

Hierarchic Government, Endogenous Policies, and Foreign Direct Investment: Theory and Evidence From China and India*

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Abstract

By introducing a hierarchic government structure into Grossman and Helpman (1994, 1996), I construct a theoretical model to explain why two *developing* economies with similar economic fundamentals might have diametrically different amount of inward FDI as a means of technology adoption. The key mechanism is that the provincial government's attitude toward FDI is endogenously polarized when the negative pecuniary externality between the domestic and foreign-invested firms *decreases* with FDI. The provincial government chooses either prohibitively high or attractively low institutional entry cost on FDI, depending on the profit tax rate and the tariff rate which are determined by the central government under the influence of the special interest group. I define and characterize the symmetric and asymmetric political equilibrium to explain the policy variables, FDI, and GDP. The aggregate FDI level is always bifurcating, either null or full, in the economy with multiple identical provinces. The horizontal interaction between identical provincial governments might magnify the policy difference or result in an asymmetric FDI allocation. I calibrate the model to China and India's data and also perform several counterfactual experiments. I find that China-India nine-fold difference in FDI per capita CAN be ultimately due to that China's central government obtains a higher share of total tax revenue than its India counterpart. It's because China's central government benefits more from FDI and then has more incentives to manipulate the policy profile which not only admits a positive FDI supply but also induces the provincial governments to compete for rather than block FDI. A global-game analysis when the entry cost is not common knowledge is provided in the appendix.

Key Words: FDI, Endogenous Policies, Technology Adoption, Special Interest Group, Development, Tax Structure, Global Game

JEL Codes: D78, E61, F23, F43, H77, O11, O43, P26

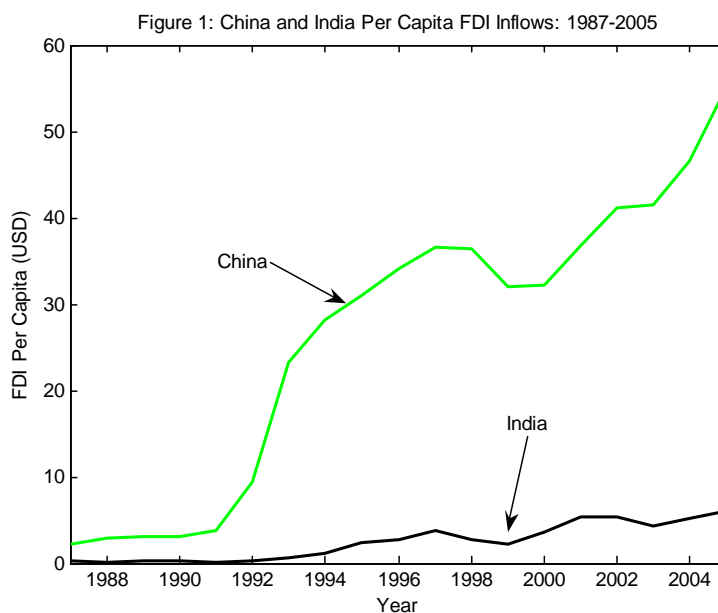
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1 Introduction

One of the most important macroeconomic phenomena in the last three decades is the remarkable economic development of China and India, which jointly account for about 40% of the world population. Despite some difference in certain aspects, these two Asian countries, with more than one billion citizens each, have demonstrated a marvelous similarity in their development experience over the past sixty years. The People's Republic of China was founded in 1949 while India declared its independence in 1947. Starting with very similar levels of GDP per capita, both countries adopted a development strategy giving priority to the heavy industries, which resulted in enormous government regulations and dreadful economic performance from 1950s to 1970s(See Lin, 2007). Both countries experienced a devastating famine and a major domestic political turmoil from the 1960s to the 1970s. The liberalization reforms in China were initiated in 1978 while the deregulation reforms in India got started in the early 1980s, both of which ignited the productivity increases and economic accelerations till today. From 1978 to 2004, the annual GDP growth rates were 9.7% and 6.5% for China and India respectively. In 1978, their real GDP per capita were 323.97USD and 603.79USD, which increased all the way to \$5600 and \$3100 in 2005. However, the two countries are still ranked below the world's top 100 economies in terms of GDP per capita.

A full-fledged comparison between China and India is beyond the scope of this paper,¹ but given all these striking similarities, it's surprising to see that their per capita FDI inflows were so different, as illustrated in Figure 1.



Source: World Development Report 2006, UNCTAD

¹Table A1 in the appendix shows the growth rates of output and various source factors in these two countries from 1978 to 2004. Please see Bosworth and Collins (2007), Rodrik and Subramanian(2004), etc., for more discussions.

As we can see, the gap was dramatically enlarged around 1992 and kept expanding afterwards. In 2005 China's aggregate FDI inflow was more than 72 billion US dollars according to the World Bank(2006), about twelve times that of India. The difference in FDI per capita was nine-fold large. Some scholars cast doubt on the consistency and compatibility of the statistical method and data quality, but the difference remains enormous even after the adjustments.² What caused this puzzling huge difference in the FDI per capita?

Economic theory suggests that cheap labor, huge domestic market, and relative political stability all help attract FDI, but these features are shared by both China and India. The problem becomes even more puzzling if one recognizes that India is more democratic than China and hence is supposed to have better property right protections and that more Indian people speak English. Presumably there are multiple forces that jointly account for this remarkable FDI difference, but what seems fundamentally important is the difference in the government's attitude and policies toward FDI as opposed to the difference in the economic fundamentals. True, India seriously opened the economy only in early 1990s, about eight years later than China. However, this timing effect alone can hardly explain why India's FDI didn't increase too much afterwards. In fact, their FDI diverged dramatically instead of converging around early 1990s. China's FDI surged immediately after Deng Xiaoping's South-Tour speech in 1992, which emphasized the government's decisions to continue the market-orientated reform and open-door policy. This speech effectively pulled China's economy out of the 1989 Tianan Men Square political shadow and many restrictions on FDI were effectively eradicated.³ In 2004, the profit tax rate on foreign invested firms was 41% in India but it's far below 30% in China. For a long time, India's government assumed the so-called "pro-business" deregulation policy primarily to enhance incumbent domestic firms' performance while restricting the entry of foreign investment(Rodrik and Subramanian, 2005). While in China, by stark contrast, the government offered much more favorable conditions to the foreign-invested firms including extended tax holidays, tax concessions, and low rent for land usage, *etc.*⁴ Another prominent difference is that China witnessed a keen competition for FDI between the local governments, especially after China adopted fiscal federalism in the early 1990s(Qian and Roland,1998). India, however, didn't see such great enthusiasm for FDI in the local governments at least until recent years, as partly reflected by the observations that India's infrastructure is not nearly as good as China (see Singh, 2005, Bosworth and Susan, 2007). Table 1 provides more such evidence for the difference in the institutional barriers confronting foreign investors. So what has caused such an big difference in the government's attitude and economic policies toward

²An alternative measure is the total number of foreign affiliates in the two countries, which is demonstrated in Table A2 in the appendix. See Singh(2005) for more discussions on India's FDI. Bajpai and Dasgupta (2004) compared China and India's FDI difference. More discussions on data are postponed until the calibration part in Section 4.

³In the appendix, we develop a global game model to explain from the information point of view why China's FDI surged immediately after Deng Xiaoping's speech in 1992 and why a disproportionately large fraction of the FDI into mainland China is from Hongkong and/or invested by ethnic oversea Chinese.

⁴ There is no accurate measure on the magnitude of round-tripping because of its clandestine nature. The

most pessimistic estimate was by Huang (2003), who reported that before 1998 about one-fourth of the total FDI was the round-tripping capital. But the importance of round-tripping capital is declining as the percentage of FDI from Hong Kong has been decreasing steadily in recent years, see Table 1a in the appendix. In fact, even after subtracting all the FDI from Hong Kong, China's FDI still accounts for about 20% of all the emerging economies, see Prasad and Wei (2005) .

Table 1: Measures of the Ease of Doing Business in China and India (2005)

Country	Overall	Starting a Business		Enforcing Contract		Registering Property	
	Ease (Rank ^b)	Time (Days)	Cost ^a (%)	Procedures (Number)	Time (Days)	Procedures (Number)	Time (Days)
China	91	48	13.6	35	406	4	29
India	116	71	62.0	46	1420	6	62

Source: World Bank, 2006, 2007

Notes: a. as a percentage of Income per capita; b. among all the economies in the world

The primary goal of this paper is therefore to develop a theoretical model trying to explain why the *de facto* policies and hence the quantities of FDI could be so different in two developing economies at similar development stages. In particular, what factors cause the differences between China and India? For the developing economies lacking rule of law, it seems crucial to not only analyze the central government but also the local government's incentives and behavior in order to understand more fully the *de facto* policies. If the local government wants to block FDI, it can impose extra cost on the foreign investment by complicating and delaying the approval procedures, by imposing overly harsh criterion in the product quality test for the foreign-invested firms, by intervening the legal process whenever the foreign-invested firms are in trouble, by restricting the services provided by the state-owned institutions, by under-investing in the public goods such as roads and electricity supply, or in the worst case, by directly confiscating or nationalizing the foreign investment, *etc.*. Such implicit government practices are rampant in many developing economies, unfortunately however, all those *de facto* institutional costs are typically taken as exogenous in most of the existing FDI literature. Therefore, in this paper, I will not only examine how the explicit policies such that tariff rates and profit tax rates are endogenously determined but also explore what derives the attitude of the local government toward FDI. Our attention will be limited only to those developing economies with a sufficiently powerful government, where this institutional cost mainly depends on the government's willingness, not its capability, of providing effective public services to assist FDI.

More specifically, I will explore how the governments, provincial and central, determine the *de facto* entry cost on FDI in conjunction with the tariff rate and the profit tax rate in their economic and political interplay with the domestic firms and the potential foreign investors in a developing economy.⁵ The level of FDI is jointly determined through the interaction between the government and the market. Our analysis has three parts. First, I show that a single revenue-maximizing provincial government is either very hostile toward FDI by imposing a prohibitively huge entry cost or very friendly by making the cost sufficiently low, depending very *sensitively* on the profile of the profit tax rate and tariff rate. This polarization from the demand side is mainly due to the endogenously decreasing negative pecuniary externality between the domestic firms and the foreign-invested firms, which is the key mechanism to generate the FDI amplification. Ultimately, the equilibrium FDI bifurcates, either full or null. This is very different from the coordination-game story with investment complementarities because FDI exhibits strategic substitutability in our model.

⁵ Admittedly, there is a long list of other relevant policy variables that might matter. For example, China's government has also adopted an export-promoting policy including keeping a low exchange rate, which facilitates the absorption of the FDI that tries to take advantage of the cheap labor in China. This effect is not examined here but it's explored in Wang and Hu (2007), where we show it only complements our argument.

Second, I show that when there exist two or more provinces the national level of FDI still bifurcates. In addition, the horizontal interaction between different provincial governments can't affect the national aggregate level of FDI, although it might intensify the competitions between different regions or even cause an asymmetric FDI allocation across the ex ante identical provinces. It suggests that, contrary to the conventional wisdom, the regional competition is actually neither necessary nor sufficient to ensure a positive FDI in the equilibrium. The conventional Tiebout effect fails when a provincial government has no incentive to attract FDI in the first place. This is because when more provinces participate in the competition for a fixed pool of foreign investors, it will lower each province's expected amount of FDI it can attract, which could be too low to warrant any positive demand for FDI because of the negative pecuniary externality. Whether the provincial government is willing to compete for or block FDI and whether the potential foreign investors choose to export or make FDI all depend on the profit tax rate and the tariff rate, which are exogenous so far.

Third, I endogenize the profit tax rate and the tariff rate by explicitly exploring the central government's vertical interaction with the provincial governments and with the special interest group. I define and characterize a symmetric political equilibrium, which shows that a big difference in the *de facto* policies and FDI could be ultimately attributed to a small difference in the central government's tax share or in the welfare weight of the anti-protectionist groups (households) in the central government's goal function. In particular, I argue that China and India's huge difference in the *de facto* policies and FDI could be mainly because the central government obtains a higher share of tax revenue in China, which provides more incentives for it to choose the policy profile such that it not only admits a positive FDI supply from investors but also induces a positive FDI demand (hence welcoming attitude) from the provincial governments, which fuels the regional competition for FDI and validates the Tiebout effect. This can explain why China's *de facto* policies toward FDI, at both provincial and central government levels, are more favorable than that of India.

I calibrate and simulate the model with China and India's data separately and the results are robustly supportive to our model. For China, our simulation results not only closely match the ratio of FDI to GDP, the tariff rate, and the profit tax rate, but also match the labor allocation across different sectors as well as the profit ratio across different types of firms. The FDI to GDP ratio is robust to the variation of some "free" parameters. For India, the simulation results also closely match the FDI to GDP ratio and the implied *de facto* entry cost, but the tariff rate and profit tax rate could be better matched when augmented by the taxation enforceability constraint proposed by Gordan and Li (2005).

The structure of this paper is organized as follows. The next section relates our model to the most relevant literature by highlighting the distinctive features and contributions of our analysis. Section 3 presents the formal model. Section 4 draws the quantitative implications. The last section concludes by providing some avenues for future work.

2 Related Literature

Four strands of literature are most closely related with our paper. One is the political-economic FDI literature, among which Grossman and Helpman (1994, 1996) are most relevant. More specifically, Grossman and Helpman (1996) brings the special interest group analysis in their

1994 paper to examine how FDI is affected by the politically determined tariff rate.⁶ Our model extends Grossman and Helpman (1996) in several important directions. First, I introduce one or more provincial governments into their single-layer central government structure. The hierarchic government structure enables us to explore how the provincial government determines the institutional cost imposed on the FDI, which is shown to be the key mechanism to generate the amplified FDI difference. Second, our model can also shed light on how the horizontal interaction between provincial governments affects the regional FDI allocation as well as the national aggregate level as a whole. These important issues can't be addressed within their framework. Third, I adapt their implicit developed-economy environment to a setting more suitable for a developing economy. So I propose a mechanism for FDI bifurcation when FDI exhibits strategic substitutability while in their model FDI exhibits strategic complementarity.

Bransetter and Feenstra (2002) slightly modifies Grossman and Helpman (1996) by introducing the profit tax rate as a second policy variable other than tariff rate, but their primary goal is to estimate the structural parameters using China's 1984-1995 province-level panel data. Our model has both the tariff rate and the profit tax rate as endogenous policy variables, but I will show that the FDI bifurcation mainly results from the third and new endogenous policy variable, namely, the *de facto* entry cost imposed by the provincial government, which is set as an exogenous fixed cost in the previous two papers. In addition, I also examine whether the central government's policy profile is incentive compatible with the provincial government's behavior. Note that the provincial government in Bransetter and Feenstra (2002) is not a decision maker and hence its framework is essentially same as the single-layer government model with no vertical or horizontal government interactions. Apart from these important differences in the goals and the theoretical models, our paper also differs from Bransetter and Feenstra (2002) in the quantitative strategies. I conduct the calibration and simulation exercise for China and India separately while they perform the regression analysis.

The second strand is the macro and development literature about purposeful technology adoption. In fact, our model may well be interpreted as a political-economy model of technology adoption for developing economies because FDI is modeled as a transfer of the more advanced technology. I derive an explicit formula for GDP as a function of productivity/FDI in the model. The central question in this literature was raised by Prescott and Parente (1999): Given the huge cross-country TFP differentials, why doesn't the poor country simply adopt the more advanced technology? They attributed this to that the incumbent will lose their monopoly rent if they allow the new technology to come in, however, the policy generating process is not explicitly studied. Krusell and Rios-Rull (1996) examine how the incumbent workers might choose to block the better technology through voting to prevent their accumulated skills or human capital from getting obsolete. Acemoglu and Robinson (2000) disagree with Prescott and Parente's "economic loser" explanation. If the incumbent is politically strong enough, why not let people adopt the most advanced technology and then tax them? Alternatively, they propose a "political loser" explanation: The incumbent resists the better technology because their political power

⁶An early analysis of the special interest group's impact on the government is Becker (1993). Later, some authors build on the common agency model of Berheim and Whinston(1986) or explore how different sepecial interest groups compete for the favors from the government and affect the policy-making process, see for example, Dixit, Grossman and Helpman (1997), Grossman and Helpman (2001), Breton and Salanie(2003). Bergemann and Valimaki (2003) extend the analysis into a dynamic setting. We will adopt this policy-making mechanism because it works both for the democracy and non-democracy where voting is not the most important policy-generating scheme.

will be undermined so that they won't be able to benefit from the new technology. Our paper differs from theirs in that our model explicitly examines the role of the hierarchic governments in the policy-generating process. Acemoglu, Antras and Helpman(2007) show that countries with exogenously worse contracting institutions tend to adopt the less advanced technologies because the more advanced technology requires more contracting- intensive intermediate goods. Our model goes somewhat further by addressing how the quality of contracting institutions, as partly reflected in the *de facto* institutional cost, is endogenously affected by the government's rational choice. Moreover, I also provide a nontrivial supply analysis of technology(FDI) as I not only examine the strategic interaction among different technology suppliers(investors) but also look at the location choices.⁷

The third strand of literature is related with property rights, institutions, and capital flows into poor countries. Velasco and Tornell (1992) show that the poor property rights protection in the form of the "tragedy of commons" can partly explain why the capital doesn't flow to the poor countries from the rich, which was initially raised by Lucas (1990). Ju and Wei (2007) propose a model of two-way capital flows in which the developing economy with intermediate property rights protection and low efficiency in financial institutions will export financial capital but simultaneously import FDI. Sonin (2003), based on his observation on Russia, proposes that the rich oligarchs might favor poor public protection of property rights because they can charge the poor people by offering a private protection of property rights. In contrast to these papers, our paper focuses on the endogenous public protection of property rights on FDI instead of exogenous public protection or endogenous private protection by the investors or a few oligarchies. Thomas and Worrall (1994) and numerous followed papers analyze the endogenous expropriation risk of FDI in a dynamic setting to show how the government's short-run incentive to confiscate the FDI can be offset by its long-run incentive to attract more FDI in the future. Our model has only one period with multiple stages, but the foreign investors might indirectly affect the entry cost by choosing a different investment destination. Also, I model FDI as technology adoption instead of physical capital inflow.

