Fiscal Decentralization, Endogenous Policies, and Foreign Direct Investment: Theory and Evidence from China and India*

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ABSTRACT

A political-macroeconomic model is developed to explain why small differences in fiscal decentralization may ultimately lead to dramatically different economic policies toward FDI hence starkly different amount of FDI flows into two otherwise identical developing countries. Too much fiscal decentralization hurts incentives of the central government while too little fiscal decentralization renders the local governments captured by the protectionist special interest group. Moreover, the local government's preference for FDI can be endogenously polarized and sensitive to fiscal decentralization. Calibration and counterfactual experiments results support fiscal decentralization as the major reason for China and India's nine-fold difference in FDI per capita.

Fiscal Decentralization, FDI, Special Interest Group

D78, F23, H77, O43, P26

Plentiful theoretical and empirical researches establish that foreign direct investment (FDI) in general helps facilitate economic growth in developing countries as it brings not only more physical capital but also better technology, both of which are badly needed in these economies.[1] However, the per capita FDI inflow varies very widely across developing economies. A case in point is the contrast between China and India, the two largest developing economies which together account for approximately 40% of the world's total population. In 2005, China's aggregate FDI inflow was more than US$ 72 billion, about twelve times that of India; its per capita FDI was nine times greater, as illustrated in Figure 1.[2]

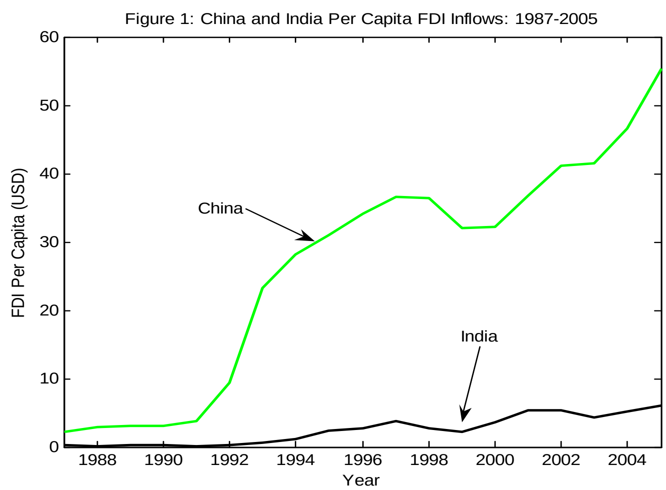

Figure 1: China and India's FDI Inflows Per Capita: 1987-2005

Such a huge difference is surprising given that these two countries are at the similar stage of development.[3] Multiple forces may contribute to this remarkable FDI difference. In this paper, however, I argue that the most decisive driving force is their difference in

[1] See, for example, Rodriguez-Clare(1996), Javorcik (2004), and Borensztein, Gregorio, and Lee (1998), and McGratten and Prescott (2007).

[2] The difference remains enormous with different measures and after adjusting things such as the "round-trip" FDI in China and the inconsistency in ways how FDI is counted in China and India. See Prasad and Wei (2005), Bajpai and Dasgupta (2004), Bosworth and Collins (2007) for more discussions.

[3] For example, real per capita GDP in 2005 was $5600 for China and $3100 for India, placing both well below the world's top one hundred economies. In addition, China and India have followed remarkably similar developmental trajectories over the past sixty years. Please see Bosworth and Collins (2007), Hsieh and Klenow (2007), Srinivasan (2004), Bajpai and Dasgupta (2004) for more discussions about China-India comparison.

the de facto economic policies toward FDI rather than differences in economic fundamentals.[4] It's widely noted that China's government has adopted much more favorable policies toward FDI than their Indian counterparts. For example, the average profit tax rate on foreign-invested firms in 2004 was 41% in India but was well under 30% in China. Moreover, China has experienced keen competition for FDI on the part of local governments, particularly after 1994 when China reformed its tax system by increasing the central government's share of tax revenues. India, however, hasn't seen such great enthusiasm for FDI at the local level. Since India is more fiscally decentralized than China, it runs against the conventional wisdom that more decentralization would foster regional competition and hence increase FDI inflows (the so-called Tiebout effect). The difference in government attitudes may also partly explain why India's infrastructure is not as good as China's and why its de facto institutional barriers to FDI were also higher (see Singh, 2005, Bosworth and Susan, 2007). Table 1 clearly demonstrates that the institutional barriers confronting foreign investors are much higher in India than China.[5]

Country	Starting a Business		Enforcing Contract		Registering Property	
	Time (Days)	Cost* (%)	Procedures (Number)	Time (Days)	Procedures (Number)	Time (Days)
China	48	13.6	35	406	4	29
India	71	62.0	46	1420	6	62

Source: World Bank, 2006, 2007

Notes: * as a percentage of Income per capita

These observations all suggest that it is important to understand how relevant governmental policies toward FDI can be so different.

The primary goal of this paper is therefore to develop a theoretical model to explain this discrepancy in de facto policies and show how it leads to dramatically different levels of FDI inflows in the equilibrium. I will examine not only how the tariff rate and the profit tax rate are endogenously determined, but more importantly, what determines the preferences of the governments for FDI, because it is these attitudes that determines the

[4] In Section 1 of Chapter 3 of my Dissertation, I develop a global game model to explain, from an 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 inflows came from Hong Kong.

[5] This table is based on data for domestic firms. It implies an even more pronounced difference in institutional barriers to FDI between China and India because foreign-invested firms in China receive much better treatment than domestic firms, while the general institutional barriers to FDI in India is at least as high as the barriers for domestic firms, as argued in the above-mentioned literature.

magnitude of the de facto institutional entry costs for FDI. For example, a hostile local government can effectively block FDI by complicating licensing procedures, by under-investing in public goods, or even by confiscating foreign investments. Such government practices are rampant in many developing economies, but they do not always happen. Why? Why Tiebout effect doesn't work in India's FDI behavior although it's more fiscally decentralized than China? These questions on de facto policies seem insufficiently treated in existing theoretical FDI models. On the empirical side, although most existing works on FDI are regression analyses, a headache challenge for that methodology is that it can hardly trace out the possibly different economic mechanisms for each different individual country. In particular, regressions may not be ideal to test a model or provide meaningful statistical inferences when we want to compare aggregate behaviors for only two countries, say China and India, at a finite number of time points. Moreover, data for the aggregate index of institutions are often needed in most regression analyses but unfortunately they are often severely plagued by measurement errors.

To address all these issues, I construct a general equilibrium political-macroeconomic model with a hierarchical government structure, which enables us to conduct calibration and simulation for each individual country with the aggregate data. In the model, policies are endogenously determined through the political games between central and local governments, under the influence of special interest groups; standard economic activities are coordinated by market-clearing prices. The interaction between the political sector and the market sector determines the political equilibrium. The analysis will focus on those developing economies with a powerful government for which the institutional entry costs mainly depend on the governmental preference, not its capability. Numerical simulations/calibrations are conducted to evaluate the theoretical model and to draw quantitative implications for China and India. As a result, we can to a large extent circumvent the endogeneity issues and difficulties associated with measuring institutional variables.

The main finding of this paper highlights the role of the fiscal decentralization, which is defined as the share of the sub-national government tax revenue in the total non-tariff government tax revenues. I show how fiscal decentralization can have a non-monotonic and dramatic impact on policies and FDI inflows. Too much fiscal decentralization may hurt the central government's incentives, hence it would choose the tariff rate and the profit tax rate to induce the provincial governments to block FDI. Too little fiscal decentralization may render the local government captured by domestic protectionist special interest groups. Therefore, de facto policies toward FDI would be sufficiently favorable only when …scal decentralization is in some medium range. Moreover, the equilibrium might bifurcate, that is, a small change in …scal decentralization might lead to policy changes that move the economy from the null-FDI equilibrium to the high-FDI equilibrium. The ampli…cation is due to the fact that the local government's induced preference for FDI can be endogenously polarized, so that a small change in …scal decentralization may ultimately result in a diametrical attitude shift in the local government, which would lead it to impose di¤erent de facto institutional entry costs on FDI. Calibration and simulation outcomes closely match China and India's macro and policy data such as GDP, FDI, labor allocation across di¤erent sectors, pro…ts in each sector as well as the tari¤ rate and pro…t tax rates. Counterfactual experiments suggest that their di¤erence in …scal decentralization can explain the policy di¤erences and also explain why China's FDI per capita is nine times larger than that of India: Chinese central government received 60% of the total tax revenue hence its …scal decentralization falls onto that "medium range", while its Indian counterpart received only 38%, which is too …scal decentralized.

Backward induction is used to characterize the political equilibrium. First, I show how the decreasing negative pecuniary externality of FDI can lead to the polarization of a local government's preference for FDI, which depends on whether the tax-base expansion e¤ect (i.e., more FDI implies more foreign …rms to collect tax from) can dominate the pro…t-reduction e¤ect (i.e., the greater the FDI, the more intensive is the competition and hence the lower average pro…t tax revenue from each …rm). Which e¤ect dominates is in turn determined by the pro…t tax rate and the tari¤ rate chosen by the central government. These policy variables also a¤ect the potential foreign investors' binary choice of FDI versus export. Hence the equilibrium FDI is either null or full (i.e., all investors choose FDI). This is the ampli…cation mechanism. Second, I show how the central government, which is also lobbied by the special interest group and foresees the bimodal outcome of FDI due to local government behaviors, will then implement its more favored equilibrium by choosing an incentive-compatible policy pro…le to induce the provincial government(s) to either compete for, or block, FDI. The full-FDI equilibrium is implemented only when the degree of …scal decentralization provides su¢ cient incentives at both levels of government to attract FDI despite the lobby of the special interest group. The balance of interests for these political players generates the non-monotonicity result. Later I show that the two main results (i.e., non–monotonic impact of …scal decentralization and FDI bifurcation) remain valid regardless of how many horizontal sub-national localities (say, provinces) exist in the economy.

The paper is organized as follows. The next section relates this paper to the relevant literature, underlying the distinctive features and contribution of this paper. Section 3 presents the theoretical model. The quantitative implications for China and India are explored in Section 4. The last section concludes with discussions about possible avenues for future research.

