



Forward-looking and myopic regional Computable General Equilibrium models: How significant is the distinction?

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ARTICLE INFO

Article history:

Accepted 6 November 2012

JEL classification:

C68
D58
D91
R10

Keywords:

Myopic and forward-looking behaviour
Computable General Equilibrium models
Regional adjustment

ABSTRACT

We present a stylized intertemporal forward-looking model that accommodates key regional economic features, an area where the literature is not well developed. The main difference, from the standard applications, is the role of saving and its implication for the balance of payments. Though maintaining dynamic forward-looking behaviour for agents, the rate of private saving is exogenously determined and so no neoclassical financial adjustment is needed. Also, we focus on the similarities and the differences between myopic and forward-looking models, highlighting the divergences amongst the main adjustment equations and the resulting simulation outcomes.

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1. Introduction

Regional Computable General Equilibrium (CGE) models solve complex optimization problems within individual time periods in order to determine a complete allocation of a region's resources between alternative uses. However, such models often lack forward-looking expectations and this has been regarded as a matter of concern (Partridge and Rickman, 1998, 2010). In this paper we attempt to identify how significant the lack of forward-looking expectations is in this setting. In particular, we build a stylized forward-looking CGE model applicable in a regional context. Results from simulations using this model are then compared to those from a similar model where the adjustment processes between periods have a myopic, backward-looking, recursive-dynamic structure.

In this comparison of results we find the simulation differences are small. The long-run equilibria are identical. Furthermore, the adjustment paths generated by the two models are not radically different. We suggest two possible reasons why the importance of incorporating forward-looking expectations into regional CGE models might have been overstated. First, in previous comparisons using national models, the fully dynamic forward-looking model has often been compared to either a static model or one with passive investment. Second, the

usual mechanism and closures that are applied in national intertemporal CGE models misrepresent the adjustment mechanisms that typically occur within an individual region.

The structure of the remainder of the paper is as follows. In Section 2 we provide a background discussion of the theoretical issues. In Section 3 we outline the model structure. In Section 4 we deal with the calibration method. In Section 5 we present the simulation strategy and in Section 6 we discuss the simulation results. In Section 7 we summarize the main results of the paper and we conclude in Section 8.

2. Background

The theoretical structure of many intertemporal forward-looking CGE models is that described in Abel and Blanchard (1983). Such a model can be solved as a decentralized economy where consumption decisions are made by intertemporal optimizing households, with savings and investment decisions separated. Financial balance equilibrium is maintained through adjustment of either foreign borrowing, the interest rate, or by means of fiscal policy that, in turn, affects the financial wealth of households. Firms' forward-looking behaviour influences their investment decisions which depend on the tax-adjusted Tobin's q (Tobin, 1969). Furthermore, in their stylized form, such models usually make households fully liable for the financial needs of the system. Hence, household savings would cover not only the needs of domestic investment, but also, ultimately, trade and Government deficits. Accordingly, households have to save as

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Table 1
Intertemporal, myopic and regional models.

	Intertemporal models	Myopic models	Regional myopic models (e. g. AMOS)	Regional forward-looking model (aim of the paper)
Dynamic structure Consumption	Forward-looking Jump variable (derived from intertemporally additive utility function)	Recursive Abstracting from future periods (derived from a simple budget equation or as a fixed share of income)	Recursive Abstracting from future periods (derived from a simple budget equation)	Forward-looking Jump variable (derived from intertemporally additive utility function)
Saving rate Investment	Endogenous Jump variable (Tobin's q)	Exogenous Usually passive (not determined independently of saving)	Exogenous Independent of saving. Uzawa (1969) or Jorgenson (1963)	Exogenous Jump variable (Tobin's q)
Balance of payments (BOP)	BOP constraint, imposing financial sector equilibrium	Often BOP constraint through passive investment	No constraint	No constraint

much as is required to clear the financial sector which, in turn, implies the imposition of a balance of payments constraint.

