The implausible growth effect of partial capital mobility: some neoclassical arithmetic

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Abstract

In the neoclassical growth model of Barro et al. [Am. Econ. Rev. 85 (1) (1995) 103−115], partial capital mobility across economies generates implausibly large growth effects under a standard parameterization of preferences and technology. Reasonable growth effects only occur if substantially less than the share of physical capital in factor income can serve as collateral for external borrowing. This finding confines the empirical relevance of the open-economy neoclassical growth model to the case of international capital flows, where market imperfections are likely to prevail. But for partial capital mobility across economies such as US states, where market imperfections appear less relevant, the model cannot produce plausible long-run growth effects. © 2002 Elsevier Science B.V. All rights reserved.

1. Introduction

The Solow-type neoclassical growth model with partial physical capital mobility by Barro et al. (1995) can explain why European regions or the US states, despite a high degree of internal capital mobility, exhibit a rather low rate of convergence to

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the steady state. The model assumes that physical capital can be financed by external borrowing because it can serve as collateral, but human capital must be financed by domestic savings. If the amount of external debt is constrained by the share of physical capital in factor income, the model predicts a rate of convergence both with and without capital mobility in the range of 2%. Holding constant the determinants of the steady state, such a rate of 'conditional' convergence has been estimated in numerous international cross section studies.[1]

The impact of partial mobility of capital on growth, as different from the impact on convergence, is a so far neglected aspect of the debt-constrained neoclassical growth model. Using the same parameterization of preferences and technology as Barro et al. (1995), I find that the predicted growth impact of partial physical capital mobility is implausibly large for economies not close to their steady state, i.e. for economies which have been growing fast in the past. My findings suggest that the neoclassical growth model only accounts for the transitional dynamics of fast growing open economies if the amount of external borrowing is limited to a minor fraction of the share of capital that can serve as collateral.

This additional constraint may apply for the case of international capital flows, where market imperfections are likely to prevail. However, there is no obvious reason why, say, external borrowing of US states on the integrated US capital market should be limited to a minor fraction of the capital share that can serve as collateral. But without this assumption, the model does not predict plausible long-run growth effects of partial capital mobility for US states. This finding is robust to alternative parameterizations of preferences and technology. Hence the empirical relevance of the open-economy neoclassical growth model appears to be limited to cases where market imperfections can be utilized to reconcile theoretical predictions with observed growth rates.

2. Partial capital mobility, convergence and growth

In the open-economy neoclassical growth model of Barro et al. (1995), output is produced with four factors: physical capital, human capital, raw labor, and technology. Thus, assuming that the production function is Cobb–Douglas,

$$Y = K^{\alpha} H^{\eta} (A L e^{gt})^{1 - \alpha - \eta}, \tag{1}$$

where Y is output, K is the stock of physical capital, H is the stock of human capital, L is the quantity of raw labor, A is a fixed technology parameter, and α and η are production elasticities which resemble the shares of physical and human capital in factor income (with $\alpha + \eta < 1$). Raw labor grows at the constant exogenous rate n, and g is the constant exogenous rate of labor augmenting technological change.

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[1] For an overview, see, e.g. Sala-i-Martin (1996).