SEYCHELLES

WELFARE IMPACTS OF EXCHANGE RATE ADJUSTMENT

AND

POLICY OPTIONS

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Welfare Impacts of Exchange Rate Adjustment and Policy Options

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1 This paper was written in response to the request by the Government of Seychelles. The task team, led by Naoko C. Kojo. Emmanuel Akpa exercised quality assurance. The team is grateful to Jyoti Bisbey, James Bond, and Fahrettin Yagci for their helpful comments. Editorial support was provided by Elianne Tchapda and Selvi Isaac.
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SEYCHELLES
WELFARE IMPACTS OF EXCHANGE RATE ADJUSTMENTS AND POLICY OPTIONS

Executive Summary

1. This paper estimates the likely impact of devaluation in Seychelles. The paper has been prepared in response to a request from the Seychelles’ authorities to Bank staff for such an analysis. This is largely a desk exercise, which draws on data and knowledge currently available to staff. After an initial exchange of views on the result of the analysis, it may be possible to deepen the inquiry further, with the aid of more and better data, as well as assumptions about policy direction.

2. A significant devaluation of the Seychelles rupee is expected to have impacts on the real economy as well as the price level. These in turn would influence the incidence of poverty through changes in real income, which are here proxied by the level of household expenditure. We first explore the likely effects on the price, and then the real economy effects on growth, public finances and the external balance, which are likely to be triggered by a change in the relative prices. The estimated changes in macroeconomic variables are then applied to household survey data to analyze the impact of devaluation on the incidence of poverty.

3. Our analysis indicates that the poverty headcount would likely increase immediately after the devaluation. However, this effect is expected to be short-lived. As the economy returns to a sustained growth path and employment opportunities improve in the medium term, the incidence of poverty would fall. To mitigate the transitory adverse effects on the most vulnerable people, the Government could decide to strengthen the social safety nets through increased transfers to such households. However, the ultimate poverty reduction policy is the resumption of growth.
SEYCHELLES
WELFARE IMPACTS OF EXCHANGE RATE ADJUSTMENTS AND POLICY OPTIONS

1. INTRODUCTION

1 Seychelles is a small island economy in the Indian Ocean with a population of 84 thousand. Despite development challenges arising from its small size and external vulnerabilities, Seychelles has achieved impressive growth. Real GDP per capita doubled during the first two and half decades after independence (Table 1). Seychelles followed a state-led development model, where the Government plays a dominant role in every segment of the economy through extensive controls and regulations. A generous welfare system, combined with public provision of free healthcare and education, led to excellent social indicators, with high life expectancy at birth (73 years), low infant mortality (12 per 1,000) and universal primary enrolment.

Table 1. Selected Economic Indicators

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Average real GDP growth</td>
<td>6.2</td>
<td>1.8 (-0.03)</td>
</tr>
<tr>
<td>rate (in percent p.a.) 1/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average real per capita</td>
<td>5.1</td>
<td>0.3 (-1.4)</td>
</tr>
<tr>
<td>GDP growth rate (in percent p.a.) 1/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real per capita GDP (in 2000 US dollar) 2/</td>
<td>3,815</td>
<td>7,619</td>
</tr>
<tr>
<td>Fiscal balance, including grants (in percent of GDP)</td>
<td>-3.4</td>
<td>-7.9</td>
</tr>
<tr>
<td>Current account balance (in percent of GDP)</td>
<td>-6.3</td>
<td>-11.3</td>
</tr>
<tr>
<td>BoP balance (in percent of GDP) 3/</td>
<td>0.7</td>
<td>-12.4</td>
</tr>
<tr>
<td>External arrears (in percent of GDP)</td>
<td>1.7</td>
<td>9.3</td>
</tr>
</tbody>
</table>

Sources: IMF IFS and World Bank WDI.
Notes:
1/ Figures in parenthesis exclude data for 1996 and 1997, where growth was achieved through heavy public investment.
3/ The average of BoP balance for 1994-02.

2 However, after more than a decade of state-led development that resulted in rapid economic growth, since the early 1990s Seychelles has experienced slowing growth, sluggish tourism income and resulting balance of payment difficulties. While in the mid-1990s the Government changed its course and took some steps in the right direction by adopting more market friendly policies, including privatization of part of the tourism industry and the tuna canning factory, public controls on the economy remained widespread, its intervention into manufacturing, distribution and access to foreign exchange persisted, and the Government continued to pursue large public investment programs, such as land reclamation projects financed through short-term external borrowing.

3 While these investment projects boosted GDP growth momentarily during 1996-97, the high public capital outlays and large foreign interest obligations led to large fiscal deficits that averaged more than 10 percent of GDP during 1995-00. External accounts
also deteriorated sharply, owing to increased foreign interest obligations as well as sharp growth in imports, not accompanied by correspondingly large export growth. The current account deterioration was further aggravated by falling grant inflows. By 2000, acute foreign exchange shortages became prevalent, and Seychelles fell into a default status with a number of external creditors (see Kojo, 2005). Beginning in 2001, imports were compressed sharply, which in turn, have adversely affected the economy that relies heavily on imported inputs for production. The overvalued rupee limited supply of foreign exchange, and also began to impair the tourism sector’s competitiveness, as tourists faced less choice of imported goods and poor value for money due to a shortage of quality import goods and food items. The number of tourist arrivals declined from the level of the mid-1990s, over 13,000, to 12,000 in 2004.

4 While aggressive fiscal tightening that began in 2003 succeeded restraining demand growth somewhat, fiscal adjustment alone has proven insufficient to bring the economy back on track, owing to the lack of accompanying comprehensive structural reforms. The Seychelles economy remains rigid, and the presence of the private sector in the economy is limited. This means that Seychelles has only few growth sources. GDP registered yet another negative growth in 2005, official unemployment reached its highest point of 3.8 percent in 2005, and social indicators have reportedly been declining since 2000. In the absence of decisive policy actions, Seychelles medium-term macroeconomic prospects are grim.

5 Turning the Seychelles’ economy back onto a growth trajectory and strengthening the balance of payment position require a sizable exchange rate adjustment, complemented by a series of reform measures, such as foreign exchange liberalization, continued fiscal tightening, a reduction of the role of the state in the economy through deregulation and liberalization, including the removal of statutory monopoly by parastatals, price controls, labor market rigidities, to name a few. This will help the Seychelles’ economy become more flexible, allowing the economy’s capacity use to expand and facilitating the emergence of new productive activities.

6 While recognizing the need for devaluation to kick start economic growth, the Government is concerned about the short-run effect on aggregate output and inflation, and the consequent adverse effect on the welfare of the population. Faced with the dilemma, the Government requested the Bank’s assistance in this area.

