

# 1 Introduction

*If the only tool you have is a hammer, you tend to see every problem as a nail.*

– Abraham Maslow (1908–70, American psychologist)

## *1.1 Macroeconomic programming exercises*

This book describes a methodology to formulate multiannual macroeconomic programming exercises for developing economies. The approach is broadly in line with standard methodologies that have evolved since the 1940s, largely through practice by the World Bank and the International Monetary Fund. As discussed below, however, it includes some innovations, at broad and detailed levels.

Macroeconomic-programming exercises can serve many different purposes (see Section 1.3 below). For this book, however, the fundamental objective is to help an economy's policy-makers determine whether their overall multiannual macroeconomic program is *financially feasible*. At any moment, a government's multiannual macroeconomic program may be defined as comprising its multiannual programs for (i) the evolution of the main macroeconomic variables, including real-GDP growth, inflation, and the exchange rate; (ii) government non-financial expenditure flows; (iii) tax and other policies that determine government revenue and affect economic incentives; and (iv) the evolution of the public sector's external and internal financing flows, all set out in a context formed from assumptions about the future "state of the world." In a developing economy, these programs would presumably be set out with a view to bringing about development and poverty-reduction objectives. In these terms, the fundamental objective of the projection exercise this book describes would be to determine, on the basis of quantitative criteria, whether the multiannual macroeconomic program is likely to prove *financially feasible*. If so, then, at least on this criterion, the government could implement the program. If not, the program would have to be revised before it could be implemented.

To be sure, at any given moment not all governments have all the components of a multiannual macroeconomic program in explicit form. Even when they do, the different components may be inconsistent, or incomplete. For some economies, the World Bank, the International Monetary Fund, and other international entities will maintain their own versions of particular economies' multiannual macroeconomic programs. This book argues that by having such programs and ensuring their financial feasibility, governments can improve the quality of their policy formulation and persuade their various "stakeholders" that their development and poverty-reduction programs merit confidence. While multiannual macroeconomic projection exercises are costly to develop and maintain, the benefits are likely to be substantial.

In the exercise this book describes, quantitative "programming" assumptions — encompassing macroeconomic-performance, government-policy, and real government-expenditure objectives — are applied to base-year data to project out a multiannual macroeconomic program. This program is then used to formulate a full set of macroeconomic projections, structured in national, external, fiscal, and monetary accounts. These projections incorporate financial-feasibility indicators, which analysts and policy-makers can then evaluate.

More precisely, for each projection year, the macroeconomic "program" comprises

- a. projection assumptions for relevant *exogenous external variables*, including international variables such as world interest rates, growth rates of world commerce volumes, and growth rates of world prices;
- b. projection assumptions for relevant *exogenous internal variables*, such as population growth;
- c. programming assumptions for *basic macroeconomic variables*, including growth rates of the real gross domestic product, the price level, and the exchange rate;
- d. programmed policy settings for the determinants of *government revenue, external-accounts flows, and monetary policy*;

- e. programming assumptions for **government non-financial expenditure** in real (i.e., purchasing-power) terms, based on national development and poverty-reduction objectives; and
- f. a **financing program for the public sector**, comprising anticipated flows of external and internal debt and assets to and from the public sector.

For any projection year, a multiannual policy program may be characterized as “financially feasible” if

- a. implied **real non-government (private) per-capita consumption levels** would remain minimally acceptable on political, social, and ethical criteria;
- b. implied **external financing requirements** would be within what the rest of the world would be willing and able to provide;
- c. implied **public-sector financing requirements** would be within what external and internal financial markets would be willing and able to provide; and
- d. the implied **monetary-policy program** would be feasible, in the sense that the monetary authority could bring about the required money supply without excessively large policy interventions.

If the program and projection results are presented in appropriately structured tables and charts, they should reveal transparently how the programming variables “lead to” the feasibility indicators.

The projection exercise this book describes is not, and should not be confused with, the basic IMF monetary-programming exercise. True, any reader who has studied or worked on IMF programming exercises will recognize some of the techniques, or at least their style. But the fundamental purpose is different. The programming procedure described here aims to ensure that a government’s multiannual macroeconomic and development programs are likely to prove consistently feasible in financial terms, over several future years. The basic IMF programming exercise, in contrast, is shorter-term, and aims basically to reverse a

foreign-exchange reserve loss. An IMF program centers on nearer-term monetary programming, ensuring that the monetary system's net foreign assets increase relatively more while net domestic assets increase relatively less. The exercise described here focuses relatively more on the national, external, and fiscal-accounts projections, precisely because they embody the national-development program, and the core objective is to determine how much financing this program would require.

This book illustrates the projection methodology it describes with a spreadsheet exercise constructed from "data" and assumptions for a hypothetical developing economy called "Pacífica." This exercise is intended mainly to show how this book's concepts can be applied practically. The spreadsheet exercise can be applied to actual economies, however, with adaptations as appropriate for specific country circumstances and structures. As such, it has several features that make it competitive with other macroeconomic projection spreadsheet exercises:

the spreadsheet calculates consistent, linked projections for the balance of payments, external debt, public-sector internal debt, national accounts, the non-financial public-sector accounts, and the monetary accounts, using the kind of base-year macroeconomic data available from such standard sources as the International Monetary Fund's *International Financial Statistics* (IFS) and the World Bank's *Global Development Finance* (GDF) tables along with assumptions regarding future policy and behavioral variables;

the exercise distinguishes, and consistently projects, *year-end* and *year-average* values of such macroeconomic variables as the exchange rate, the price level, and the money stock. These variables figure in the full range of any economy's macroeconomic projections;<sup>1</sup>

---

<sup>1</sup> Incorporation of the exchange rate in the exercise makes it possible to project the exchange rate required, for example, to hold a coming year's balance-of-payments current-account deficit to some specified level, or, indeed, to hold a public deficit to some specified amount.

