

INTERNATIONAL MONETARY FUND



# Staff Country Reports

## **Solomon Islands: Selected Issues**

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INTERNATIONAL MONETARY FUND

SOLOMON ISLANDS

**Selected Issues**

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Approved by Asia and Pacific Department

November 8, 2011

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## I. MANAGING MINERAL RESOURCES IN SOLOMON ISLANDS <sup>1</sup>

### A. Introduction

1. **The mining sector has gained momentum in recent years and is expected to play an increasingly important role in the economy.** Gold Ridge mine, which was shut down in 2002 during the civil unrest, resumed its production in 2011. As of October 2011, three mining leases, one for Gold Ridge and two for small alluvial mines, have been issued. With the rapid increase in commodity prices in recent years, exploration activities have intensified (Box 1). The mining sector could become an important source of growth, generating foreign exchange earnings and fiscal revenue in the medium term.
2. **The challenge is to manage mineral resources by implementing taxation and regulatory regimes to ensure that the entire country benefits from mining.** Sound management of mineral revenues could provide the resources for financing development, thereby creating jobs, raising household incomes, and reducing poverty.
3. **This paper analyzes the ongoing reforms of the mineral taxation regime in Solomon Islands, estimates the fiscal impact of mineral resources, and outlines the policy priorities ahead.** The analysis shows that mineral revenue could be large, provided that mineral prices remain strong in the medium term. Enforcing the tax agreement with Gold Ridge and implementing the new resource taxation regime are critical to ensure that the forthcoming mineral wealth spills over to the rest of the economy. Moving forward, Solomon Islands should adopt new fiscal rules and fiscal responsibility provisions to manage large but volatile resource revenue.

#### Box 1. Solomon Islands: The Prospect for Mining Developments

Data from the Ministry of Mines indicate that more than 120 prospecting mining licenses, mainly gold and nickel, have been issued up to October 2011. About three quarters of these licenses are related to offshore mining explorations, and about two thirds were issued in 2011 alone. However, there has been controversy and a legal case in the Solomon Islands High Court on the prospecting license to develop a large nickel mine on Isabel Island. The license was issued to one company in late 2010, but it was then canceled and reissued to another company in early 2011 after the latter secured agreement with the land owners. This case highlights the need for establishing a transparent, predictable, and stable mining regime to attract foreign investment in the mining sector. Despite this controversy, however, the prospect for nickel mining development in the other islands, such as on Choiseul Island, remains favorable.

### B. The Taxation Regime and Regulatory Framework

4. **The taxation regime for mining is generally separated from the general taxation due to the specific characteristics of mining projects** (Box 2). The extraction of nonrenewable and

<sup>1</sup> Prepared by Tubagus Feridhanusetyawan (APD).

scarce resources would generate economic rents which can be viewed as the difference between the price and the opportunity cost of producing the commodity. The latter includes the cost of production, the return to capital, and other factors (such as the risk premium). Therefore, an appropriate tax regime should strike a balance between maximizing tax collection from the rents and providing an incentive for companies to invest in mining activities. The government could also reduce political and commercial risk, thereby increasing the potential rents that can be taxed by lowering the opportunity cost of investment. The instruments of the mining regime include direct taxes, such as the corporate income tax and the profit tax, and indirect taxes such as royalties, export duties, and import duties. Other non-tax instruments can also be used such as production sharing arrangements and state equity participation.<sup>2</sup>

### **Box 2. The Unique Characteristics of Mining Projects**

Several characteristics distinguish mining projects from other types of business. The period of mining exploration could be lengthy and risky. The amount of capital to develop the mine is lumpy, and the capital is captive and not transportable. Revenue and cost could be volatile following international mineral and fuel prices, and it takes time to recoup the large upfront investment. Mines have long lives and the project could be subject to regime changes. In addition, some decommissioning costs are usually incurred at the closing of a mining project.

5. **The government of Solomon Islands has been developing a new mining tax regime to ensure that the country benefits from the mining sector.** Under the IMF-supported program, the government has committed to formulating a new mining taxation, drafting amendments to relevant tax legislation, and implementing the new taxation regime. The IMF technical assistance that took place during 2010–11 provided recommendations to formulate new mining tax regime and to integrate mining taxation into the Income Tax Acts and other revenue legislation under the Ministry of Finance and Treasury. Before the new mining tax is in place, the government should refrain from signing new mining leases, while prospecting licenses continue to be granted under the current Mines and Mineral Act (MMA). The new tax regime should provide a fair sharing of risk and reward between the government and the investors, and should be applicable to all new mining projects to prevent the government from negotiating ad hoc fiscal arrangements for each mine. The IMF technical assistance indicated that Gold Ridge tax agreement signed in 1996 provides a reasonable starting point for a general mining tax regime although some modifications are needed<sup>3</sup>.

6. **Along with the tax reform, the government is also strengthening the legislative and regulatory framework for the mining sector.** The 1990 MMA is currently the main regulation for the mining sector, and there is a need to modernize the MMA and to develop the accompanying regulations. For example, the reforms should remove the fiscal provisions and the

<sup>2</sup> See, for example, Baunsgaard (2001).

<sup>3</sup> The mining taxation under the Gold Ridge agreement is broadly comparable to mining taxation in other countries (IMF, 2011). The corporate income tax rate is higher than in other countries, but there is no dividend withholding tax. The average effective tax rate for a Gold Ridge-like mining project is slightly lower than the international average.

power to renegotiate the fiscal terms from the MMA to legislation under the Ministry of Finance and Treasury. The government is now working on a program, with support from the World Bank, to strengthen the legislative and regulatory framework. The legislative reforms would take place during 2011–13, in parallel with the tax reforms, although the latter are expected to be completed ahead of the former.

7. **The government has also started the preparatory work for Solomon Islands’ participation in the Extractive Industry Transparency Initiative (EITI).** The government has endorsed the EITI principles on improving the transparency, accountability, and management of natural resources, and prepared for the EITI participation with the support of the World Bank. Successful implementation of the EITI will strengthen public financial management, improve investment climate, and build trust among government, mining industry, and civil society.

8. **Strengthening the capacity to implement the mining taxation regime is also critical to support the ongoing reforms of the mining sector.** In the near term, improving administrative capacity to enforce Gold Ridge tax agreement is important to ensure that taxes and royalties are properly assessed and collected. The Ministry of Finance and Treasury has developed a revenue forecasting model, and improving this model by incorporating the new mineral tax regime would be important for medium-term projections. In addition, strengthening revenue and expenditure transparency in the context of the EITI participation would improve governance and accountability of public financial management.

### C. Estimating Mineral Revenue

9. **The potential revenue from the mining sector is assessed by estimating the potential tax collection from Gold Ridge mine.** The estimation is based on assumptions on production and cost of a gold mine similar to Gold Ridge and mining taxation that is in line with the Gold Ridge tax agreement. The objective is to provide estimates of specific tax revenues and to identify operational aspects that are crucial for strengthening revenue collection. The result could be used as a benchmark for assessing the actual tax collection from Gold Ridge.

