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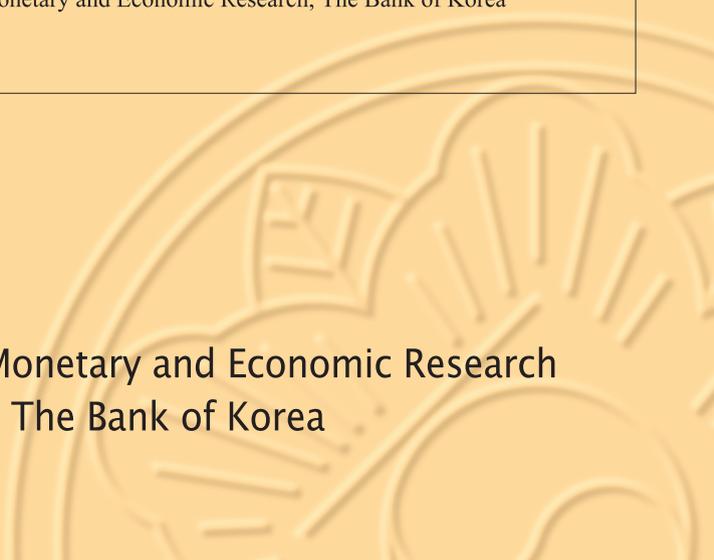
The Determinants of Informal Sector and Their Effects on the Economy: the Case of Korea

Donghun Joo*

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The Determinants of Informal Sector and Their Effects on the Economy: the Case of Korea

In this study, we adopt a general equilibrium model with occupational choice and incomplete contract enforcement to evaluate the effects of policies for reducing the size of the informal economy. More concretely, we try to quantify the effects of tax, entry cost, and contract enforcement on output, income distribution, and tax revenue. The model is specifically calibrated to the Korean economy. Under the assumption of endogenously determined interest rate, the effects of policies on total output are restrictive. However, the demand effect shows that entry cost and contract enforcement have significant potential influences on output. Lowering the tax rate increases the income inequality though the size of the informal sector shrinks. Despite the broadened tax base, there is no Laffer curve effect when the tax rate is lowered.

Key Words: informal economy, occupational choice, financial enforcement, entry cost, tax, income distribution, Korean economy

JEL Classification: E02, E6, H26, O11, O17.

1 Introduction

There are two agreements about the shadow economy. One is that the shadow economy exists in every country with a significant scale. The other is that there is no agreement on the definition of the shadow economy. This might be the reason that the shadow economy has so many names: unrecorded economy, hidden economy, underground economy, black economy, informal economy, unofficial economy, and so on. Hence, the definition of shadow economy is different depending on the purpose of literature. For instance, definitions used in the literatures estimating the size of the shadow economy are as follows: all currently unregistered economic activities that contribute to the officially calculated (or observed) Gross National Product(Schneigder[22]), market-based production of goods and services, whether legal or illegal that escapes detection in the official estimates of GDP(Smith[26]), and those economic activities and the income derived from them that circumvent or other wise government regulation, taxation or observation(Dell'Anno[10]).

As can be noticed with such literatures providing these definitions, a large number of studies are devoted to estimating the (unobservable) size of the shadow economy.¹ Thomas[29] criticized these empirical works aimed at '*gwestimating*' the size of the shadow economy as the 'measurement without theory'² and enumerated the problems of econometric assumptions and methods³ used in those estimations. He also argued that "no genuine policy conclusions emerge from the exercise, although some have been tacked on, varying according to the political persuasion of the author concerned." His critique is in the same vein with Lucas critique: though the estimated econometric model might be a good description of the phenomenon, it is not appropriate to evaluate the policy effects with it.

¹This is especially the case in the literatures about the shadow economy of Korea.

²Koopman[17] coined this phrase to characterize an approach in which

The various choices as to what to 'look for,' what economic phenomena to observe, and what measures to define and compute, are made with a minimum of assistance from theoretical conceptions or hypotheses regarding the nature of the economic processes by which the variables studied are generated.

Quoted again from Thomas[29].

³Representative econometric methods of estimating the size of the shadow economy are currency demand method used by Tanzi[28] which was developed based on cash-deposit ratio model of Cagan[8], MIMIC(multiple indicators multiple causes) model used by Loayza[19], and DYMIMIC(dynamic multiple indicators multiple causes) used by Schneider[22].

Motivated by Thomas’s critique, this study tries to evaluate the effects of policies on the shadow economy with a theoretical model. We adopt the general equilibrium model with occupational choice and institutional frictions which was developed by Antunes and Cavalcanti[4] and Antunes et al.[2]. To use this model, we define the shadow economy more specifically. Among Fleming et al.[12]’s four sectors⁴ of shadow economy, our analysis focuses on the informal sector. They define the informal sector as “economic activities that circumvent the costs and are excluded from the benefits of law, such as unregulated microenterprise.” This definition relates economic activities to regulatory compliance and hence provides theoretical descriptions of economic behavior. In addition, the definition of informal sector by Thomas[30] reveals objects of our analysis with occupational choice model more distinctively. He defines the informal sector as “self-employed agents(other than professionals like doctors and lawyers) and those (including employers) working in small enterprises, many of which are unregistered with the authorities.” In our model, an agent in the economy chooses her occupation between worker and entrepreneur. If she chooses to be an entrepreneur, she chooses again whether she operates her business in the formal sector or informal sector. Those who operate their business in the informal sector corresponds to the definition of Thomas[30]. Hence, we use the term of ‘the informal sector’ instead of the shadow economy from now on. Still, we will use the term of ‘the shadow economy’ when we need to define it comprehensively.

In the model of Antunes and Cavalcanti[4], an economic agent in the model is endowed with two state variables: managerial ability⁵ and bequest. In their model, an agent chooses to be a worker, a formal entrepreneur, or an informal entrepreneur given endowed states and the wage determined endogenously with the equilibrium conditions. Then they implement counterfactual experiments across the countries with the policy variables of financial enforcement and entry cost. In this paper, we construct the model where interest rate as well as wage is determined endogenously⁶ and calibrate the model to the Korean economy. Joo and Villamil[14] identified the two policy regimes along the development phases

⁴Fleming et al.[12] decomposes the shadow economy into the criminal, irregular, household, and informal sectors. Thomas[30] also suggests the same decomposition.

⁵Assuming the endowment of project size instead of managerial ability can be an equivalent alternative setting of the model.

⁶Hence, the solution variables of agent’s optimal problem are functions of ability, bequest, wage, and interest rate.

in Korea related with financial enforcement in the similar model: low enforcement regime and high enforcement regime. Here, we focus on the recent steady state of high enforcement regime in the Korean economy and look at the effects of policy variables of tax rate, entry cost, and incomplete contract enforcement on output, income distribution, and tax revenue in the model where the informal sector is incorporated.

Though the calibrated model generates a certain size of informal sector, that is not the estimation of the size of the informal sector in Korea. We just hope to get the reasonable size of informal sector in the model and implement the experiments which can evaluate the quantitative or qualitative effects of policy variables based on theory.⁷ We also test the robustness of the model by using the parameter values of the past steady state of low enforcement regime.

In the model, an entrepreneur in the formal sector should pay the entry cost and payroll tax for employees which gives an incentive to operate her business in the informal sector. However, an entrepreneur in the informal sector cannot borrow from the financial market and her firm size is restricted by her bequest amount. Though an entrepreneur in the formal sector can borrow from the financial market, her borrowing amount is also restricted by credit constraint because she cannot commit to repay ex-ante. We introduce the exogenous enforcement technology which is not perfect. Incomplete financial contract enforcement itself does not cause the informal sector but affects the size of informal sector once informal sector is generated by entry cost or payroll tax because most of entrepreneurs are subject to the credit constrain.⁸ Hence, our policy variables that determine the size of the informal sector are payroll tax, entry cost, and incomplete financial contract enforcement.⁹ Policy experiments are implemented in a way that the policy variables reduce the informal sector size.

