Informality as a Stepping Stone: A Search-Theoretical Assessment of Informal Sector and Government Policy*

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Abstract

This paper develops a general equilibrium model of sequential job search to understand the factors determining the effect of tax and enforcement policies on the size (i.e., employment share) of informal sector. The focus is on the role of informal sector as a stepping stone to formal jobs. I argue that the stepping-stone role of informal jobs is an important concept determining how strongly government policies affect the size of informal sector. I measure the extent of the stepping-stone role with the intensity of skill accumulation in the informal sector. If informal jobs help workers acquire skills, gain expertise, and build professional networks for boosting the chances to switch to a formal job, then the size of informal sector is less sensitive to government policy. In this case, the option value of a job in informal sector will be high and a worker with an informal job will not rush to switch to a formal job when a policy encouraging formal employment is in effect. If, on the other hand, informal sector does not provide satisfactory training opportunities, then the size of informal sector becomes more sensitive to government policy. Calibrating the model to the Brazilian data, I perform numerical exercises confirming that the effect of government policy on the size of informal sector is a decreasing function of the intensity of skill acquisition in the informal sector.

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1 Introduction

Empirical studies on the informal economy—especially the ones on the Latin American countries—find that young unskilled workers tend to work at informal jobs right after the school, since they see the informal sector as a stepping stone to acquiring essential skills that will transition them toward better jobs in the formal sector.[1] Formal jobs are more attractive than informal jobs not only because they pay better, but they provide better on-the-job training opportunities that will improve the workers' future career prospects, and better unemployment insurance and job security arrangements against the labor market risks. In this sense, informal job opportunities are welfare enhancing for the young and the unskilled in the developing countries.

The stepping stone argument may not be equally valid for everyone and for all regions in an informal economy. [Wahba (2009)] finds, using Egyptian data, that informal employment may be a viable stepping-stone to formal jobs for high-educated males, but is likely a dead end for uneducated and for females. There are also regional and industrial differences. For example, if the informal jobs are heavily concentrated in rural or agriculture-dependent areas and subsectors with less physical capital requirements, then potential for advancement for an informal worker is slim, which means that the stepping-stone role is not significant. If, on the other hand, informal jobs are densely located in urban areas or regions with capital-intensive subsectors, then the returns to start a career in the informal sector can be much higher. Finally, the composition of informal jobs in rural versus urban areas may vary across countries, which implies that the degree of the stepping-stone role may also vary across countries. These facts suggest that the degree to which informal jobs can serve as an advancement path to formal jobs can exhibit a significant degree of heterogeneity (*i*) at the individual level, (*ii*) at the sector level, and (*iii*) at the country level. The main goal of this paper is to assess the effect of government policy on the size of the informal sector taking these differences into account.

[1] For early papers in the literature, see Fields (1975) and Mazumdar (1976). More recent studies along these lines include Bosch and Maloney (2010), Cunningham and Salvagno (2011), and Gunther and Launov (2012). This is also closely related to the idea that younger workers tend to shop around for temporary jobs that will help them build enough skills, experience, and connections until they reach their final career paths [Topel and Ward (1992)]. Moreover, the informal sector appears to play the role of informal job training [Hemmer and Mannel (1989)].

I argue that the stepping-stone role of the informal jobs is an important concept to understand the link between government policy and the size of the informal economy. Think of a policy proposal targeting to reduce the size of the informal sector. To be concrete, let's assume for a moment that the government wants to reduce the tax burden on formal labor income for the purpose of increasing the relative attractiveness of formal jobs. Leaving the stepping-stone role aside, a simple theoretical setup will naturally predict a certain degree of substitution from informal jobs to formal jobs in case of a tax cut. If the stepping-stone motives are strong enough (i.e., if an informal job provides vocational training and leads to acquisition of productive skills), then the degree of this substitution will be lower because the option value of informal employment is high when informal jobs serve as a stepping-stone to formal jobs. A simple comparison of the policy consequences in these two environments (e.g., with and without the stepping-stone role of informal jobs) will lead us to the conclusion that the stepping stone role of the informal sector reduces policy effectiveness; that is, in the tax example, the effect of a tax cut on the size of the informal sector will be much lower when the informal sector is a stepping stone to formal jobs.

