

Department of Policy and Planning Sciences

Discussion Paper Series

No.1371

**Foreign Direct Investment and Wealth Distribution
Dynamics**

by

Duong Lam Anh TRAN

September 2020

UNIVERSITY OF TSUKUBA
Tsukuba, Ibaraki 305-8573
JAPAN

Foreign Direct Investment and Wealth Distribution Dynamics

Duong Lam Anh Tran*

September 2020

This paper investigates the role of foreign direct investment (FDI) firms with respect to the determination of domestic wealth distribution dynamics in the host country. Based on the traditional dynasty framework, we derive a new version that introduces the entry of FDI firms as an additional foreign factor to a closed economy. We find that the transition of the domestic wealth distribution in response to the entry is not limited to monotonically increasing or decreasing, but generates a rich set of engaging scenarios at the steady state, namely the middle-income trap, the *good* equality, the *bad* equality, and the inequality. Furthermore, we also identify factors that determine which scenario prevails, that is, the cost of starting a new business, the bequest motive, the world interest rate, and the labor productivity of the host country.

Keywords: foreign direct investment, wealth distribution dynamics, job composition, dynasty model

JEL Classification Number: D31, F21, O16

*Correspondence address: Tran Lam Anh Duong, Faculty of Engineering, Information and Systems, University of Tsukuba, Tennodai 1-1-1, Tsukuba, Ibaraki 305-8577, Japan. Email address: anhduongtl (at) sk.tsukuba.ac.jp

1 Introduction

Over the last few decades, developing countries have witnessed a significant increase in foreign direct investment (FDI) inflows, making it the most important source of external finance for such countries (United Nations Conference on Trade and Development (UNCTAD)). Between 1990 and 2018, FDI inflows into developing countries increased by about thirtyfold, as much as four times the world average, accounting for more than half of global flows.¹ Accompanying the surge in FDI inflows is an increasing concern about the adverse impacts of FDI on social equality.

Equality is mainly explored in two typical dimensions, namely wealth and income, which invoke different views of how economic resources are distributed in society. While income is defined as a “flow” of resources in a specified period of time, wealth is known as a “stock” of those resources, which is accumulated over a long period of time. The key difference between the two is that wealth itself can generate income as it is a source of investment; thus, a higher inequality in wealth can widen that in income, or in other words, wealth inequality tends to be more pronounced than income inequality.² Furthermore, although the two concepts are interrelated, it is clear from the perspective of long-run dynamics that the stock of wealth is a more important factor than the annual flow of income resulting from it (Baranzini, 1991). The goal of this paper is to develop a framework in which we examine the dynamic change in the domestic wealth distribution in response to the entry of FDI firms.

Despite the importance of this issue, there are no studies of how foreign investment, especially FDI, affects the wealth distribution. The closest studies examine such impacts in terms of income, not wealth inequality. Although wealth inequalities appear to be more important, the availability and reliability of income data have allowed inequalities in income to be studied more closely (Brian, 2015). Our literature review, however, suggests that the results of the previous studies on income inequality, both theoretical and empirical, are inconclusive. Empirical studies present inconsistent evidence on this impact,³ while theoretical studies also yield mixed results through several mechanisms

¹Author’s calculations using the World Development Indicators database and World Investment Report 2019 of the UNCTAD.

²Davies et al. (2009) find that income inequality is on average half of the size of wealth inequality in both industrial and emerging economies. For example, most Gini coefficients for disposable income lie in the range of about 0.35–0.45, whereas Gini coefficients for wealth typically fall in the range of about 0.65–0.80.

³Gopinath and Chen (2003), Choi (2006), Lee (2006), and Basu and Guariglia (2007) find, in cross-sectional data across a large group of countries, that FDI promotes income inequality. In contrast, Borraz and Lopez-Cordova (2007), Jensen and Rosas (2007), and Chintrakarn et al. (2012) both agree that FDI results in less income inequality in Mexico and the US. On the contrary, Figini and Görg (2011), Herzer and Nunnenkamp (2013), Franco and Gerussi (2013) draw conclusions on identifying the impact of FDI on income inequality as a non-linear trend, while Lindert and Williamson (2003), Milanović (2005), and

(Feenstra & Hanson, 1996; Pandya, 2014).

In this context, Pandya (2014) makes an argument on the impact of FDI firms on income inequality that is crucial to further develop dynamic models examining such an impact on wealth inequality. Pandya (2014) argues that FDI could reduce income inequality because of the competition with domestic firms in the labor market. This competition raises the incomes of domestic workers and drives down the income of domestic capitalists, giving local capital owners incentive to use their influence on policymakers to restrict foreign ownership. Although the argument on the changes in domestic income is consistent with some empirical observations (Aitken et al., 1996; Lipsey & Sjöholm, 2004; Hijzen et al., 2013), they appear static only with no model specification. In order to examine the impact of the entry of FDI firms on the distribution of both income and wealth, we formalize and extend Pandya’s argument to a dynamic model by incorporating this mechanism into the traditional dynasty framework.

Dynasty framework is a series of previous models⁴ that progressively build on each other to analyze the dynamics of household wealth distribution and development under credit market imperfections. Based on the dynasty framework reviewed by Matsuyama (2011), we build a new version that includes the entry of FDI firms as an additional foreign factor to a closed economy. In the traditional dynasty framework, changes in wealth distribution are generated by the borrowing constraint which prevents poor individual agents from accessing loans, thereby establishing a barrier between rich and poor agents. From the perspective of the credit market, the borrowing constraint also plays a crucial role in differentiating domestic firms, owned by local entrepreneurs, and FDI firms. Taking advantage of this feature, we introduced the entry of FDI firms into the framework by incorporating the differences in credit constraints between these two types of firms. In particular, unlike the domestic firms, FDI firms can come from any country from the “rest of the world,” and the “rest of the world” is assumed to be creditworthy such that their credit constraint is not their major concern. Whenever profit remains positive, FDI firms can always afford the setup costs and enter the domestic economy. The entry of FDI firms then affects the overall structure of the labor market, followed by an endogenous change in the domestic wealth distribution.

By providing country-specific conditions under which the entry of FDI firms alters the distribution of domestic wealth and by examining such alternations dynamically, the paper identifies four engaging scenarios for the entry of FDI firms. The first scenario is that, by providing a “push” to move the poorer members of society out of a poverty trap, the entry

Sylwester (2005) find no evidence of a significant relationship between FDI and income inequality.

⁴See Galor and Zeira (1993), Banerjee and Newman (1993), Aghion and Bolton (1997), and Matsuyama (2006).

of FDI firms yields *good* equality in wealth distribution and job selection among domestic agents. In the second scenario, the entry of FDI firms worsens the financial condition of all domestic entrepreneurs, leaving all local agents no choice other than to work as workers for FDI firms, thus leading to *bad* equality. In the third scenario, by redistributing wealth to make the wealthiest agents, who survive the competition in the labor market with FDI firms, better off, this entry widens the gap between the rich and poor, thus bringing about greater inequality. Along with the discussion of these three scenarios, whereby the wealth distribution and the job composition are significantly changed, we also examine another modest but feasible post-FDI scenario called the “middle-income trap.” In this middle-income trap scenario, the participation of FDI firms can make domestic workers slightly better off, but they still cannot change their status as workers; thus, this entry simply makes the economy more equal without any changes in job composition. In sum, the findings do not simply conclude that the effect of the FDI firms’ entry is monotonically positive or negative, but describe it as a transition path from the initial entry of FDI firms to the steady state, providing a rich set of scenarios. In addition, we identify four specific factors that determine the effects of FDI firms’ entry, namely, the cost of starting a new business, the bequest motive, the world interest rate, and the labor productivity in the host country. In particular, when there is a lower cost of starting a new business, a greater bequest to the next generation, a higher world interest rate, or higher labor productivity, the entry of FDI firms is more likely to lead the economy of the host country toward a new steady state where all domestic agents experience better equality in either wealth distribution or both wealth distribution and job selection. Furthermore, we also provide numerical examples to illustrate each scenario and their determinants.

The remainder of the paper is organized as follows. Section 2 presents the basic model. Section 3 provides the theoretical analysis. Section 4 discusses the numerical examples. Section 5 concludes.

2 The model

This section presents a model that introduces the entry of FDI firms within a closed economy as an additional foreign factor. The model is based on the dynasty framework presented by Matsuyama (2011).

The basic assumptions of the model are as follows. Consider a country that consists of an infinite number of generations. Each generation has a unit mass of identical agents who live for only one period. The size of the population is assumed to be continuous and set to one. There is a single numeraire good that can be allocated to consumption, inheritance, or investment. The country is assumed to be a small open economy where

the interest rate, r , is determined exogenously depending on the current world rate, $r \geq 1$.

Domestic agents

Agents in the economy are individuals who are assumed to be homogeneous in ability but heterogeneous in initial wealth. Regarding initial wealth, at the beginning of period t , a representative $Agent_t$ inherits h_t units of the numeraire good from his parent. Then, based on the size of the inheritance received, he decides to either run a business as an entrepreneur or work as a worker for another firm. This job selection allows for the endogenous entry and exit of entrepreneurs, which is an important channel of resource allocation. At the end of the period, the agent derives utility by consuming c_t and by leaving an inheritance h_{t+1} to the next generation. Thus, the utility function is

$$U_t = c_t^{1-\beta} h_{t+1}^\beta, \quad (1)$$

where β is the bequest share.

If $Agent_t$ decides to become a worker, he can work in a domestic or an FDI firm and earn a wage of w_t . At the beginning of period t , a worker does not need to spend money on either consumption or investment, so he lends all his idle inheritance, h_t , at interest rate r . Thus, at the end of period t , his wealth is $w_t + rh_t$.