7 This paper studies likely macroeconomic impacts and social consequences of devaluation of the Seychelles rupee. Analyzing potential welfare impacts of devaluation ex ante is crucial for policy making, since information obtained from such analyses would allow policy makers to design cost-effective, well-targeted policy measures, with the aim of mitigating negative social consequences of devaluation. Based on the estimated welfare impact of devaluation, the paper considers mitigation policy options, and discusses their effectiveness and associated budgetary costs. The focus of this study is the likely impacts of devaluation on the prices, economy and social welfare. For this reason, the paper takes devaluation of the US dollar value of the rupee by 45 percent as given, and does discuss issues such as whether the rupee should be devalued, whether the
magnitude of devaluation is appropriate or the likely economic consequences without devaluation.

8 The reminder of the paper is structured as follows. Section 2 first analyzes Seychelles’ household expenditure survey data and presents the incidence of poverty and inequality in Seychelles. Section 3 then discusses how the Seychelles economy would adjust to an initial devaluation of the US dollar value of the rupee by 45 percent, followed by a gradual move to an equilibrium level. Projected macroeconomic variables and prices are applied to the household survey data to estimate possible impacts on the incidence of poverty. Section 4 discusses a variety of policy measures designed to alleviate the adverse impacts on the poor. Fiscal viability of these measures is also discussed in this section. Section 5 concludes the paper.

2. POVERTY SITUATION IN SEYCHELLES

9 This section analyzes the poverty situation in Seychelles using expenditure and income based indicators, based on the results of the last Household Income and Expenditure Survey (HES) conducted during 1999-00. The poverty indicators discussed in this section are later used as a benchmark to gauge the adverse impact of devaluation on poverty.

2.1 Poverty Headcount

10 Absolute poverty in Seychelles is estimated to be relatively low, although the estimate of absolute poverty can vary significantly by the choice of the poverty line. According to the HES results and the official poverty line of SR841 (in 2000 prices) per capita per month, the poverty headcount in Seychelles was estimated at 20 percent in 1999/00. That is, in 1999/00, one out of 5 persons lived below the official poverty line in Seychelles (see Appendix 1). This estimate, however, may well overestimate the incidence of poverty in Seychelles. It is generally perceived that the incidence of poverty would be much lower if poverty was measured by a more conventional approach based on the costs of food basket that provided a minimum daily calorie intake. If a more conservative poverty line of PPP US$3 per head per day is used, the incidence of poverty in Seychelles falls to about 2.5 percent, and poverty effectively diminishes if a poverty line of PPP US$1 is used instead. Interestingly, distributional inequality measured by the Gini coefficient is very high in Seychelles, 42.8 percent.

<table>
<thead>
<tr>
<th>Table 2. Seychelles Poverty Indicators (in percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poverty headcount (official poverty line)</td>
</tr>
<tr>
<td>Poverty headcount (PPP US$3 per day)</td>
</tr>
<tr>
<td>Gini coefficient</td>
</tr>
</tbody>
</table>

Sources: Household Income and Expenditure Survey (1999/00) and World Bank staff estimates.

2 The official poverty line refers to the assumed subsistence minimum used by the Management and Information Systems Division (MISD) in their analysis of the 1999/00 HES.
2.2 Poverty Distribution

In terms of their per capita expenditure most of the poor in Seychelles are concentrated close to the official poverty line. A reduction in the baseline poverty line by 10 percent would decrease the headcount index from 19.9 percent to 15.3 percent (Table 3). The poverty depth index, which shows the average gap between per capita expenditure and the poverty line (with non-poor assigned the value of zero), is equal to 6 percent at the baseline poverty line. This implies that broad-based economic growth would rapidly reduce the number of poor.

Table 3. Poverty Distribution in 1999/00 (in percent)

<table>
<thead>
<tr>
<th>Poverty line</th>
<th>Poverty headcount</th>
<th>Poverty depth</th>
<th>Poverty severity</th>
<th>Gini coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>std.err.</td>
<td>Mean</td>
<td>std.err.</td>
</tr>
<tr>
<td>Baseline−10%</td>
<td>15.26</td>
<td>0.63</td>
<td>4.66</td>
<td>0.24</td>
</tr>
<tr>
<td>Baseline 1/</td>
<td>19.87</td>
<td>0.69</td>
<td>5.98</td>
<td>0.27</td>
</tr>
<tr>
<td>Baseline+10%</td>
<td>24.81</td>
<td>0.75</td>
<td>7.48</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Sources: Household Income and Expenditure Survey (1999/00) and World Bank staff estimates.
Note: 1/ The baseline poverty line is SR841 (in 2000 prices)

2.3 Composition of Household Expenditure

The structure of the household per capita expenditure distribution indicates that expenditure on food, utilities and housing (non-substitutable items) constitutes about two thirds of total expenditure of the poorest households (Quintile 1). The poorest 20 percent of households spend about 45 percent for food, and 14 percent for utilities. In addition, about 9 percent on average is spent on housing (Table 4). The share of food expenditures declines with household wealth; it drops below 40 percent only for the richest quintile (Quintile 5).

Table 4. Structure of Household Per Capita Expenditure by Quintile

<table>
<thead>
<tr>
<th>Expenditure category</th>
<th>Per capita expenditure quintile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Food</td>
<td>45.5</td>
</tr>
<tr>
<td>Utilities</td>
<td>13.7</td>
</tr>
<tr>
<td>Housing (rent/mortgage) payments</td>
<td>8.7</td>
</tr>
<tr>
<td>Clothing and footwear</td>
<td>6.6</td>
</tr>
<tr>
<td>Durable goods</td>
<td>3.1</td>
</tr>
<tr>
<td>Social services (health, education, childcare)</td>
<td>2.9</td>
</tr>
<tr>
<td>Cash remittances</td>
<td>0.9</td>
</tr>
<tr>
<td>In-kind remittances (value)</td>
<td>1.9</td>
</tr>
<tr>
<td>Other expenditures</td>
<td>16.6</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Memorandum item:
Mean per capita expenditure (SR) 1/ 653.7 1190.2 1721.7 2517.0 6,325.5

The share of per capita spending on clothing is relatively stable across households, and represents about 6-7 percent of total per capita household expenditure. Expenditure on durable goods increases from 3.1 percent for the poorest quintile to 8.9 percent for the richest quintile. As expected, given that most health and education services are provided by the Government, the share of these categories in the total households budget does not exceed 3 percent of total per capita expenditure at any step of the distribution ladder. The combined value of cash and in-kind remittances from household increases from 2.8 percent for the bottom quintile to 5.6 percent for the top quintile. The share of other expenditures, including miscellaneous goods and services, recreation, repayments of non-housing loans, and other items, varies from 16.7 percent for the poorest to 30.1 percent for the richest households.

