



# Optimal borrowing constraints and growth in a small open economy



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## ABSTRACT

Chinese high growth has been accompanied by government restrictions on international borrowing (capital controls). In this paper, we ask: are such restrictions a useful policy tool to facilitate growth? We provide a theory of borrowing constraints on households as a tool to correct a learning-by-doing externality. Borrowing constraints operate as a policy tool through two channels: (i) increasing labor supply and (ii) reallocating labor towards traded goods. We find that welfare gains are closest to that of the First-Best Planner allocation when the externality is not too large. We compute the sequence of optimal constraints along the growth path and show how the use of this policy tool contributes to repressed wages, current account balance, and slow real exchange rate appreciation.

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## 1. Introduction

Financial liberalizations of the late 1980s and 1990s came on the heels of economic literature linking underdeveloped financial markets to poor economic outcomes.<sup>1</sup> China has followed a different path. For several decades Chinese policy actively limited households' access to financial markets while the country experienced extraordinary economic growth. As the world seeks to take a lesson from the Chinese experience, important questions remain unanswered. Did China grow in spite of these policies, or can financial repression of households promote growth? If the latter is true and financial repression can increase growth, is it at the cost or the benefit to the welfare of households? Our goal is to address these questions by analyzing financially repressive policies, directed at households, as a tool to facilitate growth.

We provide a theory of borrowing constraints on households as a means to facilitate growth through a "learning-by-doing" (LBD) externality (Arrow, 1962, Romer, 1986). LBD is the idea that increased production accelerates productivity growth through institutional learn-

ing. The classic channel through which borrowing constraints correct such externalities is through reallocation of resources from the non-traded sector to the traded goods sector where empirical evidence suggests that LBD externalities are largest.<sup>2</sup> We introduce a new labor supply channel through elastic labor supply that complements the reallocation channel in increasing labor in the traded goods sector.

The mechanism of the new labor supply channel is straightforward. Borrowing constraints reduce current consumption of households.<sup>3</sup> If leisure is a normal good and/or if leisure and consumption are complements, households choose less leisure and work more when current consumption is reduced. The LBD externality translates higher labor today into higher growth by increasing future productivity. Thus, borrowing constraints facilitate growth.

What is not obvious is how borrowing constraints affect welfare. Our main finding is that optimal borrowing constraints produce welfare improvements closest to the First-Best Planner for values of the learning-by-doing externality that are not too large or too small. This result is explained as follows. Correcting a large learning by doing externality implies a large increase in permanent income. However, if

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<sup>1</sup> Financial reforms were one part of a general package of market-based reforms prescribed to developing countries by the IMF, World Bank, and US Treasury during this time. This broad-based unanimity of this view in these international institutions is referred to as the Washington Consensus.

<sup>2</sup> Deaton and Laroque (1999) provide a theory of a "virtuous" cycle where borrowing constraints lead households to save for land purchases, thus raising capital allocated to the production sector. Fernandes and Isgut (2005) provide evidence of learning by exporting for Colombia; Ma and Zhang (2008) for China.

<sup>3</sup> It is not simply a wealth effect since total wealth is unchanged, but the availability of wealth in a given period is constrained.

borrowing constraints are used to correct the externality, households will be limited in smoothing consumption. Therefore, households enjoy a *smaller share* of the welfare gains from correcting the externality when LBD is large. For smaller values of LBD, the increase in permanent income is smaller, and the contemporaneous increase in output from higher labor supply today better smooths consumption in the absence of borrowing. Therefore households enjoy a *larger share* of the welfare gains from correcting the externality when LBD is moderate-sized.

We provide a quantitative example to explore our theory in the context of the Chinese growth experience. We consider a two-sector model of traded and non-traded goods, where LBD occurs in the traded sector. We calibrate the model to the Chinese economy from 1990 to 2009, considering several LBD elasticities and choosing a sequence of borrowing constraints to match the time series of China's trade balance. When calibrated to standard preference parameters, we find a welfare loss equivalent to a 13% decline in annual consumption relative to *laissez-faire* despite a moderate LBD elasticity of 5%. We conclude that Chinese policy constrained households beyond what could be justified by correcting this LBD externality alone. However, the mechanics at work in the model are consistent with the data. Including borrowing constraints provides annual real wage growth and real exchange rate appreciation of magnitudes that are significantly closer to the data than the *laissez faire* allocation. We also quantify the importance of our new channel of elastic labor supply for this calibration; it accounts for about 25% of the increase in labor in the traded sector labor relative to *laissez-faire*. All of these results are highly sensitive to preference parameters. We will discuss how increasing complementarity between traded and non-traded goods, or the intertemporal elasticity of substitution for consumption or for leisure all reduce welfare losses, and can bring welfare gains.