If $Agent_t$ decides to become an entrepreneur, he establishes a domestic firm and enjoys its profit. Because agents in the economy are assumed to be homogeneous in ability, all domestic firms share an identical production function such as:

$$Y_t = \phi(l_t), \quad (2)$$

where $\phi' > 0$, $\phi'' < 0$, $\phi(0) = 0$, and l_t is the number of workers working in this domestic firm, $l_t \leq 1$. Labor is the sole production input. To start a firm, the entrepreneur must pay a setup cost F , where $F \geq 0$. At the beginning of period t , if he has more wealth than the setup cost, he can lend the remainder, after paying F , at interest rate r . Thus, the wealth of the entrepreneur at the end of period t , can be derived as $\phi(l_t) - w_t l_t + r(h_t - F)$, where $w_t l_t$ is the labor cost. If we separate the part that varies with the number of workers, $\phi(l_t) - w_t l_t$, and denote it as $\pi(l_t)$, the wealth of the entrepreneur can be rewritten as $\pi(l_t) + r(h_t - F)$. In order to maximize the profit, the entrepreneur determines the optimal number of workers to recruit. His profit maximization condition takes the form $w_t = \phi'(l_t)$, hence the optimum number of workers is $l_t = \phi'^{-1}(w_t)$. Following that, we obtain an intuitive interpretation that the optimum number of workers is a decreasing function of wage, i.e., $l'(w_t) < 0$.

Every entrepreneur is subject to two constraints, a profitability constraint and a borrowing constraint. First, in terms of the profitability constraint, an entrepreneur has no incentive to invest unless his income is greater than that of a worker who receives the same amount of inheritance. Thus, his profitability constraint is

$$\pi(l_t) + r(h_t - F) = \pi(l(w_t)) + r(h_t - F) \geq w_t + rh_t.$$

This is equivalent to $\pi(w_t) - w_t \geq rF$. For w_t to satisfy the profitability constraint,

$$w_t \leq w^*, \tag{3}$$

where w^* is a solution of the equation $\pi(w_t) - w_t = rF$.⁵

Second, in terms of the borrowing constraint, we assume that an agent can only run a business if his initial wealth can cover the setup cost, F . This means that an agent cannot access a loan to cover the shortage of the setup cost to start a business. This assumption is consistent with the case of developing countries where the credit market has not been developed yet, or in other words, the domestic credit market is still imperfect. Based on this assumption, the borrowing constraint can be expressed as follows:

$$h_t \geq F. \tag{4}$$

FDI firms

A new addition to the basic framework in Matsuyama (2011) is the introduction of FDI firms to a closed economy. FDI firms in this model are defined as firms that are controlled by foreign agents. In contrast to domestic firms in the host country, the most important assumption relevant to FDI firms here, novel to this paper, is that they do not face any borrowing constraints. FDI firms come from the “rest of the world,” and the “rest of the world” is large and wealthy enough to ensure that as long as the profitability constraint is satisfied, FDI firms can access global finance to make a loan of up to the amount of the setup cost, F . Thus, there exist FDI firms that can afford to pay a setup cost to enter this economy. FDI firms enter the economy of the host country, hiring workers for

⁵This equation always has a unique solution because the left-hand side is a decreasing function of w_t . This is true because the profit function, $\pi(w)$, which is defined as $\phi(l(w)) - wl$, is also a decreasing function of w . We can prove this as follows. When we differentiate the profit function with respect to the wage, w , we have $\pi'_w = \phi'_l l'_w - (l + wl'_w)$. Under the profit maximization problem of domestic firm, $w = \phi'_l$, the differentiation of profit can be rewritten as $\pi'_w = -l$, which is negative. Thus, profit function is a decreasing function of the wage.

production, and at the end of the period, they repatriate the income earned back to their home countries.

Note that, in this paper, we do not focus on the potential effects of FDI firms such as technological and human capital spillovers, or competition in domestic goods markets.⁶ Thus, we assume that FDI firms have the same production function as domestic firms, i.e., $Y_t = \phi(l_t)$.

Similar to domestic firms, FDI firms also face a profitability constraint. These firms always invest if the profit can cover the setup cost. Thus, its profitability constraint is as follows:

$$\pi(w_t) \geq rF.$$

For w_t to satisfy the profitability constraint,

$$w_t \leq w^{**}, \tag{5}$$

where w^{**} is a solution of the equation $\pi(w_t) = rF$. It is obvious that if the profitability constraint of a domestic firm is satisfied, that of FDI firms also holds, i.e., $w^{**} \geq w^*$.⁷

Furthermore, one more realistic fact underlying FDI firms in this model is that such firms face entry restrictions. Entry restrictions on FDI firms include not only formal restrictions on investment under the Investment Law, but also informal restrictions on an ad hoc basis by regulatory authorities (Pandya, 2014). In this model, we integrate all entry restrictions on FDI firms into an assumption that the ratio of the number of FDI firms to the domestic population, θ , is given, where $\theta > 0$.

Labor market

In the labor market, labor supply, defined as the participation in the labor force, is the number of people who cannot satisfy the borrowing constraint or people who fulfill such a constraint but do not satisfy the profitability constraint to run a firm. When the wage is lower than w^* , under the profitability condition, all potential agents whose initial wealth can cover the setup cost choose to become entrepreneurs. Thus, labor supply is precisely equal to the rest of the population who cannot satisfy the borrowing constraint. However, when the wage is higher than w^* , there will be no advantage in becoming entrepreneurs,

⁶For details of such effects, see Markusen and Venables (1999), Fosfuri et al. (2001).

⁷We prove the inequality $w^{**} \geq w^*$ here. First, w^* is a solution of the equation $\pi(w_t) - w_t - rF = 0$ at period t , that is, $\pi(w^*) - w^* - rF = 0$. This is equivalent to $\pi(w^*) - rF = w^* > 0$ because w^* is positive. Thus, when we solve the equation $\pi(w) - rF = 0$, the solution w^{**} must be higher than w^* , because the left-hand side of this equation is a decreasing function of wage.

and labor supply equals the entire population. Labor supply is summarized such as:

$$L_t^S = \begin{cases} G_t(F) & w_t \leq w^* \\ 1 & w_t > w^*, \end{cases}$$

where $G_t(F)$ denotes the fraction of the agents whose inheritance is less than the setup cost, F , at period t .⁸ In fact, when w_t equals w^* , labor supply, L_t^S , can be either $G_t(F)$ or 1. In the case that these variables equal, to avoid duplication, we take the initiative to define labor supply as $G_t(F)$. A similar discussion on dealing with such an equality applies to labor demand.

Labor demand is the number of workers that firms operating domestically need to employ to maximize their profit. We examine two cases: the first, with no FDI firms, and the second, with existing FDI firms. In the first case, where there is no FDI firm, when the wage is lower than w^* , the profitability constraint is satisfied. All agents who can afford the setup cost will start their businesses, taking advantage of a profit opportunity because of low labor costs. Thus, in this case, labor demand is the total number of workers hired by all domestic firms at such a wage. When the wage is higher than w^* , no agent can earn profit income higher than their wage income; thus, there are no domestic firms and no labor demand. Labor demand in the case of no FDI firms is defined such as:

$$L_t^D = \begin{cases} (1 - G_t(F))l(w_t) & w_t \leq w^* \\ 0 & w_t > w^*, \end{cases}$$

where the term on the right-hand side of the first equation is a multiplication of the number of local firms, $1 - G_t(F)$, and the number of workers hired by such a firm at wage w_t , $l(w_t)$.

Next, we investigate the second case, the case of existing FDI firms. Similarly, because of the profitability constraints of both domestic and FDI firms, we consider three ranges of wage which are lower than w^* , between w^* and w^{**} , and higher than w^{**} . First, with the wage lower than w^* , both types of firms satisfy the profitability constraints; thus, labor demand is the total number of workers hired by both domestic and FDI firms at such low wages. Second, when the wage ranges between w^* and w^{**} , only FDI firms satisfy the profitability constraint; thus, labor demand is the total number of workers hired by only FDI firms at such medium wages. Third, when the wage is higher than w^{**} , no firm finds it profitable enough to run the business; thus, labor demand remains at zero. Therefore, labor demand in the case of existing FDI firms is as follows:

⁸Refer to borrowing constraint in equation (4).

$$L_t^D = \begin{cases} (1 - G_t(F))l(w_t) + \theta l(w_t) & w_t \leq w^* \\ \theta l(w_t) & w^* < w_t \leq w^{**} \\ 0 & w_t > w^{**}. \end{cases}$$

The first term on the right-hand side of the first equation indicates the total number of workers in domestic firms, while the second one shows the total number of workers who are hired by FDI firms.

The market clears when labor demand equals labor supply, $L_t^S = L_t^D$. Under this market clearing condition, we solve for the equilibrium wage at period t , \hat{w}_t . All firms operating domestically share this common wage.

Bequest rules

Based on the utility function in equation (1), to maximize utility, $Agent_t$ should leave an inheritance equal to a fraction, β , of his wealth at the end of period t . We consider the bequest rule of an agent in two cases: the inheritance he receives from his parent is lower or higher than the setup cost. When the inheritance the agent receives from his parent is lower than the setup cost, he has no choice other than becoming a worker. Thus, the inheritance he leaves for his child is the fraction β of his income earned as a worker. A similar analysis applied to the remaining case yields that when an agent becomes an entrepreneur, at the end of period t , he leaves an inheritance for his child equal to the fraction β of his income earned as an entrepreneur. This bequest rule is shown as follows:

$$h_{t+1} = \begin{cases} \beta(\hat{w}_t + rh_t) & h_t \leq F \\ \beta(\pi(\hat{w}_t) + r(h_t - F)) & otherwise. \end{cases} \quad (6)$$

3 Theoretical analysis

We analyze the impact of the entry of FDI firms on wealth distribution and job composition dynamics in this section.