Under the assumption of closed financial market, policies of reducing the informal sector have limited effects on total output, which is the sum of formal and informal sector output. However, formal sector output increases as part of

⁷Though Loayza[19] developed the growth model which accommodated the informal sector, empirical analysis was implemented with econometric model of MIMIC of which the structural equations were not developed from the theory. However, our model is calibrated to the data and its results are directly compared with the data.

⁸Refer to Joo and Villamil[14].

⁹Antunes and Cavalcanti[4] interpreted entry cost and imperfect financial enforcement as barriers to legality and legal failures. The former means too much regulation in an unnecessary part and the latter means too little regulation in a necessary part in the economy.

the informal sector turns into the formal sector. If we remove the assumption of closed financial market, improved contract enforcement increases total output and formal sector output significantly while the effect of lowered tax rate on output is still limited. The effects of tax rate and entry cost on income distribution are alternate: lowered tax rate increases the income inequality while reduced entry cost decreases it. Regarding tax revenue, there is no Laffer curve effect; tax increase induced by the broadened tax base cannot compensate the decrease induced by the lowed tax rate.

The paper proceeds as follows. Section 2 contains the model and defines an equilibrium. Section 3 explains the calibration procedures and presents results for the baseline model. Section 4 contains experiments with the model. Section 5 suggests the policy implications and further research direction.

2 Model

The economy has a continuum of measure one individuals. Each individual lives for one period, reproduces another keeping population constant, and passes away. Time is discrete and infinite. A single good can be used for consumption, production(a capital input), or as a bequest.

2.1 Preferences

Agents care about their own consumption and leave a bequest to their descendants. Bequests link agents across periods. Let c_t^i and b_{t+1}^i denote consumption and bequests, respectively, by agent i in period t . Preferences are given by¹⁰

$$U^i = (c_t^i)^\gamma (b_{t+1}^i)^{1-\gamma}, \quad \gamma \in (0, 1). \quad (1)$$

2.2 Endowments

Each agent is endowed with initial wealth, b_t , inherited from the previous generation. An individual can be either an entrepreneur, formal or informal, creating jobs and managing labor force, n , or a worker. Each agent is also endowed with a

¹⁰Preferences are for the bequest and not the descendent's utility. Andreoni[1] called this as 'warm-glow' utility, or impure altruism. Banerjee, Newman[6] also employ this form of utility function.

talent for managing, x^i , drawn from a log normal distribution $F(x; \mu, \sigma)$.¹¹ Thus, agents are distinguished by (b_t^i, x_t^i) . We drop agent superscript i for notational convenience.

2.3 Production technology

There are two production sectors: the formal sector and the informal sector. The production technology is the same for both sectors. Entrepreneurs operate a technology that uses labor, n , and capital, k , to produce a single consumption good, y . Capital fully depreciates between periods and managers can operate only one project. Capital is owned by the firm. The technology is given by

$$y = xk^\alpha n^\beta, \quad \alpha, \beta > 0, \text{ and } \alpha + \beta < 1. \quad (2)$$

Entrepreneurs choose to work at the formal sector or informal sector. In order to operate in the formal sector, entrepreneurs must pay a start up cost ς , in the form of complying with regulation costs. This cost is independent of firm output since it is an *ex-ante* payment to the government. Firms that are legally declared also pay a uniform payroll tax, τ . Informal firms do not pay any start up costs or taxes. Instead, they cannot borrow from the financial market.

2.4 The capital market

Agents have two options in which to invest their initial wealth:

Financial Intermediaries: Agents can competitively rent capital to financial intermediaries (banks) and earn an endogenously determined interest rate, r .

Private Equity: Agents can use their own capital as part of the amount required to start a business. They borrow the remaining capital they require from a bank at interest rate r .

We assume that only the domestic financial market is accessible to lenders and borrowers, which implies that the interest rate is determined endogenously. For computational purpose, we use the equivalent setting where all agents deposit their initial wealth in a financial intermediary and earn return r . The intermediaries lend these resources to entrepreneurs at the interest rate of r .

¹¹Joo and Villamil[14] showed that log normal distribution is appropriate as an ability distribution to calibrate the percentage of entrepreneurs and income distribution in the Korean economy.

Borrowers cannot commit ex-ante to repay. If they default on their debt, they incur cost ϕ , which is a percentage of output net of wages. This penalty is equivalent to an additive utility punishment, and reflects the strength of contract enforcement.

2.5 Entrepreneurs' Problem

Agents who have sufficient resources and managerial ability to become entrepreneurs choose capital and labor to maximize profit subject to a technological constraint and a credit market incentive constraint. We let the letter $j = F, I$ index an entrepreneur who operates the firm formally or informally. As mentioned earlier, an entrepreneur who operates her business in the formal sector pays the fixed startup cost, ς , and the payroll tax, τ . Let \mathcal{I}_F be the indicator function that $\mathcal{I}_F = 1$ if $j = F$ and $\mathcal{I}_F = 0$ if $j = I$.

An entrepreneur's problem is divided into two stages.

First, the entrepreneur chooses labor, given capital, k , and wage, w :

$$\pi_j(k, x; w) = \max_{n_j} xk^\alpha n_j^\beta - (1 + \tau \mathcal{I}_F)wn_j, \quad (3)$$

This yields the labor demand of each entrepreneur:

$$n_j(k, x; w) = \left(\frac{\beta xk^\alpha}{(1 + \tau \mathcal{I}_F)w} \right)^{\frac{1}{1-\beta}}. \quad (4)$$

Substituting (4) into (3) yields the profit function for a given level of capital,

$$\pi_j(k, x; w) = (1 - \beta)(xk^\alpha)^{\frac{1}{1-\beta}} \left(\frac{\beta}{(1 + \tau \mathcal{I}_F)w} \right)^{\frac{\beta}{1-\beta}}. \quad (5)$$

Second, let a be the amount of self-financed capital and l be the amount of funds borrowed from a bank. The entrepreneur now chooses the optimal amount of capital, through a and l , to maximize the net income from running the project given wage, w , and interest rate, r :

$$V_j(b, x; w, r) = \max_{a_j \geq 0, l_j \geq 0} \pi_j(a_j + l_j, x; w) - (1 + r)(a_j + l_j) - \varsigma \mathcal{I}_F \quad (6)$$

subject to the credit market incentive constraint and feasibility

$$\begin{aligned} \pi_j(a_j + l_j, x; w) - (1 + r)(a_j + l_j) - \varsigma \mathcal{I}_F \\ \geq (1 - \phi \mathcal{I}_F) \pi_j(a_j + l_j, x; w) - (1 + r)a_j \end{aligned} \quad (7)$$

$$b \geq a_j. \quad (8)$$

Restriction (7) is an incentive constraint which guarantees that ex-ante repayment promises will be honored. We can rewrite this constraint as

$$l_j(b, x; w, r) \leq \left[\frac{\phi \pi_j(k_j(b, x; w, r), x; w) - \varsigma}{(1 + r)} \right] \mathcal{I}_F. \quad (9)$$

Note that the informal entrepreneur's borrowing, l_j is zero. The problem yields optimal policy functions $a(\cdot)$ and $l(\cdot)$ that define firm size,

$$k_j(b, x; w, r) = a_j(b, x; w, r) + l_j(b, x; w, r). \quad (10)$$

We assume that entrepreneurs use their own bequest as capital first¹² and borrow if their bequests are not enough to satisfy the optimal capital amount. There are three types of solutions to the entrepreneurs' problem.

Case 1. No constraint binds. The entrepreneur self-finances ($b > a > 0$, $l = 0$).

Using (5) and (6),

$$a_j^* = \left(x \left(\frac{\beta}{(1 + \tau \mathcal{I}_F) w} \right)^\beta \left(\frac{\alpha}{1 + r} \right)^{1 - \beta} \right)^{\frac{1}{1 - \alpha - \beta}},$$

which is the unconstrained $k_j^*(x; w, r)$.