2.4 Source of Income

The earnings data indicate that the main income source for 82 percent of total household is employment, including self-employment. About 16 percent of households rely on pensions and social security transfers for their living (Figure 1).

![Figure 1. Main Sources of Household Income (in percent of total households)](source: Household Income and Expenditure Survey (1999/00)).

2.5 Non-income/Expenditure Based Indicators

Non-income/consumption indicators also suggest that the incidence of absolute poverty in Seychelles is low. 79.4 percent of households live in owner-occupied dwellings. 80 percent of dwellings are brick/stone construction. 95 percent of households have access to electricity, a flush toilet, and a refrigerator. More than 80 percent of
households have access to treated water supply. 90 percent of households have a television, and 18 percent a motor vehicle (Figure 2).

**Figure 2. Access to Basic Necessities and Durable Goods**
(in percent of total households)

![Bar chart showing access to basic necessities and durable goods](chart.png)

Source: Household Income and Expenditure Survey (1999/00).

### 3. Immediate Impact of Devaluation on Prices, Real Economy and Poverty

This section estimates how the proposed devaluation of the rupee would affect the incidence of poverty through its impact on macroeconomic variables. The first part of this section estimates the initial impacts of devaluation on the price level and the real economy, assuming no changes in trade tax, price controls and no anticipation of devaluation. Then, the second part of the section estimates how much the devaluation-induced changes in the price level, nominal wages and income would affect the incidence of poverty in Seychelles.

#### 3.1 Short-run Impact on the Price Level

In Seychelles, inflation is measured by the retail price index (RPI). Components as well as their respective weight in the RPI basket are summarized in Table 5. Details of goods and services included in each component are not published. While the weight of

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3 Empirical literature suggests that in situations where future devaluation seems unavoidable, postponing it for fear of inflation simply intensifies inflationary pressures (Turnovsky, 1981; Calvo, 1983). While the estimation exercise in this paper assumes no anticipation of devaluation, the existence of the black market for foreign exchange in Seychelles indicates that the anticipation of devaluation exists. If magnitude of devaluation is deemed insufficient by the market (i.e., continuation of black market premiums), the domestic price level may, in the short run, overshoot its long-run equilibrium.
imported goods in Table 5 may appear small for Seychelles, which depends heavily on imports, many of the domestically produced goods and services require imported inputs. Thus, devaluation will have a direct one-to-one rupee-denominated price impact on not only imported goods, but also on imported inputs for domestic production of goods and services. There are no data on the degree of import input requirements for domestically produced goods and services.

Table 5. Retail Price Index

<table>
<thead>
<tr>
<th>Components</th>
<th>Weights (in percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestically produced goods</td>
<td>62.5</td>
</tr>
<tr>
<td>Fish</td>
<td>2.6</td>
</tr>
<tr>
<td>Other food</td>
<td>11.9</td>
</tr>
<tr>
<td>Non-food</td>
<td>49.0</td>
</tr>
<tr>
<td>Imported goods</td>
<td>37.5</td>
</tr>
<tr>
<td>Food</td>
<td>14.5</td>
</tr>
<tr>
<td>Non-food</td>
<td>23.0</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Statistical Abstract.

18 To estimate the impacts on the price level, this paper makes the following assumptions. First, it is assumed that foreign input requirements for domestic production of fish, other food items and non-food items are 10 percent, 30 percent and 30 percent of total production inputs (including labor), respectively. Second, while devaluation tends to raise domestic demand for, and thus the prices of domestically produced goods and services through the substitution effect, we assume that this effect plays a very limited role in Seychelles as few domestic substitutes are available for imported goods and services.

19 Now, let us assume that the US dollar value of the Seychelles rupee is devalued from SR5.5 to SR8 (i.e., devaluation of 45 percent in the US dollar term) on January 1, 2007, followed by a gradual move to the “equilibrium” market clearing level over the next few years. What would the initial impact on the price level be?

20 Following the devaluation of 45 percent, the rupee-denominated prices of imported goods would jump by 45 percent. As production of local goods requires imported inputs, the prices of domestically produced goods would rise too, but less proportionally to the rate of devaluation. As the relative prices of imported goods and services are now relatively higher, consumers would, to a very limited extent, substitute imported goods for domestically produced goods (e.g., imported beer and cigarettes for local beer and cigarettes), or give up consumption of now more expensive imported goods. This would lower the demand for imported goods, leading to a decline in the volume of imports, and raise the demand for domestically produced goods, pushing up the prices of these goods in the short run.

21 Producers of domestic goods would also face the impact of the devaluation. Excess demand for non-tradables can be aggravated further by a reduction in the supply of non-tradables, stemming from a rising unit labor cost and the higher rupee-
denominated cost of imported inputs. In the short run, underemployment may worsen and real output would not expand sharply immediately after the devaluation.

22 The impact on the aggregate price level in the first year following the devaluation is estimated to be 25 percent, where the prices of domestically produced fish, other food and non-food are estimated to rise by 5 percent, 14 percent and 14 percent, respectively. The rupee denominated price of imported goods would rise by 45 percent. The aggregate price impact is expected to fade gradually over the following few years.4

23 Note that the initial impact on the price level is affected by a number of factors that are uncertain on a priori grounds, and the estimated first year inflation of 25 percent can be higher or lower, depending on how these factors would interplay. For example, while the above analysis assumes that virtually no substitution occurs between domestically produced and imported goods, a higher degree of substitution (i.e., higher demand for domestically produced goods) would raise the prices of domestic goods further, pushing the overall inflation rate up. On the other hand, the upward pressure on the prices of domestically produced goods and services may be weaker if nominal wages adjust to the new price level more slowly.

24 A simple simulation analysis is conducted to see the inflationary impact of devaluation, by varying the magnitude of devaluation. Table 6 summarizes the results.

<table>
<thead>
<tr>
<th>Devaluation</th>
<th>Estimated Inflation (annual average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR6/US$ (9%)</td>
<td>5.0%</td>
</tr>
<tr>
<td>SR7/US$ (27%)</td>
<td>15.1%</td>
</tr>
<tr>
<td>SR8/US$ (45%)</td>
<td>25.2%</td>
</tr>
<tr>
<td>SR9/US$ (64%)</td>
<td>35.9%</td>
</tr>
<tr>
<td>SR10/US$ (82%)</td>
<td>45.9%</td>
</tr>
</tbody>
</table>

Source: World Bank staff estimates.
Note:
1/ One-time devaluation of the US dollar value of the rupee from SR5.5.

