How does Monetary Policy Work in Solomon Islands?

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Abstract

The Central Bank of Solomon Islands (CBSI) was established in 1983 with the objective of maintaining price and exchange rate stability. In the 1980s and 1990s, CBSI was forced to finance the government borrowing requirements as well. Ethnic violence in 1999 and subsequent efforts for restoration of law and order thereafter threw up further challenges for CBSI. This paper examines how monetary policy tools employed by CBSI worked in Solomon Islands. The study finding is that the given the current undeveloped money market conditions in Solomon Islands, monetary pulses are transmitted to the real sector predominantly through money channel rather than through interest rate channel.
Solomon Islands is one of the six amongst the 14 Pacific island countries\(^1\) (PICs) with their own independent currencies. The other eight PICs are dollarised\(^2\) economies, which have adopted one of the three currencies of the metropolitan countries, Australia, New Zealand and the United States, as legal tender. Solomon Islands along with Fiji, Samoa, Tonga and Vanuatu, has a fixed exchange rate regime, whereas the sixth PIC, namely Papua New Guinea has a floating exchange rate arrangement.

The country’s monetary authority, the Central Bank of Solomon Islands (CBSI) was established in 1983 with the objectives of promoting monetary stability; a sound financial structure; and fostering conditions conducive to orderly and balanced economic development. Monetary stability denotes achieving price stability in terms of low inflation as well as external stability of its domestic currency, the Solomon Island dollar. However, CBSI was called upon to perform over its 25 years existence an additional role of being the government’s agent for financing its budget deficits. In that process, achieving the mandated objectives had been a challenging task. Government borrowing from the central bank was often inflationary and any subsequent efforts to fight inflation and reduce pressures on external reserves often presented difficult situations for CBSI.

Solomon Islands is highly dependent on critical imports, ranging from food to fuel and all intermediate and capital goods. The CBSI, which aims at maintaining gross foreign reserves equivalent to three months of total imports or above, is intensely aware that exchange stability is critical for maintaining domestic price stability. There is a high pass-through of the exchange rate changes to the price level since more than two-thirds of the items in the basket for determination of consumer price index are dominated by imported goods.

\(^1\) The 14 PICs are: Cook Islands, Fiji, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu. These 14 PICs, together with two metropolitan countries, namely Australia and New Zealand form the regional intergovernmental organization, known as Pacific Islands Forum (the Forum).

\(^2\) The eight dollarized economies, using any one of the three major currencies as legal tender, are: Kiribati, Nauru, and Tuvalu (Aus $); Cook Islands and Niue (NZ $), Marshall Islands, Federated States of Micronesia and Palau (US $).
The CBSI has pursued its mandated objectives during the last two decades with mixed success. Its monetary policy measures include direct instruments such as statutory reserve requirement ratio and credit control measures, and indirect instruments such as open market operations in its own securities. There are no studies so far undertaken on monetary policy transmission in Solomon Islands. The present paper seeks to fill the gap. Since the data available cover a 28-year period (1980-2007), we employ the bounds testing approach, which does not require a large sample size data as well as stringent requirements in regard to the order of integration of the variables employed.

The paper is organized as follows: Section 2 provides a background of the country’s economy and monetary policy instruments employed; Section 3 reviews monetary policy developments since the inception of CBSI; Section 4 outlines various transmission mechanisms as studied in advanced and developing economies and their limitations when applied to island economies; Section 5 deals with the methodology adopted for the empirical analysis; Section 6 reports the results; and Section 7 presents some conclusions with policy implications.

A. Background

Solomon Islands (population 489,000), whose key indicators are given in Table 1 share many commonalities with rest of the PICs. The country’s manufacturing base is very small, confined to tuna canning, palm oil, coconut oil, soaps and detergents, and biscuits and breads. Solomon Islands is heavily subsistence oriented, providing livelihood to 80 percent of the population. Because of the communal land tenure system unique to all PICs in terms of the inalienable nature of communally held land to any private individual for land-based activities, private sector development has been seriously hampered. The commercial banks find it difficult to lend in the absence of land as collateral.
Table 1: Solomon Islands: Recent Selected Key Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area (Sq.km.'000)</td>
<td>28.0</td>
</tr>
<tr>
<td>Population (2006: '000)</td>
<td>489</td>
</tr>
<tr>
<td>Per Capita GDP (US$) Current prices : 2006</td>
<td>684</td>
</tr>
<tr>
<td>Aid Per Capita in US$ (2006)</td>
<td>418</td>
</tr>
<tr>
<td>Aid as percentage of GDP (2006)</td>
<td>47.8</td>
</tr>
<tr>
<td>Annual Average Growth Rate in percent (2001-2007)</td>
<td>3.6</td>
</tr>
<tr>
<td>Annual Average Inflation in percent (2001-2007)</td>
<td>8.6</td>
</tr>
<tr>
<td>Overall Budget Balance as percent of GDP (2001-2007)</td>
<td>-2.1</td>
</tr>
<tr>
<td>Current Account Balance as percent of GDP (2001-2007)</td>
<td>-9.5</td>
</tr>
</tbody>
</table>


The country’s fixed exchange rate regime has served the country well. Since most of the imports are sourced from Australia and New Zealand, whose central banks have been targeting inflation, Solomon Islands’ inflation has been kept low in recent years despite expanding domestic fiscal deficits. Although much better endowed with large land and marine resources than other PICs, with the exception of Papua New Guinea, Solomon Islands’ economic progress has been disrupted several times in the past by frequent government changes as well as volatile political uncertainties.

Economic structure has remained stagnant during the last three decades, characterised by a large public sector and a small private sector with modest activities. The country’s exports have been timber, tuna and palm oil. The country is heavily dependent on imports ranging from food and beverages, to fuel and capital and transportation machinery and equipment. Steady aid inflows in the past and more in recent years after the Regional Assistance Mission to Solomon Islands (RAMSI), which was mounted in 2005 to restore law and order have been a great source of support to the country’s current account balance, minimising pressures on exchange rate.

**Macroeconomic performance**

The 1980s for Solomon Islands were a difficult period. Fall in terms of trade and withdrawal of annual budgetary support by the United Kingdom put the country’s finances in poor shape. Aside from the decline in international prices of copra, palm oil
and timber, which resulted in lower export earnings, cyclone Namu in 1986 led to reduction in export volumes as well, as it had uprooted the country’s copra and oil palm plantations. The adverse impact of the cyclone lingered on export earnings for next three years. Solomon Islands had to seek help from International Monetary Fund (IMF) to tide over the shortage in foreign exchange. Two Stand-by Arrangements, one in 1981 and the second in 1983 came to the country’s rescue. However, as the authorities could not fully meet conditionality requirements, the full amount envisaged under the second Stand-by Arrangement of 1983 could not be disbursed (Ginting and Porter 2006).