Case 2. (8) binds ($a = b > 0$), (7) does not. The entrepreneur uses all wealth to self-finance and borrows additional funds. Optimal loan is

$$l_j = [k_j^*(x; w, r) - b] \mathcal{I}_F,$$

$$\text{where } k_j^*(x; w, r) = \left(x \left(\frac{\beta}{(1 + \tau \mathcal{I}_F) w} \right)^\beta \left(\frac{\alpha}{1 + r} \right)^{1 - \beta} \right)^{\frac{1}{1 - \alpha - \beta}}, \text{ as in case 1.}$$

¹²Entrepreneurs are indifferent between self investment and borrowing as the opportunity cost of self investment is the same with borrowing cost, r .

Case 3. Both constraints bind. The entrepreneur uses all wealth to self-finance ($a = b$) and borrows ($l > 0$), but is credit constrained. The amount of loan is given by the solution to:

$$l_j(b, x; w, r) \leq \left[\frac{\phi\pi_j(a_j(b, x; w, r) + l_j(b, x; w, r), x; w) - \varsigma}{(1 + r)} \right] \mathcal{I}_F.$$

$l_j(b, x; w, r)$ is found numerically in this case.

2.6 Occupational Choice

Occupational choice determines lifetime income. An agent will choose the occupation that gives him the greatest income. Define $\Omega = [0, \infty) \times [\underline{x}, \bar{x}]$ and four sets $E(w, r)$, $E^c(w, r)$, $E_F(w, r)$, and $E_I(w, r)$:

$$E(w, r) = \{(b, x) \in \Omega : \max\{V_F(b, x; w, r), V_I(b, x; w, r)\} \geq w\}, \quad (11)$$

$$E^c(w, r) = \{(b, x) \in \Omega : w > \max\{V_F(b, x; w, r), V_I(b, x; w, r)\}\}, \quad (12)$$

$$E_F(w, r) = \{(b, x) \in E(w, r) : V_F(b, x; w, r) \geq V_I(b, x; w, r)\}, \quad (13)$$

$$E_I(w, r) = \{(b, x) \in E(w, r) : V_I(b, x; w, r) > V_F(b, x; w, r)\}. \quad (14)$$

$E^c(w, r)$ is the complement set of $E(w, r)$ in Ω . If $(b, x) \in E^c(w, r)$, then for this combination of ability and a bequest the agent would choose to be a worker, otherwise, to be an entrepreneur. Among entrepreneurs, for $(b, x) \in E_F(w, r)$ the agent would choose to manage a firm in the formal sector, and for $(b, x) \in E_I(w, r)$ the agent would choose to manage a firm in the informal sector.

Figure 1 illustrates the occupational choice policy given w and r .¹³ ‘ \times ’ marks are the simulated states of agents in the model economy. The left side of the downward sloping curve is the set of $E^c(w, r)$. Agents represented by ‘ \times ’ marks in this area choose to be workers. The right side of the downward sloping curve is the set of $E(w, r)$. This set is divided by the upward sloping curve. The right side of this curve is the set of $E_F(w, r)$. Agents represented by ‘ \times ’ marks in this area become formal entrepreneurs. The left side of this curve is the set of $E_I(w, r)$. Agents represented by ‘ \times ’ marks in this area become informal entrepreneurs.

¹³The horizontal axis is the ability transformed from x by $h = \frac{x}{w^\beta}$. Recall that the value function in 6 is a function of four variables, $(b_t, x_t; w_t, r_t)$. We can reduce the computational complexity using the relationship between w and x .

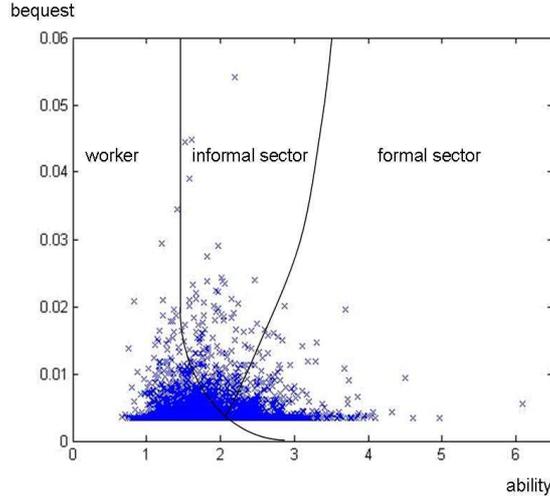


Figure 1: Occupational Choice Policy Front

Agents with high ability but comparably less bequest want to be at the formal sector so that they can borrow from the financial market. Agents with modest ability but enough bequest for the firm size to be within the amount of self-finance become informal entrepreneurs.

By the construction of the model, τ and ς are determinants of the informal sector size. Note that there is no informal sector without them. Incomplete contract enforcement, ϕ , which is less than one, does not cause the informal sector in the economy but the change of that value affects the size of the informal sector by changing the position of occupational choice border between $E(w, r)$ and $E^c(w, r)$.¹⁴

2.7 Consumers' problem

Consumers solve the following problem:

$$\max_{c_t, b_t} c_t^\gamma b_{t+1}^{1-\gamma} \quad (15)$$

subject to:

¹⁴The ability distribution $F(x; \mu, \sigma)$ also affects the size of informal sector. We assume the exogenously given ability distribution does not change.

$$Y_t = \max\{w_t, V_F(b_t, x_t, w_t, r_t), V_I(b_t, x_t, w_t, r_t)\} + (1 + r_t)b_t, \quad (16)$$

$$Y_t = c_t + b_{t+1}, \quad (17)$$

where (16) is the period t lifetime wealth of an agent characterized by (b_t, x_t) . Lifetime wealth is thus a function of agent-specific b_t and x_t , and economy-wide w_t and r_t . This problem defines optimal consumption, $c_t = c(Y_t)$, and bequest, $b_{t+1} = b(Y_t)$, policies. The functional form of the objective function implies that agents leave a proportion $1 - \gamma$ of their lifetime wealth as a bequest. Bequests cannot be negative because every agent can become a worker.

2.8 Competitive Equilibrium

Let Υ_t be the bequest distribution in period t , which evolves endogenously across periods, with initial bequest distribution, Υ_0 , given exogenously. The only connection between periods is the bequest, through the law of motion. A non-stationary transition probability function, P_t , assigns a probability to event A for the descendant of an agent with bequest b_t , who does not yet know x_t . The law of motion of the bequest distribution is¹⁵

$$\Upsilon_{t+1} = \int P_t(b, A) \Upsilon_t(db). \quad (18)$$

Given (ϕ, τ, ς) , distribution F and Υ_t , a competitive equilibrium at date t is a $w_t, r_t, \{n_j(k_j, x : w_t)\}_{j \in \{F, I\}}, \{l_j(b, x; w_t, r_t)\}_{j \in \{F, I\}}, \{a_j(b, x; w_t, r_t)\}_{j \in \{F, I\}}, \{k_j(b, x; w_t, r_t)\}_{j \in \{F, I\}}, c_t = c(\cdot)$, and $b_{t+1} = b(\cdot)$ such that:

- Given w_t, r_t , agent of type (b, x) chooses an occupation to maximize lifetime wealth, (16).
- Given w_t, r_t , technology, and frictions, entrepreneurs choose n_j to maximize profits, (3).
- $l_j(b, x; w_t, r_t)$ and $a_j(b, x; w_t, r_t)$ solve (6) and $k_j(b, x; w_t, r_t) = a_j(b, x; w_t, r_t) + l_j(b, x; w_t, r_t)$.
- Given lifetime wealth, (16), each agent maximizes utility, (1).

¹⁵Antunes et al.[3] define $P_t(b_t, A) = Pr\{b_{t+1} \in A | b_t\}$, where $(b_t, A) \in (Z, \mathcal{B})$, $Z = [\underline{b}, \bar{b}]$ is the set of possible bequests, and (Z, \mathcal{B}) is a measurable space with Borel algebra \mathcal{B} for the set.