4 The cumulative inflationary effects of devaluation, while generally found to be substantial, differ significantly from country to country, varying from 10 percent to 80 percent. For example, the study by Cooper (1971), who investigates the experiences of 19 countries involving 24 devaluation cases, indicates that consumer prices rose on average by 40 percent of the devaluation rate during the 12 months following devaluation. On the other hand, Himarios (1987) estimates the cumulative devaluation effect to be equal, on average, to about 30 percent of the devaluation rate. Variations across countries are driven by differences in terms of import dependence, accumulated excess liquidity, real-wage resistance and other factors. Guittian (1976) argues that the price impact of devaluation will generally depend on the extent of price adjustments necessary to restore real variables in the economy to their equilibrium values.
3.2 Short-run Impact on the Real Economy

Output

The short-run impact on output is expected to be rather limited. For the tourism sector, which accounts for 37 percent of GDP, the immediate impact of devaluation would be positive, but unlikely be significant. First, the devaluation would lead to increased consumption of ancillary goods and services by tourists (handicrafts, restaurant meals, diving equipments hire, and local transports), stimulating the tertiary sector. However, little positive effect of devaluation is expected in the short run on hotel receipts (room charges and meals), which account for the bulk of tourism related income in Seychelles, since room rates are denominated in either the euro or US dollar, and foreign tourists are required to settle their hotel bills in a foreign currency. Furthermore, a majority of foreign tourists purchase a package tour (which includes air fare, room charges, optional tours to other islands, and sometimes meal coupons) in foreign currency prior to arriving in Seychelles, and adjustments of the prices of these tour packages are expected to lag behind. Therefore, devaluation is unlikely to have an immediate effect on foreign tourists’ choice of Seychelles as a less expensive holiday destination. The recovery of non-tourism sector would also be limited immediately after the devaluation. Given the high foreign input requirements for production of domestically produced goods and services, devaluation would not lead to an immediate supply expansion despite the change in the relative prices.

Fiscal Position

The overall impact on the fiscal position depends on the Government’s response to the devaluation induced inflation and the prospects for renewed donor assistance. The devaluation is expected to have a small, yet positive impact on revenue. Trade tax collection may not increase proportionally to the expected jump in imports in the rupee terms, since some imported goods (e.g., soft drinks, alcoholic products, and tobacco) are subject to a specific tax.\(^5\) However, business tax revenue can rise as the economy slowly recovers from recession. External grant flows may be forthcoming.

As regards expenditure, higher prices of imported goods and services in the rupee term will undoubtedly increase spending on these goods and services. However, a tight fiscal position is called for so as to keep an aggregate demand expansion under control, since a demand expansion during this time could fuel inflation further, eroding the impact on the real exchange rate. There is a point to ponder over civil service wages. While the Government would face significant pressure to raise nominal civil service wages, nominal wage adjustments proportional to the inflation rate could lead to a wage-inflation spiral. The fiscal framework presented in Table 11 assumes only a partial nominal wage adjustment. Tight control over public spending is also warranted in view of the need to

\(^5\) In 2005, for example, trade tax collection did not increase proportionally to the sharp rise in the value of imports. The increase in imports was due in part to the higher oil import bill, which was driven by the higher world oil prices instead of a rise in the volume of oil imported to Seychelles.
provide assistance to the vulnerable group of population affected by the inflation (this will be discussed in Section 4).

External Position

28 The impact on the balance of payments position would likely be non-significant in the initial year following the devaluation. The initial response of the export sector to the devaluation would be limited. In the absence of foreign capital inflows, foreign exchange shortages would continue in the first year, necessitating a continued import compression. As imports of fuel, chemical and pharmaceutical products cannot be compressed significantly; major cuts would be required for imports of non-essential food and consumer goods (i.e., luxury food and consumer items).

29 The projected short-term impacts on the real economy and prices are summarized in Table 7. Discussions on medium-term impacts on the real economy are provided in Section 4.

Table 7. Short-run Impacts on Real Economy and Prices
(in percent, unless otherwise indicated)

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Devaluation 1/</td>
<td>0.0</td>
<td>45.5</td>
</tr>
<tr>
<td>Real GDP growth</td>
<td>-2.0</td>
<td>1.5</td>
</tr>
<tr>
<td>Inflation (annual average)</td>
<td>4.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Fiscal balance (in percent of GDP)</td>
<td>-2.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Current account balance (in percent of GDP)</td>
<td>-12.6</td>
<td>-4.4</td>
</tr>
<tr>
<td><strong>Memorandum item</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seychelles rupees per US dollar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(end period)</td>
<td>5.5</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Source: World Bank staff estimates.

Note:
1/ Devaluation of the rupee is assumed to take place on January 1, 2007.

3.3 Short-run Impact on Poverty

30 This sub-section attempts to measure how devaluation-induced macroeconomic changes would affect the poor in Seychelles. To this end, this paper employs an approach developed by Chen and Ravallion (2004). To estimate how devaluation would affect the incidence of poverty, we apply the macroeconomic variables projected in Section 3 to the expenditure data of a representative household for each quintile. Changes in the level of household expenditure are interpreted as changes in poverty. See Appendix 2, which discusses various techniques of estimating the welfare impacts of

---

6 Although Section 2 notes that the incidence of poverty under the official poverty line is likely to be overestimated, this analysis relies on the official poverty line, and does not use the poverty indicators under the PPP US$3 based poverty line. This is because of the difficulties in estimating possible changes in the index of purchasing power parity for rupee conversion.

7 This model is a static model, in that it assumes that consumers’ consumption pattern does not change in response to the price changes.
macroeconomic policy changes as well as the details of the Chen-Ravallion model used in this paper.

31 As a base case (no policy intervention case), we first estimate the change in the poverty headcount, assuming that devaluation of the US dollar value of the rupee by 45 percent (i.e., from SR5.5 to SR8 per US dollar) on January 1, 2007 would lead to inflation of 25 percent in 2007 and a nominal wage increase of 10 percent. The latter reflects our assumption that the Government will keep a tight control over public sector remuneration, so as to ensure non-occurrence of the wage-inflation spiral.

32 How would the incidence of poverty respond to the devaluation-induced changes in macroeconomic variables? Ideally, the analysis should estimate how poverty indicators of 2006 change in response to changes the macroeconomic variables following the devaluation of 2007. In the absence of such poverty data, the only way to circumvent this problem is to project the level of poverty in 2006 by applying (actual and projected) data on GDP growth for 2000-06 to the expenditure data obtained in the 1999/00 HES, assuming no substantial changes in income/expenditure inequality. The projected headcount for 2006 is 27 percent, compared with 20 percent in 2000.

33 Our estimate indicates that the devaluation-induced changes in the macroeconomic variables would lead to an increase in the poverty headcounts by 7 percentage points, from 27 percent to 34 percent.

