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Fiscal consolidation with high growth: A policy simulation model for India

Sudipto Mundle, N.R. Bhanumurthy *, Surajit Das

National Institute of Public Finance & Policy (NIPFP), New Delhi, India

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ABSTRACT

In this paper a fiscal consolidation program for India has been presented based on a policy simulation model that enables us to examine the macroeconomic implications of alternative fiscal strategies, given certain assumptions about other macro policy choices and relevant exogenous factors. The model is then used to estimate the outcomes resulting from a possible strategy of fiscal consolidation in the base case. The exercise shows that it is possible to have fiscal consolidation while at the same time maintaining high GDP growth of around 8% or so. The strategy is to gradually bring down the revenue deficit to zero by 2014–15, while allowing a combined fiscal deficit for centre plus states of about 6% of GDP. This provides the space for substantial government capital expenditure, which translates to a significant public investment program. This in turn leads to high overall investment directly and indirectly, via the crowding in effect on private investment, which drives the high GDP growth. The exercise has also tested the robustness of this strategy under two alternative scenarios of higher and lower advanced country growth compared to the base case.

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1. Introduction

The Thirteenth Finance Commission (henceforth The Commission) was mandated to recommend a fiscal consolidation program for implementation by central and state governments. This task was made particularly challenging by the global financial crisis that followed the collapse of Lehman Brothers on 11th September 2008. India did not suffer a deep recession like most developed countries. However, the recession in developed countries resulted in a decline in demand for Indian exports to those countries. This effect was compounded by considerable volatility in financial markets, triggered by the rapid withdrawal of portfolio investments by foreign institutional investors (FIIs) and a sharp squeeze of liquidity, resulting in severe demand deficiency in several sectors of the real economy. The combined effect of the external crisis transmitted through these two main channels resulted in a significant dip in India's growth from around 9% in the recent past to only 6.7% in FY2008-2009.

A strong fiscal stimulus became necessary in the second half of FY 2008–2009 and again in FY2009–2010 to help revive growth. The positive impact of this stimulus became evident especially during the last two quarters of FY 2009–2010. At the same time the stimulus entailed a further deterioration of the fiscal condition, which was challenging even before the global crisis got underway. One of the key tasks before the Commission was to propose a program of revenue and public expenditure for the federal and state governments that takes the economy back to a sustainable fiscal path along with high growth. The NIPFP policy simulation model (henceforth NIPFP model) was used to assist the Commission in addressing this question. This paper reports on that exercise.

Alternative approaches to macroeconomic policy simulation are discussed in Section 2, which also provides the rationale for choosing a traditional Tinbergen-Goldberger-Klein type structural model (henceforth Tinbergen type model) as the appropriate macroeconomic policy simulation tool. The model itself is presented in Section 3. In its present application the model enables us to examine the macroeconomic implications of alternative fiscal strategies, given certain assumptions about other macro policy choices and relevant exogenous factors, such as the state of the global economy and world oil prices. The model is then used to estimate the outcomes resulting from a possible strategy of fiscal consolidation in the base case discussed in Section 4. The possible consequences of this strategy under altered global conditions, both positive and negative, are also examined by perturbing the exogenous assumptions relating to future growth performance of advanced countries. Section 5 concludes. Appendix A states the data sources. Appendix B presents the estimated equations. Appendix C describes some ratios and definitions that have been used for the empirical estimation of the model.

* Corresponding author.
E-mail addresses: sudipto.mundle@gmail.com (S. Mundle), nrbmurthy@gmail.com (N.R. Bhanumurthy), dasur@nic.com (S. Das).

