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The Interaction Between Conventional Monetary Policy and Financial Stability:

Chile, Colombia, Japan, Portugal and the UK

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The Interaction Between Conventional Monetary Policy and Financial Stability: Chile, Colombia, Japan, Portugal and the UK[1]

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Abstract

The relationship between monetary policy and financial stability has gained importance in recent years as Central Bank policy rates neared the zero-lower bound. The need to coordinate policy choices, to expand the scope of monetary policy measures and lastly, the need to target financial stability objectives while maintaining a primary objective of financial stability, has become essential. We use an SVAR model and impulse response functions to study the impact of monetary policy shocks on three proxies for financial stability as well as a proxy for economic growth. Our main results show that the Central Bank policy rate may be used to correct asset mispricing due to the inverse relationship between the policy rate and the stock market index. The results also show that, in line with theory, the exchange rate appreciates following a positive interest rate shock. Although the impact is only statistically significant for industrial production for the case of the UK, conventional monetary policy may indeed be able to contribute to financial stability when used in conjunction with alternative policy choices.

JEL Classification: E52, F42, F34, F55
Keywords: Monetary Policy, Financial Stability, Structural Vector Autoregressive Model

[1]I am grateful to António Afonso for his useful comments. Any omissions or exclusions are exclusively the author's own.
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1. Introduction

The relationship between monetary policy and financial stability became an important topic in the aftermath of the 2008-2009 Global Financial Crisis (GFC) as Central Banks lowered their policy rates in an effort to revive the economy and the zero-lower bound loomed[3]. Traditionally, price stability had been the main objective of Central Banks and hence, of monetary policy however, the crisis emphasized the need to implement alternative measures and to expand the scope of monetary policy to include a focus on the maintenance of financial stability while maintaining the primary objective of achieving price stability. Kryvstov et al. (2015) discusses the relationship between financial and macroeconomic conditions. They note that financial stability conditions are an important part of monetary policy implementation as financial stability is a precondition for a well-functioning financial system.

A number of SVAR analyses have been conducted on the U.S. Economy as well as other advanced economies. However, due to a lack of data availability and hence, shorter time series as well structural reforms in Latin American countries, SVARs have not been used frequently in econometric studies. SVAR models, based on the VAR approach suggested by Sims (1980) have been used frequently in Japan, Portugal and the UK with three available examples being Nakahira (2009), Afonso and Sousa (2009, 2012), Elbourne (2007) respectively. Mäki-Fränti (2003) points out that "the importance of monetary policy has further increased due to the diminished slack of fiscal policy and the practical difficulties to successfully conduct stabilizing fiscal policy". A decade after the GFC, financial stability and the effective implementation of monetary policy remains a priority for many Central Banks, studying the relationship between conventional monetary policy and financial stability, in particular, the effect on different areas of potential vulnerability may play an important role in future targeted policy decisions.

The purpose of this paper is to study the impact of short term interest rate shocks on financial stability for the cases of Chile, Colombia, Japan, Portugal and the UK. Monetary policy influences the amount of money in circulation in the economy as well as the borrowing cost of money. The countries chosen have autonomous, inflation targeting central banks, which provides the opportunity for more independent monetary policy decisions. In the case of Colombia and Chile, this combined with a lack of empirical studies due to limited data availability makes for an interesting case study. The UK dilemma in the midst of ongoing

[3] Advanced economies had limited options to further reduce policy rates and hence, employed unconventional monetary policy tools.

Brexit uncertainty and Japan's unending battle with deflation and sluggish growth justifies the study of the UK and Japan. Lastly, although Portuguese monetary policy is determined by the objectives of the European Central Bank, the effect on credit growth in Portugal is noteworthy considering Portugal's economic recovery following a bailout from the European Union which provides the reasoning behind the inclusion of this case.

A Structural Vector Autoregressive model is employed and impulse response functions are used in an effort to test the impact of monetary policy on financial stability. As in Cocriş and Nucu (2013), the impact of short term interest rates on three proxies for financial stability namely, credit growth (instead of loan-to-deposit ratio), stock prices and the exchange rate is studied. Industrial production is included as a proxy for the real sector and hence, for economic growth. Although GDP growth would usually be included as a representative variable for the business cycle, the accuracy of an SVAR model increases as the number of observations is increased, industrial production is therefore included due to the data being available monthly instead of quarterly. Our main results show that the Central Bank policy rate may be used to correct asset mispricing due to the inverse relationship between the policy rate and the stock market index. The results also show that, in line with theory, the exchange rate appreciates following a positive interest rate shock. Although the impact is only statistically significant for industrial production for the case of the UK, conventional monetary policy may indeed be able to contribute to financial stability when used in conjunction with alternative policy choices.

The rest of the paper is as follows: Section 2 surveys existing literature; Section 3 discusses the methodology and the data used; Section 4 discusses the empirical results; and Section 5 concludes.

2. Literature Review

Orphanides (2013) discusses the increased responsibility[4] placed on Central Banks namely in the aftermath of the GFC, he finds that overburdening monetary policy may result in Central Banks once again acting as agents of the government and hence, may potentially reduce both independence and credibility. Orphanides (2013) notes that by focussing on the single objective

[4] Full employment, fiscal sustainability and financial stability in an effort to strengthen weakened banks after the crisis. Borio (2014) notes that Central Banks have greater ambition following the crisis as they acknowledge that monetary policy may due more to prevent systematic financial crises however, great humility is needed in combination with this.

of price stability, doubts regarding capture could be held at bay. Jorda et al. (2011), Drehmann et al. (2011), Schularick and Taylor (2012) note that the most important predictor of financial crises is strong credit growth financed by foreign liabilities and Jorda et al. (2013) use a cross sectional study to show that excess credit growth in the period prior to a peak is usually associated with a more severe recession in both the case of a normal recession as well as a financial crisis. Low, stable and predictable inflation is necessary to achieve financial stability however, it is by no means sufficient (Poloz, 2015) while Bernanke and Gertler (1999, 2001) note that policy only needs to be acceptably sensitive to inflation forecasts. Alpanda and Zubairy (2014) find that under certain circumstances such as elevated household imbalances, monetary policy may have unforeseen side effects, Svensson (2014) has a similar view on the topic. Kocherlakota (2014) notes that monetary policy is needed as regulatory tools may result in residual systematic risk and Stein (2014) has a similar view as he notes that the build-up of imbalances is not completely prevented by regulatory measures. Stein (2013), Kohn (2013) and Bean (2014) conclude that the financial system becomes more resilient and financial stability improves (in the long run) in the presence of regulatory measures.

Khan et al. (2000) look at impulse response functions and find that sticky prices mean that optimal policy requires positive nominal rates with shocks affecting both the cost of credit as well as real quantities. Dudley (2014) concludes that monetary tightening in the US during the great moderation should have been more aggressive in an effort to curb the overheating of the housing sector. Adrian and Liang (2014) and Jimenez et al. (2014) find that periods of low interest rates may stimulate excessively risky behaviour by financial institutions and Farhi and Tirole (2012) find that this behaviour may also be amplified by the anticipation of policy intervention. Adrian et al. (2018) note that monetary policy tracks financial vulnerabilities and conditions and Bean et al. (2010) notes that the case for “leaning against the wind” is stronger in the post-crisis period than in the pre-crisis period. Aikman et al. (2016) use a threshold VAR to show that improved financial conditions and the credit-to-GDO gap depend on the level of the credit-to-GDP gap when compared to the trend level. A credit-to-GDP gap that is above the trend, combined with looser financial conditions, initially leads to an economic expansion however, this may result in a recession over time as the economy unwinds and a higher credit-to-GDP gap also makes monetary policy implementation more challenging.

Klaus and Woodford (2018) show that in the presence of housing subsidies and inefficiently low output, Central Banks who are concerned with the robustness of their PS expectation should "lean against the wind" and target higher inflation and a higher output gap when housing prices are lower than expected. Carney (2011) and Bauer (2014) show that high asset prices combined with low interest rates and financial stability for extended periods may lead to households becoming careless about their credit practices. Asiriyan et al. (2018) considers monetary policy in a bubbly world where low interest rates result in frequent booms and busts in asset prices. Both monetary policy and bubbles have expansionary effects on the economy with bubbles having both an overhand effect as well as a wealth effect[5]. Mendicino et al. (2018) find that macroeconomic impacts are magnified in periods where both the default rate of firms as well as that of banks is high. They find that shocks to non-diversifiable risk, when banks are highly leveraged, has a significant impact on financial instability. Côté (2014) looks at the case of Canada and points out that the circumstances under which it is appropriate to use monetary policy to "lean against the wind" should be more clearly defined. Edwards (2015) considers countries with flexible exchange rates, inflation targeting systems and capital mobility and finds that there is significant spillover of policies from larger, advanced economies to smaller, emerging economies. It is found that the Latin American policy rates are "Granger Caused" by changes in the Federal Fund rate and hence, destabilizing policies pursued by advanced Central Banks affect emerging economies' policy rates. The Mexican economy, which has a number of both European and U.S. banks is the focus of a paper by Morais et al. (2019) in which they find that firms that have a higher lagged share of foreign bank credit are more affected by foreign monetary policy and foreign banks have a tendency to soften lending conditions to firms with higher ex-ante interest rates in times of looser monetary policy. Bernanke and Lown (1991) and Calvo and Reinhart (2000) note that crises are often accompanied by bank credit crunches and halting foreign capital flows.

Adrian and Liang (2018) note that accommodative monetary policy in the presence of financial frictions may result in higher risk to financial stability as financial vulnerabilities may increase. The intertemporal trade-off between improving current financial conditions and increasing future financial vulnerabilities should be considered when setting monetary policy. Claessens et al. (2013) find that the monetary policy may affect the implementation of regulatory reform and Bean (2003) believes that financial stability should only be dealt with through regulation. Orphanides (2013) notes that monetary policy, as a substitute, is not an appropriate tool to restore global economic balance and Smaghi (2009) notes that unconventional measures are

[5] The overhand effect refers to resources being moved away from investment and the wealth effect refers to bubbles reducing the cost of intermediation.

warranted when the monetary policy transmission mechanism is impaired as shocks to the economy may be too large to be corrected by conventional monetary policy tools. Gelain and Ilbas (2013) note that when the primary objective of monetary policy is the maintenance of financial stability, the coordination of monetary and capital policy may not be optimal.

