



# How big are the gains from international financial integration?<sup>☆</sup>



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## ARTICLE INFO

### Article history:

Received 11 October 2012

Received in revised form 28 January 2013

Accepted 7 February 2013

### JEL classification:

O4

F36

F41

F43

### Keywords:

Productivity

Neoclassical growth model

Welfare

FDI

Financial integration

## ABSTRACT

The literature has shown that the implied welfare gains from financial integration are very small. We revisit these findings and document that welfare gains are substantial if capital goods are not perfect substitutes. We use a model of optimal savings where the elasticity of substitution between capital varieties is less than infinity, but more than the value that would generate endogenous growth. This production structure is consistent with empirical estimates of the actual elasticity of substitution between capital types, as well as with the relatively slow speed of convergence documented in the literature. Calibrating the model, welfare gains from financial integration are equivalent to a 9% increase in consumption for the median country, and 14% for the most capital-scarce. This rises substantially if capital's share in output increases even modestly above 0.3, and remains large if inflows of foreign capital are limited to a fraction of the existing capital stock.

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## 1. Introduction

How big are the gains from international financial integration? Given the crises of emerging market countries after their liberalizations, and the recent global financial meltdown, one wonders if there are any gains at all from the trade in international assets. Indeed, the literature so far has shown that the implied welfare gains from financial integration are very small. We reexamine the potential benefits of integration by incorporating the tools of endogenous growth theory into an otherwise standard neo-classical model of consumption and savings.

The essential idea of our paper is that the welfare gains increase when capital varieties within a country are not perfect substitutes, as is the case in the typical production functions used so far in the integration literature. Once we allow for an elasticity of substitution between capital varieties of less than infinity, the potential gains of financial integration become quite large. Our simple model of capital varieties lies between the neo-classical model (with infinite substitution of capital varieties) and the endogenous growth literature

(which makes a knife-edge assumption implying that substitution is very low). In our more realistic intermediate setting, financial integration benefits a country by providing access to scarce capital, even though it has no effect on the long-run rate of technological progress.

Financial integration generates a welfare gain, relative to autarky, because capital flows in immediately to bring the rate of return down to the world rate, which allows for a permanently higher level of consumption. This benefit is larger the longer it would have taken in autarky to reach the world rate. Once capital types are not perfect substitutes, the marginal product of any single type is less sensitive to the size of the aggregate stock of capital. As capital accumulates, the rate of return falls more slowly than in the standard neo-classical model, and the time it takes in autarky to reach the world rate is extended. Hence, the welfare gain of integrating is larger once capital types are imperfect substitutes.

Several recent empirical studies indicate the elasticity of substitution between capital types cluster around values of 3–4.<sup>1</sup> In our calibrations, elasticities in this range imply a welfare gain of integration equivalent to a 9% permanent increase in consumption, on average, for developing countries with the median capital/output ratio. For those countries that are very capital scarce, with capital/output ratios of one or lower, the welfare gains are equivalent to a 14% permanent increase in consumption on average. If we allow for capital's share in output to be as high as 0.40, which is well within the observed range

<sup>☆</sup> The authors would like to thank the participants at the 2007 NBER Summer Institute, 2008 IEFS Meetings, 2008 CEPR-ESSIM Meetings, Fabrizio Perri, Andrei Levchenko, Bent Sorensen, David Weil and Helen Popper for their comments and suggestions. We also thank Pierre-Olivier Gourinchas and Olivier Jeanne, who kindly provided us with their data and gave suggestions.

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<sup>1</sup> See Chun and Mun (2006), Goolsbee (2004), and Goolsbee and Gross (2000).

of values, then the gains are as large as 23% for the median country and 34% for the most capital-scarce.

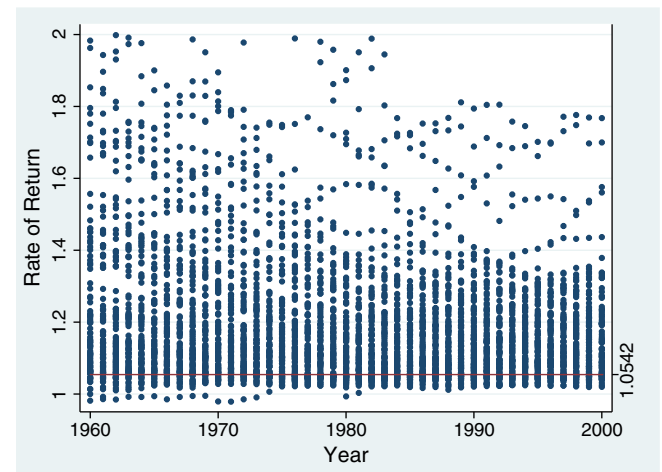
Allowing for imperfect substitution between types of capital or intermediate goods is commonly used in studies of both economic growth and trade. Romer (1990) builds his original endogenous growth model with varieties of intermediate goods, and explicitly mentions that these can be thought of as different capital types. Later endogenous growth models dealing with scale effects, such as Dinopoulos and Thompson (1998), Peretto (1998), and Young (1998), all rely on varieties of intermediate goods. Voigtländer and Voth (2006) use the idea of different capital varieties explicitly in their model of long-run growth, while Acemoglu and Guerrieri (2008) study structural change and accumulation using different varieties of intermediate goods produced directly using capital.