the spreadsheet solution uses analytical, not iterative, solution procedures “to close” the various accounts systems. Consequences of changes in assumptions can therefore be determined directly. More important, the use of analytical rather than iterative solution procedures makes it possible to close more than one accounts system. That is, the calculation procedure can close the fiscal and monetary accounts as well as the balance-of-payments accounts;

fiscal projections are carried out for disaggregated public-sector entities, including a central government, sub-national governments, public enterprises, and a public pensions system. (For specific country adaptations the fiscal structure could be disaggregated even further.) Among other things, this enables the exercise to analyze and project public external debt by borrowing entity;

the monetary projections take account, *inter alia*, of the central bank’s profit-and-loss accounts, and also of the monetary consequences of movements in the public-sector deposit accounts;

the exercise is structured to be useful for debt-sustainability analysis and to gauge the consequences of debt-reduction exercises;

the updating procedure is complicated, unfortunately, but relatively straightforward compared with others;<sup>2</sup>

---

<sup>2</sup> Computer projection models are typically set up with historical and projection periods. Suppose a spreadsheet’s historical period is 1995–2005 and the projection period 2006–2010. After 2006 concludes, its outcomes must be included in the historical period and 2007 then made the new initial projection year. This updating procedure can be difficult and complicated in some projection exercises.

the exercise has been developed to be as transparent and user-friendly as possible, explicitly showing its “bottom-line” feasibility measures.

In this introductory chapter, Section 1.2 summarizes how the macroeconomic projection exercise works. Section 1.3 discusses practical applications of multiannual macroeconomic policy planning. Section 1.4 discusses some general characteristics and principles of macroeconomic “consistency” analysis. Section 1.5 discusses the exercise’s programming assumptions in general terms. Finally, Section 1.6 introduces the hypothetical economy of “Pacífica,” projections for which are used to illustrate the book’s points. Finally, Section 1.7 provides an overview of the book’s structure.

## ***1.2 The projection exercise, in summary***

As noted, the basic purpose of the projection procedure this book describes is to help policy planners determine whether, taken together, their overall multiannual macroeconomic and government-expenditure program is likely to prove “financially feasible.” Such a program may be said to be financially feasible if the financing resources the program requires — taxation proceeds, external and internal financing and non-government saving — are within what could reasonably be expected to be available. In particular, one would want to be sure that the projected financing and saving requirements would not follow an explosive trajectory (as percentages of GDP).<sup>3</sup>

Suppose a nation’s policy planners have set out assumptions for relevant exogenous world economic conditions, such as interest rates and export-market conditions, and for relevant “exogenous” internal conditions, such as population growth. (Exogenous conditions are those determined outside the macroeconomic system of the projection exercise.) Suppose they have set out a program for the evolution of the

---

<sup>3</sup> In this book, the expression “saving” refers to saving flows, while the word “savings” is used to refer to accumulated savings stocks.

key macroeconomic variables, including year-by-year objectives for real-GDP growth, inflation, exchange-rate evolution. Suppose that they have projected policy settings for determinants of government revenue, external trade, and the monetary system.

In this context, suppose the authorities propose a quantitatively specified multiannual government expenditure program, encompassing what they believe must be spent on education, health, and social welfare; public infrastructure formation and maintenance; and other essential government services. These real spending flows would be based on the specific development and poverty-reduction objectives. Finally, suppose the authorities propose a quantitatively specified multiannual external-debt program, covering borrowing and amortization flows by and to public-sector borrowers and external financing sources.

The projection exercise consists of applying these programming assumptions to base-year data to calculate projected (i) national, (ii) fiscal, (iii) external, and (iv) monetary accounts, making use of various assumed “behavioral parameters.” In the process, the exercise determines the residual financing flows required “to close” the accounts structures in each set of accounts. Each year’s overall financing flows give rise to debt-servicing requirements in subsequent years, which in turn affect the overall financing flows necessary to close those years’ accounts.

Judgments can then be made about whether the required financing flows, and hence the macroeconomic program, would be feasible. General rules for making such judgments are difficult to set out, but analysts who know a given economy well should be able to form views based on their knowledge of the economy’s circumstances and the willingness and ability of foreign and internal entities to provide financing. In some degree, the feasibility criteria are matters of common sense. Slow (not to mention negative) growth in per-capita real non-government consumption growth is likely to be acceptable at most for a year or two, in the context of a temporary crisis, not for the longer term. Foreign creditors may be reluctant, in some circumstances, to provide positive transfers (i.e., disbursements exceeding total debt service), or even positive flows (i.e., disbursement exceeding repayment). In any case, they would probably be uncomfortable seeing their own credit

exposure, or all credit outstanding to a country, grow faster than the country's GDP. It may not be feasible, let alone desirable, for a government to demand a large, or fast-growing, share of internal credit resources to finance its deficit. Similarly, it may be neither feasible nor desirable for a central bank to carry out large, continuing volumes of open-market operations to absorb money.

By running and re-running a projection exercise with modified assumptions, analysts should be able to devise a multiannual macroeconomic and fiscal program that is consistent in all respects — i.e., consistent not only with the government's development objectives, but also with the financing flows likely to be available from all sources. They should then be able then to use the results not only to guide policy settings and expenditure programs, but also to communicate their assumptions and intentions to other "stakeholders." By showing the program's consistency and feasibility, they can help persuade all concerned that the program has a high likelihood of working as hoped — and thereby help maximize the likelihood that all concerned will play their roles as assumed.

### *1.3 Uses of multiannual macroeconomic programming exercises*

Projection exercises of the kind this book describes can be useful in various ways to the different observers of a nation's macroeconomy. Current and potential external creditors, for example, could use such projection exercises to estimate future borrowing needs, or to gauge the risk in their exposure. International companies contemplating or engaged in investment activities can use the exercise to determine whether the fiscal and external accounts are likely to be fully financed — and, therefore, to what extent they face such risks as tax increases, adverse exchange-rate adjustment, inadequate internal growth, or macroeconomic instability.