Four strands of literature are closely related to this paper. One is the political-economy FDI literature, of which Grossman and Helpman (1994, 1996) are most relevant. More specifically, Grossman and Helpman (1996) examine how FDI is affected by the politically-determined tariff rate. My model extends their paper in several important directions. First, I introduce one or more provincial governments into their single-layer central government structure. The hierarchical government structure enables us to explore both vertical interaction between the two layers of government and the horizontal interaction between different provincial governments. These interactions are crucial for understanding FDI bifurcation, non-monotonic impact of fiscal decentralization, as well as regional allocations of FDI. None of these can be addressed in their model. Second, I change their implicit model environment to a setting more suitable for a developing economy and I propose a mechanism for FDI bifurcation when FDI exhibits strategic substitutability, while in their model FDI exhibits strategic complementarity.

Branstetter and Feenstra (2002) slightly modify Grossman and Helpman (1996) by introducing the profit tax rate as a second policy variable, but their primary goal is to estimate the structural parameters using China's 1984-1995 province-level panel data. My model has both the tariff rate and the profit tax rate as endogenous policy variables, but the FDI bifurcation mainly results from the third and newly introduced endogenous policy variable, namely, the de facto entry cost, which is exogenous in the previous papers. The provincial government in Branstetter and Feenstra (2002) is not a decision-maker, and hence its framework is the same as the single-layer government model, with no vertical or horizontal governmental interactions. Apart from these important differences in the goals and the model constructions, this paper also differs from Branstetter and Feenstra (2002) in the quantitative strategies. I mainly conduct the calibration and simulation exercise for China and India separately, based on a general-equilibrium model, while they perform a regression analysis.

The second pertinent strand is the macro and development literature concerning purposeful technology adoption. Prescott and Parente (1999) argue that some poor countries may resist adopting better technology because incumbent firm owners fear that they would lose their monopoly rent. Acemoglu and Robinson (2000) argue that superior technology is blocked mainly because the incumbent fear their political power will be jeopardized and thus unable to benefit from the new technology. My paper contributes to this literature by explicitly examining the importance of fiscal decentralization and the roles played by the different layers of the hierarchical governments in the adoption of new technology. I show that the de facto policies toward superior foreign technology can still be diametrically different even if the monopoly rents of the incumbent firms are always harmed by new technology and even if the incumbent is always politically secure. Acemoglu, Helpman and Antras (2007) show that countries with exogenously weaker contracting institutions tend to adopt less-advanced technologies. My model goes somewhat further, by showing how the quality of contracting institutions, as partly reflected in de facto institutional cost, is endogenously affected by the government's rational choice. Moreover, unlike the literature cited above, I also provide a nontrivial supply analysis of technology because it not only involves the foreign potential investors' choice of export versus FDI but also their strategic interactions.[6]

The third strand concerns fiscal decentralization. The earlier fiscal federalism literature mainly supports decentralization because of the Tiebout effect. For example, Qian and Roland (1998) argues that it hardens soft budget constraints. Nevertheless, the impact of decentralization on economic performance is still an unsettled issue. The results are very context-specific and are inconclusive both from empirical and theoretical perspectives, see a wonderful survey by Bardhan and Mookherjee (2006).[7] Blanchard and Shleifer (2000) argue that political centralization has been crucial to the success of China's economic decentralization, whereas federalism in Russia sizing the information advantage of local governments, my perfect-information model places more emphasis on the compatibility of incentives and policies of the different levels of government, since they are asymmetric both in their incentives and their abilities (policy instruments) to affect FDI. Moreover, the special interest group in my model is a national-level organized group while their model mainly considers the small regional special interest groups competing for regional favors. Besides, none of these models are about FDI. Another distinctive feature of my paper is that I provide an explicit general-equilibrium micro-foundation for decentralized market behaviors together with an endogenous policy determination process, which enables a country-by-country calibration and simulation analysis. In contrast, most of the fiscal decentralization literature uses the reduced-form model with ad hoc return functions, and are thus not suitable for macro calibrations/simulations.

The fourth strand is related to property rights, institutions, and capital flows into poor countries. Velasco and Tornell (1992) show that the poor property rights protection due to the "tragedy of commons" can explain why capital doesn't flow to the poor countries from the rich, a question initially raised by Lucas (1990). Thomas and Worrall (1994) 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. While these papers all assume that the recipient economy unambiguously always wants additional FDI, my model shows that, contrary to these assumptions, governments sometimes want to block FDI, even in cases where foreign investors are eager to invest. Cai and Treisman (2005) argue that capital liberalization might amplify the capital inflow difference between countries/provinces with heterogeneous endowments because the relatively poorly-endowed regions may lose hope and therefore invest even less in the infrastructure. My paper shows that asymmetric equilibria may arise even if the provinces or countries are perfectly identical ex ante. Finally, I model FDI as technology adoption instead of physical capital inflow.

To highlight the policy determination mechanism and its dramatic impact on macroeconomic performances, I will first present a reduced-form model in which the standard market process is suppressed into some ad hoc payoff functions with certain assumed properties. Later a general equilibrium setting is provided with very standard assumptions on preference, technology and market structures. I show that all those seemingly ad hoc properties are actually satisfied automatically, as we can derive the explicit functional forms for all these payoff functions.[8]

The basic model environment is very similar to Grossman and Helpman (1994, 1996). The main deviation is that now there will be two layers of governments, say, central and provincial, and the institutional entry cost for FDI will be endogenously determined. Let us first consider the simplest case in which there is only one province so we can solely focus on the vertical interaction between the central and provincial governments. I show in Appendix II that the key results remain valid for an economy with an arbitrary number of provinces, because the nature of horizontal interaction between different provincial governments shall critically depend on the central government's policies.

The host economy is a developing country and FDI is mainly from a representative foreign developed economy. In this host economy, the central government chooses two policy variables. One is the gross ad valorem tariff rate τ, so the net tariff rate is $\tau-1 \geq 0$. The second is the profit tax rate λ on the foreign-invested firms (or interchangeably, multinational firms). The provincial government chooses the institutional entry cost $\phi \geq 0$ for FDI, which is a fixed cost including the waiting cost to get a license, etc. Like Grossman and Helpman (1996), I assume there are n_h domestic firms in this developing economy and a total of n_f foreign firms from a developed economy. Each of the (n_h+n_f) firms can produce a differentiated consumption good and are engaged in monopolistic competition in the sense of Dixit and Stiglitz. Just as in Grossman and Helpman (1996), FDI is modeled as the establishment of a plant by the headquarter of a multinational firm in the host economy. FDI is greenfield, horizontal, and fully foreign-owned.[9] The owners of the foreign firms (or called potential foreign investors) simultaneously choose whether to make FDI or export to the developing country. FDI is measured by n_m, the number of

[8] They include the profit functions for each type of firms: $\pi\ (n\ ,\tau)$ for any $x \in \{h, m, f\}$, tariff revenue function $A(n\ ,\tau)$ and household welfare function $W(n\ ,\tau)$. They will be introduced soon.

[9] Greenfield FDI is much more common than merge and acquisions in the deveoping economies, but the opposite is true for developed economies. See Wei (2006) and Prasad and Wei (2005). For modelling simplicity and data limitation, we assume away joint ventures both in the model and in the calibration. Joint ventures account for half of China's total FDI in 1980s but decreased all the way down to less than 25% in early 2000's. For more justification and discussions, please refer to Branstetter and Feenstra (2002) as well as the aforementioned literature.

the foreign …rms that make FDI. Therefore the rest $n_f - n_m$ foreign …rms choose to export and pay tari¤ τ. A foreign …rm would earn zero pro…t from the developing economy if it doesn't make FDI or export. Both n_h and n_f are exogenous but n_m is endogenous and will depend on the three policy variables ϕ, λ, τ. Obviously, $n_m \in [0, n_f]$. Labor is the only input and all the technologies are constant return to scale. The technology of the foreign …rms is better in the sense that their unit labor cost is smaller than that of domestic products, although all these goods are symmetrically desirable for consumers. Therefore, inward FDI can be equivalently interpreted as adopting foreign better technology.[10] All the domestic …rms are symmetric and earn the same monopolistic competition pro…t $\pi_h(n_m, \tau)$. Similarly, each of the n_m symmetric multinational …rms earns pro…t $\pi_m(n_m, \tau)$ and each foreign exporting …rm earns pro…t $\pi_f(n_m, \tau)$.[11] Multinational …rms can employ cheaper local labor and avoid tari¤ burden, thus FDI commodities are cheaper than imports, so more FDI simply implies more intensive cost competition between …rms and drives down the pro…ts of each …rm. That is, we assume negative pecuniary externality:

$$\pi'_{m1}(n_m, \tau) < 0,\ \pi'_{h1}(n_m, \tau) < 0, \pi'_{f1}(n_m, \tau) < 0. \tag{1}$$

Moreover, we assume, as more FDI comes in, the negative marginal impact of FDI on the domestic …rm's pro…t is decreasing:

$$\pi''_{h1}(n_m, \tau) > 0. \tag{2}$$

This decreasing negative pecuniary externality is ultimately due to households' decreasing marginal utility for each di¤erentiated consumption good. For foreign-invested …rms, we assume:

$$-\frac{n_m \pi''_{m1}(n_m, \tau)}{\pi'_{m1}(n_m, \tau)} > 2 \text{ for all } n_m \in [0, n_f], \tag{3}$$

that is, one percentage increase in the total FDI will lead to more than two percentage decrease in the marginal negative impact of FDI on each multinational …rm's pro…t.[12] Observe (3) and (1) imply $\pi''_{m1}(n_m, \tau) > 0$, thus the strategic substitutability (negative

[10] We may assume some potential domestic …rms can also produce those exact "foreign goods" but their productivity is su¢ ciently low so that they make almost zero pro…t. They can't stand to competitions from foreign …rms either through FDI or trade.

[11] Since pro…t tax is not distorting and the entry cost is the …xed deadweight loss, they would a¤ect pro…ts only through n when there is no other general equilibrium e¤ect. However, tari¤ rate would directly a¤ect the market prices and hence the pro…ts. In the general equilibrium setting with the quasiliner utility function and su¢ cient large labor endowment, we can verify the validity of the functional forms for each type of …rms' pro…ts, see the Appendix.

