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Inflation and Economic Activity in Suriname

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CENTRALE BANK VAN SURINAME

Inflation and Economic Activity in Suriname

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ABSTRACT

Maintaining a low rate of inflation and sustainable economic growth are at the core of monetary policymaking. Price stability is considered a condition for a healthy macroeconomic environment which promotes sustainable growth and a low rate of inflation is necessary to maintain stability in the financial sector as well as to boost investment activities.

Motivated by the largely-discussed relationship between inflation and output, this paper examines this relationship for the economy of Suriname over the period 1975 to 2015, utilizing a vector autoregressive model and impulse response functions. The findings of the study reveal how the various sources of inflation impact on the economy of Suriname. Domestic price shocks and money-supply shocks, in particular, seem to substantially impact on economic activity. Exchange-rate shocks are detrimental to domestic prices.

Based on the findings of this study, it is highly recommended for the Central Bank of Suriname to continue its prudent monetary policies in order to maintain a stable exchange rate and price stability. The study advocates for maintaining a healthy macroeconomic climate with price stability, which is a crucial condition for Suriname to follow a sustained path for economic growth and development.

Keywords: Inflation, Economic Growth, Vector Autoregression, Impulse Response Functions

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1 INTRODUCTION

Maintaining both a low rate of inflation and sustainable economic growth are at the core of monetary policymaking. Price stability is crucial to maintain stability in the financial sector of the economy as well as to boost investment activities. Low inflation is therefore a necessary condition for economic growth, while high inflation rates are known be harmful for the economy. Since the economy of Suriname is fragile, inflationary pressures may translate into other socio-economic factors such as confidence in the government and the economy, exchange rate pressures, credit worthiness and the investment climate which is important for attracting foreign direct investments. However, achieving low inflation along with high economic growth has not always been achievable in developing countries such as Suriname.

Numerous empirical studies have investigated the link between inflation and economic activity. Often, these studies come across a detrimental impact of inflation on macroeconomic performance. High inflation is found to impede market efficiency and economic stability by inducing uncertainty and reducing capital investments. On the other hand, some studies point out that low inflation actually might have some positive effects on an economy. More recent empirical studies proclaim a non-linear relationship between inflation and economic growth, as they show that inflation impedes economic activity beyond a certain threshold. Though, estimating the non-linear effect of inflation on growth is not the focus of this research paper.

This paper seeks to identify the relationship between various sources of inflation and economic activity in Suriname. To answer this research questions, the study utilizes a vector autoregressive model with annual data from 1975 to 2015. The main results show that especially consumer inflation impedes both financial development and economic growth in Suriname. The findings of this paper are particularly informative for policymakers and the broader community as it empirically shows that maintaining a low inflation rate of inflation is crucial for economic activity.

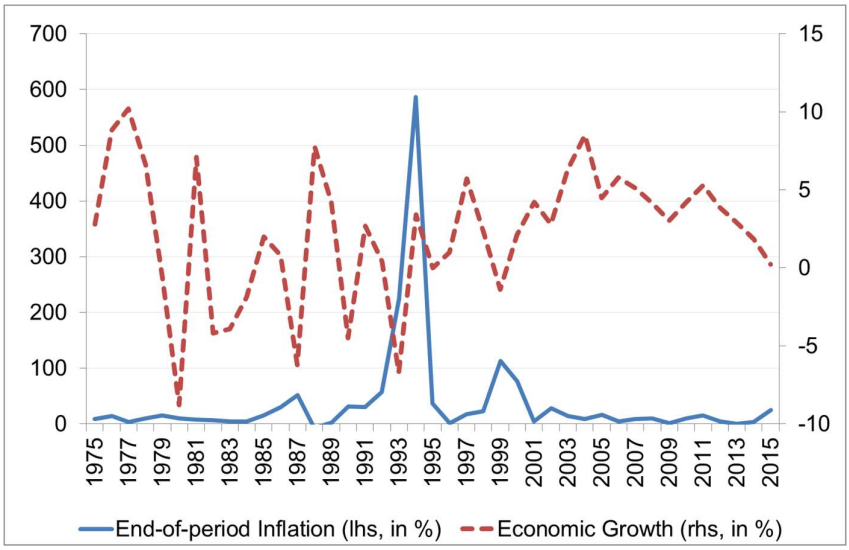
The remainder of this paper is organized as follows. Section 2 describes the process of inflation and economic growth in Suriname from 1975 to 2015. Section 3 reviews theoretical and empirical literature on the topic, while Section 4 outlines the utilized methodology. Section 5 presents the data-analysis and results. Section 6 concludes the research paper and provides policy recommendations.

2 INFLATION AND ECONOMIC ACTIVITY IN SURINAME

This section reviews the co-evolution of inflation and economic growth in Suriname, a tropical country located in the northern coast of South-America. Suriname has a small open mineral-based economy which is rather vulnerable to international shocks. Given its natural endowments, economic growth in Suriname has always been driven by the production and exports of natural resources, especially mining products. Before independence in 1975 up to the early 2000s, the bauxite sector has been the main driver of the economy. Since 1990, the crude-oil sector has also contributed significantly to growth in Suriname. From 2004, the country also started to export gold on a large scale. Agriculture and tourism contributed to the economy to a lesser extent.

After independence in 1975, the economy of Suriname went through different phases of inflation and growth. In the period 1975 to 2015, the average end-of-period inflation rate of the country was 37.3%, while the economy grew by 2.3% on average on an annual basis. Most inflationary episodes were primarily the result of domestic factors. Figure 1 presents the relationship between inflation and real economic growth in Suriname over the research period.

Figure 1: Inflation and Economic Growth in Suriname



Source: Central Bank of Suriname

The remainder of this analysis breaks down economic growth in Suriname in several periods based on the then-prevailing characteristics of the economy. The post-independence period 1975-1979 was characterized by relatively low inflation and high growth. The following

period, 1980-1994, was known as a period of low international bauxite prices and political unrest, resulting in instability and a contraction of the domestic economy. The third period, 1995-2000 was marked by high inflation and low growth, as the economy of Suriname went through some structural reforms. The most recent period, 2001-2015, was characterized by reasonable monetary policy resulting in sustained economic output growth and relatively stable prices (see Table 1).

Table 1 – Period Averages of Inflation and Growth

Period	Inflation (period average)	Growth (period average)
I: 1975 - 1979	10.0%	5.6%
II: 1980 - 1994	70.4%	-0.5%
III: 1995 - 2000	44.6%	1.6%
IV: 2001 - 2015	10.4%	4.2%

Source: author's estimates

PERIOD I: 1975 TO 1979

In this period the economy registered a year-over-year inflation of 10.0% on average. Compared to the pre-independence period, inflation accelerated significantly, mainly due to soaring commodity prices. The increases in import duties on consumption goods intensified these inflationary pressures even more. Increased revenues from the bauxite sector and foreign aid that spurred expansionary fiscal policies were also the backdrop for even more inflationary effects in the post-independence period up to 1980. Still, the economy was able to grow by about 5.6% on an annual basis, mainly driven by the production and export of bauxite products (Caram, 2007).

PERIOD II: 1980 TO 1994

This period was mainly characterized by a stagnation of economic activity and inflation. A military regime was formed in 1980 as a result of dissatisfaction with the then-reigning government. A set of factors such as government inexperience, inappropriate macroeconomic policies, suspension of the development assistance from the Netherlands between 1982 and 1987, internal political unrest and a drop in international alumina[1] prices, caused the economy to contract sharply (Braumann & Shah, 1999).

[1] At that time, bauxite – the ore of alumina – was the main contributor to the Surinamese economy.