I develop a general equilibrium sequential search model to assess the relevance of these ideas both qualitatively and quantitatively. The basic theoretical setting is a version of the McCall (1970) search model. There are three labor market states; unemployment, employment in the informal sector, and employment in the formal sector. Unemployed workers gradually lose their skills over time, while employed workers in formal and informal jobs accumulate skills—where the rate of skill accumulation is higher at formal jobs. The motivation behind the way I introduce these ideas into a job search environment comes from Ljungqvist and Sargent (2008). I measure the extent of the stepping-stone role with the intensity of skill accumulation in the informal sector. In other words, whether the informal sector serves as a good stepping stone to formal jobs or not depends on the intensity of skill accumulation in the informal sector. I vary this intensity to understand the link between government policy and the size of the informal sector under different configurations for the importance of the stepping-stone role. This is the first paper in the literature mentioning the stepping-stone role

of the informal sector to operate as a mechanism determining policy effectiveness.

Calibrating the model to the Brazilian economy, in which policing is moderate (close to being loose) and around 50 percent of the workers are employed in informal jobs, I perform numerical exercises to assess these ideas quantitatively. The focus is on two policy variables: taxes on formal labor income and the degree of enforcement (or policing). I vary the intensity of skill acquisition at an informal job.[2] I find that a 5 percentage points reduction in taxes—a reduction from 40 to 35 percent—leads to a 6.5 percentage points decline in the size of the informal sector when the stepping-stone role of the informal sector is strong, while the size of the informal sector declines by almost 14 percentage points when the stepping-stone motives are weak.

The same mechanism works when the degree of enforcement is varied, holding the taxes fixed. When the stepping-stone role motives are strong, 10 percentage points increase in the probability of getting caught—an increase from 30 percent to 40 percent—leads to an approximately 9.5 percentage points decline in the size of the informal economy. When the stepping-stone role of the informal sector is diminished, however, the decline in the size of the informal economy now amounts to almost 23 percentage points.

There are also implications for the unemployment rate. It is well-known that there is a tradeoff between lower informal employment and higher unemployment rates; that is, policies that reduce the size of informal employment will likely increase the rate of unemployment [Boeri and Garibaldi (2005)]. The model suggests that government policy generates extra unemployment when the intensity of skill accumulation in the informal sector is low. For the tax exercise, the environment with a low-learning-intensity informal sector generates an additional 1.83 percentage points unemployment rate than the environment with a high-learning-intensity informal sector does. The difference goes up to 4.42 percentage points for the enforcement exercise.

These results communicate two related but distinct messages in terms of policy recommenda-

[2]See Section 3 for the details.

tions:

1. These findings suggest that government policy is potentially less effective on the size of informal sector in countries with more capital-intensive, skill-intensive, and "urban" informal sectors. Conversely, standard tax and enforcement policies are potentially more effective in countries with less capital-intensive and rural (i.e., agriculture-oriented) informal sectors. In terms of empirical research based on cross-country comparisons, this result means that the explanatory power of cross-country tax and enforcement differentials on the size of informal sector depends on the composition and types of jobs in the informal sector.

2. At the individual-level, these results mean the effect of government policy on skilled workers in the informal sector will be limited. However, government policy will more likely effect those who work in informal jobs with low-intensity training opportunities.

To my knowledge, this is the first paper in the literature studying the question how the effectiveness of government policy (targeted to reduce the size of the informal sector) depends on the stepping-stone role of the informal sector. Specifically, this paper is innovative in the sense that it introduces the stepping stone role of the informal sector as an intermediary mechanism that determines policy effectiveness. Moreover, this is the first theoretical attempt to explicitly model how informal sector may help workers to get formal jobs and how the existence of this avenue, in turn, affects workers' decision to accept formal versus informal job offers. I incorporate this idea into a version of the McCall search model *via* an explicit law of motion for human capital, which is stochastic and state-dependent.[3]

This paper is related to a growing body of literature investigating the effect of government policy on the size of the informal sector using search-theoretical models.[4] Boeri and Garibaldi (2005) and Albrecht, Navarro, and Vroman (2009) examine the effects of government policy in models based on the "shadow sorting" idea; that is, workers are heterogeneous along the

[3] Esteban-Pretel, Nakajima, and Ryuichi (2011) embed the idea of a "stepping-stone" job into a search model; but, they do this in their analysis of contingent jobs versus regular jobs and they do not model human capital dynamics.