The basic application this book envisages, however, is governments' own macroeconomic and fiscal policy programming. Many developing economies' governments have been persuaded that is useful to maintain rolling multiannual macroeconomic and fiscal

“frameworks” — standing, continually updated projection exercises — and to use these to help formulate financially feasible policy and expenditure programs that address development objectives. A growing number of governments have made efforts to develop and implement multiannual expenditure frameworks, often with assistance from the World Bank, the International Monetary Fund, and other international agencies. This book is intended to contribute to and advance on such work.

A government that maintains a multiannual macroeconomic “framework” — that is, a standing procedure for formulating and evaluating macroeconomic programs — should be able to work more effectively with the World Bank, the International Monetary Fund, and other international agencies. The World Bank has developed a practice of organizing its operations with countries on the basis of its “Country Assistance Strategies,” medium-term business plans that Bank staff work out with governments every few years. (Many other international agencies have strategies themselves, or make use of the Bank’s Country Assistance Strategies to set the bases for their own programs with governments.) To the extent a government can articulate its own multiannual macroeconomic program, it can participate more effectively in the formulation of the Bank’s strategy. Similarly, it stands to reason that, if a government must develop a program with the IMF, it can work more effectively and efficiently with IMF staff if it has a macroeconomic program of its own. There is every reason to suppose that World Bank and IMF programs will work better to the extent governments have genuinely participated in their formulation.

For similar reasons, multiannual macroeconomic programs are, or should be, essential components of “economic-development and poverty-reduction” strategies (EDPRS). Many governments have disseminated such strategies as formal documents in recent years, setting out multiannual policy and government-expenditure programs requiring substantial foreign-financing flows. Such strategies should be considered incomplete unless they include projection exercises showing not only that their policy and expenditure programs are likely to bring about their intended economic-development and poverty-reduction objectives, but also that the programmed economic-growth patterns and government

expenditure are macroeconomically feasible — that is, that the external and internal and financing flows they require are feasible. The techniques this book describes can be applied to carry out the required analysis.

To be sure, many governments formulate multiannual projections for revenue, expenditure, and external and internal financing. Similarly, central banks routinely formulate projections for their external accounts and for their monetary programs. One point of a macroeconomic projection exercise is to ensure that all these programs are mutually consistent, and then together financially feasible. As an overall macroeconomic program is developed, an integrated projection exercise helps ensure that *all* aspects of the macroeconomic projection remain financially feasible. Once a macroeconomic program has been developed, the output of the projection exercise can be used to demonstrate its general consistency and feasibility.

For a government engaged in dialogue with external financing entities, the value of having a multiannual macroeconomic “framework” is obvious, and difficult to overstate. Perhaps less obviously, multiannual macroeconomic programming exercises can, indeed should, play vital and routine roles in nations’ annual budget-preparation exercises. The basic way that a multiannual projection exercise can “add value” to an annual budget process may be understood as follows. Preparation of a given’s year’s budget typically takes place over the course of the year immediately preceding the budget year. In a conventional budget exercise, government analysts and policy-makers set out with assumptions for such basic macroeconomic programming variables as real-GDP growth, inflation, and the exchange rate, as well as for such exogenous variables as the growth rates of world trade, the world dollar price level, key commodity prices, and relevant world interest rates. They then use these to project the “envelope” of available resources, comprising the flows of tax and non-tax revenue and (net) external and internal financing. Next, they calculate the flow of expenditure to which they are legally or contractually committed. This includes remuneration for staff already on the payroll, government services, transfer payments to other governmental entities, transfer payments outside the government, and interest due. The difference

between the resource envelope and the total committed expenditure is the scope for “discretionary” expenditure, that is, expenditure that the government is *not now* committed to make, but could choose to make.

The key point is that a large proportion of the discretionary expenditure that the government chooses to make will give rise to non-discretionary expenditure in subsequent years.<sup>4</sup> Teachers hired, roads constructed, loans taken on this coming year will commit the government to additional expenditure for staff remuneration, road maintenance, and debt service in subsequent years. The government’s and legislature’s evaluation of this year’s budget is therefore incomplete unless it addresses subsequent years’ budgets and their financial feasibility. Indeed, even if an austerity-minded government decides to undertake *no* discretionary expenditure this year, it should still want to consider how the non-discretionary expenditure deriving from previous years’ discretionary choices will play out in future years. For this reason, the documentation accompanying the current annual budget on its approval process through the legislature should include a multiannual projection indicating its future financial feasibility, as a matter of “best practice.”

Two broad issues for which a multiannual projection can be especially useful may be summarized in the terms “sustainability” and “vulnerability.” Economists have defined “sustainability” differently in the economics literature, but for present purposes a macroeconomic program may be deemed “sustainable” if its projected financing requirements — broadly defined to include internal saving and perhaps private bank credit — can be reliably projected to remain within what is likely to be available — and, in particular, not grow explosively (as percentages of GDP).

For developing economies with substantial public-debt stocks, the sustainability issue has both fiscal and external aspects. For the

---

<sup>4</sup> “Discretionary” is, perhaps, a relative term. One criterion for whether a given expenditure is “non-discretionary” could be that, if it were not carried out, the amount not paid would have to be added to the government’s stock of arrears. Even so, a government might decline, say, to carry out vital road maintenance. It may be that no arrears would arise as a consequence, but until the expenditure is made the road might be exceedingly dangerous, and, at least in principle, could expose the government to legal liability in the event of an accident.

fiscal aspect the essential question is, “Over coming years, can the government simultaneously maintain adequate expenditure on essential “developmental” programs and maintain reasonably business-friendly tax policies, *while* maintaining its debt-servicing commitments?” For the external aspect the essential question is, “Over coming years, can the economy as a whole maintain an adequate external-saving flow for its development needs, *while* maintaining its debt-servicing commitments?” A well-formulated macroeconomic-consistency projection exercise should help policy-makers simultaneously address *both* the fiscal and external questions, as complete debt-sustainability analyses always should. Should policy-makers find that their fiscal and/or external accounts are unsustainable in these senses, they may consider not only policy adjustments, but perhaps also a request for debt relief, in which case the exercise can help determine how much and what kind would suffice to ensure sustainability.