<table>
<thead>
<tr>
<th>Table 8. Actual and Projected Poverty Indicators (in percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>Sources: Household Income and Expenditure Survey (1999/00) and World Bank staff estimates.</td>
</tr>
<tr>
<td>Notes: 1/ Poverty indicators before devaluation. 2/ Poverty indicators after devaluation.</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
</tr>
</tbody>
</table>

4. POLICY IMPLICATIONS

4.1 Social Policy

34 In the absence of any policy intervention, our estimate suggests that the 45 percent devaluation of the rupee would raise the incidence of poverty by 7 percentage points, or about 5,700 people. To alleviate the transitional adverse effects on the most vulnerable group, below we consider three policy options, which are and summarized in Table 9.

8 Real GDP is projected to decline by 12.6 percent during 2000-06.
Policy 1. The Government maintains the nominal prices of food fixed through economy-wide price controls. That is, all the population, regardless of expenditure levels, benefit from a zero price increase in food items.

Policy 2. The Government maintains the nominal utility tariffs and payments for public services unchanged through price controls for all the population, but allows the prices of food items to increase.

Policy 3. Instead of direct price controls, the Government chooses to raise the nominal value of transfer payments to the poor population (i.e., income supplements)—those who were poor prior to the devaluation and those who became poor following the devaluation—by the inflation rate (25 percent) so as to maintain the level of transfer payments in real terms.

Table 9. Summary of Social Policy Options for 2006
(in percent)

<table>
<thead>
<tr>
<th></th>
<th>No policy intervention</th>
<th>Policy 1</th>
<th>Policy 2</th>
<th>Policy 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange rate</td>
<td>45</td>
<td>45</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Nominal wage</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Inflation 2/</td>
<td>25.1</td>
<td>17.1</td>
<td>18.6</td>
<td>25.1</td>
</tr>
<tr>
<td>Change in food prices</td>
<td>28.0</td>
<td>0</td>
<td>28.0</td>
<td>28.0</td>
</tr>
<tr>
<td>Change in utilities tariffs</td>
<td>13.1</td>
<td>13.1</td>
<td>0</td>
<td>13.1</td>
</tr>
<tr>
<td>Transfer payments</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td><strong>25.1</strong></td>
</tr>
</tbody>
</table>

Source: World Bank staff estimates.
Notes:
1/ Numbers in bold indicate the impact of policy intervention.
2/ Price controls on specific items affect the overall inflation rate through the weights of these items in the RPI basket.

35 Implementation of Policy 1 (constant nominal food prices) is expected to reduce the poverty headcount to 27 percent from 34 percent under the non-policy intervention scenario (Table 10). The real mean expenditure per capita is estimated at SR2,054 per month. The annual cost of this mitigation policy would be 6 percent of GDP. If the whole cost is to be borne by the SMB, the budget would be requested to transfer this amount to the SMB to compensate for the loss.

36 Policy 2 (constant nominal utility charges and fees for public services) has a much less profound effect on the incidence of poverty – to 33 percent compared to 34 percent in the absence of policy interventions. Under Policy 2, the estimated mean per capita expenditure would be SR1,845. If this cost is to be borne by state owned utility companies, then again the budget may be asked transfer resources as compensation.

37 Policy 3 (increased transfer payments to the poor) is a more targeted approach in that the Government’s mitigation policy is aimed only at the poor population. A 25 percent increase in the nominal value of transfers to the poor population would raise the real mean per capita expenditure through the income effect. Assuming that consumers
use all the transfers to remedy their purchasing power, the estimated mean per capita expenditure would be SR1,843. The poverty headcount would fall from 34 percent to 32 percent. The projected cost for this intervention cost is 0.6 percent of GDP, and is a direct cost to the budget.

<table>
<thead>
<tr>
<th>Table 10. Poverty Impact under Different Policy Options</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Real mean per capita expenditure (in 2006 rupee)</td>
</tr>
<tr>
<td>Poverty headcount (in percent)</td>
</tr>
<tr>
<td>Number of poor people</td>
</tr>
<tr>
<td>Reduction in number of poor people 3/</td>
</tr>
<tr>
<td>Monthly costs of reducing incidence of poverty by 1 person (in 2006 rupee)</td>
</tr>
<tr>
<td>Cost (in percent of GDP)</td>
</tr>
</tbody>
</table>

Source: World Bank staff estimates.
Notes:
1/ Under the official poverty line.
2/ Assumes a total population of 86,500 people in 2006.
3/ A change in the number of poor people compared with no policy intervention case.

38 As is clear from the above analysis, Policy 3 is expected to be the least costly and also most efficient in terms of its poverty reduction effect among the 3 policy options. As the time advances and inflationary pressure subsides, the Government should lower the level of transfers to then a smaller number of poor people.

4.2 Macroeconomic and Structural Policies

39 Economic gains of the devaluation would be felt mostly in the medium term, provided that the devaluation is accompanied by a comprehensive reform package geared towards allowing private initiatives to play a larger role. The reform measures would include foreign exchange liberalization, trade liberalization, tight fiscal policy and deregulation and structural reform aimed at reducing the role of the state in the economy. Price controls on markups on imported goods and the price ceilings on some essential goods should be eliminated, allowing the prices to adjust freely in response to changes in the economy. See World Bank (2004) for more comprehensive policy discussions.

40 As both the economy adjusts to new relative prices and a new business environment free of state controls on trade, foreign exchange, price, credit and labor, resources are expected to move more freely to the now more profitable export sector, allowing this sector to expand. With more liberal trade and foreign exchange policy, together with improved business environment, the tourism sector is expected to restore
competitiveness. Improved availability and access to foreign exchange would allow more choices of imported goods for tourism, restoring the image of Seychelles as a holiday destination, currently considered as a five-star price destination for 3-star services. Labor market liberalization would lower real wages. Increased foreign direct investment may be forthcoming in this sector. As export activities pick up, foreign exchange shortages will be gradually resolved, allowing increased imports of essential inputs for production. This will further facilitate output growth, as shortage of foreign input is no longer a great constraint for production. The resulting improved employment opportunities would help mitigate the poverty situation.

41 As regards fiscal policy, a tight fiscal position needs to be continued, both to keep aggregate demand under control and to reduce the stock of debt. As the economy recovers, revenue collection is expected to increase. The Government may consider cuts in tax rates to reduce the tax burden of the private sector. Continued tight control over government expenditure would be warranted, as an aggregate demand expansion assumes critical importance, as demand expansion during this time could fuel inflation further, eroding the impact on the real exchange rate. Maintenance of a tight fiscal policy would help reduce the stock of the Government’s domestic debt.