Anderson and Cesa-Bianchi (2018) show that the impact of monetary policy on firms' investment and borrowing decisions is affected by financial frictions with constrained firms investing or borrowing more in the presence of a strong financial accelerator and unconstrained firms investing or borrowing more in the presence of a weak financial accelerator. Bernanke and Blinder (1992), Bernanke et al. (1999) and Kashyap and Stein (2000) also look at the credit view of monetary policy and the financial accelerator with Bernanke and Gertler (1995) considering the credit channel view and the impact of monetary policy on financial constraints via the financial accelerator[6] mechanism. Jimenez et al. (2012) looks at the impact of monetary policy on the supply of credit, they show that tighter monetary policy and weaker economic conditions substantially reduce loan granting, in particular loan granting by banks with lower capital or liquidity ratios. Kashyap and Stein (2000) and Aiyar et al. (2014) find that the amount of lending by large banks is not as significantly impacted by monetary policy as small banks are, additionally, small banks react to both the tightening of capital requirements as well as monetary policy whereas larger banks react to capital requirements only. Jimenez et al. (2012) note that the crisis has shown that the use of monetary policy rates as a means of supporting credit supply seems advisable.

IMF (2013) discuss unconventional monetary policy and note that the aim of unconventional monetary policy is to restore the functioning of financial markets and to provide additional room for monetary policy when policy rates are close to the zero-lower bound. As IMF (2015) notes that price stability is not sufficient to achieve financial stability and Janet Yellen, the Chair of the Board of Governors of the U.S. Federal Reserve notes that: "Monetary policy faces significant limitations as a tool to promote financial stability… [However,] it may be appropriate to adjust monetary policy to "get in the cracks" that persist in the macroprudential framework." Stein (2014) also notes that monetary policy affects costs for both borrowers and lenders as it "gets in all the cracks. The BIS supports the interaction between monetary policy and financial stability, "Financial stability is too large a task for prudential […] frameworks

[6] Bernanke and Gertler (1989), Bernanke et al. (1996) and Kiyotaki and Moore (1997) also look at the effect of "financial accelerators".

alone. Monetary policy strategies also need to […] lean against the build-up of financial imbalances even if near-term inflation remains low and stable.”

Stein (2011) shows that in a simple economy where commercial banks are the only lenders, open-market operations may be able to regulate unregulated private money creation in an effort to prevent excess levels of short-term debt being issued. Lorenzoni (2008) note that an economy with financial frictions may be exposed to socially excessive borrowing and Bernanke and Gertler (1995) discuss the bank lending channel of monetary policy and conclude that this channel predicts a contraction in loans after an increase in interest rate when cash reserve requirements are binding and liquidity of banks is constrained. Van den Heuwel (2002) looks at the bank capital requirement channel of monetary policy which predicts that a tightening of monetary policy as a result of interest rate risk losses would cause bank capital to decrease.

Sims (1980) suggested that VARs are a useful tool in an econometric toolbox with the aim of evaluating alternative macroeconomic models. Eichenbaum and Evans (1995) make use of a VAR analysis to investigate the effect of shocks (in monetary policy) on exchange rates in the U.S. and find that contractionary monetary policy results in a long-lasting appreciation in the exchange rate. Cocriş and Nucu (2013) look at the relationship between financial stability and monetary policy in several Central and Eastern European countries and they find that, using a SVAR model and impulse response functions, in countries with inflation targeting schemes, the interest rate instrument is conductive to monetary policy. In countries with fixed exchange rates, monetary policy is not conductive to financial stability except in the case of Bulgaria.

Both Granville and Mallick (2009) and Cocriş and Nucu (2013) define financial stability in terms of the change in share price, the exchange rate as the units of local currency per unit of Euro and the bank-deposit ratio. Cocriş and Nucu (2013) go further to include the effect of monetary policy shocks on the real sector and include industrial production in the model. Dhyrmes and Dimitros (1997) look at more economically compatible SVAR models, they find that foreign interest rates and the real exchange rate are determinants of real output. Cavallari (2001) found that monetary shocks have no effect on real variables in the long run when considering a SVAR however, Lee and Chinn (2002) extended this model to include exchange rate data and found that monetary policy does indeed influence exchange rates. Dias et al. (2012) use an SVAR model to analyse the impact of European macroeconomic policy choices on Latin American Economies and find that European fiscal policy affects Latin American economies however, the impact differs for each Latin American country. Carrillo et al. (2017) study the impact of U.S. monetary policy shocks to the Mexican economy using a SVAR model, they find that U.S. monetary policy shocks explain roughly 60% of core inflation.

Canova (2005) uses an SVAR model to show that floating exchange rate regime countries are less affected by changes in U.S. monetary policy shocks than countries with fixed exchange rate regimes. The effect of monetary policy in advanced economies on financial conditions in emerging economies is considered by Takáts and Vela (2014), they use a VAR analysis to show that emerging market policy rates have been less affected by advanced economy monetary policy in the time after the global crisis. Takáts and Vela (2014) also show that U.S. long term policy rates have a significant impact on both international reserves as well as capital flows to emerging economies. Elbourne (2007) makes use of an SVAR model to analyse the impact of monetary policy shocks on the housing market in the UK and finds that a temporary positive shock to the short-term policy rate leads to a decrease in house prices. Afonso and Sousa (2009) make use of a Bayesian SVAR to study the macroeconomic impact of Portuguese fiscal policy, they find that shocks to government spending have a negative impact on GDP. Lastly, Nakahira (2009) makes use of a SVAR to analyse the impact of monetary policy in Japan, the results show that the both the interest rate targeting regime as well as the quantitative easing regime implemented in Japan were effective in the period studied.

3. Methodology and Data

Hurwicz (1962) explains that a structural model is one in which the impact of "interventions"[7] is predicted. This paper makes use of a Structural Vector Autoregressive (SVAR) model to identify the impact of interest rate policy on financial stability. I apply this methodology to the cases of Chile, Colombia, Japan, Portugal and the UK.

3.1. Methodology

The starting point for the SVAR model used in this paper is a Vector Autoregressive model of order p (VAR(p)) which can be written in matrix notation as follows:

$$X_t = \phi_0 + \sum_{l=1}^{p} \Phi_l X_{t-l} + \varepsilon_t \quad (1)$$

[7] "Deliberate policy actions, or changes in the economy or in the nature of known types." Sims (2002)

where X_t is a (K x 1) vector of endogenous variables, ϕ_0 is a (K x 1) vector of intercepts, Φ_l are (K x K) coefficient matrices and $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t}, \dots, \varepsilon_{kt})'$ is an unobservable error term with the following properties:

$$E[u_t] = 0 \quad (2)$$

$$E[u_t u_s] = 0 \, \forall \, t \neq s \quad (3)$$

and K is the number of variables, with

$$U_t = B_0 * \varepsilon_t. \quad (4)$$

The SVAR model is as follows:

$$B_0 X_t = c + B_1 X_{t-1} + B_2 X_{t-2} + B_p X_{t-p} + U_t \quad (5)$$

$$E\,(U_t) = 0 \quad (6)$$

$$var\,(U_t) = D \quad (7)$$

where U_t is a multivariate white noise process and B_i are (K x K) matrices with i = 0, …, p. Equation (4) represents the relationship between the reduced-form shocks and structural shocks. Matrix D contains K(K+1)/2 elements while $B_0, B_1, \dots, B_p$ contains (1+p)*K^2 lastly, c contains K elements. A Cholesky Decomposition allows us to solve the model with B_0 being lower triangular. The SVAR model implemented is based on that proposed by Sims (1980). A SVAR model allows for contemporaneous relationships between variables and also allows us to study the effect of a shock to one equation whilst other shocks remain constant. This makes the SVAR model more appropriate than a reduced-form VAR model in which error terms are correlated and hence, error terms cannot be decomposed into mutually orthogonal shocks (Schenck, 2016), as follows:

$$\begin{pmatrix} u_{ip} \\ u_{ir} \\ u_{cg} \\ u_{sp} \\ u_{er} \end{pmatrix} = \begin{pmatrix} b_{11} & 0 & 0 & 0 & 0 \\ b_{21} & b_{22} & 0 & 0 & 0 \\ b_{31} & b_{32} & b_{33} & 0 & 0 \\ b_{41} & b_{42} & b_{43} & b_{44} & 0 \\ b_{51} & b_{52} & b_{53} & b_{54} & b_{55} \end{pmatrix} * \begin{pmatrix} \varepsilon_{pr} \\ \varepsilon_{cg} \\ \varepsilon_{si} \\ \varepsilon_{er} \\ \varepsilon_{ip} \end{pmatrix} \begin{matrix} \textit{industrial production innovation} \\ \textit{short term policy rates innovation} \\ \textit{credit growth innovation} \\ \textit{stock price innovation} \\ \textit{exchange rate innovation} \end{matrix} . \quad (8)$$

The variables are ordered as above due to the assumption that industrial production affects all other variables contemporaneously, short term policy rates affect credit growth, stock price and the exchange rate contemporaneously however, short term policy rates do not affect industrial production contemporaneously. Credit growth affects stock price and the exchange rate contemporaneously however, industrial production and short-term policy rates are not affected contemporaneously by the credit growth. Changes in the stock price affect the exchange rate contemporaneously however, no other variables are affected contemporaneously. Lastly, the exchange rate does not have a contemporaneous effect on the other variables included in the model.

The lag length is selected using Akaike Info Criterion (AIC) and Final Prediction Error (FPE). The AIC and FPE suggest seven lags for Chile, Japan, Portugal and the UK while eight lags are suggested for Colombia.

A unit root analysis using the Augmented Dickey-Fuller (ADF) test shows that we fail to reject the null hypothesis of the presence of a unit root for all five variables across the sample of five countries with the exception of the Central Bank policy rate for Chile and Colombia and the industrial production for Japan. The level of certainty with which we can reject the null hypothesis of the presence of a unit for these variables increases when using the first difference. The first difference of the five variables is therefore used in all five cases as the variables can be characterized as having an order of integration of I(1) and hence the variables are non-stationary. The ADF test shows that the first-differenced variables have an order of integration of I(0) and hence the first-differenced variables are stationary.

The five countries included in the analysis have somewhat autonomous Central Banks with inflation targeting frameworks in place. These countries also have floating exchange rate regimes with Colombia having a managed floating exchange rate regime while the remaining four countries have a fully floating exchange rate regime.