A well-formulated projection exercise can help policy-makers address their macroeconomy’s “vulnerability” by making it possible to test contingency plans for alternative “states of the world.” Particularly in economies subject to export-price volatility and other sources of uncertainty, policy-makers are likely to want to determine how different export- and import-price arrays would affect their fiscal and external financing requirements. They may find it useful to sketch policy responses in advance. A projection exercise with different “scenarios” should enable policy-makers to plan responses to such contingencies as oil prices turning out significantly higher (or, for oil-exporting economies, lower), or external interest rates turning out higher, than the “base” scenario assumes.<sup>5</sup>

When formulating projection exercises for sustainability and vulnerability issues, it is important that analysts be clear about the specific questions such exercises are meant to address. This helps

---

<sup>5</sup> In recent years, policy-makers have become increasingly aware of the dangers of “contingent” liabilities — i.e., expenditure programs a government may have to undertake in the event certain imaginable contingencies materialize (see Polackova 1999). A projection exercise can be used to plan a financing strategy in the event a government must carry out a large expenditure program to cope with a conflict or a major disaster.

determine the specific way each particular exercise is set up — in particular, the structure of the sensitivity analysis (see Section 10.5). Broadly speaking, the analyst will aim to determine, under the different versions of the “assumption array,” whether and how the external and fiscal accounts could be feasibly and sustainably financed and whether and how private real per-capita consumption could grow adequately. Policy-makers and analysts are likely to focus on different sets of projection scenarios in different contexts. For example, policy-makers preparing a budget for the coming year may want to ask whether, if they undertake certain expenditure programs that would continue over several years, the resulting public deficits would exceed what foreign and internal sources could feasibly finance, especially after taking account of the interest on the accumulating public debt. Or, policy-makers may be concerned about the economy’s vulnerability to shocks. Suppose, for example, that after one year oil prices were to surge (in the case of an oil importer) or to plunge (in the case of an oil exporter). How would public-sector and external financing requirements be affected? How large a real-effective exchange-rate depreciation might prove necessary to bring about the necessary changes in public and external financing requirements? Alternatively, how large a debt-stock reduction might be needed to accomplish the same?

#### ***1.4 Macroeconomic “consistency” analysis***

The projection exercise this book describes is a “consistency” analysis, in several different senses. The most important is that, unlike projection exercises that simulate economic processes and, as appropriate, adjustment to equilibrium, the analysis described here aims only to determine the financing flows *consistent with* programmed macroeconomic and public-expenditure objectives, to determine whether these would be *consistent with* what is likely to be available.

“Consistency” is a recurring theme in this book, but the word comes up in several different ways. First, it has a practical mechanical significance. When constructing a macroeconomic projection, if particular variables figure in different sets of accounts for the same year,

care must be taken to ensure that their values are consistent. Thus, for example, dollar flows of external-debt flows (disbursements and repayment) to and from the government must be consistent in the fiscal and the external accounts; net international-reserve flows must be consistent in the monetary and external accounts; exports and imports of goods and non-factor services must be consistent in the national and the external accounts<sup>6</sup>; and so on. (Section 2.7 discusses this point in more detail.)

Moreover, since accounting “identities” — equivalence relationships that must always be true — govern the different sets of accounts, projected values must be consistent with these identities. Thus, for example, the central bank’s stock and flow balance-sheet identities must hold at all moments and over all time intervals. Similarly, each year’s non-government consumption flow must be consistent through the national-accounts “expenditure” identity (see Chapter 6) with net exports of goods and non-factor services, gross investment, and government consumption. In addition, year-average and year-end exchange rates, or year-average and year-end price-index values, must be mutually consistent, and in general should not “oscillate” (see Section 3.7 below).

“Consistency” goes beyond simple adding-up considerations, however. One of the book’s themes is that policy-makers should endeavor to formulate macroeconomic programs with financially feasible outcomes in all aspects of the macroeconomy. That is, projections must be consistent with resources likely to be available. Will private consumption grow adequately (and so allow a sufficient flow of private saving to take place)? Will adequate financing flows be available for the external accounts and the fiscal accounts? Will government expenditure be consistent with the economy’s development objectives? Is the current macroeconomic program likely to do well enough for a time but then

---

<sup>6</sup> Note, however, that (for example) the dollar value of exports of goods and non-factor services for a given year in the balance of payments may not be precisely match the national-currency value in the national accounts, converted at the year-average exchange rate. If the exchange rate varies over the year, and exports happen not to be spaced evenly over the year, then the actual average exchange rate for exports over the year may differ from the recorded average of the daily averages.

lead to financing problems several years later? A program that is inadequate in these regards is likely, sooner or later, to prove unworkable.

A repeated lesson from experience since the international “debt crisis” of the 1980s has been that an economy’s fiscal, monetary, and exchange-rate policies must balance a broad range of objectives. A minimal list would include (a) economic growth, (b) improvement of private-consumption standards, (c) physical- and human- capital formation and maintenance, (d) control of public debt, (e) price and exchange-rate stability, and (f) internal financial stability. Excessive emphasis on one objective tends to distort overall macroeconomic evolution. Thus, for example, nations whose policy-makers over-emphasized external-debt management (e.g., Romania in the 1980s) limited their growth rates, impaired their populations’ living standards, and ran down their physical and human capital stocks. Nations whose policy-makers relied on aggressive exchange-rate adjustment to meet balance-of-payments objectives (e.g., Brazil in the 1970s and early 1980s) often incurred the penalty of high inflation. Nations whose policy-makers relied on “hard” exchange-rate policies to meet stabilization objectives (e.g., Argentina in the 1990s) often suffered diminished growth performance and excessive external-debt accumulation. Economies that relied too heavily on tight monetary policy to limit inflation starved productive sectors of credit, and so reduced real growth and living standards.<sup>7</sup>

Experience of this kind suggests that policy-makers could use programming exercises, first, to ensure that they are not over-emphasizing one set of macroeconomic objectives at the expense of others, and, second, to ensure that they are not storing up unmanageable

---

<sup>7</sup> Some analysts believe that monetary authorities should dedicate themselves fundamentally to the objective of price-level stability. Most monetary authorities, however, even those whose charters direct them to prioritize price-level stability, in fact pursue a triad of objectives: (i) adequate availability of bank credit at tolerable interest rates; (ii) adequate foreign-exchange reserves; and (iii) price-level and exchange-rate stability. They typically aim for a practical balance of emphasis among these variables, aiming for the lowest possible inflation rate *subject to* minimum levels of credit adequacy and foreign-exchange reserves.

trouble for the future.<sup>8</sup> Put differently, macroeconomic programs must satisfy conditions of consistency with available resources in *all* aspects of the macroeconomy — as revealed by the national-, external-, fiscal-, and monetary-accounts identities.

