods are critically important to sustain economic growth in the countries under investigation. The IRFs also highlight the importance of the size of balance sheets of central banks and quantitative easing policy of central banks for sustaining economic growth without causing inflation in all 12 countries.

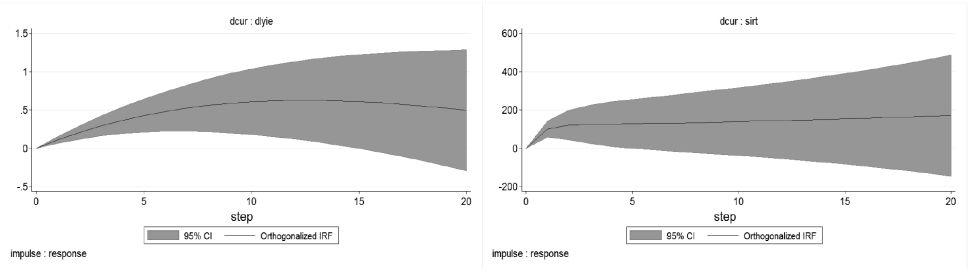
Figure 5. Responses of *infl* and *drexch* to a *dcur* Shock



Source: Authors' Computation.

On the other hand, we find that improvements in current account balance do not lead to statistically significant changes in the values of the currencies of these countries against the U.S. dollar, which is contrary to what Yuan and Chen (2015) support. We can interpret that improvements in current account balance of these countries lower risk perception, and, thus, lead to a fall in interest rates. However, improvements in current account balance can also be recognised as a factor leading to a fall in the flow of funds in domestic markets, which, in turn, increases long-term interest rates in the countries under investigation with respect to the US. We have detected that improvements in current account balance in all 12 countries increase the spread between the government bonds of said countries and the U.S. in ensuing periods. The flow of funds from the 12 OECD countries may also impact the interbank market by negatively influencing short-term financing conditions. Our impulse response exercise is in line with this implication, because short-term interest rates are increased as a result of improvements in current account balance. Therefore, we can infer that the volume of capital and financial account needed to balance the current account may have considerable impact on interest rate policy and the conditions of the money market in the countries we have investigated.

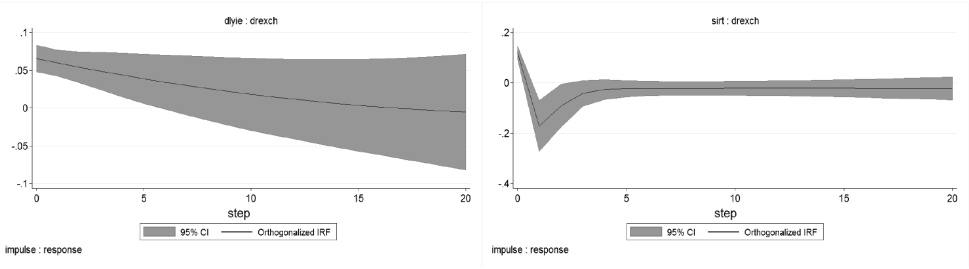
Figure 6. Responses of *dlyie* and *sirt* to a *dcur* Shock



Source: Authors' Computation.

According to our impulse response analysis, an increase in bond yield difference leads to fluctuations in the value of the currencies of the countries under investigation against the U.S. dollar, a finding that is partially in line with Yuan and Chen's one (2015). The response of the real exchange rate gap is not statistically significant after the ensuing 5th quarter; therefore, we cannot argue that implementation of a contractionary monetary policy in all 12 countries does not lead to inflow of funds into their money markets affecting deviations in real exchange rates in the long-term.

