Human Capital, Entrepreneurship and the Transition to Market

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Abstract

There exists substantial evidence indicating that skill shortages have characterized labor relocation during the transition from plan to market. Along with changes in technology and aggregate demand, this pattern of human capital relocation has been associated with shifts in the structure of employment and earnings. Using a search model, we examine the link between human capital bottlenecks and private sector development during the transition. We show how the unavailability of skilled labor inhibits entrepreneurship and gives rise to higher unemployment, wage gaps and income inequality. Although government subsidies for skill acquisition help narrow the skill premium and raise output, they exacerbate overall income inequality.

JEL Classification Numbers: J4, J31, P21

Keywords: Skill acquisition, firm creation, transition
I INTRODUCTION

The successful transition from plan to market has required the emergence of a dynamic private sector that would serve as the engine of growth, job creation and global economic integration. At the heart of this objective lay the relocation of labor from the old state sector to the new private economy, comprising both restructured firms and de novo enterprises. At the start of the transition, it was recognized that high and even persistent unemployment was inevitable, at least in the short-run, as a result of the higher speed of job destruction relative to job creation (Aghion and Blanchard, 1994). However, a decade into the transition, unemployment remains high and the recovery of output to pre-transition levels is incomplete in many countries (Fischer and Sahay, 2000). And while attention remains focused on aggregate flows in labor and output markets, researchers have started to examine the structural components of these flows including the relocation of human capital.

In this regard, the accumulating evidence from country and industry studies has pointed to the emergence of human capital bottlenecks during the transition (EBRD, 2000). Indeed, the widely accepted belief a decade ago that the former planned economies would benefit from a highly educated workforce has now been qualified by evidence suggesting that skill shortages and mismatches have characterized labor relocation during the transition (Boeri, Burda, and Köllo, 1998; Cazes and Scarpetta, 1998; Chase, 1998). Together with skill-biased shifts in aggregate demand and technological accumulation, this pattern of human capital relocation has led to high unemployment amongst unskilled workers, widening wage gaps, and a general rise in income inequality (Aghion and Commander, 1999; Milanovic, 1999; Rutkowski, 1996).

Of particular interest to us is the suggestion in the literature that the emerging human capital bottlenecks have constrained the emergence and growth of the private sector, especially
small and medium size de novo enterprises (Chadha, Coricelli and Krajnyak, 1993; Fan and Spagat, 1994). Although widely cited, the link between human capital and entrepreneurship has not received adequate analytical attention in the literature. To date, analyses of the constraints on the growth and performance of the private sector have largely focused on the availability of capital, progress on privatization, and the institutional and regulatory environment. In this paper we attempt to fill this gap by providing a theoretical framework for analyzing the impact of skill shortages on the emergence of the private sector and, in turn, the structure of employment and earnings. In light of their growing policy relevance, we also analyze the impact of government-financed retraining programs.

Our framework draws on three strands of the theoretical literature: first, the literature on industry evolution and entrepreneurship (Jovanovic, 1982; Hopenhayn and Rogerson, 1993; Li, 2002); second, studies of labor relocation dynamics in transition economies (Aghion and Blanchard, 1994; Atkeson and Kehoe, 1995; Brixiova and Kiyotaki, 1997); and the literature on differential productivity and endogenous job creation (Acemoglu, 1996; Saint-Paul, 1996; Sarychev, 1999). We show how the unavailability of skills discourages entrepreneurship and pushes unskilled workers into unemployment (the informal sector). Our numerical illustrations are consistent with several stylized facts concerning the structure of employment, wages and income inequality during the transition. We provide a rationale for and highlight the limitations of workers retraining programs.

Following the introduction, the paper is organized as follows: Sections II summarizes the relevant stylized facts about human capital relocation during the transition; Section III covers the theoretical model; section IV analyzes the role of government intervention; section V presents a numerical example of the model and policy outcomes; and Section VI concludes.
II STYLIZED FACTS

The suggestion that human capital bottlenecks, embodied in skill shortages and mismatches, would characterize labor relocation during the transition runs counter to historical perceptions of the countries of the Eastern and Central Europe and the former Soviet Union. On the eve of restructuring, the transition economies were considered endowed with high levels of human capital. The former plan economies rapidly increased basic and vocational education and achieved high levels of literacy and technical expertise. This legacy may help account for the limited attention devoted to the subject of human capital in the early years of the transition. As Lehmann and Walsh (1999) have noted, the early literature has implicitly assumed that workers have effective human capital for the requirements of the transition from plan to market. Subsequent examinations of the stock of human capital, however, have uncovered serious deficiencies in the educational systems under central planning which became exposed during the transition to a market economy (Laporte and Ringold, 1997).