As government revenues dropped, mainly due to lower income from the alumina sector, budget deficits were inevitable. To finance these deficits, the Central Bank adopted expansionary monetary policies which induced inflationary effects. Furthermore, price increases were also triggered by foreign exchange controls which resulted in excess liquidity within the economy. However, inflation was lower than expected in this period, possibly due to the exchange rate which was kept fixed artificially. Also, foreign currency was made available for imports. Another possible explanation for the low inflation was the underestimation of the consumer price index. Inflation accelerations became more evident after price controls were eased from 1986. The economy even recorded a record-high inflation of 52.2% as well as a contraction in real output by about 6.20% in 1987. Nevertheless, Suriname was able to achieve inflation levels far below those of other South-American countries in this period (Caram, 2007).

Since 1971, the Surinamese Guilder was pegged to the U.S. dollar. However, the government introduced a multiple exchange rate in 1992, leading to a substantial decrease of the value of the local currency. Expectedly, inflation started to accelerate as a result of some local factors such as a monetary overhang, wage increases, budget deficits and diminishing confidence in economic policymaking (Caram, 2007). As economic conditions deteriorated, a Structural Adjustment Program was implemented. Important measures adopted were the unification of the multiple exchange rates, reduction in government spending and elimination of the quasi-fiscal deficit of the central bank. However, due to liquidity creation and lack of confidence of society, year-on-year inflation in 1994 reached a record high of 586.50%. The average year-on-year inflation rate was 70.4% in this period, mostly caused by domestic factors.

PERIOD III: 1995 TO 2000

This period was characterized by structural reforms in order to bring the economy on to the right track. Economic performance improved and the average inflation in this period came down to 44.6%, about 25 percentage points lower than the previous period. Growth averaged to 1.6%. In 1995, price levels were finally stabilized after successful macroeconomic policy actions (Braumann & Shah, 1999).

The government took measures to skim excess liquidity in the economy. Along with increasing aid disbursements and increasing commodity prices, the economy was able to grow by 4% in 1996-1997. Also, inflation dropped to about 1.2% in 1996 as a result of

measures to stabilize the financial sector. From 1997 to 2000, government expenses more than doubled. The civil service expanded even more and budget deficits were once again consistently high. Hence, the spending pattern of the government and excess liquidity in the economy once again triggered inflation, particularly in 1999 and 2000 (Caram, 2007).

PERIOD IV: 2001 TO 2015

From 2001, the economy of Suriname followed a more sustainable growth path. The economy grew on average by 4.2% per year while the average year-on-year inflation was 10.4%. Economic growth was mainly driven by investments in construction, mining and infrastructure, while price stability was mainly achieved as a result of prudent monetary policies by the Central Bank of Suriname. Several measures were implemented to increase government revenues, e.g. increases in income taxes and sales taxes in 2003. The stabilization of the exchange rate market and the introduction of the Surinamese Dollar (SRD)[2] in 2004 were also significant measures to restore confidence in the economy (Sonneveld, Ooft, & Narain, 2014).

The economy experienced favorable conditions from 2003, mainly due to high prices for its main export products: gold and oil. Besides, the Central Bank was able to keep the exchange rate stable and the government has been fairly disciplined. However, since 2013 macroeconomic conditions deteriorated due to declining international prices for Suriname's main commodities, gold and crude oil (International Monetary Fund, 2014).

3 LITERATURE REVIEW

Inflation is widely viewed as a monetary phenomenon, since it is often induced by changes in money supply. It has been pointed out that there is a trade-off between inflation and economic activity. Nowadays there is broad consensus that this phenomenon is harmful for economic growth as it discourages both real sector and financial activity. Inflation is also known to distort the exchange mechanisms in market economies.

Friedman (1977) points out that high inflation is associated with uncertainty and volatilities on microeconomic and macroeconomic levels, which leads to a negative impact on economic activity. These negative effects of inflation on economic activity became increasingly evident

[2] The SRD replaced the Surinamese Guilder (SRG) in 2004. SRD 1.00 equals SRG 1,000.

during the sixties and seventies. During these years, unanticipated inflation was associated with economic contractions and increasing unemployment, as opposed to the conventional view of the Phillips curve. Friedman also points out that high inflation is also associated with credit rationing in the financial market while inflation volatility is found to enhance government policy inefficiencies. The latter occurs, because governments undertake actions based on posterior information, which no longer might be valid for making assumptions, when high inflation volatility occurs. Inflation volatility is also associated with disrupted and decreased economic activity as it impacts on the real sector of the economy in a framework of sticky wages and prices in the short run.

Economic theories hold diverse views on the interrelation between inflation and economic activity. The classical view is that nominal variables (e.g. money supply) do not impact on real economic variables such as output. Sidrauski (1967) points out that money is neutral within a neoclassical framework, implying that broad money growth has no effect on real variables. According to the Sidrauski model, inflation has welfare costs when money holdings are taken into account, while consumption remains unaffected by inflation in the long run. Some authors also investigate whether it is not only the level of the money supply, but also the growth rate of the money supply that are neutral with respect to real economic variables. This is known as superneutrality of money.

Empirical studies such as Fisher and Seater (1993) utilize a log-linear ARIMA framework to investigate long-run neutrality and superneutrality for the U.S. and Germany. The study finds no evidence for long-run superneutrality. In the short run, the study finds some evidence for neutrality of money on output. However, no evidence for neutrality of money is found with respect to real interest rates, velocity and real balances. In a broader context, Bullard and Keating (1995) utilize a structural VAR to investigate whether superneutrality of money holds in a sample of 58 countries. This paper mainly assumes that inflation is a result of money growth. The study comes across evidence of superneutrality for most countries in the sample, while in low-inflation countries, non-superneutrality seemed to hold. Permanent shocks to inflation do not seem to be related to output growth. Likewise, King and Watson (1997) study long-run neutrality and superneutrality in a time span of 40 years of quarterly data of the U.S. economy. The study comes across some evidence for neutrality of money whereas mixed results are found for the support of superneutrality, i.e. the long-run effects of money growth on output are not evident.

Endogenous economic models also point out that high inflation rates have consistently been associated with lower economic growth. Fischer (1993) comes across evidence that high rates of inflation over long periods are detrimental to economic growth, whereas low inflation rates are not per se mandatory to achieve robust and sustained growth. The study points out that inflation mainly impacts on economic growth by reducing both investments and productivity growth. Barro (1995) utilizes panel estimations with instrumental variables to estimate the effect of inflation on economic growth between 1960 and 1990 in a sample of 100 countries. The results point out that annual inflation significantly reduces investment activity and, hence, impedes economic activity. An acceleration of average annual inflation by 10 percentage points discourages investments by 0.4 to 0.6 percentage points and slows down GDP growth by approximately 0.2 to 0.3 percentage points per year. The authors point out that in the long run, high inflation significantly impedes living standards. Similarly, Bruno and Easterly (1998) come across a firm negative relationship between high inflation, defined as inflation above 40%, and economic activity. Especially in periods of high inflation, the detrimental effects of inflation on growth become substantial while in the so-called recovery period (i.e. the end of the crisis) output growth seems to accelerate substantially.

More recent examinations provide evidence that the effects of inflation on economic growth are non-linear. For instance, Sarel (1996) shows that inflation beyond a threshold of 8% has a significantly impeding effect on growth, looking at a sample of 87 countries over the period 1970 to 1990. On the other hand, low levels of inflation have no significant negative impact on growth and might even slightly stimulate growth. Khan and Senhadji (2001) measure threshold effects in the relationship between inflation and growth for 140 developing and industrialized countries over the period 1960 to 1998. This study employs a conditional (non-linear) least squares regression model and comes across statistically significant threshold inflation rates of 1-3% for industrial countries and 11-12% for developing countries. According to the authors, low inflation may produce some favorable growth effects. On the other side, the study indicates that a setback might be that the total effect of inflation might be underestimated, since the model assumed that the main impact on growth comes from productivity variables, i.e. investments and employment.

Pollin and Zhu (2005) utilize non-linear regression models to study the relation between inflation and growth in 80 countries over the period 1961 to 2000. The study finds no

justification for aiming at inflation rates between 3 to 5 percent as practiced by policymakers. The findings show that inflation rates even up to 15 to 18 percent are associated with moderate increases in economic activity. Especially for low- and middle-income countries, inflation rates around 10 percent are consistently linked to higher economic growth. In the case of expanding economies, inflation is often a result of investment demand pressures. Another implication of the results is that, for developed countries, no justification is found for inflation-targeting practices, i.e. keeping inflation between 3 and 5 percent.