The next decade witnessed a spurt in export earnings, thanks to controversial log export policies, which were questioned by international agencies from environmental protection points of view. As timber exports to Japan, Korea and Malaysia reached new highs, there was a boom during the 1990s. Annual economic growth during the first half of the 1990s was around 8 percent. However, exports to Asian countries came to a sudden halt in the late 1990s as the Asian Financial Crisis of 1997/98 abruptly reduced the demand for log exports. Further, in addition to fall in export earnings, the ethnic crisis which exploded in 1999 severely impacted the economy, as physical infrastructure and private sector shops in the capital town, Honiara were destroyed in the riots. The gross domestic output (GDP) declined throughout the next six-year period. All export-oriented projects were closed and international reserves were at a minimum level until 2003, when RAMSI arrived to restore law and order in the country. In the meanwhile, the Solomon Island dollar was allowed to gradually depreciate by 30 percent and inflation reached the peak at 16 percent.

The end of ethnic conflict encouraged private sector activities. Export trade in timber resumed in earnest. Many of the suspended foreign investment projects were revived to put the economy on growth path. Annual growth rate during 2003-2007 averaged at 7 percent. Substantial aid inflows averaging around 49 percent of GDP helped the country to reduce current account deficit, which was around 24 percent of GDP in 2004 to a sustainable level of 3 percent in 2007. Government’s fiscal surpluses during 2003-2006
were also due to aid inflows, besides growth in revenues, mainly from export taxes and royalties from log exports.

In 2007, the economy grew at an impressive 10.3 percent, the highest annual growth in 15 years. The growth was due to massive expansion in logging activities during the year, as the forestry sector represents 16 percent of total GDP. Export of round logs rose by 25 per cent. The expansion of logging on an unsustainable scale has brought closer the imminent decline of the forestry sector, now forecast to begin as early as 2010 and exports becoming negligible by 2014.

Further, volatility in fuel and food prices in the early months of 2008 had already exposed government’s weaknesses, especially in its fiscal management and its ability to resist demand for rise in public sector wages. In 2008, GDP growth rate fell to 7 percent, though still the second highest in the region, next only to Papua New Guinea which was benefiting from the mineral boom. As fiscal expenditure rose and with continued increases in private sector lending, both budget balance and current account balance deteriorated (CBSI 2008). The ongoing global economic recession has posed a challenge before the country, as log exports have been declining, which have been the mainstay of export earnings. In the midst of calls for fiscal stimulus packages to fight recession, the May 2009 Monetary Policy Statement of CBSI (2009) rejected such moves as inadvisable.

Annual fiscal deficits have been posing major problems for monetary authorities, as their monetization in the past led to excess liquidity in the system. Further, inflows of aid money and a credit boom, reflected in the high annual growth rate of 60 percent during 2005-2007 have compounded the problem. The CBSI and finance ministry have to coordinate their efforts with a view to reducing inflationary pressures.

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3 CBSI’s Monetary Policy Statement (CBSI 2009) issued in May 2009 says “It would not however be appropriate for Solomon Islands to implement such a program at this juncture as the cost would be prohibitive, it would encumber the nation with further debts and provide very little boost to the economy given the supply constraints of the economy and the dependence on foreign demand It would not however be appropriate for Solomon Islands to implement such a program at this juncture as the cost would be prohibitive, it would encumber the nation with further debts and provide very little boost to the economy given the supply constraints of the economy and the dependence on foreign demand”
Monetary Policy formulation and Implementation

Structure of the financial system and market

As of December 2008, Solomon Island’s financial sector consists of five institutions: CBSI, three commercial banks comprising one domestic bank (National Bank of Solomon Islands) and two foreign commercial bank (Westpac and ANZ), and one state-owned pension fund, the Solomon Islands National Provident Fund (SINPF) (Table 2). A few credit unions and a small insurance sector complete the financial sector.

As banking activities are largely confined to urban centres, in which formal sector activities are concentrated, the deepening process of financial sector over the period, as reflected in the ratios of narrow and broad money, has been slow. In the absence of vibrant bond and equity markets, there are no other attractive financial assets than saving and time deposits for savers to invest in. Table 3 presents monetary statistics of Solomon Islands. Following liberalisation of the economy in general and financial sectors, with discontinuance of controls on lending and deposit rates from the late 1980s, the ratio of broad money to GDP has been on the rise.

Monetary framework

Solomon Islands’ monetary policy is implemented in the context of a fixed exchange rate arrangement according to which the value of the domestic currency is linked to a trade-weighted basket of currencies comprising the Australian dollar, the Japanese yen, the New Zealand dollar, and the US dollar. Two devaluations took place: one in the mid 1980s and another after the Asian financial crisis of 1998. In 2002 soon after the law and order restoration efforts began, the Solomon Islands currency (SI$) was further adjusted downwards, in all a cumulative 30 percent against the US dollar. These adjustments have contributed to keeping the real exchange rate more or less constant. However, since 2003 CBSI has maintained a de facto peg to the US dollar, which has been serving as an effective nominal anchor. As substantial aid inflows strengthened the reserve position,
CBSI was keen to maintain a stable bilateral rate US dollar/SI$ rather than permitting an appreciation of the Solomon Islands dollar (IMF 2006).

### Table 2: Solomon Islands: Financial Structure (2008)

<table>
<thead>
<tr>
<th>Assets (Millions in Solomon Islands Dollar)</th>
<th>Percent in Total Assets</th>
<th>Number of Institutions</th>
<th>Percent of 2008 GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Banks</td>
<td>1841.5</td>
<td>66</td>
<td>3</td>
</tr>
<tr>
<td>Credit Unions</td>
<td>31.4</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Insurance companies</td>
<td>74.2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pension funds (SINPF)</td>
<td>856.6</td>
<td>30</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2803.7</strong></td>
<td><strong>100.0</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Source: CBSI (2008)

Central banks in PICs, including Solomon Islands in the initial years of their existence relied on direct instruments. Direct instruments, also known as rules-based instruments, include: (i) liquid asset ratio (LAR); a requirement for a bank to hold minimum amounts of specified liquid assets, typically as a percentage of its liabilities; (ii) reserve ratio; a requirement for a bank to hold minimum balances with the central bank, typically as a percentage of its liabilities, known as statutory reserve deposit (SRD) ratio; and (iii) standing facilities, used at the initiative of banks and, allowing banks to borrow from (refinance facility) or deposit funds with the central bank (deposit facility).

On the other hand, indirect instruments are linked to money market conditions. These are used at the discretion of the central bank and they bear an interest rate. They include: open market operations conducted by the central bank as a participant in the money market. They involve: (i) buying/selling bonds issued by government and government agencies in the secondary market; and buying/selling assets under a repurchase

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4 When the central bank uses direct instruments, its aim is to change the balance sheets of commercial banks. By so doing, there is one to one correspondence effect between, say credit ceiling and commercial loans. On the other hand, when central bank uses indirect instruments, the aim is to change its own balance sheet. For example, if central bank undertakes sale of its own security, it acquires additional reserves, thereby absorbing the intended excess surplus funds from the economy. If there is a stable relationship between reserve money and aggregate demand, indirect instruments will be effective.
agreement in the repo market, or foreign exchange swaps; and (ii) open market-type operations, which are monetary operations based on auction techniques that are regulated by the central bank. They involve primary market issuance of central bank’s own securities or government securities issued exclusively for monetary policy purposes (IMF 2004).