— The labor market clears:

$$\begin{aligned} \iint_{E_F(w_t, r_t)} n_F(x; w_t, r_t) \Upsilon_t(db) F(dx) + \iint_{E_I(w_t, r_t)} n_I(x; w_t, r_t) \Upsilon_t(db) F(dx) \\ = \iint_{E^c(w_t, r_t)} \Upsilon_t(db) F(dx). \end{aligned} \quad (19)$$

— The aggregate supply of funds for investment is given by initial wealth:

$$\begin{aligned} \iint_{E_F(w_t, r_t)} k_F(x; w_t, r_t) \Upsilon_t(db) F(dx) + \iint_{E_I(w_t, r_t)} k_I(x; w_t, r_t) \Upsilon_t(db) F(dx) \\ = \iint_{\Omega} b \Upsilon_t(db) F(dx). \end{aligned} \quad (20)$$

The quantitative exercises evaluate policy effects where the real wage, the interest rate and the income distribution do not change significantly.¹⁶

3 Calibration and Baseline Economy

Unlike developed economies, some of Kaldor’s ‘stylized facts that typified the process of economic growth’¹⁷ such as stable movements of labor share and capital-output ratio did not appear during the rapid growth period of 70’s and 80’s in Korea. However, it seems like that the situation has changed after 90’s, as can be seen from figure 2 to figure 4. Based on these observations, we calibrate the model to the Korean economy at the years around 2000. As the quantitative results of our model are obtained from the steady state, it is desirable to calibrate the model to the economy that shows the characteristics of steady state.

Parameters that we need to calibrate to implement the policy experiments with the model are as follows: production function parameters, α , β , bequest preference parameter, $1 - \gamma$, financial contract enforcement parameter, ϕ , ability distribution parameters, μ , σ , payroll tax, τ , and entry cost, ς .

Let us look at the calibration for each parameter in turn. First, β is matched to the labor share obtained from compensation of employees. Figure 2 shows that the labor share shows stable moves at around 0.45 after 1991. Hence, we set

¹⁶Antunes et al. [2] propositions 5 and 6 show that when policies and institutions are stationary, a unique steady state equilibrium exists; from any initial condition, the economy converges to this equilibrium.

¹⁷Refer to the introduction of Barro and Sala-i-Martin[7].

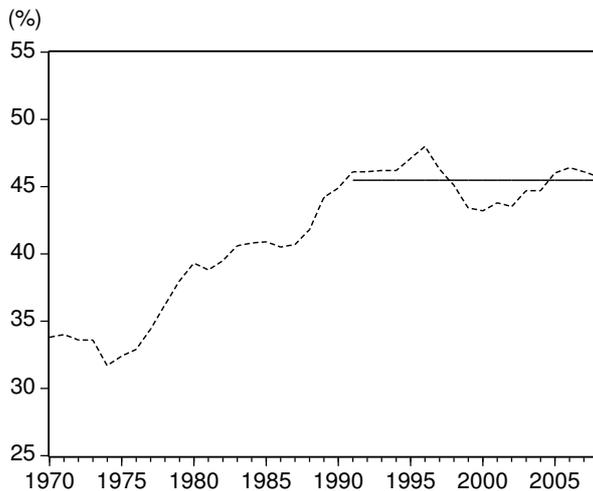


Figure 2: Compensation for Employee

β at 0.45. To decide the value of α , we use the computation of Gollin[13]. He noted that the labor share in developing countries are underestimated because the income of the self-employed (and other proprietors) is unduely accrued to capital share and urged that ‘operating surplus of unincorporated enterprises (OSPUE)’ should be added to labor share. In this study, we allocate the compensation for entrepreneurs to profits¹⁸ rather than add it to the labor share as we consider entrepreneurs explicitly. Following the second adjustment method of Gollin[13],¹⁹ we set α at 0.3²⁰ which implies the profit share of entrepreneurs is 0.25.

Second, $1 - \gamma$ is calibrated in a way that the capital-output ratio of the model matches that of the data.²¹ As the annual capital stock data is not available, we provide the capital-output ratio in figure 3 using the law of motion of capital which is generally used in RBC model: $k_t = (1 - \delta)k_{t-1} + i_t$, where the depreciation rate, δ , is 8% which was used in the BOKDSGE model[15] and i_t is the annual

¹⁸Remind that $\alpha + \beta < 1$ in the production function.

¹⁹Gollin[13] suggested three methods for the adjustment of labor share with OSPUE. The second adjustment we use here is to treat OSPUE as comprising the same mix of labor and capital income as the rest of the economy.

²⁰Barro and Sala-i-Martin[7] also set α for Korea at 0.3 in Ch. 10.

²¹ $1 - \gamma$ is also closely related with the real interest rate. However, the movements of the real interest rate is somewhat erratic and is affected by the change of other parameters, especially ϕ . On the contrary, the relationship between $1 - \gamma$ and capital output ratio is stable and robust.

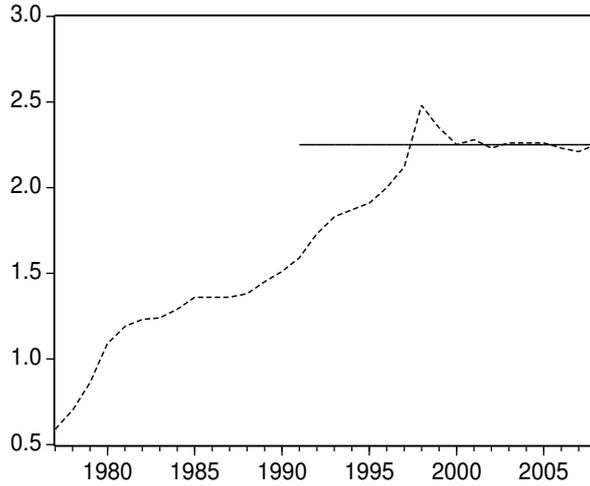


Figure 3: Capital-Output Ratio

physical investment. The initial capital stock was brought from Shin[25].²² The figure shows that the movements of capital-output ratio become stable after 90's. Hence, we select the value of $1 - \gamma$ as 0.065 so that the capital-output ratio of the model to be near to 2.12, the average capital-output ratio from 1991 to 2008.

Third, τ is set at 0.24, the payroll tax rate used by Noh and Yoon[20]²³ and ς is calibrated so that the entry cost per capita GDP in the model to be near at 16.24%,²⁴ the entry cost calculated by Djankov et al.[11]. The cost includes all identifiable official expenses(fees, costs of procedures and forms, photocopies, fiscal stamps, legal and notary charges, etc.) which are needed to obtain legal status to operate a firm. It does not include time cost or bribery.

Lastly, given other parameter values are fixed in ways explained above, remaining parameters, μ , σ and ϕ will be determined simultaneously to match the percentage of entrepreneurs over the employed and the entrepreneur's income Gini. Although all three parameters affect the entrepreneurship related variables

²²Recently, Song[27] also computed the capital-output ratio using quarterly data. The movements of his capital output ratio is quite similar with ours.

²³They argued that to use the tax rate rather than the tax burden is appropriate when the size of shadow economy is estimated with cash demand approach. This is the same in our model because tax rate should be the condition for decision making, not the result of it.

²⁴This number is for year 1999. According to the World Bank(World Development Indicators), the entry cost has remained at a similar level since 2002.