Espinoza, Leon and Prasad (2010) study the impact of inflation on economic growth for a panel of 165 countries over the period 1960 to 2007. The estimations are carried out with a smooth transition model and indicate on a threshold level of inflation of about 10 percent. Beyond this threshold, inflation significantly impedes economic activity. Furthermore, inflation is found to be more harmful for oil-exporting countries. It is found that inflationary effects translate rapidly into other sectors of the economy.

Yilmazkuday (2013) studies the effect of inflation on long-run growth for 84 countries from 1965 to 2004. The paper provides evidence that inflation below 12% is efficient for developing countries to catch up with more developed countries and the effect of human capital on growth has been positive below a threshold level of inflation of 15%. Moreover, other growth determinants, such as financial development and trade impact positively on growth below inflation rates of respectively 10% and 8%.

Ashraf, Gershman and Howitt (2013) employ an agent-based approach to investigate the impact of inflation on macroeconomic performance. The study shows that increases of inflation trend rates above 3 percent are associated with worsened macroeconomic outcomes, while inflation rates below 3 percent do not necessarily boost economic activity. The authors argue that inflation impedes economic activity as it disrupts the exchange mechanism in decentralized market economies. Macroeconomic climate also worsens when inflation pushes up costs of economic transactions.

Numerous empirical studies also show that inflation does not only discourage economic activity, but also impedes financial development, which is, in turn, a significant driver of economic growth, according to the literature. The impeding impact of inflation on financial activity makes sense, since activity in the real sector is strongly associated with bank lending

and quantities traded on equity markets. Financial development, often measured as credit to the private sector, is assumed to drive economic activities mainly via investment credits. Huybens and Smith (1999) come across a negative long-run relationship between inflation and both financial and real economic activity. The study provides some evidence for threshold relationships between aforementioned variables. Beyond the threshold rate, the effects of inflation on real economic activity increase substantially. On the contrary, the effects of high inflation on financial market activity seem to flatten considerably. Similarly, Boyd, Levine and Smith (2001) indicate that inflation accelerations are detrimental for banking sector activity, equity market activity and real sector activity, due to a strong link between the financial and the real sector. The findings suggest that this relationship may be nonlinear, as inflation beyond 15 percent is associated with a drop in financial sector activity. The results of high inflation are clearly visible in drops in bank lending activity and stock market activity.

In a cross-sectional study, Rousseau and Watchel (2002) investigate whether the strength of the proclaimed relationship between the financial sector and the real sector is impacted by the inflation rate. Utilizing data from 1960 to 1995 for about 84 countries, the study posits a threshold inflation rate for the relationship between finance and growth between 13 and 25 percent. Beyond this threshold, the impact of the financial sector on economic growth disappears. Rousseau and Yilmazkuday (2009) examine the channels through which inflation impacts on financial development and economic growth. Not surprisingly, the findings of this study point out that economic growth is more robust at higher levels of financial development accompanied by low inflation in particular in developing countries. The authors stress the importance of financial deepening for long-run growth. As inflation impedes the financial sector, it is crucial for policy-makers to maintain low inflation rates.

Hassan, Sanches and Yu (2011) stress the importance of a developed financial system for healthy economic growth in developing countries. The study uses credit to the private sector as indicator for financial development. The findings of a panel VAR analysis point on a positive association between financial development and economic growth in developing countries. Besides the financial sector, the study stresses the role of trade and government expenditures as main ingredients of growth.

4 METHODOLOGY

Empirical studies often utilize vector autoregressive (VAR) models to model interrelationships between economic variables. Stock and Watson (2001) point out that VAR analysis is particularly useful in modeling multivariate time series. The VAR model regresses each variable on lags of all variables considered. Therefore, each variable is a linear combination of all utilized variables, estimated by OLS. VAR models also offer the possibility to determine the impact of shocks by means of impulse response functions and variance decomposition.

This study analyzes how various sources of inflation affect economic activity by means of a reduced VAR model. Thus, this framework analyzes how various fundamental shocks affect the other economic variables which are a priori considered to be endogenous. Based on the characteristics of the Surinamese economy, the model incorporates broad money (M2), the exchange rate (ER) and international oil prices (OIL) as main sources of inflation. The estimations also include consumer price inflation (CPI). Besides these variables, the model incorporates other determinants of economic growth such as credit extended to the private sector (CRD) as financial deepening variable, government expenditures (GE) and total trade (TRD). Besides GDP, the variables are considered to be determinants of economic growth for Suriname and are deemed the minimum set of relevant variables to explain growth for this country (see appendix 1 for calculation and data sources).

Accordingly, the VAR model utilized in this paper is of the following form:

$$\begin{bmatrix} GDP_t \\ CPI_t \\ CRD_t \\ ER_t \\ GE_t \\ M2_t \\ OIL_t \\ TRD_t \end{bmatrix} = \alpha + \left[A_{ij}(L)\right] \begin{bmatrix} GDP_{t-j} \\ CPI_{t-j} \\ CRD_{t-j} \\ ER_{t-j} \\ GE_{t-j} \\ M2_{t-j} \\ OIL_{t-j} \\ TRD_{t-j} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \\ e_{5t} \\ e_{6t} \\ e_{7t} \\ e_{8t} \end{bmatrix} \quad \textbf{(1)}$$

where A_{ij} represents the matrix of coefficients to be estimated.

The lag length of the VAR model is determined by the model selection criteria, while the residuals are tested for autocorrelation and heteroskedasticity to check whether the VAR is

correctly specified. To determine how various inflation shocks propagate to economic activity, this study utilizes impulse response functions. These functions are particularly informative to describe how the economy reacts to shocks. In this case, the shocks are expected to come from consumer prices (i.e. supply price shocks), money supply, international oil prices (i.e. the WTI oil price) and the exchange-rate. The study also utilizes variance decomposition in order to investigate to which amount the different sources of inflation contribute to the endogenous economic variables included in the model.

5 DATA-ANALYSIS AND RESULTS

This study utilizes annual data for Suriname from 1975 to 2015 which are obtained from the Statistical Compendium (2013) and statistical tables from the Central Bank of Suriname (2016), while international oil prices are obtained from the U.S. Energy Information Administration. The study carries out the regression with a sample of 41 observations, which is above the suggested minimum of 30 observations for time series regressions. The descriptive statistics and correlations between utilized variables are presented in table 2.

Table 2 – Descriptive Statistics – Growth Rates of Variables

	GDP	CPI	CRD	ER	GE	M2	OIL	TRD
Mean	2.26	37.28	6.52	75.28	4.20	5.15	7.18	15.45
Median	2.80	10.31	6.03	0.00	2.87	7.54	0.77	-4.16
Maximum	10.20	586.50	134.05	2305.56	58.29	35.32	125.46	741.06
Minimum	-8.80	-7.60	-60.38	-9.85	-38.27	-34.43	-47.77	-35.62
Std. Dev.	4.36	96.28	29.03	363.23	21.67	16.11	29.34	117.35
Skewness	-0.61	4.88	1.65	5.87	0.25	-0.76	1.39	5.97
Kurtosis	3.02	27.52	10.97	36.44	3.05	3.65	7.92	37.46
Correlations								
GDP	1.00							
CPI	-0.14	1.00						
CRD	0.28	-0.53	1.00					
ER	-0.33	0.47	-0.40	1.00				
GE	0.19	-0.33	0.30	-0.14	1.00			
M2	0.36	-0.47	0.59	-0.46	0.45	1.00		
OIL	-0.01	-0.05	0.00	-0.10	-0.06	-0.06	1.00	
TRD	-0.27	0.30	-0.31	0.97	-0.10	-0.36	-0.05	1.00

Source: author's estimates

Since economic variables are often subject to underlying trends, it is necessary to check for unit roots. The order of integration of the used variables is determined by well-known Augmented Dicky-Fuller test (1979) and the Phillips-Perron test (1988) for unit roots. The unit root test (Table 3) results point out that the utilized variables are all integrated of the

order one in levels and stationary in first difference. As the study investigates the inflation-growth relationship, it considers utilizing a VAR with stationary data (i.e. growth rates), which allows for employing impulse response functions. The lag length of the VAR model is determined by the model-selection criteria. The model with the lowest criteria points on a VAR model with two (2) lags was selected, which makes sense for annual data (appendix 2).