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2. Approaches to macroeconomic policy simulation

The idea that a Keynesian (or any other) macroeconomic model with empirically estimated functions and behavioural parameters, and some degrees of freedom, could be used to derive the required values of a vector of policy (instrument) variables that would generate the desired values of a vector of target variables (outcomes) was first spelt out in Tinbergen's theory of economic policy (Tinbergen, 1967). However, empirical application of this approach had already started in the 1950s with the structuralist macroeconometric models of Klein and Goldberger (1955) that followed the neoclassical synthesis of Keynesian economics in Hick's IS-LM framework (Hicks, 1937). After a clear run of almost two decades Tinbergen theory and its empirical application in Klein-Goldberger type structural macroeconomic models (henceforth Tinbergen models) came under attack in the 1970s for several reasons. Keynesian policies had failed to tackle the phenomenon of 'stagflation', rising unemployment and rising inflation at the same time. This fuelled a growing hostility towards *dirigisme*, or government activism, during the Reagan-Thatcher years of market fundamentalism. While Friedman and the monetarists (Friedman and Schwartz, 1971) led the intellectual attack against Keynesianism, the attack against Tinbergen type policy modelling was led by the emerging paradigm of 'rational expectations', and in particular the Lucas critique.

To understand the Lucas critique, it is useful to view macroeconomic policy making as a Stackelberg game in which the government is the Stackleberg leader setting policy while all private agents, firms and households are followers responding to Government policy. In a seminal paper that came to symbolize what Mishkin (1995) has called the 'rational expectation revolution', Robert Lucas (1976) argued that the behaviour of private firms and households is not policy independent. If behaviours change in response to policy changes then structural parameters of the policy model, based on past behaviour of individual private entities, will become invalid. As such structural relationships estimated on the basis of past behaviour may no longer be valid. Building on his critique Kydland and Prescott (1977) demonstrated in another seminal paper that optimal policies would necessarily be time inconsistent because an optimal policy based on current behaviour may not be optimal post changes in behaviour of private agents in response to that policy.[1]

These key papers and a host of others that together constitute the rational expectations revolution have fundamentally changed the landscape of macroeconomics and the way policymakers approach macroeconomic policies. There is greater focus now on long term issues, the importance of time consistency and the credibility of announced policies. Nevertheless, policymakers have continued to primarily draw on traditional Tinbergen models as policy tools despite the emergence of an alternative genre of real business cycle (RBC) models that grew out of the Lucas critique (Gali, 2008). In these models business cycles are driven by Lucas's 'deep' variables such as technology and consumer preferences that are policy independent. Mishkin suggests that policy makers are not comfortable with these RBC models because they do not reflect the behaviour of real economies. He mentions that the RBC theorists tend to reject disconfirming evidence, attributing it to faulty data rather than any fault in their theories (Prescott, 1986).

There are also other reasons for the continuing recourse to traditional Tinbergen models despite the Lucas critique. First, not all policy choices are choices between alternative policy rules, and some choices may merely represent alternative values of policy variables within a given policy rule, and these need not affect behaviour. For this class of policy choices, Tinbergen models are no more subject to the Lucas critique than the models based on the 'deep' micro-foundation variables that he recommended. Second, the information requirements of micro-foundation based RBC models, such as Bayesian Dynamic Stochastic General Equilibrium (DSGE) models, are so large that they are not easily applicable in real world economies, especially developing economies. Thus, while DSGE modelling is an important field of contemporary research on macroeconomic policy simulation, it is not an available option for comparing between alternative policy choices at present.[2]

The information question points to more fundamental issues about the behavioural foundations of real business cycle theory. In this paradigm policy choices are posed as options for welfare maximization in a context where macro relations aggregate the behaviour of individual agents maximizing their respective utility functions. However, the assumed optimizing behaviour of individual agents that provides the micro-foundation of RBC theory, as indeed much of standard economic theory, is a matter of belief rather than scientific evidence. There is a growing body of disconfirming evidence in the field of behavioural economics that economic agents do not in fact manifest optimizing behaviour. Behavioural economics is founded on the early insight of Herbert Simon (1957) that economic models would be much better approximations of reality if they assumed that individual agents engage in what he termed 'satisficing' behaviour. The central conclusion of repeated empirical verification in behavioural economics is that given the limits of cognitive capacity, economic agents look for satisfactory options rather than best options. Typically, in making choices, agents restrict the information they are prepared to process to a limited information set, and choose the best option based on that limited information set, i.e., bounded rationality (Kahneman, 2003). This applies not only to decision making under conditions of certainty but also decision making under conditions of risk (Kahneman and Tversky, 1979).