Figure 7. Response of *drexch* to a *dlyie* Shock and a *sirt* Shock

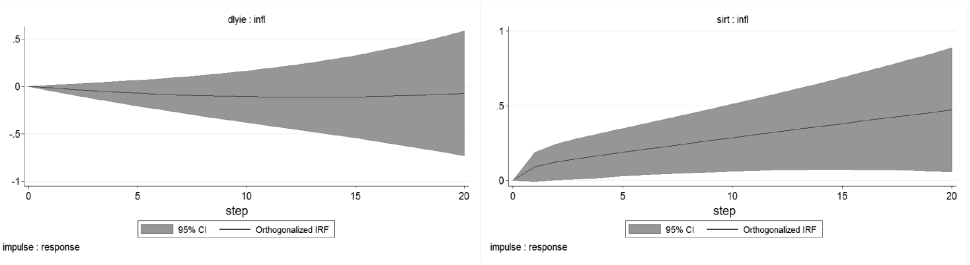


Source: Authors' Computation.

On the other hand, the impulse response exercise indicates that the real exchange rate of the 12 OECD countries may be depreciated up to the ensuing 5th quarter, as a result of a positive shock in the interbank interest rates of these countries contrary to the concept of "overshooting." In this respect, it may be interpreted that increases in short-term interest rates negatively affect expectations related to the economic conditions of the OECD countries we have investigated. Thus, possible capital outflow from these countries supports the existence of the UIP condition in the short-term.

It may be asserted that the short-term interest rate is an effective tool to stabilise real exchange rate fluctuations and eliminate real exchange rate misalignments in the short-term. It may also be interpreted that investors recognise changes in short-term interest rates and a signal of the change in the monetary policy stance of their central banks and, thus, they make their decisions accordingly. Herein, our impulse response exercise implies that long-term bonds are under the influence of the supply and demand dynamics of the bond market and the relationship of the bond market with other financial markets rather than changes in monetary policy stance.

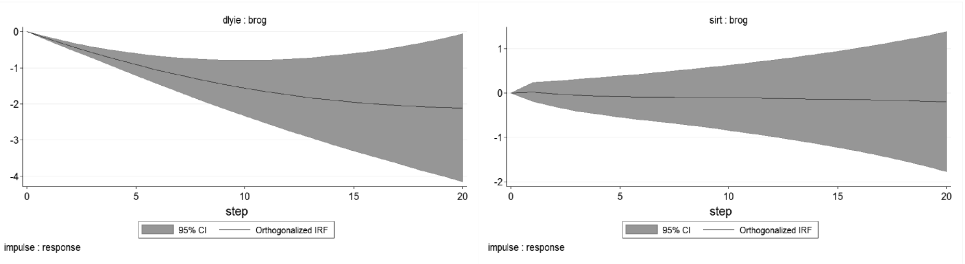
Figure 8. Response of *infl* to a *dlyie* Shock and a *sirt* Shock



Source: Authors' Computation.

The impulse response analysis also shows that an increase in the bond yield difference and interbank interest rate do not lead to a significant increase in inflation, which is inconsistent with the real interest rate parity (RIRP) condition. Our impulse response exercise shows that contractionary monetary policy implementation in the OECD countries under investigation may lead to increased inflation. We may interpret that inflation dynamics in the 12 OECD countries is much more under the influence of changes in aggregate supply than changes in aggregate demand. More precisely, increasing short-term interest rates is a factor negatively affecting the level of investments. It may also be inferred that high interest rates are a significant cost factor because of the high indebtedness of firms in said countries. Thus, the impulse response exercise implies that short-term interest rates may be an effective tool to control inflation in the OECD countries we have investigated.

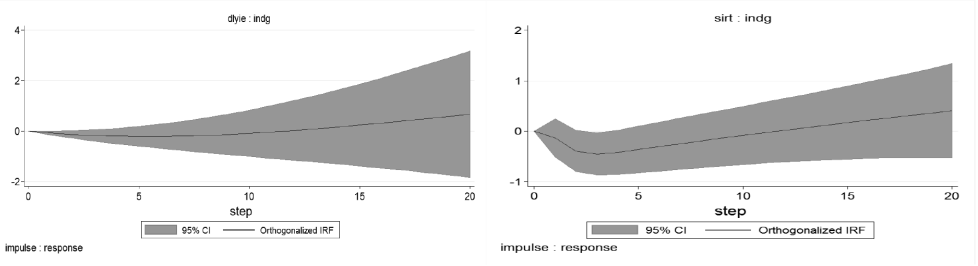
Figure 9. Response of *brog* to a *dlyie* Shock and a *sirt* Shock



Source: Authors' Computation.