Table 3 – Unit Root Test Results

Variable	ADF (intercept)		ADF (trend & intercept)		PP (intercept)		PP (trend & intercept)	
	Level	Δ	Level	Δ	Level	Δ	Level	Δ
GDP	-0.004	-2.140	-1.103	-4.978***	1.395	-4.763***	-0.315	-5.039***
CPI	4.458	0.271	0.696	-4.692***	4.723	-2.157	1.163	-3.618**
CRD	-2.235	-4.918***	-2.281	-4.859***	-1.335	-4.208***	-1.294	-4.143**
ER	0.152	-3.984***	-1.888	-4.155**	0.375	-3.920***	-1.741	-4.222***
GE	-1.543	-9.848***	-1.556	-9.725***	-2.559	-9.688***	-2.569	-9.572***
M2	-2.646	-4.771**	-2.920	-4.710***	-1.754	-4.957***	-1.868	-4.901***
OIL	-1.563	-6.021***	-2.017	-5.890***	-1.575	-6.012***	-2.079	-5.863***
TRD	-2.131	-6.665***	-2.812	-6.592***	-2.053	-8.968***	-2.763	-9.556***

ADF test and PP test results present adjusted t-statistics
Individual coefficients are statistically siginificant at the **5% or ***1% level of significance

Source: author's estimates

This paper studies the impact of three types of shocks on economic activity, namely

- Domestic price shocks, which are driven by consumer-price inflation;
- Monetary shocks, which result from an increase in the money supply;
- Oil-price shocks, which result from an increase in international oil prices;
- Exchange-rate shocks, which result from a depreciation of local currency.

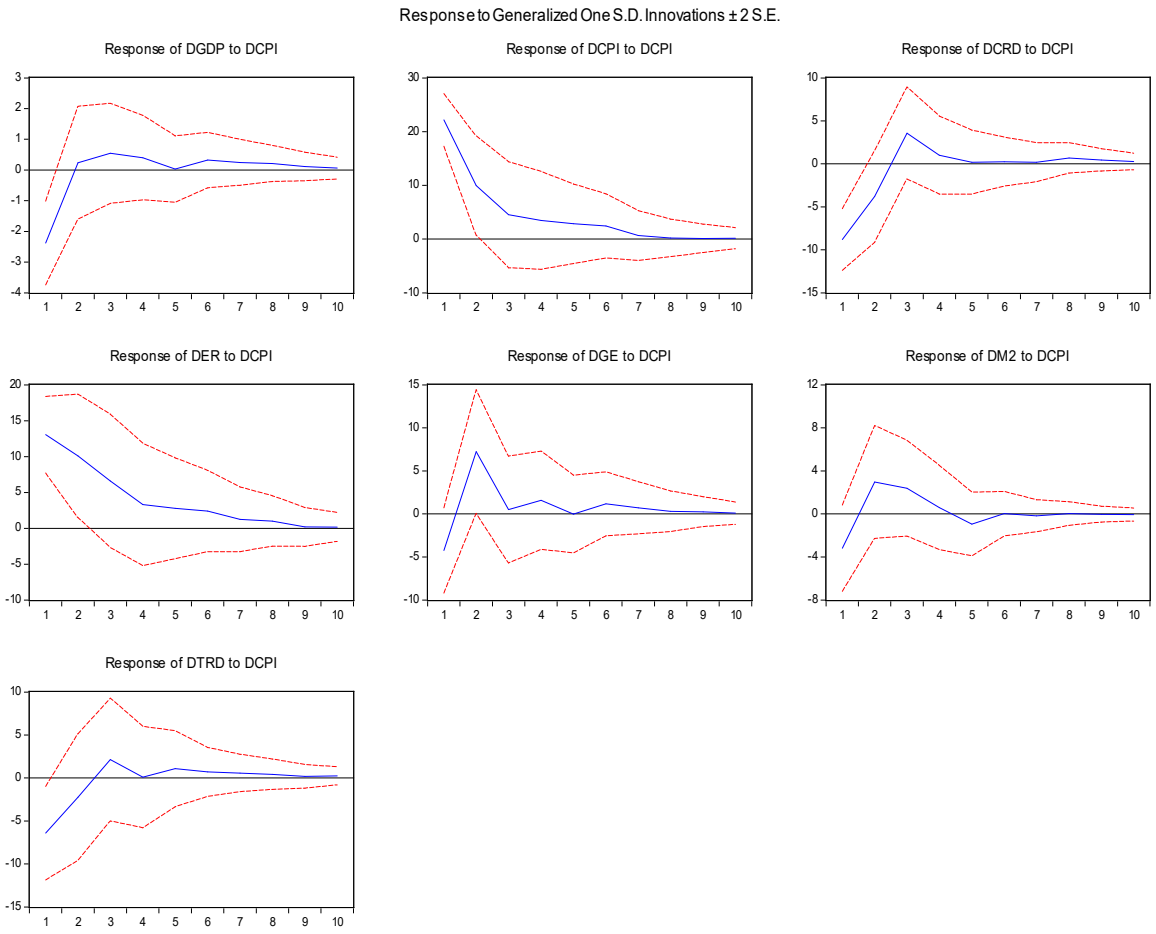
THE IMPACT OF SHOCKS ON ECONOMIC ACTIVITY

The study estimates a VAR model and mainly utilizes Generalized Impulse Response Functions and Variance Decomposition to assess the impact of various sources of inflation on economic activity in Suriname. The VAR adds a dummy variable for 1993 when the multiple exchange rates were unified, causing the exchange rate to increase by more than 2000%. The addition of the dummy variable is also justified since it is statistically significant in most of the regressions (appendix 3).

Domestic Price Shocks

According to economic theory, domestic (supply) price shocks impede economic activity, as described by studies mentioned in the literature review. The results provide evidence that domestic price shocks significantly worsen macroeconomic conditions. These shocks trigger initial negative responses in output growth, credit growth, broad money, government expenditures and trade (figure 2). After a couple of periods, growth improves and restores to initial equilibrium. Domestic price shocks are also associated with sharp deterioration in the exchange rate. The variance decomposition points out that domestic price shocks explain about 20% of the variance of economic activity, i.e. credit and economic growth (see appendix 6).