The micro-foundations of the normative policy making process implicit in RBC models are also subject to a similar critique. Building on the insights of institutional economics (North, 1990; Williamson, 1985) and public choice theory (Buchanan and Tullock, 1962), Dixit has argued that the assumption of an omnipotent, omniscient, welfare maximizing benevolent dictator is inappropriate for policy analysis (Dixit, 1996). In Dixit's view policy making is essentially a multi-stage political process constrained by varieties of asymmetric information, adverse selection and moral hazard. In some cases a particular policy game may be modelled with one principal and many agents. In other games, the policy maker is a single agent dealing simultaneously with multiple principals. Dixit has tried to capture this rich variety of policy contexts within the general approach of transaction cost politics. However, this broad approach is yet to be developed into a general model of the policy process that can serve as an appropriate micro-foundation for RBC theory.[3]

These open questions regarding the micro-foundations of RBC theory, combined with its very demanding data requirements for empirical application, probably account for the continuing popularity of Tinbergen type models. The principle of parsimony would suggest

[1] An alternative class of 'structuralist' models replace time series estimated parameters with parameters calibrated by solving a computable general equilibrium model for some base year (Dixit and Ross, 2003; Taylor, 2004). For a recent application to India see Naastepad (1999). These models are also subject to the same Lucas critique. Non structural models usually used for unconditional forecasts, such as the vector autoregression models due to Sims (1980), are not subject to the Lucas critique, but on the other hand they are also not very useful for comparing the outcomes of alternative policy decisions.

[2] Early experiments with DSGE modelling in India have generated some promising insights. See for instance the evidence on 'financial accelerator' and volatility (Anand et al., 2010). NIPFP also has an ongoing research program on DSGE modelling for India. For an initial output from this programme see the paper by Kalmi et al. (2010) which compares domestic inflation targeting under floating and managed exchange rate regimes.

[3] It is quite likely that the large variety of policy contexts envisaged in Dixit's approach may not be reducible to a single general model of the policy process. For some early attempts to model the political economy of macroeconomic policy see Persson and Tabellini (1994).

that Tinbergen models, with their much less demanding information requirements, are better tools for macroeconomic policy simulation in the present state of our knowledge. In India, although building of Tinbergen type structural models started from early 1960s, large economy-wide models emerged only in the late 1980s. Several such models were built to address different policy questions.[4] Over time these models became increasingly complex, highly disaggregated and intractable. Recent research in this genre has tended to build relatively simple core models with additional satellite models to deal with specific policy questions as required.[5]

3. The model

3.1. Key features

The NIPFP model presented here belongs to this Tinbergen tradition. It has been developed as a tool that policymakers can use to assess the likely consequences of alternative policy choices. Policy decisions are primarily based on intuition, the political decision makers' judgement about the likely consequences of her action. However, it helps the cautious policymaker a great deal if she can cross check her judgement with model simulated test runs of her policy, provided of course that the model itself is a reasonable approximation of reality.

To effectively serve as a user friendly policy tool for this purpose, the model has to have three key characteristics. First, it has to be applicable. It should be possible to run the model based on data that is actually available and it should not have data requirements that are impossible to meet. Second, the model has to be flexible, amenable to adjustments in its structure to address the specific policy questions policy makers may ask from time to time, and provide answers in the form that is required. Finally, the model has to be transparent, simple enough for the non-specialist policymaker to at least broadly understand the structure and mechanics of the model, or the chain of cause-effect relationships that lead from her policy choice to a particular outcome under given conditions as specified in the model.

The NIPFP model has been developed to meet these characteristics. It is a simultaneous equations system model developed for *policy simulation*. Hence, the main results presented below are not unconditional forecasts but conditional indicators of what would be the outcome for, say, growth or inflation if a particular set of policies were adopted and under an assumed, but hopefully realistic, set of exogenous conditions. In other words the exercise is the nature of 'if, then' statements which estimate the likely outcomes *if* certain policy and external conditions prevail. It is also a fairly simple model, consisting of only 22 equations. There are 13 behavioural relationships and 9 identities. The model has been kept deliberately simple to make the cause-effect relationships transparent and not a black box as often happens in very large models. This enables us to easily see how particular policy or exogenous variables are affecting the outcome variables. The model is also quite flexible and easily adaptable to answer different types of policy questions. Thus, the instrument and target variables can be interchanged to fit the question being asked. Sub-components of the model can easily be expanded if the policy question requires such detail on one or another aspect of the model. It is therefore in the very nature of this model that it will always be 'work in progress'. There is no 'final' version of this model and it will be adapted from time to time to address the specific policy question being asked. In the present application the model has been applied to track the macroeconomic outcomes of a fiscal consolidation path.