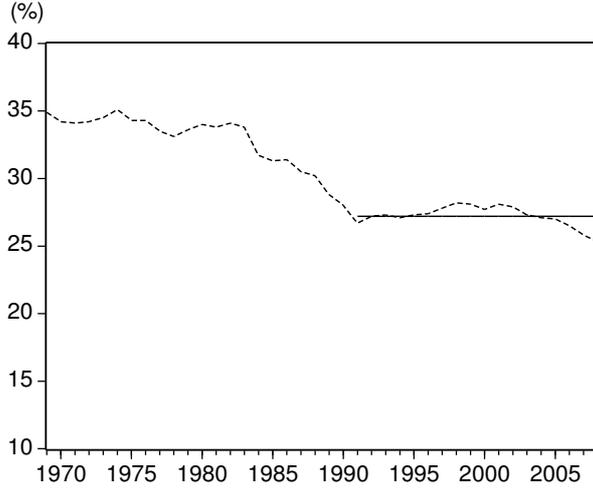


Figure 4: Percent of Entrepreneurs over the Employed

that are targets of calibration, Antunes et al.[3] show that contract enforcement parameter, ϕ , has the most influence on the percent of entrepreneurs and that the ability distribution has the most influence on income inequality. We calibrate those parameters based on these relationships.

μ and σ is set at 0.46 and 0.1271 respectively. The ability space is normalized so that 99.87% of agents' ability is within $[0,1]$. This normalization restricts the two dimensional choice problem of μ and σ to one dimensional problem. Then, we can choose the values of these parameters by calibrating to the Gini coefficient data. As the Gini coefficient for entrepreneurs is not available, we use the worker's income Gini+0.05 as a calibration target value.²⁵ ϕ is set as 0.18 so that the percent of entrepreneurs in the model is near at 27%, the average percent of entrepreneurs from 1991 to 2008.

The calibration result is summarized in table 1. Note that the characteristic of ς is different from other policy variables. While τ and ϕ are rates attached to wage and profit net of wage, ς is the value of absolute level. As a result, the entry cost per capita income of the model changes when we implement the policy experiment with a specific policy variable under the condition of *ceteris paribus*.²⁶ To avoid this problem, we define the entry cost per capita income, $\frac{\varsigma}{y}$,

²⁵See Joo and Villamil[14] for details of ability distribution parameters calibration.

²⁶Note that the change of a specific policy variable causes the change of output.

Table 1: Parameter values

Parameters	Values	Comments
β	0.45	the Bank of Korea
α	0.30	Gollin[13]
τ	0.24	Noh and Yoon[20]
ς	0.0091	Calibrated to match the entry cost of Djankov et al.[11]
$1 - \gamma$	0.065	calibrated to match K-Y ratio
ϕ	0.18	calibrated to match % of entrepreneurs
μ	0.46	Normalization
σ	0.1271	calibrated to match entrepreneurs' income Gini

as a policy variable instead of ς .

Another fact that should be noted in our calibration exercise is that we do not use the size of the informal sector as a target variable in any parameter calibration. The size of the informal sector in the model is determined with the values of parameters calibrated to data other than the size of the informal sector. As a result, the model provides a ‘gestimate’ of the size of informal sector in the Korean economy with theory, though this is not a main purpose of this study. The main purpose of this study is to evaluate the effects of policy variables with a model accommodating the informal sector. We just hope that the size of the informal sector in the model economy to be in the reasonable range. On the other hand, it is worthwhile to look over the calibration procedure of Antunes and Cavalcanti[4]. They use the size of informal sector estimated by Schneider and Enste[24] as a calibration target variable. Instead, they made the income distribution to be produced by the structure of the model. However, considering the variation of the estimation of the size of the shadow economy in Korea,²⁷ we thought that using the size of the informal sector as a calibration target variable is problematic in the Korean economy.

The calibration result is presented in table 2.²⁸ The upper section of the table shows that the targeted variables for the calibration are well reproduced by the baseline model. The lower section of the table presents some selected dimensions of economy with which our analysis is related. Informal sector share in the baseline economy includes the income of informal sector entrepreneurs and workers. Kang[16] asserted that the size of the shadow economy seems to be greater than 20% and less than 30% of GDP based on their survey of literatures estimating the size of shadow economy in the Korean economy.²⁹ Hence, the size of the informal sector produced by the baseline economy, 22%, looks reasonable.³⁰ Tax burden

²⁷The estimation of the size of the shadow economy using micro data ranges 3 50%. The estimation using macro approach ranges from 10 30%. For the survey of the estimation of the size of the shadow economy in Korea, see Kang[16].

²⁸Refer to Antunes et al.[2] for computational method.

²⁹Schneider[23] estimates that the size of the shadow economy of Korea has not changed much since 1999 at around 28%.

³⁰Rigorously speaking, the way of computing the share of informal sector in our model is somewhat different from other literatures estimating the size of informal sector. Because they express the size of informal sector as a percent of GDP, the share of informal sector among total output(the addition of GDP and informal sector output), which is the way of computing the informal sector size here, is lower than the size of informal sector as a percent of GDP.

Table 2: Baseline model economy and corresponding data

	baseline	data ¹	comment
Capital-output ratio			
whole economy	2.2	-	
formal sector	2.1	2.1	
Percent of entrepreneurs	26.2	27.2	
Gini coefficient			
all entrepreneurs	0.391	-	
formal sector	0.357	0.351	
Entry cost per capita income(%)	16.2	16.2	Djankov et al.[11]
Informal sector share(%)	21.9	20~30	Kang[16], Noh and Yoon[20]
Tax burden ratio(%)	12.1	12.4	Internal tax burden ratio
Annual real interest rate(%)	0.7	3.3	Time and savings deposits rate -CPI inflation

Sources: The Bank of Korea, National Statistics Office

¹ Averages of 1991-2008 except entry cost per capita income and informal sector share.

ratio of the baseline economy is computed by dividing the tax revenue with the formal sector output. The result matches well with the internal tax burden ratio of the Korean economy. We also present real interest rate of the baseline economy though it is much lower than that of the data³¹ because the change of endogenously determined interest rate affects the results of policy experiments in some cases. Overall, the baseline economy reproduces the characteristics of the real economy around year 2000 fairly well.

4 Policy Experiments

Many studies on the shadow economy in Korea were fulfilled with the purpose of providing the policy suggestions that would help to increase the tax base.³² Unfortunately, those studies are hard to escape from the critique of Thomas[29]:

The search for the magic number corresponding to the size of the black economy as a percentage of GNP without providing economic theories to explain the determinants and structure of the black economy has led economists into a blind alley in which the question of size has become an end in itself and more important issues are not addressed. No genuine policy conclusions emerge from the exercise, although some have been tacked on, varying according to the political persuasion of the author concerned.

We hope our model to provide more meaningful policy suggestions just as different forms of general equilibrium models have provided theoretical foundation for the policy evaluation in other fields.

The experiments will be implemented in two directions. The first direction is the comparison with the past. Joo and Villamil[14] identified another steady state at around 1980 besides around 2000 in the Korean economy. The structural parameters in utility and production functions are asserted to be different

³¹By construction of the model, our baseline economy has less capital demand compared with the economy without informal sector which makes the interest rate to be lowered. Remind the assumption that the entrepreneurs working in the informal sector cannot borrow from the financial institutions.

³²Among many studies, previously cited articles such as Noh and Yoon[20] and Kang[16] are such examples.

at around 1980 from those of around 2000. The experiments of using the parameters of the past provide robustness test of the model as well as some implications on the economy related with the change of informal sector size. The second direction is testing the changes of policy variables. The usual policy suggestions for decreasing the size of informal sector is to lower taxes, to reduce the entry costs, and to improve the legal enforcement. However, they did not provide quantitative measurements of policy effectiveness. This experiments will provide criteria of policy choice by comparing effects of each policy quantitatively. In addition, we also implement the experiments with fixed interest rate to consider the effect of increasing accessibility of international financial markets. The dimensions of economy that we are interested in are the changes of output, informal sector size, income distribution, and tax burden.

4.1 Comparison with the Past

Table 3 presents the economy when we use the parameter values of around 1980. First, we try the robustness test by changing the parameter values of preference and production functions only: α , β , and γ . The results are given in the third column of the table. Those parameter changes reduces output significantly. Joo and Villamil[14] show that γ changes output by affecting the accumulation of physical capital, which is reflected in the change of capital-output ratio, and that the effect of β on output reflects the change of human capital, which is reflected in the wage increase. However, the changes of those parameter values have little effects on informal sector related variables. The share of informal sector increases only 2% points.