3.1 Wage movement and wealth dynamics

First, regarding wage movements, we recognize that while there is no change in labor supply, labor demand increases because of the entry of FDI firms. This change in labor demand leads to an increase in the equilibrium wage; thus, we conclude that immediately after the entry of FDI firms, the equilibrium wage increases. This conclusion is consistent with the line of empirical research investigating the effect of FDI on the domestic wage rate (Aitken et al., 1996; Lipsey & Sjöholm, 2004; Hijzen et al., 2013).

Next, because of the conclusion of the wage movement, we analyze the wealth dynamics in response to the FDI firms' entry. Based on the bequest rule derived in equation (6), we illustrate the transition of domestic wealth, or in other words, the transition of inheritance, in Figure 1. The horizontal axis corresponds to the inheritance that $Agent_t$ receives from

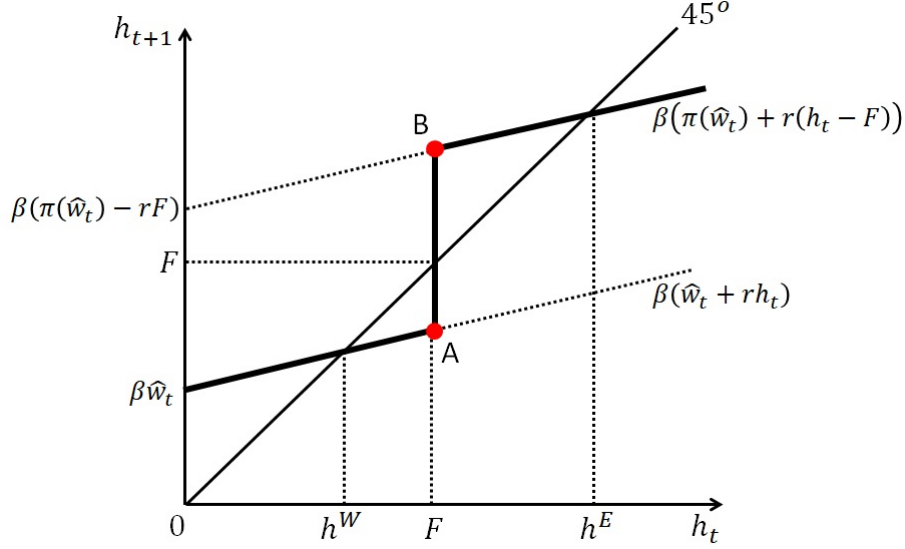


Figure 1: Initial wealth dynamics without FDI firms

his parent, h_t , and the vertical axis corresponds to the inheritance he leaves to his child, h_{t+1} . To the left of F lies the line $\beta(\hat{w}_t + r h_t)$, called the “lower line,” showing the transition of a worker’s wealth. The line $\beta(\pi(\hat{w}_t) + r(h_t - F))$ to the right of F , called the “upper line,” indicates the transition of an entrepreneur’s wealth. Point A lies on the “lower line” at $h_t = F$, while point B is located on the “upper line” at the same position of h_t . The equilibrium wage obtained in the labor market determines the position of these two lines in each period. However, note that, because of the profitability constraint of domestic firms, the “upper line” is always vertically higher than the “lower line.”

At the steady state, the size of the inheritance that an agent leaves to his child is exactly equal to how much he receives from his parent, i.e., $h_t = h_{t+1}$. Under the assumption that $\beta r < 1$, the steady state exists. The wealth of workers at the steady state, obtained at the intersection of the “lower line” and the 45-degree line, is $h^W = \frac{\beta \hat{w}}{1 - \beta r}$. On the other hand, the steady-state wealth of entrepreneurs, which lies at the intersection of the “upper line” and the 45-degree line, is $h^E = \frac{\beta(\pi(\hat{w}) - rF)}{1 - \beta r}$, where \hat{w} is the wage at the steady state. We name this steady state as the “poverty trap,” in which the population remains polarized between workers and entrepreneurs. Workers are caught in a trap where their inheritance never exceeds the setup cost to start a business without an external shock. Besides, it is important to note that because every agent in the economy is homogeneous

in ability, the graph of the wealth transition can be applied to any agent in the economy.⁹

Immediately FDI firms enter the economy, the equilibrium wage increases. This increase causes shifts in the wealth transition paths of all agents. The increase in the equilibrium wage raises income and, thus, increases the inheritance of the next generation of workers. However, the increase in the equilibrium wage decreases the profit of the entrepreneurs and, thus, reduces their income and subsequently lowers the inheritance left to their children. Therefore, the transition path of a worker's wealth moves upwards, while that of an entrepreneur's wealth moves downwards.

With such shifts, the relative positions of points A and B change, altering the steady-state wealth of all the agents. In particular, upon the upward shift of the "lower line," point A moves vertically upward. If point A moves to an allocation above the 45-degree line, the intersection between this line and the "lower line" disappears. The same situation happens to the intersection of the 45-degree line and the "upper line" when point B moves to an allocation below the 45-degree line upon the downward shift of the "upper line." Therefore, depending on the new positions of points A and B, the entry of FDI firms yields four different steady states for the economy: 1. Middle-income trap, 2. FDI-push, 3. FDI-dominance, and 4. Inequality. We describe these scenarios in the next section.

3.2 The steady states

In this section, we use figures to identify the characteristics of the four steady states and explain the process of transition in each of them. Note that, in these figures, the dotted line corresponds to the period just before FDI firms enter, the dark-colored solid line presents the steady state, and the light-colored solid line, if any, shows an arbitrary period during the transition process toward the steady state.

Scenario 1: Middle-income trap

In this scenario, equality is improved, but the job composition does not change upon the entry of FDI firms. Figure 2 illustrates how this happens. Graphically, when the new points A and B still lie below and above the 45-degree line, respectively, a new steady state exists, remaining the existence of both entrepreneurs and workers. At the new steady state, agents whose initial wealth is smaller than the setup cost, F , can never become entrepreneurs. In contrast, agents, whose initial wealth can cover such a cost, leave an amount of inheritance higher than F so that their descendants can still run a business. Hence, the job composition does not change. However, because of the increase

⁹Graphically, the condition for the existence and stability of the steady state is that points A and B lie below and above the 45-degree line, respectively. We discuss this condition mathematically in Section 3.3.

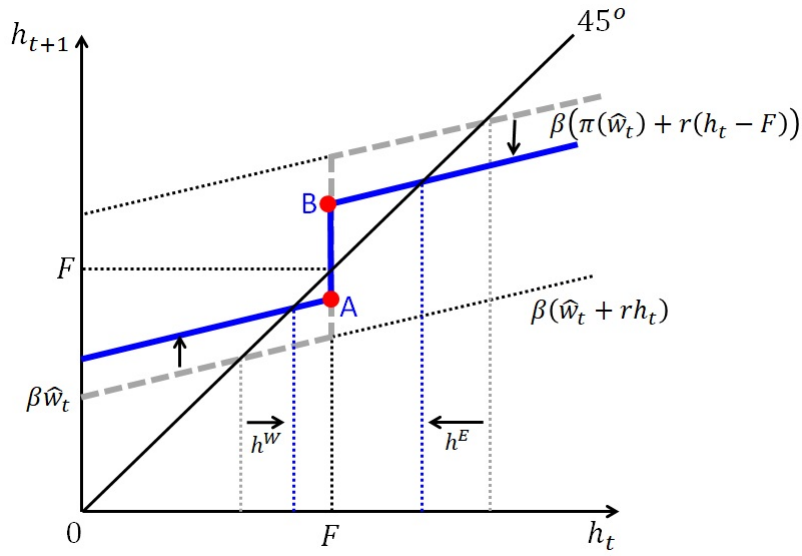


Figure 2: Middle-income trap

in equilibrium wage, the steady-state wealth of workers, $h^W = \frac{\beta\hat{w}}{1-\beta r}$, increases, while that of entrepreneurs, $h^E = \frac{\beta(\pi(\hat{w})-rF)}{1-\beta r}$, falls. Workers become better off, while entrepreneurs become worse off; thus, the entry of FDI firms in this scenario increases equality in the economy. We call this steady state the “middle-income trap.”