Figure 2: Domestic Price Shocks and Economic Activity



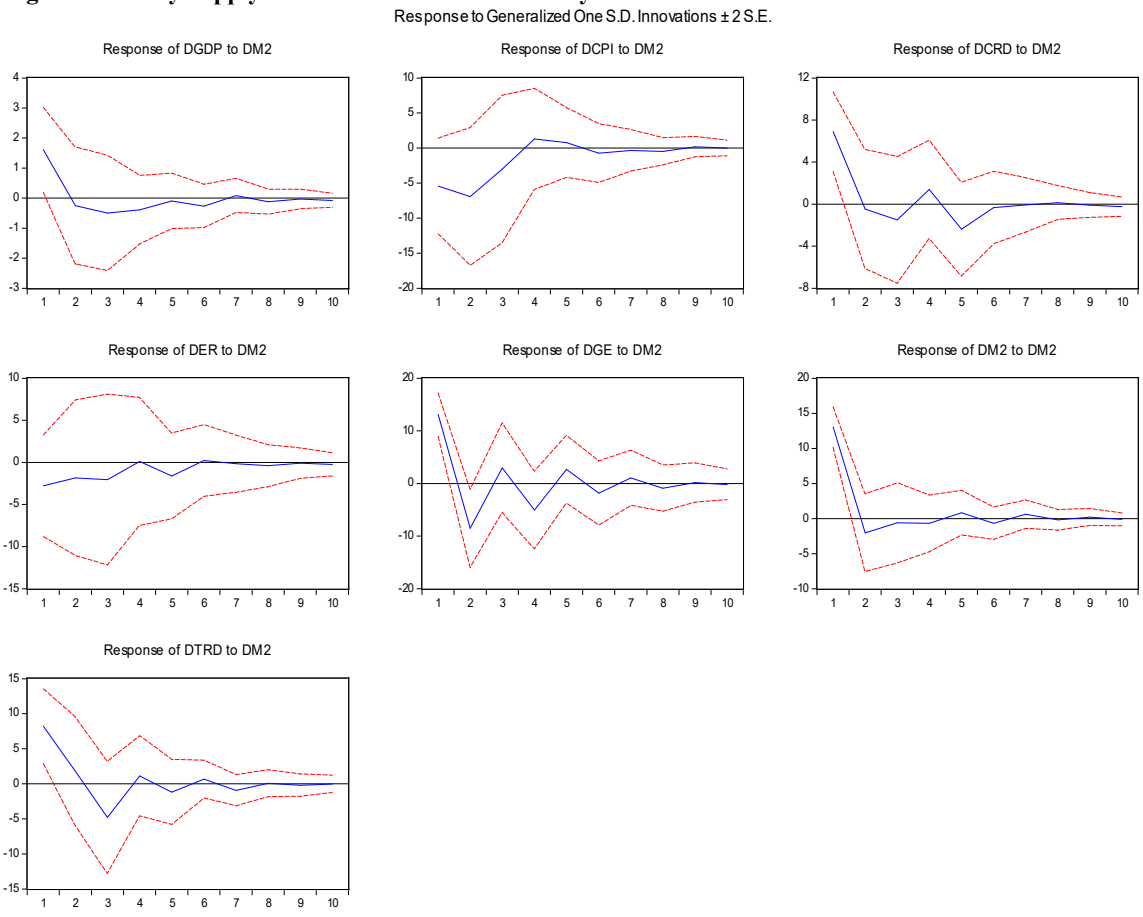
Source: author's estimates

Monetary Shocks

Since the interest rate channel is underdeveloped in Suriname, monetary shocks are modeled by an increase in the money supply. Monetary shocks, i.e. an increase in broad money, seem to slightly boost economic activity, i.e. credit growth, government expenses, trade and output growth, in the first period after the shock (see figure 3). However, economic activity seems to diminish from year two onwards, implying that these monetary shocks do a good job in boosting contemporaneous growth, but may not be sustainable in the long run.

The channel through which money supply impacts on economic growth is possibly the bank-lending channel. Banks provide (investment) credit to companies what, in turn, leads to increased economic activity. A counterintuitive finding is that money-supply shocks seem to cause a deceleration in consumer price inflation. Money shocks explain about 10% of the variance in economic activity and about 20% in credit growth (see appendix 6).

Figure 3: Money-supply Shocks and Economic Activity



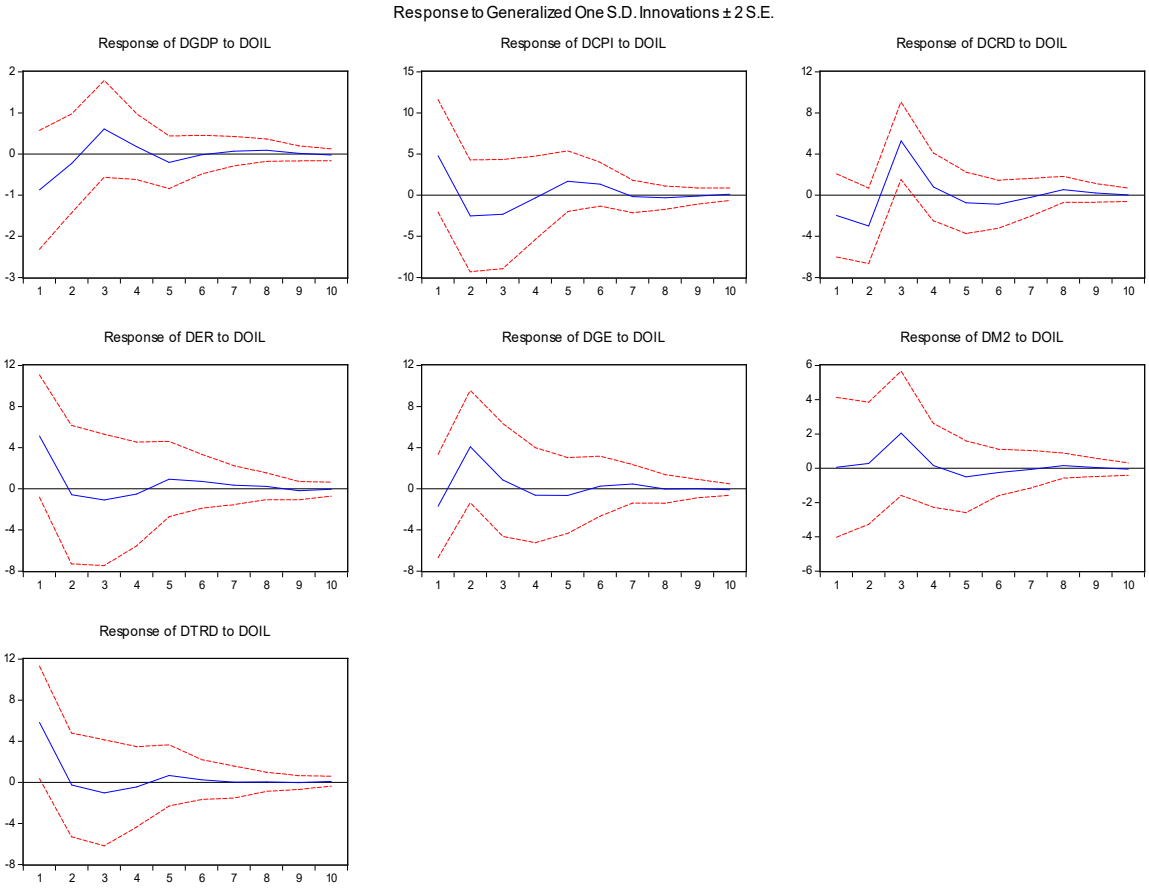
Source: author's estimates

Oil-price Shocks

As crude oil has been both an important input and an output (after 1980) of the Surinamese economy, the examination also sheds some light on the effects of international oil prices on economic activity.

The impulse responses point out that an oil-price shock seems to deprive growth initially, while after two years growth starts to pick up. On the other hand, government expenditures and trade benefit from a shock in oil prices. This makes sense, since oil production contributes significantly to government revenues. After the initial year of the shock, credit growth and money growth also seem to accelerate. Inflation seems to pick-up, probably due to imported inflation (i.e. increasing local fuel prices, which also impact on prices of other local consumer goods)