The fourth literature is about federalism and its economic impact as our model has a hierarchic government structure. In particular, Qian and Roland (1998) show how the fiscal federalism in China helps harden the soft budget constraints for the state-owned enterprises. Interestingly, in their paper foreign investment is the capital in the joint venture with the provincial governments, but the total foreign investment at the country level is exogenous and unaffected by any government policies or regional competitions. By contrast, our model addresses how the aggregate level of FDI are endogenously determined and, more importantly, why it's bifurcated. Blanchard and Shleifer (2000) argue that political centralization is crucial for the success of China's economic decentralization with fiscal federalism whereas the federalism in Russia didn't achieve the desirable performance due to the lack of political centralization. The main findings of our paper are consistent with their views because our calibration and simulation exercises do indicate that the strong central government in China (measured by its tax revenue share) leads to the *de facto* policies that facilitate the FDI (technology) absorption.

⁷An important branch of the recent FDI versus trade literature focuses on the heterogenous firms. After the realization of the productivities, the most productive firms make FDI, the less productive firms export, while the most unproductive firms only serve the domestic market (see Helpman, Melitz, and Yeaple, 2004, Chaney, 2008).

3 Formal Model

The basic setting is very similar to Grossman and Helpman (1996) except that I will introduce two layers of governments and the institutional entry cost will be endogenous. More explicitly, FDI is modeled as the establishment of a plant by the headquarter of a multinational firm in the host economy. All FDI is greenfield and horizontal. It only serves the domestic market of the host economy. All the multinational firms are wholly foreign-owned.⁸

3.1 One-Province Model

3.1.1 Preference

The province is populated by a continuum of households with a unit mass. They have the same quasi-linear utility function as follows

$$U = x_0 + \frac{\theta}{\theta-1} x^{\frac{\theta-1}{\theta}}, \quad \theta > 1, \quad (1)$$

where x_0 is the consumption of the numeraire good and x is the Dixit-Stiglitz aggregate of the differentiated goods with the price elasticity equal to θ :

$$x = \left[\int_{j \in N_h} x(j)^{\frac{\varepsilon-1}{\varepsilon}} dj + \int_{j \in N_m} x(j)^{\frac{\varepsilon-1}{\varepsilon}} dj + \int_{j \in N_f/N_m} x(j)^{\frac{\varepsilon-1}{\varepsilon}} dj \right]^{\frac{\varepsilon}{\varepsilon-1}}, \quad \varepsilon > 1, \quad (2)$$

where $x(j)$ denotes the commodity of brand j , N_h and N_f are the sets of the domestic and foreign brands with measures n_h and n_f , respectively. N_m is the subset of N_f that are produced by the foreign invested firms located in the host country. Hence, the measure of N_m , denoted by n_m , quantifies the magnitude of FDI. The complementary subset, N_f/N_m , is therefore the set of the imported foreign brands with a measure $n_f - n_m$. Let $N \equiv N_h \cup N_f$ for future reference.

3.1.2 Technology

Labor is the only production factor.⁹ All the technologies are constant return to scale. The numeraire good is produced in the perfectly competitive firms. One unit of labor produces one

⁸ Another related and burgeoning literature explores how the contract incompleteness and property rights affect the form of the corporate governance of a multinational firm and the optimal choice of outsourcing versus FDI, see Antras and Helpman (2004), Feenstra and Hansen (2005), *etc.*

⁹ There are several reasons why we don't introduce physical capital. Borensztein, Gregorio, and Lee (1998) provide empirical evidence showing that FDI is more important as a device of technology diffusion instead of capital investment for the developing economies. The evidence from China and India seems also quite supportive of the view. First, the FDI inflow accounts for less than 10% of China's gross fixed investment and is only about 5% of total GDP. The fraction for India is also small. Second, Bosworth and Collins (2007) show that, for the post-1994 period, the manufacturing sector has the highest TFP and output growth in China while in India the service sector experiences the highest TFP and output growth. Interestingly, FDI is most concentrated in the manufacturing sector in China while the largest proportion of India's FDI is allocated in the service sector (Singh,

unit of numeraire. I normalize the domestic wage rate to be one. One unit of each differentiated domestic good $j \in N_h$ requires c_h units of labor. One unit of each imported good $j \in N_f/N_m$ requires c_f units of foreign labor. Let w denote the exogenous foreign wage rate. One unit of each multinational good $j \in N_m$ also requires c_f units of domestic labor. That is, FDI can fully transfer the foreign technology to the host country.¹⁰ The foreign technology is more advanced, thus $c_f < c_h$.

3.1.3 Endowment

Each household is endowed with L units of labor, which are inelastically supplied. To exclude the collusive pricing and to simplify the public welfare analysis, I assume that the owners of the domestic firms have a zero measure and are scattered in the population. The after-tax net profit of the multinationals will be repatriated to the source country. L is sufficiently large so that the trade account is balanced by exporting the numeraire goods to the international market at the competitive world price equal to one.

3.1.4 Commodity Prices and Profits

The labor market is perfectly competitive. Labor is freely mobile across different sectors. Each differentiated commodity is produced by a single monopolist. Let τ denote one plus the *ad valorem* tariff rate. The usual mark-up pricing rule implies

$$p(j) = \begin{cases} p_h \equiv \frac{\varepsilon}{\varepsilon-1}c_h, & \text{if } j \in N_h \\ p_m \equiv \frac{\varepsilon}{\varepsilon-1}c_f, & \text{if } j \in N_m \\ p_f \equiv \frac{\varepsilon}{\varepsilon-1}c_f w \tau, & \text{if } j \in N_f/N_m \end{cases}, \quad (3)$$

where w denotes the exogenous wage rate in the foreign country, $w \geq 1$. The household maximization problem gives the market demand for each differentiated good

$$x(j) = \begin{cases} x_h \equiv p_h^{-\varepsilon} q^{\varepsilon-\theta}, & \text{if } j \in N_h \\ x_m \equiv p_m^{-\varepsilon} q^{\varepsilon-\theta}, & \text{if } j \in N_m \\ x_f \equiv p_f^{-\varepsilon} q^{\varepsilon-\theta}, & \text{if } j \in N_f/N_m \end{cases}, \quad (4)$$

where I assume $\varepsilon > \theta$ to ensure a positive cross-elasticity of demand and q is the price index for x :

$$q = [n_h p_h^{1-\varepsilon} + n_m p_m^{1-\varepsilon} + (n_f - n_m) p_f^{1-\varepsilon}]^{\frac{1}{1-\varepsilon}}. \quad (5)$$

Each firm takes q as exogenous when making production decisions. I assume that the international market demand for these differentiated commodity is zero.¹¹

2005). This seems to suggest that FDI is highly correlated with TFP growth and it motivates us to see FDI mainly as technology adoption.

¹⁰Grossman and Helpman(1996) assume that the unit cost of the multinational good is c_h rather than c_f for each $j \in N_m$ and $w = 1$, which results in strategic complementarity for international investors, although they didn't point it out explicitly. However, we obtain strategic substitutability here, which makes our main point even more pronounced, as we will show soon.

¹¹For analytical parsimony, we exclude the possibility that FDI is made in the developing economy to mainly serve as the production and export base for the whole international market. However, this might be an important motive for FDI decision in China.Wang and Hu(2007) explicitly examine this export effect on FDI. But for our purpose here, introducing the export-led FDI will inevitably increase FDI inflow, only to reinforce our conclusions

The profit of the numeraire sector is zero. For any $j \in N$, the profit is

$$\pi(j) = \begin{cases} \pi_h \equiv \frac{1}{\varepsilon} p_h^{1-\varepsilon} q^{\varepsilon-\theta}, & \text{if } j \in N_h \\ \pi_m \equiv \frac{1}{\varepsilon} p_m^{1-\varepsilon} q^{\varepsilon-\theta}, & \text{if } j \in N_m \\ \pi_f \equiv \frac{1}{\varepsilon \tau} p_f^{1-\varepsilon} q^{\varepsilon-\theta}, & \text{if } j \in N_f/N_m \end{cases}. \quad (6)$$

3.1.5 Labor Allocation and GDP

The total labor employed in the domestic firms that produce the differentiated goods is $l_h \equiv n_h x_h c_h$. $l_m \equiv n_m x_m c_f$ denotes the employment in the multinational sector. The rest, $l_n \equiv L - n_h x_h c_h - n_m x_m c_f$, are employed in the numeraire sector. The per capita GDP is equal to the total GDP, which is the total output from the numeraire sector, the domestic sector, and the foreign-invested sector:

$$\begin{aligned} \text{GDP} &= (L - n_h x_h c_h - n_m x_m c_f) + n_h p_h x_h + n_m p_m x_m \\ &= L + n_h \pi_h + n_m \pi_m. \end{aligned} \quad (7)$$

Later, I will exploit this information to calibrate the model.

3.1.6 FDI Decision

For now, the tariff rate τ and profit tax rate on the multinational firms λ are exogenous. A potential foreign investor $j \in N_f$ decides to make FDI ($D_j^* = 1$) rather than produce in her home country and export ($D_j^* = 0$) if and only if the net profit of making FDI is larger than that of exporting:

$$(1 - \lambda)\pi_m - \phi \geq \pi_f, \quad (8)$$

where ϕ is up-front fixed cost associated with FDI. It denotes the de facto entry cost determined by the provincial government. If the provincial government wants to block FDI, it can make ϕ very high by, for example, making the application procedures very complicated and time-consuming, independent of the size of the investment. When $\phi = 0$, (8) requires

$$1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0, \quad (9)$$

which reminds us of the simple fact that a higher profit tax λ hampers FDI while a higher tariff rate τ and a higher foreign wage w would facilitate FDI because the investors will have a stronger incentive to circumvent the trade barrier and take advantage of the low labor cost.

Lemma 1. (a) $\pi(j)$ decreases with n_m for all $j \in N$. (b) When (9) holds as a strict inequality, the binary entry decisions of the potential investors exhibit strategic substitutability.

The proof is straightforward and the intuition is the following. Since the multinational good price p_m is smaller than the import price p_f according to (3), the aggregate price index q decreases when n_m increases, therefore the positive cross-price elasticity implies that the demand for each differentiated commodity also decreases, resulting in the profit drop of each firm $j \in N$. In other words, the negative pecuniary externality is ultimately attributed to two joint forces. One is the host country's trade barrier and/or cheaper labor (which gives

that an economy like China can receive a lot of FDI.

$p_m < p_f$), and the other is that the substitutability between differentiated goods exceeds the price elasticity for the aggregate (which gives the positive cross elasticity). Consequently, when n_m increases, the entry condition (8) becomes less likely to hold for any positive ϕ , *ceteris paribus*.

3.1.7 Provincial Government

All the domestic firms also need to turn in the profit tax at the exogenous rate $\bar{\lambda}$. Only a fraction $1 - \gamma$ of the profit tax revenue is accruing to the provincial government. $\gamma \in (0, 1)$ denotes the fraction obtained by the central government introduced later. The provincial government wants to maximize its tax revenue by choosing the institutional cost $\phi \in [0, \infty)$:

$$\max_{\phi \geq 0} (1 - \gamma)[\lambda n_m \pi_m + \bar{\lambda} n_h \pi_h] \quad (10)$$

If $\lambda = \bar{\lambda}$, then the goal is equivalent to maximizing GDP as indicated by (7). For simplicity, ϕ is assumed to be the deadweight loss.¹² FDI has two competing effects from the provincial government's point of view. One is the tax-base expansion effect, which favors more FDI because more FDI implies more firms to tax from. The other is the average-profit reduction effect, which discourages FDI because the profit of each firm will decrease according to Lemma 1. Consequently, the total taxable profit might not be monotonic in the total FDI. Mathematically, there are three possibilities how the provincial government's revenue might change with FDI n_m on the pertinent range $[0, n_f]$, as shown in Figure 2:

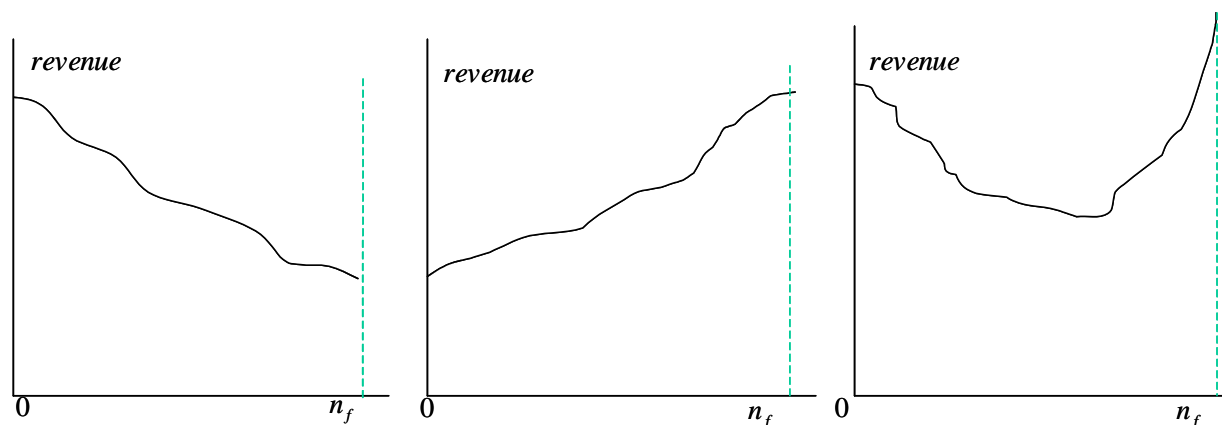


Figure 2: Total Tax Revenue as a Function of FDI n_m

If the expansion effect always is always dominated by the reduction effect, the equilibrium FDI is zero (illustrated by the left panel in Figure 2). If the expansion effect always dominates the reduction effect, the equilibrium FDI is zero (illustrated by the middle panel in Figure 2). The third possibility is that the dominant effect changes with the amount of FDI, in which case the average-profit reduction effect dominates when the total FDI is small but will be eventually

¹² An interesting extension is to examine the bribery and corruption explicitly by taking ϕ into the goal function of the corrupt local official.

dominated by the tax-base expansion effect as the FDI increases since the negative pecuniary externality is decreasing (because $\frac{\partial^2 \pi_x}{\partial n_m^2} > 0$, for any $x = h, m, f$), which also leads to a corner solution (illustrated by the right panel in Figure 2). Therefore, the provincial government's demand for FDI, denoted by n_m^d , must be very "extreme", either zero or n_f . More precisely, we obtain

$$n_m^d = \begin{cases} 0, & \text{if } \lambda \leq \tilde{\lambda}(\tau) \\ n_f, & \text{if } \lambda > \tilde{\lambda}(\tau) \end{cases}, \quad (11)$$

where

$$\tilde{\lambda}(\tau) \equiv \frac{\left[1 - \left[\frac{n_h c_h^{1-\varepsilon} + n_f c_f^{1-\varepsilon}}{n_h c_h^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}} \right]^{\frac{\varepsilon-\theta}{1-\varepsilon}} \right] \bar{\lambda}}{\frac{n_f}{n_h} \left(\frac{c_f}{c_h} \right)^{1-\varepsilon} \left[\frac{n_h c_h^{1-\varepsilon} + n_f c_f^{1-\varepsilon}}{n_h c_h^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}} \right]^{\frac{\varepsilon-\theta}{1-\varepsilon}}}.$$

When the profit tax rate λ exceeds the threshold value $\tilde{\lambda}(\tau)$, the effect of tax base expansion dominates the effect of profit reduction, hence the highest revenue is reached at full FDI, $n_m^d = n_f$. If λ is smaller than $\tilde{\lambda}(\tau)$, the provincial government would block any FDI. This bifurcation in the government's demand mainly results from the additive linearity of the tax structure plus the decreasing negative pecuniary externality between the domestic firms and the foreign-invested firms.