Weaknesses in Soviet-style educational systems included excessive specialization and emphasis on vocational training, which tended to lower worker flexibility and adaptability. There was also a disproportionate emphasis on hard sciences at the expense of social sciences (Sandi, 1992). Since the wage scale under central planning was largely flat and employment was guaranteed, workers also lacked the incentive to acquire skills to cope with the potential loss of employment or the demand for new skills. More fundamentally, the stock of human capital

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1 See (EBRD, 1995–2001) for the evolution of thinking on the educational systems in planned economies and their impact on labor market outcomes.
acquired under central planning may have become less relevant in the new market economy. With the launch of reforms in ownership, technology, and trade, demand for certain skills increased, rendering other types of training obsolete (Laporte and Schweitzer, 1994). As a result, the relocation of labor across sectors gave rise to significant mismatches between the human capital demanded by new enterprises and that available in the existing workforce.

But the downgrading of human capital was not only confined to the initial stock at the start of the transition. There is also growing evidence that the situation was made worse subsequently by the deterioration of educational outcomes, owing to budgetary cutbacks, administrative weaknesses and a general institutional decline (Berryman, 2000). This is most clearly seen in the decline of basic and secondary enrollment rates across the transition countries since 1989. The decline in public spending and the rise in the cost of education have particularly affected the poor, further contributing to the emerging income inequality (Micklewright, 1999). Even where skilled labor was available, hoarding and mobility costs in addition to limited transferability are believed to have held back its migration from the old state sector and restructured public enterprises to the emerging private economy (Boeri and Flinn, 1999; Earle and Sabirianova, 2000; Turunen, 2000).

Evidence for the view that emphasizes the obsolescence of the inherited human capital under central planning has been based on the evolution of returns to education and experience before and after the transition (Flanagan, 1998; Munich et al, 2000; Orazem and Vodopivec, 1997). Although a general decline in real wages has been registered during the transition, the magnitude of the fall in earnings varied across skill levels. In general, the returns to education have risen rapidly while the returns to experience have flattened. The increase in relative wages was especially marked for university graduates in contrast to holders of vocational degrees and
unskilled workers who faced lower wages and longer unemployment duration. Within a few years into the transition, wage differences by educational attainment approached those observed in OECD countries and in some cases exceed them (Rutkowski, 1996). Not surprisingly, the realignments of wage structures widened the distribution of earnings and raised income inequality across transition countries (Milanovic, 1999).\(^2\)

Additional evidence on skill shortages and their impact on the transition comes from the surveys of small and medium size enterprises that have been responsible for the bulk of job creation in the past decade. Entrepreneurs and managers have consistently cited the lack of skilled workers as the most serious labor-related problem in starting new firms and sustaining their expansion (Bilsen and Konings, 1998; Wyznikiewicz, Pinto and Grabowski, 1993). For example, in surveys of small and medium-sized manufacturing enterprises in Estonia, Latvia, Lithuania, and Poland in the mid 1990s, between 50-70 percent of firms in each industry indicated that the most common labor-related constraint to business development was the shortage of skills (Smallbone, Venesaar, and Piasecki, 1996). In contrast to unskilled labor, the St. Petersburg survey of service firms found that more than 50 percent of entrepreneurs reported having problems recruiting skilled professionals (De Melo and Ofer, 1994). In response, training of the workforce has become standard practice for enterprises along with the expansion of state-sponsored training programs (EBRD, 2000).

In the remainder of the paper, we present a simple theoretical model to examine the impact of skill shortages on firm creation. As will become clear, the link between human capital

\(^2\) The distribution of earnings in most countries has become less centered around the mode with a greater proportion of workers in the low-wage categories and a greater incidence of high-paid (continued)
bottlenecks and entrepreneurship can account for many of the noted stylized facts about the structure of earnings and employment during the transition.