10. **The estimation of tax collection is based on a standard model of production, revenue, and costs, of a gold mining operation.** In line with the recommendations of IMF technical assistance (IMF, 2001), the taxable income and Corporate Income Tax (CIT) are estimated as follows:

*Taxable income subject to CIT = Revenue – Tax deductible allowances, where:*

*Revenue = Value of refined gold = Weight of gold doré bars × Mineral grade × Reference price.*

*Tax deductible allowances = Production cost + Development cost + Depreciation of capital replacement + Interest payment + Tax paid (e.g., export duty, royalties).*

Export duty and royalties, at 1½ percent respectively, are calculated based on the value of refined gold contained in an assay report prepared by the refinery in Australia.

To estimate the amount of Additional Profit Tax (APT), the net cash flow is calculated as follows:

$$\text{Net cash flow} = \text{Taxable income} + \text{Depreciation of capital replacement} + \text{Interest payments} - \text{Capital replacement expenditure} - \text{Corporate income tax payment.}$$

The APT of 30 percent is applied to the net cash flow if the closing balance at year  $t$  is positive, and the closing balance is calculated as follows:

$$\text{Closing balance in year } t = \text{Closing balance in year } t-1 \times (1 + \text{uplift factor} + \text{inflation adjustment factor}) + \text{net cash flow in year } t.$$

The uplift factor of 25 percent and the inflation adjustment factor, assumed at 2½ percent, indicate the threshold of internal rate of return in real terms before the APT applies.

11. **The production and cost of the gold mining project are assumed as follows.** The mining life is expected to be ten years, and production starts with 55 thousand ounces in 2011, 105 thousand ounces in 2012, and 120 thousand ounces annually until the end of its mining life. Gold price is assumed to follow the IMF World Economic Outlook prices until 2016 and

	2010	2011:Q1		
	World	World	Oceania	Asia
Average cost	579	620	778	489
25 percent quartile	431	435	596	353
50 percent quartile	565	583	718	475
75 percent quartile	699	760	955	521

Source: ABN AMRO (2011)

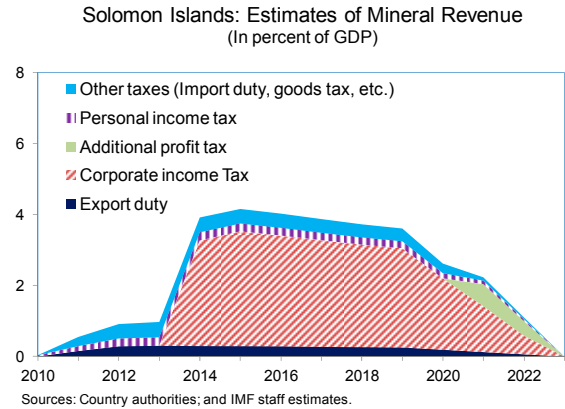
continue to grow by ½ percent annually in the long term in line with the projected inflation in advanced economies. The development cost is assumed at US\$250 million, including refurbishment costs and additional development cost incurred in the past, while capital replacement cost is assumed at US\$10 million per year. The production cost is assumed at US\$750 per ounce, which is higher than the world average cost of US\$620 in the first quarter of 2011, but broadly in line with the cost of mining operations in Oceania. The production cost comprises mainly of fuels, personnel, interest payments, management fees, payment to contractors, and other costs including mining supplies.

12. **The tax regime is assumed to be in line with the agreement signed with Gold Ridge mine.** Royalties are collected at 1½ percent rate (1.2 percent for landowner and 0.3 percent for provincial government) of gross sale value with no netting back of transportation, insurance, or refining cost. The export duty for the central government is also set at 1½ percent of gross value. The CIT rate is 35 percent, with an unlimited carry forward of tax losses and 100 percent capital allowance for exploration and development costs (initial or expansion) and annual allowance for other plant and equipment. There are other taxes, such as a 5 percent withholding tax on interest payments and 7 percent withholding tax on payments to non-resident contractors, but there is no dividend withholding tax. Capital equipment and certain specialized mining inputs are generally exempted from import duties and the goods tax. The tax regime includes an APT of 30 percent rate with a 25 percent threshold on the real rate of return. This means a 30 percent tax would apply to the post-tax income after the project has earned an internal rate of return (IRR) of 25 percent in real terms.



13. **These results indicate that the government would collect substantial mineral revenue in the medium term.**<sup>4</sup> Assuming that gold price remains strong, mineral revenue is expected to increase from less than 1 percent of GDP during 2011–13 to around 4 percent annually starting in 2014. Some further details and policy implications are as follows:

- The amount of CIT collection is estimated at around 3 percent of GDP starting in 2014. Although the gold mining company is not expected to pay any CIT in the near term due to its upfront expenditure to develop the mine, the government should collect information on the taxable income and the tax position to ensure future tax collection. The overall objective is to make sure that any taxes would be paid in due course rather than being deferred by disputed expense claims. This could be done by collecting and auditing the annual tax returns starting from the first year of development. Since the Gold Ridge mine has had repeated changes of ownership in the past, the government would also need to deal with possible tax complications, for example, on the treatment of past development expenditures.<sup>5</sup>



- The government could expect some revenue from APT provided that gold price remains strong. Based on the current trend of prices, for example, the project could generate some excess profit after 2020 once the internal rate of return of investment reaches above the 25 percent threshold. The calculation of annual cash flow to determine the amount of APT would require complete information on the amount of capital expenditure and other allowable deduction to derive the real rate of return. Therefore, collecting and auditing the annual tax returns starting from the development phase are critical to calculate the amount of APT in later years.
- Revenue from export duty is projected at around US\$1 million in 2011 and will increase to around US\$3 million (a quarter of GDP) annually starting in 2012. Since the value of the gold exports is determined based on the market reference price, the government should monitor and verify the amount of export tax (as well as royalties for landowners and provincial government) on regular basis. The government could also consider independent verification of the value of gold exports reported by the refinery.

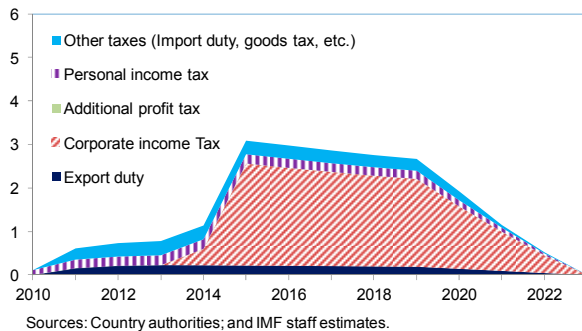
<sup>4</sup> The calculations of tax collection are presented in the Appendix.

<sup>5</sup> The estimate of CIT depends on the amount of development cost that can be deducted for tax calculation. The estimation in this paper assumes an additional cost of US\$100 million, on top of the US\$150 million refurbishment cost of the mine, to reflect past development expenses. If this past development cost cannot be deducted, the amount of taxable income and tax collection would be larger. The estimation also assumes no development cost to expand the mine after 2011. If the company claims additional cost to expand the mines, the CIT will be smaller in the near term but potentially larger in the long term due to larger production capacity.