“Consistency” has yet another, perhaps more subtle, significance in the approach this book describes. Financial-programming exercises of the kind this book describes differ in an important sense from other kinds of economic “model.” Broadly speaking, economic models *simulate* the economic processes they describe, mathematically representing economic systems’ movement toward equilibrium through price movements and stock and flow adjustments. For example, a general-equilibrium macroeconomic model might represent an economy’s adjustment to a terms-of-trade “shock” by showing the period-by-period adjustments of prices and quantities in domestic financial markets, export and import markets, foreign-exchange markets, the market for external financing resources, and other markets. A “consistency exercise,” in contrast, would calculate the changes in the net external financing inflow that would be *consistent with* the post-shock prices, making it possible to determine whether this inflow would be feasible — i.e., whether the programmed GDP growth and exchange rate would be still be possible, or would have to be adjusted to be consistent with available financing resources.<sup>9</sup>

Academic economists sometimes disparage such consistency exercises as “mere” accounting rather than genuine “modeling” exercises. This book takes the view, however, that there is no reason to consider consistency exercises any less “valid” than general-equilibrium models. Consistency exercises are simply *different* instruments of analysis. They may be more appropriate for certain practical questions that policy-makers often need to address — in particular, the financial-feasibility issues on which this book focuses. Like all instruments of

---

<sup>8</sup> Analysts sometimes use the expression “time consistency” to refer to this issue. That is, macroeconomic policy needs to be set with a view to ensuring consistency “over time.”

<sup>9</sup> Consistency exercises like the one this book describes are often referred to as “models,” but this is loose usage. It is more appropriate to describe them as “projection exercises.”

analysis, they should be used when appropriate, and not used when inappropriate, or less appropriate than some alternative instrument. Well-designed consistency exercises are well suited for determining the financial feasibility of multiannual macroeconomic programs, and this book therefore recommends their use for that purpose.

Among the better-known macroeconomic consistency “models,” the World Bank’s “Revised Minimum Standard Model” (the “RMSM-X”) has become widely familiar, not only within the Bank but among government analysts who have applied it, or considered applying it, in their own economies. The International Monetary Fund’s standard programming procedure, with the “performance targets” on which it has traditionally conditioned its basic lending programs, is also a consistency exercise (see Annex 9.2). Many governments and financial institutions have come to use similar approaches in their own projection work. Commercial banks and other financial institutions that provide finance with developing economies have also developed and applied financial-programming exercises for their own purposes. Many of these are grounded in an approach articulated in the early 1980s, at the outset of the debt crisis, by William Cline (see Cline 1983). Macroeconomic consistency exercises of the kind discussed here work in broadly similar ways. The specific exercise this book describes is intended to be typical, so that readers who understand how this one works may find it easier to understand how others work.

To help understand the distinction between “equilibrium” and “consistency” models, recall the well-known Leontief fixed-coefficients input-output system (see Leontief 1951).<sup>10</sup> Although the Leontief system is sometimes presented in university economics courses as one kind of “general-equilibrium model,” it is surely more appropriate to describe it as a consistency “model.” It aims only to determine whether an economy’s available productive resources would be *consistent with* final-output objectives, assuming that the estimated or assumed input-output

---

<sup>10</sup> For a given set of net final outputs an economy intends to produce, the Leontief system determines the gross output that must be produced, taking account of the reality that some of the gross output must be used as inputs in the production of the final outputs. In the Leontief system, each unit of any output requires a fixed unit of the various types of input.

coefficients apply. Although widely considered a helpful planning exercise, in its basic version, as has often been pointed out, it incorporates no adjustment mechanism by which the productive structure would move to “equilibrium.”

In this book’s projection exercise, in each aspect of the macroeconomic structure, year-by-year projections are carried out so as to yield *residuals* — typically, (a) non-government consumption and capital formation for the national accounts, (b) the “gap-filling financing” required “to close” the external accounts, (c) internal public debt accumulation for the fiscal accounts, and (d) the required monetary-policy stance. A key point of the methodological approach is that *these residuals are evaluated for feasibility*. Thus, for example, if the projected external accounts require more external financing than foreigners could be expected to provide, it would be appropriate to revise the programming assumptions — e.g., to reduce the programmed real GDP growth rate, or to program a more depreciated real-effective exchange rate, so as to reduce import demand.

Three additional points should be noted here. First, it cannot be too strongly emphasized that it would be methodologically inappropriate to use consistency analysis, of any kind, for *prediction*. The fact that the exercise indicates, say, that a given public deficit would be consistent with a given set of programmed macroeconomic outcomes by no means implies that the deficit and outcomes will, or are even likely to, occur. What a consistency exercise can provide is confirmation that a particular programmed government expenditure program *would be* financially feasible within the context of a macroeconomic program — specifically, that the resulting public deficit and balance of payments *could* be financed, that the banking system *could* provide sufficient credit to support the assumed GDP growth, and that the required flow of non-government saving *would be* feasible. Broadly speaking, a projection that satisfied consistency criteria *could* occur; a projection that failed to satisfy consistency criteria presumably could not.<sup>11</sup>

---

<sup>11</sup> The exercise this book describes calculates “projections,” not “forecasts.” That is, the exercise is intended as a policy-planning instrument, not a device for formulating predictions.