III. THE THEORETICAL MODEL

The Environment

The population size is normalized to one. There are two types of agents, entrepreneurs and workers, with population sizes $\mu$ and $1 - \mu$, respectively. All agents live for two periods, are endowed with one unit of time every period, and have the same risk neutral preferences, $c_1 + E(c_2)$, where $c_i$ is consumption of a single good in period $i$, and $E$ denotes the expectations agents form at period 1 about income received in period 2. During the first period, all agents are employed in the state sector and receive a wage $w_s$; in the second period, the state sector dissolves.

In period 1, entrepreneurs work in the state sector and search for business opportunities to open private firms in the second period. This search effort, $x$, costs them $d(x) = x^2 / 2\gamma$, $\gamma > 0$, units of consumption good, and results in the probability $x$ of finding a business opportunity.

Thus, we do not endogenize the supply of entrepreneurs in our model which focuses on the early phase of the transition. As Earl and Sakova (2000) have confirmed, entrepreneurs have tended to be individuals with schooling, black market experience, and specific family backgrounds, all of which were characteristics acquired prior to the transition. This helps explain why the proportion of self-employed in the labor force has increased only slowly in the last decade and why entrepreneurship is not commonly a coping strategy for the unemployed.

(continued)
Workers are also employed in the state sector in period 1 and acquire skills needed by the private sector. When acquiring skills, workers incur cost according to \( k(q) = q^2 / 2\theta \), where \( \theta \) takes the values of \( \theta_L \) with probability of \( p \) and \( \theta_H \) with probability of \( 1 - p \), \( \theta_L > \theta_H > 0 \). Put it differently, workers differ in their human capital level \( \theta \). Those with more human capital (\( \theta_H \)) find it easier to invest in new human capital to be used in period 2. The learning effort results in probability \( q \) of obtaining skills.\(^4\)

In period 2, successful entrepreneurs and skilled workers work together in the formal private sector providing complementary inputs into the production function which takes the form \( m^\alpha n_f^{1-\alpha} \), where \( m \) denotes the measure of entrepreneurs who find business opportunities and \( n_f \) denotes the measure of skilled workers in the second period.\(^5\) When working in the formal sector, entrepreneurs get return \( \pi \) and workers get wage \( w_f \). For normalization, we assume that

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\(^4\) We restrict \( x \) (and \( q \)) to be between 0 and 1. We assume that despite their effort, workers (entrepreneurs) occasionally fail to acquire skills (business opportunities).

\(^5\) Capital is excluded from the production function on the assumption that the stock of capital in the planned economy is either obsolete or not mobile during the transition (Hernández-Catá, 1997). Nonetheless, the results carry through when capital is added.
entrepreneurs who do not find business opportunities get zero in the second period. 6 Unskilled workers work in the informal sector and obtain an outside wage $w_i$ where $w_i < w_f$. 7

Agents’ problems and the Equilibrium

The entrepreneurs’ period 1 problem can then be written as

$$\max_{c_1, c_2, x} c_1 + Ec_2 - x^2 / 2\gamma$$

Subject to:

$$c_1 + Ec_2 = w_s + x\pi \quad (1)$$

$$c_1, c_2 > 0.$$

Workers of type $\theta_i (i=L, H)$ in period one solve the following problem,

$$\max_{c_1, c_2, q} c_1 + Ec_2 - q^2 / 2\theta_i$$

Subject to:

$$c_1 + Ec_2 = w_s + qw_f + (1 - q)w_i, \quad (2)$$

$$c_1, c_2 > 0.$$

The firm in the formal sector in period 2 chooses the measure of entrepreneurs and skilled workers to maximize its profit as follows,

$$\max \quad$$

\[\text{subject to:} \]

\[c_1 + Ec_2 = w_s + qw_f + (1 - q)w_i, \quad (2)\]

\[c_1, c_2 > 0.\]

6 Note that unsuccessful entrepreneurs receive less than unskilled workers in the second period. This assumption is made to capture the riskier nature of entrepreneurial activity.