3.2. Data

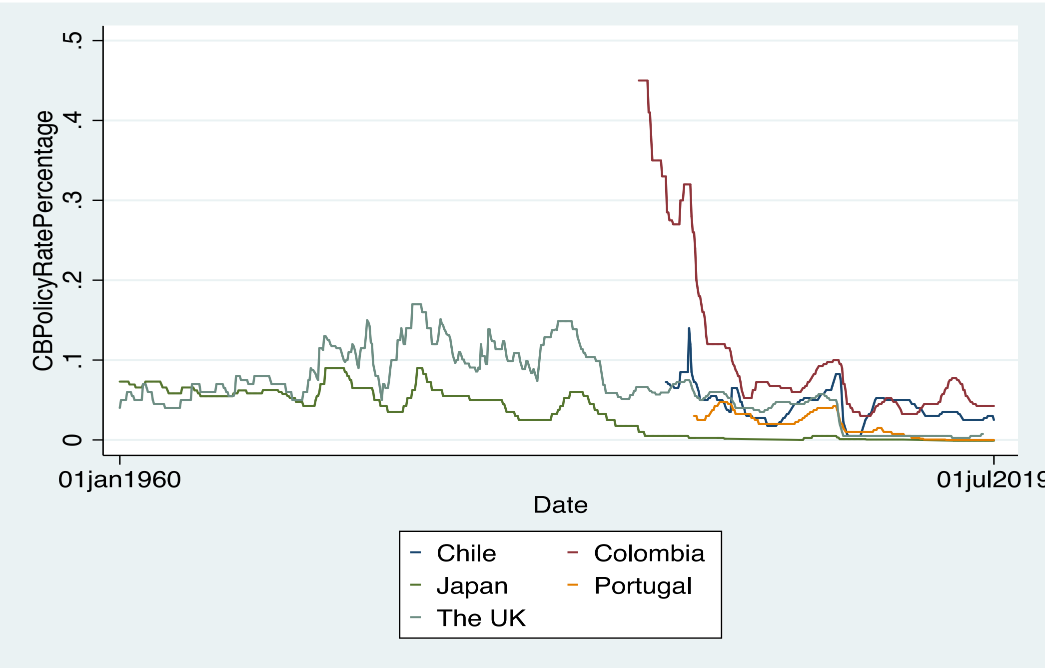
The global financial crisis emphasized the need to focus on both financial stability as well as price stability as the primary objective of Central Banks prior to the global crisis had been the maintenance of price stability. Three proxies for financial stability together with IPI to account for economic growth are included in the analysis with each proxy representing a sector of the economy which could potentially conceal financial stability risks (Cocriş and Nucu (2013)). Monetary policy is represented by the short-term interest rate in this paper, the Central Bank Policy Rate is used as available from the BIS.

The relevant variables are as follows:

- Credit growth as a proxy for the banking system (BIS total credit statistics);
- Stock index as a proxy for the capital market (World Bank calculations based on Datastream data);
- The Exchange rate measured as local currency units per unit of U.S. dollar as a proxy for the foreign exchange market (World Bank calculations based on Datastream data);
- Industrial production as a proxy for economic growth (World Bank calculations based on Datastream data).

Data is available for Chile between 2003m8 and 2018m5, Colombia between 2002m4 and 2016m5, Japan between 1991m10 and 2018m6, Portugal between 1999m11 to 2016m3 and the UK between 1991m10 and 2018m5. Breaks exist in the data, the number of observations is based on a balanced SVAR estimation. Monthly time series data is used, with the exception being credit growth data which is available quarterly. The quarterly growth data is interpolated using Cubic Spline to estimate the monthly values. Chile therefore has 177 observations, Colombia has 170 observations, Japan has 167 observations, Portugal has 197 observations and lastly, the UK has 321 observations. Figure 1 plots the Central Bank policy rate for the five countries over the period between 1960 and 2019.

Figure 1



Data Source: BIS Statistics.

4. Empirical Results

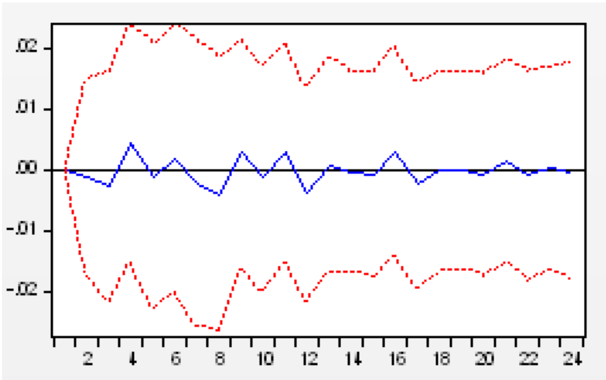
4.1 Orthogonalized Impulse Response Functions: Short Run Impact

Chile

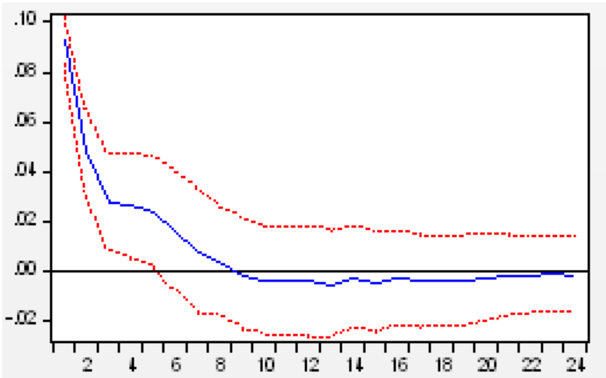
Figure 2

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Chile to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

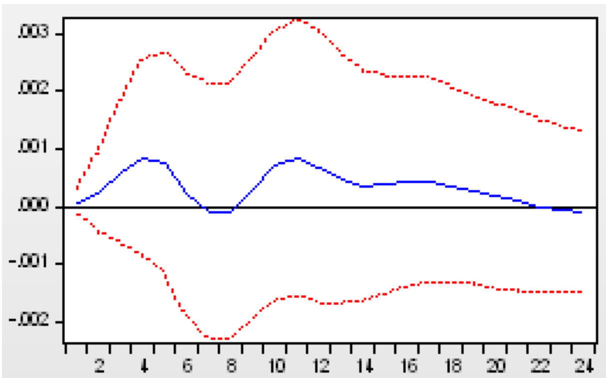
Response of Industrial Production to Central Bank Policy Rate



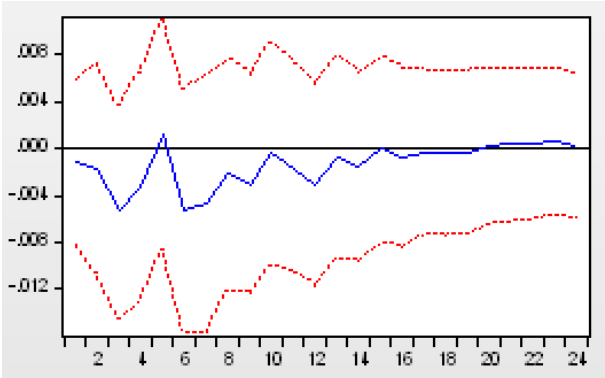
Response of Central Bank Policy Rate to Central Bank Policy Rate



Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate

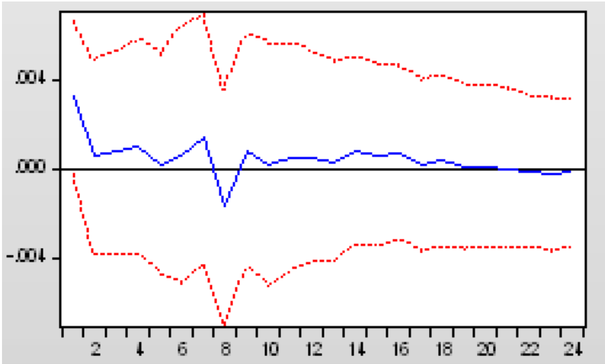


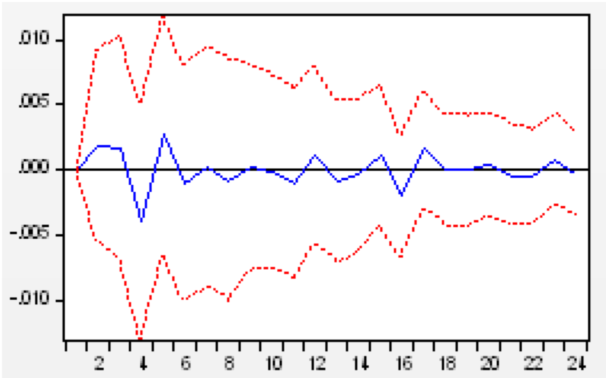
Figure 2 shows the short run impulse response functions for the case of Chile. Industrial production experiences a decrease of roughly 0.25% after 2 periods, the level of the industrial production index continues to fluctuate around the benchmark value and returns to the benchmark value after 21 periods. When looking at the response of credit growth to an interest rate shock, one can see that a shock to interest rates has a minimal effect on credit, credit increases roughly 0.1% after 4 periods and returns to the benchmark level after 21 periods. The level of the stock market decreases to a level roughly 0.5% lower than the benchmark level two periods after an interest rate shock. The level of the stock market index experiences a slight fluctuation around the benchmark value for the first 19 periods after an interest rate shock is introduced after which point, the index returns to the benchmark level. Lastly, the exchange rate experiences an immediate jump of about 0.35% however, this immediately returns to a level just above the benchmark level with a slight decrease of about 0.15% occurring after 7 periods.

Colombia

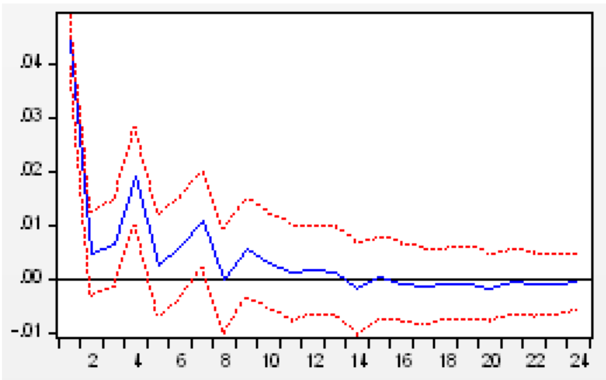
Figure 3

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Colombia to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

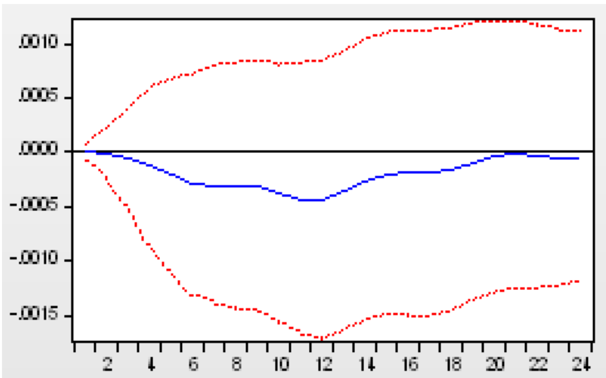
Response of Industrial Production to Central Bank Policy Rate



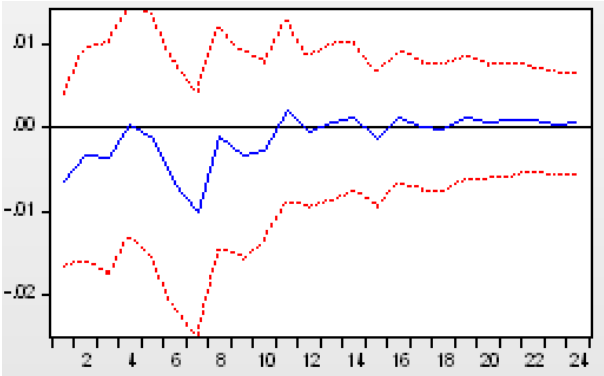
Response of Central Bank Policy Rate to Central Bank Policy Rate



Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate

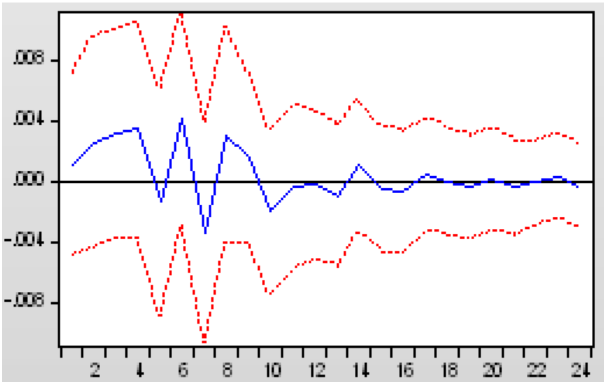


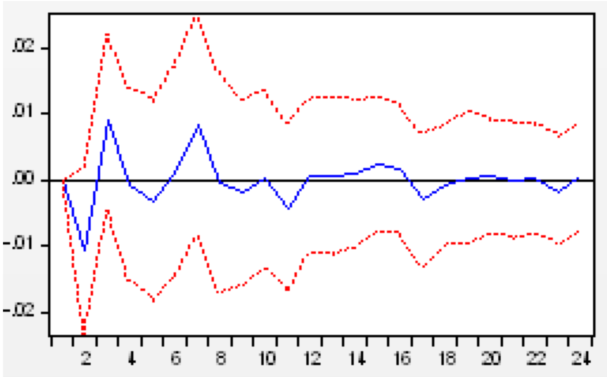
Figure 3 shows the short run impulse response functions for the case of Colombia, an interest rate shock results in a roughly 0.2% increase in the level of industrial production index with the level of the industrial production index returning to the benchmark level after about 18 periods. The response of credit to an interest rate shock is once again minimal, similarly to the case of Chile, with the credit decreasing to a level 0.04% below the benchmark level after 11 periods. The level of stock market index falls 0.8% immediately after an interest rate shock, after 7 periods this level decreases further to a level roughly 1% below the benchmark level. The level finally returns to the benchmark level after 14 periods. The exchange rate experiences an immediate shock of roughly 0.1% of the benchmark level however, after 4 periods, this shock becomes negative. In period 5, this impact is once again positive with a magnitude of 0.4%. After 16 periods, the effect of the shocks disappears as the level of the exchange rate returns to the benchmark level.

Japan

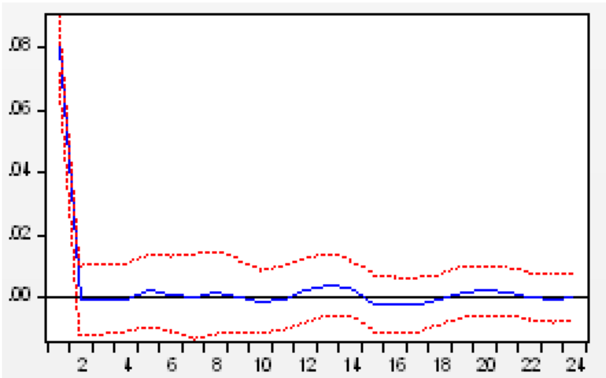
Figure 4

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Japan to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

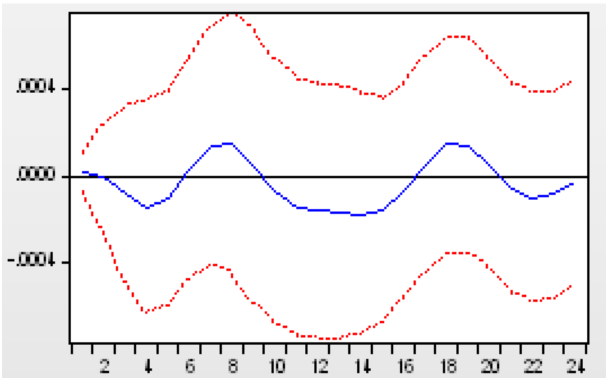
Response of Industrial Production to Central Bank Policy Rate



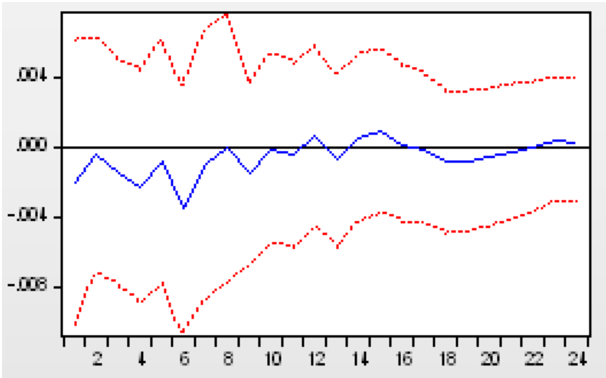
Response of Central Bank Policy Rate to Central Bank Policy Rate



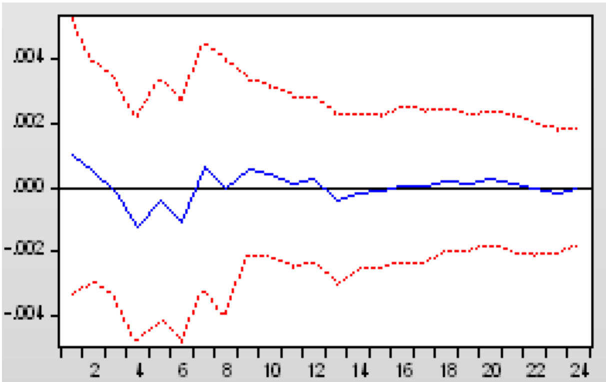
Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate



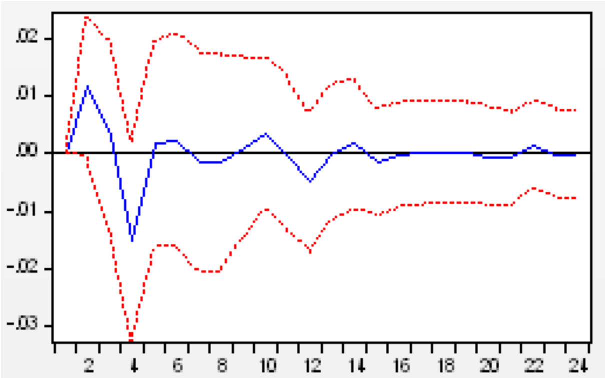
In figure 4, Industrial production decreases by 0.1% one period after a short run interest rate shock, after 2 periods this impact shifts to a level of roughly 0.9% above the benchmark level. The effect of the interest rate shock diminishes after roughly 12 periods with the level of the industrial production index returning to the benchmark level after 18 periods. The impact of an interest rate shock on credit is negligible with credit fluctuating between a level 0.01% above and below the benchmark level. The level of the stock market index falls roughly 0.2% immediately after an interest rate shock and returns to the benchmark level 16 months after the short run interest rate shock. The exchange rate increases 0.1% immediately after an interest rate shock and returns to the benchmark level after 12 months.

Portugal

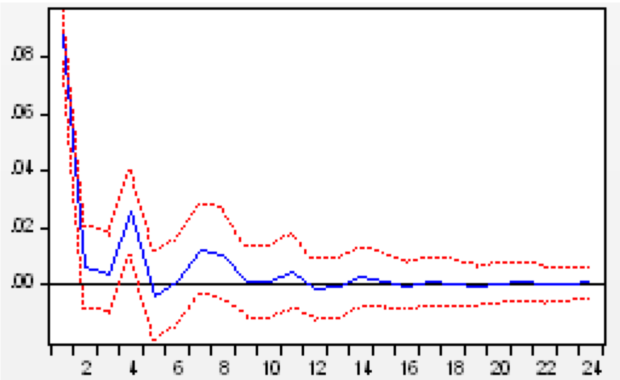
Figure 5

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Portugal to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

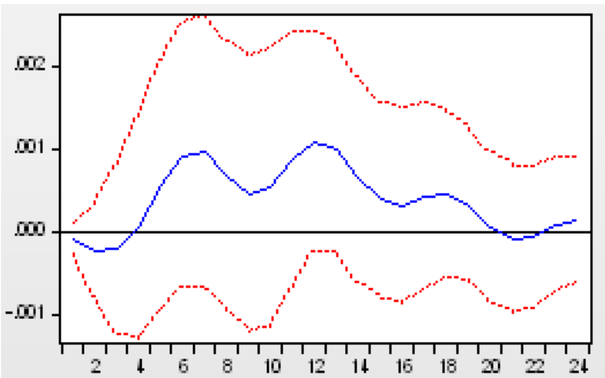
Response of Industrial Production to Central Bank Policy Rate



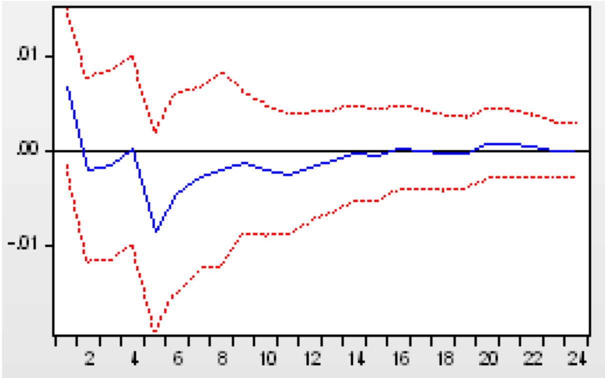
Response of Central Bank Policy Rate to Central Bank Policy Rate



Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate

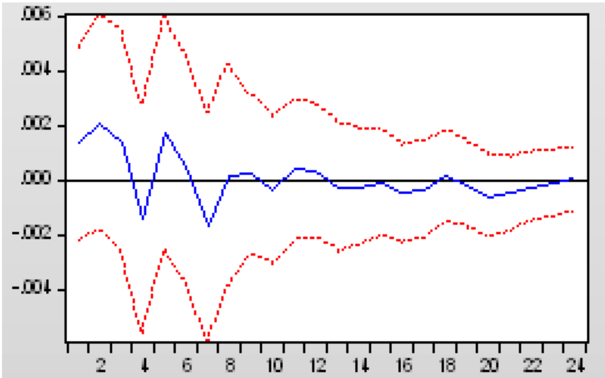


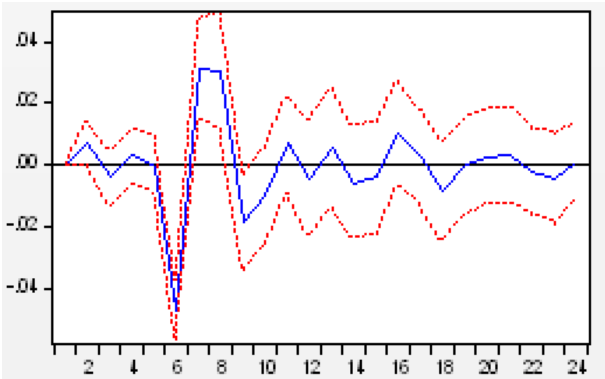
Figure 5 shows the impulse response functions for the case of Portugal, the level of the industrial production index increases by 1% two periods after a short run interest rate shock, after four periods the level of industrial production index decreases to a level roughly 1.4% below that of the benchmark level. After 14 periods, the level of the industrial production index returns to the benchmark level. Six periods after an interest rate shock, the level of credit increases to a level roughly 0.1% above the benchmark level and at the end of a twenty-four-month period, the impact is minimal. The stock market index increases by 0.8% immediately after a short run interest rate shock, four periods after an interest rate shock the level of the stock market index decreases to 0.8% below the benchmark level. Roughly 13 periods after an interest rate shock, the stock market index returns to the benchmark level. The impact on the exchange rate is minimal with the exchange rate returning to roughly the benchmark level after 8 periods after reaching a maximum point of 0.2% above the benchmark one period after the interest rate shock.