Different varieties of capital and intermediate goods have also been used to study the relationship of trade and growth, as in Grossman and Helpman (1989, 1990), Rivera-Batiz and Romer (1991), and Young (1991). More recently, Broda et al. (2006) use a similar production structure to ours to actually estimate the elasticity of substitution between intermediate good varieties, which includes capital goods. They find elasticities of 3–4, similar to the more direct estimates, from a sample that includes 73 countries.

Our contribution is to bring the concept of imperfect substitution between capital varieties to the study of welfare gains from financial integration, which has typically relied on standard neo-classical production functions with infinite substitutability. There have been two approaches in the literature to quantify the welfare gains from financial integration.<sup>2</sup> The first approach focuses on the risk sharing mechanism. International asset trades allow agents to pool idiosyncratic risk and smooth consumption. Starting with Lucas's (1987) work, there is an extensive literature that shows, in a representative agent framework with transitory shocks, the welfare gains from consumption smoothing upon integration are very small. Lucas himself finds a welfare cost of fluctuations that is around 0.042% of average consumption. Although subsequent work showed that with permanent shocks and/or a feedback effect on industrial structure welfare gains via the risk sharing mechanism of integration can be as big as 20%, once calibrated to different countries the gains stay around 1% on average (Kalemli-Ozcan et al., 2003; Obstfeld, 1994).

The second approach, and the one more closely related to our paper, focuses on capital scarcity. This channel will work through reducing the cost of capital, accelerating capital accumulation and raising consumption due to an influx of foreign capital. Gourinchas and Jeanne (2006) (GJ hereafter) were the first ones to have investigated the implied welfare gains of this channel. They find very small gains, equivalent to a permanent increase in consumption of 1.74% for the median of their sample of developing countries. They find that, although foreign integration provides an influx of capital to a country, the gain from this is small due to the fact that countries would have converged to the world rate of return very quickly in autarky.<sup>3</sup> Their results arise, in part, from their standard assumption that capital is perfectly substitutable. In GJ, the marginal product of capital falls very quickly to the assumed world rate, even in autarky, as a country accumulates capital. Hence integration provides little benefit. Allowing for even a small departure from perfect substitution of capital types generates much larger implied welfare gains.

We address the plausibility of our results by looking at the actual marginal product of capital over the period 1960–2000. As seen in Fig. 1, across a sample of 102 countries, marginal products of capital decline very slowly, so that by 2000 most of the original differences



**Fig. 1.** Observed rates of return, 1960–2000. Notes: The figure displays the observed rate of return on capital for all 102 countries in the sample, by year. The return is the marginal product of capital calculated from observed capital stock and output data, as described in the text. The assumed world rate, equal to 1.0542, is denoted by the horizontal line.

across countries from 1960 remain.<sup>4</sup> Compare the observed marginal products with Fig. 2, which shows the predictions of a neo-classical savings model using an assumption of perfect capital substitution.<sup>5</sup> The neo-classical model predicts that marginal products of capital would have converged within only 10–15 years (i.e. by 1975) to a common world rate of approximately 5.42%, far too fast compared to the data. On the other hand, our model that allows for imperfect substitution of capital types is consistent with the general pattern of slow declines in the marginal product of capital seen over time in the data.

The observations on rates of return link our work to the work on convergence in output per capita. As has been commonly noted, the estimated speed of output convergence is approximately 2–2.5% per year (see Barro and Sala-i-Martin, 1992). This slow convergence holds across countries, U.S. states and the OECD (Barro and Sala-i-Martin, 1992), Japanese prefectures, European regions, and Canadian provinces (Sala-i-Martin, 1996a,b), Indian provinces (Cashin and Sahay, 1996), and Swedish counties (Persson, 1997).<sup>6</sup> The standard neo-classical model predicts convergence speeds that are far faster, but allowing for imperfect substitution of capital varieties generates speeds of output convergence consistent with the rates of 2–2.5% per year.

To proceed we first lay out a simple production structure involving capital varieties and relate it to the existing work. Following that, we put this production structure into a standard model of intertemporal utility maximization, and use that model to evaluate the welfare gains of financial integration, similar to GJ. Calibrating that model, we find much larger welfare gains than are implied by existing work, and we then discuss the plausibility of these results in light of existing data on marginal products of capital, and under several alternative assumptions.

<sup>4</sup> The exact calculation of these marginal products is described in Section 2.5. This result holds even after we apply the relative price adjustment to marginal product of capital as suggested by Caselli and Feyrer (2007). Note as well that this data includes countries that allow inflows of foreign capital, so it likely overstates the speed at which marginal products would decline in autarky.

<sup>5</sup> The model underlying these calculations can be found in Section 2.

<sup>6</sup> While there are panel studies, such as Caselli et al. (1996), that report much faster convergence rates of around 11% per year, there appear to be biases built into the estimations. Durlauf et al. (2005) discuss the issues with the panel approach, and in particular the GMM estimation of Caselli et al. Their conclusion is that these estimates of fast convergence are not reliable. Note that if one assumes the implied autarky convergence by the Ramsey model to calculate the welfare gains as done in GJ, this rate will correspond to a much faster output convergence of 11–13%, which is not supported by the empirical evidence on output convergence.

<sup>2</sup> There is an enormous literature that tries to quantify the effect of financial integration on growth. See Kose et al. (2009) for an extensive survey.

<sup>3</sup> It will still be the case that gains are relatively larger for the countries that are further away from their steady states.

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