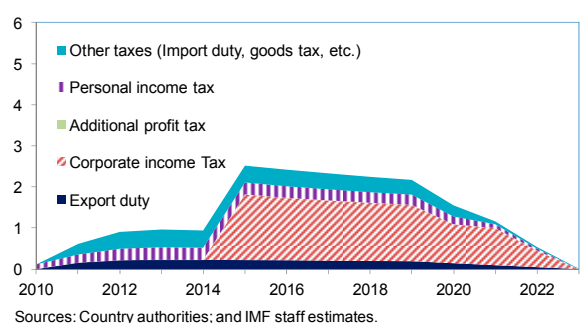
- The collection of other taxes, mainly in the form of goods tax on fuels, personal income tax, and withholding tax, is expected to be modest at around half percent of GDP. Although there is no dividend withholding tax, the government would still need to ensure that withholding taxes for interest payment and payment to contractors could be collected. Consistent enforcement of taxes on fuel and other taxable imported production inputs would also be crucial to ensure revenue collection.

14. **The stream of mineral revenue is expected to remain robust to commodity price shocks.** Sensitivity analysis is conducted to measure the impact of changes in gold price and production costs on mining revenue. The results indicate that mining revenue will remain substantial even if gold price were to decline substantially. The first scenario, in which production cost is assumed to decline by 25 percent from the baseline, shows that mining revenue would remain at around 3 percent of GDP. The second scenario — an extreme case in which production cost remains unchanged despite the sharp drop in gold price — suggests that mining revenue would stay at around 2 percent of GDP. In both scenarios, the government is not expected to collect APT. This sensitivity analysis suggests that ensuring CIT collection is critical to sustain mineral revenue.

Solomon Islands: Estimates of Mineral Revenue  
(In percent of GDP)  
Gold price: 25 percent lower than the baseline  
Production cost: 25 percent lower than the baseline



Solomon Islands: Estimates of Mineral Revenue  
(In percent of GDP)  
Gold price: 25 percent lower than the baseline  
Production cost remains at the baseline



#### D. The Fiscal Impact of Mineral Resources: Toward a New Fiscal Rule

15. **The fiscal position has improved remarkably since 2009 as a result of strong revenue collection.** Under the IMF-supported program, the authorities have increased tax collection by broadening the tax base and strengthening tax administration and enforcement. The authorities are also reforming tax legislation aimed at streamlining customs and tax exemptions. As a result, the domestic tax collection has increased since 2009. Meanwhile, international trade tax collection has also increased sharply as a result of strong logging production and price. The fiscal balance improved from less than 2 percent of GDP in 2009 to more than 6 percent of GDP in 2010, and the government cash reserves increased from nearly zero in early 2010 to SI\$300 million in June 2011.

16. **Looking ahead, mining revenue is expected to increase significantly, replacing the revenue from logging.** Revenue from logging is projected to decline from about 5 percent of GDP in 2010–11 to less than 2 percent of GDP by 2016 as logging production declines. This revenue shortfall would be mostly compensated by tax collection from the gold mine although mining revenue could not be tapped indefinitely as mining resources are exhaustible. At the same time, other tax collections (i.e., nonlogging and nonmining) are expected to increase gradually reflecting the authorities' continued efforts in broadening the noncommodity tax base, strengthening enforcement, and reducing exemptions. With the increasing role of mining in the economy, Solomon Islands will soon join the group of mineral rich countries in Asia and the Pacific.

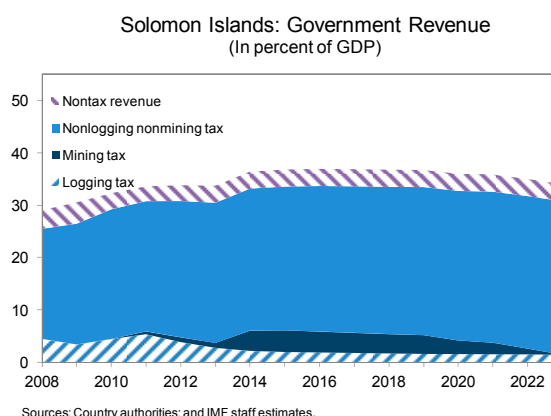
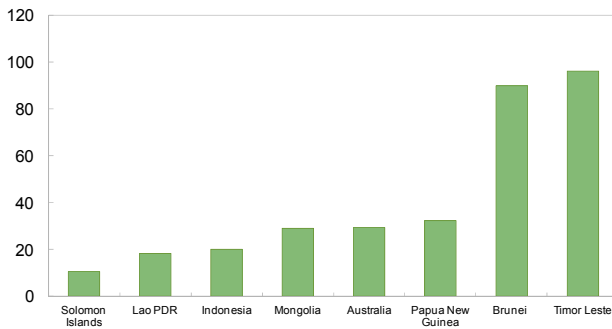


Table 1. Solomon Islands: Revenue Collections, 2009-16

	2009	2010	2011	2012	2013	2014	2015	2016
		Est.	Projection					
(In million of SI\$)								
Total revenue	1,467	1,757	2,150	2,454	2,665	3,089	3,360	3,637
Tax and customs revenue	1,272	1,589	1,968	2,235	2,409	2,813	3,063	3,317
Income and profits	540	638	727	856	953	1,281	1,410	1,519
Of which: Mining	0	2	15	26	30	283	328	342
Goods and services	423	569	744	867	968	1,046	1,135	1,234
Of which: Mining	0	0	9	19	21	23	24	25
Customs revenue	309	382	498	512	487	485	518	563
Of which: Mining	0	0	11	22	26	27	28	30
Logging	162	241	342	279	215	181	176	181
Other revenue	196	168	182	220	257	276	297	321
(In percent of GDP)								
Total revenue	30.5	32.2	33.6	33.8	33.7	36.4	36.8	36.9
Tax and customs revenue	26.4	29.2	30.7	30.8	30.4	33.1	33.5	33.6
Income and profits	11.2	11.7	11.3	11.8	12.1	15.1	15.4	15.4
Of which: Mining	0.0	0.0	0.2	0.4	0.4	3.3	3.6	3.5
Goods and services	8.8	10.4	11.6	11.9	12.2	12.3	12.4	12.5
Of which: Mining	0.0	0.0	0.1	0.3	0.3	0.3	0.3	0.3
Customs revenue	6.4	7.0	7.8	7.0	6.2	5.7	5.7	5.7
Of which: Mining	0.0	0.0	0.2	0.3	0.3	0.3	0.3	0.3
Logging	3.4	4.4	5.3	3.8	2.7	2.1	1.9	1.8
Other revenue	4.1	3.1	2.8	3.0	3.2	3.3	3.3	3.3
Nominal GDP (SI\$ million)	4,815	5,449	6,404	7,265	7,910	8,486	9,134	9,857

Sources: Country authorities; and IMF staff estimates.

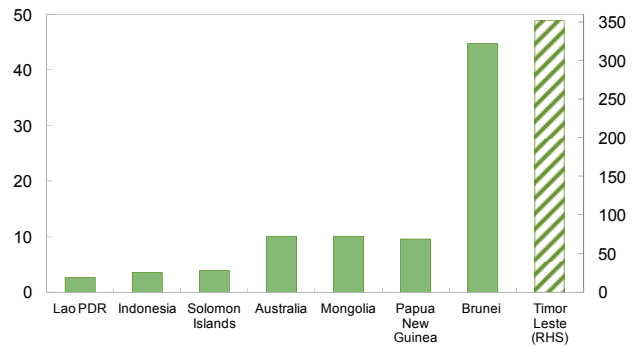
Revenue from Natural Resources, 2006-10  
(In percent of total revenue)



(Proj. 2015-2019)

Sources: Country authorities; and IMF staff estimates.