[12] We can show (3) is not a necessary condition for our main results, but it greatly simpli…es the analysis.

pecuniary externality) between diﬀerent foreign investors is also decreasing with FDI.

To make the analysis nontrivial, we assume $\pi_m(n_m, \tau)$ is suﬃciently inelastic to n_m so that the aggregate proﬁt from the multinational ﬁrms $n_m\pi_m(n_m, \tau)$ increases in n_m:

$$-\frac{n_m\pi'_{m1}(n_m, \tau)}{\pi_m(n_m, \tau)} < 1. \tag{4}$$

When τ increases, imports will become more expensive so the proﬁt of the foreign

Figure 2. Equilibrium FDI as a Function of Entry Cost ϕ when λ is Su¢ ciently Small.

Now let's analyze the demand for FDI by the provincial government, which is determined in the second stage lobby game. Recall by this time the central government has already chosen λ and τ and has been paid the lobby contribution $C(\lambda , \tau)$. Observing that, the provincial government tries to maximize the sum of its total pro…t tax revenue and the lobby contribution $D(\phi)$ by choosing the institutional entry cost $\phi \in [0, \infty)$. ϕ is modelled as the deadweight loss for simplicity. So the provincial government's goal function is

$$V_p(\phi) \equiv (1-\gamma)[\lambda n_m \pi_m(n_m, \tau) + \overline{\lambda} n_h \pi_h(n_m, \tau)] + D(\phi), \tag{8}$$

where γ is the key parameter of this whole paper, which denotes the share of the total pro…t tax revenues accruing to the central government. So …scal decentralization is measured by $(1-\gamma) \in (0,1)$. We take γ as exogenous.[13]

Given λ, τ, and $C(\lambda , \tau)$, SIG, as the principal, lobbies the provincial government (the agent) to maximize its net return:

$$\max_{\widehat{\phi} \geq 0,\ D(\phi) \geq 0} (1-\overline{\lambda}) n_h \pi_h(n_m(\widehat{\phi}, \lambda, \tau), \tau) - C(\lambda, \tau) - D(\widehat{\phi}) \tag{9}$$

exactly binding. Adding their goal functions together yields

$$\max_{n_m \in [0, n_f]} \lambda(1-\gamma) n_m \pi_m(n_m, \tau) + (1-\gamma\overline{\lambda}) n_h \pi_h(n_m, \tau), \tag{12}$$

which determines the provincial government's preference (demand) for FDI. The first term in (12) is the provincial government's profit tax revenue from the multinational firms. The second term is the total profit of domestic firms net of the tax payment to the central government. The (virtual) coalition of SIG and the provincial government tries to maximize the sum. Transferable utility ensures that SIG and the government have the same ultimate demand for FDI as their coalition.

Conditions (2) to (3) ensure that the goal function in (12) is convex in n_m, thus the FDI demand is a corner solution:

$$n_m^d = \begin{cases} 0, & \text{when } \lambda < \widetilde{\lambda}^s \\ 0 \text{ or } n_f, & \text{when } \lambda = \widetilde{\lambda}^s \\ n_f, & \text{when } \lambda > \widetilde{\lambda}^s \end{cases},$$

where $\widetilde{\lambda}^s \equiv \frac{1-\gamma\overline{\lambda}}{1-\gamma}\left(\frac{n_h\left[\pi_h(0,\tau)-\pi_h(n_f,\tau)\right]}{n_f \pi_m(n_f,\tau)}\right)$, the superscript s denotes the case with the lobby of the special interest group and superscript d means demand. That is, the provincial government's preference for FDI is polarized, either very hostile ($n_m^d = 0$), in which case the government will impose very high entry cost ϕ, or very friendly ($n_m^d = n_f$), in which case it will make ϕ small enough to encourage FDI.

The intuition for this preference polarization is straightforward. FDI has two competing effects: more FDI implies more firms to collect tax from (i.e., the pro-FDI tax base expansion effect) but less profit revenue from each firm (i.e., the anti-FDI average profit-reduction effect due to (1)). The tax base expansion effect increases with n_m linearly but the profit-reduction effect increases with n_m only at a diminishing speed (due to (3) and (2)), so the profit-reduction effect may dominate the base-expansion effect when n_m is small but the opposite would be true when n_m gets sufficiently large, which makes the total profit tax revenue convex in n_m. Only when the profit tax rate on FDI λ is sufficiently large would the base-expansion effect dominate the profit-reduction effect so that the attitude is friendly. (4) is needed to make $n_m^d = n_f$ possible, otherwise $n_m^d = 0$ holds for sure.

Notice that the preference polarization result holds even in the absence of lobby, because the provincial government's favorable level of FDI is then given by

$$\max_{n_m \in [0, n_f]} (1-\gamma)[\lambda n_m \pi_m(n_m, \tau) + \overline{\lambda} n_h \pi_h(n_m, \tau)], \tag{13}$$

which is obviously still convex in n_m, therefore its demand for FDI, denoted by $\widehat{n}_m^d$, is given by

$$\widehat{n}_m^d = \begin{cases} 0, & \text{when } \lambda < \widetilde{\lambda} \\ 0 \text{ or } n_f, & \text{when } \lambda = \widetilde{\lambda} \\ n_f, & \text{when } \lambda > \widetilde{\lambda} \end{cases},$$

where $\widetilde{\lambda} \equiv \left(\frac{n_h [\pi_h(0,\tau) - \pi_h(n_f,\tau)]}{n_f \pi_m(n_f,\tau)} \right) \overline{\lambda}$. Observe that $\widetilde{\lambda}^s = \frac{1-\gamma\overline{\lambda}}{\overline{\lambda}(1-\gamma)} \widetilde{\lambda} > \widetilde{\lambda}$ because the provincial government must be compensated with a higher pro…t tax rate on FDI in order to o¤set the lobbying in‡uence against FDI.[14] When the provincial government prefers large FDI, it can set ϕ to zero, so (7) is reduced to $\lambda \leq 1 - \frac{\pi_f(n_m,\tau)}{\pi_m(n_m,\tau)}$. Notice that $\frac{\pi_f(n_m,\tau)}{\pi_m(n_m,\tau)} < 1$ because the foreign exporting …rms use more expensive labor and need to pay tari¤. If

$$\lambda \leq 1 - \frac{\pi_f(n_f, \tau)}{\pi_m(n_f, \tau)}, \tag{14}$$

all the foreign investors will choose to make FDI when $\phi = 0$. Combining the supply and demand of FDI, we have the following FDI Bifurcation result:

(FDI Bifurcation) In the one-province economy, the equilibrium FDI is either null or full, either with or without lobby:

$$n_m^* = \begin{cases} n_f, & \text{if } \widetilde{\lambda}^{(s)}(\tau) \leq \lambda \leq 1 - \frac{\pi_f(n_f,\tau)}{\pi_m(n_f,\tau)} \\ 0, & \text{otherwise} \end{cases}. \tag{15}$$

[14] Observe that $\frac{\widetilde{\ }^s}{=} < 0$ while $\frac{\widetilde{\ }}{=} > 0$ for the following reasons. With the lobby, the bargaining power of SIG in the virtual coalition with the government decreases with $\overline{\lambda}$, therefore a welcoming attitude toward FDI requires a lower tax barrier $\widetilde{\lambda}$. Without the lobby, the provincial government's friendly attitude will require a higher pro…t tax rate on FDI when its rival domestic …rms pay the pro…t tax at a higher rate. That's why $\frac{\widetilde{\ }}{=} > 0$. Also observe that $\frac{\widetilde{\ }^s}{} > 0$ while $\frac{\widetilde{\ }}{} = 0$. With the lobby, the provincial government's bargaining power decreases with γ, therefore the tax barrier to FDI is more determined by the special interest group, hence $\frac{\widetilde{\ }^s}{} > 0$. Without the lobby, γ

The proposition states that the equilibrium FDI is full ($n_m^* = n_f$) only when λ is large enough to induce a positive demand of FDI from the provincial government and also small enough to encourage a positive supply of FDI from foreign potential investors, at any given τ. Full-FDI equilibrium is achievable only when $\widetilde{\lambda}^s(\tau) \leq 1 - \frac{\pi_f(n_f,\tau)}{\pi_m(n_f,\tau)}$, or equivalently,

$$\eta(\tau) > 1 \text{ and } \gamma \leq \frac{\eta(\tau) - 1}{\eta(\tau) - \overline{\lambda}}, \tag{16}$$

where

$$\eta(\tau) \equiv \frac{n_f\left[\pi_m(n_f,\tau) - \pi_f(n_f,\tau)\right]}{n_h\left[\pi_h(0,\tau) - \pi_h(n_f,\tau)\right]}. \tag{17}$$

(16) clearly indicates that the full-FDI equilibrium is possible only when the …scal centralization γ is not too strong, otherwise SIG could fully capture the provincial government, that is, the minimum pro…t tax rate to induce positive government demand for FDI is larger than the maximum pro…t tax rate that any potential investor would tolerate. To allow for the possibility of positive FDI with prohibitive trade barrier ($\tau = \infty$), we must have $\eta(\infty) > 1$, or equivalently,

$$n_f\pi_m(n_f,\infty) > n_h\left[\pi_h(0,\infty) - \pi_h(n_f,\infty)\right]. \tag{18}$$

That is, when import is forbidden, the total pro…ts of all the foreign-invested …rms $n_f\pi_m(n_f,\infty)$ exceeds the total pro…t loss of all the domestic …rms due to full FDI $n_h\left[\pi_h(0,\infty) - \pi_h(n_f,\infty)\right]$. Note that $\pi_f(n_f,\infty) = 0$.