Until 1989, CBSI did not have any indirect instrument (Table 3). It relied on direct instruments, including LAR and direct controls on credit. In 1989, it launched open market operations (OMO) in its own 91-day paper, known as Bokolo bills, for mopping up excess liquidity. However, fiscal dominance and sovereign defaults through the 1990s led to closure of domestic securities markets and ultimately, discontinuance of Bokolo bills. They were re-introduced and discontinued between 1992 and 1996. During the interregnum, CBSI conducted liquidity management operations by using separately issued T-Bills by government. As CBSI was undertaking OMO in T-Bills, it was under pressure. Caution was needed to ensure that use of the new issuance of T-bills did not undermine budget discipline (IMF 2005).
Table 3: Solomon Islands: Monetary Policy Instruments: Chronological Developments & Changes

<table>
<thead>
<tr>
<th>Year</th>
<th>Liquid Asset Requirement Ratio (%)</th>
<th>Statutory reserve Requirement Ratio (%)</th>
<th>Secured Advance Facility</th>
<th>Repurchase Rate (%)</th>
<th>Interest Rate Ceiling</th>
<th>Moral Suasion</th>
<th>Bokolo Deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1983</td>
<td>LAR was Introduced in 1983 LAR Ratio 15%</td>
<td>SRD was Introduced in 1988 SRD ratio 5%</td>
<td>No change</td>
<td>No ceiling until 1988</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1984</td>
<td>No Change in LAR</td>
<td>No change in SRD</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1985</td>
<td>No Change in LAR</td>
<td>No change in SRD</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1986</td>
<td>No Change in LAR</td>
<td>No change in SRD</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1987</td>
<td>LAR increased to 27.5%</td>
<td>No change in SRD</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1988</td>
<td>No change in LAR</td>
<td>SRD was discontinued</td>
<td>Repurchase Rate introduced 2.50%</td>
<td>Ceiling Was imposed 18%</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1989</td>
<td>No change in LAR</td>
<td>No change</td>
<td>No change</td>
<td>Ceiling Continued</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1990</td>
<td>LAR increased to 35%</td>
<td>No change</td>
<td>No change</td>
<td>Ceiling discontinued</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1991</td>
<td>No change in LAR</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1992</td>
<td>LAR increased to 37.5%</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1993</td>
<td>No change in LAR</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1994</td>
<td>No change in LAR</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1995</td>
<td>LAR increased to 40%</td>
<td>Increased to 5%</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1996</td>
<td>No change in LAR</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1997</td>
<td>No change in LAR</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1998</td>
<td>No change in LAR</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>1999</td>
<td>Re-definition</td>
<td>No change</td>
<td>No change</td>
<td>No ceiling</td>
<td>Yes</td>
<td>No ceiling</td>
<td>No ceiling</td>
</tr>
<tr>
<td>Year</td>
<td>LAR Rate</td>
<td>Change</td>
<td>Ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>----------</td>
<td>--------</td>
<td>---------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>7.5%</td>
<td>SAF introduced to correct any deficits that banks may experience on short-term basis</td>
<td>No change</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>LAR at 7.5%</td>
<td>No change</td>
<td>No ceiling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: CBSI (Various issues of Quarterly Economic Reviews)

Given these circumstances, Solomon Islands in recent years used LAR to the fullest extent to reduce liquidity in the banking system and for fighting potential inflationary pressures. The LAR, which was as high as 40 percent until 1998, was reduced in 1999 to 7.5 percent of deposit liabilities. Since CBSI uses T-Bills for liquidity management, LAR requirement now excludes T-Bills as eligible assets. Currently for LAR calculation, the eligible asset is only the deposits by commercial banks with central bank. Since there is
limited scope for an inter-bank money market to develop in the near future, and there is no secondary market for T-Bills, indirect instruments are not likely to emerge as a reliable monetary policy instrument. Commercial Banks have to look to standing facilities offered by CBSI for meeting liquidity needs, which would eventually emerge as a discount facility. Further, as a major departure from past practices, CBSI has now allowed the Solomon Islands National Provident Fund to invest overseas up to 30 percent of its investment portfolio (about US$ 20 million), which considerably reduced domestic liquidity in the system (IMF 2008)

Solomon Islands ran budget surpluses during 2003-2006 thanks to substantial aid inflows. The latter were a great support to government, meeting the recurring and investment expenditures. However, public sector wage bill in 2007 and 2008 rose, as opposition was pressing the government to accommodate the claims of the civil service to offset rise in fuel price. Rise in food prices in 2008 also led the government to eliminate the goods tax and import duty on rice. With likely fall in revenues including export tax and royalty revenues in the light of the expected decline in timber exports, greater fiscal deficits are anticipated. Monetary conditions were being tightened since 2008, which witnessed a credit boom in 2008, especially growth in personal loans by banks. Further tightening of monetary conditions would be needed, if fiscal deficits cannot be prevented (CBSI 2008). Since the authorities are maintaining a de facto peg with the US dollar with view to containing inflation, rather than allowing currency depreciation which would only contribute to rise in landed prices of current imports, it is all the more necessary to absorb excess liquidity. Direct instruments are likely to play a more dominant role (IMF 2008).
### Box 1: Solomon Islands: Monetary Policy Instruments

**Liquid Asset Ratio (LAR)**

Banks are required to maintain a balance of liquid assets for each working day amounting to not less than 7.5 percent of deposit liabilities. Prior to November 2008, the qualified liquid assets were both cash and deposits with CBSI. In November 2008, cash was removed from the definition of liquid assets.

Liabilities qualified for the purpose of the requirement includes:

1. Demand deposit
2. Savings deposit
3. Time deposits
4. Deposit by non-residents
5. Foreign currency deposits by residents

**Standing facilities**

*Secured Advanced Facility (SAF):* This facility is intended to assist banks with short term liquidity problems or needs due to specific market situations. This is in accordance with the principal objectives under Section 4 of CBSI Act. The maturity term of the facility is 7 days and the interest rate is 2.5% above the interest rate on earning assets as determined by CBSI. The minimum advance is SI$1 million.

**Open Market Operations**

*Treasury Bills:* CBSI auctions treasury bills, having maturities of 7, 14, 28, 56 and days. Originally introduced in early 1980s was discontinued in mid-1995. Revived around 1999 and continuing. A cap of $30 million was introduced by CBSI for total T-bills. While the instrument remains with CBSI, the cost was incurred by Government.