It can be shown that $\tilde{\lambda}'(\tau) > 0$, because a higher tariff rate drives up the aggregate price q hence increases the profit for each domestic firm, so the profit tax rate on FDI must be increased in order to induce the revenue-maximizing provincial government to prefer FDI over domestic firms. We can also show $\tilde{\lambda}(\infty) < \frac{\varepsilon-\theta}{\varepsilon-1} \bar{\lambda}$, which means that the provincial government would prefer full FDI under the uniform tax rates (*i.e.* $\bar{\lambda} = \lambda$). In addition, $\tilde{\lambda}(\tau)$ decreases with domestic production cost, c_h , because a larger c_h implies a lower profit for each domestic firm, which provides more incentives to the provincial government to attract more FDI. So the threshold tax rate will be lowered.¹³ This extreme attitude n_m^d dictates its choice of ϕ , which shall be characterized soon.

3.1.8 Timing and Equilibrium

For given τ, λ and $\bar{\lambda}$, the provincial government decides ϕ by solving (10). Next, after observing all those policy variables, all the potential investors make their entry decisions simultaneously. After that, labor market opens, output is produced, commodity market opens, trade occurs, and consumption is realized.

Definition 1. *An equilibrium with one province is a collection of the fixed cost ϕ^* , the commodity prices $p^*(j)$, $j \in N$, and the investment decisions D_j^* , for all $j \in N_f$, such that:*

¹³In Wang and Hu(2007), we exploit this result to explain why Zhejiang Province attracted much less FDI than Jiangsu Province in China. This is because Zhejiang has a more active and profitable domestic private sector while Jiangsu has a larger but much less profitable sector of state-owned enterprises. So it's more likely to induce Jiangsu Provincial government to attract FDI for any given exogenous policy variables set by the central government. In fact, we do observe that Jiangsu government is more enthusiastic in attracting FDI by establishing more special economic zones than the counterpart in Zhejiang Province. We also examine its effect on the trade pattern.

1. The provincial government maximizes its fiscal revenue(10), the solution to which is ϕ^* , given τ and λ .
2. Each potential investor $j \in N_f$ makes the investment decision (8) by solving D_j^* , and it also makes pricing decision $p^*(j)$, given ϕ^* . D_j^* is a best response to D_{-j}^* .
3. Each domestic firm $j \in N_h$ maximizes its profit, the solution to which is $p^*(j)$.
4. Each household maximizes the utility by choosing the right consumption subject to the budget constraint.
5. Markets clear for domestic labor, each domestically produced and consumed commodity, and the international payment is balanced for the domestic economy.

Obviously, $p^*(j)$, $j \in N$, is given by (3). Backward induction is used to characterize the equilibrium. We first examine the investor's choice. When (8) holds as an equality, an investor is indifferent between FDI and export, from which we can derive n_m as a function of ϕ , denoted by $H(\phi)$:

$$H(\phi) = \frac{\left[\frac{\phi \varepsilon}{\left(\frac{\varepsilon}{\varepsilon-1} c_f\right)^{1-\varepsilon} (1-\lambda-\tau^{-\varepsilon} w^{1-\varepsilon})} \right]^{\frac{1-\varepsilon}{\varepsilon-\theta}} - n_h p_h^{1-\varepsilon} - n_f p_f^{1-\varepsilon}}{p_m^{1-\varepsilon} - p_f^{1-\varepsilon}}.$$

The optimal entry decision, D_j^* , for any investor $j \in N_f$ is given by

$$D_j^* = \begin{cases} 1, & \text{if } \lambda < 1 - \tau^{-\varepsilon} w^{1-\varepsilon}, \int_{j' \in N_f, j' \neq j} 1_{(D_{j'}^*=1)} dj' < H(\phi) \\ 0 \text{ or } 1, & \text{if } \lambda < 1 - \tau^{-\varepsilon} w^{1-\varepsilon}, \int_{j' \in N_f, j' \neq j} 1_{(D_{j'}^*=1)} dj' = H(\phi) \\ & \text{or } \lambda = 1 - \tau^{-\varepsilon} w^{1-\varepsilon}, \phi = 0 \\ 0, & \text{if otherwise} \end{cases}. \quad (12)$$

It says that an investor would choose to make FDI if she expects that the total amount of FDI, $\int_{j' \in N_f, j' \neq j} 1_{(D_{j'}^*=1)} dj'$, is less than the threshold value $H(\phi)$, provided that the profit tax rate is sufficiently low so that (9) holds as a strict inequality. When the total amount of FDI is exactly equal to $H(\phi)$ or when (9) holds as an equality with $\phi = 0$, the investor obtains the same net profit for FDI and export, and therefore becomes indifferent. In summary, when (9) holds as a strict inequality, the aggregate FDI can be uniquely pinned down as a function of ϕ :

$$n_m = \begin{cases} n_f, & \text{if } \phi \leq \underline{\phi} \\ H(\phi), & \text{if } \underline{\phi} < \phi < \bar{\phi} \\ 0, & \text{if } \phi \geq \bar{\phi} \end{cases},$$

where

$$\underline{\phi} \equiv \frac{1}{\varepsilon} (n_h p_h^{1-\varepsilon} + n_f p_m^{1-\varepsilon})^{\frac{\varepsilon-\theta}{1-\varepsilon}} \left(\frac{\varepsilon}{\varepsilon-1} c_f \right)^{1-\varepsilon} (1-\lambda-\tau^{-\varepsilon} w^{1-\varepsilon}), \quad (13)$$

and

$$\bar{\phi} \equiv \frac{1}{\varepsilon} (n_h p_h^{1-\varepsilon} + n_f p_f^{1-\varepsilon})^{\frac{\varepsilon-\theta}{1-\varepsilon}} \left(\frac{\varepsilon}{\varepsilon-1} c_f \right)^{1-\varepsilon} (1-\lambda-\tau^{-\varepsilon} w^{1-\varepsilon}). \quad (14)$$

The supply of FDI as a function of the provincial government's policy is depicted in Figure 3.

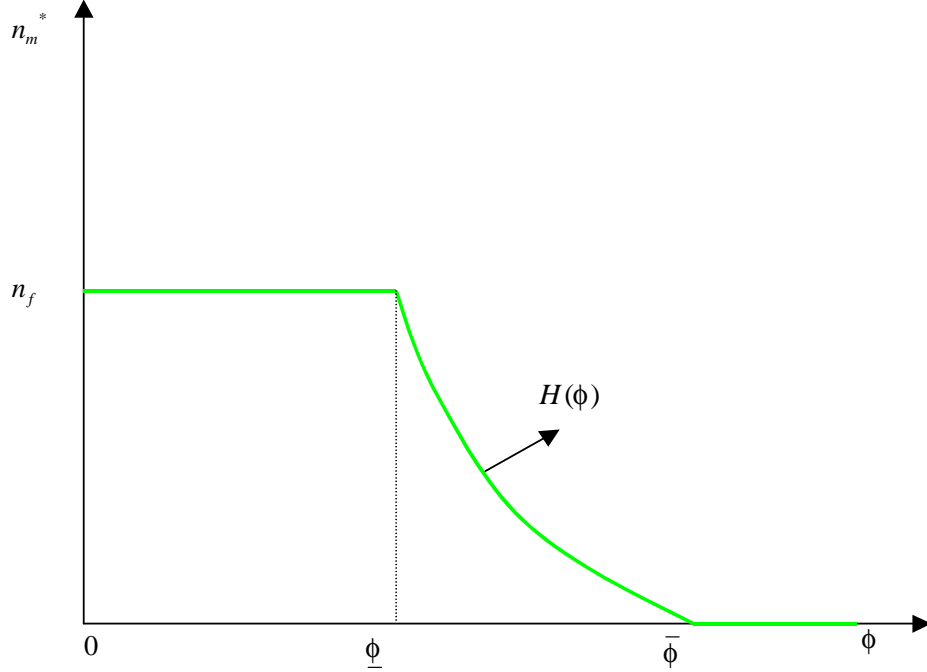


Figure 3: FDI Supply as Function of ϕ when $\lambda < 1 - \tau^{-\varepsilon}w^{1-\varepsilon}$

Given the investor's decision rule, we can obtain the optimal choice of the provincial government from (11):

$$\phi^* = \begin{cases} \text{any } \phi \leq \underline{\phi}, & \text{if } \lambda \geq \tilde{\lambda}(\tau), \lambda < 1 - \tau^{-\varepsilon}w^{1-\varepsilon} \\ 0, & \text{if } \lambda \geq \tilde{\lambda}(\tau), \lambda = 1 - \tau^{-\varepsilon}w^{1-\varepsilon} \\ \text{any } \phi \geq \bar{\phi}, & \text{if } \lambda < \tilde{\lambda}(\tau), \lambda < 1 - \tau^{-\varepsilon}w^{1-\varepsilon} \\ \text{any } \phi > 0, & \text{if } \lambda < \tilde{\lambda}(\tau), \lambda = 1 - \tau^{-\varepsilon}w^{1-\varepsilon} \\ \text{any } \phi \geq 0, & \text{if } \lambda > 1 - \tau^{-\varepsilon}w^{1-\varepsilon} \end{cases} . \quad (15)$$

It says that when the profit tax rate is large enough to lure a positive FDI demand from the provincial government ($\lambda \geq \tilde{\lambda}(\tau)$) and it's also small enough to admit a positive FDI supply from potential investors ($\lambda < 1 - \tau^{-\varepsilon}w^{1-\varepsilon}$), then the provincial government would choose a sufficiently small cost $\phi \leq \underline{\phi}$ to guarantee that all the foreign investors will choose FDI. It requires the following necessary condition for an equilibrium with positive FDI:

$$1 - \tilde{\lambda}(\tau) - \tau^{-\varepsilon}w^{1-\varepsilon} \geq 0. \quad (16)$$

In particular, when $\lambda > \tilde{\lambda}(\tau)$ and $\lambda = 1 - \tau^{-\varepsilon}w^{1-\varepsilon}$, the provincial government strictly prefers full FDI to none while the investors strictly prefer exporting to making FDI whenever $\phi > 0$ and become indifferent if $\phi = 0$. So if the provincial government chooses $\phi = 0$, any $n_m \in [0, n_f]$ can be a Nash equilibrium among the investors. In particular, if $\lambda \geq \frac{\varepsilon - \theta}{\varepsilon - 1} \left(\frac{\bar{\lambda} n_h c_h^{1-\varepsilon}}{c_f^{1-\varepsilon}} \right)$

$\left(\frac{c_f^{1-\varepsilon} - (\tau w c_f)^{1-\varepsilon}}{n_h c_h^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}} \right)$, then the provincial government's goal function is strictly increasing in n_m on the whole interval of $[0, n_f]$, hence it's optimal to choose $\phi = 0$. Otherwise, the provincial government might strictly prefer $n_m = 0$ to some $n_m \in (0, n_f)$. I break the tie by assuming that the provincial government could write a recommendation to all the investors by coordinating them to its most favorable Nash equilibrium. Hence when the provincial government chooses $\phi = 0$, all the investors will make FDI. All the other cases are straightforward.

On the demand side, the provincial government can always implement zero FDI by setting ϕ sufficiently high whenever it dislikes FDI ($\lambda < \tilde{\lambda}(\tau)$). On the supply side, the investors won't invest for sure when (9) is violated. Whenever (16) is violated, either the demand or the supply of FDI must be zero.

Proposition 1. *In the equilibrium with one province, the equilibrium FDI is either null or full:*

$$n_m^* = \int_{j \in N_f} 1_{(D_j^*=1)} dj = \begin{cases} n_f, & \text{if } \tilde{\lambda}(\tau) < \lambda \leq 1 - \tau^{-\varepsilon} w^{1-\varepsilon} \\ 0, & \text{if otherwise} \end{cases},$$

moreover, the provincial government's strategy is given by (15), the optimal entry decision of any $j \in N_f$, D_j^* , is given by (12), the equilibrium prices $p^*(j)$, $j \in N$, are given by (3).

This proposition establishes the crucial result that the unique equilibrium FDI is a corner solution. The underlying logic for this bifurcation lies in the fact that there exists an endogenously decreasing negative pecuniary externality between domestic and multinational firms together with the fact that the provincial government is maximizing its profit-tax revenue, as analyzed before. It's crucial that the pecuniary negative externality is decreasing. If it were increasing, then we could have an interior solution because the revenue as a function of the entry cost might exhibit a hump shape instead of the inverted U shape. Proposition 1 shows that which extremity is reached shall depend on the exogenous policy profile of the profit tax rate and tariff rate, which I will endogenize later.

3.2 Two-Province Economy

3.2.1 Economic Environment

Now I introduce a second province into the economy to examine the possible competition effect. The two provinces are indexed by $k \in \{1, 2\}$. Each province is a replicate of the economy described in the last subsection. The two provinces face the same pool of the foreign investors N_f with measure n_f . Assume no inter-provincial trade is allowed.¹⁴ The central government determines the nation-wide uniform tariff rate τ and the profit tax rates on foreign invested

¹⁴Young(2000) argued with ample empirical evidence that the gradual reform strategy resulted in enormous distortions in the economy, one of which is the extremely strong regional protectionism. The domestic market is segregated across different provinces.

firms in the two provinces, denoted by λ_k , for $k \in \{1, 2\}$. No household can own a firm that is located in the other province. Again, all the domestic firms need to turn in the profit tax with the exogenous rate $\bar{\lambda}$ and each provincial government obtains $1 - \gamma$ of the tax revenue in that province. The rest of the profit tax revenue accrues to the central government introduced later.

The timing is that after observing the public information about τ and λ_k , for $k \in \{1, 2\}$, both provincial governments decide their own entry cost ϕ_k simultaneously and non-cooperatively. Then all the investors make investment decisions simultaneously. The rest is exactly the same as before.

The government of province k solves

$$\max_{\phi_k \geq 0} (1 - \gamma) [\lambda_k \pi_m(k) n_m(k) + \bar{\lambda} n_h \pi_h(k)], \quad (17)$$

where $n_m(k)$, $\pi_m(k)$ and $\pi_h(k)$ denote, respectively, the amount of FDI, the profit of a multinational firm, and the profit of a domestic firm in province k .

To avoid the trivial case with no competition, I assume each foreign investor can invest in at most one province. One possible justification is that the investor might be financially constrained to set multiple plants in one country. I also assume that the foreign-invested firms can only serve the provincial market while the other province can be only accessed through export directly from the plant in the foreign country, so I also exclude the possibility that a foreign firm makes FDI in one province and then "export abroad and re-import to the other province". Each investor has the same choice set denoted by $\{A, B(1), B(2)\}$, where A refers to exporting to both provinces, in which case the total profit is

$$\Pi^A = \sum_{k=1}^2 \pi_f(k), \quad (18)$$

$B(1)$ refers to making FDI in province 1 while exporting to province 2:

$$\Pi^{B(1)} = [(1 - \lambda_1) \pi_m(1) - \phi_1] + \pi_f(2), \quad (19)$$

and $B(2)$ refers to making FDI in province 2 while exporting to province 1:

$$\Pi^{B(2)} = [(1 - \lambda_2) \pi_m(2) - \phi_2] + \pi_f(1). \quad (20)$$

Therefore, for any potential investor $j \in N_f$, she chooses

$$D_j^* \in \arg \max_{D \in \{A, B(1), B(2)\}} \{\Pi^A, \Pi^{B(1)}, \Pi^{B(2)}\}. \quad (21)$$

Definition 2. *An equilibrium with two provinces is a collection of the fixed cost $\{\phi_k^*\}_{k=1}^2$, the commodity prices $p^*(j, k)$, $j \in N, k = 1, 2$, and the investment decisions D_j^* , for all $j \in N_f$, such that:*

1. *Each provincial government $k = 1, 2$ maximizes its fiscal revenue(17) by choosing ϕ_k^* , which is a best response to ϕ_{-k}^* .*

2. Each potential investor $j \in N_f$ makes the investment (and location choice) decision D_j^* in (21) and the pricing decision $p^*(j, k)$, given $\{\phi_k^*\}_{k=1}^2$. D_j^* is a best response to D_{-j}^* .
3. Each domestic firm $j \in N_h$ in province k maximizes its profit, the solution to which is $p^*(j, k)$.
4. Each household maximizes the utility by choosing the right consumption subject to the budget constraint.
5. Markets clear for the domestic labor, each domestically produced and consumed commodity, and the international payment is balanced for the domestic economy.