[4] There are also papers focusing on the same question in the RBC and AK growth model literatures. Ihrig and Moe (2004) is an example to the former literature and papers including Loayza (1996) and Sarte (2000) are in the latter.

productivity dimension and policy interventions affect the productivity compositions in the formal and informal sectors. Different from these papers, the model I develop does not require heterogeneity to generate sorting of workers into formal and informal sectors; search frictions is the main source of sorting. In this sense, my model is similar to Ulyssea (2010), who extends the two-sector Mortensen-Pissarides equilibrium search model proposed by Acemoglu (2001) to study the potential effects of government policy on the size of the informal sector in Brazil. Other search-theoretic attempts to model informal sector include Bosch and Esteban-Pretel (2012), who compare the cyclical properties of job finding rates of formal versus informal jobs and Zenou (2008), who studies a two-sector search model in which the formal sector is subject the search frictions and the informal sector is competitive. The distinctive feature of the present paper is that it introduces an explicit law of motion for human capital accumulation into a standard search model to account for the stepping-stone role of informal jobs.

This paper is also related to the empirical literature on the correlation between government policy (mainly taxes) and the size of informal sector. Johnson, Kaufmann, and Zoido-Lobaton (1998) and Schneider and Enste (2000) find that the size of informal economy is positively related to formal labor income taxes. Friedman, Johnson, Kaufmann, and Zoido-Lobaton (2000) find no statistically significant relationship between taxes and the size of informal economy. Johnson, Kaufmann, and Shleifer (1997) find, on the other hand, a negative relationship between taxes and the size of informal economy for transition economies. Theoretical papers in this literature tend to bring political economy and institutions related explanations to these diverging results. The consensus is that factors including the degree of corruption, the burden of bureaucracy, institutions [Aruoba (2010)], and political turnover [Elgin (2010)] are the likely determinants of the link between taxes and the size of informal economy. My contribution to this literature is that the degree of the stepping-stone role of informal jobs can also be important in determining the magnitude of the correlation between taxes and the size of informal sector.

The plan of the paper is as follows. Section 2 introduces the theoretical model and describes the solution strategy. Section 3 presents and discusses the results. Section 4 concludes.

2 Model

The basic theoretical framework is a version of the McCall (1970) search model. Consider an unemployed worker, with human capital level h, who engages in sequential job search activity in the formal and informal sectors simultaneously. Each period the worker draws two wage offers, w_f and w_i, from two different wage distributions, $G_f(\cdot)$ and $G_i(\cdot)$, where the subscripts f and i stand for formal and informal sectors, respectively. The wage distributions have the properties $G_f(0) = G_i(0) = 0$ and $G_f(B_f) = G_i(B_i) = 1$, with $B_f < \infty$ and $B_i < \infty$. The worker has the option to reject the offers, in which case she receives c this period in unemployment compensation and waits unemployed until next period when she draws another set of offers from $G_f(\cdot)$ and $G_i(\cdot)$—i.e., one from each. Alternatively, the worker can accept either w_f or w_i, in which case she receives a wage payment as long as she is employed. Wages are paid per unit of human capital. There is a strictly positive firing probability, $\gamma \in (0, 1)$, every period. I assume no recall and no voluntary quit.

Employed workers keep shopping for jobs; that is, workers in the informal sector are allowed to transition to formal jobs and, similarly, workers in the formal sector can switch to informal jobs. The formal sector is more attractive for two reasons. First, it provides better training, therefore, better human capital accumulation opportunities lifting up earnings prospects. And, second, it offers unemployment compensation if the worker is laid off; thus, it raises the present discounted value of unemployment, when the last job is a formal one.