*Bokolo Deposit facility:* This was introduced in late 2008 by CBSI with a fixed term maturity of 12, 18 and 24 months. Interest rates on the facility are 4%, 4.25% and 4.5%. The amount of deposit is negotiable. The purpose behind the facility is to absorb excess liquidity in the banking system.

In fact, CBSI (2005) has indicated the possibility of a larger role by direct instruments in the near term. These include credit ceilings, changes in LAR and standing facilities if rise in money growth presents problems preventing the realization of CBSI objectives. No
doubt each one of them has its own drawbacks. Increases in LAR, if unremunerated, as it is now would be a tax on intermediation. Bank–by-bank credit ceiling would also distort intermediation. The use of a deposit facility has quasi-implications. On the other hand, use of an indirect instrument, the Bokolo Bills would run the risk of fragmenting the sovereign-debt and would also involve costs (Porter 2008).

In PICs, mopping up the structural excess liquidity prevalent in economies with shallow financial markets with a small number of participants is not easy. Absorbing excess liquidity through open markets using either government issued securities or the central bank’s own paper would result in overshooting of interest rates and market volatility (IMF 2004, 2005). In these circumstances, as CBSI (2005) has indicated that employment of direct instruments including LAR and other quantitative measures such as including credit ceilings would be more effective, as they directly affect the volume of liquidity. Experiences of other PICs are relevant here.

Monetary Policy Transmission in Pacific Islands: Some Limitations

Monetary policy transmission is described as a process through which changes in monetary policy influence aggregate demand, output and price level in the economy. The impact of monetary policy decision on the country’s GDP is through its influences on consumption and investment decisions of households, business and financial intermediaries. At least six channels through which monetary policy impacts economic activities have been identified. These include: (i) interest rate channel; (ii) money supply

---

5 IMF (2004) observes that there were insufficient market instruments for liquidity management, noting the then existing excess reserves were almost six times the stock of T-Bills, and almost twice the T-bill issuance permitted under the then existing prospectus (SI$100 million).

6 IMF (2005) reports that central banks in Tonga and Vanuatu had to rely eventually on imposing bank-by-bank credit ceilings and raising LAR for controlling liquidity. IMF (2005) cites the experiences of developed countries in this regard: use of reserve requirements (Spain), mandatory deposits (Mexico and the Netherlands) and moving deposits from commercial banks to the central bank (Malaysia and Thailand).
channel; (iii) credit channel; (iv) the balance sheet channel; (v) asset price channel; (vi) exchange rate channel; and (vii) expectations channel (Mishkin 1995, 1996, 2001, 2006).

**Limitations in the island economies**

There are constraints limiting the efficiency of transmission mechanisms acting through various channels. One of the constraints faced by Solomon Islands is that in the absence of a well-developed financial sector and a vibrant secondary market, in which financial assets could be traded with considerable ease and speed, interest rate channel does not effectively operate (Worrell 2000; Fairbairn and Worrell 1996).

The balance sheet approach presupposes that financial assets are important constituents of firms’/consumers’ portfolios and assumes the existence of convertibility between illiquid (consumer durables) and liquid (financial) assets. Empirical studies have shown that markets for assets in the PICs and the Caribbean region have not attained such sophistication to function as an efficient conduit for monetary policy (Baksh and Craigwell 1997). A recent study (Dabla-Norris and Floerkemeir 2006) notes that the inability of banks in developing countries to properly assess credit risk, due to both weak risk management expertise and opaque corporate accounting practices, increases banking spreads and reduces the effectiveness of balance sheet channel.

With reference to asset price channel mechanism and its variants of Tobin’s $q$ theory (valuation of equities), the required pre-condition, namely the presence of financial assets constituting a key component of borrowers’ and wealth holders’ portfolios, does not exist in any PIC. Further, commercial banks dominate the financial sector, since the non-bank financial sector institutions (stock, debt securities and mortgage market, insurance industry) are still in their infancy. Thus, market financing does not matter, which largely precludes the asset price channel’s working through wealth and income effects (Dabla-Norris and Floerkemeir 2006).
The exchange rate channel transmission mechanism for its full efficiency presupposes a floating system, which adjusts to capital flows. Since Solomon Islands has adopted a fixed exchange rate regime, this particular channel does not operate. In view of the constraints discussed above, it is more likely that in small island economies with undeveloped money markets, monetary pulses are transmitted to the real sector through money channel rather than through interest rate channel. The next section undertakes an empirical investigation for testing the hypothesis that changes in monetary aggregate are more important than changes in interest rate.

Variables, Data and Methodology

For our empirical study, the choice of variables is constrained by data deficiencies. Further, the modeling methodology has to remain simple considering the fact degrees of freedom, which are restricted by the limited number of available annual observations. For our analysis, we choose two policy variables, monetary aggregate and interest rate. Monetary aggregate is represented by broad money. Interest rate is proxied by average lending rate, since there is no consistent data series for short-term interest rate in Solomon Islands. The target variables are real output, which is represented by real gross domestic product (RGDP), and price level, which is represented by consumer price index (P). Besides these variables, we include the nominal exchange rate, to check whether it could be a channel of transmission mechanism. The nominal exchange rate is expressed as units of US dollar per unit of domestic currency. The annual data for the empirical study are drawn from two sources: the monetary and exchange rate data from International Financial Statistics published by International Monetary Fund (2008) and output data from Asian Development Bank (2008) and UN ESCAP (2008). Table 4 presents a summary of monetary statistics during 1980-2007.

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7 The reason for using the nominal exchange rate is that one can isolate changes in the nominal exchange rate on real economic activity separately from changes in prices; and since the real exchange rate is already adjusted for changes in prices and using real exchange rate would make it difficult to isolate price changes (inflation) from exchange rate changes (Dabla-Norris and Floerkemeir, 2006).
Table 4: Solomon Islands: Output and Monetary Statistics

<table>
<thead>
<tr>
<th>Ave</th>
<th>GR (%)</th>
<th>Inflation (%)</th>
<th>Interest Rate (%)</th>
<th>Exchange Rate US$/SI$</th>
<th>M1 (% of GDP)</th>
<th>M2 (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980-1989</td>
<td>7.4</td>
<td>12.5</td>
<td>13.3</td>
<td>0.77</td>
<td>12.2</td>
<td>30.1</td>
</tr>
<tr>
<td>1990-1999</td>
<td>2.9</td>
<td>10.7</td>
<td>16.2</td>
<td>0.30</td>
<td>14.2</td>
<td>28.5</td>
</tr>
<tr>
<td>2000-2004</td>
<td>-2.1</td>
<td>8.2</td>
<td>14.5</td>
<td>0.16</td>
<td>15.9</td>
<td>26.6</td>
</tr>
<tr>
<td>2005</td>
<td>5.0</td>
<td>7.3</td>
<td>14.1</td>
<td>0.13</td>
<td>24.0</td>
<td>38.5</td>
</tr>
<tr>
<td>2006</td>
<td>6.2</td>
<td>11.2</td>
<td>13.9</td>
<td>0.13</td>
<td>27.5</td>
<td>42.6</td>
</tr>
<tr>
<td>2007</td>
<td>5.4</td>
<td>7.7</td>
<td>14.1</td>
<td>0.13</td>
<td>32.9</td>
<td>49.0</td>
</tr>
</tbody>
</table>

Source: International Monetary Fund (2008)

**Bounds testing approach**

Since the number of annual observations, being only 28 (covering 1980-2007), is not large enough for estimating a long-run money and output model, we resort to the autoregressive distributed lag (ARDL) procedure, developed by Pesaran, *et al.* (2001). The ARDL bounds testing model is a general dynamic specification, which applies lags of the dependent variable and the lagged and contemporaneous values of the explanatory variables, through which short-run impacts can be directly assessed and long-run relationship indirectly estimated.