Although we have found that an increase in bond yield difference may lead to a fall in broad money due to capital outflows, the impulse response exercise indicates that changes in short-term interest rates do not have any statistically significant impact on broad money growth. It may be asserted that short-term interest rates cannot be recognised as a major factor influencing money demand. Conversely, IRFs indicate that fluctuations in bond markets have crucial effects on money demand, in line with the liquidity preference theory.

Figure 10. Response of *indg* to a *dlyie* Shock and a *sirt* Shock

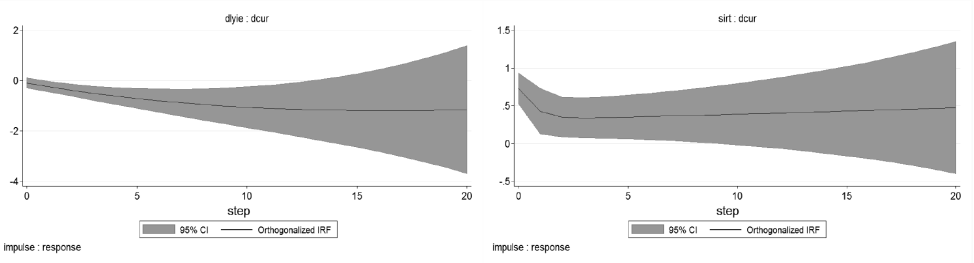


Source: Authors' Computation.

Figure 10 indicates that industrial production is not significantly affected by positive shocks in bond yield difference. IRFs show that changes in call money/interbank rates may influence industrial production and, therefore, short-term interest rates may be used as a policy tool to promote economic growth. More specifically, increasing short-term interest rates may lead to deterioration of real economic activity in line with theoretical expectations. Our assertion is also supported by the finding that changes in short-term interest rates positively affect current account balance due to decrease in domestic production and demand for imports. On the

other hand, bond yield differences may cause an increase in current account deficit according to the IRFs. This finding may be interpreted as meaning lower increases in bond yield difference lead to an increase in capital inflows to the bond market, which, in turn, facilitates the financing of current account deficits. Therefore, we can imply that changes in monetary policy stances may have a significant impact on total factor productivity or consumer preference shocks, which may influence expenditure decisions, and, thus, current account balance.

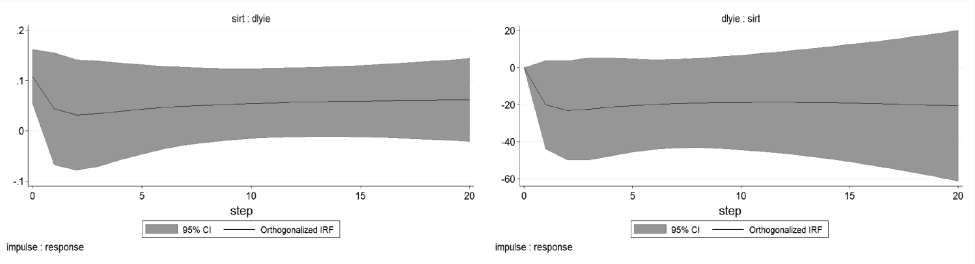
Figure 11. Response of *dcur* to a *dlyie* Shock and a *sirt* Shock



Source: Authors' Computation.

IRFs particularly stress the fact that interest assets with different maturities may have opposite impacts on macroeconomic variables. Thus, it is critically important to determine the effects of short-term interest rates on long-term interest rates, because monetary policy authorities aim to control long-term interest rates with their policy interest rate. As shown in Figure 12, increases in call money/interbank rate do not have any statistically significant impact on the 10-year government bond yield spread. It can be asserted that central banks of the OECD countries we have investigated cannot control long-term interest rates. It may also be interpreted that negative consequences of the rise in long-term interest rates cannot be eliminated by policy interest rate. On the other hand, bond yield difference does not have any impact on the interbank money market and monetary policy stance in said OECD countries. IRFs show that there is no relationship between short- and long-term interest rates; consequently, we propose that the monetary policy authorities of the 12 OECD countries should develop new tools and policies to control long-term interest rates.