Following the formulation in Ljungqvist and Sargent (2008), I assume that employed and unemployed workers experience stochastic accumulation or deterioration of human capital, respectively. The probability of transition from human capital level h to h' is described by the densities $\mu_f(h, h')$, $\mu_i(h, h')$, and $\mu_u(h, h')$ for formal employed, informal employed, and unemployed workers, respectively. A worker with human capital level h, who is employed in the formal sector, faces a probability $\mu_f(h, h')$ that her human capital level at the beginning of the next period is h', contingent on not being fired. Similarly, a worker with human capital level h, who is employed in the informal sector, faces a probability $\mu_i(h, h')$ that her human

capital level at the beginning of the next period is h', again contingent on not being fired. An unemployed worker with skill level h, on the other hand, faces a probability $\mu_u(h, h')$ that her skill level at the beginning of the next period is h'. In the event of a layoff, the transition probability is $\mu_\ell(h, h')$. After the initial period coinciding with a layoff, the stochastic skill level of an unemployed worker is again governed by the transition probability $\mu_u(h, h')$.

In this setting, human capital evaporates after layoffs. The degree of this evaporation is governed by the transition probability $\mu_\ell(h, h')$ and is the same for layoffs in the formal and informal sectors. Human capital depreciates during the spell of unemployment and the degree of depreciation is governed by the transition probability $\mu_u(h, h')$. The way human capital depreciates is independent from the sector previously employed. For employed workers, however, human capital appreciates. Formal jobs offer better training opportunities on the job than informal jobs do. To capture this fact, I formulate two different transition probabilities, $\mu_f(h, h')$ and $\mu_i(h, h')$, for formal and informal jobs, respectively, the former generating a higher stock of human capital in the long run and the latter generating lower. The degree of the stepping-stone role of informal jobs is described by $\mu_i(h, h')$.

Let y_t be the worker's income in period t. We have $y_t = c$ if the worker is unemployed and $y_t = \max\{w_f, w_i\}$ if the worker has decided to work. Note that the unemployment compensation is available only if the unemployed worker's previous job is a formal-sector job; otherwise, she receives no compensation during the unemployment spell. In other words, for the unemployed worker, $y_t = c$ if her last job was in the formal sector and $y_t = 0$ if she previously worked in the informal sector. The unemployed worker devises a strategy to maximize $\mathbb{E}\sum_{t=0}^{\infty}\beta^t y_t$, where $\beta \in (0, 1)$ is a subjective discount factor.

If the worker with skill level h is employed in a formal-sector job, then a fraction, $\tau \in (0, 1)$, of her wage is taxed by the government. If she is employed in an informal-sector job, however, her wage is taxed only if she gets caught [see Ihrig and Moe (2004) for a similar formulation]. The probability of getting caught while working at an informal job is $\rho \in (0, 1)$, which can be interpreted as the efficiency of policing in the economy. This means that the unemployed

worker will receive a net wage payment of $(1-\tau)w_f h$ if she works in the formal sector and $(1-\rho\tau)w_i h$ if she works in the informal sector.

Let $V_i(w_f, w_i, h)$ be the expected value of $\mathbb{E}\sum_{t=0}^{\infty}\beta^t y_t$ for an unemployed worker with human capital level h, who has the pair of offers (w_f, w_i) in hand, who is deciding whether to accept any of the offers or reject both, who behaves optimally, and who previously worked in the informal sector. Similarly, let $V_f(w_f, w_i, h)$ describe the same value for a worker, who previously worked in the formal sector. The value functions $V_i(w_f, w_i, h)$ and $V_f(w_f, w_i, h)$ satisfies the Bellman equations

$$\begin{aligned} V_i(w_f, w_i, h) = &\max\Bigg\{J(w_f, h), Z(w_i, h), \\ &\beta\sum_{h'}\mu_u(h, h')\left[\int\int V_i(w_f', w_i', h')dG_f(w_f')dG_i(w_i')\right]\Bigg\} \end{aligned} \tag{2.1}$$

and

$$\begin{aligned} V_f(w_f, w_i, h) = &\max\Bigg\{J(w_f, h), Z(w_i, h), \\ &c+\beta\sum_{h'}\mu_u(h, h')\left[\int\int V_f(w_f', w_i', h')dG_f(w_f')dG_i(w_i')\right]\Bigg\}, \end{aligned} \tag{2.2}$$

respectively, where $J(\cdot)$ denotes the Bellman equation for formal employment and $Z(\cdot)$ denotes the Bellman equation for informal employment. $J(\cdot)$ and $Z(\cdot)$ can be formulated as