Bound testing with ARDL framework has several advantages: (i) it allows testing for the existence of a cointegrating relationship between variables in levels irrespective of whether the underlying regressors are I(0) or I(1) (Pesaran and Shin, 1999; Pesaran, *et al.*, 2001); (ii) it is considered more appropriate than the Johansen and Juselius (1990) multivariate approach for testing the long run relationship amongst variables when the data are of a small sample size (Mah, 2000; Tang and Nair, 2002); (iii) Pesaran and Shin (1999) show that estimators of the short-run parameters are consistent and the estimators of long-run parameters are super-consistent in small sample sizes. For econometric

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8 Some previous studies have applied ARDL model to relatively small sample sizes with as few as 20 observations in their research. For example, Pattichis (1999) apply the ARDL model to estimate an import demand function for Cyprus from 1975 to 1994 (20 observations). Tang (2001) applies the ARDL framework to study inflation in Malaysia for the period of 1973-1997 (25 observations) while Tang and Nair (2002) apply the ARDL technique for estimating import demand function for Malaysia from 1970 to 1998 (29 observations).
analysis, all variables are duly transformed into their natural logs. We also added a trend variable\(^9\).

There are two steps involved in estimating the long-run relationship between money, output and other variables. The first step is to examine the presence of a long-run relationship among all variables in the equation. Once the long run relationship is confirmed in the model, the long-run coefficients are estimated using the associated ARDL model. To examine for cointegration by the bounds test proposed by Pesaran, et al., the following models are constructed for estimation purposes.

\[
\Delta \text{LRGDP}_t = \delta_1 + \beta_{11} \Delta \text{LRGDP}_{t-1} + \beta_{21} \Delta P_{t-1} + \beta_{31} \Delta LM2_{t-1} + \beta_{41} \Delta \text{LIR}_{t-1} + \beta_{51} \Delta \text{LER}_{t-1} \\
+ \beta_{61} \text{TREND} + \sum_{i=1}^{p} \alpha_{1i} \Delta \text{LRGDP}_{t-i} + \sum_{i=0}^{p} \alpha_{2i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{3i} \Delta LM2_{t-i} \\
+ \sum_{i=0}^{p} \alpha_{4i} \Delta \text{LIR}_{t-i} + \sum_{i=0}^{p} \alpha_{5i} \Delta \text{LER}_{t-i} + \epsilon_{1t} \tag{1}
\]

\[
\Delta P_t = \delta_2 + \beta_{12} \Delta \text{LRGDP}_{t-1} + \beta_{22} \Delta P_{t-1} + \beta_{32} \Delta LM2_{t-1} + \beta_{42} \Delta \text{LIR}_{t-1} + \beta_{52} \Delta \text{LER}_{t-1} \\
+ \beta_{62} \text{TREND} + \sum_{i=1}^{p} \alpha_{12i} \Delta \text{LRGDP}_{t-i} + \sum_{i=0}^{p} \alpha_{22i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{32i} \Delta LM2_{t-i} \\
+ \sum_{i=0}^{p} \alpha_{42i} \Delta \text{LIR}_{t-i} + \sum_{i=0}^{p} \alpha_{52i} \Delta \text{LER}_{t-i} + \epsilon_{2t} \tag{2}
\]

\[
\Delta \text{LM2}_t = \delta_3 + \beta_{13} \Delta \text{LRGDP}_{t-1} + \beta_{23} \Delta P_{t-1} + \beta_{33} \Delta LM2_{t-1} + \beta_{43} \Delta \text{LIR}_{t-1} + \beta_{53} \Delta \text{LER}_{t-1} \\
+ \beta_{63} \text{TREND} + \sum_{i=1}^{p} \alpha_{13i} \Delta \text{LRGDP}_{t-i} + \sum_{i=0}^{p} \alpha_{23i} \Delta P_{t-i} + \sum_{i=0}^{p} \alpha_{33i} \Delta LM2_{t-i} \\
+ \sum_{i=0}^{p} \alpha_{43i} \Delta \text{LIR}_{t-i} + \sum_{i=0}^{p} \alpha_{53i} \Delta \text{LER}_{t-i} + \epsilon_{3t} \tag{3}
\]

\(^9\) Narayan and Smyth (2006) have extensively discussed the inclusion of time trend variable in the estimation.
\[ \Delta LIR_t = \delta_4 + \beta_{14} \Delta LGDP_{t-1} + \beta_{24} \Delta L_{t-1} + \beta_{34} \Delta L^2_{t-1} + \beta_{44} \Delta LIR_{t-1} + \beta_{54} \Delta LER_{t-1} \]

\[ + \beta_{64} TREN卓 + \sum_{i=1}^{p} \alpha_{14i} \Delta LGDP_{t-i} + \sum_{i=0}^{p} \alpha_{24i} \Delta L_{t-i} + \sum_{i=0}^{p} \alpha_{34i} \Delta L^2_{t-i} \quad (4) \]

\[ + \sum_{i=0}^{p} \alpha_{44i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \alpha_{54i} \Delta LER_{t-i} + \varepsilon_{4t} \]

\[ \Delta LER_t = \delta_5 + \beta_{15} \Delta LGDP_{t-1} + \beta_{25} \Delta L_{t-1} + \beta_{35} \Delta L^2_{t-1} + \beta_{45} \Delta LIR_{t-1} + \beta_{55} \Delta LER_{t-1} \]

\[ + \beta_{65} TREN卓 + \sum_{i=1}^{p} \alpha_{15i} \Delta LGDP_{t-i} + \sum_{i=0}^{p} \alpha_{25i} \Delta L_{t-i} + \sum_{i=0}^{p} \alpha_{35i} \Delta L^2_{t-i} \quad (5) \]

\[ + \sum_{i=0}^{p} \alpha_{45i} \Delta LIR_{t-i} + \sum_{i=0}^{p} \alpha_{55i} \Delta LER_{t-i} + \varepsilon_{5t} \]

where \( \Delta \) is the first difference operator, \( \varepsilon_{it} \) are white noise error terms, \( TREN卓 \) is the trend, or time variable. The joint significance of the lagged levels in these equations is examined by using the F-test, where the null and alternative hypotheses are expressed as follows:

For Equations (1) to (5):
\[ H_0 : \beta_{ii} = \beta_{2i} = \beta_{3i} = \beta_{4i} = \beta_{5i} = 0 \quad (There \ is \ no \ long \ run \ level \ relationship) \]

\[ H_1 : \beta_{ii} \neq \beta_{2i} \neq \beta_{3i} \neq \beta_{4i} \neq \beta_{5i} \neq 0 \quad (There \ is \ a \ long \ run \ level \ relationship) \]

where \( i = 1, 2, ..., 5 \)

The distribution of the F-statistics is non-standard under the null hypothesis and testing the hypothesis, two sets of critical values are based on Pesaran, et al. (2001) and Narayan (2005). Narayan and Narayan (2005) and Narayan (2005) show that the use of Pesaran, et al.’s (2001) critical values for small sample study may lead misleading inferences as the computed critical values are generally lower than those generated by Narayan who used similar GAUSS code provided by Pesaran, et al. (2001). Narayan (2005) has generated a set of critical values for small sample size ranging from 30 to 80 observations. Since the sample size in our study is small, and as the critical values provided by Pesaran, et al. (2001) are calculated on the basis of large sample sizes of 500 and 1000 observations and
2000 and 40000 replications respectively, we also use the critical values generated by Narayan (2005)\textsuperscript{10}.

If the computed F-statistic is greater than the upper critical bound value, the null hypothesis of no cointegration is rejected irrespective of whether the variable is I(0) or I(1). In contrast, when the F-statistic is smaller than the lower critical bound value, the null hypothesis is not rejected, and we conclude that there is no long-run level relationship between the variables under study. However, if the computed F-statistic lies inside the lower and upper critical bound values, there is inconclusive inference unless the order of integration of the series under consideration is clearly examined.

**Granger causality test**

If the variables are cointegrated, the next step is to perform the Granger causality test to examine the short-run dynamic causality relationship between variables. Equations (1) and (2) can be re-formulated into a vector error-correction model (VECM) framework in order to capture the short- and long-run effect of the cointegrating vector. Let $Z_t$ as the vector of a set of endogenous variables, we can model $Z_t$ as an unrestricted vector autoregression (VAR) model with optimum lag-length\textsuperscript{11}:

$$Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \ldots + A_k Z_{t-k} + U_t \quad \text{where } U_t \sim \text{IN}(0, \sigma)$$  \hfill (6)

where $Z_t$ is a (5 x 1) vector comprised of $\text{LRGDP}, \text{LP}, \text{LM2}, \text{LIR}$ and $\text{LER}$. Each of the $A_i$ is a (5 x 5) matrix of parameters. The 5-variable VAR model as shown in Equation (6) is used, if there is no long run relationship in the bound testing approach. Nevertheless, if there appears a cointegration vector, then the following VECM will be used to examine the long- and short-run causality relationship between variables under study.

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \ldots + \Pi Z_{t-k} + U_t$$  \hfill (7)

where $\Delta Z_t = [\text{LRGDP}, \text{LP}, \text{LM2}, \text{LIR} \text{ and } \text{LER}]'$, $\Gamma_1 = -(I - A_1)$, $\Gamma_2 = -(I - A_1 - A_2)$ and $\Pi = -(I - A_1 - A_2 - A_3)$, $\Gamma_i$ reflects the short-run relationship of the changes in $Z_t$. The

\textsuperscript{10} See Table 5 for these critical values.
\textsuperscript{11} The optimum lag length is chosen based on the Akaike’s information criterion.
(5 x 5) matrix of $\Pi (=a\beta')$ contains both speed of adjustment to disequilibrium ($\alpha$) and the long-run information ($\beta$) such that the term $\beta'Z_{t-3}$ embedded in Equation (7) represents the $(n-1)$ cointegrating relationship in the model.

**Results and Discussion**

**Unit root tests**

We employed three testing procedures for examining the order of integration of each series. The first test is proposed by Dickey and Fuller (1979, ADF) with the null hypothesis of unit root process. However, one of the problems with the ADF tests is that the test has low power in examining the properties of the series. Indeed, Pantula, et al. (1994) have argued that unit root tests based on the ordinary least squares (OLS) estimator such as ADF tests, are the least powerful among the test statistics they examined. Hence, we also apply the Ng and Perron (NP, 2001) and KPSS unit root tests. The test suggested by Kwiatkowski, et al. (KPSS, 1992) with the null hypothesis of stationarity, while the test developed by Ng and Perron (2001) has a similar null hypothesis as ADF test. Table 5, which reports the results of three unit root tests, shows that variables are non-stationary at level form. After first difference, however, all unit root tests reveal that the series are I(1) variables.

<table>
<thead>
<tr>
<th>Country / Variable</th>
<th>ADF</th>
<th>Ng and Perron</th>
<th>KPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level</td>
<td>Level</td>
<td>Level</td>
</tr>
<tr>
<td></td>
<td>First Difference</td>
<td>First Difference</td>
<td>First Difference</td>
</tr>
<tr>
<td>LRGDP</td>
<td>-1.6895</td>
<td>-3.9769**</td>
<td>-3.9876**</td>
</tr>
<tr>
<td>LP</td>
<td>-0.0198</td>
<td>-0.9114</td>
<td>-9.4059**</td>
</tr>
<tr>
<td>LM2</td>
<td>-2.3758</td>
<td>-6.8024</td>
<td>-16.5891**</td>
</tr>
<tr>
<td>LIR</td>
<td>-2.0578</td>
<td>-1.6627</td>
<td>-11.5221**</td>
</tr>
<tr>
<td>LER</td>
<td>-1.3039</td>
<td>-3.9639</td>
<td>-12.5771**</td>
</tr>
</tbody>
</table>

Notes: The ADF critical values are based on Mckinnon. The optimal lag is chosen on the basis of Akaike Information Criterion (AIC). The null hypothesis for both ADF and Ng-Perron tests is a series has a unit root (non-stationary) while the null hypothesis of the KPSS test is does not contain unit root (stationary). The asterisk ** denotes the rejection of the null hypothesis at the 5% level of significance.
Bounds testing results

The results of bounds tests are reported in Table 6. The computed F-statistics for real output equation suggests rejection of the null hypothesis of no cointegration. However, the null hypothesis is not rejected for other equations. This finding shows that there is a long-run equilibrium relationship between real output, prices, money variable (M2), interest rate, and exchange rate in Solomon Islands.

The long run estimated equation by OLS for real GDP as dependent variable is shown as follows:

\[
L_{RGDP_t} = 7.269 - 3.222L_{P_t} + 1.981LM_{2_t} - 0.351LIR_t - 0.947LER_t
\]

\[ t = (3.282) (-3.967) (4.181) (-1.284) (-2.455) \]  \( (8) \)

*, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.
Figures in parentheses are t-statistics.