Next, we changed the values of policy variables in addition to the changes of structural parameters. τ is set as 0.33 following Nah and Yoon[20] and ϕ is calibrated so that the percent of entrepreneurs matches the data of around 1980. We did not change $\frac{\xi}{y}$ as the entry cost measurement from that time is not available. The results in the fourth column of the table match the data fairly well. Most notable result is the increase of informal sector from 22% to 41%, which coincides with many literatures estimating the size of informal sector in Korea.³³ High τ increases the cost of becoming a formal entrepreneur. Low ϕ decreases the advantage of becoming a formal entrepreneur. The increase of informal sector is the result of these two forces. Another notable result is the change of the

³³For example, Lee[18], Bae[5], Noh and Yoon[20].

Table 3: Calibration results with the past parameter values

	baseline	$1 - \gamma = 0.035,$ $\alpha = 0.35, \beta = 0.4$		data(80) ¹
		$\tau = 0.24$ $\phi = 0.18$	$\tau = 0.33$ $\phi = 0.1$	
Output(baseline=100)				
total	100.0	47.1	45.4	-
formal sector	100.0	45.9	34.4	29.5 ²
Informal sector share(%)	21.9	24.0	40.8	30~40 ³
Gini Coefficient				
all entrepreneurs	0.391	0.390	0.421	-
formal sector	0.357	0.371	0.346	-
Tax burden ratio(%)	12.1	10.8	10.8	10.6
Percent of entrepreneurs	26.2	30.8	33.8	34.0
Capital output ratio				
whole economy	2.2	1.2	1.0	-
formal sector	2.1	1.1	1.0	0.9
Annual real interest rate(%)	0.7	3.0	1.0	0.5

¹ Average of 1974-1982 except output and informal sector share.

² Percent of year 1980 output to year 2000 output.

³ Noh and Yoon[20].

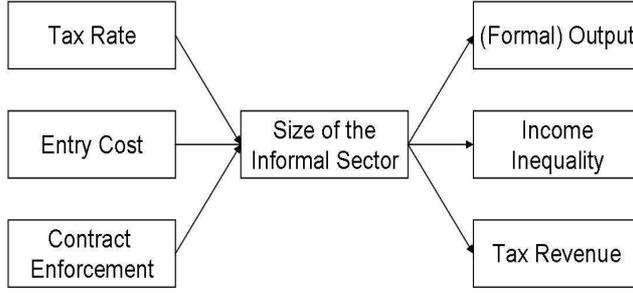


Figure 5: Policy experiments summary

formal sector output, which corresponds to official output measure such as GDP. Though the changes of policy variables have not much effects on total output, they cause 11.5% points of formal output increase. This implies the possibility that the transition of the informal sector into the formal sector contributed to the output increase in the past development of the Korean economy, probably without actual welfare increase.

4.2 Experiments with Policy Variables

As the previous section implied, it is generally believed that the size of the informal sector in the Korean economy was reduced significantly. However, the size of the informal sector in Korea is still higher compared with other developed nations as can be seen in table 4. High tax rate and entry cost and incomplete institutional environment are often blamed as the sources of relatively large size of shadow economy in Korea. Again, the large size of the shadow economy is blamed for hampering the growth(Loayza[19]) and worsening the income distribution(Rosser et al.[21]). In addition, reducing the size of informal sector as a way of broadening the tax base attracts people's interest when the fiscal deficit is expected to increase just like these days of the Korean economy.³⁴ With these regards, we try to quantify the effects of policy variables of τ , ς/y , and ϕ on output, income distribution, and tax revenue based on our calibrated model which accommodates the informal sector. This analysis is summarized with figure 5 using the analogous diagram expressing the structure of MIMIC model.

³⁴The Korean government should have increased fiscal spending in responding to the recent global financial crisis. Also, long term perspectives of the economy such as the increase of aging population make it necessary to find more sources of tax.

Table 4: The size of shadow economy and its determinants in OECD countries

	Shadow economy ¹	Tax burden ²	Startup cost ³	Rule of law ⁴
Australia	12.8	30.6	0.8	1.8
Austria	9.3	41.7	5.1	1.9
Belgium	19.6	44.5	5.2	1.5
Canada	14.1	33.3	0.5	1.9
Czech Republic	18.3	36.9	9.6	0.8
Denmark	16.1	49.1	0.0	2.0
Finland	15.8	43.5	1.0	1.9
France	13.2	44.2	1.0	1.3
Germany	15.3	35.6	5.6	1.8
Greece	26.3	31.3	10.2	0.7
Hungary	24.3	37.1	8.4	0.7
Iceland	-	41.5	2.6	2.0
Ireland	14.1	31.9	0.3	1.8
Italy	23.2	42.1	18.5	0.4
Japan	8.8	27.9	7.5	1.4

	Shadow economy ¹	Tax burden ²	Startup cost ³	Rule of law ⁴
Korea	27.6	26.8	16.9	0.8
Luxembourg	-	35.9	6.5	1.9
Mexico	31.7	20.6	12.5	-0.6
Netherlands	11.1	39.3	5.9	1.8
New Zealand	10.9	36.7	0.4	1.9
Norway	16.8	43.9	2.1	2.0
Poland	27.3	33.5	18.8	0.3
Portugal	20.4	35.7	2.9	1.0
Slovak Republic	18.2	29.8	3.3	0.4
Spain	20.5	36.6	14.9	1.1
Sweden	16.3	49.1	0.6	1.9
Switzerland	8.5	29.6	2.1	2.0
Turkey	33.2	24.5	14.9	0.0
United Kingdom	10.3	37.1	0.8	1.8
United States	7.9	28.0	0.7	1.6

Sources: Schneider[23], OECD Stat, World Bank WDI, World Resources Institute

¹ Percent of GDP, 2004/5.

² Percent of GDP, 2006.

³ Percent of per capita GDP, 2008.

⁴ Index: -2.5 worst governance, 0 average, 2.5 best governance. 2007.

Table 5: Effects of policy variables on output

	baseline	$\tau \times \frac{1}{2}$	$\tau = 0$	$\frac{\varsigma}{y} \times \frac{1}{2}$	$\frac{\varsigma}{y} = 0$	$\phi \times 2$	$\phi = 1$
Total	100.0	104.2	109.0	100.9	102.8	101.4	103.1
Formal sector	100.0	109.4	119.8	118.9	127.0	113.7	105.9
Informal sector share(%)	21.9	18.0	14.2	8.0	3.6	12.5	19.8
Annual real interest rate(%)	0.7	1.0	1.2	1.2	1.9	3.1	4.0

4.2.1 Effects on Output

In the real world economy, we expect the formal output, usually measured by GDP, to increase when the informal sector reduces in two ways: one through the improved efficiency and the other with the formal sector transformed from the informal sector. Table 5 shows the effects of policies that reduce the informal sector on output in the model economy. Among three policy alternatives, lowering the entry cost turns out to increase the formal output the most. The effects of lowered tax rate and improved contract enforcement are limited even with assumptive amount of parameter changes.

Actually, lowering the tax rate to a half of present level or improving the contract enforcement so that the value of enforcement parameter to be doubled is a daunting task. If we look at the tax burden ratio of OECD countries as a proxy variable for the tax rate, Turkey has the lowest tax burden ratio of 20.6%, lower than that of Korea by 6.2% points. In case of contract enforcement parameter, Antunes et. al.[3] and Cagetti and De Nardi[9] calibrated the parameter as 0.25 for the U.S. economy. Therefore, τ values of 12% or even zero percent and ϕ values of 0.36 or 1 are looked to be unrealistic for the Korean economy. However, entry costs of many OECD countries are much lower than that of Korea and it is even near to zero in some countries³⁵ according to Djankov et. al.[11]. This means that the entry cost of Korea has much room to be lowered and the above policy experiment with ς/y can have substantive meaning.