Revenue from Natural Resources, 2006-10  
(In percent of GDP)

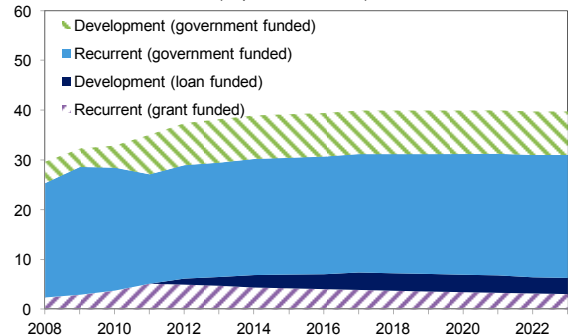


(Proj. 2015-2019)

Sources: Country authorities; and IMF staff estimates.

17. **On the expenditure side, the challenge is to provide resources to finance large development needs as development grants are expected to decline over time.** The improved fiscal position and favorable revenue prospects provide some scope for resuming concessional borrowing, which would be critical to tap additional resources to replace the declining grants. Public debt declined from 60 percent of GDP in 2005 to below 30 percent in 2010, and all external arrears have been cleared under the framework of Honiara Club Agreement (HCA).<sup>6</sup> The authorities are now conducting the HCA review aimed at paving the way for resuming concessional borrowing to finance development projects. The government-funded spending, both recurrent and development, is projected to increase slightly in terms of GDP, reflecting higher spending on health, education, and infrastructure. The overall challenge for the government is to maintain a smooth pattern of spending. However, since mineral revenue tends to be lumpy and volatile and mineral resources are exhaustible, the fiscal management could be a challenge.

Solomon Islands: Government Expenditure  
(In percent of GDP)



Sources: Country authorities; and IMF staff estimates.

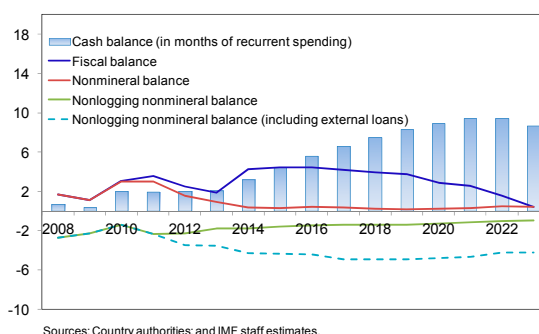
<sup>6</sup> Under the Honiara Club Agreement signed in 2005, Solomon Islands is expected to pursue grants and other overseas development assistance until it received “green light” status from World Bank’s International Development Assistance.

**18. Solomon Islands would need to adopt a new medium-term fiscal rule to help manage highly volatile mineral revenue and implement sound fiscal policies.**

Adopting an appropriate fiscal rule is important since revenue from mineral resources could have important macro economic implications (Box 3). In the near term, when mineral revenue is small, targeting the government cash balance remains appropriate to lock-in recent gains. In the medium term, however, targeting government cash balance would be less relevant since the revenue from mining would

be much larger than the total stock of cash balance, making the target nonbinding. Targeting the cash balance could lead to procyclical fiscal policy (i.e., spending more during booms and less during busts). Instead, targeting the noncommodity fiscal balance (e.g., nonmineral and nonlogging balance) would be more appropriate to insulate the budget from volatility of commodity revenue, help smooth expenditure over the mining cycle, and ensure a long-term use of exhaustible resources. The government’s plan to reform the Public Finance and Audit Act to include fiscal responsibility provisions will help the government implement a sound fiscal policy. Such provisions would specify the medium-term fiscal strategy and help strengthen fiscal transparency and accountability.

Solomon Islands: Fiscal Balance and Government Saving  
(In percent of GDP, or otherwise indicated)



Sources: Country authorities; and IMF staff estimates.

## E. Conclusion

**19. The mining sector is expected to generate large fiscal revenue in the medium term.**

Tax collection from the mining sector is projected to remain modest at less than one percent of GDP in the near term, but it would increase significantly to around 4 percent of GDP in the medium term.

**20. Implementing the new resource taxation regime is critical to ensure that the country could benefit from the mining sector.** This should be complemented by a stable and transparent regime to attract foreign investment and by the EITI participation to improve fiscal transparency and accountability. In the near term, however, consistent implementation of the Gold Ridge tax agreement should be the top priority. Moving forward, Solomon Islands should adopt a new fiscal rule, such as targeting the noncommodity balance, to help manage large but potentially volatile mineral revenue.

### Box 3. Fiscal Challenges in Managing Natural Resources

**Managing mineral revenues could be a challenge since mining commodity resources are exhaustible and the revenue stream volatile.** Sharp decline in revenue during busts could lead to drastic spending cuts, while large increase in revenue during booms could lead to a rapid increase in expenditure. Therefore, targeting the overall fiscal balance could foster procyclicality. Intergenerational distribution of the benefits from nonrenewable resources is also an issue in commodity-rich countries.

**On the spending side, the use of large mining revenue has important macroeconomic implications.** The spending on recurrent budget such as raising wages or increasing government employees could easily lead to inflation. Moreover, these measures are difficult to reverse and should not be used as countercyclical measures. The government could invest in productive activities or in infrastructure development although the quality of public spending could deteriorate quickly when the absorptive capacity is low and the scale of investment is large. In general, a temporary revenue windfall could lead to permanently higher expenditure commitment, including higher maintenance cost of government's investment projects. Large fluctuation in mineral revenue could also give rise to real exchange rate volatility and to the Dutch Disease, where the increase in demand for nontradable goods causes a real exchange rate appreciation. Sachs and Warner (1997) and Sala-i-Martin and Subramanian (2003) analyzed the relationship between natural resource abundance and lower growth in resource-rich countries. The channels include rent-seeking behaviors such as corruption, the country's exposure to commodity price volatility, and on balance an overvalued real exchange rate.

**Various fiscal rules have been adopted around the world by commodity exporters to address both the excessive revenue volatility and intergenerational equity issues.** In general, the difficulty of distinguishing between temporary and permanent terms-of-trade shocks could further complicate the design and implementation of fiscal rules in these countries.

**Mineral exporter countries may choose to target a fiscal balance that excludes revenues from mineral exports in order to anchor fiscal policy** (IMF, 2009). Setting a target on the noncommodity fiscal balance can insulate the budget from the volatility of commodity revenues and allow the authorities to focus on fiscal aggregates that can be controlled more readily than the overall fiscal balance. During the period of high commodity prices or output, the overall budget might accumulate a surplus, which can be used to maintain smooth pattern of spending during the period of low prices or output. There are concerns, however, that targeting a noncommodity balance could lead to excessive headline deficit in case of a sharp drop in commodity prices or output, assuming that the drop is temporary.