Scenario 2: FDI-push

Figure 3 illustrates this scenario. This scenario occurs when both points A and B move

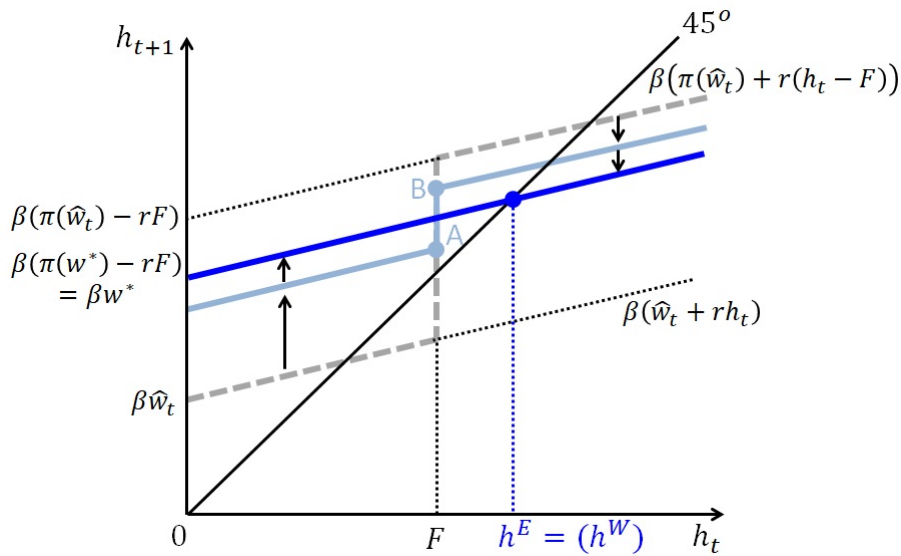


Figure 3: FDI-push

to allocations above the 45-degree line. In this scenario, workers can escape from the poverty trap and become entrepreneurs. The transition process toward this steady state is as follows. First, although the increase in the equilibrium wage upon the entry of FDI firms does not affect the number of existing entrepreneurs even if there is a loss in profit, it can raise the wealth of all workers so that some of the relatively rich ones become wealthy enough to leave sufficient inheritance for their children to run a business. That is, the children of these rich workers become entrepreneurs, leading to a shrinkage of labor supply and an increase in labor demand. As a result, the equilibrium wage increases further and, thus, more workers can become entrepreneurs. This process repeats itself continuously until the income levels of workers and entrepreneurs are equivalent. The equality sign in the profitability condition for domestic firms holds, leading to indifference with respect to an agent's job selection. Furthermore, the bequest rules of all agents are identical such that each agent leaves for his child the same fraction β of his income at the end of period t ; thus, the wealth levels of workers and entrepreneurs are also equivalent. The "lower line" and "upper line" now merge into a single line lying between their original positions. The wealth transition path for all agents that determines the steady state is shown as the dark-colored solid line in Figure 3. In this scenario, every agent has the same level of wealth, which is higher than, or at least equal to, the setup cost, i.e., $h^E = h^W \geq F$. Therefore, the entry of FDI firms in this scenario acts as a "push," erasing the differences in wealth distribution and job selection among domestic agents. The economy achieves perfect equality; furthermore, it is a *good* equality. We call this scenario the "FDI-push."

Mathematically, the wage at the steady state in this scenario satisfies the three following properties. First, the steady-state wage makes the "lower line" and the "upper line" merge, yielding equality in the profitability constraint. That is, $\pi(l(w_t)) + r(h_t - F) = w_t + rh_t$, or we can rewrite this as $\pi(w_t) - w_t = rF$. As we already solved this equation in the setting of the profitability constraint, the equilibrium wage is w^* . Second, the steady-state wage satisfies the labor market clearing condition under the case of existing FDI firms, that is $(1 - G^*(F))l(w_t) + \theta l(w_t) = G^*(F)$, where $G^*(F)$ is the share of labor at the steady state. Following this, we find that $G^*(F) = \frac{(1+\theta)l(w^*)}{1+l(w^*)}$. Third, the wealth arising from this steady-state wage must be higher than, or at least equal to the setup cost, F . The steady-state wealth satisfies the condition $h_{t+1} = h_t = h^*$, or $\beta(w^* + rh^*) = h^*$; thus, $h^* = \frac{\beta w^*}{1-\beta r}$ ($= h^E = h^W$). To satisfy the third condition, we must have $\frac{\beta w^*}{1-\beta r} \geq F$, or $w^* \geq \frac{F(1-\beta r)}{\beta}$. Under these three conditions, the economy achieves perfect equality, and the shares of workers and entrepreneurs are $\frac{(1+\theta)l(w^*)}{1+l(w^*)}$ and $\frac{1-\theta l(w^*)}{1+l(w^*)}$, respectively.

Next, scenarios 3 and 4 occur when both points A and B move to allocations below the 45-degree line upon the entry of FDI firms. We describe the transition process ap-

proaching this steady state as follows. First, although the increase in the equilibrium wage in response to the entry of FDI firms does not affect the number of existing workers, it reduces the profit of entrepreneurs significantly such that this reduction makes all entrepreneurs poorer. Some entrepreneurs cannot provide large inheritances that would allow their children to run a business; thus, the next generation has no choice other than becoming workers, leading to an increase in labor supply and a decrease in labor demand. This change in the labor market leads to an adverse reduction in the equilibrium wage. Thus, in these scenarios, the equilibrium wage first increases and then declines because of the endogenous change in job composition. Graphically, the “lower line” and “upper line” initially move toward each other in response to the wage-increasing effect of the entry of FDI firms. However, soon afterward, they move back again. This reverse movement of the wealth transition paths of workers and entrepreneurs makes these scenarios more complicated than the previous two. How far the two lines move away from each other determines the properties of the new steady state. The formation of this movement depends mainly on the initial wealth distribution of this economy at the time FDI firms enter.

Scenario 3: FDI-dominance

In this scenario, whereby all entrepreneurs in the economy are not wealthy enough to

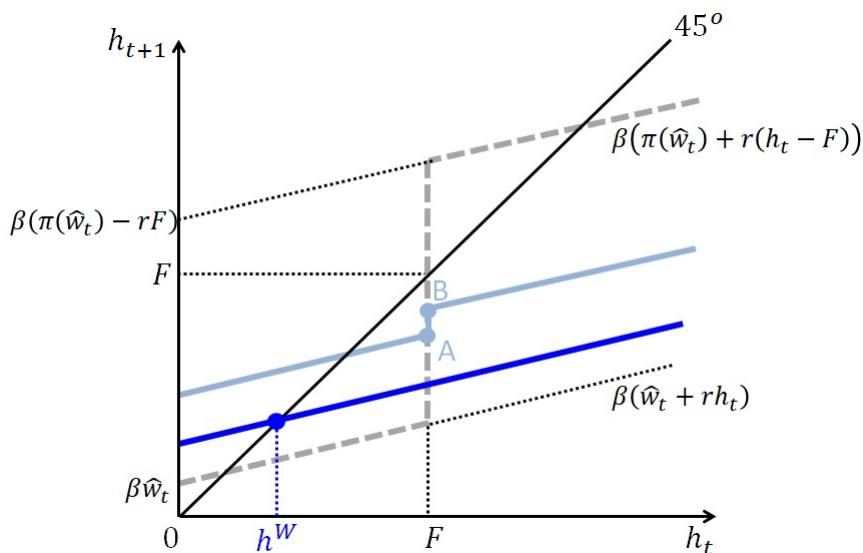


Figure 4: FDI-dominance

withstand the significant profit loss caused by the increase in wages in response to the entry of FDI firms, all of them are incapable of leaving a substantial inheritance. The

next generation cannot run businesses continuously and become workers. As a result, the labor supply eventually equals the entire population, and labor demand is now the purview of FDI firms only. In particular, the large increase in labor supply, together with the decrease in labor demand, leads to a decrease in equilibrium wage. No agent in an economy, where the entire population works as workers, can change his status to be an entrepreneur; subsequently, all domestic agents work for FDI firms. The economy achieves perfect equality, and the labor share equals one. The steady-state wage is the solution of the labor market clearing condition where labor demand equals labor supply, that is $\theta l(w) = 1$. The inheritance of all domestic agents at the steady state in this scenario is lower than the setup cost, F . Thus, this scenario yields a *bad* equality, and we call it “FDI-dominance.” Figure 4 illustrates this situation. Every agent in this economy now shares the same steady-state wealth at $h^W = \frac{\beta \hat{w}}{1 - \beta r}$.

Scenario 4: Inequality

In this scenario, the increase in wage caused by the entry of FDI firms, followed by the profit loss, increases the number of domestic entrepreneurs who become unable to leave their children enough inheritance to run a business. However, this profit loss does not last forever. The market exit of poor entrepreneurs leads to an increase in labor supply and a decrease in labor demand, resulting in a wage reduction, thus easing the loss in profits of the remaining entrepreneurs. Thus, if these relatively wealthy entrepreneurs can survive until this loss ends, they can maintain large inheritances for their children to run a business. At the new steady state, the number of workers increases, while that of entrepreneurs decreases, but does not decrease to zero. Following that, the wealth of workers decreases, while that of the remaining entrepreneurs increases. The result that a small number of entrepreneurs own large amounts of wealth, while a large number of workers own small amounts of wealth, widens the gap between the wealth of workers and entrepreneurs, explaining the possible greater inequality in response to the entry of FDI firms. Thus, we name this scenario “inequality.” Figure 5 shows such an example.

3.3 Conditions of the four scenarios

In this section, we examine the conditions under which these four scenarios may occur. First, we discuss the conditions under which workers and entrepreneurs exist. The condition for the existence of workers or entrepreneurs or both depends on the comparative positions of the “lower line” and “upper line” on the plane of the wealth transition path.

If the “lower line” and 45-degree line intersect, workers exist, and the intersection determines their steady-state wealth, h^W . This happens if and only if point A lies below the 45-degree line, or

$$\beta(\hat{w}_t + rF) \leq F.$$

This is equivalent to $\hat{w}_t \leq \hat{w}_1$, where $\hat{w}_1 \equiv F(1 - \beta r)/\beta$. Thus, \hat{w}_1 is the maximum wage that ensures the existence of the workers. This is because if the wage is higher than \hat{w}_1 , workers become wealthy enough to leave their children an amount of inheritance that can cover the setup cost to run a business. As a result, under the profitability constraint, no one becomes a worker.