Let's derive the lobby function $D(\phi)$. $D(\phi) > 0$ if and only if the provincial government prefers the full-FDI equilibrium without being lobbied but lobby changes its attitude. $D(\phi)$ therefore can be derived from the binding participation constraint (11). For any other cases, $D(\phi) = 0$ either because it's unnecessary to lobby (when $\lambda > 1 - \frac{\pi_f(0,\tau)}{\pi_m(0,\tau)}$ or when $\lambda < \widetilde{\lambda}$ or both) or because it's too costly to lobby (when $\widetilde{\lambda}^s \leq \lambda \leq 1 - \frac{\pi_f(n_f,\tau)}{\pi_m(n_f,\tau)}$). We can therefore infer that $D(\phi) = 0$ whenever $n_m^* > 0$ but $D(\phi)$ could be positive if $n_m^* = 0$.[15] So far, we take λ and τ as given parameters, but for future reference, let's express them out explicitly in the lobby function:

The optimal solution to the second stage lobby game (9) is the following: $\widehat{\phi}^*(\lambda\ ,\tau)$ can be any value larger than $(1-\lambda)\pi_m(0,\tau) - \pi_f(0,\tau)$ when $\widetilde{\lambda}(\tau) \leq \lambda \leq 1 - \frac{\pi_f(n_f,\tau)}{\pi_m(n_f,\tau)}$ and $\lambda < \widetilde{\lambda}^s(\tau)$; $\widehat{\phi}^*(\lambda\ ,\tau) = 0$ when $\widetilde{\lambda}^s(\tau) \leq \lambda \leq 1 - \frac{\pi_f(n_f,\tau)}{\pi_m(n_f,\tau)}$. $D^*(\phi,\lambda\ ,\tau) =$

[15] It is di¤erent from the more restrictive truthful equilibrium characterized by Dixit, Grossman and Helpman (1997).

$(1-\gamma)[\lambda n_f \pi_m(n_f,\tau)+\overline{\lambda} n_h \pi_h(n_f,\tau)-\overline{\lambda} n_h \pi_h(0,\tau)]$ when $\widetilde{\lambda}(\tau) \le \lambda \le 1-\frac{\pi_f(n_f,\tau)}{\pi_m(n_f,\tau)}$, $\lambda < \widetilde{\lambda}^s(\tau)$ and $\phi = \widehat{\phi}^*$; $D^*(\phi, \lambda\ , \tau) = 0$ otherwise.

Proposition 1 shows that whether the equilibrium has full FDI or null FDI depends on the pro…t tax rate λ and the tari¤ rate τ, which are determined in the …rst lobby game between SIG and the central government. This is addressed in the next subsection.

At the …rst stage lobby game, the central government tries to maximize the weighted sum of total revenues and the public welfare by choosing λ and τ. The public welfare is denoted by $W(n_m,\tau)$ because λ and ϕ a¤ects W only through n_m. Consumers prefer lower prices, hence prefer FDI good to imports and also prefer a lower tari¤ rate, so we assume

$$W_1'(n_m,\tau) > 0 \text{ and } W_2'(n_m,\tau) < 0 \text{ for any } n_m < n_f. \tag{19}$$

The central government's revenue has three parts. One is the total tari¤ revenue denoted by $A(n_m,\tau)$, as it depends on τ and the number of foreign exporting …rms $n_f - n_m$. More FDI implies less import hence less tari¤ revenue, so we assume

$$A_1'(n_m,\tau) < 0. \tag{20}$$

Moreover, standard trade theory predicts that tari¤ revenue $A(0,\tau)$ …rst increases with tari¤ rate τ and then decreases with τ, so we also assume

$$A_2''(n_m,\tau) < 0 \text{ when } \tau \text{ is not too large.} \tag{21}$$

The second part of revenue is the total pro…t tax $\gamma[\lambda n_m \pi_m(n_m,\tau) + \overline{\lambda} n_h \pi_h(n_m,\tau)]$. The third part is the political contribution $C(\lambda,\tau)$. Since SIG hates FDI, $C(\lambda,\tau)$ is non-decreasing in λ. By suppressing $n_m(\phi,\lambda,\tau)$ to n_m, we can write the central government's problem as

$$\max_{\lambda\in[0,1],\tau\in[1,\infty)} V_c(\lambda,\tau) \equiv A(n_m,\tau)+\gamma[\lambda n_m \pi_m(n_m,\tau)+\overline{\lambda} n_h \pi_h(n_m,\tau)]+C(\lambda,\tau)+aW(n_m,\tau) \tag{22}$$

where a is the welfare weight. When $a = 0$, the central government doesn't care about public welfare. When a

more FDI implies less tari¤ revenue $A(n_m, \tau)$ due to (20), less pro…t tax revenues from domestic …rms $\overline{\lambda} n_h \pi_h(n_m, \tau)$ due to (1) and less political contribution $C(\lambda, \tau)$, but it also implies more pro…t tax revenues from multinational …rms $\lambda n_m \pi_m(n_m, \tau)$ due to (4) and a higher public welfare $W(n_m, \tau)$. Without the lobby, the central government has the reservation value

$$B_c = \max_{\lambda,\tau} A(n_m, \tau) + \gamma[\lambda n_m \pi_m(n_m, \tau) + \overline{\lambda} n_h \pi_h(n_m, \tau)] + aW(n_m, \tau).$$

Now foreseeing the optimal response functions $\widehat{\phi}^*(\lambda, \tau)$ and $D^*(\phi, \lambda, \tau)$ in the second stage lobby game, SIG recommends pro…t tax rate $\widehat{\lambda}$, gross tari¤ rate $\widehat{\tau}$ and also chooses the lobby function $C(\lambda, \tau)$ to maximize the net gain

$$\max_{\widehat{\lambda}\in[0,1],\widehat{\tau}\in[1,\infty),C(\lambda,\tau)\geq 0} (1 - \overline{\lambda}) n_h \pi_h(n_m(\widehat{\phi}^*, \widehat{\lambda}, \widehat{\tau}), \widehat{\tau}) - C(\widehat{\lambda}, \widehat{\tau}) - D^*(\widehat{\phi}^*, \widehat{\lambda}, \widehat{\tau}), \tag{23}$$

subject to the incentive compatibility constraint for the central government $(\widehat{\lambda}, \widehat{\tau}) \in \arg\max_{\lambda,\tau} V_c(\lambda, \tau)$ and the participation constraint $V_c(\widehat{\lambda}, \widehat{\tau}) \geq B_c$. Again, thanks to the transferable utility, (22) and (23) can be combined and it's reduced to

$$\begin{aligned} \max_{\widehat{\lambda}\in[0,1],\widehat{\tau}\in[1,\infty)} \; & A(n_m, \widehat{\tau}) + \gamma[\widehat{\lambda} n_m \pi_m(n_m, \widehat{\tau}) + \overline{\lambda} n_h \pi_h(n_m, \widehat{\tau})] \\ & + (1 - \overline{\lambda}) n_h \pi_h(n_m, \widehat{\tau}) + aW(n_m, \widehat{\tau}) - D^*(\widehat{\phi}^*, \widehat{\lambda}, \widehat{\tau}), \end{aligned} \tag{24}$$

where $n_m = n_m(\widehat{\phi}^*, \widehat{\lambda}, \widehat{\tau})$ and function $D^*(\widehat{\phi}^*, \widehat{\lambda}, \widehat{\tau})$ is given by Lemma 2.

The central government (or equivalently, the coalition of the central government and SIG) knows that ultimately n_m will be either zero or n_f , as predicted in Proposition 1, therefore it only compares the coalition's largest value at $n_m = 0$, denote by R_1 , and its largest value at $n_m = n_f$, denoted by R_2. It will choose to implement the full-FDI equilibrium if and only if $R_2 \geq R_1$. To simplify the notations, from now on, we will write ϕ, λ, τ instead of $\widehat{\phi}^*, \widehat{\lambda}, \widehat{\tau}$ whenever no confusion occurs.

Substituting $n_m = 0$ into (24) yields $R_1 = \max_{\lambda,\tau} A(0, \tau) + (\gamma\overline{\lambda} + 1 - \overline{\lambda}) n_h \pi_h(0, \tau) + aW(0, \tau) - D^*(\phi, \lambda\ , \tau)$,subject to that λ and τ are such that $n_m = 0$ will be implemented. There are two possibilities, either SIG e¤ectively didn't lobby the provincial government or it did lobby the provincial government. Let R_{11} and R_{12} denote the values for the virtual coalition in these two scenarios respectively. By de…nition, we have

$$R_{11} \equiv \max_{\lambda,\tau} A(0,\tau) + (\gamma\overline{\lambda} + 1 - \overline{\lambda})n_h\pi_h(0,\tau) + aW(0,\tau)$$

subject to

$$\lambda > 1 - \frac{\pi_f(0,\tau)}{\pi_m(0,\tau)} \text{ , or } \lambda < \widetilde{\lambda}(\tau).$$

Observe that the goal function doesn't depend on λ, so the optimal tari¤ rate τ^* is given by

$$\tau^* = \arg\max_{\tau\in[1,\infty)} A(0,\tau) + (\gamma\overline{\lambda} + 1 - \overline{\lambda})n_h\pi_h(0,\tau) + aW(0,\tau), \tag{25}$$

but the optimal pro…t tax rate is indeterminate:

$$\lambda^* \in (1 - \frac{\pi_f(0,\tau^*)}{\pi_m(0,\tau^*)}, 1] \cup [0, \widetilde{\lambda}(\tau^*)). \tag{26}$$

When $D(\phi,\lambda\ ,\tau) > 0,$ Lemma 2 enables us to rewrite (24) as

$$R_{12} \equiv \max_{\lambda,\tau} A(0,\tau) + aW(0,\tau) + n_h\pi_h(0,\tau) - (1-\gamma)[\lambda n_f\pi_m(n_f,\tau) + \overline{\lambda}n_h\pi_h(n_f,\tau)]$$

subject to

$$\widetilde{\lambda} \le \lambda \le 1 - \frac{\pi_f(n_f,\tau)}{\pi_m(n_f,\tau)} \text{ and } \lambda < \widetilde{\lambda}^s. \tag{27}$$

Therefore the optimal tax rate $\lambda^* = \widetilde{\lambda}$. Substituting it into the goal function, we have

$$R_{12} = \max_{\tau\in[1,\infty)} A(0,\tau) + aW(0,\tau) + n_h\pi_h(0,\tau)[1 - (1-\gamma)\overline{\lambda}]$$

subject to $\overline{\lambda} \le \eta(\tau)$, where $\eta(\tau)$ is de…ned in (17).

$R_1 = \max\{R_{11}, R_{12}\}$. So we compare R_{11} and R_{12}. Observe that the same goal function is maximized but the constraint in the …rst case is weakly less restrictive, so we can conclude $R_1 = R_{11}$. Since $D(\phi,\lambda\ ,\tau) = 0$ whenever $n_m = n_f$, it immediately implies the following important result.