**Some countries have developed natural resource or stabilization funds to help manage natural resource revenue** (Davis, et al, 2001). Revenue volatility and intergenerational issues can also be achieved by establishing "stabilization" or "saving" funds. Stabilization funds are a mechanism that helps smooth government expenditure in view of volatile commodity revenue. They are designed to accumulate resources when the commodity revenue is above or below some preannounced thresholds. Saving funds convert resource wealth into financial wealth. These funds have mostly been used in oil and gas exporters such as Algeria, Azerbaijan, the Gulf countries and Russia, and in a few cases their creation supplements other fiscal rules (Norway).

## APPENDIX

Solomon Islands: Estimating Mineral Tax Revenue  
(In million of US\$ unless otherwise indicated)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
<b>Project assumptions</b>													
Gold production (000 ounce)	0	55	105	120	120	120	120	120	120	120	90	60	30
Gold price (US\$ per ounce)	1,225	1,582	1,758	1,760	1,790	1,830	1,880	1,911	1,942	1,973	2,005	2,038	2,071
Oil price (US\$ per barrel)	79	103	100	100	98	97	96	97	99	100	102	104	105
Gross revenue	0	87	185	211	215	220	226	229	233	237	180	122	62
Development cost	200	50	0	0	0	0	0	0	0	0	0	0	0
Capital replacement cost	0	0	10	10	10	10	10	10	10	10	10	5	5
Interest payment	0	2	3	3	3	3	3	3	3	3	3	3	3
Production cost	0	41	78	90	91	93	96	97	99	101	77	52	26
Fuel	0	12	25	29	29	30	30	31	31	32	24	17	8
Personnel	0	9	18	21	21	22	23	23	23	24	18	12	6
Others	0	21	35	40	41	42	43	44	44	45	34	23	12
Production cost per ounce (US\$)	0	748	747	748	761	778	799	812	825	839	852	866	880
<b>Tax revenue estimates</b>													
<b>Royalty</b>	0	1	3	3	3	3	3	3	3	4	3	2	1
Landowner	0	1	2	3	3	3	3	3	3	3	2	1	1
Provincial government	0	0	1	1	1	1	1	1	1	1	1	0	0
<b>Export duty</b>	0	1	3	3	3	3	3	3	3	4	3	2	1
<b>Corporate income tax (CIT)</b>													
Gross revenues	0	87	185	211	215	220	226	229	233	237	180	122	62
Tax deductible allowances	-200	-97	-92	-106	-110	-114	-119	-121	-122	-124	-98	-68	-39
Production cost	0	-41	-78	-90	-91	-93	-96	-97	-99	-101	-77	-52	-26
Development cost (immediate expensing)	-200	-50	0	0	0	0	0	0	0	0	0	0	0
Depreciation of capital replacement (5 years)	0	0	-2	-4	-6	-8	-10	-10	-10	-10	-10	-9	-8
Interest payment	0	-2	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
Goods tax and import duties	0	-1	-3	-3	-3	-3	-3	-3	-3	-3	-3	0	0
Royalty and export tax	0	-3	-6	-6	-6	-7	-7	-7	-7	-7	-5	-4	-2
Taxable income	-200	-10	93	105	105	105	107	109	111	113	83	54	23
Calculated CIT at 35 percent	-70	-4	33	37	37	37	37	38	39	39	29	19	8
Carry forward tax losses	0	-70	-74	-41	-4	0	0	0	0	0	0	0	0
Actual CIT to be paid	0	0	0	0	32	37	37	38	39	39	29	19	8
Post-tax income	-200	-10	93	105	72	69	69	71	72	73	54	35	15
Internal Rate of Return (IRR)	28%												
<b>Additional profit tax (APT)</b>													
Taxable income	-200	-10	93	105	105	105	107	109	111	113	83	54	23
plus depreciation and interest allowances	0	2	5	7	9	11	13	13	13	13	13	12	11
minus capital replacement expenditures	0	0	-10	-10	-10	-10	-10	-10	-10	-10	-10	-5	-5
minus CIT (incorporating carry forward losses)	0	0	0	0	-32	-37	-37	-38	-39	-39	-29	-19	-8
Net cash flow	-200	-8	88	102	71	70	72	74	75	76	57	42	21
<b>APT calculation</b>													
Opening balance	0	-200	-263	-248	-214	-201	-187	-166	-138	-100	-52	-9	0
Apply uplift factor of 25%, plus 2.5% inflation	0	-55	-72	-68	-59	-55	-51	-46	-38	-28	-14	-3	0
Current period net cash flow	-200	-8	88	102	71	70	72	74	75	76	57	42	21
Closing balance	-200	-263	-248	-214	-201	-187	-166	-138	-100	-52	-9	30	21
Additional profit tax at 30% rate	0	0	0	0	0	0	0	0	0	0	0	9	6
Net cash flow post tax	-200	-8	88	102	71	70	72	74	75	76	57	16	0
IRR (corrected by 2.5% inflation factor)	25%												
<b>Central government revenue</b>	0.3	4.6	9.0	10.2	42.9	47.5	48.2	49.1	50.0	50.8	37.7	32.8	16.6
Export duty	0.0	1.3	2.8	3.2	3.2	3.3	3.4	3.4	3.5	3.6	2.7	1.8	0.9
Personal income tax	0.3	1.2	2.2	2.5	2.6	2.6	2.7	2.8	2.8	2.8	2.2	1.5	0.7
CIT	0.0	0.0	0.0	0.0	32.5	36.9	37.3	38.0	38.7	39.4	28.9	19.0	7.9
APT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.1	6.2
Other taxes (goods tax, withholding tax, etc.)	0.0	2.2	4.0	4.5	4.6	4.7	4.8	4.9	5.0	5.1	3.9	1.3	0.8
<b>Central government revenue (in percent of GDP)</b>	0.0	0.6	0.9	1.0	3.9	4.2	4.0	3.9	3.7	3.6	2.6	2.2	1.1
Export duty	0.0	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1	0.1
Personal income tax	0.0	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.0
CIT	0.0	0.0	0.0	0.0	3.0	3.2	3.1	3.0	2.9	2.8	2.0	1.3	0.5
APT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.4
Other taxes (goods tax, withholding tax, etc.)	0.0	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.1	0.1
<b>Memorandum item:</b>													
Nominal GDP in SI\$ million	5,449	6,404	7,265	7,910	8,486	9,134	9,857	10,746	11,708	12,685	13,329	14,013	14,765

Sources: Country authorities, and IMF staff estimates

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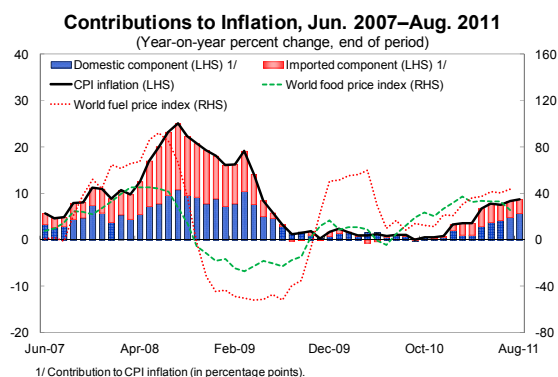
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## II. MONETARY TRANSMISSION MECHANISMS AND INFLATION DYNAMICS IN SOLOMON ISLANDS<sup>1</sup>

### A. Introduction

1. **Solomon Islands, like many Pacific Islands, is vulnerable to commodity price shocks, and this poses challenges to monetary policy.** The spike in global commodity prices in 2007–08 led to rise in headline inflation. The global financial crisis that intensified in September 2008 exerted downward pressure on both imported and domestic inflation through lower commodity prices and weak demand conditions. The authorities loosened monetary policy by stopping open market operations that mopped-up liquidity but there have been limited reductions in lending rates, and private credit growth has been anemic because of a tightening in banks' lending standards. These sluggish responses have raised questions about the effectiveness of monetary policy transmission mechanisms in Solomon Islands.