7 Estimates of the size of the underground informal sector in transition economies range from 20 percent in Eastern Europe to 50 percent in Russia (Johnson, Kaufman and Shleifer, 1997). Since the size of underground economic activities coincides with the observed levels of unemployment in these countries, the informal sector can be viewed as unemployment in our model.
The equilibrium of this economy is then defined as allocation of workers and entrepreneurs and a wage rate such that (i) each entrepreneur chooses the optimal effort put into searching for a business opportunity, (ii) each worker chooses the optimal effort put into acquiring skills, (iii) the firm in the formal sector chooses the measure of entrepreneurs and workers to maximize its profit, (iv) markets for entrepreneurs, workers and output clear, i.e.

\[ m = \mu x \quad (3) \]

for entrepreneurs and

\[ n_F = (1 - \mu) [pq_L + (1 - p)q_H] \quad (4) \]

for workers.

**Model Analysis**

The firm in the formal sector sets the returns to entrepreneurs and workers to their respective marginal productivity, i.e.,

\[ \pi = \alpha m^{\alpha - 1} n_F^{1-\alpha} \quad (5) \]

and

\[ w_F = (1 - \alpha) m^\alpha n_F^{-\alpha} \quad (6) \]

Entrepreneurs solve their utility maximization problem by setting the marginal cost of searching for a business opportunity equal to the marginal benefit of operating a firm in the formal sector. Workers optimally set their learning effort equal to the wage in the formal sector less income in the informal sector. Our first result follows immediately from the first order condition of the workers’ maximization problem.
Result 1. Workers with high-learning costs exert less effort in acquiring skills in period 1. As a result, they are more likely in period 2 to be unemployed, i.e., work in the informal sector.

Substituting in the labor market clearing conditions in the first order conditions, we obtain the following:

\[ x = (\alpha \gamma)^{\frac{1}{2-\mu}} \left( \frac{1-\mu}{\mu} \right)^{\frac{1}{2-\mu}} \frac{1-\mu}{\sigma}^{\frac{1}{2-\mu}} \]  

(7)

\[ x^{8} = \left[ \frac{1}{1-\alpha} \right]^{\frac{1}{2}} \left[ \frac{1-\mu}{\mu} \right]^{\frac{1}{2}} \frac{\overline{q}}{\overline{\xi}} (\frac{\overline{\theta}}{\theta} + w_i)^{\frac{1}{2}} \]  

(8)

In equations (7) and (8), \( \overline{q} = pq_L + (1-p)q_H \) represents the average learning effort of workers, and \( \overline{\theta} = p\theta_L + (1-p)\theta_H \) represents the average learning cost. Together, equations (7) and (8) show that the effort that entrepreneurs put into searching for business opportunities influences the effort that workers put into acquiring skills, and vice versa. Figure 1 depicts this complimentarity relationship between the efforts of workers and entrepreneurs.

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Insert Figure 1 About Here
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Result 2. Depending on the parameters, the model either has a unique trivial equilibrium where workers and entrepreneurs exert zero effort, or one trivial and one unique equilibrium where positive effort by workers and entrepreneurs is observed.  

9 The proof for this result is straightforward and available from the authors upon request.
Comparative Static Analysis

The comparative statics of the model with respect to the entrepreneurs’ searching efficiency, $\gamma$, and the average learning cost by workers, $\theta$, are straightforward. When it is cheaper to search for a business opportunity, entrepreneurs will search harder. The resulting higher fraction of entrepreneurs in the formal sector drives up the wage for skilled workers and gives workers more incentive to acquire skills. The movement of the searching curve in Figure 2.a captures this effect. Similarly, when it is cheaper for workers to learn, workers will exert more effort acquiring new skills. More skilled workers imply higher returns from running a business in the formal sector and a greater incentive for entrepreneurs to search in the first period. Figure 2.b shows the effect of reduced learning costs on the equilibrium efforts.

