



Extrapolative expectations and capital flows during convergence[☆]



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ABSTRACT

How long shall a country take to learn the world technological frontier? What would happen if that country found the same difficulties in learning the true model of its economy? After all, countries catching up often experience life-changing transformations during the catch-up to a balanced growth path. We show that an open economy, learning rational expectations alongside foreign technology, may be characterized by excessive saving and current account surpluses, as often observed in the data and at odds with the standard open economy theoretical predictions, and not fully explained by standard adaptations such as habit formation. Moreover, such a learning process in a large developing country can upset the savings behavior of a fully rational expectations advanced country. In a US-China calibration, we show that this effect can be so strong as to explain important current account imbalances, the savings glut hypothesis, as well as the distribution of factor income.

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1. Introduction

The workhorse neoclassical model makes very clear predictions about the relationship between the current account and long term or persistent productivity growth (e.g. Obstfeld and Rogoff, 1996). In the face of persistent growth, consumption increases in excess of current output and is supplemented by capital inflows; similar patterns are present for investment decisions, which respond positively to expected future total factor productivity increases. Hence, lower savings and higher investments should be associated with faster technological progress. Faster growing economies should be on the receiving end of international capital flows and these flows should be increasing in productivity growth.

In spite of these predictions, not only large global imbalances, but also a negative relationship between persistent economic growth and capital inflows has emerged over a longer period starting in

1980s for non-developed economies: the allocation puzzle (Alfaro et al., 2014; Gourinchas and Jeanne, 2013). This premise relies on three key features that deserve greater attention. First, the neoclassical model in relation to these puzzles subsumes perfectly functioning financial markets. Second, analysis often focuses on a representative agent framework, abstracting from life-cycle savings motives and demographic structure. Third, it relies on the ability of agents to rationally forecast the persistent growth component as well as future marginal utility of consumption.

While many explanations for global imbalances and the allocation puzzle focus on the first and second points, no model has instead exploited the potential open economy effects of a slow convergence to rational expectations, quite natural for an economy undergoing a transition towards a more balanced environment, and essential to consolidate agents' knowledge of the true model of their economy. In the present paper, we incorporate extrapolative expectations (where agents rely on their more recent experience) into an otherwise standard small open economy, dynamic general equilibrium (DGE) model that can be brought to the data. We use a reduced form of learning, where agents forming expectations are learning to rationally forecast their future marginal utility and the future marginal product of capital, that is endogenous to the path of development. When this occurs, we show that a negative pattern between realized economic growth and capital inflows may emerge that is strengthened for higher productivity growth, and thus can explain the allocation puzzle. This

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novel channel of persistence can also induce the emergence of global imbalances between two large regions that we calibrate to the China and United States.

The basic intuition behind our results is as follows. At the beginning of a transition to a balanced growth path associated with a higher productivity levels, agents must learn to forecast rationally along with the new model of their economy. As this occurs, they rely on more recent experience in forming their expectations. Agents at the beginning of transition tend to overestimate the extent of their future marginal utility of consumption and the unconstrained consumer smooths consumption to a new level that reflects the increase in *perceived* marginal utility of income. Current consumption is therefore too low and excess saving flows out of the economy. This mechanism is augmented with higher productivity growth and higher convergence. Our expectational mechanism is consistent with the well documented positive relationship between savings and economic growth, but goes a step further in that it offers an additional channel that supports causation running from economic growth to savings.

By focusing on the potential of our new channel in a transparent way, our paper purposefully neglects other important ingredients highlighted in the literature, which of course matter in the international capital market. Most notably, in a model of equilibrium global imbalances, Caballero et al. (2008a) show that uphill capital flows may emerge as a result of depressed supply of safe assets in developing economies. Mendoza et al. (2007) argue that it is a lack of supply for contingent claims in the presence of idiosyncratic risks and, as a consequence, precautionary savings motives that can explain current account surpluses of developing countries. Similar arguments have been made for developing economies on the investment side.¹

However, in a panel of developed and developing economies, Gruber and Kamin (2009) do not find systematic evidence that measures of financial development such as credit to GDP ratio or capitalization of stock markets can explain the direction of observed capital flows.²

Central to the emergence of both imbalances and the puzzling allocation of capital, is an underlying positive relationship between savings and economic growth. The work of Carroll and Weil (1993) highlights the causal channel running from economic growth to household saving, which can be accounted for in a model of habit formation where agents adjust consumption slowly (Carroll et al., 2000; Carroll and Weil, 1993).