2. **The exchange rate could be used as an additional tool to cushion against exogenous shocks.**<sup>2</sup> With a conventional exchange rate peg and limited degree of capital mobility, monetary policy enjoys a certain degree of independence. However, if monetary policy transmission is weak and the prospects for improving its effectiveness are limited in the short run, counter-cyclical policies will require an appropriate mix of monetary, fiscal and exchange rate policies.<sup>3</sup> Monetary policy could be closely coordinated with fiscal policy to achieve the desired impact, but that is often constrained by a lack of fiscal space and long-lags in fiscal policy implementation. Therefore, a pegged exchange rate regime should not preclude a role for the exchange rate to absorb external shocks and provide additional independence to monetary policy.

3. **This paper provides an assessment of the pass-through of international commodity prices to domestic prices and monetary transmission mechanisms in Solomon Islands.** In doing so, it also explores whether the exchange rate could help absorb external shocks. The paper is structured as follows. The next section reviews the key objectives of monetary policy and how it is conducted in Solomon Islands. Section III provides an empirical assessment of monetary policy transmission mechanisms focusing on the responses of headline inflation to external

<sup>1</sup> Prepared by Shanaka J. Peiris (APD).

<sup>2</sup> The de jure exchange rate basket regime in Solomon Islands has operated largely as a conventional peg against the U.S. dollar with periodic crawls or adjustments against it.

<sup>3</sup> Dunn and others (2011) show that the monetary transmission mechanisms in Pacific Island countries including Solomon Islands, is weak. They suggest that the underdeveloped state of the financial markets' affect the interest rate and credit channel of monetary policy. Collateralized interbank lending is not widely available, and secondary markets for government and central bank paper are virtually non-existent in most Pacific Islands.

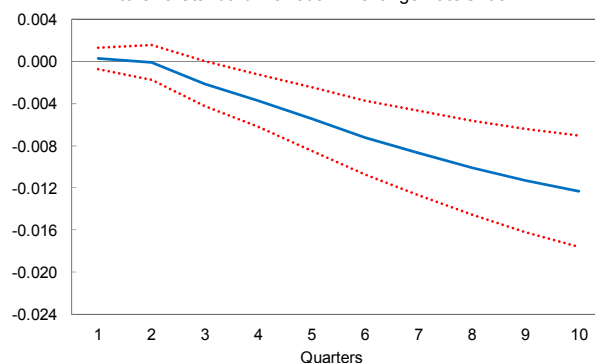
shocks, imported inflation, aggregate demand, and monetary policy variables. Section IV concludes with policy implications.

## B. The Choice of a Nominal Anchor

4. **To ensure price stability, central banks must choose between strategies that target a monetary indicator or the exchange rate.**<sup>4</sup> Dynamic Stochastic General Equilibrium (DSGE) model based analyses generally find that inflation targeting performs better than fixed exchange rates in terms of maximizing social welfare and/or minimizing macroeconomic volatility (Stone and others, 2009). However, McCallum (2006) compares the performance of Taylor-rule type inflation targeting to exchange rate based approaches in an economy with varying degrees of openness. The key finding is that as the degree of openness increases an exchange rate based approach to inflation control does much better than the standard interest rate based approach in stabilizing output, with no adverse consequences for inflation volatility. The reason for this result is that in an interest rate based approach, the variability of the interest rate is low while that of the exchange rate is high, while in an exchange rate based approach, the opposite is found. These results suggest that in an economy with a high exchange rate pass-through to imported prices and low interest rate sensitivity of aggregate expenditures, smoothing the exchange rate rather than interest rates may help control inflation and reduce output volatility.

5. **The high import propensity in Solomon Islands and near-complete exchange rate pass-through to imported consumer goods prices suggest a greater role for exchange rate flexibility in controlling inflation.** There is a large weight of imported items (40 percent) in the consumption basket according to the Honiara consumer price index (CPI). Monthly data from January 2000 to August 2011 also show that the exchange rate has a direct impact on the imported component of the CPI and an indirect effect on the domestic component (the exchange rate granger causes the imported component of the CPI; and, in turn, the imported component of the CPI granger causes the domestic component of the CPI and not vice-versa).<sup>5</sup> While a direct measure of exchange rate pass-through to headline inflation is difficult to estimate in Solomon Islands due to the infrequent exchange rate adjustments in the past and greater volatility of the headline price index, a standard bi-variate

Solomon Islands: Accumulated Response of the Imported Component of CPI to One-Standard-Deviation Exchange Rate Shock



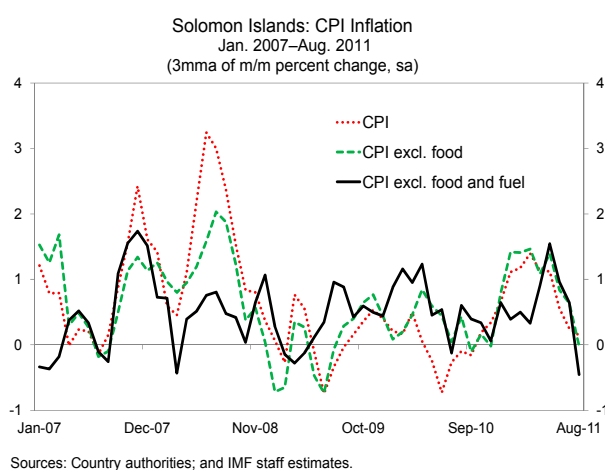
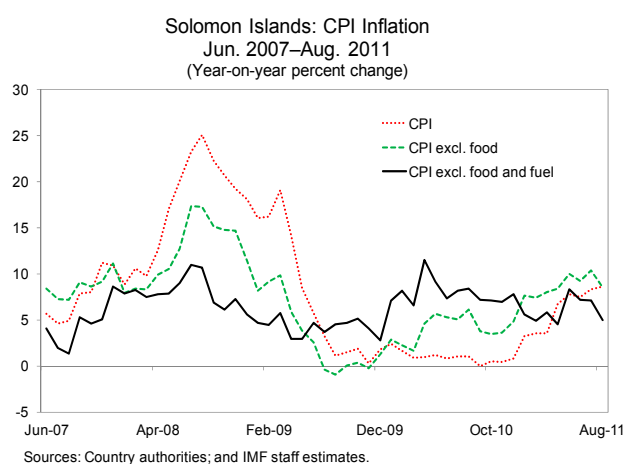
Source: IMF staff estimates.

<sup>4</sup> Exchange rate flexibility is also important to maintain external stability, and thus may not be an instrument that is available to target domestic stability objectives. Therefore, this discussion presupposes a comfortable level of international reserves which appears to be the case in Solomon Islands at present but does not preclude the possibility of the exchange rate being subordinate to external stability concerns.