On the other hand, if the “upper line” and 45-degree line intersect, entrepreneurs exist and the intersection determines their steady-state wealth, h^E . This happens if and only if point B lies above the 45-degree line, or

$$\beta(\pi(\hat{w}_t) + r(F - F)) \geq F.$$

This can be rewritten as $\pi(\hat{w}_t) \geq F/\beta$; thus, the equation now is equivalent to $\hat{w}_t \leq \hat{w}_2$, where \hat{w}_2 is the solution of equation $\pi(\hat{w}_t) = F/\beta$. Thus, \hat{w}_2 is the maximum wage that ensures the existence of the entrepreneurs. This is because if the wage is higher than \hat{w}_2 , the loss in profit decreases the entrepreneur’s wealth, making them unable to leave enough inheritance for their children to start a business; thus, there exist no entrepreneurs in this economy.

Next, we discuss the conditions under which the four scenarios described Section 3.2 may occur. The first is scenario 1, the middle-income trap. In this scenario, there exist both workers and entrepreneurs and, thus, points A and B lie below and above the 45-degree line, respectively. The condition for this scenario is as follows:

$$\hat{w}_t \leq \min(\hat{w}_1, \hat{w}_2).$$

Intuitively, we know that when the equilibrium wage is low, workers are so poor that they can never own a business, whereas entrepreneurs earn such a high profit that they can leave enough inheritance to their children to run a business. Therefore, the economy will

contain both workers and entrepreneurs.¹¹

The second is scenario 2, the FDI-push. In this scenario, workers can escape from the poverty trap, while the existing entrepreneurs remain. The scenario occurs when both points A and B lie above the 45-degree line, meaning that the condition guaranteeing the position of these two points can lead to better equality. That is

$$\hat{w}_1 < \hat{w}_t < \hat{w}_2.$$

Next, we consider scenarios 3 and 4, which are FDI-dominance and inequality, respectively. In these scenarios, both points A and B lie below the 45-degree line. The condition of the equilibrium wage for this scenario is as follows:

$$\hat{w}_2 < \hat{w}_t < \hat{w}_1.$$

Scenario 1 differs from the other three scenarios in that the comparison between \hat{w}_1 and \hat{w}_2 does not affect the result. However, the specific conditions on this comparison for scenarios 2, 3, and 4 are significantly different. The main difference between scenario 2 and the other two scenarios is that in scenario 2, $\hat{w}_1 < \hat{w}_2$, while in scenarios 3 and 4, the reverse is true.

To compare \hat{w}_1 and \hat{w}_2 , first we note that the profit function is a decreasing function of the equilibrium wage. Following that, the necessary condition for the FDI-push scenario (scenario 2), $\hat{w}_1 < \hat{w}_2$, is satisfied if and only if profit calculated at \hat{w}_1 is higher than that calculated at \hat{w}_2 , i.e., $\pi(\hat{w}_1) > \pi(\hat{w}_2)$. This condition is rewritten as follows:

$$\pi\left(\underbrace{\frac{F}{\beta}(1 - \beta r)}_{\hat{w}_1}\right) > \frac{F}{\beta}. \quad (7)$$

This equation is applied to derive the following proposition.

Proposition. *The FDI-dominance or inequality scenario (FDI-push scenario) cannot exist if at least one of the conditions below holds:*

- *The setup cost is sufficiently low (high).*
- *The bequest share is sufficiently high (low).*
- *The interest rate is sufficiently high (low).*
- *The host country's labor productivity is sufficiently high (low).*

¹¹This is also similar to the condition on the existence and stability of the steady state prior to the entry of FDI firms discussed in Section 3.1.

Mathematically, when F is low, or β and r are high, equation (7) holds, making \hat{w}_1 more likely to be smaller than \hat{w}_2 ; thus, the FDI-dominance or inequality scenario cannot occur. Intuitively, first, if the cost required to start a firm is low, it is easier for agents with moderate inheritance to become entrepreneurs, especially agents whose inheritances are very close to F . Once those agents become entrepreneurs, the structure of the labor market changes with demand increasing and supply decreasing, raising the equilibrium wage, making it easier for others to become entrepreneurs as well. The role of the setup cost leads to a policy implication. The setup cost used in this chapter is the expense associated with the entire process of establishing a new firm. Part of this cost is related to government policies, both tangible (i.e., legal and professional fees, license, etc.) and intangible (i.e., registration time, administration, corruption, etc.). Therefore, together with accepting FDI firms, if the government imposes policies that ease the environment for firm establishment, the economy can achieve better equality. Second, if the bequest share of the agent is high, or in other words, he is altruistic, the inheritance increases. Third, when the interest rate is high, although none of the agents can borrow, returns to lenders increase because of the high capital gains. In this case, the wealth of workers increases and, thus, the inheritance increases as well. Finally, if the host country's labor productivity is high, the wealth of all domestic agents increases. It is obvious that the higher the wealth is, the greater the inheritance becomes, and more workers can become entrepreneurs. Therefore, the economy cannot converge to scenario 3 or 4. Only scenario 1 or 2 occurs, leading to better equality in either wealth distribution as in scenario 1 or both wealth distribution and job selection as in scenario 2.

4 Numerical examples

The goal of this section is to illustrate quantitatively the four scenarios discussed in Section 3.2 by introducing a numerical simulation analysis using assumed parameter values.

4.1 Specific functions and parameter settings

First, the model is approximated by a discrete number of domestic agents in order to be tractable for the simulation. Here, we suppose the size of the population is L .

Second, functions used in the model need to be explicitly specified. The production function is assumed to have the following form:

$$Y_t = \phi(l_t) = Al_t^\alpha,$$

where A is an index of technology and α is the output elasticity with respect to labor.

Third, inheritance is different for each agent. The initial wealth distribution is assumed to take the Pareto distribution form. Thus, the initial inheritance of agent i is

$$h_0^i = (h_0^{max} - h_0^{min}) \left(\frac{i}{L} \right)^k, \quad i = 1 \cdots L, \quad (8)$$

where k is the parameter of the Pareto distribution, and h_0^{max} and h_0^{min} are the initial wealth of the wealthiest and poorest agents, respectively.

Finally, in the benchmark scenario, all the parameters in the model are set as in Table 2.

Table 2: Some specific parameters

Parameter	Value	Note
α	0.5	Output elasticity with respect to labor
β	0.5	Bequest share
r	1.1	World interest rate
F	0.8	Setup cost
A	1	Index of technology
h_0^{max}	$3F$	Initial wealth of the wealthiest agent
h_0^{min}	$0.01F$	Initial wealth of the poorest agent
θ	0.01	Share of FDI firms over population of the host country
k	20	Parameter of Pareto distribution
L	10,000	Population size

With this setting, about 6% of the population in the initial distribution can become entrepreneurs.

4.2 Findings

This section discusses the numerical examples. In the theoretical analysis on the four scenarios in Section 3.2, we mentioned the dependence of scenarios 2 and 4 on the wealth diversity of workers and entrepreneurs, respectively. Thus, for scenarios 2 and 4, FDI firms are assumed to enter when the economy is **not** at a steady state. In contrast, scenarios 1 and 3 can occur regardless of the status of the economy at the time FDI firms enter. Therefore, in order to clarify the difference among the four scenarios, we simulate all of them with regard to the case where FDI firms enter when the economy is **not** at its steady state.¹² When the economy is not at its steady state, we assume its initial wealth

¹²To check the robustness, the simulation results of scenarios 1 and 3 for the case where FDI firms enter when the economy is at its steady state are shown in the Appendix.

distribution at the time FDI firms enter to be defined as in equation (8). Here, among four determinants of the impact of FDI firms mentioned in the Proposition, we adjust bequest share, β , to demonstrate the four scenarios quantitatively. The simulation results are shown in Figures 6 to 9.

Each figure has four panels labelled a to d. In panels a, b, and c, the horizontal axes indicate time (period). The solid lines show the transition paths of three factors, i.e., wage, worker share, and Gini coefficient, in response to the entry of FDI firms at period 1. To compare with the case of no FDI firm, we let the dotted lines illustrate the steady-state level of those three factors when there is no FDI firm entering the economy. Note that such steady-state levels do not correspond to the time measures on the horizontal axis. Panel d shows the steady-state wealth of all domestic agents in both cases, with and without FDI firms. All agents in the economy are ordered from the poorest to the wealthiest along the horizontal axes. The solid line shows the steady-state wealth of the case where FDI firms enter, while the dotted line illustrates that of the case with no FDI firm.

Scenario 1: Middle-income trap (benchmark)

This benchmark scenario corresponds to scenario 1, the “middle-income trap.” The simulation results are described in Figure 6 with benchmark parameters shown in Table 2.

Figure 6a shows the wage schedule. As the solid line lies above the dotted line, the wage is found to be higher in the case of FDI firms compared with the case of no FDI firm. Furthermore, the wage remains unchanged for the entire period, indicating that after FDI firms enter the host country in period 1, there is no flow from the pool of workers into the pool of entrepreneurs or vice versa. When there is no change in the composition of labor supply and demand, the wage takes a constant value, which is equal to the steady-state value.

Figure 6b shows no change in the worker share compared with that at the steady state of the case with no FDI firm. The worker share is 94.6%.

Figure 6d shows the steady-state wealth distribution with regard to two cases, with and without FDI firms. We can observe the difference in agents’ wealth and the indifference in the job composition. Because of the increase in wages, workers become richer, while entrepreneurs become poorer upon the entry of FDI firms. The wealth of domestic workers and entrepreneurs at the steady state is 9.3% higher and 14.1% lower, respectively, compared with the case of no FDI firms.