Figure 12. Response of *dlyie* to a *sirt* Shock and Vice-Versa



Source: Authors' Computation.

4.2.2 Results of Variance Decomposition Analysis

VDCs based on our PVAR model are employed to determine the degree of significance of each variable included in the model. For this reason, sources of variation in real exchange rates may be useful in determining the consistency of purchasing power parity (PPP) in the countries under investigation. By performing VDC analysis, we can also draw implications about real exchange rate misalignments in the ensuing periods. According to our variance error decomposition analysis, deviations in real exchange rates may explain approximately 25% of the variation in themselves up to the 20th quarter. Although it is indicated that real exchange rates may have a considerable role when examining variations *per se* over the 20-quarter period, the total contribution of other variables is relatively higher, not supporting the consistency of PPP.

Table 2. VDCs of *drexch*

Forecast Horizon	Shocks						
	indg	*infl*	*brog*	*sirt*	*dlyie*	*drexch*	*dcur*
1	0	0	0	0	1	0	0
4	0.002439	3.37E-05	0.083881	0.001292	0.697336	0.184354	0.030664
8	0.004805	0.000296	0.077871	0.002286	0.52711	0.267327	0.120305
12	0.006143	0.000632	0.063153	0.002665	0.423709	0.262585	0.241113
16	0.006728	0.000796	0.049262	0.002681	0.340504	0.229236	0.370793
20	0.006782	0.000748	0.037523	0.002495	0.270753	0.189806	0.491893

Source: Authors' Computation.

Table 2 shows that changes in current account balance are the major source of fluctuations in real exchange rates, revealing the importance of changes in current account balance for real exchange rates. Accordingly, it may be inferred that current account balance may impact the dynamics of currency markets due to changing the need for funds to balance current account. In addition, the money markets of

all of the countries in the study and the U.S. may affect the value of real exchange rates and the foreign competiveness of the countries under investigation. Similarly, we have found that the spread between bonds yields accounts for nearly 30% of the variation in real exchange rates up to the 20th quarter. Therefore, it may be argued that variations in real exchange rates and real exchange rate misalignments may stem from external and internal economic factors. More precisely, it may be inferred that the dynamics of bond markets in the OECD countries and the Federal Reserve's possible monetary policy change in terms of raising interest rates can become crucial factors.

Table 3. VDCs of *dcur*

Forecast Horizon	Shocks						
	indg	*infl*	*brog*	*sirt*	*dlyie*	*drexch*	*dcur*
1	0	0	0	0	0	0.990672	0.009328
4	0.046537	0.00011	0.003336	0.000397	0.002551	0.936076	0.010993
8	0.244851	0.001872	0.004131	0.056228	0.003156	0.671289	0.018473
12	0.381341	0.005691	0.029729	0.138736	0.002956	0.391608	0.049939
16	0.432356	0.013172	0.071038	0.128606	0.002655	0.208789	0.143384
20	0.486443	0.023188	0.082544	0.094582	0.002389	0.140236	0.170618

Source: Authors' Computation.

Table 3 shows that shocks to the industrial production growth rate play the greatest role in explaining variations in current account balance up to the ensuing 20th quarter. Along with supply shocks, this result suggests that the dynamics of domestic economic agents' expenditures is a critical source of changes in current account balance for ensuing periods, as also referred by Aizenman and Sun (2010) and Lane and Pels (2012). Thus, the role of investment-specific and technology shocks may be regarded as important issues when analysing current account balance in all the countries we have examined. Based on our variance decomposition analysis, we can assert that currency markets may have an important role along with industrial production growth in the analysis of changes in current account balance, in line with Freund (2005) and De Haan *et al.* (2008). The VDCs indicate that deviations in real exchange rates can account for approximately 15% of the variation in current account balance up to the ensuing 20th quarter. This finding also implies that foreign price changes may be crucial for domestic variables and, more specifically, for current account balance in the countries we have investigated. According to the VDCs, it may be revealed that changes in real exchange rates can be expenditure switching. Our assertion is also supported by our finding that domestic inflation can explain nearly 8% of the variation in current account balance up to the ensuing 20th quarter.