<sup>5</sup> The exchange rate level used in this empirical analysis is the bilateral rate against the U.S. dollar.

vector autoregression (VAR) shows that the exchange rate pass-through to the imported component of the CPI is near-complete within a year (i.e., a 1 percent depreciation in the exchange rate raises the imported component of the CPI by 0.97 percent within 8 months). The immediate impact of the exchange rate on imported consumer goods prices indicates that changes in the level of the exchange rate could be a useful tool to control inflation. However, whether exchange rate policy is more appropriate than monetary policy is largely dependent on the nature of shocks, efficacy of the monetary transmission mechanism as well as the degree of pass-through of imported consumer goods prices to headline inflation, which is the focus of the next section.

**6. The CBSI has already moved towards using greater exchange rate flexibility to control inflation.** In January 2011, the Central Bank Board Monetary Policy Committee (MPC) indicated that in light of the record high level of foreign reserves, it would pursue exchange rate flexibility in order to re-align the value of the Solomon Islands dollar (SBD) with the trade weighted basket of currencies and cushion the anticipated rapid increase in imported fuel and food prices. Although the short time period precludes a full assessment of the impact, preliminary analysis suggests that the recent nominal appreciation of the SI\$ by about 7 percent since March 2010 has helped contain inflation pressures and achieve the CBSI's objective of reducing inflation to around 6 percent by end-2011.



### C. The Monetary Transmission Mechanism

**7. There is an extensive literature on the empirical transmission mechanism of monetary policy in advanced countries and emerging markets but few studies on Pacific Islands.**<sup>6</sup> Typically, this strand of research has been conducted in the context of a VAR framework pioneered by Sims (1980). Notable examples using VAR to identify transmission of monetary policy for advanced economies include Christiano, Eichenbaum, and Evans (2000) for the United States and Kim and Roubini (2000) for the G-7 Economies. Dunn and others (2011) use single-equation econometric techniques to assess the pass-through of policy rates to lending

<sup>6</sup> This partly reflects data limitations in Pacific Islands, particularly lack of quarterly real sector variables.

rates and private credit growth and conclude that the monetary transmission mechanism is relatively weak in the Pacific Islands. As the same time, Jayaraman and Choong (2009) show that the most effective channel of monetary policy transmission in Fiji is money supply using a simple VAR approach. Jayaraman and Dahalan, (2009) also suggests that the monetary and exchange rate channels are important in transmitting monetary shocks to Samoa's output while monetary aggregates matter more for inflation. We build on their approach and account for the pass-through of international commodity prices and alternative channels of monetary transmission by using a more comprehensive set of external and macro-financial variables.

8. **A VAR model is estimated for Solomon Islands to estimate the pass-through of global commodity prices and the effectiveness of monetary transmission mechanism to the real economy.**<sup>7</sup> The ordering of variables in the VAR is the following: the global exogenous factors (international fuel and food prices) come first, followed by the assumption that monetary indicators or policy respond to demand conditions (the output gap). These factors and the imported component of the CPI (*MCPI*) can impact the headline CPI (*HCPI*) with no immediate effects and vice versa. The nominal exchange rate is not explicitly included but is implicitly reflected in the imported component of the CPI which is responding to all global shocks and domestic monetary indicators. The VAR model is estimated using quarterly data between 2002 and 2011 to capture the post-ethnic tension period and avoid structural breaks. All variables are in log-differences, except interest rates and output gap, which are in percentage changes.<sup>8</sup> This is likely to result in a loss of information on long-run relationships between the variables in the system. However, given the short time span of the sample, we do not consider that an explicit analysis of the long-run behavior of the economy would have been fruitful or essential to answering the questions at hand. Standard information criteria are used to select the lag lengths of the VAR, which turn out to be 2 quarters. Results of Granger causality tests tend to support a unidirectional transmission of external shocks to the imported component of the CPI and the domestic economy.

## **Results**

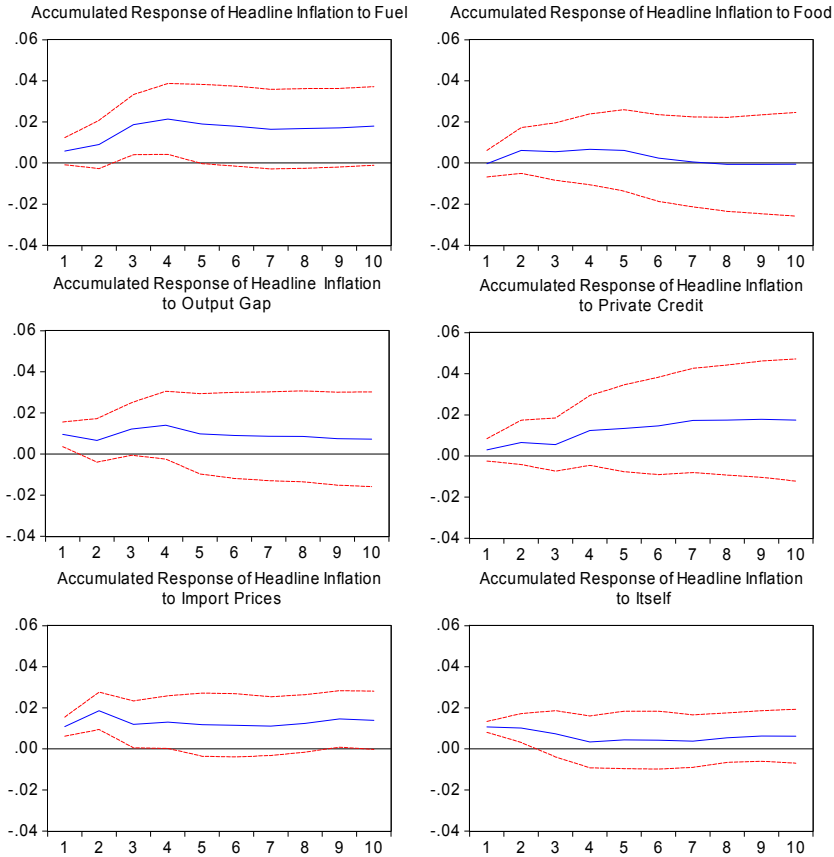
9. **The results of the baseline VAR model are shown below.** The charts display the impact (the impulse response) of headline inflation to a one-standard deviation shock to global fuel prices, global food prices, output gap, private credit, imported inflation and headline inflation itself. The imported inflation pass-through is calculated as the impact of a shock to the imported component of the CPI (defined as an exogenous, unexpected, temporary rise at  $t = 0$ ) on the headline CPI over a specific time interval. The relative importance of the exogenous and monetary shocks for fluctuations in headline inflation and the output gap at different forecast horizons can be gauged through the forecast error variance decompositions.