3.2.2 Symmetric Equilibrium

Obviously, $p^*(j, k)$, $j \in N, k = 1, 2$, is still given by (3) ignoring index k . Consider the case where the two provinces have the same exogenous profit tax rates on the multinational firms $\lambda_1 = \lambda_2 = \lambda$. In addition, let's characterize the symmetric two-province equilibrium with the following two properties:

$$\phi_1^* = \phi_2^*, \quad (22)$$

and

$$n_m^*(1) = n_m^*(2). \quad (23)$$

First, observe that (23) alone implies equal profit for each type of firms across the two provinces:

$\pi_x^*(1) = \pi_x^*(2)$ for any $x \in \{h, m, f\}$. Second, (22) together with the previous result implies that each investor must be indifferent between the two provinces as their investment destinations in the symmetric equilibrium, if such an equilibrium exists. Third, the investment decision problem can be reduced to (8) at each province in the symmetric equilibrium. Obviously, (9) remains as a necessary condition to attract positive FDI. Suppose it always holds. Now that the largest possible FDI for each province in the symmetric equilibrium is $\frac{n_f}{2}$ instead of n_f , I define

$$\widehat{\lambda}(\tau) \equiv \frac{n_h c_h^{1-\varepsilon} \left\{ \left(n_h c_h^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon} \right)^{\frac{\varepsilon-\theta}{1-\varepsilon}} - \left(n_h c_h^{1-\varepsilon} + \frac{n_f ((\tau w c_f)^{1-\varepsilon} + c_f^{1-\varepsilon})}{2} \right)^{\frac{\varepsilon-\theta}{1-\varepsilon}} \right\} \bar{\lambda}}{c_f^{1-\varepsilon} \frac{n_f}{2} \left(n_h c_h^{1-\varepsilon} + \frac{n_f ((\tau w c_f)^{1-\varepsilon} + c_f^{1-\varepsilon})}{2} \right)^{\frac{\varepsilon-\theta}{1-\varepsilon}}},$$

which is the lowest possible profit tax rate that can induce the provincial government to strictly prefer $n_m(k) = \frac{n_f}{2}$ to zero FDI. $\widehat{\lambda}(\tau)$ is strictly increasing in τ and smaller than $\frac{\varepsilon-\theta}{\varepsilon-1} \bar{\lambda}$. In addition, $\widehat{\lambda}(\tau) > \widetilde{\lambda}(\tau)$, for any $\tau \geq 1$. When $\lambda = \widehat{\lambda}(\tau)$, the provincial governments impose a prohibitively high entry cost because they each know that they can't both achieve full FDI simultaneously. When (9) holds as an equality with zero fixed cost, any $n_m^*(1) = n_m^*(2) \in [0, \frac{n_f}{2}]$ can be realized as a result of the simultaneous investment decisions, in which case I assume that provincial government's most favorable equilibrium $n_m^*(1) = n_m^*(2) = \frac{n_f}{2}$ will be realized for the similar argument in the previous section. When (9) is violated, no FDI will be supplied hence the entry cost is irrelevant and $n_m^*(1) = n_m^*(2) = 0$. More precisely, we have the following proposition.

Proposition 2. *When $\lambda \in (\tilde{\lambda}(\tau), \hat{\lambda}(\tau))$, the symmetric equilibrium with two provinces doesn't exist but there exists an asymmetric equilibrium in which one province absorbs full FDI while the other has no FDI. When $\lambda \notin (\tilde{\lambda}(\tau), \hat{\lambda}(\tau))$, the symmetric equilibrium does exist, in which the equilibrium FDI is still bifurcated:*

$$n_m^*(1) = n_m^*(2) = \begin{cases} 0, & \text{if } \lambda \leq \tilde{\lambda}(\tau), 1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0 \text{ or} \\ & 1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} < 0 \\ \frac{n_f}{2}, & \text{if } \lambda \geq \hat{\lambda}(\tau), 1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0 \end{cases}. \quad (24)$$

When $\lambda < \tilde{\lambda}(\tau)$, the provincial government in province k would make ϕ_k^* sufficiently large to deter any FDI. When $\tilde{\lambda}(\tau) < \lambda < \hat{\lambda}(\tau)$, no symmetric equilibrium exists because each provincial government strictly prefers zero FDI to any $n_m(k) \in (0, \frac{n_f}{2}]$, but would strictly prefer $n_m(k) = n_f$ to zero FDI. In that case, there exists one and only one pure-strategy asymmetric equilibrium in which one provincial government completely blocks any FDI by setting its ϕ sufficiently large while the other provincial government sets ϕ equal to zero and hence attracts full FDI. If $\lambda \geq \hat{\lambda}(\tau)$, then the government k has a higher revenue at $n_m(k) = \frac{n_f}{2}$ than at zero FDI. In addition, the revenue is strictly increasing in $n_m(k)$ on $[\frac{n_f}{2}, n_f]$, so the symmetric equilibrium exists, in which $n_m^*(1) = n_m^*(2) = \frac{n_f}{2}$ and $\phi_1^* = \phi_2^* = 0$. Half of the foreign investors will export to Province 2 and make FDI in Province 1 while the other half will export to Province 1 and make FDI in Province 2. It's straightforward to derive the following optimal decisions for the provincial governments and potential foreign investors:

$$\phi_1^* = \phi_2^* = \begin{cases} \text{any value on } [\bar{\phi}, \infty), & \text{if } \lambda \leq \tilde{\lambda}(\tau), 1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0 \\ 0, & \text{if } \lambda \geq \hat{\lambda}(\tau), 1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0 \\ \text{any value on } [0, \infty), & \text{if } 1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} < 0 \end{cases}, \quad (25)$$

and, for any investor $j \in N_f$, the optimal entry decision is

$$D_j^* = \begin{cases} B(1) \text{ or } B(2), & \text{if } \lambda < 1 - \tau^{-\varepsilon} w^{1-\varepsilon}, \phi_1 = \phi_2 = 0 \\ A, & \text{if } \lambda < 1 - \tau^{-\varepsilon} w^{1-\varepsilon}, \phi_1 = \phi_2 \geq \bar{\phi} \text{ or} \\ & 1 - \lambda - \tau^{-\varepsilon} w^{1-\varepsilon} < 0 \\ A, B(1), \text{ or } B(2), & \text{if } \lambda = 1 - \tau^{-\varepsilon} w^{1-\varepsilon}, \phi_1 = \phi_2 = 0, \end{cases}. \quad (26)$$

Hence, the FDI bifurcation obtained in the single-province equilibrium remains valid in the two-province equilibrium. Their main difference is that the entry cost might be positive in the single-province equilibrium with positive FDI while in the two-province equilibrium, symmetric or not, the potential regional competition drives the entry cost down to zero for sure in the province with positive FDI. In this very sense, introducing another province won't affect the equilibrium FDI at the national level for any given profit tax rate and tariff rate. However, the equilibrium attitude of any particular provincial government might change as there are more competing provinces coming into the model. This occurs only when total investor pool n_f is sufficiently small such that it can support positive FDI in some but not all the provinces in the equilibrium.

This result holds for more than two provinces. Define

$$\Lambda(z, \tau) \equiv \frac{\bar{\lambda} n_h c_h^{1-\varepsilon} \left\{ \left[\frac{n_h c_h^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}}{n_h c_h^{1-\varepsilon} + (n_f - z) (\tau w c_f)^{1-\varepsilon} + z c_f^{1-\varepsilon}} \right]^{\frac{\varepsilon-\theta}{1-\varepsilon}} - 1 \right\}}{z c_f^{1-\varepsilon}}, \quad (27)$$

where $z \in [0, n_f]$. Using L'Hospital Rule, we obtain $\Lambda(0, \tau) = \frac{\varepsilon-\theta}{\varepsilon-1} \left(\frac{\bar{\lambda} n_h c_h^{1-\varepsilon}}{c_f^{1-\varepsilon}} \right) \left(\frac{c_f^{1-\varepsilon} - (\tau w c_f)^{1-\varepsilon}}{n_h c_h^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}} \right)$. Note $\hat{\lambda}(\tau) = \Lambda(\frac{n_f}{2}, \tau)$ and $\tilde{\lambda}(\tau) = \Lambda(n_f, \tau)$. We can show that $\Lambda_1 < 0$, meaning that the higher the expected amount of FDI that the provincial government k can attract, the lower the threshold value of the profit tax rate. .

Corollary. *In an economy with K ex ante identical provinces, where $K \geq 2$. Suppose the necessary condition for positive FDI supply (9) still holds. Provincial government k would prefer any $n_m(k) \in (0, n_f]$ to $n_m(k) = 0$ if and only if $\lambda \geq \Lambda(n_m(k), \tau)$. In addition, if $\lambda \geq \Lambda(\frac{n_f}{K}, \tau)$, there exists a unique symmetric equilibrium, in which $\phi_k^* = 0$ and $n_m^*(k) = \frac{n_f}{K}$, for all $k \in \{1, 2, \dots, K\}$. If $\lambda \leq \Lambda(n_f, \tau)$, then there exist a continuum of symmetric equilibria, in which $\phi_k^* \geq \bar{\phi}$ and the FDI outcome is uniquely zero: $n_m^*(k) = 0$, for all $k \in \{1, 2, \dots, K\}$. If $\lambda \in (\Lambda(n_f, \tau), \Lambda(\frac{n_f}{K}, \tau))$, no symmetric equilibrium exists.*

We can also show that $\Lambda_2 > 0$ and $\Lambda(n_f, 1) \leq \Lambda(n_m(k), \tau) \leq \Lambda(0, \infty) = \left(\frac{\varepsilon-\theta}{\varepsilon-1} \right) \bar{\lambda} < \bar{\lambda}$. Therefore, when $\lambda < \Lambda(n_f, 1)$, all the provinces will block FDI and there will be zero FDI for any tariff rate τ . By contrast, when $\lambda > \left(\frac{\varepsilon-\theta}{\varepsilon-1} \right) \bar{\lambda}$, the equilibrium FDI at the national level will be always equal to n_f although the regional distribution of FDI might be different across ex ante identical provinces. Next I will characterize asymmetric equilibrium more systematically.

3.2.3 Asymmetric Equilibrium

First, I show that the result of FDI bifurcation is robust to matter how many provinces there are in the country.

Proposition 3. *In any equilibrium with K ex ante identical provinces ($K \geq 2$), symmetric or not, the aggregate FDI must be either zero or full.*

Proof. By contradiction. Suppose there exists an asymmetric equilibrium which satisfies

$$0 < \sum_{k=1}^K n_m^*(k) < n_f.$$

So $n_m^*(k) > 0$ for some $k \in \{1, 2, \dots, K\}$. It implies that $\lambda_k^* \geq \Lambda(n_m^*(k), \tau) > \Lambda(n_m^*(k) + \Delta, \tau)$ for some small $\Delta > 0$ because $\Lambda_1 < 0$. Moreover, $n_m^*(k) + \Delta$ is feasible as $\sum_{k=1}^K n_m^*(k) < n_f$. This contradicts the optimality of $n_m^*(k)$ because any provincial government is assumed throughout to coordinate the investors' behavior to its most preferred Nash Equilibrium. **Q.E.D.**

This proposition shows that our previous FDI bifurcation result is robust to the number of provinces in the equilibrium. Now let's consider the asymmetric equilibrium with full FDI for

$K = 2$, namely,

$$\sum_{k=1}^2 n_m^*(k) = n_f. \quad (28)$$

Proposition 4. *In the equilibrium with positive FDI in both provinces, the entry cost is zero in both provinces ($\phi^*(k) = 0, \forall k \in \{1, 2\}$) and the FDI allocation is given by*

$$\begin{cases} n_m^*(1) = F(\lambda_1, \lambda_2) \\ n_m^*(2) = F(\lambda_2, \lambda_1) \end{cases}, \quad (29)$$

where $F(x, y)$ is defined as

$$\frac{(1 - y - \tau^{-\varepsilon} w^{1-\varepsilon})^{\frac{1-\varepsilon}{\varepsilon-\theta}} [n_h p_h^{1-\varepsilon} + n_f p_m^{1-\varepsilon}] - (1 - x - \tau^{-\varepsilon} w^{1-\varepsilon})^{\frac{1-\varepsilon}{\varepsilon-\theta}} [n_h p_h^{1-\varepsilon} + n_f p_f^{1-\varepsilon}]}{\left[(1 - y - \tau^{-\varepsilon} w^{1-\varepsilon})^{\frac{1-\varepsilon}{\varepsilon-\theta}} + (1 - x - \tau^{-\varepsilon} w^{1-\varepsilon})^{\frac{1-\varepsilon}{\varepsilon-\theta}} \right] (p_m^{1-\varepsilon} - p_f^{1-\varepsilon})}.$$

Proof. Now $n_m^*(k) > 0$ for both $k \in \{1, 2\}$, but $n_m^*(1) \neq n_m^*(2)$. This means $\Pi^{B(1)} = \Pi^{B(2)} \geq \Pi^A$. Competition implies that $\phi^*(k) = 0$ for each $k \in \{1, 2\}$, so we must have

$$(1 - \lambda_1^*)\pi_m^*(1) + \pi_f^*(2) = (1 - \lambda_2^*)\pi_m^*(2) + \pi_f^*(1). \quad (30)$$

By solving (28) and (30), we uniquely obtain (29). Such an equilibrium exists if and only if the foreign investors have incentives to supply FDI, that is, $1 - \lambda_k - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0, \forall k \in \{1, 2\}$, and the provincial governments have incentives to acquire that amount of FDI, that is, $\lambda_k \geq \Lambda(n_m^*(k), \tau)$ for both $k \in \{1, 2\}$. **Q.E.D.**

$F(x, y)$ is strictly decreasing in x and increasing in y , consequently the province with a higher FDI profit tax attracts less FDI. In fact, $\lambda_1 = \lambda_2$ implies a symmetric equilibrium $n_m^*(1) = n_m^*(2) = \frac{n_f}{2}$ according to (29), which is consistent with (24). Again in such an equilibrium, each province will produce those foreign brands which the other province imports from the foreign country.

Proposition 5. *In any equilibrium with unequal FDI across the two identical provinces, the FDI profit tax rate in the province with the smaller FDI must be weakly higher unless it is too small to induce any positive FDI demand from that provincial government. Moreover, the FDI profit tax rates are identical in the two provinces if and only if both provincial governments are indifferent between full FDI and zero FDI.*

Proof. We need to show that if $n_m^*(k) > n_m^*(k')$ for some $k, k' \in \{1, 2\}$, and $k \neq k'$, then it must be that $\lambda_k \geq \lambda_{k'}$. When $n_m^*(k) > n_m^*(k') > 0$, Proposition 4 immediately implies $\lambda_k < \lambda_{k'}$. By Proposition 3, it only suffices to show that $\lambda_k \leq \lambda_{k'}$ whenever $n_m^*(k) = n_f$ and $n_m^*(k') = 0$ for some $k, k' \in \{1, 2\}$. Without loss of generality, suppose $n_m^*(1) = 0$ and $n_m^*(2) = n_f$. This means $\Pi^{B(2)} \geq \Pi^A$ and $\Pi^{B(2)} \geq \Pi^{B(1)}$. Note $n_m^*(2) = n_f$ implies that $\lambda_2 \geq \tilde{\lambda}(\tau)$ hence $\phi_2^* = 0$. Moreover, $\Pi^{B(2)} \geq \Pi^A$ means $1 - \lambda_2 - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0$. On the other hand, $\Pi^{B(2)} \geq \Pi^{B(1)}$ implies $(1 - \lambda_2)\pi_m^*(2) + \pi_f^*(1) \geq (1 - \lambda_1)\pi_m^*(1) - \phi_1^* + \pi_f^*(2)$. There are three possible cases for $n_m^*(1) = 0$:

(1) $\lambda_1 \leq \tilde{\lambda}(\tau)$ and ϕ_1^* is big enough to deter any FDI, so $\lambda_1 \leq \lambda_2$ with equality holding only when $\lambda_1 = \lambda_2 = \tilde{\lambda}(\tau)$, at which both provincial governments are indifferent between full FDI and zero FDI. (2) $\lambda_1 > \tilde{\lambda}(\tau)$ hence $\phi_1^* = 0$ but $1 - \lambda_1 - \tau^{-\varepsilon} w^{1-\varepsilon} < 0$, so $\lambda_2 < \lambda_1$; (3) $\lambda_1 > \tilde{\lambda}(\tau)$ hence $\phi_1^* = 0$ and $1 - \lambda_1 - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0$ but $(1 - \lambda_2)\pi_m^*(2) + \pi_f^*(1) > (1 - \lambda_1)\pi_m^*(1) + \pi_f^*(2)$, or equivalently, $(1 - \lambda_2 - \tau^{-\varepsilon} w^{1-\varepsilon})\pi_m^*(2) > (1 - \lambda_1 - \tau^{-\varepsilon} w^{1-\varepsilon})\pi_m^*(1)$, which implies $\lambda_2 < \lambda_1$ as $\pi_m^*(2) < \pi_m^*(1)$. **Q.E.D.**

Recall in the one-province economy, the potential investor chooses to make FDI if and only if the net profit of making FDI exceeds the profit of exporting to that province. However, this result might no longer hold in the two-province economy. For example, as shown in case (3) in the above proof for Proposition 5, when the net profit of making FDI in Province 1 exceeds the profit of exporting to that province, a potential investor might still make no FDI in that province. This is solely because the net gain of FDI versus exporting is larger in Province 2 than in Province 1. So all the tariff revenue of that country comes from Province 1, where the provincial government can only collect the tax revenues from the domestic firms. Such a difference between one-province economy and multi-province economy would disappear if we relax the constraint that each investor can invest in at most one province.