The UK

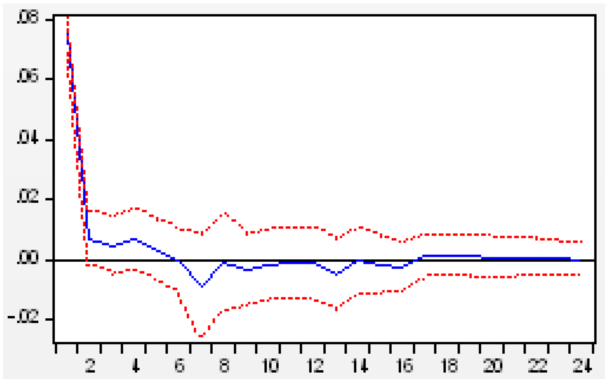
Figure 6

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in the UK to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

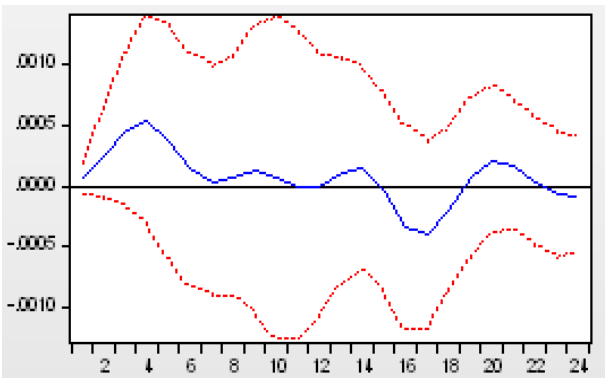
Response of Industrial Production to Central Bank Policy Rate



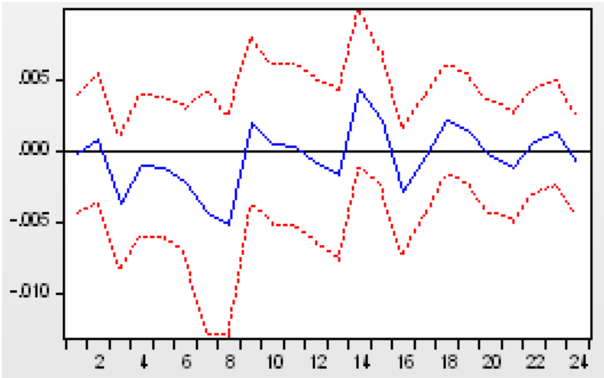
Response of Central Bank Policy Rate to Central Bank Policy Rate



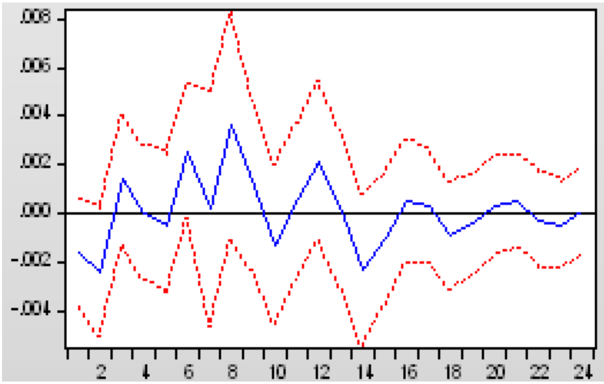
Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate



In figure 6, the industrial production decreases by roughly 4% after 6 periods, this decrease then reverses and the industrial productions rises to a level 3% above the benchmark level after 8 periods. After 18 periods, the level of industrial production steadies. The impact on credit is negligible with the level of credit moving between 0.05% of the benchmark level for the 24 months following an interest rate shock. The stock market decreases to 0.5% 0f the benchmark level 8 periods after the interest rate shock, this increases to 0.5% of the benchmark level after 14 periods. The exchange rate decreases to roughly 0.2% below the benchmark level two months after an interest rate shock, this then increases to 0.4% above the benchmark level after 8 periods. After 15 periods, the exchange rate fluctuation steadies and the variation around the benchmark decreases.

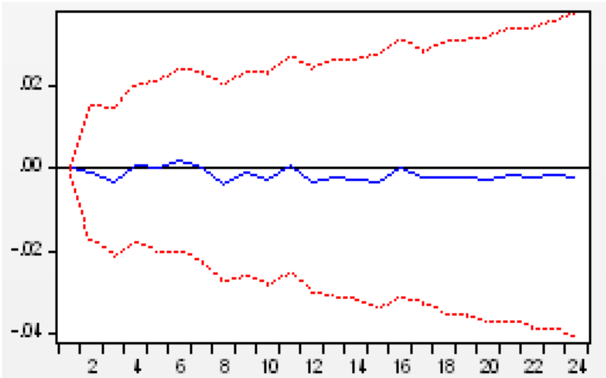
4.2 Cumulative Orthogonalized Impulse Response Functions: Long Run Impact

Chile

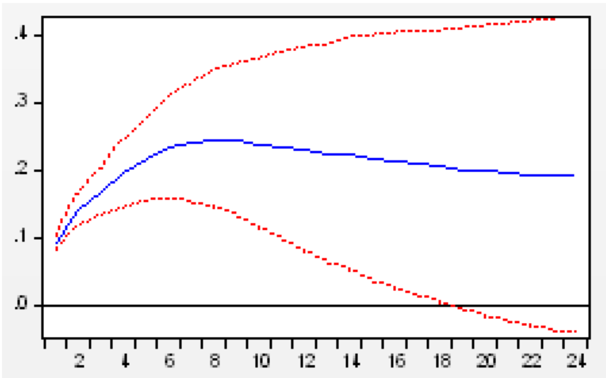
Figure 7

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Chile to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

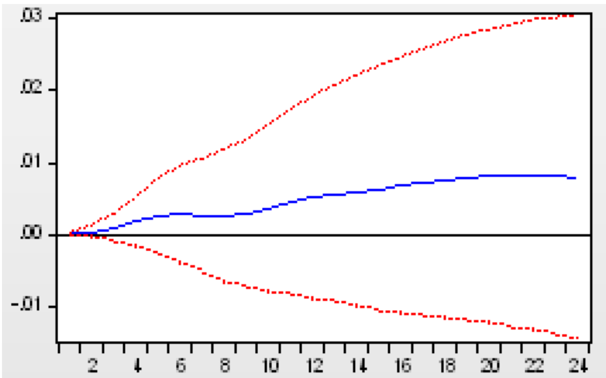
Response of Industrial Production to Central Bank Policy Rate



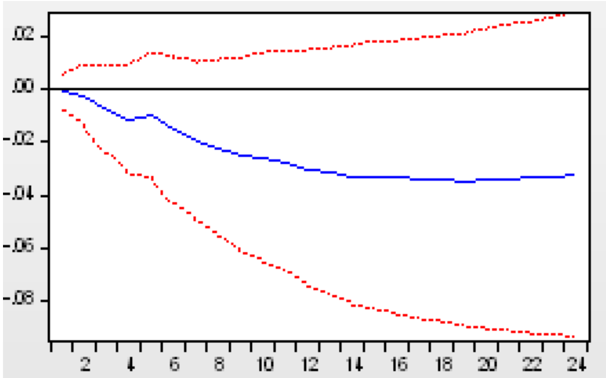
Response of Central Bank Policy Rate to Central Bank Policy Rate



Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate

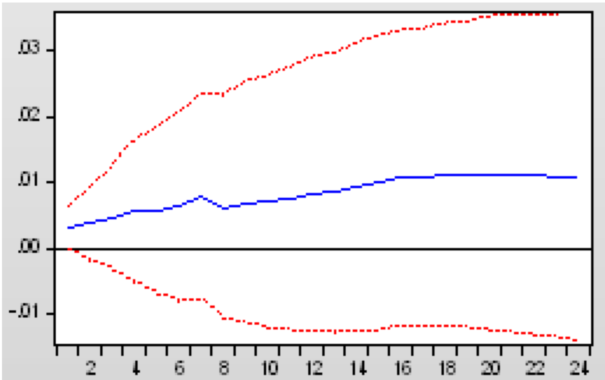


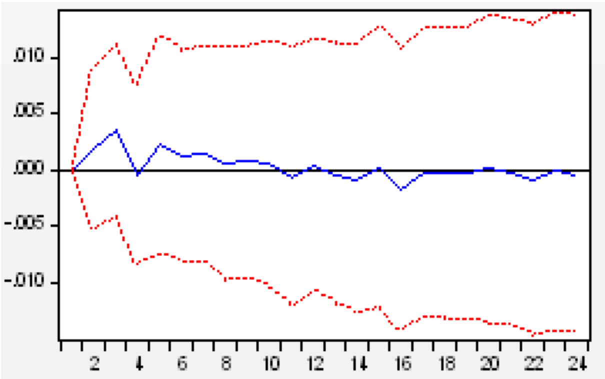
Figure 7 shows the long run impulse response functions for the case of Chile. Industrial production does not exhibit a significant reaction to a long run interest rate shock with the level of industrial production hovering slightly below that of the benchmark level. The level of credit increases gradually over the 24-month period following a long run interest rate shock and reaches a level that is roughly 0.8% higher than the benchmark level. The stock market index immediately reacts to a long run interest rate shock, three periods after the shock, the level is 1% lower than the benchmark level. 24 Months after a long run interest rate shock, the level of the stock market index is 3% below the benchmark level. The exchange rate increases to a level 1% above the benchmark level after 24 months.