The VDCs suggest that monetary policy decisions, and, therefore, the flow of funds across money markets have a considerable impact on current account balance, since call money/interbank rate and the spread of government bonds between countries under investigation and the U.S. account for approximately 10% of the variation in current account balance (deviation of the original series from its equilibrium value) over 20 quarters. Accordingly, we find support that supply, demand and nominal shocks arising from external and internal economic developments are important for the variations of current account balance in all of the countries investigated. We infer that the effects of monetary policy shocks on current account balance can be studied within the DSGE modelling framework, along with other shocks, to analyse current account imbalances. Furthermore, the VDCs indicate that current account balance can explain nearly 15% of the variation *per se* up to the ensuing 20th quarter, revealing its significance for the conclusion of foreign trade agreements, existing trade connections, and markets for foreign trade flows.

Table 4. VDCs of *sirt*

Forecast Horizon	Shocks						
	indg	*infl*	*brog*	*sirt*	*dlyie*	*drexch*	*dcur*
1	0	0	0	0.888307	0	0.05718	0.054513
4	0.000161	0.000251	7.44E-05	0.663867	0.022148	0.067111	0.246388
8	0.000386	0.000842	0.000245	0.398644	0.065349	0.067119	0.467415
12	0.000555	0.001079	0.000278	0.252624	0.075129	0.060282	0.610053
16	0.000754	0.001115	0.00025	0.167552	0.07208	0.05377	0.704479
20	0.001016	0.001067	0.000207	0.114464	0.066218	0.048465	0.768563

Source: Authors' Computation.

As shown in *Table 4*, call money/interbank rate plays the greatest role in explaining variations *per se* in ensuing periods. This finding exposes that the dynamics of the interbank money market is critically important in explaining variations in short-term interest rates. In this respect, it may be inferred that factors affecting short-term borrowing requirements of banks and the liquidity of the interbank money market should be analysed in detail. According to the VDCs, we can also interpret that the bond market may have a considerable impact on the interbank money market up to the ensuing 20th quarter. It can, therefore, be proposed that monetary policy authorities in the OECD countries we have investigated should also determine possible impact of long-term interest rates on short-term interest rates, when attempting to achieve their targets. Herein, external imbalance can become a crucial factor for variations in short-term interest rates, because VDCs indicate that current account balance may account for nearly 10% of the variation of the call money/interbank rate up to the ensuing 20th quarter.

Table 5. VDCs of *dlyie*

Forecast Horizon	Shocks						
	indg	*infl*	*brog*	*sirt*	*dlyie*	*drexch*	*dcur*
1	0.998671	3.75E-07	0.000233	0	0	0	0.001096
4	0.817059	0.0787558	0.014422	0.0012808	0.0268479	0.0302345	0.0314
8	0.561064	0.0602731	0.023583	0.0079883	0.0771834	0.0912144	0.178694
12	0.372323	0.087302	0.024242	0.020294	0.1488685	0.1086679	0.238303
16	0.270034	0.1019371	0.024242	0.0343977	0.2875056	0.0913705	0.190513
20	0.233593	0.0680835	0.018634	0.0410566	0.4493363	0.0681651	0.121131

Source: Authors' Computation.