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Insert Figure 2 About Here
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IV. POLICY ANALYSIS

In response to high unemployment rates and to speed the relocation of labor, active labor market programs have become increasingly common in transition countries (Fretwell, Benus and O’Leary, 1999). Retraining programs, in particular, have been implemented as part of a strategy to upgrade workers skills and improve their likelihood of securing employment. (EBRD, 2000). In this section, we analyze the impact of government financing of workers’ retraining
programs.\textsuperscript{10} We model the retraining program by a government subsidy to workers that is positively linked to the learning effort. For simplicity we assume that subsidy takes the form $\frac{1}{2}sq^2$, in other words, government subsidizes workers’ learning cost. We first study the case where the subsidy is financed by an across the board non-distortionary lump-sum tax. Then we investigate the more realistic case where the subsidy is financed by a payroll tax on wages in the formal sector.

\textit{Subsidies Financed by Lump-sum Taxes}

In this scenario, the lump-sum tax does not depend on the agents’ behavior. The only change occurs in workers’ budget constraint. In particular, equation (2) now becomes

$$c_1 + Ec_2 = w_S + \frac{1}{2}sq_i^2 + q_iw_f + (1 - q_i)w_i - \tau, \quad i = L, H.$$  \hspace{1cm} (9)

We can no longer compress workers’ first order conditions into one single equation. Instead workers’ of low and high learning cost chose their learning effort according to the following two equations, respectively:

$$q_L\left(\frac{1}{\theta_L} - s\right) = (1 - \alpha)(\frac{\mu}{1 - \mu})^a \left(\frac{x}{pq_L + (1 - p)q_H}\right)^a - w_L, \quad (10)$$

$$q_H\left(\frac{1}{\theta_H} - s\right) = (1 - \alpha)(\frac{\mu}{1 - \mu})^a \left(\frac{x}{pq_L + (1 - p)q_H}\right)^a - w_L. \quad (11)$$

It can be shown that with the subsidy workers and entrepreneurs will increase their learning effort. There will be fewer unemployed workers in the informal sector. Because of the

\textsuperscript{10}Unlike other interventions, retraining programs have been found to have a positive impact on employment. For example, Puhani (2002) attributes the success of Poland’s retraining program to the fact that it addressed the root cause of unemployment, lack of skills.
complementarity between skilled labor and successful entrepreneurs, entrepreneurs will also search more intensively.

If in equilibrium, the ratio of skilled workers to entrepreneurs who find business opportunities is higher than under the benchmark case without the subsidy, then the returns to entrepreneurs will increase while the wage rate for skilled workers declines. However, since skilled workers also obtain government subsidies, they may still be better off on net. On the other hand, if the ratio of skilled workers to entrepreneurs turns out to be lower than the benchmark case, then entrepreneurs will be worse off while skilled workers will be better off. Entrepreneurs who did not find business opportunities and unemployed workers in the informal sector will certainly be made worse off since the tax reduces the amount they can consume in equilibrium. The overall implications of these effects for total output and income inequality are parameter specific.

**Subsidy Financed by a Payroll Tax**

Let \( \tau \) denote the payroll tax levied by the government on the formal sector, the firm’s problem now changes to

\[
\max_{m>0,n_F>0} m^n n_F^{1-u} - \pi m - (1 + \tau)w_F n_F.
\]

Now the workers’ wage becomes \( w_F = \frac{1 - \alpha}{1 + \tau} m^n n_F^{-u} \). It follows immediately that the imposition of tax will discourage workers and entrepreneurs from learning and searching respectively, undoing some of the effects induced by the subsidy.

**V. Numerical Example**

In this section, we provide an illustrative numerical example of the theoretical model and the policy scenarios examined in the previous section. Rather than calibrate all the parameters to
one or more countries in the transition, we have chosen to focus on the more general story consistent with the motivation for this paper. Table 1 presents the baseline parameters used in the numerical simulations of the model. Some of the parameters -- the share of entrepreneurs in the labor force and the income share of skilled workers in formal sector production -- were drawn directly from the transition literature. We also make the innocuous assumption that the measure of high and low learning cost workers is evenly distributed in the population.