Colombia

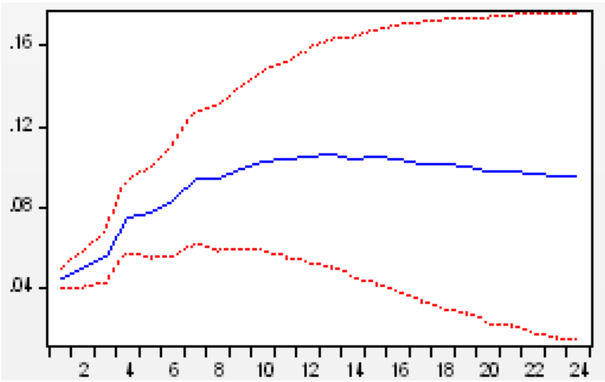
Figure 8

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Colombia to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

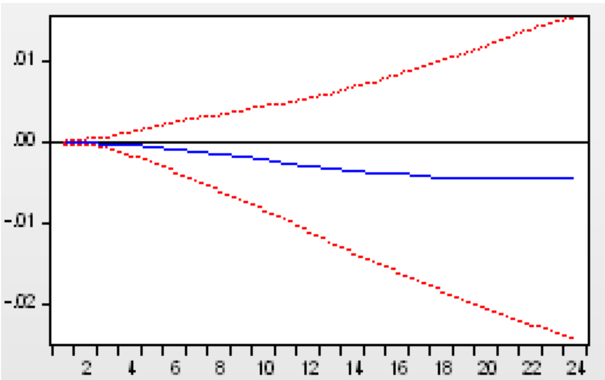
Response of Industrial Production to Central Bank Policy Rate



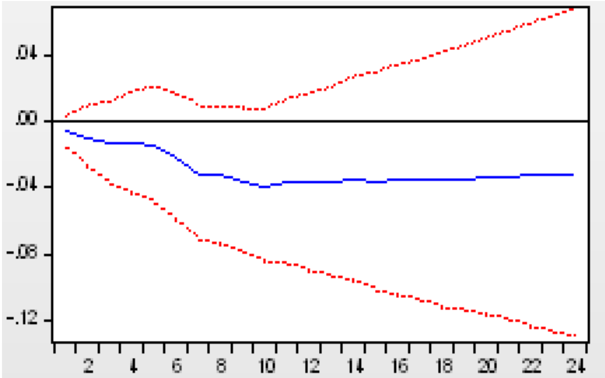
Response of Central Bank Policy Rate to Central Bank Policy Rate



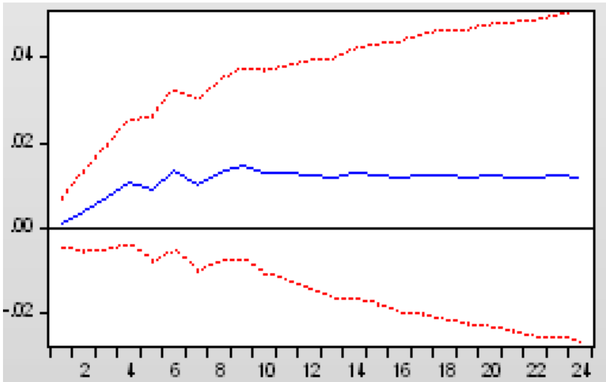
Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate



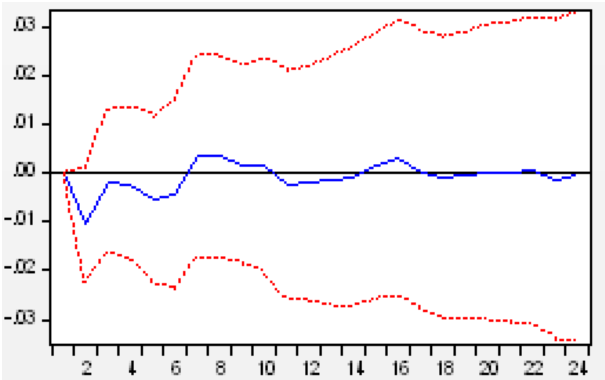
In figure 8, the industrial production increases by roughly 0.3% two periods after an interest rate shock and after nine months, the impact of this shock has dissipated. Credit declines gradually following an interest rate shock and after 24 months, the level of credit is roughly 0.3% lower than the benchmark level. The level of the stock market index decreases by roughly 4% over the first 8 months following an interest rate shock, the level then plateaus. The exchange rate reaches a level 1.5% higher than the benchmark level five months after the interest rate shock. 24 months after the interest rate shock, the exchange rate is at a level 1% higher than the benchmark level.

Japan

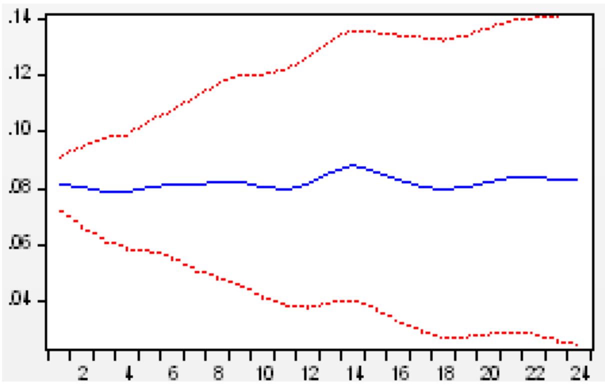
Figure 9

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Japan to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

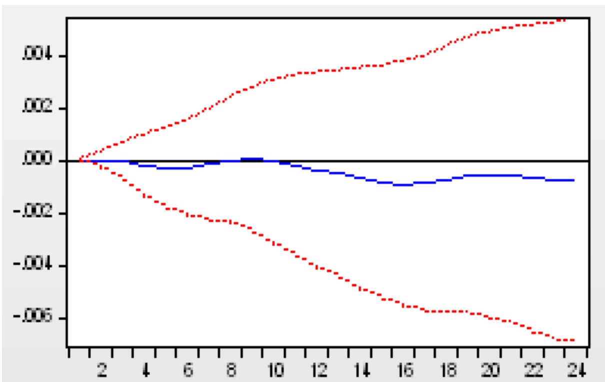
Response of Industrial Production to Central Bank Policy Rate



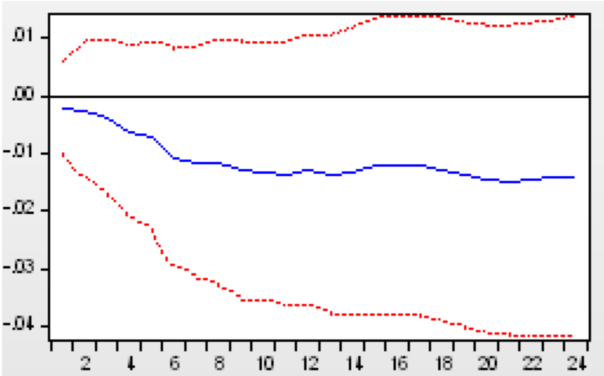
Response of Central Bank Policy Rate to Central Bank Policy Rate



Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate

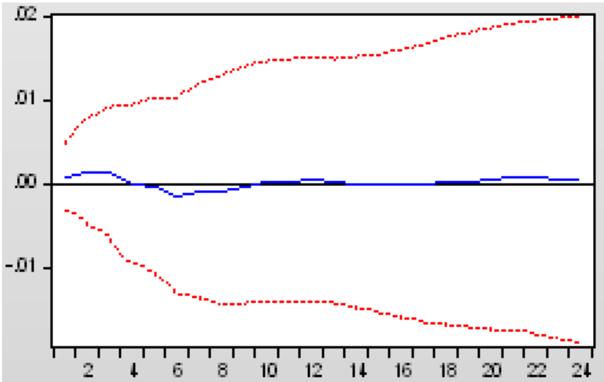


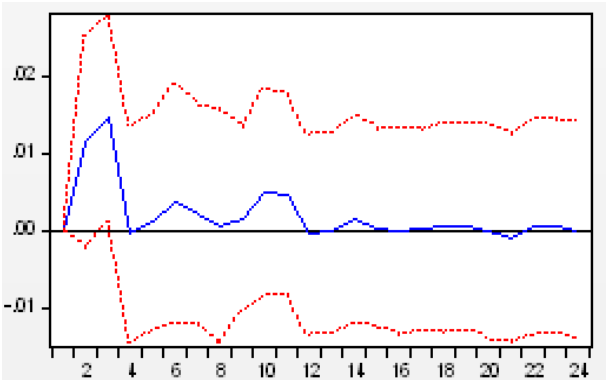
Figure 9 shows the long run impulse response functions for the case of Japan. The level of the industrial production index increases by roughly 1% after two periods, the effect of the shock has mainly dissipated after 8 periods. Similarly to the case of Colombia, the impact of an interest rate shock on credit growth is not large with the level of credit growth decreasing to a level that is 0.05% below the benchmark level after 24 months. The stock market index declines to a level roughly 1% below that of the benchmark 24 months after a long run interest rate shock. The impact on the exchange rate is negligible.

Portugal

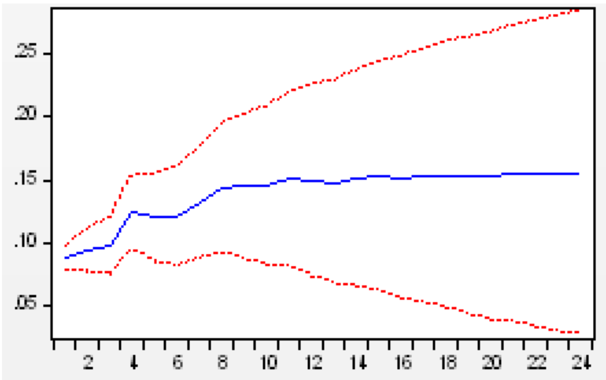
Figure 10

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Portugal to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

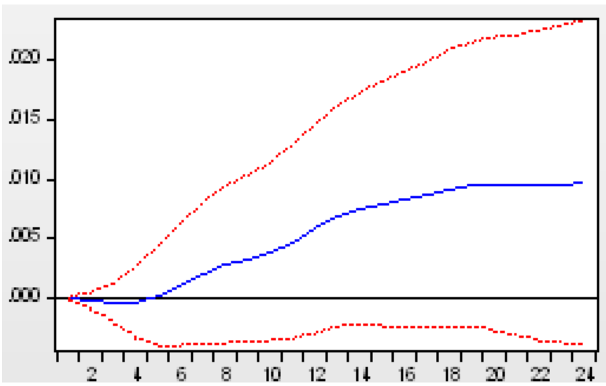
Response of Industrial Production to Central Bank Policy Rate



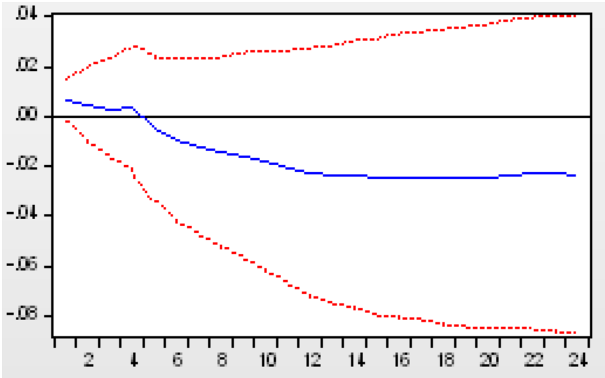
Response of Central Bank Policy Rate to Central Bank Policy Rate



Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate

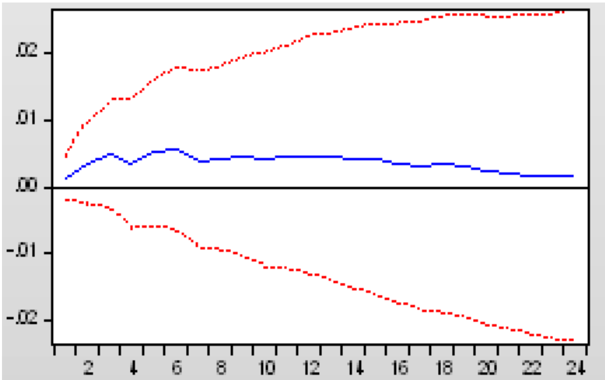


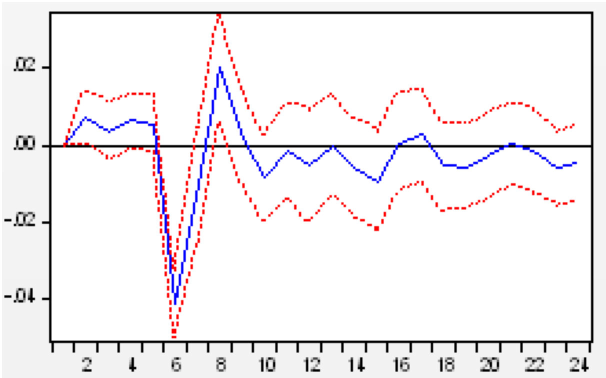
Figure 10 shows the long run impulse response functions for the case of Portugal. Two periods after an interest rate shock, the industrial production index increases by 1.4% with the level of the industrial production plateauing after 14 periods at roughly the benchmark level. The credit responds gradually to an interest rate shock with the level of credit increasing by roughly 1% after 24 periods. The stock market index responds immediately following an interest rate shock with the level of the stock market index being roughly 0.5% higher than the benchmark level, after four periods this declines to a level 0.5% below the benchmark level. After 12 periods, the level of the stock market index plateaus at a level roughly 2% below the benchmark stock market index level. The exchange rate increases by 0.5% two periods after a long run interest rate shock, after 24 months the exchange rate returns to a level slightly above the benchmark level.

The UK

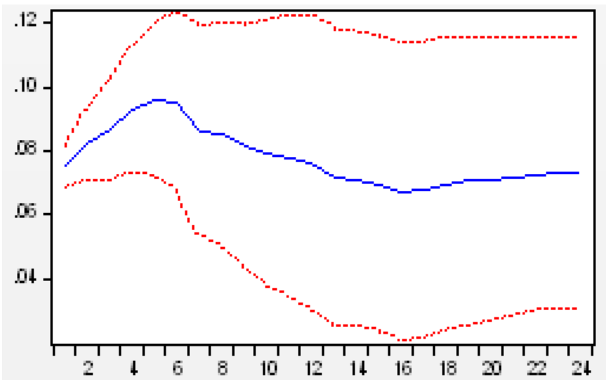
Figure 11

Responses of industrial production, the Central Bank policy rate, credit, stock market and the exchange rate in Colombia to a Central Bank policy rate shock. A 95% confidence interval based on 1000 replications is included.

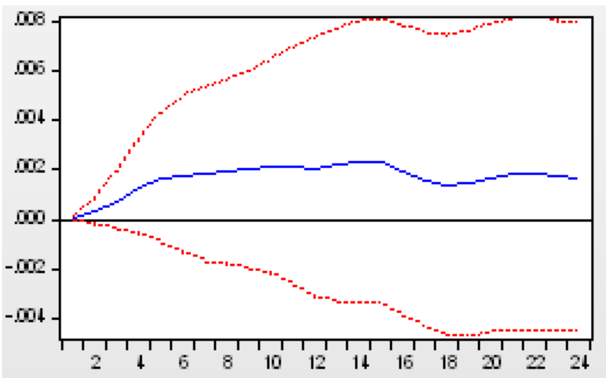
Response of Industrial Production to Central Bank Policy Rate



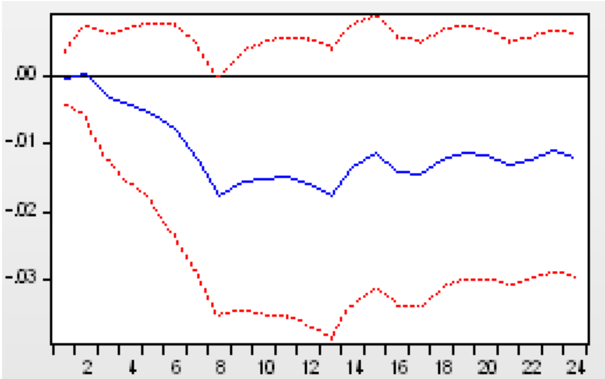
Response of Central Bank Policy Rate to Central Bank Policy Rate



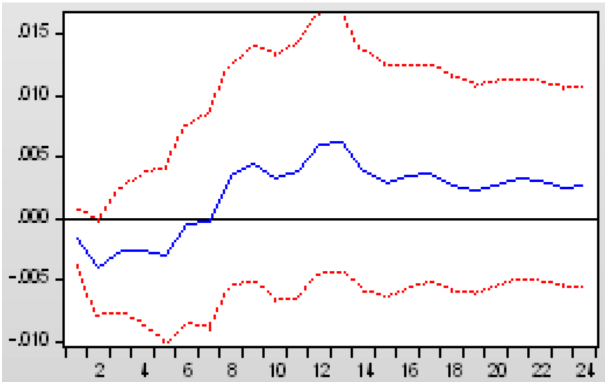
Response of Credit to Central Bank Policy Rate



Response of Stock Market to Central Bank Policy Rate



Response of Exchange Rate to Central Bank Policy Rate



In figure 11, the industrial production decreases to a level 4% below the benchmark level 6 periods after an interest rate shock, the level then reverses as the industrial production reaches a level 2% above the benchmark level after 7 periods. The level of credit increases gradually to a level roughly 0.2% above the benchmark level after 24 periods. The level of the stock market index declines to 1.8% below the benchmark level after 7 periods, 24 periods after an interest rate shock the level of the stock market index is roughly 1% below the benchmark level. The exchange rate reaches a peak of roughly 0.6% after 12 periods with the exchange rate levelling-out at a level 0.3% above the benchmark level after 13 periods.

Note: Vertical Axes – the deviation from the baseline level

Horizontal Axes – the number of months after the shock

Source: Author's estimates based on Datastream and BIS statistics, IRFs generated in Stata.

Table 1

Summary of Responses of variables to a Central Bank policy shock					
Variables					
Short Run Response					
	Chile	Colombia	Japan	Portugal	The UK
Industrial Production Index	-	-	-	-	-*
Credit	+	-	-	+	+
Stock Market Index	-	-	-	-	-
Exchange Rate	+	+	+	+	+
Long Run Response					
	Chile	Colombia	Japan	Portugal	The UK
Industrial Production Index	-	-	-	-	-*
Credit	+	-	-	+	+
Stock Market Index	-	-	-	-	-
Exchange Rate	+	+	+	+	+

Note: - negative response, + positive response, * statistically significant response at 5% level.

5. Conclusion

The financial turmoil caused by the GFC highlighted the importance of financial stability and resulted in the relationship between financial stability and monetary policy becoming an important element when policy mandates were updated in the period after the crisis. In this paper, the impact of short term interest rate shocks on financial stability for the cases of Chile, Colombia, Japan, Portugal and the UK is analysed. The five countries chosen have autonomous, inflation targeting Central Banks with floating exchange rate regimes in place which allows us to analyse the impact of interest rate shocks on five countries with similar policy mandates. The set of countries presents an interesting case with Colombia and Chile being categorized as emerging economies with a history of limited availability of data, the UK and Japan facing political uncertainty and economic uncertainty respectively and finally, Portugal which experienced the most profound economic growth in the group of countries that received an injection of European funding.

A SVAR model is employed and impulse response functions are used in an effort to test the impact of monetary policy on financial stability. Credit growth, the stock market index growth and the exchange rate growth are included as proxies for financial stability while industrial production growth is included as a proxy for the business cycle. Our results show that the level of industrial production as well as the level of the stock market index have a negative relationship with interest rate shocks and hence, an increase in the Central Bank policy rate results in both the industrial production index and the stock market index decreasing in value in both the short run and the long run for all five countries. The inverse relationship between the Central Bank policy rate and the stock market index indicates that Central Bank policy rates may be useful in times of asset mispricing, which is in line with the results of Cocriş and Nucu (2013). The inverse relationship between the Central Bank policy rate and industrial production indicates that the Central Bank policy rate may be used to control booms and busts.

Credit growth increases in Chile, Portugal and the UK in both the short run and the long run following a positive Central Bank policy rate shock while credit growth in Colombia and Japan decreases in both the short run and the long run. Lastly, our results show that the exchange rate appreciates in both the long run and the short run following a positive interest rate shock in all five countries. The results are in line with theory as a positive interest rate shock, in a country with a floating exchange rate regime, results in currency appreciation as foreign investment is attracted. Although the impact is only statistically significant for industrial production for the case of the UK, conventional monetary policy may indeed be able to contribute to financial stability when used in conjunction with alternative policy choices.