Table 5 shows that changes in industrial production growth rate make a major contribution to variations in bond yield spreads between the countries under investigation and the U.S., explaining nearly 25% of the variation. Thus, we may infer that determining the effects of factors influencing aggregate demand is important, since this is also the case with technology shocks, in terms of analysing fluctuations in interest rates. Along with the level of real economic activity, our VDCs indicate that currency markets may affect the spread between bond yields, since we find that real exchange rates (deviation of the original series from its equilibrium value) account for nearly 5% of variation in bond yields up to the ensuing 20th quarter. Accordingly, we can also assert that changes in the level of foreign competiveness may cause considerable changes in the economic situation, which monetary policy authorities should consider in all countries analysed. We have also found that current account balance is another crucial variable in terms of analysing variations in bond yield spread, since the volume of current account balance can be a determinant of the level of capital needed and of financial account. On the other hand, we may argue that foreign and domestic prices may indirectly lead to changes in the dynamics of the bond market in all 12 countries, according to the VDCs. *Table 5* indicates that variations in government bond yield spread are mainly driven by their own shocks up to the ensuing 20th quarter in said countries. However, VDCs imply that short-term interest rates cannot be an efficient tool for controlling long-term interest rates, because variations in bond yield spread account for nearly %4 of variation in call money/interbank rate up to the ensuing 20th quarter. We can, therefore, infer that the previous dynamics leading to the flow of funds between the countries under investigation and the U.S. may well influence the dynamics of the flow of funds in future periods.

Table 6. VDCs of *brog*

Forecast Horizon	Shocks						
	indg	*infl*	*brog*	*sirt*	*dlyie*	*drexch*	*dcur*
1	0.00E+00	7.38E-01	5.70E-06	0	8.65E-07	0.00151	0.260483
4	7.90E-03	1.70E-01	5.73E-05	3.62E-02	2.47E-01	0.112838	0.426005
8	1.20E-02	4.22E-02	0.000298	1.21E-02	5.20E-01	0.228302	0.1851
12	1.12E-02	2.39E-02	0.001289	1.25E-02	5.82E-01	0.283303	0.085808
16	1.04E-02	2.39E-02	0.002406	3.37E-02	5.38E-01	0.296253	0.095341
20	1.17E-02	3.13E-02	0.003309	4.80E-02	4.99E-01	0.290619	0.116072

Source: Authors' Computation.

Broad money can be regarded as a crucial variable reflecting changes in economic situations. More precisely, the total volume of money supply in an economy highly interacts with various macroeconomic variables. The total volume of credit is also influenced by changes in the balance of payments, since net domestic assets are related to net foreign assets when the liberalisation and financial integration process is considered. In this respect, our VDCs show that current account balance and bond yield spread explain approximately 60% of variation in real broad money growth, verifying the significance of net foreign assets for monetary aggregates in the countries analysed. We can, therefore, assert that the foreign competiveness level and monetary policy stance of the countries investigated and the U.S. are factors influencing variations in credit volume. On the other hand, there can also be interactions among currency markets and money markets in the countries under investigation, since we find that deviations in real exchange rates account for nearly 30% of variation in broad money. Accordingly, we suggest that the central banks of all 12 countries should incorporate the role of financial markets in their monetary policy formulation and money demand equations. The VDCs also imply that foreign price dynamics may be transmitted to domestic prices in these countries through changes in credit volume and aggregate demand in future periods. We, therefore, suggest that this mechanism should be taken into consideration when determining monetary policy.

Table 7. VDCs of *indg*

Forecast Horizon	Shocks						
	indg	*infl*	*brog*	*sirt*	*dlyie*	*drexch*	*dcur*
1	6.83E-01	0.002615	2.25E-03	2.71E-03	0	0.257703	0.051722
4	5.75E-01	2.00E-03	3.69E-03	1.36E-01	6.11E-03	0.060743	0.216457
8	4.82E-01	0.005757	6.88E-03	1.11E-01	5.75E-02	0.113099	0.223764
12	4.58E-01	0.008082	1.49E-02	6.34E-02	9.62E-02	0.213301	0.146117
16	5.01E-01	0.00946	2.52E-02	7.96E-02	9.15E-02	0.200706	0.092534
20	5.93E-01	0.010305	3.37E-02	5.66E-02	7.44E-02	0.144218	0.087777

Source: Authors' Computation.