For any equilibrium policy pro…le $(\phi^*,\lambda^*\ ,\tau^*)$ and lobby functions $C^*(\lambda\ ,\tau)$ and $D^*(\phi,\lambda\ ,\tau)$, whenever $D^*(\phi^*,\lambda^*\ ,\tau^*) > 0$, there always exists another equilibrium policy pro…le $(\phi^{**},\lambda^{**}\ ,\tau^{**})$ with the same lobby functions such that the same market allocation is achieved and $D^{*}(\phi^{**}, \lambda^{**}\ , \tau^{**}) = 0$.

This proposition implies that, without loss of generality, we can assume that SIG only "e¤ectively" lobbies the central government by setting $D(\phi, \lambda\ , \tau) = 0$. Observe that $D(\phi, \lambda\ , \tau) > 0$ holds only when the provincial government wants to encourage FDI before the lobby but it changes its attitude after being lobbied, in which case the equilibrium FDI is zero. However, SIG could have chosen to withdraw all this lobby money for the provincial government and slightly increase its lobby contribution to the central government and only ask the central government to adopt the same τ but a restrictively high λ(for example, let $\lambda = 1$). The equilibrium FDI, tari¤ rate, pro…t tax revenues would all be the same as before, so the central government would happily accept the new lobby suggestion.

The asymmetric ability of the two government levels to a¤ect equilibrium FDI is the fundamental reason why SIG can harmlessly restrict its own choice of the lobby functions such that the local government is never paid in the equilibrium. The central government can e¤ectively fully block any FDI without any cooperation from the local government because the local government has limited ability to encourage FDI since we restrict $\phi \geq 0$. In the above example, when λ is reset to one, the provincial government actually wants to have as much FDI as possible, but the best it can do is to set $\phi = 0$, which is still not enough to encourage any FDI supply. If the provincial government can su¢ ciently subsidize FDI (let $\phi < 0$), then SIG would have to pay some money to the provincial government in order to fully block FDI. However, the above proposition doesn ’t mean that the second stage lobby game is unimportant. The fact that SIG has the ability to lobby the provincial government always imposes a real potential "threat" to the central

When $n_m = n_f$, we know $D(\phi, \lambda\ , \tau) = 0$ and $A(n_f, \tau) = 0$ because of no imports. (24) can be rewritten as

$$R_2 = \max_{\lambda,\tau} \gamma[\lambda n_f \pi_m(n_f, \tau) + \overline{\lambda} n_h \pi_h(n_f, \tau)] + (1 - \overline{\lambda}) n_h \pi_h(n_f, \tau) + aW(n_f, \tau)$$

subject to

$$\widetilde{\lambda}^s(\tau) \leq \lambda \leq 1 - \frac{\pi_f(n_f, \tau)}{\pi_m(n_f, \tau)} \ .$$

This immediately implies

$$\lambda^* = 1 - \frac{\pi_f(n_f, \tau^*)}{\pi_m(n_f, \tau^*)}. \tag{28}$$

Substituting it back into the goal function, we obtain

$$R_2 = \max_{\tau \geq 1} \gamma n_f [\pi_m(n_f, \tau) - \pi_f(n_f, \tau)] + (1 - \overline{\lambda} + \gamma \overline{\lambda}) n_h \pi_h(n_f, \tau) + aW(n_f, \tau)$$

subject to

$$\frac{1 - \gamma\overline{\lambda}}{1 - \gamma} \leq \eta(\tau). \tag{29}$$

Notice that $\pi_m(n_f, \tau)$, $\pi_h(n_f, \tau)$ and $W(n_f, \tau)$ are all independent of τ when there is no import, but $\pi_f(n_f, \tau)$ decreases with τ as it a¤ects the price of imports. The optimal tari¤ rate is

$$\tau^* = \sup\{\tau |\, \tau \in [1, \infty) \text{ and } (29) \text{ is satis…ed}\}. \tag{30}$$

Obviously R_2 increases with τ^*. It's easy to verify that $\eta(\infty) < \infty$ and $0 \leq \eta(1) < \infty$. Since $\eta(\tau)$ is continuous and (18) is assumed, there exists a …nite maximum value for $\eta(\tau)$, denoted by M. So $M \geq \eta(\infty) > 1$. Let τ^M denote the largest tari¤ rate that achieves this maximum value M. De…ne $\overline{\gamma} \equiv \frac{M-1}{M-\overline{\lambda}}$ and $\widetilde{\gamma} \equiv \frac{\eta(\infty)-1}{\eta(\infty)-\overline{\lambda}}$.

When there exists a …nite $\widehat{\tau} > 0$ such that

$$\frac{-\pi'_{f2}(n_f, \tau)}{\pi'_{h2}(0, \tau)} \leq \frac{\pi_m(n_f, \tau) - \pi_f(n_f, \tau)}{\pi_h(0, \tau) - \pi_h(n_f, \tau)} \text{ for any } \tau \geq \widehat{\tau}, \text{ (with "} = \text{" only when } \tau = \widehat{\tau}) \tag{31}$$

(31) implies $\eta'(\tau) < 0$ for any $\tau > \widehat{\tau}$, therefore $M > \eta(\infty)$ and $\tau^M \leq \widehat{\tau}$. Let's assume such $\widehat{\tau}$ exists, which can be veri…ed in the next section. It literally means that when the trade barrier is su¢ ciently large($\tau > \widehat{\tau}$) and FDI is fully encouraged ($\phi = \lambda = 0$), the ratio of each investor's pro…t increase by shifting to FDI from exporting, $\pi_m(n_f, \tau) - \pi_f(n_f, \tau)$, to each domestic …rm's pro…t loss due to full FDI, $[\pi_h(0, \tau) - \pi_h(n_f, \tau)]$, is larger than the ratio of the marginal decrease in each exporting …rm's pro…t due to a

tari¤ increase $(-\pi'_{f2}(n_f,\tau))$ to the marginal increase in each domestic …rm's pro…t due to a tari¤ increase$(\pi'_{h2}(0,\tau))$. Or roughly, the right hand side of (31) measures the gain of an investor relative to the loss of a domestic …rm while the left hand side measures the marginal loss in an exporter's pro…t relative to the marginal gain in a domestic producer's pro…t as the tari¤ rate changes.

If $\gamma > \overline{\gamma}$, then (29) can never be satis…ed, hence it's never feasible to have the full-FDI equilibrium because the provincial government is fully captured by SIG. If $\gamma \leq \overline{\gamma}$, there are two possibilities for the full-FDI equilibrium. One is $\gamma \leq \widetilde{\gamma}$, in which case the optimal tari¤ is $\tau^* = \infty$ and correspondingly,

$$R_2 = \gamma n_f[\pi_m(n_f,\infty) - \pi_f(n_f,\infty)] + (1-\overline{\lambda}+\gamma\overline{\lambda})n_h\pi_h(n_f,\infty) + aW(n_f,\infty). \quad (32)$$

The other possibility is $\gamma \in (\widetilde{\gamma}, \overline{\gamma})$, then (29) must be binding and the optimal tari¤ rate is

$$\tau^*(\gamma) = \max\left\{\tau | \, \eta(\tau) = \frac{1-\gamma\overline{\lambda}}{1-\gamma}\right\}. \quad (33)$$

The optimal pro…t tax rate is always given by (28). Correspondingly,

$$R_2 = \frac{\gamma(1-\gamma\overline{\lambda})}{1-\gamma} n_h[\pi_h(0,\tau^*(\gamma)) - \pi_h(n_f,\tau^*(\gamma))] + (1-\overline{\lambda}+\gamma\overline{\lambda})n_h\pi_h(n_f,\tau^*(\gamma)) + aW(n_f,\tau^*(\gamma)). \quad (34)$$

In summary, we have

In the full-FDI equilibrium, if …scal decentralization is su¢ ciently strong ($\gamma < \widetilde{\gamma}$), the coalition of the central government and the special interest group obtains R_2 given by (32), the optimal tari¤ rate is in…nity, and the optimal pro…t tax rate is one (full taxation). If …scal decentralization is su¢ ciently strong but not too strong($\gamma \in (\widetilde{\gamma}, \overline{\gamma})$),$R_2$ is given by (34), the optimal tari¤ rate is given by (33) and the pro…t tax rate is given by (28).

Whenever $\gamma > \overline{\gamma}$, we must have $R_1 > R_2$ and thus the null-FDI equilibrium is reached. Otherwise,

$$R_2 - R_1 = \frac{\gamma(1-\gamma\overline{\lambda})}{1-\gamma} n_h[\pi_h(0,\tau_2^*) - \pi_h(n_f,\tau_2^*)] + (1-\overline{\lambda}+\gamma\overline{\lambda})n_h\left[\pi_h(n_f,\tau_1^*) - \pi_h(0,\tau_1^*)\right]$$
$$+ a\left[W(n_f,\tau_1^*) - W(0,\tau_1^*)\right] - A(0,\tau_1^*), \quad (35)$$

where τ_1^* and τ_2^* denote the optimal tari¤ rate for R_1 and R_2, respectively. For now, let's focus on the case when $a = 0$. De…ne $\Delta(\gamma) \equiv R_2 - R_1$ for all $\gamma \in [0, \overline{\gamma}]$.

$\Delta(\gamma)$ is continuous and strictly increasing on $[0, \overline{\gamma}]$.