Finally, Figure 6c shows a lower Gini coefficient at the steady state in the case of FDI firms compared with the case of no FDI firms, representing greater equality. Thus,

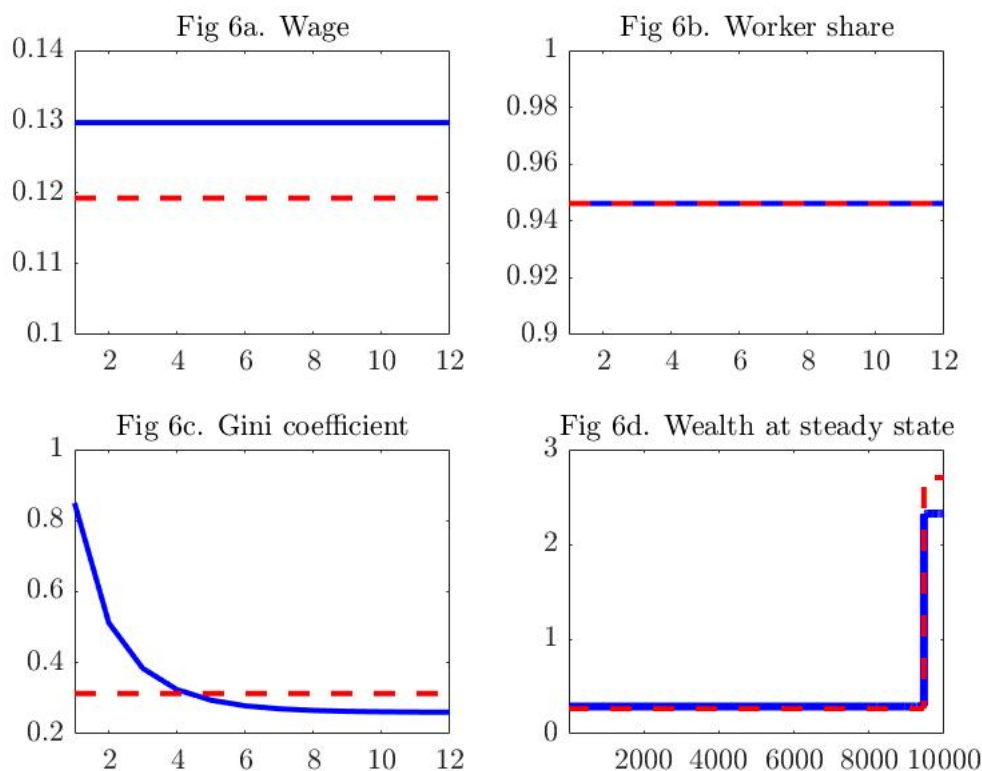


Figure 6: Middle-income trap (benchmark) scenario

in this economy, the entry of FDI firms, followed by better-off workers and worse-off entrepreneurs, brings an improvement in equality.

Scenario 2: FDI-push

Figure 7 shows the simulation results of scenario 2, named “FDI-push,” with the bequest share increasing from 0.5 (benchmark scenario) to 0.8.

As the equilibrium wage rises soon after the entry of FDI firms and the bequest share is high enough, the inheritance that workers leave to the next generation increases significantly so that their children can afford the setup cost. Because of the profitability condition, when the inheritance is larger than the setup cost, agents would rather become entrepreneurs than workers. Thus, agents not bound by the borrowing constraint pay the setup cost to run their businesses. The number of entrepreneurs increases, while the number of workers decreases, leading to an overall increase in the wage. The continuous increase of the equilibrium wage is shown in Figure 7a, while the decrease in worker share is illustrated in Figure 7b. The increase in wage, the decrease in firm profit, and the

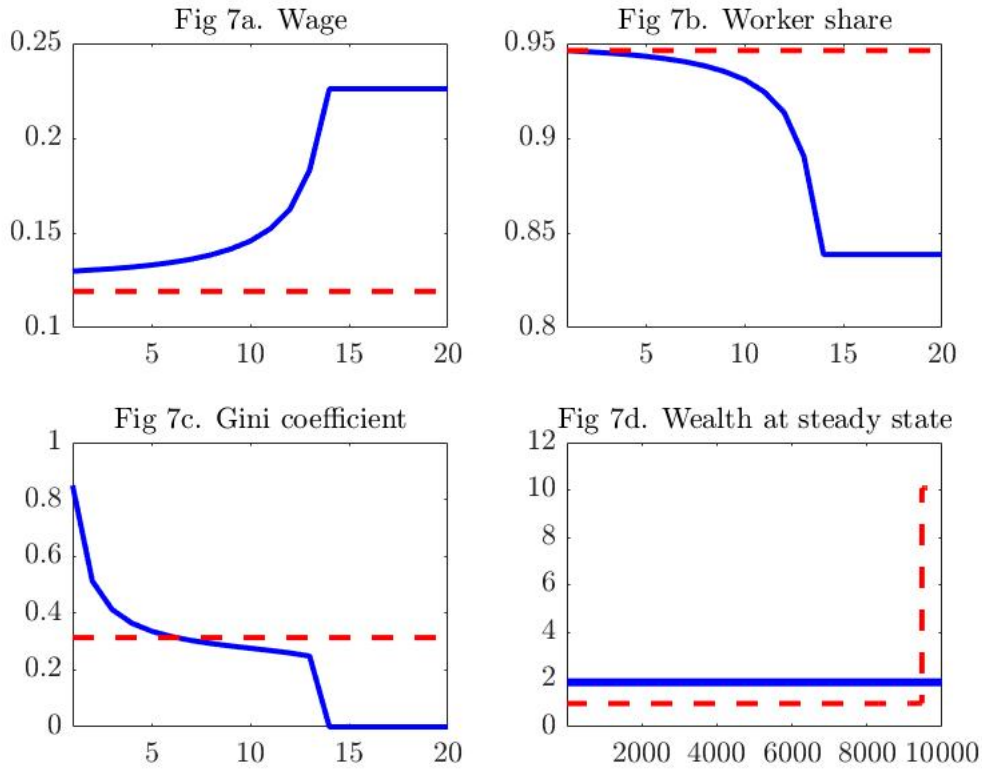


Figure 7: FDI-push scenario

transition of agents from workers to entrepreneurs continue until the economy approaches the steady state where the income and the wealth of the workers and the entrepreneurs become equal. Time to converge to the steady state is 14 periods. From then on, individuals are indifferent between becoming a worker or an entrepreneur, which results in a perfect equality of wealth. This equality is indicated as a reduction of the Gini coefficient to zero in Figure 7c. Figure 7d shows the wealth at the steady state of all agents in the economy in both cases, with and without FDI firms. The steady-state wealth of all domestic agents after the entry of FDI firms is equal, and the size of the inheritance is larger than the setup cost. The result shows that with a high bequest share, the economy can achieve better equality as shown in the Proposition.

Scenario 3: FDI-dominance

Figure 8 shows the simulation results of scenario 3, named “FDI-dominance,” with the bequest share decreasing from 0.5 (benchmark scenario) to 0.21.

Immediately after the entry of FDI firms, the equilibrium wage is relatively high in

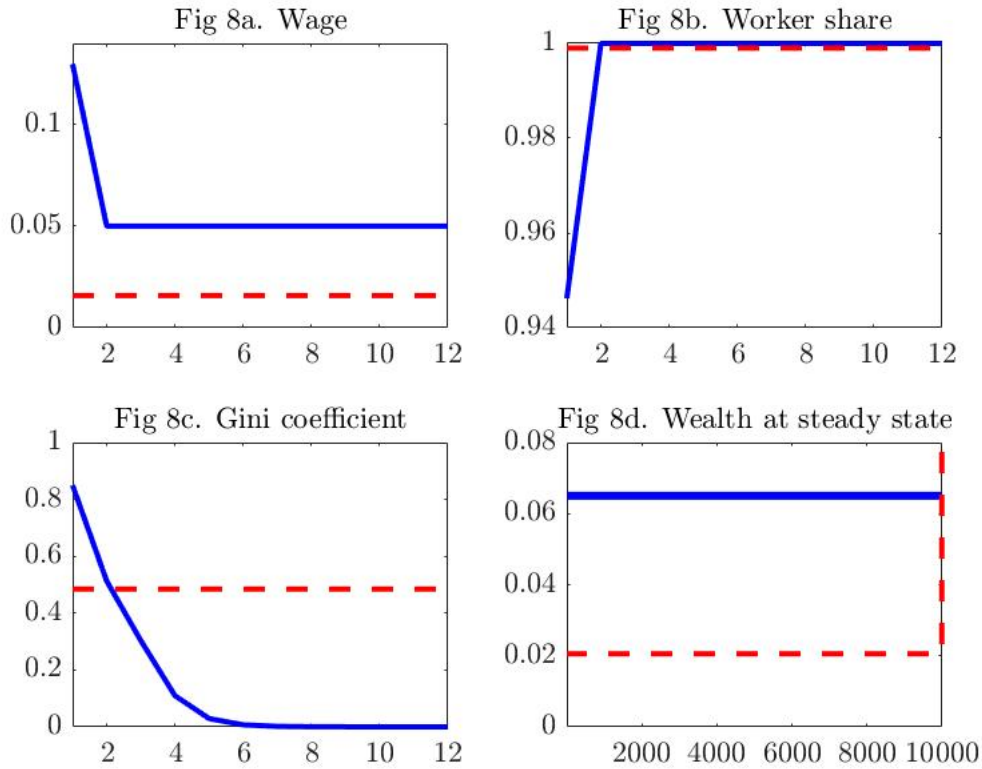


Figure 8: FDI-dominance scenario

the first period. However, because of the high equilibrium wage, entrepreneurs' profits fall. In this scenario, the decrease in profit along with the lower bequest share makes the children of all entrepreneurs poorer so that they are eventually unable to pay the setup cost to run their businesses, or in other words, they have no choice other than working as workers in FDI firms. As a result, the worker share becomes one, as shown in Figure 8b.