Figure 4: Oil Price Shocks and Economic Activity

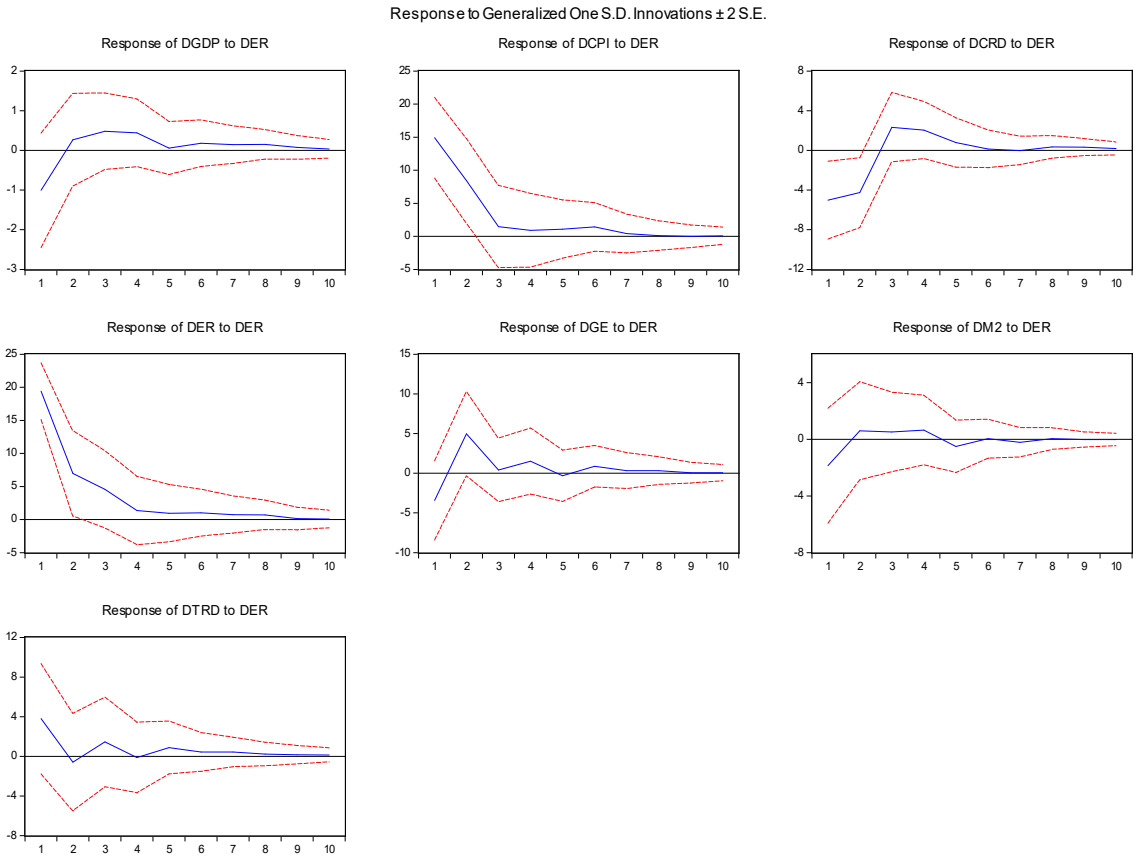


Source: author's estimates

Exchange-rate Shocks

As Suriname has a small open economy, the exchange rate has been an important nominal anchor for price stability and macroeconomic stability. The results show that a shock to the exchange rate (i.e. exchange-rate depreciation) primarily impedes private sector credit growth and triggers domestic inflation (figure 5). The effect of exchange-rate shocks on economic growth is limited, possibly due to improvements in the trade balance resulting from the depreciation.

Figure 5: Exchange-rate Shocks and Economic Activity



Source: author's estimates

Robustness of Results

As the results of the VAR models make economic sense and the residuals pass the relevant residual tests (see appendix 4), the estimations of the model are considered robust. We attempted to add a human capital variable for education (years of schooling) to the model, as suggested by endogenous growth theory (e.g. Romer, 1989). However, this variable did not improve the model, as it is most likely an indicator for long-run growth.

6 CONCLUSION AND POLICY RECOMMENDATIONS

Motivated by the largely discussed relationship between inflation and output, this paper seeks to explore the interrelationship between possible sources of inflation and economic activity in Suriname over the period 1975 to 2015 by means of a VAR framework, impulse responses and variance decomposition. The results show how main economic indicators respond to domestic price shocks, monetary shocks, oil-price shocks and exchange-rate shocks.

As several empirical studies point out, the indirect effects of inflation on economic growth should not be underestimated. This regards the channels through which inflation impacts on the economy. As the economy of Suriname is small and fragile, sustained inflationary pressures may translate into socio-economic factors as confidence in the government and the economy, exchange rate pressures, credit worthiness and the investment climate which is important for attracting foreign direct investments.

As expected, domestic price shocks seem to impede credit, government expenditures, and economic growth substantially. On the other hand, monetary shocks (i.e. increases in money supply) slightly stimulate the economy in the period of the shock, probably via extended credit. International oil-price shocks initially lower economic growth, but after two periods the effect is reversed. A shock to international oil prices also triggers substantial domestic inflationary pressures, due to imported inflation. Lastly, exchange-rate shocks seem mostly detrimental to consumer prices and credit extended to the private sector.

Nowadays, there is global consensus that inflation should not exceed one digit, in order to allow for sustainable economic growth performance. Based on the findings of this study, it is highly recommended that policymakers in Suriname aim at price stability and a stable exchange rate, in order to eliminate shocks to output growth and hence maximize growth potential. Between 2001 and 2014, the Central Bank of Suriname has successfully maintained relatively low inflation rates of on average 9.3%. This has been reflected clearly in the growth rate of the economy which was on average 4.5% in this period. It is therefore crucial for the Central Bank of Suriname to continue its policies in order to maintain financial stability and hence sustainable economic growth.

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APPENDICES

APPENDIX 1 – DEFINITIONS OF UTILIZED VARIABLES

Indicator	Definition	Source
GDP	Gross Domestic Product (2007=100)	Statistical Tables of the Central Bank of Suriname
CPI	Consumer Price Index (2007=100)	Statistical Tables of the Central Bank of Suriname
CRD	Credit to the Private Sector (2007=100)	Statistical Tables of the Central Bank of Suriname
ER	SRD/USD exchange rate	Statistical Tables of the Central Bank of Suriname
GE	Government Expenditures 2007=100)	Statistical Tables of the Central Bank of Suriname
M2	Broad Money (2007=100)	Statistical Tables of the Central Bank of Suriname
OIL	West Texas Intermediate Oil Prices	U.S. Energy Information Administration
TRD	Trade of Goods and Services (2007=100)	Statistical Tables of the Central Bank of Suriname

APPENDIX 2 – LAG LENGTH SELECTION

VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1415.04	NA	2.87e+20	69.81	70.48	70.05
1	-1249.96	249.64	2.24e+18	64.88	68.22*	66.09*
2	-1168.18	91.75*	1.45e+18*	64.01*	70.03	66.20