$$\begin{aligned} J(w_f, h) = (1-\tau)w_f h + \beta\Bigg[&\gamma\sum_{h'}\mu_\ell(h, h')\left(\int\int V_f(w_f', w_i', h')dG_f(w_f')dG_i(w_i')\right) \\ &+(1-\gamma)\sum_{h'}\mu_f(h, h')\int Q(w_f, w_i', h')dG_i(w_i')\Bigg] \end{aligned} \tag{2.3}$$

and

$$\begin{aligned} Z(w_i, h) = (1-\rho\tau)w_i h + \beta\Bigg[&(\gamma+\rho^\epsilon)\sum_{h'}\mu_\ell(h, h')\left(\int\int V_i(w_f', w_i', h')dG_f(w_f')dG_i(w_i')\right) \\ &+(1-\gamma-\rho^\epsilon)\sum_{h'}\mu_i(h, h')\int Q(w_f', w_i, h')dG_f(w_f')\Bigg]. \end{aligned} \tag{2.4}$$

respectively, where

$$Q(w_f, w_i, h) = \max\Big\{J(w_f, h), Z(w_i, h)\Big\}. \tag{2.5}$$

The model introduces the idea that the probability of being fired is increasing in the degree of enforcement. The layoff probability, in this case, is $\gamma + \rho^{\epsilon}$, where $\epsilon > 1$. For example, if $\gamma = 0.07$, $\rho = 0.2$, and $\epsilon = 3$, then the formal-sector worker faces a firing risk of 7 percent, while this risk is 7.8 percent for the informal-sector worker. Note that the parametric restriction $\gamma + \rho^{\epsilon} < 1$ should hold.

The steady state flows across the labor market states can be calculated in a standard way. The unemployment rates for those who had their last jobs in the informal and formal sectors can be calculated via the formulas

$$u_i = \eta^i_{uu} u_i + (\gamma + \rho^{\epsilon}) I - \eta^i_{ue} u_i - \eta^f_{ue} u_i \tag{2.6}$$

and

$$u_f = \eta^f_{uu} u_f + \gamma F - \eta^i_{ue} u_f - \eta^f_{ue} u_f, \tag{2.7}$$

respectively. The parameter η_{uu} denotes the probability of staying unemployed and η_{ue} denotes the probability of transition from unemployment to employment. The superscripts define the destination sector. The aggregate unemployment rate is $U = u_i + u_f$. Similarly, F and I are the steady state fractions of the formal and informal workers, which can be calculated as

$$I = \eta^i_{ee} I - (\gamma + \rho^{\epsilon}) I - \eta^i_{ue} I - \eta^f_{ue} I + \eta^f_{e|e} F \tag{2.8}$$

and

$$F = \eta^f_{ee} F - \gamma F - \eta^i_{ue} F - \eta^f_{ue} F + \eta^i_{e|e} I, \tag{2.9}$$

where the parameter $\eta_{e|e}$ is the probability of a job-to-job transition. Again, the superscripts

denote the destination sectors. Finally, the condition $u_i + u_f + I + F = 1$ must hold. For clarity, I only describe what Equation (2.6) communicates. It says that the steady state fraction of the unemployed workers, whose previous job was in the informal sector, consists of the ones who stayed unemployed, plus the ones who were fired from their jobs in the informal sector, minus the ones who find a formal job, and minus the ones who find an informal job. The rest of the system can easily be described in a similar logic.

3 Calibration, Numerical Results, and Discussion

The main policy exercise I perform in this paper is to vary the intensity of human capital accumulation in the informal sector and then to observe what happens to the correlation between government policy and the size of the informal sector. Next, I calibrate the model and then provide a detailed discussion of the numerical results.

3.1 Calibration

I calibrate the model to the Brazilian data. Table (1) summarizes the parameterization and the aggregates that I target to match. The discount factor, formal and informal separation rates, enforcement, and unemployment benefit parameters are chosen to match the estimates and facts reported in the literature [see Heckman and Pages (2000) and Ulyssea (2010)]. The formal labor income tax rate is set to roughly match the tax rate in Brazil (a combination of social security, severance fund, and employee contribution rates). Note that there are no firms in the model; so, I set a pooled tax rate. The unemployment rate and the employment rates in the informal and formal sectors are chosen to match the average level reported by the official data from 1998 to 2008.