As every agent in this economy becomes a worker, the abundance of labor supply leads to a decline in wage. Figure 8a shows a reduction in wages from a high level at period 1. Wages at the steady state drop to less than half of what they were in the period right after FDI firms entered the economy but are still higher than the case of no FDI firm. Thanks to this, workers in this scenario are still better off as shown in Figure 8d.

As the economy achieves perfect equality, Figure 8c shows the zero-convergence of the Gini coefficient. Figure 8d also confirms the perfect equality where the steady-state wealth of all agents in the economy is the same. However, this is an equality in which every agent is poor; no one can become an entrepreneur because the steady-state wealth is substantially lower than the setup cost. Thus, with a lower bequest share compared with the benchmark, this scenario shows bad equality named "FDI-dominance."

Scenario 4: Inequality

Figure 9 shows the simulation results of scenario 4, named “inequality,” with the bequest share decreasing from 0.5 (benchmark scenario) to 0.3. Besides, as discussed in Section 3.2, scenario 4 occurs depending on the wealth diversity of the domestic entrepreneur; thus, to create a larger diversity in the wealth of entrepreneurs, h_0^{max} is supposed to be quadruple, $4F$, instead of triple the setup cost as in the benchmark case in Table 2.

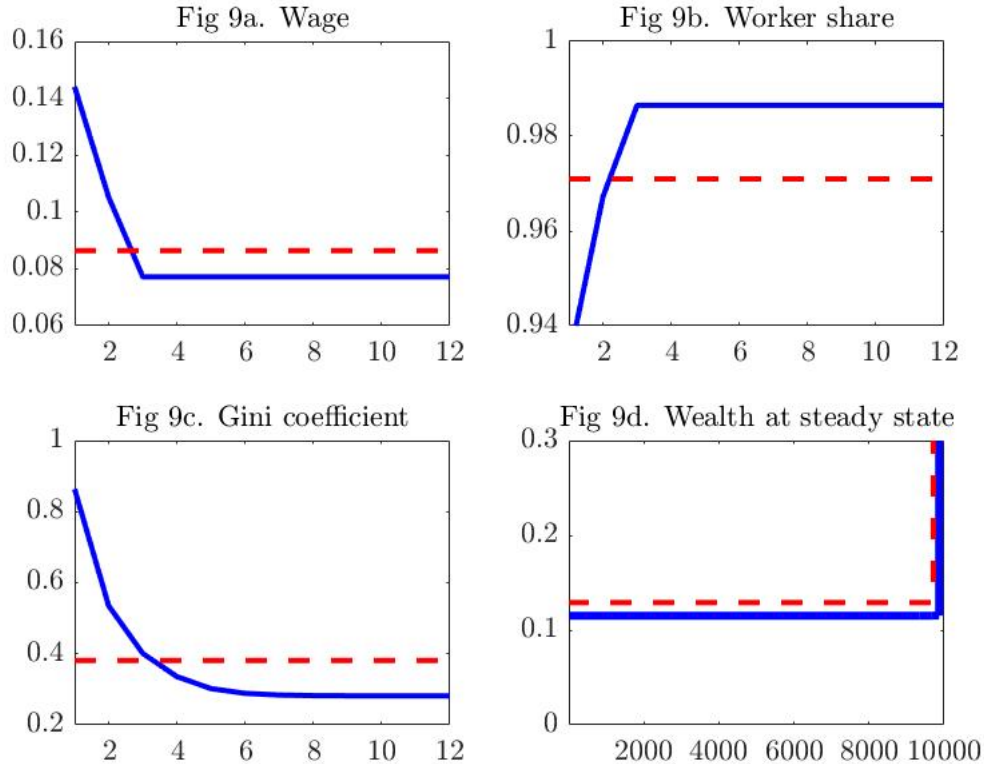


Figure 9: Inequality scenario

As the equilibrium wage increases soon after the entry of FDI, some poor entrepreneurs, who face reductions in profit, do not have much wealth to leave to the next generation so their children cannot run a business. The exit of poor entrepreneurs leads to a decrease in labor demand and an increase in labor supply, followed by a reduction in wage. The steady-state wage is 10.6% lower than that in the case of no FDI firm as shown in Figure 9a. The increase in labor supply is illustrated in Figure 9b. However, although some poor entrepreneurs’ children have no choice other than becoming workers, the children of the wealthiest families still inherit enough to afford the setup cost, paying F to run a business. Therefore, the worker share in Figure 9b converges to 98.7% but not 100% as in the scenario of FDI-dominance. The wealth at the steady state of these wealthy entrepreneurs

and other workers is illustrated in Figure 9d. Compared with the case of no FDI firm, the steady-state wealth of workers after the entry of FDI firms decreases by 10.6% while that of entrepreneurs increases by 17.2%. In the economy, 98.7% of agents share the same wealth; thus, the Gini coefficient in Figure 9c still shows a downward trend as the wealth distribution becomes more equal. However, the fact that entrepreneurs, consisting of only 1.3% of the population, hold nearly 30% of the wealth of the whole country, shows that inequality becomes more serious in this scenario. The comparison is with regard to scenario 1, where an approximately equal percentage of wealth is held by 5.4% of the population.

5 Conclusion

The purpose of this paper is to analyze the changes in domestic wealth distribution and job composition in response to the entry of FDI firms. We develop a model of dynamic wealth distribution in the presence of an imperfect capital market. To our knowledge, instead of echoing previous studies that mainly focus on the static income inequality among workers, this is the first dynamic model that investigates the impact of the entry of FDI firms on domestic wealth distribution. The findings not only conclude that the effect of the entry is monotonically positive or negative but describe it as a transition path from the initial entry of FDI firms to the steady state, providing a rich set of scenarios.

More specifically, the model is based on the traditional dynasty framework presented by Matsuyama (2011). The main assumption regarding FDI firms introduced into this framework is that unlike the domestic firms, these firms are sufficiently creditworthy that credit constraint is not their primary concern. We use the model to examine the transition of wealth and labor corresponding to the entry of FDI firms. Through this theoretical analysis, the paper describes this transition with four engaging scenarios. First, the participation of FDI firms can make the economy more equal without any changes in job composition by having domestic workers slightly better off, but still unable to change their status as workers. We call this scenario “middle-income trap.” Second, the entry of FDI firms can produce a *good* equality by providing an “FDI-push” to move workers out of a poverty trap so that all domestic agents become equal with respect to wealth and job selection. Third, FDI firms may cause the economy to fall into an “FDI-dominance,” leading to a *bad* equality whereby all domestic agents have no choice other than to work for FDI firms at a low wage. Fourth, the entry can also widen the gap between the rich and the poor, causing inequality by redistributing domestic wealth to make the wealthiest agents better off if they can survive the competition with FDI firms. We also identified four factors affecting the impact of FDI firms on the economy, namely, setup

costs, bequest motives, world interest rates, and the host country's labor productivity. More specifically, a lower cost in starting a new business, a more altruistic population, a higher world interest rate, and higher labor productivity of the host country could promote better domestic wealth equality. This result suggests the policy implication that, together with accepting FDI firms, if the government imposes policies that ease the environment for firm-establishment or enhance labor productivity, the economy can obtain better equality. Furthermore, we also provide numerical examples to illustrate each scenario and their determinants.

References

- Aghion, P., & Bolton, P. (1997). A theory of trickle-down growth and development. *The Review of Economic Studies*, 64(2), 151–172.
- Aitken, B., Harrison, A., & Lipsey, R. E. (1996). Wages and foreign ownership a comparative study of Mexico, Venezuela, and the United States. *Journal of International Economics*, 40(3), 345–371.
- Banerjee, A. V., & Newman, A. F. (1993). Occupational choice and the process of development. *Journal of Political Economy*, 101(2), 274–298.
- Baranzini, M. (1991). *A theory of wealth distribution and accumulation*. Oxford University Press.
- Basu, P., & Guariglia, A. (2007). Foreign direct investment, inequality, and growth. *Journal of Macroeconomics*, 29(4), 824–839.
- Borraz, F., & Lopez-Cordova, J. E. (2007). Has globalization deepened income inequality in Mexico? *Global Economy Journal*, 7(1), 1850103.
- Brian, K. (2015). *Oecd insights income inequality the gap between rich and poor: The gap between rich and poor*. OECD Publishing.
- Chintrakarn, P., Herzer, D., & Nunnenkamp, P. (2012). FDI and income inequality: Evidence from a panel of US states. *Economic Inquiry*, 50(3), 788–801.
- Choi, C. (2006). Does foreign direct investment affect domestic income inequality? *Applied Economics Letters*, 13(12), 811–814.
- Davies, J. B., Sandstrom, S., Shorrocks, A., & Wolff, E. N. (2009). The world distribution of household wealth. In N. Yeates & C. Holden (Eds.), *The global social policy reader* (pp. 149–162). Policy Press.
- Feenstra, R. C., & Hanson, G. H. (1996). Foreign investment, outsourcing, and relative wages. In R. C. Feenstra, G. M. Grossman, & D. A. Irwin (Eds.), *The political economy of trade policy: Papers in honor of Jagdish Bhagwati* (pp. 89–127). MIT Press.