42 Favorable impacts of devaluation would also be seen in the balance of payments position in the medium term. With increased exports of goods and services, the current account position is expected to improve gradually, whilst the implementation of the comprehensive reform package—depending on the comprehensiveness of the reform—may invite renewed foreign financing. The brighter medium-term economic prospects would facilitate inward FDI inflows, and encourage residents to return holdings of foreign exchange held abroad (reversal of capital flight). The balance of payments position would gradually improve, allowing the Government to clear accumulated external arrears, while building international reserves to a more comfortable position. It is projected that the stock of arrears would decline from 36 percent of GDP in 2007 to 24 percent by 2010, and the level of reserves would more than double to reach 1.7 months of imports.
43 Table 11 provides details of projected medium-term macroeconomic framework.

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<td>Selected Economic Indicators:</td>
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<tr>
<td>GDP growth, % p.a.</td>
<td>12.0</td>
<td>8.4</td>
<td>7.6</td>
<td>6.6</td>
<td>5.3</td>
<td>4.5</td>
<td>4.5</td>
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<td>4.5</td>
</tr>
<tr>
<td>GDP inflation, % p.a.</td>
<td>1.1</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
<td>4.4</td>
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<tr>
<td>Exchange rate, % p.a.</td>
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<td>5.9</td>
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<td>5.9</td>
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<td>Consumption expenditure growth, % p.a.</td>
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<td></td>
</tr>
<tr>
<td>Central govt total revenue (incl. grants), GDP, %</td>
<td>46.6</td>
<td>42.5</td>
<td>45.9</td>
<td>49.0</td>
<td>49.4</td>
<td>49.1</td>
<td>49.4</td>
<td>49.8</td>
<td>49.8</td>
<td>49.8</td>
<td>49.8</td>
<td>49.8</td>
<td>49.8</td>
<td>49.8</td>
</tr>
<tr>
<td>Central govt total revenue (excl. grants), GDP, %</td>
<td>46.3</td>
<td>42.1</td>
<td>45.3</td>
<td>39.9</td>
<td>39.9</td>
<td>49.4</td>
<td>48.6</td>
<td>45.8</td>
<td>46.5</td>
<td>45.7</td>
<td>46.1</td>
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<td>Gov't current exp, GDP, %</td>
<td>46.4</td>
<td>46.4</td>
<td>42.4</td>
<td>40.7</td>
<td>40.8</td>
<td>44.5</td>
<td>46.3</td>
<td>44.2</td>
<td>43.7</td>
<td>40.1</td>
<td>36.8</td>
<td>35.2</td>
<td>32.3</td>
<td>32.3</td>
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<tr>
<td>Gov't capital exp &amp; net lending, GDP, %</td>
<td>8.1</td>
<td>9.7</td>
<td>11.4</td>
<td>12.3</td>
<td>6.6</td>
<td>10.5</td>
<td>2.3</td>
<td>4.3</td>
<td>5.4</td>
<td>4.5</td>
<td>4.2</td>
<td>4.7</td>
<td>4.5</td>
<td>4.5</td>
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<tr>
<td>Gov't total exp, GDP, %</td>
<td>54.7</td>
<td>56.2</td>
<td>53.8</td>
<td>53.0</td>
<td>47.4</td>
<td>56.7</td>
<td>46.8</td>
<td>50.7</td>
<td>47.6</td>
<td>48.3</td>
<td>44.4</td>
<td>41.5</td>
<td>39.9</td>
<td>36.8</td>
</tr>
<tr>
<td>Overall budget balance, GDP, % (incl. grants)</td>
<td>8.1</td>
<td>13.7</td>
<td>7.9</td>
<td>12.9</td>
<td>9.6</td>
<td>18.7</td>
<td>2.6</td>
<td>1.5</td>
<td>1.8</td>
<td>2.4</td>
<td>3.4</td>
<td>5.5</td>
<td>5.5</td>
<td>7.4</td>
</tr>
<tr>
<td>Broad Money, GDP, %</td>
<td>78.0</td>
<td>80.2</td>
<td>91.8</td>
<td>93.6</td>
<td>101.8</td>
<td>108.8</td>
<td>111.4</td>
<td>110.5</td>
<td>108.1</td>
<td>102.9</td>
<td>98.2</td>
<td>90.6</td>
<td>90.0</td>
<td>87.0</td>
</tr>
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<td>Credit to government, net GDP, %</td>
<td>67.4</td>
<td>79.2</td>
<td>88.5</td>
<td>93.4</td>
<td>100.6</td>
<td>108.6</td>
<td>108.7</td>
<td>106.6</td>
<td>105.3</td>
<td>104.2</td>
<td>81.3</td>
<td>60.5</td>
<td>47.2</td>
<td>37.9</td>
</tr>
<tr>
<td>Trade balance, GDP, %</td>
<td>-33.5</td>
<td>-37.5</td>
<td>-36.8</td>
<td>-17.7</td>
<td>-32.1</td>
<td>-15.9</td>
<td>-13.0</td>
<td>-16.6</td>
<td>-28.1</td>
<td>-22.9</td>
<td>-12.2</td>
<td>-8.5</td>
<td>-7.7</td>
<td>-6.9</td>
</tr>
<tr>
<td>Non-factor services balance, GDP, %</td>
<td>22.3</td>
<td>22.0</td>
<td>20.3</td>
<td>15.2</td>
<td>10.9</td>
<td>14.3</td>
<td>17.0</td>
<td>16.6</td>
<td>14.2</td>
<td>13.3</td>
<td>10.9</td>
<td>12.0</td>
<td>14.3</td>
<td>14.2</td>
</tr>
<tr>
<td>Current Account balance, GDP, %</td>
<td>-10.7</td>
<td>-16.5</td>
<td>-19.8</td>
<td>-7.2</td>
<td>-23.5</td>
<td>-13.6</td>
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<td>-12.6</td>
<td>-4.4</td>
<td>0.4</td>
<td>2.3</td>
<td>3.5</td>
</tr>
<tr>
<td>Gross international reserves, months of imports e.o.p.</td>
<td>0.7</td>
<td>0.5</td>
<td>0.6</td>
<td>1.0</td>
<td>0.7</td>
<td>1.3</td>
<td>1.4</td>
<td>0.6</td>
<td>0.7</td>
<td>0.8</td>
<td>0.7</td>
<td>1.0</td>
<td>1.2</td>
<td>1.7</td>
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<tr>
<td>External PPG debt, GDP, %</td>
<td>27.4</td>
<td>25.6</td>
<td>42.4</td>
<td>47.9</td>
<td>53.0</td>
<td>80.2</td>
<td>77.6</td>
<td>72.4</td>
<td>64.6</td>
<td>56.5</td>
<td>61.0</td>
<td>50.6</td>
<td>42.6</td>
<td>36.4</td>
</tr>
<tr>
<td>… of which: arrears, GDP, %</td>
<td>0.0</td>
<td>1.8</td>
<td>3.8</td>
<td>7.1</td>
<td>10.9</td>
<td>10.8</td>
<td>17.5</td>
<td>19.9</td>
<td>23.2</td>
<td>27.3</td>
<td>35.5</td>
<td>32.7</td>
<td>28.9</td>
<td>24.1</td>
</tr>
<tr>
<td>Total government debt, GDP, %</td>
<td>109.6</td>
<td>123.1</td>
<td>150.4</td>
<td>166.7</td>
<td>172.1</td>
<td>201.7</td>
<td>197.5</td>
<td>191.8</td>
<td>181.0</td>
<td>170.6</td>
<td>152.5</td>
<td>120.7</td>
<td>100.7</td>
<td>84.5</td>
</tr>
</tbody>
</table>