As shown in Equation (8), the estimated coefficient of money variable (M2) has a positive sign, which is also found statistically significant. The value of the coefficient (1.981) is the long run elasticity of output with respect to money. The estimated coefficient of price has the theoretically expected sign and is also significant. Similarly, exchange rate has also a negative sign, suggesting depreciation would contribute to a rise in output. However, although the coefficient of interest rate has the expected negative sign, it is not statistically significant.
Table 6: Solomon Islands: Bounds Test Results for Solomon Islands

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Computed F-statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRGDP</td>
<td>11.1141***</td>
</tr>
<tr>
<td>LP</td>
<td>1.3304</td>
</tr>
<tr>
<td>LM2</td>
<td>0.4546</td>
</tr>
<tr>
<td>LIR</td>
<td>1.1478</td>
</tr>
<tr>
<td>LER</td>
<td>1.7097</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pesaran, et al. (2001)(^a)</th>
<th>Narayan (2005)(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Value</td>
<td>Lower bound value</td>
</tr>
<tr>
<td>1 per cent</td>
<td>3.41</td>
</tr>
<tr>
<td>5 per cent</td>
<td>2.62</td>
</tr>
<tr>
<td>10 per cent</td>
<td>2.26</td>
</tr>
</tbody>
</table>

\(^a\) Critical values are obtained from Pesaran, et al. (2001), Table CI(iii) Case III: Unrestricted intercept and no trend, p. 300.

\(^b\) Critical values are obtained from Narayan (2005), Table case III: unrestricted intercept and no trend, p. 10.

*, ** and *** indicate significance at 10%, 5% and 1% levels, respectively.

Equation (8) is adequate since the results of a battery of tests indicate that the disturbance terms are normally distributed and serially uncorrelated with homoscedasticity of residuals, confirming the model has a correct functional form. Moreover, the CUSUM and CUSUM of Squares plot show that the parameters of the model are stable over time\(^12\).

**Granger causality test**

Table 7 presents the long- and short-run dynamic causal relationships among real output, prices, money variable (M2), interest rate and exchange rate. In line with the findings of cointegration test, money variable (M2), prices, interest rate and exchange rate are Granger-cause real output significantly in the long-run, as indicated by the significance of the error correction term (ECT). The magnitude of ECT indicates the speed of adjustment of any disequilibrium towards a long-run equilibrium, which is 9.14% within a year. However, ECT is not significant in all the other four equations, with price, money, interest rate and exchange rate as dependent variables, indicating that the long run

\(^{12}\) In order to conserve space, we include the figures in the appendix.
relationship exists in only one direction. The linkage runs only from money, interest rate, prices and exchange rate to output and not otherwise. This also confirms the results we obtained from bound tests that there is only one cointegrating equation, which was the equation with output as the dependent variable.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>F-statistics</th>
<th>ECT (t-statistics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔLRGDP</td>
<td>ΔLP</td>
<td>ΔLM2</td>
</tr>
<tr>
<td>ΔLRGDP</td>
<td>-</td>
<td>0.4089</td>
</tr>
<tr>
<td>ΔLP</td>
<td>9.3695***</td>
<td>-</td>
</tr>
<tr>
<td>ΔLM2</td>
<td>1.1753</td>
<td>0.5401</td>
</tr>
<tr>
<td>ΔLIR</td>
<td>0.4931</td>
<td>3.2884*</td>
</tr>
<tr>
<td>ΔLER</td>
<td>0.9387</td>
<td>4.7739**</td>
</tr>
</tbody>
</table>

Note: *, ** and *** indicate significance at 10%, 5% and 1% levels, respectively. Figures in parentheses are t-statistics.

In regard to short run relationship, we find that there are two variables (that is, money variable and exchange rate) Granger-cause real output, while price is Granger-caused by both real output and money variable. It is also seen that price significantly Granger-causes both interest rate and exchange rate. For money variable, there is no evidence of any Granger causality whatsoever.

Variance decomposition analysis

For variance decomposition analysis, we order the variables with policy variables first followed by target variables, namely: money variable (LM2), interest rate (LIR), exchange rate (LER), prices (LP) and real output (LRGDP). The results of decomposition analysis for real output are shown in Table 8. Real output is very sensitive to its own shock and money variable. It is found that substantial variation in output, about 84
percent is explained by its own shock in the first year, which slowly decreases in the long-run to around 40 percent (at a 10-year horizon). Money variable explains a large proportion of variation in real output for the whole time horizon. The effect of shock in money variable on real output increases until the sixth year, and achieved its peak with about 50 percent. It, however, decreases from the seventh year onwards with steady momentum to reach about 43 percent. In contrast, real output is not very responsive to price, interest rate and exchange rate (that is, less than 10 percent of its forecast error variance explained by these three variables), either in the short- or long-run.

As regards price level (Table 9), the analysis shows that more than 40 percent of variation in price is explained by its own shock in the first year. However, the impact decreases in the remaining years. Money variable is the most important determinant in explaining the variation in price both in the short run and long run. Variation in price is explained by money to an extent of 31 percent in the first year and rises in the medium term to around 47 percent and in the long run around 38 percent. Although the variation in price is explained minimally by shock in the first year, influence of output on price rises over the remaining period of the time horizon. Shock to interest rate has no significant impact on price, either in the short or long run. On the other hand, about 27 percent of variation in price is explained by shock to exchange rate in the first year. Over the time horizon, the impact of exchange rate on price declines to about 17 percent in the medium term and to around 11 percent in the long run.

<table>
<thead>
<tr>
<th>Period</th>
<th>S.E.</th>
<th>LRGDP</th>
<th>LP</th>
<th>LM2</th>
<th>LIR</th>
<th>LER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0586</td>
<td>83.9182</td>
<td>0.2976</td>
<td>10.8862</td>
<td>2.0304</td>
<td>2.8677</td>
</tr>
<tr>
<td>2</td>
<td>0.0827</td>
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<td>34.7844</td>
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<td>2.5653</td>
<td>45.1058</td>
<td>4.3621</td>
<td>4.0082</td>
</tr>
<tr>
<td>4</td>
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<td>2.9755</td>
<td>46.0279</td>
<td>7.4523</td>
<td>5.3338</td>
</tr>
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<td>33.1116</td>
<td>3.8758</td>
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<td>4.0729</td>
<td>43.1340</td>
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<td>4.1543</td>
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Notes: Cholesky Ordering: LM2, LIR, LER, LP, LRGDP. We have used different orderings of the variables under concerned, but the findings are robust to changes.
Table 9. Solomon Islands: Variance Decomposition Analysis for Prices

<table>
<thead>
<tr>
<th>Period</th>
<th>S.E.</th>
<th>LRGDP</th>
<th>LP</th>
<th>LM2</th>
<th>LIR</th>
<th>LER</th>
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<td>0.0000</td>
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<td>5.3669</td>
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<td>4</td>
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<td>20.9433</td>
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<td>41.1106</td>
<td>8.3245</td>
<td>15.5272</td>
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<tr>
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<td>19.7246</td>
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<td>6.2459</td>
<td>17.3760</td>
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<td>18.5644</td>
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<td>7.3847</td>
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</table>

Notes: Refer to Table 7.