- Figini, P., & Görg, H. (2011). Does foreign direct investment affect wage inequality? An empirical investigation. *The World Economy*, 34(9), 1455–1475.
- Fosfuri, A., Motta, M., & Rønnde, T. (2001). Foreign direct investment and spillovers through workers' mobility. *Journal of International Economics*, 53(1), 205–222.
- Franco, C., & Gerussi, E. (2013). Trade, foreign direct investments, and income inequality: Empirical evidence from transition countries. *The Journal of International Trade & Economic Development*, 22(8), 1131–1160.
- Galor, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The Review of Economic Studies*, 60(1), 35–52.
- Gopinath, M., & Chen, W. (2003). Foreign direct investment and wages: A cross-country analysis. *Journal of International Trade & Economic Development*, 12(3), 285–309.
- Herzer, D., & Nunnenkamp, P. (2013). Inward and outward fdi and income inequality: Evidence from Europe. *Review of World Economics*, 149(2), 395–422.
- Hijzen, A., Martins, P. S., Schank, T., & Upward, R. (2013). Foreign-owned firms around the world: A comparative analysis of wages and employment at the micro-level. *European Economic Review*, 60, 170–188.
- Jensen, N. M., & Rosas, G. (2007). Foreign direct investment and income inequality in Mexico, 1990-2000. *International Organization*, 61(3), 467–487.
- Lee, J.-E. (2006). Inequality and globalization in Europe. *Journal of Policy Modeling*, 28(7), 791–796.
- Lindert, P. H., & Williamson, J. G. (2003). Does globalization make the world more unequal? In *Globalization in historical perspective* (pp. 227–276). University of Chicago Press.
- Lipsey, R. E., & Sjöholm, F. (2004). Foreign direct investment, education and wages in Indonesian manufacturing. *Journal of Development Economics*, 73(1), 415–422.
- Markusen, J. R., & Venables, A. J. (1999). Foreign direct investment as a catalyst for industrial development. *European Economic Review*, 43(2), 335–356.
- Matsuyama, K. (2006). The 2005 Lawrence R. Klein lecture: Emergent class structure. *International Economic Review*, 47(2), 327–360.
- Matsuyama, K. (2011). Imperfect credit markets, household wealth distribution, and development. *Annual Review of Economics*, 3(1), 339–362.
- Milanović, B. (2005). Can we discern the effect of globalization on income distribution? Evidence from household surveys. *The World Bank Economic Review*, 19(1), 21–44.
- Pandya, S. S. (2014). *Trading spaces*. Cambridge University Press.
- Sylwester, K. (2005). Foreign direct investment, growth and income inequality in less developed countries. *International Review of Applied Economics*, 19(3), 289–300.

Appendix. Some extra simulation results

In the main text, FDI firms are assumed to enter when the economy is not at a steady state. To check the robustness of the results, in this Appendix, we assume that FDI firms enter when the economy is at its steady state, or in other words, this steady state occurs before FDI firms enter the economy. As discussed in Section 3.2, in this situation, only scenarios 1 and 3 occur because of the independence of these two scenarios on wealth diversity. We simulate these two scenarios with the same parameters and function settings as in Section 4.1. The only modification here is that when FDI firms enter, the economy already converged to a steady state from the initial wealth distribution shown in equation (8). At this steady state, all the workers are identical in terms of wealth, and so are the entrepreneurs as shown in Figure 1. Following that, if the increase in the equilibrium wage caused by the entry of FDI firms forces a worker or an entrepreneur to change their job, other workers and entrepreneurs do the same.

Figure 10 shows the simulation results for scenario 1 with all benchmark parameters. After the increase in wage upon entry of FDI firms, workers are better off and entrepreneurs are worse off, while the job composition remains unchanged, leading to a better equality.

Figure 11 illustrates scenario 3 with the change in the bequest share from 0.5 (benchmark scenario) to 0.25. Because of the increase in wages upon the entry of FDI firms, domestic entrepreneurs start facing profit losses. They put up with this loss until the fifth period, then become so poor that they are unable to leave their children enough inheritance to run a business. Thus, all entrepreneurs have no choice other than becoming workers working for FDI firms, sharing the same wealth. The economy achieves perfect equality as the Gini index decreases to zero from the ninth period. Besides, following the increase in labor supply and the decline in labor demand, wages drop below the steady-state level prior to the entry of FDI firms.

We find that the simulation results are almost the same as those in the main text. The only difference is that in this case, the changes in worker share and Gini coefficient in response to the entry of FDI firms, as shown in panels b and c, both start from the old steady-state level prior to such entry. This is natural because the economy is assumed to be at the steady state when FDI firms enter. The other results remain almost unchanged, meaning that all the features of scenarios 1 and 3 discussed in the theoretical analysis can be demonstrated quantitatively regardless of the status of the economy at the time FDI firms enter.

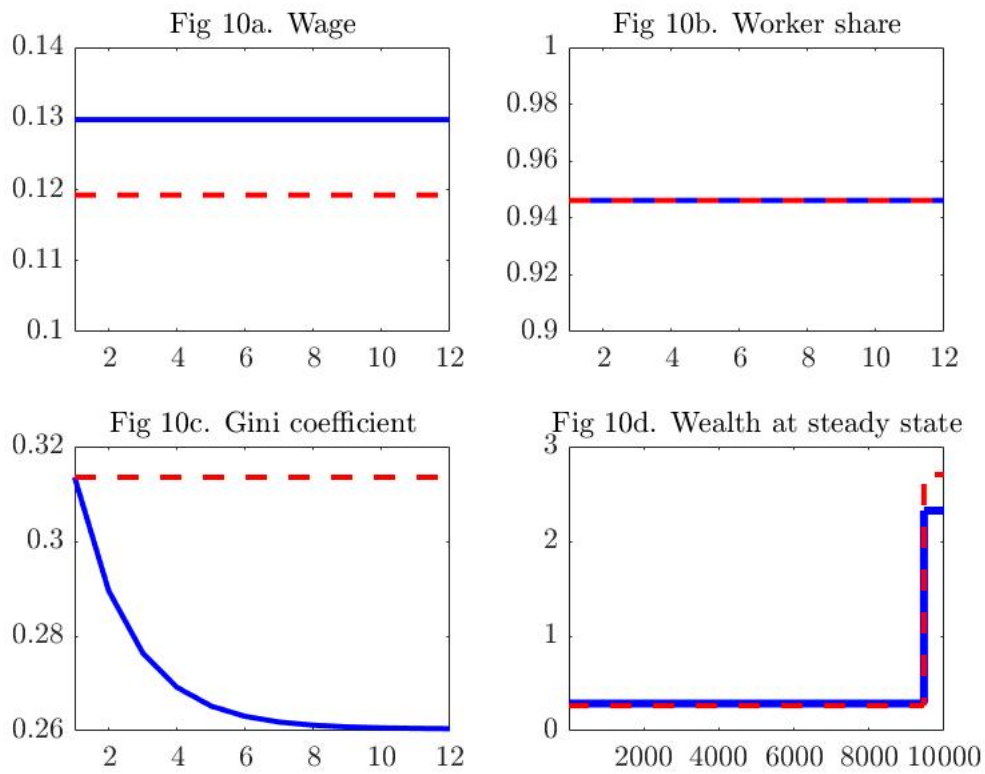


Figure 10: Scenario 1 in the case where FDI firms enter when the economy is at the steady state

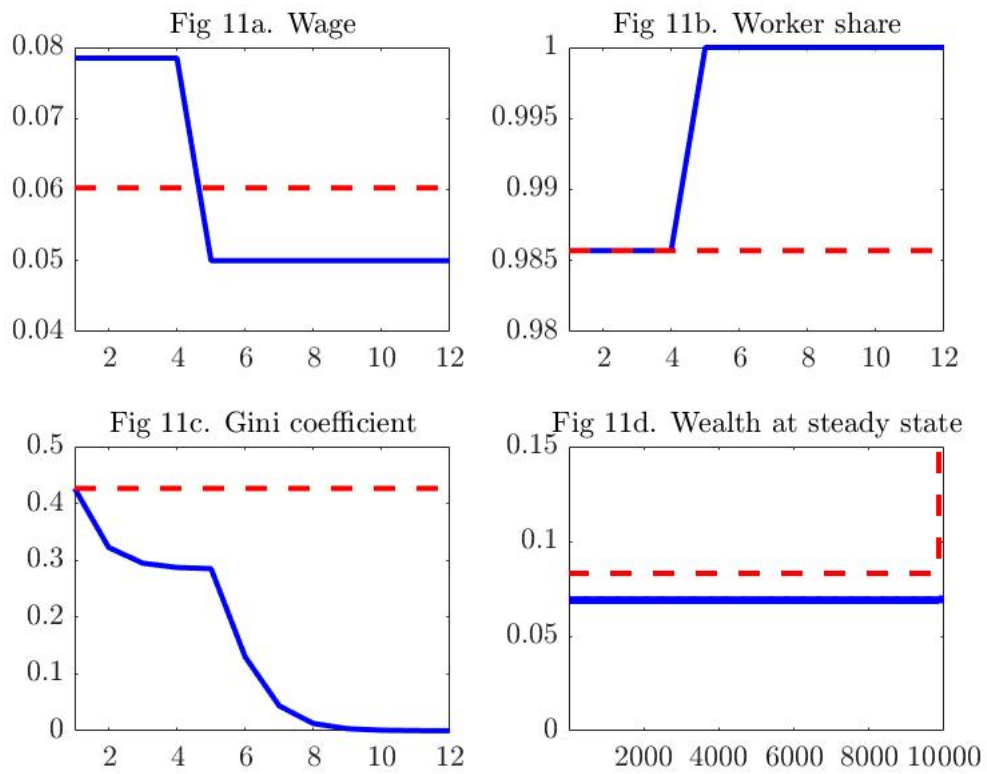


Figure 11: Scenario 3 in the case where FDI firms enter when the economy is at the steady state