In fact, forward-looking models are frequently calibrated on national data and their specification is nowadays becoming standardized. Their key characteristics are summarized in the first column of Table 1. However, the application of model specifications that imply a zero balance of payments and a savings rate obtained endogenously through financial balance equilibrium, may be inappropriate in a regional context since regions are likely to differ from the country as a whole in a number of significant respects.

It is widely recognized that regions are more open than nations and that regional economies typically do not have the full range of macroeconomic policy levers (and many regions have none at all). Both monetary and fiscal policy are centralized and are under the control of national Government so that policy instruments and some macroeconomic adjustment mechanisms, whose incorporation is uncontroversial in a national model, cannot routinely be assumed to apply to the case of a region.¹ Furthermore, regions, unlike nations, do not face a binding balance of payments constraint. There are at least two reasons for this. Firstly, the balance of payments is not required as a policy target since regions usually belong to a common currency area and to a nationally integrated financial system. As a result, fiscal and monetary policies cannot be used to produce balance of payments adjustments through control variables such as exchange rates, reserve assets and interest rates. Secondly, the subvention that regions receive from higher level authorities, such as centralized Government and the EU, may cause some distortionary effects so that a rigorous theory of the composition of the balance of payments is not really a regional issue. As pointed out by McGregor et al. (1995), such subventions are key determinants of the regional trade deficits. As long as national governments are credibly committed to the maintenance of the monetary union, regions do not face binding balance of payments constraints. In the UK context, for example, it is well-known that Northern Ireland has over many years maintained a balance of payments (and public sector) deficit that would be unsustainable for a national economy. But the UK government is committed to the union and essentially underwrites this position.²

The point is that forward-looking models impose balance of payments equilibrium in order to maintain financial sector sustainability, but regions are not obliged to undergo this form of financial adjustment. For instance, if a region faces an unsustainable position in which a net foreign debt is accompanied by a persistent trade deficit,

it is not required to adopt rigorous adjustment in order to produce a trade surplus to cover interest payments because there is no superior authority to impose it. A superior institution such as central Government, may reduce the subvention to reduce its level of debt and, in turn, the region's implicit (unobservable) debt. However, this is a process that occurs outside the region. It implies that any adjustment is imposed exogenously, from outside the region; it does not operate as an automatic, endogenous adjustment mechanism. This also means that the Ricardian implication of the fiscal deficit which is usually embedded in consumers' optimal decisions might be unrealistic; typically a regional (i.e. sub-national) Government which has no significant devolution of tax or borrowing powers, cannot finance its expenditure by levying taxes or issuing bonds. In this context regional policy is exogenous to the region, reflecting the subvention received from outside the region.

Of course, given widespread movement towards greater devolution within the EU, more regions will be given the responsibility, and be equipped with the corresponding instruments, to deal with the reduction in subventions, thereby introducing specific sustainable targets that might bring about a partial endogenous financial adjustment operating within the region. However, only when regions start to behave like countries belonging to a common currency area, e.g. the European countries, does the balance of payments begin to be a matter at the regional level, and any adjustment in internal and foreign assets ceases to be exogenously determined. However, this does not necessarily imply that the traditional approach to the balance of payments becomes appropriate. Even in this case, and for such regions, it may be inappropriate to impose full interregional and international payments constraints.

Our view is that in a regional intertemporal model, the treatment of internal and external debts should differ from the usual application in a corresponding national model. Thus, in a stylized regional model, Government and external debt, with their correspondent internal and external deficit flows, should not be involved in the process that determines financial adjustment within the region. This also means that the role of savings should differ from that played in standard applications. In a region, the household savings decisions are independent of the regional financial system. In fact, such decisions are more likely to be affected by national adjustment which is, of course, exogenous in a single small, open regional economy model.

The intertemporal model developed in this paper maintains a forward-looking behaviour for both households and firms, and investment and saving decisions are kept separate. However, unlike standard applications, in our formulation savings follow the Solow–Swan assumption so that the rate of savings is exogenous. This does not prevent the absolute level of savings from varying through time. The key characteristics of this model are summarized in the final column of Table 1.

¹ Even though some nations are likely to behave as regions (European countries for example).

² This does not threaten the sustainability of UK public finances because Northern Ireland accounts for only 2% of UK GDP.

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