At the root of our mechanism is indeed a positive correlation between saving rate and rate of growth, however, as we document in Section 8, habit formation is not enough to generate proximity of the model's predictions to the data. In other words, the extent of underconsumption observed from many fast-growing converging economies cannot be sufficiently explained with habit formation in an open economy model.

Models with an overlapping generation structure may also predict positive relationship between savings and growth, differing from the standard neoclassical model (Obstfeld and Rogoff, 2009). Recent research has focused on the demographic structure in explaining a feedback loop that allows causation in both directions. Mehлум et al. (2013) in a two sector, overlapping generations (OLG) economy, derive the “savings multiplier” of economic growth that emerges via more redistribution to a young generation of savers and by increasing the cost of old age care. The model is able to explain why faster-growing

economies exhibit higher saving rates absent any additional market imperfections.

Further, research in this area highlights implications of the interaction of economic growth and financial frictions in a life-cycle framework for private saving. Coeurdacier et al. (2012) consider demographic structure with economic growth differentials and heterogeneous borrowing constraints in a two country model calibrated for China and the US. Their model is able to replicate divergence of private savings rates, global imbalances and falling interest rates, while making predictions for the age-specific savings behavior in the presence of economic growth.

Our paper relates to a growing literature in macroeconomics that incorporates extrapolation bias in order to bring model predictions more in line with various empirical features.³ De Long et al. (1990) introduce a model with extrapolative traders that trade in financial markets alongside rational traders; such a model replicates excess volatility, mean reversion and the equity premium. In addition, the behavioral finance literature has replicated long-run swings in the stock market as well as the response of the market to news, previously unaccounted for in models with rational expectations (Barberis et al., 1998; Barsky and De Long, 1993). The introduction of partially extrapolative expectations into macro models has been shown to match well inertia in inflation expectations (Ball, 2000), unemployment expectations (Tortorice, 2012), house price dynamics (Glaeser and Nathanson, 2015), and various features of the response to productivity shocks at business cycle frequencies (Hirshleifer et al., 2015). De Grauwe (2012) allows agents to switch probabilistically between a rational and extrapolative forecasting rules, and shows that complex dynamics and heterogeneous expectations may result. Fuster et al. (2010) incorporate expectations that combine rational expectations with a parsimonious, backward-looking forecasting rule into a macro model and generate a hump shaped response (inertia coupled with mean reversion). We take a similar approach that allows rational expectations to account for an extrapolative bias in expectations, but allow the bias to diminish over time, representing a reduced form of learning. Furthermore, we use our model to estimate the share of extrapolation and the learning process in a sample of developing countries.

Although we highlight an expectational mechanism, we view our approach to be complementary to the friction channels that may affect savings and investment decisions in developing economies. When agents use more recent experience to form expectations as transition begins, this represents a market friction between what is optimal given the true model and what agents judge to be optimal. This channel operates via a distortion in agents' optimal savings behavior. These implications are discussed in greater detail in Section 8.

2. Stylized facts

Among the empirical facts well documented by the international economic literature has been the emergence of the global imbalances documented in Fig. 1, which shows current account as a ratio to world GDP for a select group of economies. Current account imbalances emerged from the mid 1990s and increase towards the late 1990s after the east Asian financial crisis. For the United States deficits persist throughout the 2000s, with a significant improvement from 2006 to 2007 and a further improvement after the financial crisis. Current account deficits do not return to previous levels after the financial crisis.

The US deficits are matched by current account surpluses from fast growing, emerging economies on the whole, most particularly developing Asia, oil producing economies, and former Soviet countries. A

¹ Prasad et al. (2007) argue that a lack of financial intermediation prevents domestic savings from being channeled into productive investments; and Song et al. (2011) model financial frictions which prevent loans from being allocated to highly productive investment in the private sector as the source of capital outflows in the Chinese case.

² Furthermore, Gourinchas and Jeanne (2013), point out that the allocation puzzle is strongest for developing economies that are the most financially integrated (and perhaps equipped with more developed financial markets).

³ This literature builds on vast empirical evidence documenting the prevalence of extrapolation bias. Fuster et al. (2010) provide a nice overview of the empirical literature that documents the prevalence of extrapolation bias.

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