Finally, it should be mentioned that the model is theoretically eclectic rather than purist, picking up elements from different theoretical approaches as required by the empirical realities of the Indian economy. To illustrate, the inflation function in Eq. (2) has elements of demand-supply based price formation, where markets are cleared through price adjustment, as well as cost plus mark-up pricing where markers are cleared through quantity adjustments, and also an administered price component because we believe that all three price formation rules apply in different segments of the Indian economy (Mundle and Mukhopadhyay, 1993). That being said, it should be mentioned that the model is essentially Keynesian in nature since output levels are demand determined rather than supply constrained (Bhaduri, 1990). Given the persistence of high levels of involuntary unemployment, either open or disguised, we believe that this is the appropriate specification for India. Capacity constraints enter the picture only in the form of utilization levels influencing the level of private investment demand in Eq. (3).

3.2. Macroeconomic Block[6]

The aggregate (nominal) demand in the economy in period t (Y_t) is given by

$$Y_t \equiv C_t + I_t^p + I_t^g + G_t + B_t^f + L_t \tag{1}$$

where C_t is aggregate private consumption expenditure, I_t^p is aggregate private investment demand, I_t^g is aggregate government investment, G_t is aggregate government consumption expenditure, B_t^f is the aggregate balance of trade in goods and services, and L_t is net inflow of invisibles (remittances etc.). Therefore, $B_t^f + L_t$ is the net current account balance.

It is assumed that there is a 'fix price' segment of the economy where prices are determined as a mark-up over cost and another segment where prices are administered by the government. In both these segments the market is cleared through quantity adjustments. There is a third segment of the economy, e.g., food grain sector above the threshold price, where the market is cleared through price adjustments in response to excess demand or supply. Excess demand in turn is dependent on rainfall, which is a major determinant of annual variations in food grain supply. Hence the rate of change in the aggregate price level (inflation) is assumed to depend on liquidity, measured by the rate of change of money supply, cost push factors such as the rate of change in administered prices and production costs, and rainfall. Thus, inflation in period t ($\dot{p}_t$) is given by

$$\dot{p}_t = \phi\left(\dot{M}_{1t}, \dot{\bar{p}}_t^a, \dot{A}_t, \dot{\bar{V}}_t\right) \tag{2}$$

where $\dot{M}_{1t}$ is the growth rate of narrow money, $\dot{\bar{p}}_t^a$ is the rate of change in the level of administered prices, $\dot{A}_t$ is the rate of change in factor costs (wage, rent and interest costs), and $\bar{V}_t$ is the index of rainfall in period t. In the estimated equation system all the inflation determinants are significant with expected signs (Appendix B).

There is an accelerator type private investment function, where private investment is assumed to depend on the cost of capital as well as the crowding in effect of public investment, and the expected rate of capacity utilization. Hence, the rate of private investment $\left(\frac{I_t^p}{Y_t}\right)$ is given by:

$$\frac{I_t^p}{Y_t} = \phi\left(r_t, \frac{\bar{I}_t^g}{Y_t}, \frac{\bar{Z}_t^e}{\bar{Z}_t^e}\right) \tag{3}$$

[4] See Krishnamurthy (2008) for an excellent survey of Indian macroeconometric models.

[5] For a recent small macroeconometric model applied to high frequency data see Bhanumurthy and Kumawat (2009).

[6] In the following system of equations the notation convention adopted is to denote all exogenous variables with a bar ($\bar{x}$), all policy variables with a hat ($\hat{x}$), and growth rates with a dot ($\dot{x}$).