The choice of $G_i(\cdot)$ and $G_f(\cdot)$—i.e., the wage offer distributions in the informal and formal sectors, respectively—is a rather subtle issue. It is well-documented in the literature that formal jobs pay better than informal jobs, on average [see, for example, Heckman and Hotz (1986)].[5] First, I set the formal wage offer distribution to be a uniform distribution with 10

[5]Note that this finding is not robust to alternative theoretical specifications. It persists when markets are assumed to be

Parameters	Values	Source/Rationale
Discount factor (β)	0.925	Heckman and Pages (2000), Ulyssea (2010)
Formal separation rate (γ)	0.13	Literature
Enforcement (ρ)	0.30	Literature
Informal separation parameter (ϵ)	8	–
Unemployment benefit (c)	0.60	Ulyssea (2010)
Formal labor income tax rate (τ)	0.40	Tax data
Unemployment rate (U)	0.1127	Mean (1998–2008)
Formal employment rate (F)	0.4359	Mean (1998–2008)
Informal employment rate (F)	0.4514	Mean (1998–2008)

Table 1: Parameters and their definitions.

grids in the unit interval [0.1,1]. This suggests that the offer probability is 10 percent for each possible wage value. For the informal sector, I set 10 grids in the same unit interval, but I construct a slightly tilted probability distribution: the offer probability is 15 percent for each possible wage value in the interval [0.1,0.5], but it becomes 5 percent in the interval [0.6,1]. This means that, for informal jobs, it is three times more likely to receive an offer from the lower half of the distribution than the upper half. Note that this formulation also suggests that the top income values are the same for formal and informal jobs, but the probability of receiving a high wage offer is greater in the formal sector than in the informal sector.

The stochastic law of motion of human capital is the final object to calibrate. There are 11 possible skill categories evenly partitioning the interval [0.5,1.5]. The starting value for each worker is set to be 1. Human capital depreciates along the unemployment spell and is accumulated in the spell of employment. In addition, skills evaporate upon layoff; that is, the worker receives a one-time shock to her skills in case of a layoff. For $\mu_u(h, h')$, the unemployed worker loses 0.2 units of skills with probability 0.1 for each period of unemployment, while she preserves her skills with 0.9 probability. Upon layoff (i.e., for $\mu_\ell(h, h')$), the worker loses 0.5 units of skills with probability 0.4 and she retains her skills with probability 0.6. For the employed worker in the formal sector (i.e., for $\mu_f(h, h')$), the worker with a formal job accumulates 0.225 units of skills with probability 0.1 and her skills do not change with 0.9 probability.

segmented [Fields (1975)], but disappears under competitiveness [Magnac (1991)]. This discussion is out of the scope of this paper and I solely focus on matching the empirical observations.

The worker employed at an informal job accumulates skills less intensively than a worker with a formal job can do. For the worker at an informal job (i.e., for $\mu_i(h, h')$), the baseline case is that the worker accumulates 0.2 units of skills with probability 0.1 and her human capital level does not change with probability 0.9. This is the case for a high-intensity-learning informal job, although the intensity is still lower than that of a formal job. The policy experiment I perform is as follows. For the low-intensity informal job, the worker accumulates 0.1 units of skills with probability 0.1 and her human capital level does not change with probability 0.9. In other words, the intensity of skill accumulation is reduced by 0.1 units. These are the two scenarios that I focus on. The crux of the matter is as follows: I vary the intensity of skill accumulation in the informal sector to test how the correlation between government policy and the size of the informal economy changes.

The variation in the government policy that I perform is as follows. First, I compare the effects of a 5 percentage points tax cut—from 40 percent to 35 percent—on the size of informal sector under the two scenarios. Finally, I compare the effects of a 10 percentage points tightening in enforcement—from 30 percent to 40 percent—on the size of informal sector under the two scenarios. Results are reported and discussed in the next subsection.

3.2 Results and Discussion

I compare the effects of government policy under two scenarios. The benchmark case is the steady state solution under the baseline calibration. The first scenario is the existence of an informal sector in which employed individuals can easily accumulate labor market skills and, in the second scenario, the informal jobs lead to a low-intensity skill accumulation. To simplify the terminology, I rename the first one as the "high-intensity" scenario and the second one as the "low-intensity" scenario. Table (2) summarizes the results.