Table 2 summarizes the effect of the costs of acquiring skills on the steady state (period 2) structure of employment and earnings during the transition. In particular, we track the evolution of the following variables: searching effort by entrepreneurs, learning effort by workers, wages in the formal sector, profits per entrepreneur, employment in the formal sector, ratio of formal to informal sector wage, formal sector output and the Gini measure of income inequality. The levels of these variables in Table 2 constitute our benchmark results, i.e., those that would be observed absent any government intervention with retraining programs. As the calculations make clear, the transition gives rise to significant labor and income adjustments. Relative to initial levels under central planning, the transition is associated with a smaller labor force, workers and entrepreneurs, in the formal sector; a higher skill premium as reflected in ratio of formal to informal sector wages; and a higher level of overall income inequality.

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Tables 3 and 4 present the results of the policy intervention when the government subsidizes skill acquisition by workers. In both cases, we experiment with several subsidy levels and measure the direction of change of the parameters relative to the benchmark results reported in Table 2. Table 3 simulates the impact of a retraining program that is financed by a lump-sum tax. In this case, the lower cost of acquiring skills encourages workers of both types to increase their learning effort, and more so for those with low learning cost given that they are more likely to succeed and receive the subsidy. The higher number of skilled workers drives up the profit that successful entrepreneurs receive during the transition. In period 1, therefore, potential entrepreneurs also raise their search intensity. As a result, total output in the formal sector goes up relative to the benchmark level. In terms of income sharing, under our parameterization, the increase in skilled labor in the formal sector outpaces that of successful entrepreneurs. Therefore, skilled workers are receiving less relative to the benchmark case, while successful entrepreneurs obtain a larger share of income.

The increase in total output comes at the cost of worsening income inequality during the transition. Two forces are at work here. On one hand, successful entrepreneurs are better off with a higher subsidy rate; there are more of them operating businesses and earning greater profits. Unsuccessful entrepreneurs and unskilled workers are unambiguously worse off because of the lump-sum tax they have to pay with no change in their earnings. This effect alone worsens income inequality. On the other hand, skilled workers in the formal sector earn less and the wage gap between them and unskilled workers is smaller. This second effect pushes the economy towards greater income inequality relative to the benchmark case. In equilibrium, the
first effect dominates the second and, as a result, income inequality measured by the Gini coefficient increases with subsidies.

Table 4 reports the effects of a retraining program that is financed by a payroll tax. As discussed above, payroll taxes are used more often in transition economies and elsewhere to finance active labor market policies. In Table 4, we see that the imposition of a payroll tax mitigates to a large extent some of the effects of the subsidy as our theory predicts. In particular, both workers and entrepreneurs in the formal sector earn less in the second period than under the lump-sum tax case. In the first period, workers and entrepreneurs are, therefore, leaning and searching less intensively, respectively. As a result, total output is also reduced but the skill premium and income inequality are lower than under the lump-sum tax.

VI. Conclusion

The accumulated human capital under central planning was rendered obsolete in the new economic environment of the transition. As a result, the relocation of labor has coincided with the emergence of skill shortages. This paper has analyzed the impact of the resulting human capital bottlenecks on the growth of the private sector in the early phase of the transition. We presented an analytical framework to show how this link between human capital and entrepreneurship is consistent with several stylized facts concerning the structure of employment and earnings in transition economies. Furthermore, we highlighted the potential role and tradeoffs in government policies designed to encourage workers’ retraining. Our numerical illustrations have not attempted to account for the wide range of experience across the transition
countries. As such, an important extension of this research would be to pursue these issues at the country and regional level.
REFERENCES


Figure 1 Learning and Searching Curves

q: Learning effort

x: searching effort

E₁

Learning

Searching
Figure 2. Analysis of Comparative Statistics

2a. Lower searching cost

2b. Lower learning cost
Table 1. Parameters Used in the Numerical Example

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure of entrepreneurs (( \mu ))</td>
<td>0.1</td>
</tr>
<tr>
<td>Entrepreneurs= profit share in formal sector production (( \alpha ))</td>
<td>0.4</td>
</tr>
<tr>
<td>First period wage income (( w_s ))</td>
<td>0.5</td>
</tr>
<tr>
<td>Wage in the informal sector (( w_i ))</td>
<td>0.1</td>
</tr>
<tr>
<td>Learning cost for less capable workers (( \theta_l ))</td>
<td>0.75</td>
</tr>
<tr>
<td>Learning cost for more capable workers (( \theta_h ))</td>
<td>1.25</td>
</tr>
<tr>
<td>Share of workers with high learning ability (( p ))</td>
<td>0.5</td>
</tr>
<tr>
<td>Searching cost for entrepreneurs (( \gamma ))</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 2. Simulation Results -- Benchmark