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

APPENDIX 3 – VAR RESULTS

	DGDP	DCPI	DCRD	DER	DGE	DM2	DOIL	DTRD
DGDP(-1)	0.22	0.71	0.00	0.29	0.03	-0.59	1.79	1.29
	(0.23)	(1.11)	(0.65)	(0.97)	(0.81)	(0.66)	(1.50)	(0.90)
DGDP(-2)	-0.06	0.23	0.52	-0.21	-0.66	-0.24	3.29	0.22
	(0.24)	(1.12)	(0.66)	(0.98)	(0.82)	(0.66)	(1.51)	(0.91)
DCPI(-1)	0.05	0.52	-0.32	0.43	0.21	-0.08	0.54	0.14
	(0.06)	(0.29)	(0.17)	(0.25)	(0.21)	(0.17)	(0.39)	(0.23)
DCPI(-2)	-0.01	-0.16	0.17	-0.24	0.22	0.02	0.04	-0.15
	(0.03)	(0.14)	(0.08)	(0.12)	(0.10)	(0.08)	(0.19)	(0.11)
DCRD(-1)	0.01	0.42	0.10	-0.20	0.14	-0.13	0.18	0.02
	(0.09)	(0.41)	(0.24)	(0.36)	(0.30)	(0.24)	(0.56)	(0.33)
DCRD(-2)	-0.01	-0.03	0.01	-0.05	0.16	0.07	-0.29	-0.04
	(0.04)	(0.18)	(0.11)	(0.16)	(0.13)	(0.11)	(0.25)	(0.15)
DER(-1)	-0.01	0.22	0.13	0.12	0.00	0.06	-0.20	-0.07
	(0.03)	(0.13)	(0.08)	(0.11)	(0.10)	(0.08)	(0.18)	(0.11)
DER(-2)	-0.01	0.02	0.05	0.05	-0.11	0.02	-0.04	0.09
	(0.03)	(0.15)	(0.09)	(0.13)	(0.11)	(0.09)	(0.20)	(0.12)
DGE(-1)	0.08	0.30	0.02	1.23	-0.73	-0.11	-0.38	0.53
	(0.09)	(0.40)	(0.24)	(0.35)	(0.29)	(0.24)	(0.55)	(0.33)
DGE(-2)	0.06	-0.35	0.00	0.36	0.20	0.23	-0.42	-0.15
	(0.08)	(0.40)	(0.24)	(0.35)	(0.29)	(0.24)	(0.54)	(0.32)
DM2(-1)	-0.13	-0.84	0.04	-1.11	0.15	0.21	0.05	-0.63
	(0.12)	(0.57)	(0.34)	(0.50)	(0.42)	(0.34)	(0.77)	(0.46)
DM2(-2)	-0.02	0.75	-0.16	0.53	-0.34	-0.27	-0.18	0.25
	(0.11)	(0.52)	(0.30)	(0.45)	(0.38)	(0.30)	(0.70)	(0.42)
DOIL(-1)	-0.01	-0.12	0.01	-0.04	0.09	0.02	-0.12	0.02
	(0.02)	(0.10)	(0.06)	(0.09)	(0.08)	(0.06)	(0.14)	(0.08)
DOIL(-2)	0.02	0.07	0.14	-0.07	0.12	0.08	0.06	-0.01
	(0.02)	(0.11)	(0.06)	(0.10)	(0.08)	(0.06)	(0.15)	(0.09)
DTRD(-1)	0.03	-0.07	-0.39	0.01	-0.10	-0.22	0.44	0.16
	(0.07)	(0.35)	(0.21)	(0.31)	(0.26)	(0.21)	(0.48)	(0.29)
DTRD(-2)	-0.01	-0.46	-0.03	-0.33	0.16	-0.11	-0.20	-0.33
	(0.08)	(0.36)	(0.21)	(0.32)	(0.26)	(0.21)	(0.49)	(0.29)
C	1.75	6.84	3.46	4.59	-3.93	8.16	-5.56	-4.51
	(2.28)	(10.80)	(6.35)	(9.46)	(7.88)	(6.36)	(14.58)	(8.77)
D1993	-10.26	179.26	-52.79	2285.61	-40.29	-50.27	-33.04	747.57
	(5.53)	(26.25)	(15.44)	(22.98)	(19.14)	(15.45)	(35.44)	(21.32)
R-squared	0.34	0.97	0.88	1.00	0.68	0.62	0.40	0.99
S.E. equation	4.67	22.17	13.04	19.41	16.17	13.05	29.93	18.01
F-statistic	0.69	43.01	10.31	822.91	2.88	2.23	0.91	98.57
Akaike AIC	6.22	9.34	8.27	9.07	8.70	8.28	9.94	8.92
Schwarz Criterion	6.97	10.09	9.03	9.82	9.46	9.03	10.69	9.67
Standard errors in brackets ( )								

APPENDIX 4 – VAR RESIDUAL DIAGNOSTICS

VAR Residual Serial Correlation LM Tests
Null Hypothesis: no serial correlation at lag order h
Included observations: 41

Lags	LM-Stat	Probability
1	80.45	0.08
2	55.76	0.76
3	50.80	0.88

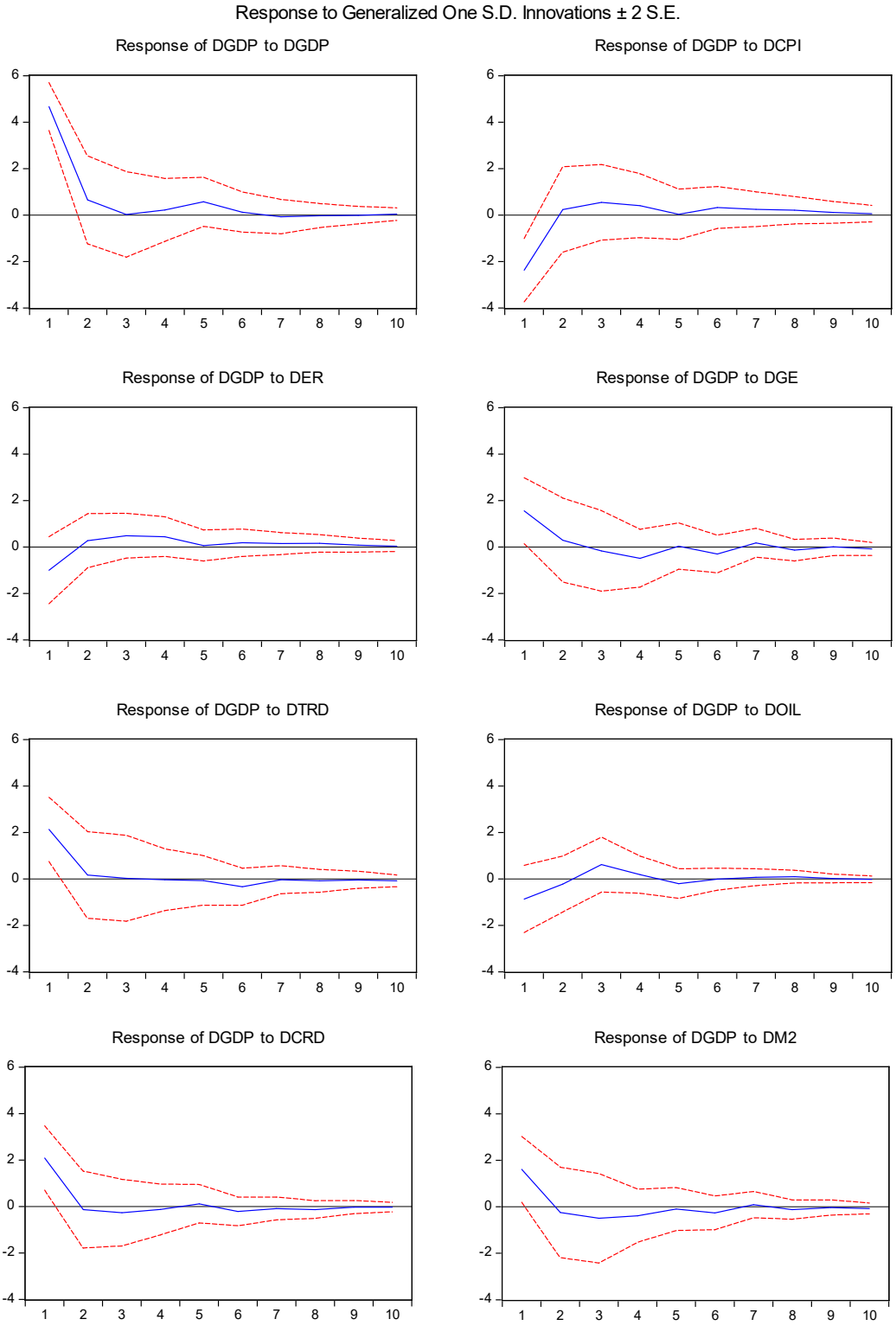
Probabilities from Chi-Square with 64 df

VAR Residual Heteroskedasticity Tests:
No Cross Terms (only levels and squares)
Included observations: 41