The first policy exercise is a 5 percentage points reduction in formal labor income tax rate—from 40 percent to 35 percent—under two scenarios. In the high-intensity case, tax cut leads to a 6.46 percentage points decline in the size of informal sector, whereas the decline is 14.13 percentage points in the low-intensity case. Moreover, the low-intensity case generates 1.83

Experiment	Intensity	Variable	Change (pp)
5% tax cut	High	Informal emp. rate	-6.46
5% tax cut	High	Formal emp. rate	5.47
5% tax cut	High	Unemp. rate	0.99
5% tax cut	Low	Informal emp. rate	-14.13
5% tax cut	Low	Formal emp. rate	11.31
5% tax cut	Low	Unemp. rate	2.82
10% increase in enforcement	High	Informal emp. rate	-9.59
10% increase in enforcement	High	Formal emp. rate	5.18
10% increase in enforcement	High	Unemp. rate	4.41
10% increase in enforcement	Low	Informal emp. rate	-23.29
10% increase in enforcement	Low	Formal emp. rate	14.46
10% increase in enforcement	Low	Unemp. rate	8.83

Table 2: Model outcomes under two scenarios.

percentage points extra unemployment. Figures (1) and (2) give the changes in transitions across labor market states at the steady state under the high-intensity scenario, while Figures (3) and (4) give those under the low-intensity scenario. This suggests that the correlation between taxes and the size of the informal sector is larger when the informal sector does not contribute much to personal development. This is related to job characteristics and the sub-sector of employment. Lack of peer effects in the workplace, agriculture-related activities, and jobs in less capital-intensive regions may be the reasons for low-intensity skill accumulation in the informal sector.

The second policy exercise features a 10 percentage points tightening in policing (or enforcement) against informal jobs. In the high-intensity case, an increase in enforcement leads to a 9.59 percentage points decline in the size of informal sector, whereas the decline is as large as 23.29 percentage points in the low-intensity case. Figures (1) and (5) give the changes in transitions across labor market states at the steady state under the high-intensity scenario, while Figures (3) and (6) give those under the low-intensity scenario. Again, the low-intensity case generates 4.42 percentage points extra unemployment. Similar to the tax exercise, the correlation between action and response is greater in the low-intensity case.

To be concrete, think of a country with a large informal sector. Taxes on formal labor income are high and enforcement is loose. For some reason (either for fiscal or efficiency concerns), the government thinks that the informal sector is too large and should be downsized. There are two

policy options: either taxes will be reduced or enforcement will be strengthened (or both). The results of this study suggest that the government should not expect a large reduction in the size of the informal sector in response to the policy intervention, if the composition of informal jobs is such that workers in the informal sector can get intensive training and then switch to better jobs. To put it differently, knowing the structure of informal jobs can improve the government's ability to foresee the policy outcomes. These results also inform empirical research on the correlation between government policy and the size of informal sector. Specifically, the results suggest that controlling for job composition in the informal sector can potentially alter the estimates of the correlation between government policy and the size of informal sector in cross-country studies.

4 Concluding Remarks

The strength of the correlation between government policy and the size of the informal sector is widely investigated in the literature. The results are mixed, with some studies finding a weak correlation, while others finding a strong one. In this paper, I argue that the stepping-stone role of the informal sector is an important factor determining how strongly the government policy affects the size of the informal sector. I find that if the informal sector is intensively used to acquire skills, gain expertise, and build professional networks for the purpose of switching to formal jobs (in other words, if the informal sector is a stepping stone to the formal sector), then the size of the informal sector is less sensitive to changes in government policy. If, on the other hand, informal sector is a dead end, then the size of the informal sector is more sensitive to government policy.

The whole idea can be summarized with two terms: learning and option value. If the informal sector offers decent opportunities for learning and human capital accumulation, then the option value of a job in the informal sector will be higher, because it offers a path for self-development and an improved chance of transition to a formal job. When a policy intervention makes formal jobs more attractive, then the degree of substitution from informal sector to formal sector will depend on the intensity of learning in the informal sector. If learning is less intensive, then

the option value will be lower and the policy will induce greater substitution at the steady state. The degree of substitution will be lower when the intensity of learning is high.