The table also shows that the total output, the addition of formal and informal sector output, is barely changed in each case of policy experiments, though

³⁵For example, the entry costs to per capita GDP of the U.S. and New Zealand is 0.5%.

Table 6: Effects of policy variables on output with fixed interest rate

	baseline	$\tau \times \frac{1}{2}$	$\tau = 0$	$\frac{\xi}{y} \times \frac{1}{2}$	$\frac{\xi}{y} = 0$	$\phi \times 2$	$\phi = 1$
Total	100.0	106.4	113.7	105.7	113.1	124.1	133.4
Formal sector	100.0	110.3	129.7	126.8	142.9	155.2	169.6
Informal sector share(%)	21.9	19.1	11.0	6.3	1.4	2.5	0.8

the formal sector output increases significantly with those policy changes. This implies most of formal output increase results from the transition of informal sector into formal sector and practical welfare effect of reducing the informal sector is limited according to our model. To understand this result, notice that the interest rates rise with the policy variable changes as shown in the last row of the table. Policies of increasing the formal sector increase the borrowing demand and the interest rate rises as a result. The higher interest rate reduces the firm size of the formal sector which is called ‘general equilibrium effect’ by Antunes et al.[3]. The general equilibrium effect is stark with the change of ϕ . Improved contract enforcement not only induces the demand for capital by turning the informal sector entrepreneurs into the formal sector but also by increasing the capital demands of existing formal sector entrepreneurs. As a result, the interest rate rises the most when ϕ changes to the level so that the informal sector increases again with improved contract enforcement.³⁶

If we fix the interest rate, the general equilibrium effect disappears and output increases accordingly. Table 6 presents the effects of the policies on output when interest rate is fixed at the baseline model interest rate. In this case, formal sector output increase reflects not only the transition of informal sector into the formal sector but also the practical efficiency improvement of the economy.

4.2.2 Effects on Income Distribution

In our model, policy changes of reducing the informal sector show different effects on income distribution. Table 7 shows that lowered entry cost and improved contract enforcement reduces both of the informal sector size and income inequality.

³⁶Though not presented here, informal sector size decreases in line with improved contract enforcement until ϕ reaches above 3 and starts to increase when the value of ϕ increases more than that.

Table 7: Effects of policy variables on income inequality

	baseline	$\tau \times \frac{1}{2}$	$\tau = 0$	$\frac{\varsigma}{y} \times \frac{1}{2}$	$\frac{\varsigma}{y} = 0$	$\phi \times 2$	$\phi = 1$
All entrepreneurs	0.391	0.399	0.416	0.333	0.284	0.334	0.318
Formal sector	0.357	0.351	0.360	0.336	0.286	0.337	0.312

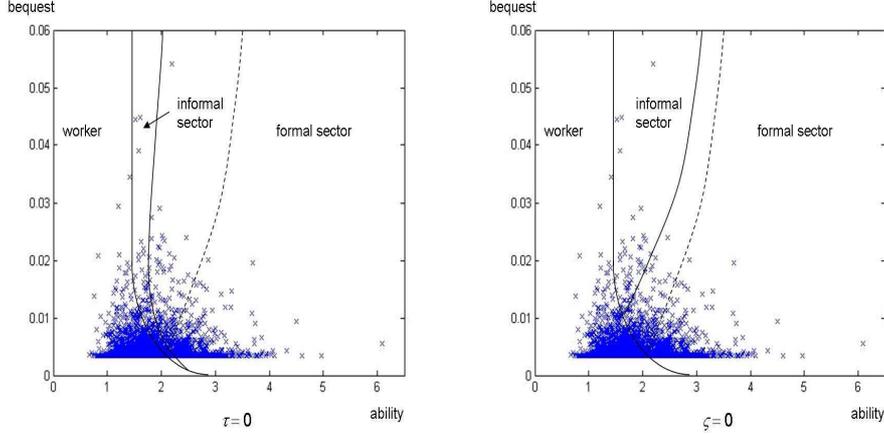


Figure 6: Occupational border changes with the changes of policy variables

This is consistent with Rosser[21]. However, lowered tax rate does not improve the income inequality even though it reduces the informal sector.

This happens because the tax is attached to the wage in the model, which makes the firms with bigger size to reap more benefits from lowered tax rate. Hence, an agent endowed with high ability or bequest in the informal sector has an incentive to do her business in the formal sector. This makes the occupational choice border between formal and informal sector to turn around in a counter clockwise which is shown in the left panel of figure 6. The figure shows that the increased inequality comes from the difference between formal and informal sector rather than inside of the formal sector and that the decrease of informal sector is also limited under the policy of tax reduction. This contrasts with the case of entry cost. As shown in the right panel of figure 6, the decrease of ς/y shifts the occupational choice border between formal and informal sector to upward direction, rather than turning it around. The formal sector entrepreneurs who turned from informal sector produce more as they are able to borrow from the

Table 8: Effects of policy variables on tax revenue

	baseline	$\tau \times \frac{1}{2}$	$\tau = 0$	$\frac{\varsigma}{y} \times \frac{1}{2}$	$\frac{\varsigma}{y} = 0$	$\phi \times 2$	$\phi = 1$
Tax revenue	100.0	52.6	0.0	117.8	123.4	114.2	105.2
Tax burden ratio	12.1	5.8	0.0	12.0	11.8	12.1	12.1

financial market to increase the capital. As a result, the share of informal sector decreases significantly and both of the whole and formal sector entrepreneurs' Gini coefficient decrease.

The effect of ϕ on the distribution works in two ways: income inequality decreases as the low ability entrepreneurs turns into workers while it increases as the high ability entrepreneurs who are under the credit constraint can borrow and produce more. The changes of Gini coefficient indicate that the former effect is greater than the latter. Tax revenue increases with the improved contract enforcement but the amount of changes moves with the size of informal sector.

4.2.3 Effects on Tax Revenue

Tax burden is generally believed to be a major cause of informal sector in the economy. At the same time, the policy of reducing the size of informal sector is considered as a way of increasing the tax revenue. These seemingly contradictory assertions can be reconciled by reminding the Laffer curve effect. Originally, the Laffer curve effect predicts the tax revenue will increase when the tax rate is lowered as the output increase induced by tax cut broadens the tax base. In the economy with informal sector, the Laffer curve effect has another path of extending the tax base: increasing the size of formal sector which reenforces the original Laffer curve effect. Unfortunately, table 8 shows that this is not the case according to our model. As shown in table 5, formal output increase or the increase of tax base³⁷ caused by lowered tax rate is not significant and hence the tax revenue decreases almost proportionately with the lowered tax rate. The result does not change even in the case of fixed interest rate.

To increase the tax revenue by reducing the size of informal sector, lowering the entry cost instead of tax rate is more effective. Though the effect of ϕ in increasing the tax revenue is smaller than that of ς/y under the endogenous

³⁷More exactly, the tax base in our model is the number of employment of formal sector and wage.

interest rate, it has the biggest effect of increasing the tax revenue if the tax rate is fixed. Also note that the effect of ϕ on tax revenue is not monotone in accordance with its effect on formal output.

5 Policy Implications and Further Research Suggestions

We tried to analyze how policy variables such as tax, entry cost(a barrier to legality), and imperfect contract enforcement(legal failure) affect output, income distribution, and tax revenue using the general equilibrium model with occupational choice and incomplete financial contract enforcement. In the model, the basic determinant factors of the size of informal sector are tax and entry cost. There will be no entrepreneurs who operate their firms in the informal sector without them. Once the informal sector is introduced with those variables, the distribution of ability which is assumed exogenous and financial contract enforcement which is calibrated to the percent of entrepreneurs play important roles in determining the size of informal sector. As the ability distribution barely changes, we added only the enforcement parameter to the policy variables. The calibrated model reproduces the characteristics of the Korean economy including the informal sector reasonably well, not only the recent but also the past economy. From the experiments with the model, we obtain the following policy implications.