6. Appendix A

Table 2

Variable	Code	Source	Frequency	Initial Date	End Date
IndustrialProduction			Monthly	01/01/1991	01/05/2018
Chile	IPTOTNSKD	World Bank staff calculations based on Datastream data. Global Economic Monitor (GEM).	Monthly	01/01/1992	01/05/2018
Colombia	IPTOTNSKD	World Bank staff calculations based on Datastream data. Global Economic Monitor (GEM).	Monthly	01/01/1993	01/05/2018
Japan	IPTOTNSKD	World Bank staff calculations based on Datastream data. Global Economic Monitor (GEM).	Monthly	01/01/1994	01/05/2018
Portugal	IPTOTNSKD	World Bank staff calculations based on Datastream data. Global Economic Monitor (GEM).	Monthly	01/01/1995	01/05/2018
The UK	IPTOTNSKD	World Bank staff calculations based on Datastream data. Global Economic Monitor (GEM).			
IndustrialProductionGrowth		Author's own calculations using IPTOTNSKD			
StockMarketUS			Monthly	01/07.2001	01/07/2018
Chile	DSTKMKTXD	World Bank staff calculations based on Datastream and IMF International Finance Statistics data. Global Economic Monitor (GEM).	Monthly	01/01/2003	01/06/2016
Colombia	DSTKMKTXD	World Bank staff calculations based on Datastream and IMF International Finance Statistics data. Global Economic Monitor (GEM).	Monthly	01/01/1990	01/05/2018
Japan	DSTKMKTXD	World Bank staff calculations based on Datastream and IMF International Finance Statistics data. Global Economic Monitor (GEM).	Monthly	01/01/1993	01/07/2018
Portugal	DSTKMKTXD	World Bank staff calculations based on Datastream and IMF International Finance Statistics data. Global Economic Monitor (GEM).	Monthly	01/01/1990	01/07/2018
The UK	DSTKMKTXD	World Bank staff calculations based on Datastream and IMF International Finance Statistics data. Global Economic Monitor (GEM).			
StockMarketUSGrowth		Author's own calculations using DSTKMKTXD			
CBPolicyRate	BIS_CBPOL	BIS Statistics	Monthly	28/02/1997	30/06/2019
Chile	M:CL	Central Bank of Chile	Monthly	30/04/1995	30/06/2019
Colombia	M:CO	Central Bank of Colombia	Monthly	31/01/1946	30/06/2019
Japan	M:JP	Bank of Japan	Monthly	31/01/1999	30/06/2019
Portugal	M:XM	Bank of Portugal	Monthly	31.01/1946	30/06/2019
The UK	M:GB	Bank of England			
CBPolicyRateGrowth		Author's own calculations using BIS_CBPOL			
ExchangeRateUSDollarPostEuro			Monthly	01/01/1960	01/05/2019
Chile	CCUSMA02CLM618N	Federal Reserve Economic Data	Monthly	01/01/1960	01/05/2019
Colombia	COLCCUSSP02STM	Federal Reserve Economic Data	Monthly	01/01/1971	01/07/2019
Japan	EXJPUS	Federal Reserve Economic Data	Monthly	01/01/1999	01/07/2019
Portugal	EXUSEU	Federal Reserve Economic Data	Monthly	01/01/1971	01/07/2019
The UK	EXUSUK	Federal Reserve Economic Data			
ExchangeRateUSDollarGrowthPostEuro		Author's own calculations using ExchangeRateUSDollarPostEuro			
CreditNonFinancial			Quarterly	31/12/2002	30/09/2018
Chile	Q:CL:N:A:M:770:A	BIS total credit statistics.	Quarterly	31/12/1996	30/09/2018
Colombia	Q:CO:N:A:M:770:A	BIS total credit statistics.	Quarterly	31/12/1964	30/09/2018
Japan	Q:JP:N:A:M:770:A	BIS total credit statistics.	Quarterly	31/12/1979	30/09/2018
Portugal	Q:PT:N:A:M:770:A	BIS total credit statistics.	Quarterly	31/03/1976	30/09/2018
The UK	Q:GB:N:A:M:770:A	BIS total credit statistics.			
CreditNonFinancialGrowth		Author's own calculations using Q:CL:N:A:M:770:A			

Table 3

Variable	Description
IndustrialProduction	
Chile	An economic indicator that measures changes in output for the industrial sector of the economy. The industrial sector includes manufacturing, mining, and utilities. Data is in constant US$, and not seasonally adjusted. The base year is 2005.
Colombia	An economic indicator that measures changes in output for the industrial sector of the economy. The industrial sector includes manufacturing, mining, and utilities. Data is in constant US$, and not seasonally adjusted. The base year is 2005.
Japan	An economic indicator that measures changes in output for the industrial sector of the economy. The industrial sector includes manufacturing, mining, and utilities. Data is in constant US$, and not seasonally adjusted. The base year is 2005.
Portugal	An economic indicator that measures changes in output for the industrial sector of the economy. The industrial sector includes manufacturing, mining, and utilities. Data is in constant US$, and not seasonally adjusted. The base year is 2005.
The UK	An economic indicator that measures changes in output for the industrial sector of the economy. The industrial sector includes manufacturing, mining, and utilities. Data is in constant US$, and not seasonally adjusted. The base year is 2005.
IndustrialProductionGrowth	Growth Rate in Industrial Production
StockMarketUS	
Chile	Local equity market index valued in US$ terms
Colombia	Local equity market index valued in US$ terms
Japan	Local equity market index valued in US$ terms
Portugal	Local equity market index valued in US$ terms
The UK	Local equity market index valued in US$ terms
StockMarketUSGrowth	Growth Rate in equity market index valued in US$
CBPolicyRate	
Chile	Central Bank Policy Rates
Colombia	Central Bank Policy Rates
Japan	Central Bank Policy Rates
Portugal	Central Bank Policy Rates
The UK	Central Bank Policy Rates
CBPolicyRateGrowth	Growth Rate in Central Bank Policy Rates
ExchangeRateUSDollarPostEuro	
Chile	National Currency to US Dollar Exchange Rate: Average of Daily Rates for Chile, National Currency Units per US Dollar, Monthly, Not Seasonally Adjusted
Colombia	Currency Conversions: US$ exchange rate: Spot, end of period: National currency:USD for Colombia, National Currency Units per US Dollar, Monthly, Not Seasonally Adjusted
Japan	Japan / U.S. Foreign Exchange Rate, Japanese Yen to One U.S. Dollar, Monthly, Not Seasonally Adjusted
Portugal	U.S. / Euro Foreign Exchange Rate, U.S. Dollars to One Euro, Monthly, Not Seasonally Adjusted - Post Euro Implementation
The UK	U.S. / U.K. Foreign Exchange Rate, U.S. Dollars to One British Pound, Monthly, Not Seasonally Adjusted
ExchangeRateUSDollarGrowthPostEuro	Growth Rate in Excahnge Rate
CreditNonFinancial	
Chile	Credit to Non-financial corporations from All sectors at Market value - Percentage of GDP - Adjusted for breaks
Colombia	Credit to Non-financial corporations from All sectors at Market value - Percentage of GDP - Adjusted for breaks
Japan	Credit to Non-financial corporations from All sectors at Market value - Percentage of GDP - Adjusted for breaks
Portugal	Credit to Non-financial corporations from All sectors at Market value - Percentage of GDP - Adjusted for breaks
The UK	Credit to Non-financial corporations from All sectors at Market value - Percentage of GDP - Adjusted for breaks
CreditNonFinancialGrowth	Growth Rate in Credit to Non-financial corporations

Table 4

Summary Statistics					
Variable	**Obs**	**Mean**	**Std. Dev**	**Min**	**Max**
Chile					
exchangerateusdollar	177	562.3308	68.71007	442.942	721.5532
exchangerateusdollargrowth	177	-0.0002841	0.0274675	.0729275	0.1762434
industrialproduction	177	7.14e+09	5.44e+08	5.46e+09	8.14e+09
industrialproductiongrowth	177	-0.0024256	0.0978866	-1	0.1831565
stockmarketus	177	84.08402	28.91814	27.34087	139.3169
stockmarketusgrowth	177	0.0101866	0.0539572	-0.2520419	0.1667696
cbpolicyrate	177	3.779661	1.702741	0.5	8.25
cbpolicyrategrowth	177	0.0064249	0.1216444	-0.5263158	1
creditnonfinancial	177	80.95128	12.29851	63.3	106.3095
creditnonfinancialgrowth	177	0.0004585	0.0114371	-0.0263535	0.0340661
Colombia					
exchangerateusdollar	170	2251.963	403.6371	1755.95	3306
exchangerateusdollargrowth	170	0.0025676	0.0395798	-0.1059968	0.1397559
industrialproduction	170	8.05e+09	8.74e+08	6.03e+09	9.42e+09
industrialproductiongrowth	170	0.0036533	0.0503919	-0.1281703	0.1343001
stockmarketus	170	81.19653	37.02019	9.734484	144.9735
stockmarketusgrowth	170	0.014719	0.0604588	-0.2132033	0.217136
cbpolicyrate	170	5.776471	2.001487	3	10
cbpolicyrategrowth	170	0.0002447	0.0532382	-0.25	0.1904762
creditnonfinancial	170	31.0345	4.176246	26.57196	40.564
creditnonfinancialgrowth	170	0.0005056	0.0075822	-0.0149542	0.0159138
Japan					
exchangerateusdollar	167	108.7881	13.9745	76.643	144.68
exchangerateusdollargrowth	167	-0.0003493	0.0255226	-0.0998799	0.0839994
industrialproduction	167	4.73e+13	8.41e+14	1.12e+11	1.50e+16
industrialproductiongrowth	167	-0.0026887	0.1110884	-1	0.1773442
stockmarketus	167	118.8168	29.98151	56.39191	184.9003
stockmarketusgrowth	167	0.0019624	0.0509375	0.1992353	0.1841055
cbpolicyrate	167	0.7987864	1.21834	0.1	5.5
cbpolicyrategrowth	167	-0.0171704	0.1199015	-0.1992353	0.1841055
creditnonfinancial	167	332.6177	24.41816	301.0504	373.0404
creditnonfinancialgrowth	167	0.0008439	0.0029313	-0.0054499	0.0088564
Portugal					
exchangerateusdollar	198	0.8373743	0.1379676	0.634558	1.17302
exchangerateusdollargrowth	198	4.19e+06	0.024648	-0.0600554	0.0811096
industrialproduction	198	4.20e+09	4.91e+08	3.11e+09	5.14e+09
industrialproductiongrowth	198	0.0098488	0.1420378	-0.3404088	0.4280899
stockmarketus	198	79.29688	26.23213	42.81661	158.35
stockmarketusgrowth	198	-0.0011698	0.0601243	-0.2498273	0.1325545
cbpolicyrate	198	2.078788	1.42101	0.05	4.75
cbpolicyrategrowth	198	-0.0136451	0.0923705	-0.6666667	0.25
creditnonfinancial	198	112.3074	17.51838	77.46725	141.531
creditnonfinancialgrowth	198	0.0021845	0.0100971	-0.0299609	0.0496274
The UK					
exchangerateusdollar	321	0.626812	0.0651381	0.4830684	0.81103
exchangerateusdollargrowth	321	0.0009448	0.0225175	-0.0580976	0.1171275
industrialproduction	321	4.00e+10	2.70e+09	3.23e+10	4.78e+10
industrialproductiongrowth	321	-0.0007185	0.0834769	-1	0.1531733
stockmarketus	321	94.9008	27.3539	43.90269	155.0531
stockmarketusgrowth	321	0.0039022	0.0391984	-0.2367088	0.1398742
cbpolicyrate	321	3.866044	2.78933	0.25	10.875
cbpolicyrategrowth	321	-0.0062672	0.0813411	-0.5	1
creditnonfinancial	321	79.30644	13.94949	55.90281	102.4907
creditnonfinancialgrowth	321	0.0009912	0.0078529	-0.0197681	0.0233896

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