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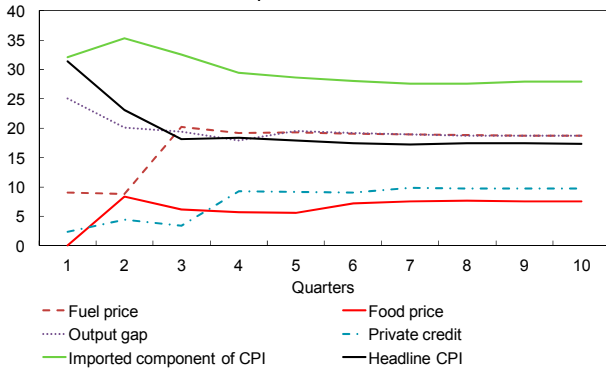
<sup>7</sup> See Appendix for more details on the VAR model.

<sup>8</sup> An analysis of the time-series properties of the variables revealed that the variables are integrated of order one or  $I(1)$ . Therefore, the series are first-differenced for estimation purposes.

Accumulated Response to Cholesky One S.D. Innovations  $\pm 2$  S.E.

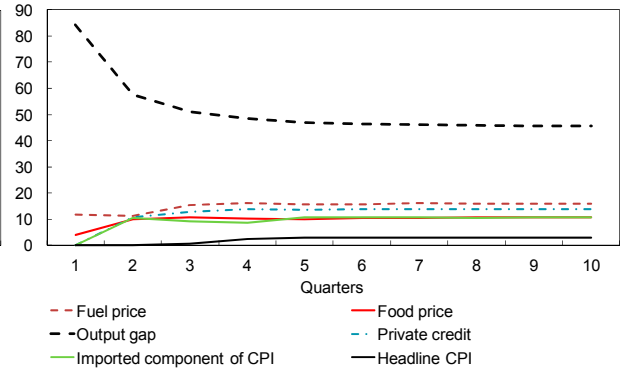


Variance Decomposition of Headline Inflation



Source: IMF staff estimates.

Variance Decomposition of Output Gap



Source: IMF staff estimates.

10. **The transmission of external and monetary shocks provides little scope for the CBSI to influence the real economy through monetary management.** The key insights are as follows:

- **As expected, higher global food and fuel prices raise headline inflation.** The impact of global fuel prices is larger than global food prices given the automatic adjustment of domestic

petroleum prices to global prices and the importance of domestically produced food items in the consumer basket.

- **The impact of monetary shocks on headline inflation is not as significant as imported inflation.** The pass-through of the imported component of the CPI to headline CPI is 0.47 percent within 4 quarters. A greater value than the weight of imported items in the consumer price basket suggests significant second-round effects of higher imported inflation on headline inflation.<sup>9</sup> On the other hand, the impact on and variation of headline inflation explained by monetary shocks is relatively small whether one considers broad money, reserve money, interest rates, or private credit.
- **CPI inflation responds positively to an increase in aggregate demand, proxied by the output gap.** However, the output gap is largely unaffected by monetary variables and international commodity prices, suggesting also the importance of domestic supply-side factors in determining inflation.
- **Supply-side factors (e.g., agriculture) affect the headline inflation dynamics.** This reflects the large weight of food items (43 percent) in the consumer price index.

#### **D. Policy Implications**

11. **Exchange rate policy could be a useful tool to control inflation in Solomon Islands.** External shocks particularly global fuel prices have a significant impact on headline inflation, both directly and indirectly through second-round effects. The strong influence of the imported component of the CPI on headline CPI inflation and the weak monetary transmission mechanism suggest a greater role for exchange rate changes in affecting inflation rather than monetary policy. The impact of monetary shocks on headline inflation is weak whether one considers broad money, reserve money, interest rates, or domestic credit, probably reflecting the excess liquidity in the banking system and structural impediments to lending such as the difficulties in using land as collateral. In terms of the trade-off between exchange rate and monetary policy in controlling inflation, the empirical evidence tilts in the favor of exchange rate policy given the close relationship between exchange rate changes and headline inflation and low interest rate sensitivity of aggregate demand. That said, the use of exchange rate flexibility for short-term domestic stability objectives in the context of the de jure exchange rate basket regime will only be possible in a situation of comfortable international reserves and should avoid the exchange rate from significantly deviating from its medium-term fundamentals.

12. **Greater exchange rate flexibility and structural reforms may help strengthen the effectiveness of the monetary transmission mechanism.** While monetary policy is unlikely to be subordinate to the exchange rate regime because of limited interest-sensitive cross-border capital flows, some private transfers such as remittances and non-resident bank deposits may

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<sup>9</sup> The second-order (or round) effects could be due to the high content of intermediate imports in finished consumer goods in Solomon Islands and/or indexation of wages to import prices.

respond to changes in domestic interest rates. Thus, exchange rate flexibility may provide greater independence to monetary policy. The monetary transmission could be strengthened by enhancing the interest rate pass-through to lending rates by addressing the excess liquidity and structural problems mentioned, above including by introducing greater competition in the financial system.

## APPENDIX

**Structural VAR modeling**

Following Kim and Roubini (2000) and Sims and Zha (2006), we assume the economy is described by a structural-form equation:

$$G(L)Y_t = C(L)X_t + \varepsilon_t$$

where  $G(L)$  is a  $n \times n$  matrix polynomial in the lag operator;  $C(L)$  is a  $n \times k$  matrix polynomial in the lag operator;  $Y_t$  is a  $n \times 1$  vector of endogenous Mozambican variables; and  $X_t$  is a  $k \times 1$  vector of exogenous foreign variables;  $\varepsilon_t$  is a  $n \times 1$  vector of structural disturbances, with  $\text{var}(\varepsilon_t) = \Lambda$ , where  $\Lambda$  is a diagonal matrix and the diagonal elements are the variances of structural disturbances; therefore, structural disturbances are assumed to be mutually uncorrelated.

Corresponding with this structural model we can estimate a reduced-form VAR:

$$Y_t = A(L)Y_t + B(L)X_t + \mu_t$$

where  $A(L)$  and  $B(L)$  are matrices polynomial;  $\mu_t$  is a vector of reduced-form disturbances, with  $\text{var}(\mu_t) = \Sigma$ .

We assume the exogenous vector  $X_t$  contains WEO global fuel prices (Fuel) and food prices (Food):

$$X_t' = [Fuel \ Food]$$

These variables are included to control for changes in overall global economic conditions and fluctuations in the prices of Solomon's main imported commodities. The other endogenous variables include the outputgap ( $Y$ ), a monetary aggregate ( $M$ ), the imported component of the consumer price index (MCPI), and headline consumer price index (HCPI).

$$Y_t' = [Y \ M \ MCPI \ HCPI]$$

The output gap variable is proxied by the HP-filtered non-mining import series as quarterly GDP data are unavailable in Solomon Islands. In the baseline model, the money aggregate ( $M$ ) is chosen to be domestic credit to the private sector as it has the largest explanatory power but other monetary indicators such as M3, reserve money, excess bank reserves to deposit ratio, and the 91-day Treasury bill rate and lending rate were also examined.



**Identification Scheme: Recursive VAR**

There are many ways of recovering the parameters in the structural-form equations from the estimated parameters in the reduced form equation. A popular and convenient method is to orthogonalize reduced-form disturbances by Cholesky decomposition using a simple recursive VAR (as in Sims, 1980). The limited data and difficulty in identifying policy feedback rules precluded a structural VAR approach for Solomon Islands and a recursive VAR is estimated.

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