First, policy changes inducing the shrinkage of informal sector, i.e., lowering the tax rate, reducing the entry cost or improving the contract enforcement, have limited effects on output increase under the assumption of closed financial market. The effect of lowed tax rate on output is still limited even if we relax the closed financial market assumption. The experiments also imply that formal GDP might increase as a result of the transition of the informal sector into the formal sector, especially when the entry cost is reduced.

Second, each of policies has different effect on the income distribution among entrepreneurs. Lowering the tax rate increases the income inequality between the formal and informal sector. This happens because the tax is attached to the wage in the model, which makes the firms with bigger size to reap the more benefits from lowered tax rate. On the contrary, reducing the entry cost improves the income inequality among entrepreneurs. As the entrepreneurs in the informal sector turn into the formal sector with the reduced entry cost they become acces-

sible to financial market and increase their firm size. This make their incomes to be closer to previous formal sector entrepreneurs. Improved contract enforcement also reduces the inequality in a similar way, though the effect is weaker than the case of entry cost.

Third, the effect on tax revenue is also different in each policy. It is notable that lowering the tax rate has no Laffer curve effect. We might expect the increased share of formal sector by lowered tax rate to contribute to the increase of tax base, which can be added to the traditional Laffer curve effect route. However, not only the effect of lowered tax rate on increasing the output is restrictive but also on reducing the size of informal sector is small compared with other variables. As a result, increment of tax revenue which comes from increased wage and broadened tax base does not compensate the decrease of the revenue induced by lowered tax rate. It turns out that more effective way of increasing the tax revenue is to reduce the entry cost.

If we look at the tax burden ratio of the OECD countries in table 4, Korea has the third lowest tax burden ratio. Considering the current demographic structure of Korea, more fiscal spending will be needed and it is not likely to lower the tax rate further. Furthermore, tax revenue is not a deadweight loss in the real world unlike we assumed in the model. Government provides public service with tax revenue. Hence, adjusting the tax rate is a very restrictive policy as a tool for reducing the informal sector. On the contrary, there is much room for the entry cost to be used as a policy for reducing the size of informal sector in Korea. According to Djankov et al.[11], the entry cost of Korea is around at the average and the difference with the lowest country is wide: the entry cost of Korea is higher than that of the United States by 15.8% points.³⁸ In case of the entry cost, it is not unrealistic to treat it as a deadweight loss in the economy. Hence, making efforts to reduce the entry cost is a much viable policy option.

Fourth, the effect of improved contract enforcement on the size of informal sector, and hence on the tax revenue, is not monotonic when the interest rate is determined endogenously. The size of informal sector decreases as the contract enforcement improves at first because the entrepreneur's credit constraint is eased but the increase of the demand for capital raises the interest rate. At some point

³⁸Among OECD countries, the entry costs to per capita GDP of Czech Republic, Norway, Australia, Canada, the United Kingdom, Finland, New Zealand, and the United States are less than a half of the entry cost of Korea. See table 4.

of the contract enforcement improvement, the advantage of eased credit constraint is outweighed by the cost of borrowing. This makes the size of informal sector to increase as the contract enforcement improves further. In the real economy, however, the efforts to improve the financial contract enforcement is not likely to reach to the point where the size of informal sector to increase if we consider the difficulties of improving the incomplete legal enforcement.³⁹ In addition, if we relax the assumption of closed financial market, improved contract enforcement brings out the biggest increase of output among our policy variables.

In summary, reducing the entry cost is the most viable and effective way to shrink the size of informal sector and to raise the tax revenue with broadened tax base. It might also contribute to the improvement of income distribution. Policy options for reducing the informal sector considered in this study have restrictive effects on total output increase but the formal output could increase significantly as part of the informal sector turns into the formal sector.

Toward a future research, it is interesting to compare our model with the model of Loayza[19]. His model uses similar apparatuses to introduce the informal sector with our model: tax, limited access to public service, and incomplete enforcement. It also allows the heterogeneity of agents with respect to the endowment of capital.⁴⁰ There are differences too. His model deals with the growth of the economy by employing the AK endogenous growth model⁴¹ and tax revenue is used to provide the public service⁴² which contributes to the production of the economy. However, his model does not provide the computational framework and only the analytical and qualitative results are presented. Accommodating the merits of his model to our model would open another dimension of analysis such as obtaining the optimal tax rate. Also note that the entry cost is not only a burden(public choice theory of regulation) but also a benefactor(public interest theory of regulation) in the economy, as Djankov et al.[11] presented. If the beneficial effect of entry cost were accommodated, we might suggest the optimal size of informal sector.

³⁹Remind that the value of ϕ has changed from 0.1 at around 1970 to 0.18 at around 2000. Also refer to the rule of law presented in table 4.

⁴⁰However, this factor plays no role in his model. It only has declarative meaning.

⁴¹Our model includes a dynamic factor in a sense that each generation is related by the bequest but its object of analysis is static as the steady state is defined with constant level of output.

⁴²Tax revenue is totally wasted in our model.

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<Abstract in Korean>

주동현*

지하경제는 경제주체가 합법적 영역에서 경제활동을 영위할 경우 부과되는 조세, 창업비용 등의 부담을 회피하면서 발생한다. Fleming et al.(2000), Thomas(2001) 등의 분류에 따르면 지하경제는 가사부문(household sector), 비공식부문(informal sector), 탈법부문(irregular sector) 및 범죄부문(criminal sector)의 네가지로 분류되는데 본 연구는 이 중 비공식부문을 대상으로 한다. 비공식부문의 구체적인 예로서는 세금을 납부하지 않는 소득 탈루 자영업자를 들 수 있다.

기존 연구들도 각자의 연구목적에 따라 지하경제를 정의한 후 지하경제 규모의 추정을 시도하고 지하경제 규모 축소를 위한 정책을 나열하고 있으나 지하경제 규모 결정 요인과 경제변수간의 이론적 관계를 명시적으로 고려하지 못한다는 한계가 있다.

본 연구는 경제주체의 직업선택(창업 또는 취업)이 가능한 일반균형모형을 이용하여 비공식부문의 규모를 결정하는 정책변수가 생산, 분배 및 세수에 미치는 영향을 분석함으로써 정책평가의 이론적 근거를 제시하고자 한다. 모형에서 고려되는 정책변수는 세율, 창업비용, 그리고 신용제약이다. 분석결과는 다음과 같다.

첫째, 지하경제중 비공식부문을 감축하기 위해 세율인하, 창업비용 축소 또는 신용제약 완화의 정책을 시행할 경우 생산은 모두 늘어나는 것으로 나타났다. 이는 주로 이들 정책에 힘입어 비공식부문이 양성화되는 데 따른 것이나 경제효율 향상에도 일부 기인한다. 둘째, 분배면에서는 창업비용 축소 및 신용제약 완화의 경우 개선효과가 있는 반면 세율인하는 분배를 악화시키는 것으로 나타났다. 셋째, 세율인하의 경우 비공식부문이 양성화됨에 따라 세율이 늘어나더라도 세수를 증대시킬 가능성은 작은 것으로 분석되었다. 이러한 점에서 비공식부문의 감축을 위해서는 창업비용 축소와 신용제약 완화가 바람직한 것으로 보인다. 특히 선진국과 비교하여 우리 경제의 조세부담률은 높지 않은 반면 창업비용은 커 감축여지가 많다는 점에서도 비공식부문을 줄이기 위한 정책으로서 창업비용 축소가 우선 추진될 필요가 있겠다.

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연구내용은 집필자의 개인의견이며 한국은행의 공식견해와는 무관합니다. 따라서 본 논문의 내용을 보도하거나 인용할 경우에는 집필자명을 반드시 명시하여 주시기 바랍니다.