Lastly, consider the asymmetric political equilibrium with $n_m^*(1) = n_m^*(2) = 0$. The equilibrium profit tax rate on FDI is either too low to induce the provincial governments to compete for FDI or too high to attract investors. More specifically, if the tariff rate τ is such that $1 - \tilde{\lambda}(\tau) - \tau^{-\varepsilon} w^{1-\varepsilon} < 0$, then the profit tax rates and the entry cost can be any value. If $1 - \tilde{\lambda}(\tau) - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0$, then it must be $\lambda_k \leq \tilde{\lambda}(\tau)$ for both $k \in \{1, 2\}$, hence the two provinces choose possibly different but very high entry cost such that FDI is blocked in both provinces.

The characterization of asymmetric equilibria not only helps us understand the regional allocation of FDI within a country but also proves helpful in understanding the aggregate FDI at the national level. In particular, it shows that for any given profit tax rates and tariff rate the non-cooperative horizontal interaction between the different provincial governments would not affect the aggregate FDI at the national level, although the entry cost might change because of the competition effect. All the analyses suggest that the tariff rate and FDI profit tax rates can solely determine the attitude of each provincial government toward FDI and the aggregate level and regional distribution of FDI. They also affect the equilibrium entry costs, depending on how many competing provinces there are in this economy. In the next subsection I will endogenize the tariff rate and profit tax rates on FDI.

3.3 Endogenous Policies

Now there exists a central government in the two-province economy described above. The central government holds all the tariff revenue as well as a fraction γ of the profit tax revenues in both provinces. Suppose all the owners of domestic firms in the country form one organized special interest group (SIG), which tries to persuade the central government to adopt the SIG's favorable policies by offering a non-negative contribution menu $C(\lambda_1, \lambda_2, \tau)$, which is the committed transfer to the central government if λ_1, λ_2 and τ are chosen. Assume there is no lobbying at the provincial level. The timing is as follows:

1. The special interest group lobbies the central government by providing $C(\lambda_1, \lambda_2, \tau)$;
2. The central government decides $\lambda_1, \lambda_2, \tau$;
3. The two provincial governments decide ϕ_1 and ϕ_2 simultaneously;
4. All the potential investors make FDI decisions simultaneously;
5. Labor market opens, output is produced, commodity market opens, taxation and transfer occur, and consumption is realized.

3.3.1 Special Interest Group and Central Government

The special interest group solves

$$\max_{C(\lambda_1, \lambda_2, \tau)} \sum_{k=1}^2 (1 - \bar{\lambda}) n_h \pi_h(k) - C(\lambda_1, \lambda_2, \tau) \quad (31)$$

subject to the participation constraint of the central government. A complete description should also specify how the cost is split among the members of the SIG, but it's irrelevant for our current purpose.¹⁵

The central government solves:

$$\begin{aligned} \max_{\lambda_1, \lambda_2, \tau} C(\lambda_1, \lambda_2, \tau) + \sum_{k=1}^2 \gamma [\bar{\lambda} n_h \pi_h(k) + \lambda_k n_m(k) \pi_m(k)] \\ + \sum_{k=1}^2 \frac{\tau - 1}{\tau} (n_f - n_m(k)) p_f x_f(k) + a \sum_{k=1}^2 W_k(\tau, n_m(k)), \end{aligned} \quad (32)$$

where the second term on the right hand side of (32) is the tax revenue from the profits of the domestic and multinational firms in the two provinces, the third term is the aggregate tariff revenue, and the central government also cares about the welfare of an average household in both provinces, denoted by $W_k(\tau, n_m(k))$, $k = 1, 2$, with a welfare weight a .¹⁶ Solving the household problem in province k , we obtain

$$W_k(\tau, n_m(k)) = L + (1 - \bar{\lambda}) n_h \pi_h(k) + \frac{q(k)^{1-\theta}}{\theta - 1}, \quad (33)$$

which is the sum of the total wage income, the after-tax profit, and the utilities from the consumption. Notice it's the welfare level without taking the lobby cost into account. It

¹⁵The owners from different provinces might disagree with the FDI profit tax rates across the two provinces because they want to keep the tax rate high in their own province and low in the other province in order to deter FDI into their own province. We simplify our analysis by assuming that all the owners could reach an agreement within themselves and form a single contribution schedule as one interest group. If they form two separate interest groups competing for the favor of the central government, it constitutes a menu auction. The central government's optimal policy choice would remain unchanged because of the transferable utility, although the central government instead of the interest groups will exploit all the surplus. Another extension is to bring the lobby analysis at the level of the provincial government as well. We will leave these issues for future exploration.

¹⁶Breton and Salanie (2003) examine in a different environment the interest group formation and the lobbying behavior when the politicians have different types captured by the parameter a , which is privately informed.

strictly decreases with τ and strictly increases with $n_m(k)$ because they generally prefer low consumption prices, which means that the average households are the anti-protectionists.

Hence (31) and (32) implies the following reduced policy decision problem:

$$\begin{aligned} \max_{\lambda_1, \lambda_2, \tau} & \sum_{k=1}^2 [(1 - \bar{\lambda})n_h\pi_h(k) + aW_k(\tau, n_m(k))] + \sum_{k=1}^2 \gamma[\bar{\lambda}n_h\pi_h(k) \\ & + \lambda_k n_m(k)\pi_m(k)] + \sum_{k=1}^2 \frac{\tau - 1}{\tau} (n_f - n_m(k))p_f(k)x_f(k). \end{aligned} \quad (34)$$

Let $C(\lambda_1, \lambda_2, \tau) \equiv 0$, the optimized value of (32) is the reservation value for the central government, denoted by \underline{G} . We only need to make sure that the central government can get at least \underline{G} after taking some transfer $C(\lambda_1, \lambda_2, \tau)$.

3.3.2 Political Equilibrium

Definition 3. A *Political Equilibrium (PE)* is a collection of the policy variables τ^* , $\{\phi_k^*, \lambda_k^*\}_{k \in \{1,2\}}$, the commodity prices $p^*(j)$, $j \in N$,¹⁷ the lobby schedule function $C^*(\lambda_1, \lambda_2, \tau)$, and the investment decisions D_j^* , for all $j \in N_f$, such that:

1. The interest group of the domestic firm owners solves (31), the solution to which is $C^*(\lambda_1, \lambda_2, \tau)$;
2. The central government solves (32), the solution to which is τ^* , $\{\lambda_k^*\}_{k \in \{1,2\}}$;
3. Each provincial government k maximizes its fiscal revenue by solving (17), the solution to which is ϕ_k^* , given τ^* , $\{\lambda_k^*\}_{k \in \{1,2\}}$, and ϕ_k^* is a best response to $\phi_{k'}^*$, $k' \neq k$, for $k, k' \in \{1, 2\}$;
4. Each potential investor $j \in N_f$ makes the investment decision, D_j^* , and pricing decision $p^*(j)$, given τ^* , $\{\phi_k^*, \lambda_k^*\}_{k \in \{1,2\}}$. It's a best response to all $D_{j'}^*$, $j' \in N_f$, $j' \neq j$, and all $p^*(j')$, $j' \in N$, $j' \neq j$.
5. Each domestic firm $j \in N_h$ maximizes profit, the solution to which is $p^*(j)$.
6. Each household maximizes the utility by choosing the right consumption subject to the budget constraint.
7. Markets clear for domestic labor, each domestically produced and consumed commodity, and the international payment is balanced for the domestic economy.

Lemma. *There always exists at least one Political Equilibrium.*

Proof. First, notice $\lambda_k \in [0, 1]$ for $k \in \{1, 2\}$. Second, $\phi_k \in [0, \phi_{\max}]$, where $\phi_{\max} \equiv \frac{1}{\varepsilon} p_m^{1-\varepsilon} \bar{q}^{\varepsilon-\theta}$. $\bar{q} = n_h^{\frac{1}{1-\varepsilon}} p_h$ is the finite upper bound of (5). Third, we have $\tau \in [1, \tau_{\max}]$,

¹⁷The prices must be the same across the two provinces as implied by (3).

where $\tau_{\max} < \infty$ because it's easy to show that $\tau_{\max} = \infty$ is not optimal for the continuous function(34). In addition, the entry decision(21) is a finite discrete choice, and every element of it is a continuous function. Thus, there must exist at least one solution for the optimization problems (34) and (17), because the goal function is continuous and the domains of the choice variables are compact. **Q.E.D.**

Again, I will mainly focus on the PE with the property of symmetry, because it turns out that the asymmetric political equilibrium doesn't affect the FDI at the national level, although it provides many interesting insights for issues such as the regional allocation of FDI. A detailed characterization of the asymmetric PE is presented in the appendix for theoretical completeness.

3.3.3 Symmetric Political Equilibrium

As compared with the symmetric equilibrium in the last subsection, the only additional requirement for the symmetry is that the two provinces have the same endogenous profit tax rates on the multinational firms:

$$\lambda_1^* = \lambda_2^* = \lambda^*. \quad (35)$$

Definition 4. *A Symmetric Political Equilibrium (SPE) is a PE which satisfies (22), (23), and (35).*

Based on (22)-(35), and (25), I obtain the following important necessary condition for the existence of an SPE with positive FDI. It is feasible for the central government to induce an SPE with positive FDI if and only if D_τ is not empty, where $D_\tau \equiv \{\tau \in [1, \infty) \mid 1 - \hat{\lambda}(\tau) - \tau^{-\varepsilon} w^{1-\varepsilon} \geq 0\}$. Since $\hat{\lambda}(\infty) < 1$, D_τ is indeed nonempty.

Let's consider the choice of the SIG, which wants to block FDI as best as it can, thus it will prefer a high profit tax on FDI. A higher tariff rate encourages FDI but it also implies a higher profit for domestic firms given FDI, so the preference of SIG for the tariff rate is ambiguous. It's easy to show that the optimal contribution schedule, $C^*(\lambda_1, \lambda_2, \tau)$, whenever $\lambda_1 = \lambda_2 = \lambda$, must satisfy: (1) it's affordable by the lobby, (2) when $\tau \notin D_\tau$, it's strictly increasing with τ and doesn't change with λ , (3) for any given $\tau \in D_\tau$ and any $\lambda, \lambda' < 1 - \tau^{-\varepsilon} w^{1-\varepsilon}$, $C^*(\lambda, \lambda, \tau) < C^*(\lambda', \lambda', \tau)$ when $\lambda \geq \hat{\lambda}(\tau) > \tilde{\lambda}(\tau) > \lambda'$, but $C^*(\lambda, \lambda, \tau) = C^*(\lambda', \lambda', \tau)$ when $\lambda > \lambda' \geq \hat{\lambda}(\tau)$ or $\hat{\lambda}(\tau) > \lambda > \lambda'$, and (4) when $\lambda > 1 - \tau^{-\varepsilon} w^{1-\varepsilon}$ or $\tilde{\lambda}(\tau) > \lambda$, $C^*(\lambda, \lambda, \tau)$ is strictly increasing in τ .

The central government's choice of the profit tax rate λ_k and tariff rate τ depends on the relative magnitude of each component in the goal function (32). In terms of the profit tax revenue, the central government's interest is perfectly aligned with the provincial government. As to the tariff revenue, the central government wants to keep FDI as small as possible but needs to balance the trade-off between the tariff rate and the import demand.

I first characterize the optimal choice of a benevolent central government in an SPE. That is, $a \rightarrow \infty$, so (32) reduces to maximizing (33).

Proposition 6. *Suppose the central government is benevolent ($a \rightarrow \infty$). There exists only one SPE, which has a positive profit tax on FDI ($\lambda^* = 1 - w^{1-\varepsilon}$), zero net tariff rate ($\tau^* = 1$), full entry of FDI to the country ($n_m^*(1) = n_m^*(2) = \frac{n_f}{2}$), and zero fixed cost ($\phi_1^* = \phi_2^* = 0$), if*

$1 \in D_\tau$.¹⁸

The proof is straightforward. It is the most efficient incentive-compatible SPE in the sense that it features full adoption of advanced foreign technology and no international trade barrier. However, the positive profit tax on multinationals is more than necessary to induce the provincial governments to impose zero fixed cost, because any profit tax rate on the interval $[\hat{\lambda}(1), 1 - w^{1-\varepsilon}]$ can support the full FDI equilibrium but the central government obviously would choose the revenue-maximizing one. If there exist several such developing economies engaged in perfect competition for the potential investors, the equilibrium profit tax rate should be driven down to $\hat{\lambda}(1)$.

Proposition 7. *Suppose the central government doesn't care about the welfare of the public at all ($a = 0$). If the share of tax revenue γ is sufficiently small, then in the SPE, we must have a high tariff rate ($\tau^* > \frac{\varepsilon}{\varepsilon-1}$), sufficiently small profit tax on FDI ($\lambda^* \leq \tilde{\lambda}(\tau^*)$), no FDI ($n_m^*(1) = n_m^*(2) = 0$), and high fixed cost ($\phi_1^* = \phi_2^* \geq \bar{\phi}$).*

Proof. By examining (34) together with (22)-(35). Also notice that the fiscal revenue is strictly increasing with the tariff rate at least up to $\frac{\varepsilon}{\varepsilon-1}$. **Q.E.D.**

The intuition is that when the fraction of profit tax revenues γ becomes sufficiently small, the central government cares more about the sum of the lobby contribution and the tariff revenue, both of which decrease with the amount of FDI. Moreover, the tax revenue from the domestic firms also decreases with the amount of FDI. The fiscal revenue also increases with the tariff rate as least up to $\frac{\varepsilon}{\varepsilon-1}$. A small elasticity of substitution ε implies a high tariff rate because of the low demand elasticity for the imports. $a = 0$ implies the anti-protectionist average households are no longer part of the central government's concern, naturally making the central government more prone to increase tariff and block FDI.

Such an economy is inefficient in the sense that the general public's welfare is actually minimized as $\varepsilon \rightarrow 1$, due to the huge trade barrier and no FDI (technology adoption). When $\lambda_1^* = \lambda_2^* < \hat{\lambda}(\tau^*)$, FDI could be very profitable if the fixed cost is low, but the central government induces the provincial government to be hostile toward FDI by increasing the fixed cost to the point unacceptable for the potential investor. When $\lambda^* > 1 - \tau^{*\varepsilon} w^{1-\varepsilon}$, in particular, if $\lambda_1^* = \lambda_2^* \geq \hat{\lambda}(\tau^*)$, the provincial governments would compete for FDI, but the potential investors would not make FDI because the tax rate is just too high. This is one example how the "bad" political institution (a is too small) induces a high barrier to technology adoption and tremendous trade protection.

Between the two extreme points of the spectrum (a is finitely positive), the trade-off between the different conflicting economic and political entities becomes more complicated, therefore it's harder to characterize the equilibrium policies analytically. Nevertheless, the extremity of the provincial government's attitude toward FDI remains unchanged hence the equilibrium FDI at the national level must be either 0 or n_f , even if no SPE exists. For the general case, we have the following proposition.

Proposition 8. *When the central government's share of the tax revenue γ becomes higher, it's more likely that the central government will induce the provincial governments to compete*

¹⁸We exclude the possibility of any import subsidy or any wealth transfer from the central government to the households. Strictly speaking, the equilibrium profit tax rate should be slightly smaller than but infinitely closer to $1 - w^{1-\varepsilon}$.

for rather than block FDI.

The intuition is most straightforward when $a = 0$ and $\tau = 1$, in which case an increase in γ will increase the relative importance of foreign-invested firm profits in the reduced policy determination goal function (34), and therefore it's more likely that the central government prefers full FDI to zero FDI. This would not be true if there exists no special interest group that represents domestic firms. Now if $a > 0$, when substituting (33) into (34), the conclusion obviously remains valid. Since the tariff revenue decreases with FDI n_m , the above argument goes through when $\tau > 1$.