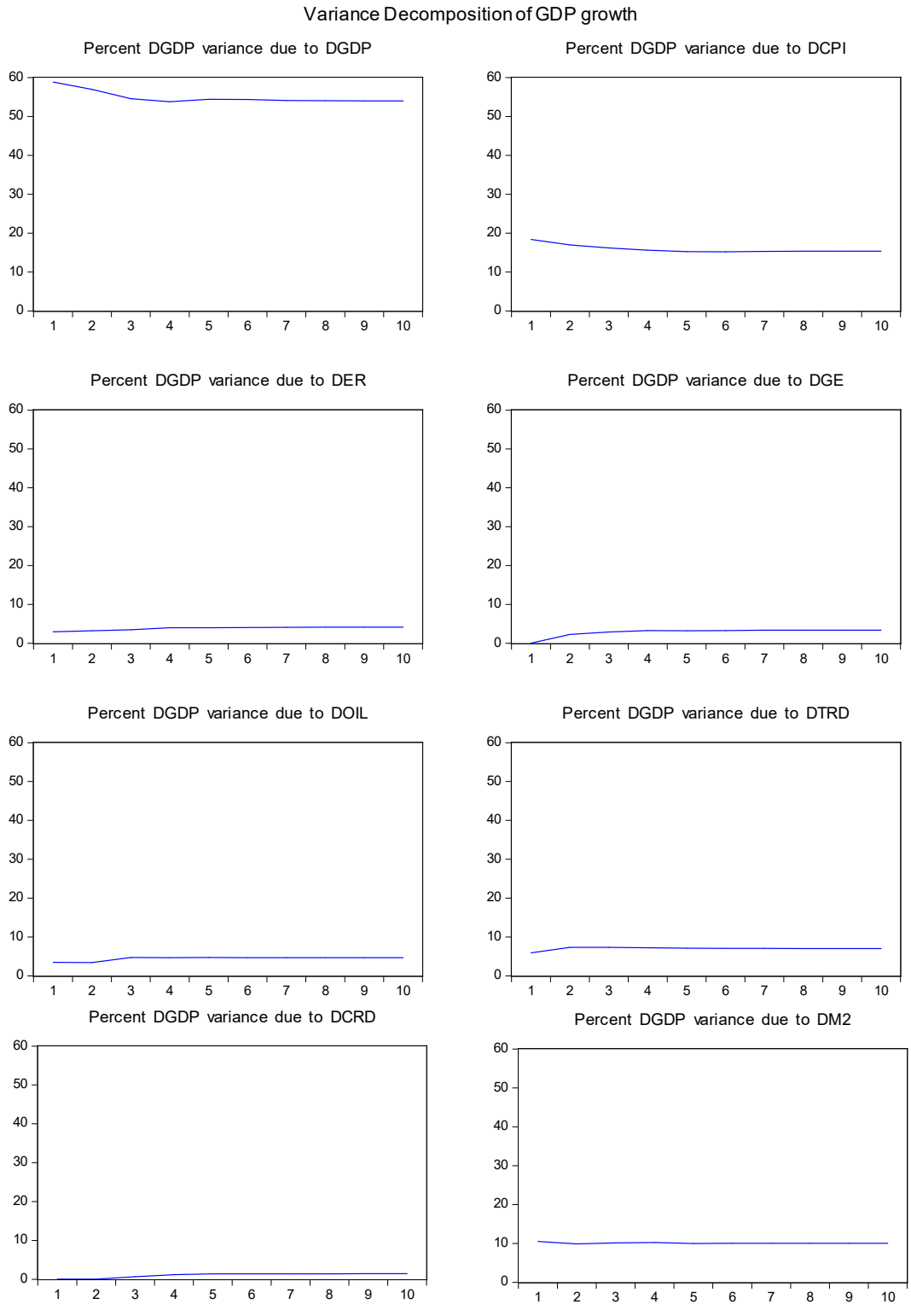
Joint test:

Chi-Sq	df	Prob.
1194.51	1188	0.44

APPENDIX 5 – IMPULSE RESPONSES OF GROWTH TO OTHER INDICATORS

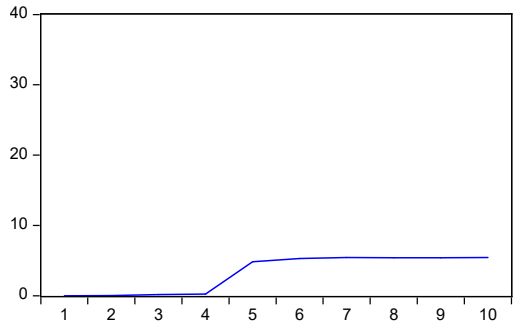


APPENDIX 6 – VARIANCE DECOMPOSITION

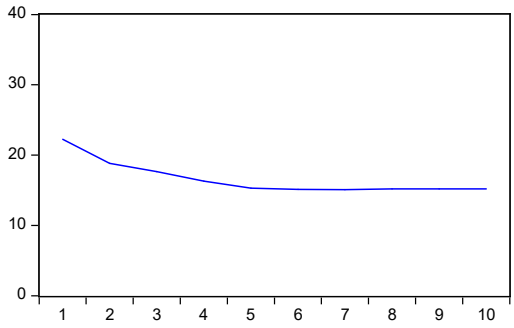


Variance Decomposition of Credit Growth

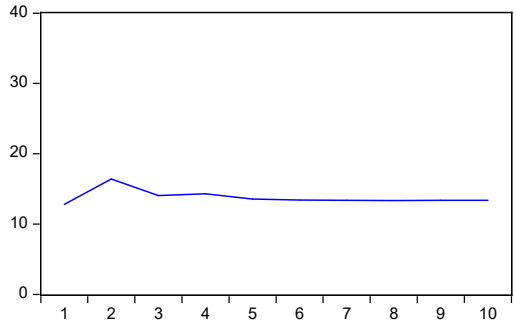
Percent DCRD variance due to DGDP



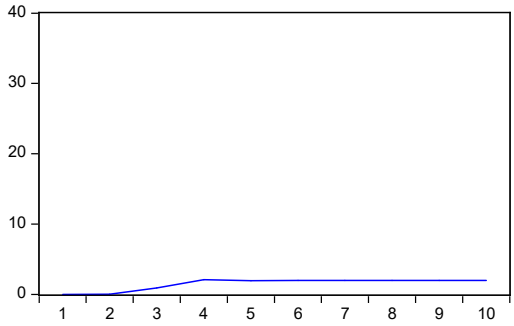
Percent DCRD variance due to DCPI



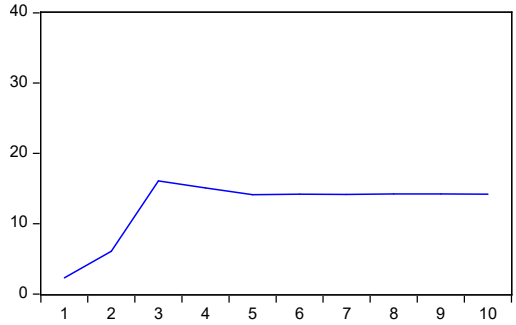
Percent DCRD variance due to DER



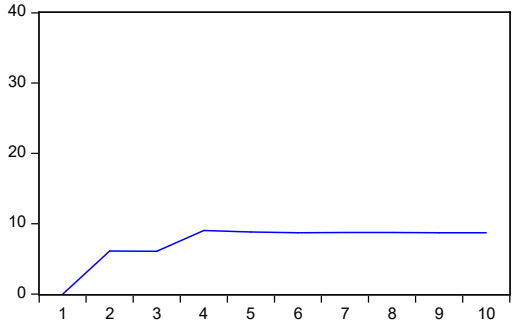
Percent DCRD variance due to DGE



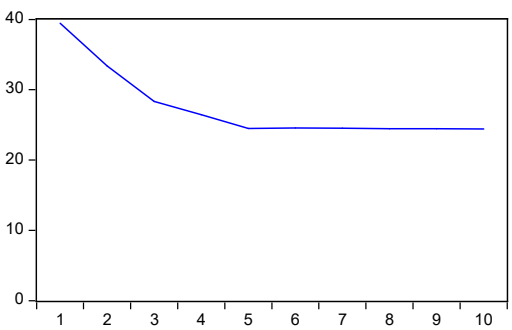
Percent DCRD variance due to DOIL



Percent DCRD variance due to DTRD



Percent DCRD variance due to DCRD



Percent DCRD variance due to DM2