From *Table 7* it becomes apparent that the industrial production growth rate is influenced by its own past dynamics, since it accounts for nearly 60% of the variation *per se* up to the ensuing 20th quarter. If follows that we can assert that supply shocks, namely, technology shocks, are critically important when analysing fluctuations in business cycles in all countries in the study. On the other hand, we can also suggest that dynamics of the balance of payments play a considerable role in variations of real economic activity due to the role of current account balance and bond yield spread in explaining variations in industrial production growth rate. In this respect, determining domestic and foreign monetary policy implementation is an important issue regarding real business cycles for all countries investigated, as is the role of foreign trade agreements. The VDCs also indicate that domestic and foreign price and currency market dynamics can impact industrial production growth rate in all countries in the study. More precisely, we find that deviations in real exchange rates account for nearly 15% of variation in industrial production growth. Monetary policy decisions and the dynamics of bond markets may also prove important factors when explaining variations in industrial production growth, reflecting the role of money markets in real economic activity in the OECD countries under investigation. We can, therefore, assert that the general equilibrium modelling frameworks employed by the central banks of these countries should consider economic and financial factors as a major source of business cycle fluctuations, as also argued by Mishkin (2011) and Chauvet *et al.* (2015), although other variables in our empirical model are not major determinants of economic growth.

Table 8. VDCs of *infl*

	Shocks						
Forecast Horizon	*indg*	*infl*	*brog*	*sirt*	*dlyie*	*drexch*	*dcur*
1	0.019559	0.008833	1.70E-04	2.61E-03	1.12E-03	5.40E-01	0.427708
4	0.005405	0.190071	9.50E-03	4.52E-02	1.89E-03	4.02E-01	0.345934
8	0.004346	0.28234	6.46E-03	2.12E-01	1.53E-03	2.63E-01	0.230324
12	0.004683	0.287746	5.32E-03	2.27E-01	2.66E-03	2.39E-01	0.233591
16	0.004815	0.268857	4.91E-03	2.27E-01	5.93E-03	2.34E-01	0.254488
20	0.004696	0.260833	6.76E-03	2.41E-01	9.89E-03	2.27E-01	0.249821

Source: Authors' Computation.

Our VDC analysis also supports this assertion by indicating that inflation explains nearly 25% of the variation *per se*. Nevertheless, we can infer the importance of inflation expectations and pricing behaviours of economic agents in the countries under investigation. In terms of shaping inflation expectations, and, therefore, influencing inflation in future periods, real value of the currencies of all 12 countries may be regarded as a crucial factor, since we have found that deviations in real exchange rates account for approximately 20% of variation in inflation in the ensuing 20th quarter. We can, therefore, suggest that currency markets may have

a considerable impact on inflation in the countries under study. The VDCs also reveal that current account balance and call money/interbank rate can influence the supply and demand dynamics in said countries through changes in net foreign assets of their central banks. Therefore, the central banks of these countries should incorporate the financial sector and financial frictions in their general equilibrium frameworks.

5. Conclusions

In a framework of PVAR modelling with quarterly data, we have estimated VDCs and IRFs to determine interactions between variables. Our VDCs show that real exchange rates can be accepted as crucial sources of fluctuation in external and internal economic factors. Variations in real exchange rates may be expenditure switching and may lead to current account imbalances via changes to the level of foreign competiveness of Australia, Brazil, Canada, the Czech Republic, Iceland, Israel, Korea, New Zealand, Norway, South Africa, Sweden, and the United Kingdom. The VDCs also show that the real value of the currencies of the countries under investigation may affect domestic consumption and investment decisions of economic agents in these countries. It follows that it can also be asserted that real exchange rates may impact supply and demand dynamics in the goods market and lead to inflation in all 12 countries. The IRFs show that appreciation in real exchange rates leads to increased current account deficits, implying that the capital account size in these countries could eventually be influenced by deviations in real exchange rates.