4 Quantitative Results

I will calibrate the model with China and India's data separately. After describing the parameter choice and presenting the benchmark results, I will conduct robustness check by varying those parameters that can not be directly obtained from the existing literature or the data available. The calibration procedure is almost the same for China and India. Quantitative comparison between the two countries, especially the choice of parameters, will be addressed simultaneously when calibrating with India's data.

4.1 Data and Benchmark Calibration For China

I will calibrate the model with China's data in 2004, the most recent year in which all the relevant data are available. The main data source is China Statistical Yearbook(2005). Here is how I choose the parameters. I set $\gamma = 0.6$, which is the calculated share of the corporate income tax revenue accruing to the central government. $\bar{\lambda} = 0.33$ is China's corporate tax rate on domestic firms. Recall w is the wage ratio of the foreign workers versus the domestic workers with the same productivity in the same industry. For the benchmark calibration, I simply set it equal to unity. $c_h : c_f = 6$ is set to match the fact that the labor productivity(in PPP-based value) ratio of OECD versus China in 2004 is \$59658 to \$10168, or roughly, 6:1.¹⁹ n_f and n_h are set to match the fact that the ratio of the numbers of domestic firms versus foreign-invested firms in China's industrial sector is roughly 1:12. All the non-industrial sectors are assumed to be the numeraire sector. ε is set equal to 1.89 as computed from the following equation

$$\frac{\pi_h}{\pi_m} = \left(\frac{c_h}{c_f} \right)^{1-\varepsilon},$$

where $\frac{\pi_h}{\pi_m}$ is the average profit ratio of a domestic firm versus a foreign-invested firm in the industrial sector, which equals 0.20344 in the data. Branstetter and Feenstra(2002) estimate this structural parameter ε by using China's 1990-1995 cross-province panel data. The estimated value for ε was 2.05 and it became 3.31 if adjusted for the export data. θ by assumption needs

¹⁹This comes from the report by Japan Productivity Center for Socio-Economic Development based on the statistics of OECD and World Bank. The report is on the website: www.jpc-sed.org.jp.

to satisfy $1 < \theta < \varepsilon$. There's no sensible point estimation for it in Bransetter and Feenstra as it's negative, so it's a free parameter in our investigation. I choose $\theta = 1.8$, but will also experiment with other values. a measures, broadly speaking, the welfare weight on the anti-protectionist household in the central government goal function. Bransetter and Feenstra find that the welfare weight on the consumer's welfare was about one half of the weight on the profits of the domestic firms based on the 1990-1995 China's provincial data. That ratio was between one-fifth and one-twelfth when incorporating earlier data from 1985 to 1990. It means that the ratio increased by more than 2.5 to 6 times in 1990-1995 as compared with the preceding five years. This weight ratio is $\frac{1-\bar{\lambda}+\gamma\bar{\lambda}}{a}$ in the model, which implies that $a = 0.434$ if the ratio was still one half. In the past 15 years, China "market-orientated" policy change has been even more dramatic and a large fraction of state-own enterprises have gone bankrupt or been restructured into private firms, so it seems reasonable to expect a to be much larger than 0.434 in 2004. In particular, I choose $a = 1.302$ by setting the weight ratio equal to 1.5. I will also experiment with other values for a . L is set equal to 3, to make sure that the equilibrium $l_m : l_n$ is roughly 1: 21.6 given the other benchmark parameters. These parameter choices are summarized in Table 3:

Table 3: Parameters for China

γ	$\bar{\lambda}$	w	n_f	n_h	c_h	c_f	L	ε	θ	a
0.6	0.33	1	1	6	6	1	3	1.89	1.8	1.302

Parameter Choices for China (2004)

Parameters	Discription	Values
γ	central government's tax share	0.6
$\bar{\lambda}$	profit tax rate on domestic firms	0.33
$n_f : n_h$	# foreign firms vs. # domestic firms	1 : 6
$c_f : c_h$	labor productivity ratio	6 : 1
L	total population	3
ε	substitution elasticity	1.89
θ	price elasticity of CES aggregate	1.8
a	weight on average household welfare	1.302
w	foreign wage	1

The following describes how we set the values to the endogenous variables based on the data.

$n_m^*(k) : n_h$ is chosen to match the numbers of the industrial firms in 2004. There were 1269098 domestic firms in the industry and 106165 foreign-invested firms(including the investment from Hong Kong, Macao, and Taiwan). There are two provinces in the model thus $n_m^*(k) : n_h$ is roughly 1: 12.

λ_k^* is the profit-tax rate on the foreign-invested firms. According to China's tax rule, the profit tax rate should be 30% for general coastal open regions but 15% for special economic zone. According to Pricewaterhouse Coopers(2006) World Tax Summaries, China's corporate tax rate on foreign firms was 33.0%.

τ^* is set to be 1.104 because according to the *Import and Export Tariff Rules of the People's*

Republic of China(2004), the general net tariff rate is 10.4%.

$l_h : l_m : l_n$ is set to match the total employment in the industrial sector in 2004. The total employment was 752 million people in the whole economy, among which 29.9141 million were allocated in the foreign-invested industrial firms(including investment from Hong Kong, Macao, and Taiwan). The total employment in the domestic industrial firms was 73.1253 million. I assume that all the workers in the non-industrial sectors were in the numeraire sector. Thus $l_h : l_m : l_n$ is roughly 2.4: 1: 21.6.

Provincial GDP is set to be half of the total GDP in 2004, which was $\frac{15987.83}{2}$, or roughly 8000 billion Yuan.

$n_h\pi_h : n_m^*(k)\pi_m$ is set to match the total profit ratio between domestic industrial firms and the foreign-invested industrial firms, which was 925.839 billion Yuan versus 380.735 billion Yuan in 2004, or roughly 2.4:1.

The benchmark parameters listed in Table 3 are plugged into the theoretical model to compute the political equilibrium. All the calibration/simulation results from the model are summarized in Table 4 together with the real data:

Table 4: Data and Calibration Result for China

	$n_m^*(k) : n_h$	λ_k^*	τ^*	$l_h : l_m : l_n$	$GDP : n_h\pi_h : n_m^*(k)\pi_m$
Data	1: 12	(0.15, 0.30)	1.104	2.4: 1: 21.6	21.0: 2.4 : 1
Model	1: 12	0.2382	1.155	2.4: 1: 21.7	25.8: 2.4: 1

We can see that the calibration result matches the data quite well. Most importantly, the computed equilibrium FDI is full in the sense that $n_m^*(k) : n_h$ is 1:12 instead of zero (recall the bifurcation result in Theorem 3). According to our theoretical model, we have

$$\frac{l_h}{l_m} = \frac{n_h\pi_h}{n_m^*(k)\pi_m} = \frac{n_h}{n_m^*(k)} \left(\frac{c_h}{c_f} \right)^{1-\varepsilon}.$$

This is well confirmed by the real data because both $l_h : l_m$ and $n_h\pi_h : n_m^*(k)\pi_m$ are about 2.4:1. The predicted τ^* is higher than the data at least partly due to the following two reasons besides measurement errors: one is that the real tariff rate is also subject to the outside downward pressure from WTO after China's entry in 2001. Second, any real-life iceberg transaction cost in the international trade will be added to the predicted value for the tariff rate in the calibration.

4.2 Robustness Check for China

a and θ are two free parameters, thus I will conduct two sets of numerical experiments to check the sensitivity of our benchmark result. Table 5a presents the results of our experiment with

parameter θ .

Table 5a: Sensitivity Relative to θ

θ	$n_m^*(k) : n_h$	λ_k^*	τ^*	$l_h : l_m : l_n$	$GDP : n_h \pi_h : n_m^*(k) \pi_m$
Data	1: 12	(0.113, 0.33)	1.104	2.4: 1: 21.6	21.0: 2.4 : 1
Model	1: 12	0.2382	1.1550	2.4: 1: 21.7	25.8: 2.4: 1
1.88	1: 12	0.2192	1.1400	2.4: 1: 21.5	25.6: 2.4: 1
1.70	1: 12	0.2913	1.2000	2.4: 1: 22.0	26.0: 2.4 : 1
1.50	1: 12	0.3634	1.2700	2.4: 1: 22.4	26.4: 2.4: 1
1.01	1: 12	0.5495	1.5250	2.4: 1: 22.8	26.8: 2.4: 1

It's most important to notice that the equilibrium FDI is very robust to the change of θ , which implies that the government policies toward FDI is always sufficiently favorable. Both λ_k^* and τ^* increase as θ decreases. The intuition is straightforward: As the price elasticity for the composite good decreases, the demand for the imported goods becomes less elastic, hence the central government can obtain more tariff revenue by increasing the tariff rate. The profit of the multinationals must increase because the consumer price of the imported goods increases and the cross-price elasticity is positive, this would allow for an increase in the profit tax rate on the multinational firms without scaring them away. Mathematically, since $1 - \lambda_k^* - \tau^{*-\varepsilon} w^{1-\varepsilon} = 0$ holds whenever the equilibrium FDI is positive, the profit tax rate must change in the same direction with the tariff rate.

Table 5b shows that when the weight on the consumer welfare a is below 0.071, there will be no FDI in the equilibrium. This is because the central government now cares relatively more about the domestic firms' profits and its tariff revenue, hence it induces the provincial governments to block FDI. One possible way to achieve this goal is to set the multinational profit tax rate equal to zero. But when the weight on household welfare is more than 1/12 of the domestic firm profit's weight (that is, $a \geq 0.072$), the equilibrium FDI is always positive. Branstetter and Feenstra (2002) found $a = 0.434$ for China from 1990-1995, and the value should be larger than that in 2004. Therefore, we conclude that China's policies toward FDI

robustly and sufficiently remained favorable relative to the parameter a .

Table 5b: Sensitivity Relative to a

a	$n_m^*:n_h$	λ_k^*	τ^*	$l_h : l_m : l_n$	$GDP: n_h\pi_h: n_m^*\pi_m$
Data	1: 12	(0.15,0.30)	1.104	2.4: 1: 21.6	21.0: 2.4 :1
Model	1: 12	0.2382	1.155	2.4: 1: 21.7	25.8: 2.4:1
1.62	1: 12	0.0090	1.005	2.4: 1: 22.0	25.9: 2.4:1
1.50	1: 12	0.1121	1.065	2.4: 1: 21.8	25.9: 2.4:1
1.00	1: 12	0.4444	1.365	2.4: 1: 21.6	25.8: 2.4:1
0.868 ($\frac{1}{1}$) [†]	1: 12	0.5045	1.450	2.4: 1: 21.6	25.7: 2.4:1
0.434 ($\frac{1}{2}$)	1: 12	0.7127	1.935	2.4: 1: 21.5	25.6: 2.4:1
0.174 ($\frac{1}{5}$)	1: 12	0.8118	2.420	2.4: 1: 21.5	25.6: 2.4:1
0.072 ($\frac{1}{12}$)	1: 12	0.8458	2.690	2.4: 1: 21.4	25.6: 2.4:1
0.071	0: 12	0	2.060	0.3: 0: 2.7	3.3: 0.3: 0
0.062 ($\frac{1}{14}$)	0: 12	0	2.080	0.3: 0: 2.7	3.3: 0.3: 0
0	0: 12	0	2.235	0.3: 0: 2.7	3.3: 0.3: 0

Note: [†] The fraction in the parenthesis is the ratio of the weight on households versus that on the profits of the domestic firms in the goal function (32).

The above exercise of robustness check is an informative comparative statics experiment *per se*. When $a \in [0.072, 1.62]$, the tariff rate decreases with a because the households are the main anti-protection group, hence the profit tax on the multinationals must decrease in order to induce the potential foreign investors to make FDI instead of exporting. The decrease of the tariff rate reduces the market demand for the differentiated commodities produced by the domestic and foreign-invested firms, hence more labors move into the numeraire sector. The profit share of foreign-invested firms in the GDP of the economy decreases accordingly. When a decreases from 0.072 to 0.071, the equilibrium FDI immediately jumps down to zero. However, the tariff rate decreases a lot because the tariff revenue becomes more important for the central government with the absence of FDI and the tariff rate is "too big" as compared with the tariff revenue maximizing tariff rate when $a = 0.072$. The tariff rate increases again as a decreases further because the anti-protection household is cared less.²⁰

4.3 Data and Benchmark Calibration for India

For India I use the data of the 2003-2004 fiscal year. Within my knowledge, there is no existent empirical estimation for India's value of a in line with Grossman and Helpman (1996). It's widely recognized that India is more democratic than China, but we need to be cautious before rushing to the conclusion that the value of a for India must be larger than that of China. This is because what matters for our purpose is not the absolute value for a but rather the relative welfare weight on the domestic firms' profits versus that on the anti-protectionist group's welfare in the government's goal function (32), which is $\frac{1-\bar{\lambda}+\gamma\bar{\lambda}}{a}$. In the real world, India's domestic

²⁰When $a \in [1.63, \infty)$, since the anti-protection group is strong enough to keep the net tariff rate equal to zero, the potential investors will have no incentive to make any FDI as opposed to export even at zero profit tax rate because we set $w = 1$, let alone any positive tax rate. Moreover, zero profit tax rate will induce the local government to block FDI. However, if we set $w > 1$, then the potential investors will strictly prefer to make FDI for sufficiently low profit tax rate, as is proved in Proposition 2. For example, if $w = 1.2$, holding everything else same as the benchmark model, the equilibrium is full FDI with zero tariff and the profit tax rate equal to 0.1491.

firms seem to have a larger bargaining power and work more against FDI than their Chinese counterparts actually because India is more democratic than China. In fact, all the India's domestic firms, private or public, might be more able to induce the government's protectionist policies through direct political channels like voting. While in China, by contrast, the effective lobby for protectionism policies is mainly attributed to the state-owned enterprises rather than the private firms, as argued by Bransetter and Feenstra(2002) and Huang (2003), *etc.*. In addition, more and more state-owned enterprises of small and median sizes are being privatized in the market-oriented reform, so the aggregate number of lobbying firms is shrinking. The relatively low profitability of the state-owned enterprises also curbs their capability of advocating protectionism. Moreover, as contrasted with India, many Chinese domestic firms, private or collectively-owned, might be less likely to be hostile toward FDI, especially when the FDI is more export-oriented or more complementary to the domestic production, for example, by easing the financial constraint of the domestic firms in the manufacturing industry and providing various kinds of intangible capital that exhibits positive externalities. After taking all these into account, I think it's absolutely possible that a for India is smaller than that of China although India is indeed more democratic. Given the indeterminacy of a , I will set it equal to the value for China in the benchmark calibration merely for the convenience of comparison.

$\gamma = 0.38$ is calculated as the central government's net tax revenue minus the customs and then divided by the total non-tariff tax revenues of the central and state governments based on the Economic Survey data provided by India's Ministry of Finance (2006-2007). I don't use the profit tax share because the direct tax is far less important than indirect tax in India's tax system as well documented in the literature. $\bar{\lambda} = 0.36$ is taken from KPMG's international corporate tax rate survey data. Data for n_f and n_h are not available and hence set the same as China for the purpose of convenient comparison. w and c_f are still set equal to unity, same as China. $c_h = 7.4$ is calculated according to the ratio of China and India's output per worker in 2003 based on Penn World Table version 6.2. $L = 2.45$ is calculated based on the population ratio between the two countries. $\varepsilon = 3.05$ is calculated in the same way as before based on UNCTAD data for the number of foreign affiliates and the 2003-2004 Annual Survey of Industries data provided by India's Ministry of Statistics and Program Implementation for the profit of domestic firms. This is not ideal because India has a relatively larger and more profitable service sector than its industrial sector and its FDI is more concentrated in the service sector, therefore the calibration is potentially more vulnerable to measurement errors. However, this seems the best I can do given that the data for the profits and numbers of the domestic firms and the foreign-invested firms in the service industry in 2003-2004 fiscal year is hard to obtain. Fortunately, though, this measurement error would affect the main results only through the choice of parameter ε . Hence 3.05 can be seen as an upper-bound since the relative profits of the domestic firms are likely to be under-measured. Later, I will check the robustness of our calibration result by varying ε in the downward ranges. θ is chosen to be the largest possible value that can lead to zero FDI with all the other parameters set at the benchmark values.

The new parameter s is multiplied to the tariff revenue term in the (32) to capture the fact that tariff revenue is a more favored tax option for the governments in many developing economies because of the enforceability constraint, as argued by Gordan and Li (2005). They argue that taxes with a narrower base(such as tariff) are chosen when the informal sector is large and the tax evasion is potentially rampant. Numerous researches show that India has a very large informal sector (or called disorganized sector in the official statistical books) and a quite inefficient tax system, which relies too much on the indirect tax while the direct tax such as

income tax is relatively unimportant as compared with the developed economies. India’s reform to introduce the value-added tax system met with stiff resistance and was severely postponed , so VAT was not well developed at least until 2005. By contrast, China’s tax structure has a well-developed VAT system, especially after the tax reform around the mid-1990s. Hence s is normalized to unity for China and set to 1.6 for India, this value is set to match India’s tariff revenue/GDP ratio, which was about 1.6% in 2003-2004 (India’s GDP was 2765491 Rupees Crore, or 588.4 billion USD, according to India Government’s Economic Survey). I will discuss this in more details later. These parameters are summarized in the following Table 6.