I conclude with the main contribution of the paper in one sentence: the strength of the correlation between government policy and the size of the informal sector is a decreasing function of the intensity of training in the informal sector.

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Figure 1: $\tau = 0.40$ and $\rho = 0.30$ under **high-intensity** scenario.

Figure 2: $\tau = 0.35$ and $\rho = 0.30$ under **high-intensity** scenario.

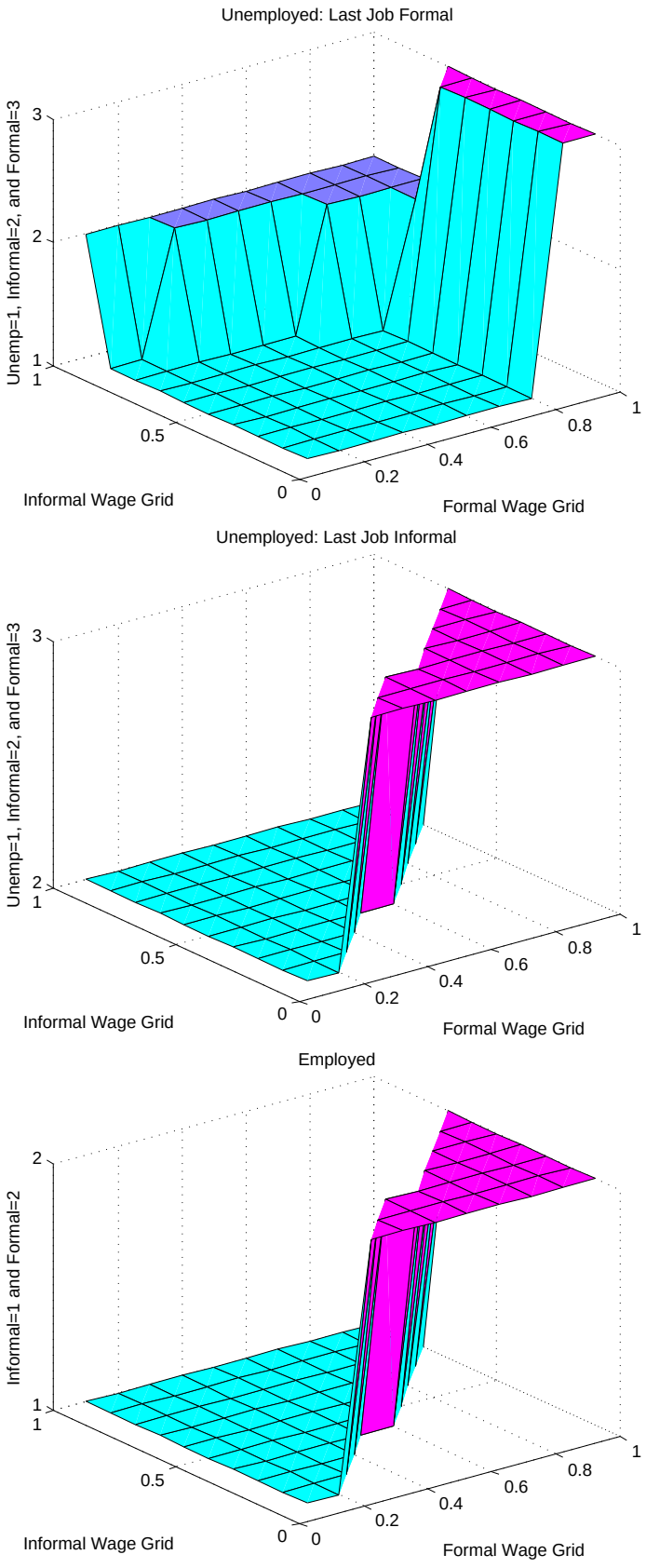

Figure 3: $\tau = 0.40$ and $\rho = 0.30$ under **low-intensity** scenario.

Figure 4: $\tau = 0.35$ and $\rho = 0.30$ under **low-intensity** scenario.

Figure 5: $\tau = 0.40$ and $\rho = 0.40$ under **high-intensity** scenario.

Figure 6: $\tau = 0.40$ and $\rho = 0.40$ under **low-intensity** scenario.