The IRFs also reveal that appreciation in real exchange rates may increase bond yield spreads between the countries we study and the U.S, possibly due to an increased need for foreign funds to finance current account deficits in said countries. We can, therefore, infer that the real value of the currencies of Australia, Brazil, Canada, the Czech Republic, Iceland, Israel, Korea, New Zealand, Norway, South Africa, Sweden, and the United Kingdom against the U.S. dollar may have considerable impact on bond markets of these countries and the U.S., in contrast to the IFE and UIRP. However, IRFs showed that changes in real exchange rates do not have any statistically significant impact on call money/interbank rate. This finding indicates that the role of real exchange rates cannot be incorporated into monetary policy decisions in said OECD countries when implementing an inflation targeting regime. This implication is also supported by the finding of the IRFs that deviations in real exchange rates do not lead to statistically significant impact on industrial production growth and inflation. More specifically, these findings reveal that appreciation/depreciation of real exchange rates in said countries may lead to considerable changes in foreign trade, which, in turn, may negatively influence domestic producers and aggregate supply in all 12 countries. It can, therefore, be asserted that the price elasticity of foreign trade in these countries is relatively higher.

On the other hand, it can be assumed that current account balance is influenced by changes in real income and vice versa. The VCDs imply that positive shocks to current account balance may have considerable impact on the economic situation. The IRFs indicate that improvements in current account balance can lead to a negative economic outlook by negatively influencing industrial production growth. In this respect, we can interpret that the positive effect of decrease in final imported goods on real economic activity will be relatively lower than the negative effect of decrease in imports of relatively high efficiency intermediate and capital goods, affecting total factor productivity and industrial production growth. The IRFs also suggest that improvements in current account balance may lead to possible increase in net foreign reserves; however, this factor does not lead to appreciation of home currency, which, in turn, may negatively affect current account balance in the long term. Although net domestic assets are related to net foreign assets, IRFs imply that improvements in current account balance can lead to a fall in capital account, and thus, growth rate of broad money. Accordingly, IRFs also reveal that improvements in current account balance can also be recognised as a factor causing a fall in the flow of funds in domestic markets, which, in turn, increases short-term interest rates and long-term interest rates in the 12 countries in our study with respect to the U.S.

According to our empirical study, bond yield spreads can be accepted as another crucial variable that influences net foreign and net domestic assets. VDCs indicate that bond yield spread can lead to variations in real exchange rates, current account balances, broad money, industrial production growth, and inflation. Thus, we can infer that monetary and fiscal policy changes in these countries and in the U.S. may affect the flow of funds across said countries. However, the IFRs imply that contractionary economic policy in Australia, Brazil, Canada, the Czech Republic, Iceland, Israel, Korea, New Zealand, Norway, South Africa, Sweden, and the United Kingdom does not promote the flow of funds into their money markets, which, in turn, decreases broad money. According to the IRFs, it can be asserted that increases in short-term interest rates may negatively affect expectations in the OECD countries, which, in turn, cause capital outflows, depreciation of home currencies against the US dollar and a fall in imports, contrary to the concept of overshooting. This finding reveals that short-term interest rates can be used as an efficient monetary policy tool to eliminate real exchange misalignments in the short-term. On the other hand, bond yield spread has the opposite impact on real exchange rates, according to the IRFs. More precisely, increases in bond yield spread may lead to appreciation of home currencies in the OECD countries studied, due to the flow of funds. This assertion is supported by the finding of IRFs indicating that bond yield differences may result in a rise in current account deficit. Bond yield differences may cause increase in capital inflows to the bond market, which, in turn, facilitates the financing of current account deficits. IRFs show that increases in call money/inter-

bank rate do not have any statistically significant impact on the 10-year government bond yield spread. In this respect, it is suggested that monetary policy authorities of the 12 OECD countries should develop new tools and policies to control long-term interest rates. Consequently, for further research, an open-economy DSGE modelling framework should be adopted by policymakers and researchers to clarify the channels through which external and internal economic changes may impact macroeconomic variables in sample countries with the inclusion of exchange rates, domestic expenditure behaviours, foreign output, and inflation shocks, foreign and domestic monetary policy shocks, terms of trade shocks, and fiscal policy changes.

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