Second, while a macroeconomic consistency exercise can help gauge the financial feasibility of a government's overall multiannual expenditure program, it would not generally be useful for determining the efficiency, much less the effectiveness, of government expenditure. Nor would it be likely to be much help in addressing issues of expenditure equity. Again, the general point is that macroeconomic consistency exercises are useful to address *some*, but not *all*, relevant issues facing policy-makers. When evaluating multiannual government expenditure programs, macroeconomic consistency exercises should be used *in conjunction with* medium-term expenditure framework (MTEF) exercises. If available, the MTEF is the appropriate instrument for expenditure effectiveness, efficiency, and prioritization; the macroeconomic projection exercise is the appropriate instrument for determining the financial feasibility of the combined macroeconomic and expenditure program.

Third, financial feasibility is not the only kind of feasibility that matters for a government-expenditure program. As in any economy, capital expenditure plans, and indeed many kinds of current expenditure, should be reviewed for technical feasibility. In some economies with weak execution systems, it is prudent to review some kinds of expenditure to determine whether they are likely to reach their intended beneficiaries — another dimension of feasibility. Particularly for developing economies, however, there is a wide range of expenditure-feasibility characteristics that are often summarized in the expression “absorption capacity.” Expenditure planners, especially those with inadequate knowledge of country circumstances, can easily overlook these. It may be financially feasible for a government to hire more teachers for rural schools, but in a developing economy qualified teachers willing to work in rural areas may be in short supply. The current national investment program may be within the government's financial-resource “envelope,” but qualified project administrators, or engineers or workers with relevant skills, may be in short supply. Financial feasibility is pretty much the only kind of feasibility the macroeconomic exercise this book describes can address, however.

### 1.5 Programming assumptions

When working with macroeconomic consistency exercises, it is essential to bear in mind that they characteristically use programming assumptions not only for policy settings and “exogenous” international and internal economic conditions, but also for the *outcomes* of such key macroeconomic variables in each projection year as the real gross domestic product (GDP), the inflation rate, and the exchange rate — even if the exchange rate is floating. Analysts sometimes find it peculiar, at least at first, *to assume* values for the GDP, inflation or exchange-rate *outcomes*: it would seem more natural to suppose that these should be the *results* of a macroeconomic projection exercise. The point is that consistency exercises characteristically work by setting programming assumptions for objectives and outcomes, and then determining the requirements — productive inputs in the case of the Leontief system, financing flows in the case of the exercise this book describes — that would be *consistent* with them.

The programming assumptions on which macroeconomic projection exercises are based may be grouped in four categories:

- (1) “**structural parameters,**” i.e., parameters that quantitatively define the relationships among variables, such as (a) elasticities of export and import volumes with respect to world market growth, real-GDP growth, real capital-formation growth, and “real-effective” prices (prices adjusted for projected exchange rates and prices), (b) parameters defining the relationships among capital formation, real-GDP growth and labor-force growth; (c) parameters defining the demand for money and cash-deposit ratios; and others;
- (2) relevant **world economic conditions and internal exogenous variables,** such as the real growth rates of export and import prices and markets; world inflation and interest rates; and growth rates of internal exogenous variables such as oil-production flows;
- (3) **macroeconomic programming objectives,** such as real-GDP growth, inflation, the exchange rate, internal interest rates, and so on; and

- (4) **macroeconomic policy settings**, including such fiscal parameters as tax rates and other public-revenue determinants, employment and remuneration rates for public workers, and such monetary parameters as reserve ratios and interest rates set by the monetary authority. Policy settings, broadly defined, also include the sizes of the government's non-interest expenditure programs and the government's program for external and internal financing.

While this taxonomy of assumption settings is useful for discussions of projection techniques and of particular projection exercises, it is important to note that the distinctions are not always hard and fast. Particular assumptions may sometimes fall into more than one category. For example, consider the elasticity of (say) the volume of cotton exports with respect to the world cotton-trade volume. Export elasticities are presumably “structural parameters.” Since a value exceeding one would imply an increase in market share, (see Section 6.4), such an assumption could stand for (a) declining cotton exports from competing economies — i.e., an exogenous world condition, *or* (b) a government program to stimulate cotton exports — i.e., a policy setting. An exchange-rate assumption is another example: it could be either a policy objective or a policy setting, depending on the projected exchange-rate policy. Under a freely-floating exchange rate, for example, the assumption would be a policy objective; under a conventional fixed exchange rate, in contrast, it would be a policy setting.

As always in economic projection work, the results of exercises of the kind this book describes require careful interpretation. Analysts interpreting given results must examine not only the “bottom-line” financial-feasibility indicators, but also the full range of projection results, to understand which assumptions “drive” the results obtained. Determining the implications for policy feasibility requires a measure of judgment regarding (say) how much external financing would be available or how much private consumption or public-sector wage rates could rise or be “compressed” as the case may be. The spreadsheet exercise itself cannot do this. A *computer*-based exercise should be able to show a more complicated range of connections among economic

variables than most human minds ordinarily comprehend. After examining the results, however, the analyst must apply judgment, skill and experience to understand out their significance.

### 1.6 *Pacífica's macroeconomy*

To illustrate the techniques it discusses, this book describes a projection exercise for a hypothetical economy. The “Republic of Pacífica” is imagined to be a mid-sized economy in the Western Hemisphere. Its estimated mid-2008 population was 8.2 million and its 2008 GDP was US\$26.6 billion, for a per-capita GDP just under US\$3,260. Pacífica’s merchandise exports comprised crude oil, bananas and manufactured products, together amounting in 2008 to 24.6 per cent of GDP. Crude-oil production, estimated at just under 210,000 barrels a day for 2008, has been an important foreign-exchange earner, although it provides Pacífica little influence in world oil markets.