Borrowing constraints on households are equivalent to capital controls in our environment.<sup>4</sup> Indeed, other second best macroeconomic policies (ex: real exchange rate manipulation) would reallocate labor to the traded goods sector as well. However, we choose to analyze the borrowing constraint tool in acknowledgment that it would function similarly in a richer environment while these alternative macroeconomic tools would not. For instance, borrowing constraints on households may be distinct from capital controls when firms have financial considerations or when capital controls are ineffective because heterogeneous agents provide a domestic credit market with both borrowers and savers as in Bacchetta et al. (2013) or Itskhoki and Moll (2014).<sup>5</sup> We also briefly discuss how Pigovian taxes can achieve the first-best, but do not consider them implementable in a practical sense. This is because: (i) there are difficulties in implementing subsidies specifically targeted at sources of growth externalities; (ii) WTO regulations may preclude uses in tradable sectors; and (iii) non-distortionary (lump-sum) taxes/transfers necessary to achieve the first best are unrealistic. As we do observe repression of households' access to international financial markets in fast growing countries like China, we aim to isolate how these policies affect labor supply and sectoral production (traded vs nontraded).

### 1.1. Related literature

The use of welfare improving capital controls to correct externalities is an area of active research.<sup>6</sup> Recent literature mainly focuses on prudential controls to regulate pecuniary externalities from over-borrowing.<sup>7</sup> Another application is regulating the interaction between private credit markets and sovereign debt markets.<sup>8</sup> We focus instead

on growth externalities, similar to the ones studied in Korinek and Serven (2010) or Aizenman and Lee (2010). Our contribution is (i) an analytic and quantitative study of the effects of capital controls on labor supply and allocation across sectors; and (ii) a computation of the entire time path of the optimal policy, in the constrained Ramsey sense, both on and off equilibrium path. Therefore, we assume no commitment to future policies on the government's behalf.

Our work belongs to the literature in which financial repression fosters growth. The mechanism typically analyzed is how financial repression increases savings rates providing higher capital investment to firms (Jappelli and Pagano, 1994, Castro et al., 2004).<sup>9</sup> In contrast, we consider that financial repression reduces current consumption of households and can increase labor supply to firms.

We integrate our work with the previous literature by incorporating the channel of substitution studied in Deaton and Laroque (1999). They show that the *laissez-faire* allocation is inefficient if assets in one sector (manufacturing) contribute to growth while assets in other sectors (agriculture or construction) do not. Policies reallocating resources to sectors with the learning-by-doing externality can then improve welfare. We model this channel using a two sector model where the growth externality is higher in traded than non-traded sectors. We then decompose the effect of the borrowing constraint into an increase in overall labor supply and a reallocation of labor across sectors.

A difference between our work and Deaton and Laroque (1999) and Jappelli and Pagano (1994) is that we consider an open economy. This connects us to the literature on learning-by-doing and the current account. Korinek and Serven (2010) show that real exchange rate (RER) undervaluation can correct a learning-by-doing externality. Aizenman and Lee (2010) show that undervaluation of RER will improve welfare only if learning-by-doing occurs through increased employment (rather than higher capital stock). These papers also focus on the classical reallocation channel. We add to this literature by developing the labor supply channel and considering a non-monetary policy tool directed at households. This is a critical distinction in calculating welfare gains. Also, our policy tool targets households directly and is applicable to broader frameworks beyond representative household where exchange rate manipulation or capital controls are either ineffective or have perverse ancillary effects.

Several papers on current account surpluses in East Asia,<sup>10</sup> focus on credit market imperfections. Our distinction is that we consider government imposed restrictions on household borrowing. This is different from Buera and Shin (2009) or Song et al. (2011) in that we focus on households rather than firms. It is also different from Mendoza et al. (2009) or Carroll and Jeanne (2009) in that we consider government imposed restrictions, rather than exogenous "credit market imperfections" or "underdeveloped banking sectors".

The empirical literature provides evidence that the learning-by-doing externality we consider may be significant.<sup>11</sup> These estimates depend on where one is looking for the externality. Estimates for industrial sectors and learning-by-exporting are generally significant (Harrison and Rodriguez-Clare, 2009, Rodrik, 2008). Empirical studies of China, the country motivating our work, also find strong evidence for these externalities, (Jarreau and Poncet, 2009 and Du et al., 2012). The inconclusiveness of this literature precisely motivates our theoretical study to provide additional testable implications to guide empirical efforts.

## 2. Theory

We break the model apart to clarify the economics behind each mechanism. We use a one-sector model with elastic labor supply to

<sup>4</sup> By the representative agent result.

<sup>5</sup> Incidentally, Itskhoki and Moll (2014) show that the externality created by credit market imperfections in their model is isomorphic to a learning-by-doing externality in labor akin to that which we study in this paper.

<sup>6</sup> See Farhi and Werning (2012) and Korinek (2011) for overviews of applications.

<sup>7</sup> Including Schmitt-Grohé and Uribe (2012), Benigno et al. (2013) and Bianchi (2011) in two-sector small open economies similar to our environment.

<sup>8</sup> Wright (2006), Jeske (2006), Dovic (2012).

<sup>9</sup> See Pagano (1993) for an early discussion of the two competing effects of financial repression.

<sup>10</sup> See Gourinchas and Jeanne (2013) for the empirical analysis.

<sup>11</sup> Giles and Williams (2001a) and Giles and Williams (2001b) provide a literature review.

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