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Searching effort by entrepreneurs ($\alpha$)</td>
<td>0.797</td>
</tr>
<tr>
<td>Learning effort by high learning cost workers ($q_L$)</td>
<td>0.209</td>
</tr>
<tr>
<td>Learning effort by low learning cost workers ($q_H$)</td>
<td>0.349</td>
</tr>
<tr>
<td>Wage per worker in the formal sector ($w_F$)</td>
<td>0.280</td>
</tr>
<tr>
<td>Profit per entrepreneur ($p$)</td>
<td>1.252</td>
</tr>
<tr>
<td>Measure of entrepreneurs in the formal sector ($m$)</td>
<td>0.080</td>
</tr>
<tr>
<td>Measure of workers in the formal sector ($n_F$)</td>
<td>0.534</td>
</tr>
<tr>
<td>Ratio of formal sector to informal sector wage ($w_F / w_I$)</td>
<td>2.804</td>
</tr>
<tr>
<td>Total output</td>
<td>0.249</td>
</tr>
<tr>
<td>Gini coefficient for period 2 earnings</td>
<td>0.481</td>
</tr>
</tbody>
</table>
Table 3. Effect of A Retraining Program Financed by a Lump-Sum Tax

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Subsidy Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S=0.05</td>
</tr>
<tr>
<td>Lump-sum tax (*0.01)</td>
<td>0.2%</td>
</tr>
<tr>
<td>Searching effort by entrepreneurs (x)</td>
<td>1.5%</td>
</tr>
<tr>
<td>Learning effort by high cost workers (q_L)</td>
<td>2.4%</td>
</tr>
<tr>
<td>Learning effort by low cost workers (q_H)</td>
<td>5.2%</td>
</tr>
<tr>
<td>Profit per entrepreneur (p)</td>
<td>1.8%</td>
</tr>
<tr>
<td>Measure of entrepreneurs in the formal sector (m)</td>
<td>1.1%</td>
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<tr>
<td>Measure of workers in the formal sector (n_F)</td>
<td>4.5%</td>
</tr>
<tr>
<td>Ratio of formal sector to informal sector wage (w_F / w_I)</td>
<td>-1.1%</td>
</tr>
<tr>
<td>Total output</td>
<td>3.6%</td>
</tr>
<tr>
<td>Gini coefficient for period 2 income</td>
<td>0.6%</td>
</tr>
</tbody>
</table>

Note: The effect of the subsidy on the parameters with the exception of the tax rate is measured by the percentage change in the value of the relevant parameter relative to the benchmark value in Table 2.
Table 4. Effect of A Retraining Program Financed by a Payroll-Tax
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Subsidy Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>S=0.05</td>
</tr>
<tr>
<td>Tax rate ($\tau$)(%)</td>
<td>1.3%</td>
</tr>
<tr>
<td>Searching effort by entrepreneurs ($x$)</td>
<td>1.0%</td>
</tr>
<tr>
<td>Learning effort by high cost workers ($q_L$)</td>
<td>1.4%</td>
</tr>
<tr>
<td>Learning effort by low cost workers ($q_H$)</td>
<td>3.7%</td>
</tr>
<tr>
<td>Profit per entrepreneur ($p$)</td>
<td>1.2%</td>
</tr>
<tr>
<td>Measure of entrepreneurs in the formal sector ($m$)</td>
<td>0.6%</td>
</tr>
<tr>
<td>Measure of workers in the formal sector ($n_F$)</td>
<td>2.9%</td>
</tr>
<tr>
<td>Ratio of formal sector to informal sector wage ($w_F / w_I$)</td>
<td>-2.1%</td>
</tr>
<tr>
<td>Total output</td>
<td>2.4%</td>
</tr>
<tr>
<td>Gini coefficient for period 2 income</td>
<td>0.4%</td>
</tr>
</tbody>
</table>

Note: The effect of the subsidy on the parameters is measured by the percentage change in the value of the relevant parameter relative to the benchmark value in Table 2.