Table 6: Parameters for India

a	γ	$\bar{\lambda}$	n_f	n_h	w	c_h	c_f	L	ε	θ	s
1.302	0.38	0.36	1	6	1	7.4	1	2.45	3.05	1.16	1.6

$n_m^*(k) : n_h$ is calculated based on UNCTAD data, which is converted proportionally to China’s Industrial data. $\lambda_k^* = 0.41$ is taken from PricewaterhouseCoopers(2006) Worldwide Tax Summaries. $\tau^* = 0.222$ is the simple average of tariff rate in 2003-2004 fiscal year based on World Bank(2004). No data for the employment in the foreign-invested firms in India for 2003-2004 is available for us, so $l_h : l_m : l_n$ is not calibrated. Due to the unsatisfying quality of the profit data mentioned above, I will also omit the calibration for the the GDP and profit comparison. The calibration result is presented in Table 7.

Table 7: Data and Calibration Results for India

	$n_m^*(k) : n_h$	λ_k^*	τ^*
Data	0.06:12	0.410	1.222
Model	0:12	≥ 0.475	1.235

The overall performance of the model also seems quite satisfying. The upward bias for the tariff rate can be justified as before. This model doesn’t generate a very precise prediction for λ_k^* , which is exactly consistent with the model per se: when the central government wants to block FDI, it can either charge a very high profit tax rate to discourage the supply of FDI directly or to stipulate an extremely low profit tax rate to induce zero demand for FDI from the provincial government. Given $\lambda_k^* > \bar{\lambda}$ in the real data, our theoretical result predicts unambiguously that the second possibility can’t apply. Since the supply of FDI is effectively discouraged for sure by the high tax rate, the provincial governments no longer have any incentive to improve the provincial investment environment, which deters FDI even further. A comparison between China and India’s parameters immediately points to the difference in the central government’s share of the profit tax revenue. The more protectionist attitude is induced by a lower share because it makes the lobby transfer and tariff revenue less attractive for the central government. The policy difference is also amplified by the provincial government’s induced attitudes. This effect is further reinforced by the more stringent taxation enforceability constraint faced by India’s government because of its more inefficient tax system. Mathematically, a more binding enforceability constraint (i.e. a higher s) is simply equivalent to a simultaneous reduction in the central government’s profit tax share γ and in the welfare weight on the anti-protectionist household, a , in goal function (32). The policy implication of the latter has been precisely given by the propositions derived in Section 3.

4.4 Sensitivity Check for India

Table 8a presents the robustness check results for the substitution elasticity ε . It shows that the equilibrium FDI is always zero when ε is in the intermediate range $[1.94, 3.06]$, which I think is the most probable case because there was a smaller proportion of foreign-invested manufacturing firms in India that are export-oriented (hence ε should be larger than China's value $\varepsilon = 1.89$) and 3.05 is very likely to be an upper-bound as argued before. The robustness of the equilibrium FDI (and the implied policies) relative to ε supports the tax share argument.

Table 8a also shows that the attitude of the central government toward FDI shifts from hostility to friendliness when ε changes from 3.06 to 3.07. This is mainly because the tariff revenue becomes sufficiently small as the substitution elasticity becomes large enough, so it becomes more profitable from the central government's point of view to expand the tax base by encouraging more substitution from importing to FDI. This is achieved first by increasing the tariff rate and then mainly by reducing the tax rate on FDI (together with tariff reduction) as ε increases. When $\varepsilon \leq 1.93$, the equilibrium FDI also becomes positive because the marginal change in the domestic firms' profits and in the tariff revenue (due to the decrease in the negative pecuniary externality among different firms) would no longer warrant the exclusion of the more efficient foreign firms from the tax base.

Table 8a: Sensitivity Check with ε

ε	$n_m^*(k) : n_h$	λ_k^*	τ^*
Data	0.06: 12	0.41	1.222
Benchmark	0: 12	≥ 0.476	1.235
3.5	1: 12	0.303	1.210
3.07	1: 12	0.4895	1.245
3.06	0: 12	≥ 0.470	1.235
3.0	0: 12	≥ 0.476	1.240
2.7	0: 12	≥ 0.470	1.265
2.3	0: 12	≥ 0.463	1.310
2.0	0: 12	≥ 0.443	1.340
1.94	0: 12	≥ 0.442	1.345
1.93	1: 12	0.5245	1.470
1.89	1: 12	0.523	1.480

Table 8b demonstrates that the equilibrium FDI is uniquely zero as s is increased above the benchmark value. The equilibrium tariff rates increase because the tariff revenue is weighted more, which also drives up the lower-bound for the profit tax rate on FDI. When s is smaller than the benchmark value, in particular, if it's equal to unity, the value for China, the central government's attitude toward FDI will be reversed to friendliness. As explained earlier, from a policy determination point of view, a decrease in s is equivalent to a simultaneous increase in the household's welfare weight a and the central government's tax share γ . This can explain

the comparative statics for τ^* and the lower-bound of λ_k^* with respect to s .

Table 8b: Sensitivity Check with s

s	$n_m^*(k) : n_h$	λ_k^*	τ^*
Data	0: 12	0.41	1.222
Model	0: 12	≥ 0.475	1.235
2.0	0: 12	≥ 0.653	1.415
1.8	0: 12	≥ 0.581	1.330
1.61	0: 12	≥ 0.481	1.240
1.59	1: 12	0.4935	1.250
1.0	1: 12	0.2092	1.0800

If we impose $s = 1$ for India, then by reverse engineering we need to set the welfare weight a down to at least 0.748 accompanied by the simultaneous adjustment of θ down to 1.01 in order to obtain zero FDI in the equilibrium.²¹ After taking the relative bargaining power of the domestic firms into account, we think it still hard to believe that India's status of democracy in 2003-2004 would imply a welfare weight for the average household that's smaller than 57.3% of China's value in 2004, or 0.748. In other words, without resorting to the tax enforcement constraint, our original model seems insufficient to account for the particularly small amount of FDI in India with the other parameters set at the benchmark values, unless we could obtain a more accurate measure for a which can show that it's indeed very low. Another empirical possibility is that India's total number of domestic firms, n_h , is actually much larger, which can drive down the value for s that needs to generate the small amount of FDI, if such data can be obtained. To address these issues in a more satisfying manner, we will have to wait until the data are available.

4.5 Further Discussions

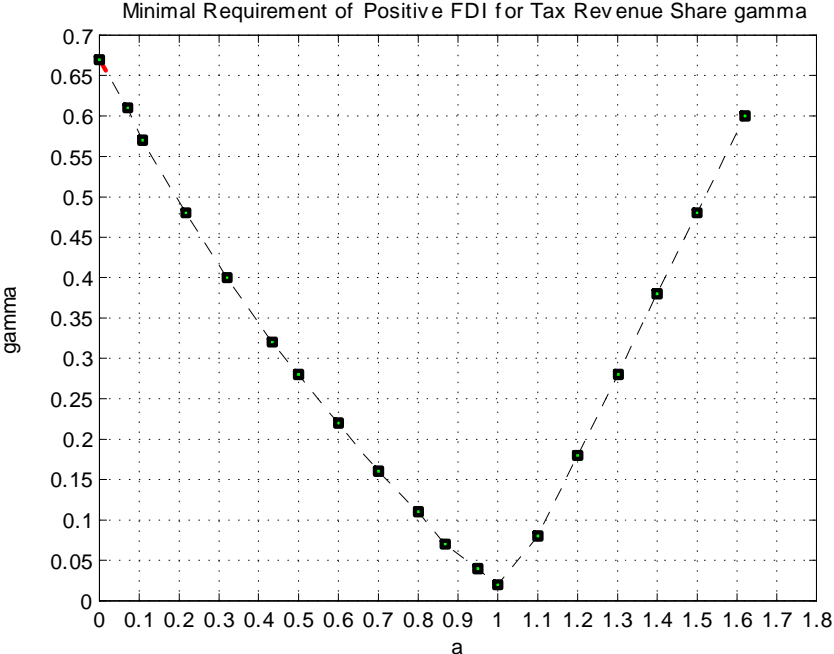
The welfare weight a is assumed to be identical for China and India in the above calibration/simulation exercise. In this subsection, by conducting a counterfactual numerical experiment, I will argue that the main explanation for China-India FDI difference still remains valid even the two countries have different a 's.

Proposition 8 implies that for each a at a sufficiently small value, there exists a unique threshold value $\gamma^*(a) \in (0, 1)$ such that the equilibrium FDI is full if and only if $\gamma \geq \gamma^*(a)$. In fact, function $\gamma^*(a)$ might be first decreasing and then increasing in a over certain range. This is because the household welfare becomes more important when a sufficiently small a increases, thus the importance of the foreign-invested firm profit tax revenue decreases. But when a becomes sufficiently big, the tariff rate and hence the profit tax rate becomes so small that positive FDI requires $\gamma^*(a)$ to be increased in order to offset the decrease in the tariff revenue and the decrease in the profit tax revenues from both the domestic and foreign-invested firms in (34). This non-monotonicity of $\gamma^*(a)$ has a very important implication for China-India comparison.

The following graph depicts function $\gamma^*(a)$ over the domain $[0, 1.62]$, where all the parame-

²¹If we set $\varepsilon = 1.89$, same as China, then the upperbound for a becomes 0.76 instead of 0.748.

ters are set to the benchmark values for China. Suppose China and India are perfectly identical except that China's (a, γ) is $(1.302, 0.6)$ while India's (a, γ) is $(a_{India}, 0.38)$. Then if a_{India} is larger than 1.4, which is larger than China's a , the equilibrium FDI in India is still zero. In other words, a more "benevolent" central government might prefer zero FDI. This is mainly because the central government also cares about its revenues.



5 Conclusion

This paper develops a political-economic model to help us understand why the governments of two similar developing economies could have different *de facto* policies which results in a bifurcation in the inward FDI. To this end, I bring in a hierarchic government structure into Grossman and Helpman(1994, 1996). I show how the utility-maximizing central government, by optimally choosing the tariff rate and the profit tax rate under the influence of the protectionist special interest group, can not only affect the investors' FDI supply decisions but also induce the provincial governments to compete for or block FDI, which jointly determines the equilibrium FDI. The amplification mechanism for FDI difference is the endogenous polarization in the provincial government's attitude toward FDI primarily because FDI has two competing effects: the pro-FDI tax-base expansion effect and the anti-FDI average profit reduction effect. These two effects arise from the endogenously decreasing negative pecuniary externality between the domestic and foreign-invested firms. Which dominates which sensitively depends on the central government's choice of the policy profile. Through that channel, a provincial government might impose dramatically different institutional entry cost on FDI because of a small difference in the central government's tax share or in the welfare weight of the consumers in the central government's goal function. The difference in the *de facto* policies can be further amplified through the horizontal interaction between different provincial governments, which nonetheless would not impact the national level of FDI. Confronted with the data through calibration

and simulation, our model indicates that India and China's different government policies and attitudes toward FDI (hence their difference in the level of FDI per capita) could be mainly due to the fact that China's central government is more powerful in the sense that it obtains a larger share on the total tax revenues from domestic and foreign-invested firms than that of India.

Although the theoretical model is largely motivated by China-India comparison and I only exploit the quantitative implication from these two countries, the same economic mechanism could be also applicable to other developing economies. Thus it's interesting to test various hypotheses derived from our model using cross-country panel data. Several other directions seem interesting to explore. First, our quantitative exercise suggests that Gordan and Li (2005)'s taxation enforcement constraint should be explicitly built into our theoretical model in order to better explain the tax structure that shapes the governments' incentives. Second, lobbying should be also allowed at the provincial government's level, which seems more suitable for the countries like India because the provincial officials are elected directly by the provincial residents rather than appointed by the central government. Third, a comprehensive set of the relevant policy variables must include other forms of export-promoting policies and exchange-rate policies, for example, a significant part of China's FDI is export-oriented and facilitated by its low exchange rate. This might require us to separate industrial sector and service sector explicitly in the analysis because sectorial allocation of FDI is different for China and India. Fourth, it seems appealing to extend the current multi-stage one period model into a multi-period dynamic setting that allows us to characterize the dynamic path of the endogenous policies and institutional variables as well as FDI and other macro variables. The dynamic common agency framework developed by Bergemann and Valimaki (2003) seems to be natural starting point for policy dynamics if the domestic firms in different provinces are modelled as separate special interest groups. If we introduce productivity heterogeneity for potential investors, it might also generate some interesting FDI dynamics as the gradual reduction in the institutional entry cost makes FDI more desirable for those less productive firms.

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Table A1. Sources of Growth in China and India: 1978-2004

Annual percentage rate of change

period		output	employment	output per worker	capital	education	TFP
1978-2004	China	9.3	2.0	7.3	3.2	0.2	3.8
	India	5.4	2.0	3.3	1.3	0.4	1.6
1978-1993	China	8.9	2.5	6.4	2.5	0.2	3.6
	India	4.5	2.1	2.4	1.0	0.3	1.1
1993-2004	China	9.7	1.2	8.5	4.2	0.2	4.0
	India	6.5	1.9	4.6	1.8	0.4	2.3

Source: Bosworth and Collins (2007)

Table A2. Number of Foreign Affiliates in Host Economies: 1995-2003

	1995	1996	1997	1998	1999	2000	2001	2002	2003
China	50 200	44 347	43 826	n.a.	26 837	28 445	31 423	34 466	38 581
India	241	268	284	321	334	447	465	490	508

Source: UNCTAD (2006)

Table A3. FDI into China By Countries or Regions (USD 10,000)

Country(Region)	2004	2005	Country(Region)	2004	2005
Total	6062998	6032459	France	65674	61506
Asia	3761986	3571889	Italy	28082	32201
Hong Kong, China	1899830	1794879	Netherlands	81056	104358
Japan	545457	652977	Switzerland	20312	20588
Macao, China	54639	60046	Latin America	904353	1129333
Malaysia	38504	36139	Cayman Islands	204258	194754
Philippines	23324	18890	Virgin Islands	673030	902167
Singapore	200814	220432	North America	497759	372996
Republic of Korea	624786	516834	Canada	61387	45413
Taiwan, China	311749	215171	United States	394095	306123
Africa	77568	107086	Bermuda	42277	21400
Mauritius	60232	90777	Oceanic and Pacific Islands	197437	199898
Europe	479830	564310	Australia	66263	40093
United Kingdom	79282	96475	Samoan	112885	135187
Germany	105848	153004	Others	144065	86947

Source: China Statistical Yearbook (2005)

Table A4. Top Ten Source Countries of FDI into India

Country	FDI Inflows: April-December 2006-2007	FDI Inflows: August 1991 -December 2006	Share, August 1991 -December 2006
	(Million Dollars)		(percent)
Mauritius	4,215	16,000	33
United States	607	5,645	12
United Kingdom	1,682	3,662	8
Netherlands	488	2,482	5
Japan	52	2,176	5
Singapore	533	1,583	3
Germany	70	1,652	3
France	80	858	2
South Korea	62	814	2
Switzerland	47	683	1
All others	1,434	12,617	26
Total	9,270	48,172	

Source: Office of Industries U.S International Trade Commission, 2007

Appendix : Global Game Analysis on FDI When Entry Cost Is Not Common Knowledge

In this Appendix, I relax the assumption that the *de facto* entry cost of FDI, ϕ , is the public information.²² This assumption of common knowledge might be innocuous for a developed economy with perfect rule of law, where the *de facto* cost should be equal to the *de jure* cost clearly stipulated and charged according to certain open and standard administrative procedures. However, in a developing economy with strong government interventions and without rule of law, the *de facto* entry cost is often very different from the *de jure* cost. It's not surprising that different international investors might often have heterogeneous information about this *de facto* cost given its clandestine and stochastic nature. Therefore, I will employ the global game techniques to analyze what happens when ϕ is no longer common knowledge.

I will show that it can at least help us understand the following two important phenomena observed in China's FDI from a purely information point of view: (1) Why a disproportionately large fraction of the FDI into mainland China is from Hongkong and/or invested by ethnic oversea Chinese? (2) Why China's FDI surged immediately after Deng Xiaoping's speech in 1992?

To focus on this main issue, I will assume both the tariff rate τ and profit tax rate λ are exogenous, fixed, and satisfy the necessary condition for positive FDI supply (9).

