



Misallocation, informality, and human capital: Understanding the role of institutions



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ABSTRACT

The aim of this paper is to quantify the role of formal-sector institutions in shaping the demand for human capital and the level of informality. We propose a firm dynamics model where firms face capital market imperfections and costs of operating in the formal sector. Formal firms have a larger set of production opportunities and the ability to employ skilled workers, but informal firms can avoid the costs of formalization. These firm-level distortions give rise to endogenous formal and informal sectors and, more importantly, affect the demand for skilled workers. The model predicts that countries with a low degree of debt enforcement and high costs of formalization are characterized by relatively lower stocks of skilled workers, larger informal sectors, low allocative efficiency, and measured TFP. Moreover, we find that the interaction between entry costs and financial frictions (as opposed to the sum of their individual effects) is the main driver of these differences. This complementarity effect derives from the introduction of skilled workers, which prevents firms from substituting labor for capital and in turn moves them closer to the financial constraint.

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1. Introduction

The question this paper addresses is, what role do formal-sector institutions play in the size of the informal sector, the stock of human capital, and measured productivity? In particular, we explore how the demand for human capital interacts with formal-sector institutions (entry costs to the formal sector, tax structure, and efficiency of debt enforcement). In summary, we find that formal-sector entry costs, financial frictions, and taxes are complementary.

We develop a general equilibrium model of firm dynamics with an endogenous demand for human capital.¹ The model also displays endogenous physical capital financing and default decisions and allows for the existence of formal and informal sectors. Although entering and operating in the formal sector is costly, these firms have access to an expanded set of production possibilities and the ability to employ skilled workers. Firms operating in the formal sector face an endogenously

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¹ Our intention is to highlight the role of the demand of human capital. For this reason, we simplify the skill-formation technology (i.e., the supply side) as much as possible. Rich models that focus on the production of human capital include those of Mankiw et al. (1992), Manuelli and Seshadri (2010), and Erosa et al. (2010).

lower cost of borrowing because they have access to credit markets with a higher degree of enforcement than those in the informal sector. In our quantitative exercise, we calibrate the model to the US economy and then impose country-specific formal-sector institutions, which are based on those measured by the World Bank as reported in its *Doing Business* database, to analyze the effects on informality, skill formation, and total factor productivity.²

Our focus is on understanding the mechanics of each institution; therefore the main results are presented through a set of counterfactuals where we analyze the individual and joint changes in the costs of formality. We find that the complementary effect of entry costs and financial frictions is the key to understanding the total effect on total factor productivity (TFP), informality, and human capital when moving from the US to developing economies.³ Individually, neither the entry cost nor the financial frictions generate significant changes in productivity, informality, or human capital. However, when they are analyzed together, we find that the complementary effect (joint effect of entry costs and financial frictions net of their individual effect) explains a large fraction of the difference between the US and Low Middle Income countries in terms of TFP, informal labor force, and skilled workers (27%, 64%, and 68% of the total difference respectively). We compute the same counterfactual in a model without human capital and show that there is no complementary effect between frictions when human capital is absent.⁴ The intuition is simple. The introduction of relatively expensive skilled workers increases the incentives to substitute away from labor and toward investment in physical capital. However, in the presence of financial frictions, this means that the firms move closer to the financial constraint and effectively pay higher interest rates. These results are in line with what [Bergoeing et al. \(2011\)](#) find in a model with technology adoption.

In order to quantify the role of human capital on measured total factor productivity and informality, we run a counterfactual with no skilled workers. We find that the model with human capital generates a drop in measured TFP that is 48% larger than in the model with no human capital. Moreover, we find that the increase in the size of the informal sector is more in line with the data when human capital is present. Finally, we study the role of informality and show that the introduction of the informal sector is quantitatively important as well. The counterfactual with no informal sector generates a reduction in measured TFP, relative to the US, that is 27% smaller than the drop produced by the benchmark model and generates a minimal change in the demand for human capital (as opposed to a 67% drop in our benchmark with informal sector and human capital). In short, when the three formal-sector institutional frictions are introduced together they have a larger impact on TFP, human capital, and informality than the sum of the effects of these frictions when each one is introduced separately.⁵

Our work is motivated by the observed cross-country differences in TFP, human capital, and informality and their correlations with formal-sector institutions. There are important differences in human capital in developed versus developing countries. [Barro and Lee \(2000\)](#) document that, in the developing world, in the year 2000, 37% of the population over 25 had no formal schooling and only 27% had some secondary education. On the other hand, in advanced and transition economies, approximately two-thirds of the population over 25 had some secondary education. The correlation between GDP per capita and skills equals 0.642.⁶ Other well known fact is the strong and positive relationship between GDP per capita and measured TFP. However, [Jones and Romer \(2010\)](#) document that differences in measured inputs explain less than half of the cross-country differences in per capita GDP. The aim of this paper is to connect institutions in the formal sector across countries to resource misallocation and human capital formation and evaluate their effects on measured TFP.

Informal activity is negatively correlated with aggregate productivity and the stock of human capital (correlations are -0.828 and -0.693 respectively).⁷ Agents involved in the informal sector make explicit efforts not to be detected, which makes measuring this sector extremely challenging. The fraction of the labor force that is engaged in production outside of the formal sector ranges from around 10% in developed countries to almost 100% at the low end of the income distribution. Although the measures of informality are extremely noisy, such a large sector of the economy cannot be ignored when analyzing cross-country differences in economic development.⁸ This relationship is also supported by firm-level data. [Pratap and Quintin \(2008\)](#) report that the informal sector is characterized by small scale, unskilled, and self-financed activities. Furthermore, in a cross-country study of Latin America countries, [Funkhouser \(1996\)](#) shows that the mean education level in the formal sector is substantially higher than in the informal sector.

The model's predictions are consistent with the macro and micro facts of the informal sector described above: more specifically, at the calibrated parameters and measured institutions, we find a strong negative correlation between the level

² In order to isolate the effects of institutional differences, we assume that all countries have access to the same production possibilities.

³ Relative to the US (which is our benchmark calibration), the model generates up to a 37% decrease in TFP, a 10 times larger informal sector and as large as a 60% decline in the stock of skilled workers when formal sector institutions are those of developing economies.

⁴ The environment with no human capital is similar to that presented in [D'Erasmo and Moscoso Boedo \(2012\)](#).

⁵ Because only firms in the formal sector are able to hire skilled workers and factor shares are unaffected, skilled workers as a fraction of the population (our measure of human capital) are almost unaffected.

⁶ Skills are defined as the percentage of people that completed college as a percentage of the population over 25 years old, were taken from [Barro and Lee \(2000\)](#).

⁷ The measure of informality corresponds the fraction of the labor force in the informal sector. This is measured as the fraction of the labor force not covered by a pension scheme, WDI (2006). We focus on the share of labor force not covered by pension schemes because it provides a better direct measure of informality for the US, the country we use for our benchmark calibration. However, this measure is highly correlated with most measures of the informal sector, either direct or indirect.

⁸ The size of the informal activity varies according to the measure used, but the empirical correlations remain unaffected. See [Schneider and Enste \(2000\)](#) for direct and indirect approaches to calculating informal activity.

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