Like many other developing economies, Pacífica has been struggling for decades with inadequate and variable real growth, persisting poverty, high external debt, and export-commodity dependence. In recent years, however, economic liberalization, structural reform, and disciplined macroeconomic policy, together with favorable world export conditions, have brought about some growth. The onset of world recession in 2008 and 2009 has raised concerns for the future, however.

The projection exercise is assumed to be carried out in June 2009. At this moment, historical data are complete through 2008, although subject to further revision. (The base year for the projections is 2008 and the initial projection year is 2009.) Table 1 gives summary indicators for the economy’s performance in the last five historical years, 2004–2008.

The world economic crisis of 1998 had interrupted Pacífica’s growth from the early 1990s, and the economy recovered relatively slowly over subsequent years. After 2003, however, *real-GDP growth* significantly exceeded annual population growth (estimated at 2 per cent). For 2006–2008, real growth rates were 5.5, 5.7 and 6.0 per cent

respectively. Rising oil-export prices figured heavily in bringing about this growth. Pacífica's policy-makers were all too aware in 2009 that sharply declining oil prices and world-trade volumes imply that real growth will be most likely be negative in 2009 and very low in 2010.

**Gross fixed capital formation** was about 19.7 per cent of GDP in 2008, slightly lower than in 2005, 2006 and 2007. Capital formation has been lackluster, but has exceeded the 16.6 per cent rate recorded in 2001. The **net exports of goods and non-factor services** account, which had shown deficits of about 1 per cent of GDP in 2004 and 2005, recorded surpluses of 2.3, 1, and 0.9 per cent in 2006–2008. In 2008, **real per-capita non-government consumption** stood at about US\$1,934, measured at the 2005 exchange rate and price level. This represented an annual average increase of 1.8 per cent over the 2003 value, a disappointingly low growth rate. Even so, the overall **poverty incidence** diminished from 20.5 per cent in 2004 to 17 per cent in 2008 while the extreme-poverty incidence diminished from 9.4 per cent to 7.4 per cent. Policy-makers were well aware in 2009, however, that it would be difficult to make additional progress until the recession passes.

**The price level and exchange rate** were essentially stable after 2004. Consumer prices had risen at annual rates on the order of 9–11 per cent from 1996 through 2000, and had risen 5.8 per cent in 2003. From 2004 through 2008, however, disciplined monetary policy reduced the inflation rate from 4.1 per cent in 2004 to 2.7 per cent in 2008. Meanwhile, both the nominal- and real-effective exchange rates remained steady. In 2009 policy-makers remained determined to hold inflation consistently at world levels over coming years, but were well aware that the exchange rate was coming under pressure to depreciate, in both nominal and real-effective terms.

With the improved trade performance, Pacífica's long-standing deficit in **the current account of the balance of payments** became a surplus. The current-account deficits had been 1.2 and 1.3 per cent of GDP in 2004 and 2005, but these were followed by surpluses exceeding 1 per cent of GDP in the following two years and a surplus of 1.4 per cent in 2008, when average oil-export prices were particularly high. Capital and financial inflows over the period 2004–2008 averaged

2.2 per cent of GDP. Multilateral and bilateral institutions maintained steady support, but direct foreign investment flows averaged about 2 per cent of GDP. Gross foreign-exchange reserves, which stood at 3.8 and 3.7 months' of imports of goods and non-factor services respectively at the ends of 2004 and 2005, rose to 5 months by the end of 2008. In 2009, however, the authorities were prepared for some deterioration in the current account, and expected to allow foreign-exchange reserves to diminish somewhat.

In 2006 and 2007 rising real-GDP growth enabled Pacífica's authorities to hold the *central-government deficit* within 1 per cent of GDP. In 2008 the deficit improved to 0.4 per cent of GDP. Total central-government revenue amounted to 20.7 per cent of GDP. Of this total, 3.9 percentage points derived from oil, and 12 percentage points from sources not directly associated with oil. Total central-government expenditure amounted to 21.4 per cent of GDP. Of this total, 14.1 percentage points corresponded to current non-interest expenditure, 2.7 percentage points to external and internal interest, and 4.7 percentage points to government capital expenditure.

Measured at 2005 prices and at the 2005 year-average exchange rate, per-capita real *non-oil tax and tariff revenue* rose steadily, from about US\$519 in 2004 to about US\$602 in 2008. The 2008 figure represented an annual average increase of 3.6 per cent over the 2003 figure. Meanwhile, per-capita real overall government expenditure rose from about US\$658 in 2004 to about US\$791 in 2008, a 4.9 per cent annual average increase from 2003. Per-capita real government external interest due rose from about US\$72 in 2004 to about US\$78 in 2008. In 2009 the authorities were well aware that slower future growth was likely to reduce tax revenue and widen the central-government deficit. They considered standing proposals to increase the value-added tax rate from 12 to 14 per cent, but were reluctant to raise tax rates at a time when the economy faced recession.

To finance substantial fiscal- and external-accounts deficits in the late 1990s, Pacífica took on a substantial stock of *external debt*. At the end of 2003 Pacífica's overall external-debt stock amounted to 30 per cent of GDP. The public and publicly guaranteed part of this — all of which was owed by the central government — amounted to 26.5 per cent

of GDP. Neither figure was especially high by comparison with the most heavily indebted developing economies, but they were high enough to merit careful monitoring by policy-makers. External interest due amounted to 1.9 per cent of GDP in 2003, of which 1.8 per cent corresponded to the public and publicly guaranteed debt. Over the next five years, Pacífica achieved some reduction in its overall external-debt stock as a percentage of GDP, in part because GDP growth was relatively strong. At the end of 2008 Pacífica's overall external-debt stock amounted to 25.2 per cent of GDP, of which 22 per cent of GDP was public and publicly guaranteed. External interest due amounted to 1.7 per cent of GDP, of which 1.4 per cent corresponded to the public and publicly guaranteed debt. In mid-2009, however, policy-makers were aware that slowing real-GDP growth would make it difficult to sustain progress on reducing the debt stock and interest bill as percentages of GDP.