See Appendix II. ■

Obviously, $\Delta(0) < 0$ because $\pi_h(0,\tau_2^*) - \pi_h(n_f,\tau_2^*) > 0$, $\pi_h(n_f,\tau_1^*) - \pi_h(0,\tau_1^*) < 0$, and $A(0,\tau_1^*) > 0$. Now if $\Delta(\widetilde{\gamma}) \geq 0$, or equivalently

$$\widetilde{\gamma} n_f \pi_m(n_f,\infty) + (1-\overline{\lambda}+\widetilde{\gamma}\overline{\lambda})n_h\left[\pi_h(n_f,\infty) - \pi_h(0,\tau_1^*(\widetilde{\gamma}))\right] - A(0,\tau_1^*(\widetilde{\gamma})) \geq 0, \quad (36)$$

where $\tau_1^*(\widetilde{\gamma})$ is given by (25) at $a = 0$ and $\gamma = \widetilde{\gamma}$, then there exists a unique threshold value $\underline{\underline{\gamma}} \in (0, \widetilde{\gamma}]$ such that $R_2 - R_1 \geq 0$ if and only if $\gamma \in [\underline{\underline{\gamma}}, \widetilde{\gamma}]$, where $\underline{\underline{\gamma}}$ is determined by $\Delta(\underline{\underline{\gamma}}) = 0$. When (36) is not satis…ed, we have $R_2 - R_1 < 0$ for any $\gamma \leq \widetilde{\gamma}$. To allow for the full-FDI equilibrium, we assume

$$\Delta(\overline{\gamma}) > 0, \quad (37)$$

where

$$\Delta(\overline{\gamma}) = \frac{\overline{\gamma}(1-\overline{\gamma}\overline{\lambda})}{1-\overline{\gamma}} n_h[\pi_h(0,\tau_2^*(\overline{\gamma})) - \pi_h(n_f,\tau_2^*(\overline{\gamma}))] - A(0,\tau_1^*(\overline{\gamma}))$$
$$+ (1-\overline{\lambda}+$$

(Non Monotonicity) Suppose the welfare weight a is zero. The equilibrium policies are su¢ ciently favorable and the equilibrium FDI (technology adoption) is full ($n_m^* = n_f$) when the …scal decentralization is on the medium range ($\gamma \in [\widehat{\gamma}, \overline{\gamma}]$), as summarized in Lemma 5. Otherwise, the equilibrium policies discourage FDI and the equilibrium FDI is zero, as summarized in Lemma 4.

This proposition demonstrates the non-monotonic relationship between the degree of the …scal decentralization and the equilibrium FDI due to the endogenous policy changes. Too much …scal decentralization will hurt the central government's incentives to attract FDI hence the central government will choose policies to induce the provincial government to block FDI instead of competing for it. This is precisely the reason why Tiebout e¤ect may not work even if there are multiple provinces with too much …scal decentralization. Too little …scal decentralization will render the provincial government captured by the anti-FDI SIG. Therefore, the economy reaches the full-FDI equilibrium if and only if the …scal decentralization is of some intermediate value. In particular, this proposition implies that a little decrease in the …scal centralization around the threshold value $\widehat{\gamma}$ could dramatically shift the equilibrium from full FDI to null FDI.[16]

More concretely, the above proposition indicates that there are two types of possible political equilibria, depending on whether (36) holds or not. The equilibrium FDI is unique once the exogenous parameters are given. Figure 3a-3c plot the case when (36) holds.[17]

[16] Both GDP and public welfare will also decrease, as we can verify in the general equilibrium model.

[17] When (36) is not satis…ed, the tari¤ revenue is su¢ ciently large so it's never possible to have the full-FDI equilibrium with in…nite tari¤ rate. This is the only di¤erence from the previous case when (36) holds. See Figures A2(a)-A2(c) in the Appendix I.

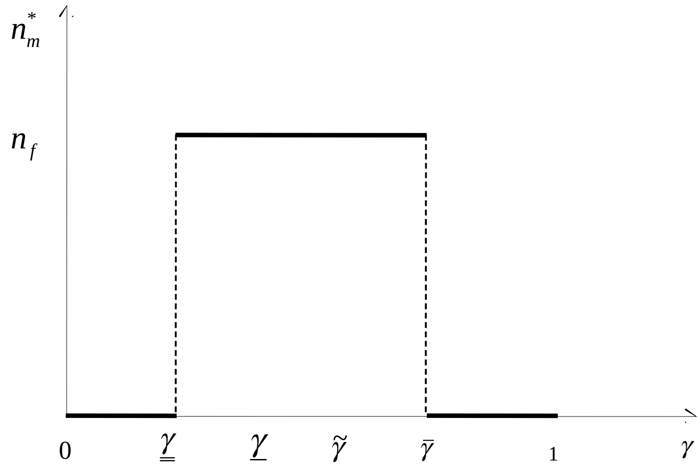

Figure 3a. Equilibrium FDI vs. Fiscal Centralization When $\Delta(\widetilde{\gamma}) \geq 0$

Figure 3a plots the equilibrium FDI n_m^* as a function of fiscal centralization γ. The intuition for this non-monotonicity has just been explained. In terms of the equilibrium policies, first notice that the de facto entry cost ϕ^* will be always sufficiently large ($\phi^* > (1-\lambda^*)\pi_m(0,\tau^*) - \pi_f(0,\tau^*)$) but indeterminate whenever the equilibrium FDI n_m^* is zero. ϕ^* will be always sufficiently small whenever $n_m^* = n_f$. A more precise characterization for ϕ^* is messy and thus relegated to Appendix.

Figure 3b. Equilibrium Tariff Rate vs. Fiscal Centralization When $\Delta(\widetilde{\gamma}) \geq 0$

Figure 3b shows how the equilibrium tariff rate changes with fiscal centralization. When $\gamma \notin [\underline{\underline{\gamma}}, \overline{\gamma}]$, the equilibrium tariff rate τ^* is determined by (25) so τ^* is strictly increasing in γ due to the following reason: An increase in γ would make the profit tax revenue from the domestic firms become more attractive to the central government as compared with its tariff revenue, therefore, the central government would raise the tariff rate in order to increase the domestic firms' profits, which SIG also likes, although the tariff revenue will decrease. When $\gamma \in [\underline{\underline{\gamma}}, \widetilde{\gamma}]$, the optimal tariff rate is prohibitively high ($\tau^* = \infty$

…rms' pro…ts are fully taxed away ($\lambda^* = 1$) so that each potential foreign investor is indi¤erent between making FDI and exporting. When $\gamma \in (\widetilde{\gamma}, \overline{\gamma}]$, τ^* strictly decreases with γ, therefore λ^* has to decrease otherwise the option of exporting becomes more attractive for the potential investors.

The previous analysis assumes that the central government doesn't care about the public welfare. The other extreme case is when $a \to \infty$, so the central government is fully benevolent. If so, not surprisingly, $R_2 > R_1$ will always hold, as can be veri…ed in (35).

When the central government is fully benevolent ($a = \infty$), there will be no trade barrier (the equilibrium net tari¤ rate $\tau^* - 1 = 0$), the equilibrium pro…t tax rate is $\lambda^* = 1 - \frac{\pi_f(n_f, 1)}{\pi_m(n_f, 1)}$. The equilibrium de facto institutional entry cost is $\phi^* = 0$, and the equilibrium FDI is full ($n_m^* = n_f$).

This proposition characterizes the …rst best, in which both the welfare and GDP are maximized. When $a \in (0, \infty)$, the equilibrium is hard to characterize without making further assumptions on $W(n_m, \tau)$ and $A(n_m, \tau)$. Most interestingly, as we will show in the quantitative section, in some circumstances, when welfare weight a increases, the equilibrium FDI actually decreases from n_f to 0. We will explain the intuition in that section.

The two main results, FDI bifurcation and Non-Monotonicity, will remain valid when the economy has multiple provinces, which is shown in the Appendix II due to space limit.

A formal general equilibrium setting is provided together with the formal de…nition of the political equilibrium. The policy games are exactly the same as before. The only thing that needs clarifying is the market process, for which we now explicitly specify one possible set of assumptions on the household utility function, technology, endowment and market structure. These assumptions are almost identical to Grossman and Helpman (1996). We can then explicitly derive the pro…t functions, tari¤ revenue function and welfare function, which can all be veri…ed to satisfy those assumptions we make earlier. The veri…cation is relegated to Appendix III.

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

$$U = x_0 + \frac{\theta}{\theta-1} x^{\frac{\theta-1}{\theta}}, \quad \theta > 1 , \tag{38}$$

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:

$$x = \left[\int_{j \in N_h \cup N_f} x(j)^{\frac{\varepsilon-1}{\varepsilon}} dj \right]^{\frac{\varepsilon}{\varepsilon-1}}, \quad \varepsilon > 1, \tag{39}$$

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. Let N_m, a subset of N_f , denote the set of foreign brands that are produced by the foreign-invested firms located in the host country. The measure of N_m, denoted by n_m, quantifies the magnitude of FDI. The complementary subset N_f/N_m is the set of the imported foreign brands with measure $n_f - n_m$. The output only serves the domestic market of the host economy.[18] All the multinational firms are wholly foreign-owned. Let $N \equiv N_h \cup N_f$ for future reference. We assume $\varepsilon > \theta$ to ensure positive cross price elasticity of the demand.

Labor is the only production factor. All the technologies are constant return to scale. One unit of labor produces one unit of numeraire. Domestic wage rate is normalized to unity. 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 $w \geq 1$ denote the 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

[18] FDI into the developing economies often serve as the production base for the outside international market, which can be an important motive for the FDI in China. In Chapter 3 of my PhD Dissertation, I explicitly examine this export effect on FDI and show that it doesn't change the qualitative results in this paper. Quantitatively, this export effect is partly captured by the susbstution elasticity parameter ε in our calibration exercises, as we will explain later. In addition, a larger and larger fraction of China's FDI is targeted mainly toward China's market as the country becomes richer and richer, especially after year 2000.

host country.[19] We assume $c_f < c_h$.

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 …rms have a zero measure and are scattered in the population. The after-tax net pro…t of the multinationals will be repatriated to the source country. L is su¢ ciently large so that the trade account is balanced by exporting the numeraire goods to the international market at the competitive world price, which is equal to one.

The labor market is perfectly competitive. Labor is freely mobile across di¤erent sectors within a country. The numeraire good market is perfectly competitive both domestically and internationally. Each di¤erentiated commodity is produced by a single monopolist. All the …rms producing non-numeraire good are engaged in monopolistic competition.

A Political Equilibrium (PE) in a single-province economy is a collection of the policy variables $\{\phi^*, \tau^*, \lambda^*\}$, the commodity prices $p^*(j), j \in N$, the lobby schedule functions $C^*(\lambda, \tau)$ and $D^*(\phi, \lambda, \tau)$, and the investment decisions $FDI_j^* \in \{0, 1\}$, for all $j \in N_f$, such that

1. The interest group of the domestic …rm owners maximizes its net gain by sequentially choosing (23) and (9), which determine $C^*(\lambda, \tau)$ and $D^*(\phi, \lambda, \tau)$;

2. The central government maximizes its goal function by solving (22), which gives τ^* andλ^*;

3. Given τ^*, λ^* and $D^*(\phi, \lambda, \tau)$, the provincial government maximizes its revenue by solving (8), which decides ϕ^*;

[19] Grossman and Helpman (1996) assumes that the unit cost of the multinational good is c rather than c for each $j \in N$ and $w = 1$, which results in strategic complementarity for international investors, although they didn't point it out explicitly. However, we obtain strategic substitutability, which makes our FDI bifurcation result less obvious.