Source: GoS and World Bank estimates

5. CONCLUSIONS

44 This paper has studied the likely impacts of devaluation in Seychelles. A sizable devaluation of the Seychelles rupee is expected to have impacts on the real economy as well as the price level. These would in turn influence the incidence of poverty through changes in real incomes, which are here proxied by the level of household expenditure. We have explored the likely short run impact on the prices as well as real economy
effects on growth, public finances and the external balance. The estimated changes in macroeconomic variables were then applied to household survey data to analyze the impact of devaluation on the incidence of poverty. Our analysis indicates that the poverty headcount would likely increase following the devaluation. However, this effect is expected to be short-lived. If the devaluation is accompanied by a comprehensive reform program—consisting foreign exchange liberalization, trade liberalization, tight fiscal policy, deregulation and liberalization to reduce the role of the Government in the economy—devaluation would help growth and export activities to resume. As the economy returns to a sustained growth path and employment opportunities improve, the incidence of poverty is expected to fall. To mitigate the transitory adverse effects on the most vulnerable people, the Government could decide to strengthen the social safety nets through increased transfers to such households. However, the ultimate poverty reduction policy is the resumption of growth.
APPENDIX 1.

HOUSEHOLD INCOME AND EXPENDITURE SURVEY OF 1999/2000

A major instrument used to assess expenditure and income patterns in Seychelles is the Household Income and Expenditure Survey (HES) conducted by the Management and Information Systems Division (MISD) every 5 to 7 years. The most recent survey, which this study is based on, was carried out during the period of August 1999 to August 2000. The survey is household-based, and collects expenditure data at the household level and income data at the individual level. The primary aim of the 1999/00 HES was to provide an update on the composition of a household’s expenditure basket.

The 1999/00 HES used as a sampling base the list of 17,878 households obtained from the 1997 Population and Housing Census that covered all islands. In consideration of the logistic and administrative problems, the geographical coverage of the 1999/00 HES was restricted to three major islands (Mahe, Praslin, and La Digue), where 99 percent of the population lives. The 1999/00 HES intended to embrace a sample of about 10 percent of Seychelles’ households. The sampling was done in two stages. In the first stage, households were stratified by 25 districts (22 districts in Mahe, Grand Anse Praslin, Baie Ste Anne and La Digue). To determine the number of households to be drawn from each district, a sample size was distributed among the districts, proportional to their size (number of households). In the second stage, the allocated number of households was drawn from each district using systematic sampling method, whereby households are selected from a list at equal intervals starting from a chosen random number. With each household having the same probability of being selected, the sample is self-weighted. The personal interview was used as a data collection tool.

As it is the case with any survey, the collected data are not without problems, including a high non-response rate and substantial number of households that had to be eliminated from the analysis due to the inadequate data (MISD, 2002). There is under-reporting of income by households. While average expenditure per household is SR8,291, the reported average income per household is only SR5,500. The respective medians are equal to SR 6,335 and SR 4,585.

A measure of welfare constructed by the MISD is expenditure rather than consumption. The problem with the expenditure measure is that it includes the whole amount spent on durable goods, while the consumption measure includes only the estimate of the “user value”(or depreciation) of durable goods. Hence, expenditure measures as such overestimates the level of welfare enjoyed by households. Nevertheless, this paper uses this expenditure measure for analysis because we also want to use the

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9 The last survey before 1999/2000 survey was done in 1992.
10 For all household members age 15 and above.
11 Households headed by expatriates have been excluded as being non-representative of Seychelles’ households.
12 This problem is encountered in most other countries as well.
official poverty line, which is consistent with this welfare measure, and because we want our welfare estimates to be comparable to those calculated by the Misd.
APPENDIX 2.

ESTIMATING WELFARE IMPACT OF MACROECONOMIC POLICIES

Methodologies for Welfare Impact Analyses

49 Several approaches have been previously employed to study the welfare impacts of policy measures. The first approach is based on the partial equilibrium analysis and uses household survey data. It identifies the direct welfare impact of a particular macroeconomic policy change by considering this policy change in isolation to other changes that it is likely to induce. For instance, Friedman and Levinsohn (2002) analyze the distributional impacts of the price changes induced by Indonesia’s 1997 financial crisis by combining the pre-crisis household expenditure data with the crisis-related changes in prices across a spectrum of goods. They apply the concept of the compensating variation to calculate the loss in real purchasing power for households across various expenditure levels and regions. A similar approach was used by Hossain (2003) to study the distributional impact of the tax reform. In principle, this methodology can be easily applied to situations when the policy change has not happened yet, but price changes can be predicted from the model. However, this approach is partial because it only looks at changes on the expenditure side, and completely ignores changes on the income side. This makes it impossible to measure the total real impact of the policy change.

50 The second approach employs a general equilibrium analysis, which uses a computable general equilibrium (CGE) model to capture economy-wide responses to a policy change. The main strength of this approach lies in its ability to provide a framework in which prices are endogenously determined and play a key role in the allocation and distribution mechanisms. However, some critical aspects of the CGE model make it difficult and often inappropriate to use for a distributional analysis. First, the data requirements for developing a CGE model are highly demanding. Second, a standard CGE model provides a simplified description of economic structure and entails considerable aggregation across household types, with only a few representative households. Third, in a CGE framework, it is often difficult to see whether the result of a policy simulation is due to specific behavioral or structural assumptions, or stems from the degree of aggregation and substitution possibilities in the economy, as Hossain (2003) and Conway (2004) argue.

51 The third approach uses a hybrid framework of linking macroeconomic models to microeconomic ones. Examples of such modular frameworks include the 123PRSP model (Devarajan and Go, 2003), Poverty Analysis and Macroeconomic Simulator

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13 An excellent review of modeling approaches used to study the welfare impact of macroeconomic shocks and policies is provided by Essama-Nssah (2005).
14 In reality, a policy shift in one macroeconomic variable will work through the system of complex macro inter-linkages to bring about changes in other macro factors. The discussion of the total impact of reforms should therefore include both direct and indirect effects of the policy change.
15 On the CGE models see Decaluwe and Martens (1988) and Hertel (1997).
(PAMS) I model (Pereira da Silva, Essama-Nssah and Samake, 2003), PAMS II model (Essama-Nssah, 2005), a micro-macro simulation model (Ferreira, Leite, Pereira da Silva and Pichetti, 2004), and Integrated Macroeconomic Model for Poverty Analysis (Agenor, Izquierdo and Fofack, 2003). In essence, all those approaches link the outputs from the macroeconomic modeling performed using a CGE, the IMF financial programming model or the World Bank RMSM-X model to the microeconomic model (unit record data) using linkage variables. Although such approaches offer consistent and comprehensive frameworks of analysis, their practical implementation is hindered by data and time requirements.