One worrisome trend has been that the *central-government internal debt* has been rising as a percentage of GDP. At the end of 2003 the central government's gross internal debt had reached 18.5 per cent of GDP. The central government had internal financial assets (deposit accounts in the central bank and commercial banks) amounting to 2.4 per cent of GDP, so its net internal debt amounted to 16.1 per cent of GDP. The internal debt continued to grow after 2003, because central-government policy-makers tried to reduce their reliance on external borrowing to finance the deficit. At the end of 2008 the central government's gross internal debt had reached 23.5 per cent of GDP. The central government's internal financial assets amounted to 3.1 per cent of GDP, so that its net internal debt amounted to 20.4 per cent of GDP. Policy-makers were concerned about this problem in mid-2009, and hoped that they could find ways to limit if not reverse the growth of the government's net internal-debt stock.

Pacífica's price and exchange-rate stability after 2003 resulted largely from effective *monetary policy*. The economy's monetization has steadily deepened: the year-end money stock rose as a percentage of GDP from just under 50 per cent for 2003 to 52.4 per cent for 2008, while the monetary base rose as a percentage of GDP from 15.3 per cent for 2003 to 16.9 per cent for 2008. The central bank's year-end net

international-reserve holdings over the period increased from 5.7 per cent of GDP for 2003 to 12.1 per cent for 2008. Through skillful monetary policy, the central bank's net domestic assets fell as a percentage of GDP from 9.5 per cent for 2003 to 4.8 per cent for 2008.

Questions for which policy-makers and foreign observers would presumably seek answers from a multiannual projection exercise include the following:

- (1) Take as given the projection exercise's assumed structural parameters and exogenous variables. The authorities anticipate that real GDP will decline about 4.5 per cent in 2009, but that the growth rate will rise gradually to about 5 per cent per year by 2015. Meanwhile, inflation will continue to run roughly at world rates. They expect the average nominal exchange rate to depreciate gradually from 9 per U.S. dollar in 2009 to 9.60 in 2011. At the same time, they intend to carry out adjustments to the government's expenditure flows favoring education, health, and infrastructure. If the other main macroeconomic policy settings remain basically unchanged, how would the (a) current-account deficit, (b) non-financial public-sector deficit, (c) "unprogrammed" external-debt inflows, and (d) per-capita real private consumption evolve? Would they evolve unsustainably, in the sense that the implied external and internal financing requirements would become unfeasibly large?
  
- (2) Suppose that the answer to this first question is that the macroeconomic program would prove unsustainable, in the sense that the external and/or internal debt-GDP ratios would tend to grow explosively. What policy changes would bring about sustainability? Suppose that the authorities are willing to consider less ambitious macroeconomic objectives. What combination of reductions in programmed real GDP growth and increases in programmed inflation rates would enable them to reduce the prospective external and internal financing requirements? What combination of changes in macroeconomic objectives and policy variables could they consider, and what

consequences could these be expected to have? In particular, should the authorities consider increasing the value-added tax rate? Would it help to seek debt relief?

- (3) Suppose that the answer to the first question is that the macroeconomy would evolve sustainably under its assumptions. Would it evolve sustainably under less favorable assumptions? In particular, how vulnerable is the macroeconomy to conceivable “exogenous shocks”?
- (4) Finally, suppose that the results of the analysis suggest that no feasible policy change is likely to lead to sustainable evolution of the macroeconomy. It might then be necessary to consider arrears in debt service or negotiated debt reduction. The analysis could be used to consider the amount of debt reduction necessary to bring about sustainability.

This book’s remaining chapters describe how macroeconomic consistency analysis could be used to address these questions.

### 1.7 *The book’s structure*

This book is organized as follows: Chapter 2 presents a ***summary overview of the projection procedure***. (Annex 2.1 lists the steps in the calculation procedure, and Annex 2.2 sets out a ***simplified version of the projection procedure*** in equations.) Chapters 3, 4, and 5 then describe the main components of the ***macroeconomic program*** that forms the basis of the projection analysis. Chapter 3 discusses the ***“basic” macroeconomic assumptions*** underlying each year’s projections, including real GDP growth, the year-average and year-end price level, the year-average and year-end exchange rate, and their relationships. Chapter 4 discusses techniques for programming ***government expenditure***. Chapter 5 discusses techniques for programming ***external and internal-government financing***.

Chapters 6, 7, 8 and 9 then describe how the macroeconomic program can be used to formulate national-, external-, fiscal-, and

monetary-accounts projections. Chapter 6 sets out a basic *national-accounts* framework to help determine whether an adequate non-government saving flow is likely to be available, given the assumptions for programmed government consumption and capital-formation expenditure. Chapter 7 presents a consistency framework for the *external accounts*, focusing, in turn, on the non-debt external accounts, the external accounts involving debt, and reconciliation of “above-” and “below-the-line” balance-of-payments projections. This reconciliation procedure aims to determine the external financing required, to see whether the balance of payments could be feasibly financed under the policy assumptions. Chapter 8 discusses the projection exercise’s *fiscal-accounts* aspects. The basic idea is to determine the public sector’s overall internal borrowing requirement, to see whether it could be feasibly met. Chapter 9 describes a programming methodology for the *monetary accounts*. Building on the previous chapters, it describes the links between the monetary- and the national-accounts, fiscal and external projections. It describes a procedure to determine whether the projected medium-term monetary program would need to be unfeasibly contractionary to hold inflation to the programmed level. In each of these chapters, one section illustrates the projection techniques using the “Pacifica” exercise.

Finally, Chapter 10 discusses some of the *practical issues* that arise in projection work. These include the criteria for setting out parameter assumptions, the use of econometric estimation techniques, and “fudging.” The final part of the chapter discusses sensitivity analysis, with examples from the “Pacifica” exercise.

On the topic of “practical issues,” one final note concludes this chapter. The methodology and specific techniques this book describes aim, above all, to be practical, to serve the cause of sound and efficient policy-making. Practical projection methodology should always be grounded in solid economic theory. In some instances, however, practicality and simplicity require compromises with full theoretical correctness. In such instances, every effort is made to be transparent.