4. Given policy variables $\{\phi^*, \tau^*, \lambda^*\}$, each potential investor $j \in N_f$ makes the investment decision FDI_j^* and pricing decision $p^*(j)$. FDI_j^* is a best response to all $FDI_{j'}^*, j' \in N_f$, $j' \neq j$;.

5. Each domestic firm $j \in N_h$ maximizes profit by choosing $p^*(j)$.

6. Each household maximizes the utility (38) by choosing the right consumption subject to the corresponding budget constraint.

7. Markets clear for labor, each domestically produced and consumed commodity, and the international payment is balanced for the domestic economy.

The existence of the political equilibrium for a single-province economy can be established by actually finding the optimal solutions. For calibration purpose, let l_m and l_h denote the total employment in the foreign-invested firms and in the monopolistic competitive domestic firms, respectively. l_n denotes the total employment in the numeraire sector. Later we will check whether our model can match the employment data. Total GDP and profits for each type of firms can also be derived analytically, which will be used in the calibration to text our model.

The full specification and analytical characterization for the multi-province model are essentially quite similar to the one-province model but much messier, and thus relegated to Appendix II due to space limit. One advantage of the multi-province setting is that it enables us to analyze and quantify the regional distribution of FDI within a country, which seems interesting although it deviates from the main focus of this paper.[20]

Simulations with calibrated parameters will be conducted for China and India based on a two-province general equilibrium model. Robustness check has been conducted with respect to all the parameters that are likely subject to sizeable measurement errors. Some counterfactual experiments also highlight the importance of fiscal decentralization.

[20] Multiple province settings give several other interesting results. For example, as the number of provinces increase, the interval for fiscal centralization at which the full-FDI equilibrium arises would shift downward because of intensified inter-regional competitions. Morevoer, ex ante identical provinces might end up with different amounts of FDI when the pool of total potential foreign investors is not large enough. This is because each province finds it optimal to attract FDI only when its expected FDI inflow is large enough for the tax-base expansion effect to dominate the profit-reduction effect; otherwise it would prefer zero FDI.

are indeed both about 2.4:1. The predicted τ^* is higher than the data partly due to the following two reasons besides possible measurement errors: one is that the real tari¤ rate is also subject to the 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 tari¤ rate.

Table 4 shows that when the welfare weight a is below 0.071 there will be no FDI in the equilibrium. This is because the central government now cares more about the domestic …rms' pro…ts and its tari¤ revenue, hence it induces the provincial governments to block FDI. One way to block FDI is to set the multinational pro…t tax rate equal to zero. But when a is more than 1/12 of the domestic …rm pro…t'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, which also generates the full-FDI equilibrium with our calibrated model, as shown in Table 4. Since a should be larger than 0.434 in 2004, we can thus conclude that China's policies toward FDI remained robustly favorable relative to the plausible variations of a.

a

a	n_m^*:n_h	λ^*	τ^*	$l_h : l_m : l_n$	GDP: $n_h\pi_h$: $n_m^*\pi_m$
Data	1: 6	(0.15,0.30)	1.104	2.4: 1: 21.6	21.0: 2.4 :1
Model	1: 6	0.2382	1.155	2.4: 1: 21.7	25.8: 2.4:1
1.62	1: 6	0.0090	1.005	2.4: 1: 22.0	25.9: 2.4:1
1.50	1: 6	0.1121	1.065	2.4: 1: 21.8	25.9: 2.4:1
1.00	1: 6	0.4444	1.365	2.4: 1: 21.6	25.8: 2.4:1
0.868 $(\frac{1}{1})^\dagger$	1: 6	0.5045	1.450	2.4: 1: 21.6	25.7: 2.4:1
0.434 $(\frac{1}{2})$	1: 6	0.7127	1.935	2.4: 1: 21.5	25.6: 2.4:1
0.174 $(\frac{1}{5})$	1: 6	0.8118	2.420	2.4: 1: 21.5	25.6: 2.4:1
0.072 $(\frac{1}{12})$	1: 6	0.8458	2.690	2.4: 1: 21.4	25.6: 2.4:1
0.071	0: 6	0	2.060	0.3: 0: 2.7	3.3: 0.3: 0
0.062 $(\frac{1}{14})$	0: 6	0	2.080	0.3: 0: 2.7	3.3: 0.3: 0
0	0: 6	0	2.235	0.3: 0: 2.7	3.3: 0.3: 0

Note: † The fraction in the parenthesis is the ratio of a versus the weight on the pro…ts of the domestic …rms in the reduced government goal function.

When $a \in [0.072,\, 1.62]$, the tariff rate decreases with a because the households are the anti-protection group, hence the profit tax on the multinationals must decrease in order to induce the potential foreign investors to make FDI. Tariff rate decrease reduces the market demand for all the differentiated commodities, hence more labors move into the numeraire sector. The total profit of foreign-invested firms as a share of GDP 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 and the tariff rate is "too big" as compared with τ^A at $a = 0.072$. The tariff rate increases again as a decreases further.

Appendix IV also presents robustness check with parameter θ, from which we can see that the equilibrium FDI for China robustly remains "full" for any θ on $(0,\, \varepsilon)$. It implies that the government policies toward FDI are robustly favorable enough in China.

di¤erent e¢ ciency in the tax system, I introduce a new parameter s in the calibration, which is multiplied to the tari¤ revenue term in the goal function (22) of the central government. This is to capture the fact that tari¤ revenue is a more favored tax option plausible because a smaller proportion of the foreign-invested manufacturing firms in India are export-oriented than China (hence ε should be larger than China's value). 3.05 is presumably an upper bound as we argue earlier. The robustness of the equilibrium FDI (and the implied policies) relative to ε supports our fiscal decentralization argument.

Table 7 also shows the equilibrium shifts from null FDI to full FDI 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 the central government has more incentives to encourage FDI in order to expand its profit tax base. 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 negative pecuniary externality is decreased hence the marginal change in the domestic firms' profits and the tariff revenue would no longer warrant the exclusion of the more efficient foreign firms from the tax base.

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

Suppose we set all the exogenous parameters identical for the two countries except that γ is set to match the real data for the two economies: 0.6 for China and 0.38 for India. We find that, again, the model predicts that China still has full FDI while India has null FDI. This suggests that their difference in fiscal decentralization is important enough to account for the big FDI di¤erences via endogenous policy di¤erentials.

The above exercises show that China and India have very di¤erent equilibrium FDI when they have identical welfare weights a , no matter a = 1.302 as we argued or a =0.434 according to Branstetter and Feentra's estimation. Now I will show that our main explanation for China-India FDI di¤erence, namely, their di¤erence in γ, does not critically depend on the assumption that the two countries have the same a's.

For each su¢ ciently small a, there exists a unique lower bound value for threshold value $\gamma^*(a) \in (0,1)$ such that the equilibrium FDI is full only if $\gamma \geq \gamma^*(a)$. The following …gure depicts function $\gamma^*(a)$ over the domain $[0, 1.62]$ when all the other parameters are set to the benchmark values for China. Function $\gamma^*(a)$ …rst decreases and then increases in a for the following reasons. When a increases from a su¢ ciently small value, the increase in household welfare becomes more important for the central government relative to the decrease in the pro…t tax revenue. But the FDI bifurcation implies that the is (a_{India}, 0.38). Suppose a_{India} exceeds 1.4, larger than China's a, the equilibrium FDI in India would be still zero. In other words, a more "benevolent" central government might prefer zero FDI. This is mainly because of the FDI bifurcation and that the central government also cares about its revenues.

This paper develops a theoretical model to show how two developing economies with identical economic fundamentals could have very different de facto policies toward inward FDI (or interpreted as foreign better technology), and how these endogenous policies can translate into a tremendous difference in the equilibrium FDI inflows. The key finding points to the importance of fiscal decentralization, which can have both a non-monotonic and dramatic impact on policies and FDI. Too much fiscal decentralization may hurt the central government's incentives, leading it to choose policy profiles that induce local governments to block FDI. Too little fiscal decentralization, on the other hand, may force local governments to succumb to pressure from the protectionist special interest group. Consequently policies toward FDI are sufficiently favorable only when fiscal decentralization is on some medium range. In addition, the equilibrium FDI may bifurcate as a result of the endogenous polarization in the local government's induced attitude toward FDI. A small change in fiscal decentralization, therefore, might diametrically shift local government attitudes and result in dramatically different institutional entry costs imposed on FDI. Simulations and calibrations using data from China and India support these theoretical findings.

The theoretical model is largely motivated by the comparison between China and India, and quantitative implications are also mainly drawn from these two countries. However, the same economic mechanism might also be applicable to other developing economies. It would be interesting, then, to test various hypotheses derived from our model using data from other countries or different regions within the same country. It would also be interesting, from a theoretical point of view, to extend this one-period dynamic model into multiple periods, which will enable us to explore the dynamics of endogenous policies and the macro economy. Another area worth exploring is how the degree of fiscal decentralization is actually endogenously determined in the political and economic institutions. Further promising areas of inquiry also include the introduction of firm heterogeneity or other forms of FDI into the model.

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Appendix I (a): More Facts.

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)

	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)

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	66463	40093
United Kingdom	79282	96475	Samoan	112885	135187
Germany	105848	153004	Others	144065	86947

Source: China Statistical Yearbook (2005)

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	1583	3
Germany	70	1652	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 I (b): Equilibrium FDI and Policies.