The challenge for applied work is to find a simple but reliable approach that combines the richness of detail available from integrated household surveys with accurate macroeconomic predictions stemming from the model which ensures that all macroeconomic implications of the policy change are recognized. This paper follows the intermediate approach advocated by Chen and Ravallion (2004). The essence of it is that we apply projected changes in macroeconomic variables following devaluation (including wages) to the data at the level of all the sampled households in the survey to measure the welfare impacts. These impacts are measured using standard tools of analysis familiar from previous work on the welfare effects of price changes associated with the macroeconomic policy reform. In addition to calculating the overall effects of devaluation on poverty and inequality, we show how these effects vary with household per capita expenditure. We also demonstrate the effectiveness of various possible government policies intended to mitigate the negative consequences of devaluation.

The Model

The derivation of the formula used in calculating the household-level welfare impacts of the price changes implied by the financial programming analysis of devaluation follows Chen and Ravallion (2004). Each household has preferences over consumption and work effort represented by a utility function \( u_i(q^c_i, L_i) \), where \( q^c_i \) is an \( m \)-dimension vector of the quantities of commodities that is consumed by household \( i \), and \( L_i \) is a \( k \)-dimension vector of the labor supplies by activity, including labor supply to the household’s own production activities. The household is assumed to be free to choose \( q^c_i \) and \( L_i \) subject to its budget constraint. The indirect utility function of household \( i \) is given by

\[
v_i(p^c_i, w_i, \pi_i) = \max_{(q^c_i, L_i)} [u_i(q^c_i, L_i) | p^c_i q^c_i = w_i L_i + \pi_i],
\]

(1)

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16 Also used by Ravallion and Lokshin (2004).
17 Chen and Ravallion (2004) apply a set of price and wage changes available from the CGE model to the household level data to investigate welfare impact of China’s accession to the World Trade Organization.
where \( p^c_i \) is the price vector corresponding to the consumption bundle \( q^c_i \), \( w_i \) is the vector of wage rates corresponding to a set of labor activities \( L_i \). \( \pi_i \) is the profit obtained from the household’s own production as given by:

\[
\pi_i(p^c_i, p^e_i, w_i) = \max \left[ p^c_i q^c_i - p^0_i q^0_i - w_i L^0_i \mid q^c_{ij} \leq f_{ij}(q^0_{ij} L^0_{ij}) \right],
\]

\( j = 1, \ldots, m; \sum_j q^0_{ij} \leq q^c_i, \sum_j L^0_{ij} \leq L^e_i \)  

(2)

where \( p^e_i \) is the \( m \)-vector of supply (sale) prices corresponding to the vector of supplied quantities \( q^e_i \), \( p^0_i \) is the price vector for the production process inputs corresponding to the set of commodities \( q^0_i \) (of which \( q^0_{ij} \) is used in producing good \( j \)), \( w^0_i \) is the vector of wages corresponding to the household own-production labor input \( L^0_i \) (of which \( L^0_{ij} \) is used in producing good \( j \)), and \( f_{ij} \) is the household-specific production function for good \( j \) (embodying fixed factors).

Estimation of the welfare impacts in Seychelles is constrained by the data, which do not include initial price and wage levels. This data limitation does not allow us to calculate the initial, i.e., before the policy change, value of the expenditure function (assuming some form of utility function). We overcome this constraint by calculating a first-order approximation to the welfare impact in a neighborhood of the household’s optimum, as Chen and Ravallion (2004) suggest. Taking the derivatives of equations (1) and (2) and using the envelope property (whereby the welfare impacts in a neighborhood of an optimum can be evaluated by treating the quantity choices as given) the monetary value of the change in utility for household \( i \) is given by

\[
\Delta e_i = \sum_{j=1}^{m} \left[ p^e_{ij} q_{ij} \frac{dp^e_{ij}}{p^e_{ij}} - p^0_{ij} (q^0_{ij} + q^0_{ij} \frac{dp^0_{ij}}{p^0_{ij}}) \right] + \sum_{k=1}^{n} (w_k L^e_{ik} \frac{dw_k}{w_k}),
\]

(3)

where \( L^e_{ik} = L^e_{ik} - L^0_{ik} \) is the household’s labor supply to activities outside own production.

Obviously, for households that are not engaged in own-production, which are the majority of households in Seychelles, equation (3) simplifies to the form given by:

\[
\Delta e_i = \sum_{j=1}^{m} \left[ - p^e_{ij} q_{ij} \frac{dp^e_{ij}}{p^e_{ij}} \right] + \sum_{k=1}^{n} (w_k L^e_{ik} \frac{dw_k}{w_k}),
\]

(4)

\[\text{18} \] Unit values (expenditure divided by quantity) for food items cannot be calculated from the survey data because detailed information on the expenditure and quantity by item is not disclosed by the authorities as being confidential. There is also no information on the quantities and prices of the food and nonfood inputs used in the production, as well as on wages (the survey has data on incomes, but not on labor supply).
where the first term in the equation measures the (negative) impact on the household from the increase in prices of the set of consumption commodities $j$, and the second term measures the (positive) impact from the increase in wages for the set of labor activities $k$. This framework of analysis requires information only on *ex ante*, i.e., before the policy reform, household expenditures ($p_j^c q_j^c$) and labor earnings ($w_k L_k^l$) combined with the information on the expected/projected changes in prices ($\frac{dp_j^c}{p_j^c}$) and wages ($\frac{dw_k}{w_k}$). It also allows for the changes in prices and wages to be different across commodities and labor activities, respectively. The analysis can be further simplified, at the cost of losing some accuracy, by considering the magnitude of changes in prices (wages) to be the same across consumption goods (labor activities). Importantly, this framework can be applied to investigate to what extent the welfare impacts of the policy reform will be different from the counterfactual under certain government mitigation interventions that alter relative prices or wages. However, a considerable limitation of the outlined approach is that by treating the quantity choices as given we preclude the possibility for the behavioral responses (shifts in consumption quantities and labor supply) that the households are likely to resort to in the longer term to mitigate the negative consequences of a policy shock.\(^{19}\)

\(^{19}\) Hence, we can reliably predict only the first-round welfare effects of devaluation. This point is also discussed below.
References


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