Table 10: Solomon Islands: Correlation Matrix of the Reduced Form VAR Residuals

<table>
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<tr>
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<th>LRGDP</th>
<th>LP</th>
<th>LM2</th>
<th>LIR</th>
<th>LER</th>
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<tbody>
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<td>0.3299</td>
<td>0.1079</td>
<td>-0.1793</td>
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<td>LP</td>
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<td>0.5553</td>
<td>-0.0484</td>
<td>-0.5496</td>
</tr>
<tr>
<td>LM2</td>
<td>0.3299</td>
<td>0.5553</td>
<td>1</td>
<td>-0.1027</td>
<td>-0.0601</td>
</tr>
<tr>
<td>LIR</td>
<td>0.1079</td>
<td>-0.0484</td>
<td>-0.1027</td>
<td>1</td>
<td>0.0706</td>
</tr>
<tr>
<td>LER</td>
<td>-0.1793</td>
<td>-0.5496</td>
<td>-0.0601</td>
<td>0.0706</td>
<td>1</td>
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</tbody>
</table>

Impulse Response Analysis

The impulse response function enables us to trace out the response of output to a shock in policy variable. The shock is represented by one standard deviation of the error term in the underlying structural model for the variable. Since all variables are measured in log forms, the impulse response functions trace out a growth rate relative to the base period when the shock occurred. Compared to Granger causality tests, IRF has an additional advantage, as it indicates whether the effect is positive or negative. For investigating IRF in regard to the output model by Choleski decomposition, we again order the variables
with policy variables first, followed by target variable: monetary aggregate \((LM2)\), interest rate \((LIR)\), exchange rate \((LER)\), prices \((LP)\) and real output \((LRGDP)\)\(^{13}\).

Figure 1 shows the response of output to shocks in monetary policy variables \((M2,\) interest rate and exchange rate) and price. A shock to price exhibits a negative impact on real output, it decreases over time with a trough at the fourth year and then it rises slowly to its steady state at eighth year. The response of real output to shock in money variable increases substantially over the first two-year period, which decreases slowly thereafter. Surprisingly, the response of the real output to shock in interest rate is positive and rises over the entire time horizon. The response of real output to shock in exchange rate is negative. The effect is changing rapidly, reaching its trough in the fourth year and then slowly increasing to its steady state over the remaining time period.

The responses of price to shocks in M2, interest rate and exchange rate and real output are shown in Figure 2. Price responds immediately to real output, that is, it decreases sharply in the first two years and then slowly steadying in the rest of the time horizon. Price is seen to be very sensitive to monetary shock in the first three-year period. Thereafter, the effect is decreasing over the time period. As to the shock in interest rate, the response of price is positive and rising during the entire time horizon. Price negatively responds steeply to shock in exchange rate. The response, however stabilizes after fifth year.

\(^{13}\) We used different orderings of the variables. With a view to evaluating the robustness of the VAR results which vary according to different orderings of the variables, the correlation matrix of the reduced-form VAR residuals based on the ordering was examined. The elements of the correlation matrix between the M2 and the rest of the variables are low, indicating that contemporaneous feedback is not a problem. These correlations suggest that the ordering of the variables in Choleski decomposition is not of any major concern (see Table 10).
Figure 1: The Results of Impulse Response Function Analysis for Real Output

- Response of LRGDP to LP
- Response of LRGDP to LM2
- Response of LRGDP to LIR
- Response of LRGDP to LER

Response to Cholesky One S.D. Innovations

1 2 3 4 5 6 7 8 9 10
-0.02 -0.01 0.00 0.01 0.02 0.03 0.04

Figure 2: The Results of Impulse Response Function Analysis for Prices

- Response of LP to LRGDP
- Response of LP to LM2
- Response of LP to LIR
- Response of LP to LER

Response to Cholesky One S.D. Innovations

1 2 3 4 5 6 7 8 9 10
-0.02 -0.01 0.00 0.01 0.02 0.03 0.04
Overall, the results of both variance decomposition and impulse response function are similar to the findings arrived at by cointegration and Granger causality tests, establishing the major roles of both monetary aggregate variable and exchange rate in explaining changes in output and price level.
Summary and Conclusions

Monetary policy transmission mechanism in both developed countries and developing countries has been well documented in the growing body of empirical literature. However, there are such studies available in regard to Solomon Islands, which is one of the five PICs with independent currencies under fixed exchange rate regimes. This paper, which sought to fill the gap, undertook an investigation as to how changes in monetary policy influence the real sector in Solomon Islands.

Solomon Islands’ financial sector is small. Its money and capital markets are at embryonic stage. Its money market is shallow and not deep, with a few participants, as it is dominated by Treasury-bills, just as capital market is saturated with long term government bonds. Further, there are no secondary markets for short-and long-term debt securities.

The study findings are: (i) there is long-run relationship between real output, price, monetary aggregate, interest rate and exchange rate; (ii) in the long run relationship, interest rate does not play any significant role; (iii) bounds testing procedure and Granger causality test results confirm the presence of only one cointegration vector and establish that significant, unidirectional causal linkage runs only from money and exchange rate to real output; and (iv) monetary aggregate is found to be significantly Granger-causing the price level.

Finally, in conformity with the long- and short-run findings, both variance decomposition and impulse responses function analyses show that the money variable is the most significant variable in explaining changes in real output and price level in Solomon Islands.

These are consistent with the findings of studies in other parts of the developing world with relatively undeveloped money markets that money markets were not the principal conduit of monetary policy shocks. The findings are useful for policy makers involved in
the design and implementation of monetary policy so as to ensure the maximum effect on investment and economic growth. With further economic liberalization and development of financial markets, the channels through which monetary policy works will continue to evolve. As such, the question of how monetary policy is transmitted to the real sector in Pacific island economies would be of continuing interest to researchers and policy makers.
References


Acknowledgments

The authors are grateful to Mr. Trevor Manemahaga and Ms. Luisa Korte, both of Central Bank of Solomon Islands for their help in compiling information on chronological developments in regard to monetary policy.
Appendix

Figure A: Plot of CUSUM Test for Real GDP (LRGDP) Equation

Figure B: Plot of CUSUM of Squares Test for Real GDP (LRGDP) Equation
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<td>Vincent D. Nomae, Andrew Manepora’a, Sunil Kumar &amp; Biman C. Prasad, <em>Poverty Amongst Minority Melanesians In Fiji: A Case Study Of Six Settlement</em></td>
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