Here is the timing: First, nature draws ϕ from a log Normal distribution: $\log \phi \sim N(\mu, \sigma_\phi^2)$. This distribution is the common prior of all the potential investors. Then, instead of observing the realized value of $\log \phi$, each investor $i \in N_f$ observes a private signal $x_i = \log \phi + \xi_i$ and a common public signal $y = \log \phi + \varsigma$, where, for any $i \in N_f$, $\xi_i \sim N(0, \sigma_x^2)$, $\varsigma \sim N(0, \sigma_y^2)$, ξ_i and ς are independent. All of these distributions are common knowledge among all the potential investors. Next, all of the potential investors simultaneously decide whether to invest. Finally, the aggregate FDI is realized.

Obviously, the common posterior about $\log \phi$ after observing the public signal also follows a Normal distribution with mean $z \equiv E[\log \phi | y] = \nu y + (1 - \nu)\mu$ and variance σ_z^2 , where $\nu \equiv \sigma_y^{-2} / \sigma_z^{-2}$ and $\sigma_z^{-2} \equiv \sigma_\phi^{-2} + \sigma_y^{-2}$. After observing the private signal, investor i updates her posterior about $\log \phi$, which is Normal with mean

$$\log \phi(i) \equiv E[\log \phi | x_i, y] = \delta z + (1 - \delta)x_i$$

and variance σ^2 , where

$$\sigma^{-2} \equiv \sigma_z^{-2} + \sigma_x^{-2} \text{ and } \delta \equiv \frac{\sigma_z^{-2}}{\sigma^{-2}}.$$

Following the pertinent literature of global game, I focus on the monotone equilibrium, which sets a cut-off value for the private signal, denoted by $r^*(z)$. That is, after observing the public signal and updating her beliefs, a potential investor will choose to invest (making FDI) if and only if her private signal about $\log \phi$ is smaller than $r^*(z)$. Thus the equilibrium FDI for

²²It's also interchangeably called as the *de facto* cost of property right protection in the paper.

given ϕ is

$$n_m(z, \phi) = n_f \cdot \text{prob}[x_i < r^*(z) | \phi] = n_f \cdot \Phi\left(\frac{r^*(z) - \log \phi}{\sigma_x}\right). \quad (36)$$

Moreover, a potential investor must feel indifferent between investing and not investing at the private signal $x = r^*(z)$, so I must have

$$E[(1 - \lambda)\pi_m - \pi_f | x = r^*(z), z] = E(\phi | x = r^*(z), z). \quad (37)$$

Substituting (36) into (37), we obtain

$$E[\Psi(\xi(z))] - \frac{\exp\left[\delta z + (1 - \delta)r^*(z) + \frac{\sigma^2}{2}\right]}{\frac{(1-\lambda)p_m^{1-\varepsilon}}{\varepsilon} - \frac{p_f^{1-\varepsilon}}{\varepsilon\tau}} = 0, \quad (38)$$

where

$$\Psi(\xi(z)) \equiv [n_h p_h^{1-\varepsilon} + n_f \cdot \Phi(\xi(z)) \cdot (p_m^{1-\varepsilon} - p_f^{1-\varepsilon}) + n_f p_f^{1-\varepsilon}]^{\frac{\varepsilon-\theta}{1-\varepsilon}}$$

and

$$\xi(z) \equiv \frac{r^*(z) - \log \phi}{\sigma_x} | x = r^*(z), z \sim N\left(\frac{\delta(r^*(z) - z)}{\sigma_x}, \frac{\sigma^2}{\sigma_x^2}\right). \quad (39)$$

For the individual whose private signal equals $r^*(z)$, her expected aggregate FDI conditional on z is given by

$$n_m^*(z) = n_f \cdot E[\Phi(\xi(z))]. \quad (40)$$

Before we can discuss the equilibrium FDI, we need to characterize $r^*(z)$ first. Lemma AA1 to Lemma AA4 discuss its existence, uniqueness and how it changes with the precision of signals. Define

$$\Upsilon(r^*(z)) \equiv E[\Psi(\xi(z))] - \frac{\exp\left[\delta z + (1 - \delta)r^*(z) + \frac{\sigma^2}{2}\right]}{\frac{(1-\lambda)p_m^{1-\varepsilon}}{\varepsilon} - \frac{p_f^{1-\varepsilon}}{\varepsilon\tau}}.$$

Lemma AA 1. *Under condition (9), there exists one and only one solution for $r^*(z)$ in equation (38). Moreover, any solution must satisfy $r^*(z) \in (r_1(z), r_2(z))$, where*

$$r_1(z) \equiv \left[\frac{\varepsilon - \theta}{1 - \varepsilon} \log [n_h p_h^{1-\varepsilon} + n_f p_m^{1-\varepsilon}] + \log\left(\frac{(1 - \lambda)p_m^{1-\varepsilon}}{\varepsilon} - \frac{p_f^{1-\varepsilon}}{\varepsilon\tau}\right) \right] \left(1 + \frac{\sigma_x^2}{\sigma_z^2}\right) - \frac{\sigma_x^2}{\sigma_z^2} z - \frac{\sigma_x^2}{2},$$

and

$$r_2(z) \equiv \left[\frac{\varepsilon - \theta}{1 - \varepsilon} \log [n_h p_h^{1-\varepsilon} + n_f p_f^{1-\varepsilon}] + \log\left(\frac{(1 - \lambda)p_m^{1-\varepsilon}}{\varepsilon} - \frac{p_f^{1-\varepsilon}}{\varepsilon\tau}\right) \right] \left(1 + \frac{\sigma_x^2}{\sigma_z^2}\right) - \frac{\sigma_x^2}{\sigma_z^2} z - \frac{\sigma_x^2}{2}.$$

Proof. Note that $\Upsilon(r^*(z))$ is continuous and can be proved to be strictly decreasing in $r^*(z)$. It is negative when $r^*(z) > r_2(z)$ and positive when $r^*(z) < r_1(z)$. Q.E.D.

Lemma AA2. *Holding everything else unchanged, if both the private signal and public*

signal become sufficiently more noisy in a way such that $\frac{\sigma_x^2}{\sigma_z^2}$ keeps constant, then $r^*(z)$ will decrease.

Proof. The whole interval $(r_1(z), r_2(z))$ moves to the left of the original interval as we increase σ_x^2 sufficiently while holding $\frac{\sigma_x^2}{\sigma_z^2}$ fixed, or more precisely, so long as the new variances $(\sigma_x'^2, \sigma_z'^2)$ satisfy $\frac{\sigma_x'^2}{\sigma_z'^2} = \frac{\sigma_x^2}{\sigma_z^2}$ and

$$\sigma_x'^2 \geq \sigma_x^2 + 2\left(1 + \frac{\sigma_x^2}{\sigma_z^2}\right) \frac{\varepsilon - \theta}{1 - \varepsilon} \log \frac{n_h p_h^{1-\varepsilon} + n_f p_f^{1-\varepsilon}}{n_h p_h^{1-\varepsilon} + n_f p_m^{1-\varepsilon}}.$$

By Lemma 1, $r^*(z)$ will decrease. Q.E.D.

I must point out that Lemma AA2 doesn't indicate how a small increase in the noises of both signals would affect $r^*(z)$. The following Lemma offers a local analysis:

Lemma AA3. *Holding everything else unchanged, if $\Upsilon(z) < 0$, then a marginal increase in the variances of the private signal and public signal such that $\frac{\sigma_x^2}{\sigma_z^2}$ keeps constant will result in a decrease in $r^*(z)$.*

Proof. First notice that the necessary and sufficient condition for $r^*(z) < z$ is $\Upsilon(z) < 0$. Now I prove the lemma by contradiction, suppose after the marginal increases in the variances, $r^*(z)$ remains constant or increases a little (because of continuity), then the first term on the left hand side of (38) remains constant or decreases, while the subtracted second term strictly increases, hence (38) can no longer hold. Q.E.D.

Lemma AA4. $\frac{\partial r^*(z)}{\partial z} < 1$. Moreover, a sufficiently large increase (decrease) in z will cause $r^*(z)$ to decrease (increase).

Proof. Consider a marginal increase in z , now suppose $\Delta(r^*(z) - z) \geq 0$, then the first term of $\Upsilon(r^*(z))$ becomes weakly smaller while the subtracted second term strictly increases. Thus $\Upsilon(r^*(z))$ can't be zero, contradiction. Thus $\Delta(r^*(z) - z) < 0$. Hence $\frac{\partial r^*(z)}{\partial z} < 1$. Notice that a sufficiently large increase in z can move the whole interval $(r_1(z), r_2(z))$ to the left of the original interval, thus $r^*(z)$ has to decrease according to Lemma 1. Q.E.D.

Now we are ready to characterize the equilibrium FDI for a given z and $\log \phi$.

Proposition AA1. *If $\Upsilon(\log \phi) > 0$, then when the private signal and public signal become sufficiently more noisy in a way such that $\frac{\sigma_x^2}{\sigma_z^2}$ keeps constant, the equilibrium FDI of the global game will decrease.*

Proof. $\Upsilon(\log \phi) > 0$ is equivalent to $r^*(z) > \log \phi$ according to the same argument in the proof of Lemma AA1. When the private signal and public signal become sufficiently more noisy in a way such that $\frac{\sigma_x^2}{\sigma_z^2}$ keeps constant, $r^*(z)$ will decrease by Lemma AA2. If the new $r^*(z)$ is still larger than $\log \phi$, then since σ_x^2 increases, hence the equilibrium FDI decreases by (36). If the new $r^*(z)$ is smaller than $\log \phi$, then it means that the equilibrium FDI will drop from above $\frac{n_f}{2}$ to below $\frac{n_f}{2}$. Q.E.D.

The economic mechanism is quite straightforward: Since the investor's initial threshold value happens to be too optimistic ($r^*(z) > \log \phi$), thus when the signals become sufficiently more

noisy, it will naturally reduce the credibility of the available information, hence the investors rectify their previous decisions by choosing a more stringent threshold value (that is, $r^*(z)$ goes down). If the adjustment is quite mild so that the new threshold is still a little too optimistic (that is, the new $r^*(z)$ is still larger than $\log \phi$), the equilibrium FDI will go down but still more than half of the foreign investors will investment. If the signals become too noisy, the adjustment becomes so large that the agents get too pessimistic, hence less than half of the potential investors would make FDI.

Next, let's examine the limit. When $\sigma_x^2 \rightarrow 0$ and $\sigma_z^2 \rightarrow 0$ while holding δ constant, there are three possibilities:

$$(1) r^*(z) > z,$$

(39) implies that $\xi(z) \rightarrow \infty$. Hence by (38), we obtain $r^*(z) = \frac{\log \phi - \delta z}{1 - \delta}$.²³ Therefore, we must have $\frac{\log \phi - \delta z}{1 - \delta} > z$, or equivalently, $\log \phi > z$. When $\sigma_y^2 \rightarrow 0$, $z \rightarrow \log \phi$, it requires that $\log \phi > \log \phi$ and hence $\lim_{z \rightarrow \log \phi} r^*(z) = \frac{\log \phi - \delta \log \phi}{1 - \delta} > \log \phi > \log \phi$. Since the limit of the private signal, $\log \phi$, is smaller than the threshold value, $\lim_{z \rightarrow \log \phi} r^*(z)$, all the potential investors will make FDI.

$$(2) r^*(z) < z,$$

(39) implies that $\xi(z) \rightarrow -\infty$. Hence by (38), we obtain $r^*(z) = \frac{\log \bar{\phi} - \delta z}{1 - \delta}$. Therefore, we must have $\frac{\log \bar{\phi} - \delta z}{1 - \delta} < z$, or equivalently, $\log \bar{\phi} < z$. When $\sigma_y^2 \rightarrow 0$, $z \rightarrow \log \phi$, it requires that $\log \bar{\phi} < \log \phi$ and hence $\lim_{z \rightarrow \log \phi} r^*(z) = \frac{\log \bar{\phi} - \delta \log \phi}{1 - \delta} < \log \bar{\phi} < \log \phi$. Since the limit of the private signal, $\log \phi$, exceeds the threshold value $\lim_{z \rightarrow \log \phi} r^*(z)$, no potential investors will make FDI.

$$(3) r^*(z) = z,$$

(39) implies that $\xi \sim N(0, 1 - \delta)$. By (38), we obtain

$$r^*(z) = z = \log \left[E\Psi(\xi) \left(\frac{(1 - \lambda)p_m^{1-\varepsilon}}{\varepsilon} - \frac{p_f^{1-\varepsilon}}{\varepsilon\tau} \right) \right] \in (\log \underline{\phi}, \log \bar{\phi}).$$

The potential investors are indifferent between investment and no investment.

The above discussion gives us the following result:

Corollary. *The equilibrium FDI with complete information is higher than the equilibrium FDI when the protection cost of property rights is not common knowledge if $\Upsilon(z) > 0$ holds.*

Let's interpret the Proposition 1 more intuitively with a simplified example. Suppose the common prior is extremely noisy ($\sigma_\phi \rightarrow \infty$). There are two groups of potential investors: group A and group B. These two groups are perfectly identical except that the precision of the private

²³Recall that $\underline{\phi}$ and $\bar{\phi}$ are given by (13) and (14) in Wang (2008).

signals and the public signals are both sufficiently higher in group A than in group B, although the relative precision of the signals (measured by $\frac{\sigma_x^2}{\sigma_y^2}$) is unchanged. The Proposition 1 predicts, under certain conditions, that a larger proportion of group A will make the investment than group B, although the two groups observe exactly the same public and private signals about the cost of protecting the property rights.

One important feature of China's FDI is that the FDI from Hong Kong accounts for a much larger proportion than that from western economies. There can be many reasons, but even from a pure information point of view, our analysis suggests that the investors from Hong Kong are more likely to make the investment than the investors from other economies even if they observe the same public and private signals about the protection cost of the property rights as the other investors, *ceteris paribus*. This is because Hong Kong investors are just like group A in our previous discussion and other investors are like group B. Hong Kong investors' information advantage (in terms of the signal precision) is obvious: geological closeness, speaking the same dialect, having relatives in Mainland China, cultural homogeneity, *etc.*. Many other developing economies don't have such a special and important investment source like Hong Kong. This gives Mainland China a unique advantage in attracting FDI. I must emphasize the fact that in Mainland China there were literally no laws explicitly discriminating the investors from Hong Kong against the investors from other countries.

Needless to say, the entry decision not only depends on the precision of the signals but also depends on the level of the signals about the protection cost. Not surprisingly, we can establish the following proposition.

Proposition AA2. *An exogenous increase in μ or y will decrease the equilibrium FDI in this global game.*

Proof. By Lemma AA4 and (36). Q.E.D.

This proposition confirms our intuition that a "bad" (high) prior mean or a "bad" public signal about the protection cost would unambiguously reduce the equilibrium FDI if the cost is not common knowledge.

Now we can add another explanation to the phenomenon described in the above example. The investors from Hong Kong should probably feel safer about their investment than other investors in Mainland China because of the purely political reason discussed in Section 3. In other words, they have a smaller prior mean μ than other investors, thus they should be more likely to make FDI in Mainland China, *ceteris paribus*.

China's FDI increased dramatically around 1992 and 1993 subsequent to several years' stagnation since the Tian An-men Square Event in 1989. There could be other explanations for this, but from a pure information point of view, it might be due to the substantial reduction in the *perceived* protection cost of property rights because Deng Xiaoping's public speech in the Spring of 1992 emphasized that China's government would be friendly toward foreign investment as it would continue the market-orientated reform and open-door policies. Deng's speech can be interpreted as a large decrease in y , the public signal about the *level* of protection cost of property rights, at a time when different potential foreign investors had heterogeneous opinions

about the political risk of investment based on their private observations.²⁴ Hence FDI should increase according to Proposition AA3. I want to emphasize that Deng's speech, as a public signal about the government's attitude, itself had a large impact in terms of attracting FDI, even without any immediate real changes in the profit tax rate or other policies.

All the above analysis is on the interim equilibrium given the public signal, but from an ex ante point of view, the expected equilibrium FDI is given by

$$H(\mu, \sigma_\phi, \sigma_y, \sigma_x) = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{n_m(\nu y + (1 - \nu)\mu, \phi)}{2\pi\sigma_\phi\sigma_y} \exp\left\{-\frac{[y - \log \phi]^2}{2\sigma_y^2}\right\} \exp\left\{-\frac{[\log \phi - \mu]^2}{2\sigma_\phi^2}\right\} dy d \log \phi,$$

where $n_m(\cdot, \cdot)$ is the interim equilibrium FDI conditioned on the public signal y for given ϕ , which is given by (36).

Based on Proposition AA2, it's easy to see $\frac{\partial H}{\partial \mu} < 0$ because a lower μ implies a lower y on average and hence a lower z . A comparative static analysis on $H(\mu, \sigma_\phi, \sigma_y, \sigma_x)$ with respect to the variance parameters can tell us how the transparency of the information might affect the ex ante expected equilibrium FDI.

²⁴The change in y is a result of the decrease in China's real ϕ , which is not the common knowledge.