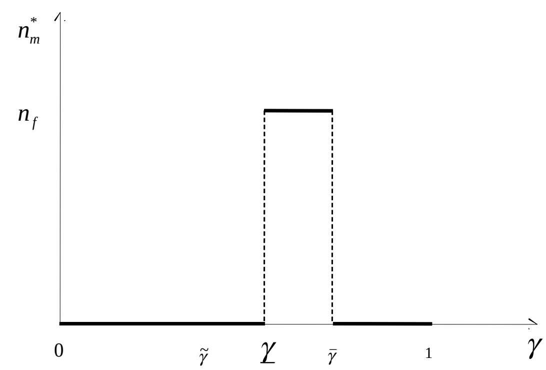

Figure A2(a). Equilibrium FDI vs. Fiscal Centralization when $\Delta(\widetilde{\gamma}) < 0$

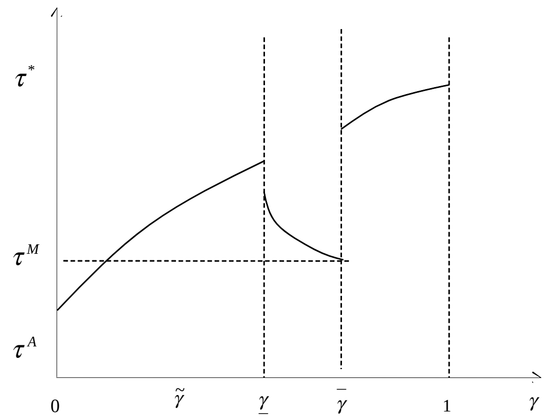

Figure A2(b). Equilibrium Tari¤ Rate vs. Fiscal Centralization When $\Delta(\widetilde{\gamma}) < 0$

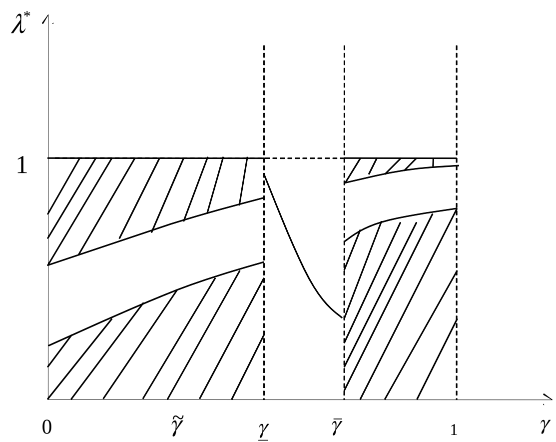

Figure A2(c). Equilibrium Pro…t Tax Rate vs. Fiscal Centralization When $\Delta(\widetilde{\gamma}) < 0$

Appendix II-a: Multiple-Province Model

Let's first consider the two-province economy and then generalize it to the K-province economy for any $K \geq 2$. 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 share the same pool of the foreign investors N_f with measure n_f. The central government determines the nation-wide uniform tariff rate τ and the profit tax rates on the foreign-invested firms in the two provinces, denoted by λ_k, for $k \in \{1, 2\}$. Similarly, let $n_{m,k}$ denote FDI in province k. No household can own a firm that is located in the other province. The profit tax sharing rule is the same as before. In each province, all the domestic firms form a special interest group, so there are two special interest groups indexed by $k \in \{1, 2\}$. To avoid the trivial case with no provincial competition, I assume each foreign investor can invest in at most one province, perhaps due to the financial constraint, for example. To simplify the analysis, we also assume no inter-provincial trade is allowed, therefore the foreign-invested firms can only serve the provincial market while the other province can be only accessed through export directly from the foreign country.[22] I also exclude the possibility that a foreign firm makes FDI in one province and then exports abroad and re-imports to the other province.

The timing is as follows. The two special interest groups first jointly and cooperatively lobby the central government by providing a non-negative menu $C(\lambda_1, \lambda_2, \tau)$, then the central government decides λ_1, λ_2 and τ, and receives the lobby money. Next, given these policies, the two special interest groups simultaneously and non-cooperatively lobby its own provincial government by providing non-negative menus $D_1(\phi_1)$ and $D_2(\phi_2)$. Then the two provincial governments simultaneously and non-cooperatively decides ϕ_1 and ϕ_2 respectively and get the lobby revenues. After observing $\{\phi_1, \phi_2, \lambda_1, \lambda_2, \tau\}$, all the foreign potential investors simultaneously and non-cooperatively make the tertiary choice $FDI \in \{A, B(1), B(2)\}$, where A refers to exporting to both provinces, in which case the total profit is

$$\Pi^A = \sum_{k=1}^{2} \pi_f(n_{m,k}, \tau),$$

[22] Relaxing this assumption would not affect the validity of the main results but would make the comparison with the one-province model more difficult. Young (2000) argued with ample empirical evidence that China's 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. Regional protectionism is also strong in India (see Singh, 2005).

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

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

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

$$\Pi^{B(2)} = [(1-\lambda_2)\pi_m(n_{m,2},\tau) - \phi_2] + \pi_f(n_{m,1},\tau).$$

Then in each province, the standard market equilibrium is achieved.

Again, we use backward induction to characterize the equilibrium. One main di¤erence is that the two special interest groups are engaged in a static game in the second-stage lobby game. It's also true for the two provincial governments when they decide their own entry cost. Market equilibrium determines all the pro…t functions for each type of …rms in both provinces. In terms of the investment choice, given all the …ve policy variables, a potential investor $j \in N_f$ takes other investors' choice as given and chooses

$$FDI_j \in \arg\max_{FDI_j \in \{A,B(1),B(2)\}} \{\Pi^A, \Pi^{B(1)}, \Pi^{B(2)}\}. \tag{40}$$

Then at the second-stage lobby game, $\lambda_1, \lambda_2, \tau$,$C(\lambda_1,\lambda_2,\tau)$, and how the two special interest groups split the lobby bill to the central government are all determined. Let θ_k denote the endogenous share of the lobby bill paid by the special interest group of province k to the central government, which is negotiated between the two special interest groups at the …rst-stage lobby game. Thus the special interest group k lobbies provincial government k by solving

$$\max_{\widehat{\phi}_k,\ D_k(\phi_k,\lambda_1,\lambda_2,\tau)\geq 0} (1-\overline{\lambda})n_h\pi_h(n_{m,k},\tau) - \theta_k C(\lambda_1,\lambda_2,\tau) - D_k(\widehat{\phi}_k,\lambda_1,\lambda_2,\tau), \tag{41}$$

subject to the provincial government k's IC constraint $\widehat{\phi}_k \in \arg\max_{\phi_k\geq 0} \widehat{V}_{p,k}(\phi_k,\lambda_1,\lambda_2,\tau)$ and its participation constraint $\widehat{V}_{p,k}(\widehat{\phi}_k,\lambda_1,\lambda_2,\tau) \geq \widehat{B}_{p,k}(\lambda_1,\lambda_2,\tau)$, where $\theta_k C(\lambda_1,\lambda_2,\tau)$ is a sunk cost, $\widehat{V}_{p,k}(\phi_k,\lambda_1,\lambda_2,\tau)$ is provincial government k 's goal function after being lobbied:

$$\widehat{V}_{p,k}(\phi_k,\lambda_1,\lambda_2,\tau) \equiv (1-\gamma_k)[\lambda_k\pi_m(n_{m,k},\tau)n_{m,k} + \overline{\lambda}n_h\pi_h(n_{m,k},\tau)] + D_k(\phi_k,\lambda_1,\lambda_2,\tau), \tag{42}$$

where γ_k is the central government's pro…t tax revenue share with respect to province k. $n_{m,k} = n_{m,k}(\phi_1,\phi_2,\lambda_1,\lambda_2,\tau)$ and $\widehat{B}_{p,k}(\lambda_1,\lambda_2,\tau)$ is government k's reservation value given by

$$\max_{\phi_k \geq 0}(1-\gamma_k)[\lambda_k \pi_m(n_{m,k},\tau)n_{m,k} + \overline{\lambda} n_h \pi_h(n_{m,k},\tau)].$$

From this lobby game, we can obtain $\widehat{\phi}_k^*$ and $D_k^*(\phi_k, \lambda_1, \lambda_2, \tau)$ for $k \in \{1,2\}$.

Finally we are back to the ﬁrst lobby game, in which the two special interest groups cooperatively lobby the central government:

$$\max_{\widehat{\lambda}_1,\widehat{\lambda}_2,\widehat{\tau},C(\lambda_1,\lambda_2,\tau)\geq 0} \sum_{k=1}^{2}(1-\overline{\lambda}_k)n_h\pi_h(n_{m,k},\widehat{\tau}) - C(\widehat{\lambda}_1,\widehat{\lambda}_2,\widehat{\tau}) - \sum_{k=1}^{2} D_k^*(\widehat{\phi}_k^*,\widehat{\lambda}_1,\widehat{\lambda}_2,\widehat{\tau})$$

In this case, θ_k^* can be determined using the fact that the ultimate net value for the two special interest groups are identical.[23]

Consider the simplest case in which the equilibrium is symmetric in the two provinces, namely, both provinces have the same profit tax rates on the multinational firms

$$\lambda_1 = \lambda_2 = \lambda, \tag{46}$$

the same lobby functions

$$D_1(\phi_1, \lambda_1, \lambda_2, \tau) \equiv D_2(\phi_2, \lambda_1, \lambda_2, \tau),$$

the same entry cost

$$\phi_1^* = \phi_2^* = \phi, \tag{47}$$

and consequently the same amount of FDI

$$n_{m,1}^* = n_{m,2}^*. \tag{48}$$

Observe that (48) alone implies the equal profit for each type of firms across the two provinces: $\pi_{x,1}^* = \pi_{x,2}^*$ for any $x \in \{h, m, f\}$. We can immediately see that the induced preferences for FDI at each province is still polarized no matter with or without the lobby. However, the threshold value for the profit tax rate would change, depending on the expected amount of FDI inflows. Recall the largest possible FDI for each province in the symmetric equilibrium is $\frac{n_f}{2}$ instead of n_f. The provincial government k has the following demand for FDI after being lobbied:

$$\widehat{n}_{m,k}^{ds} = \begin{cases} 0, & \text{when } \lambda_k < \widehat{\lambda}^s(\tau) \\ 0 \text{ or } n_f, & \text{when } \lambda_k = \widehat{\lambda}^s(\tau) \\ n_f, & \text{when } \lambda_k > \widehat{\lambda}^s(\tau) \end{cases},$$

where $\widehat{\lambda}^s(\tau) \equiv \frac{1-\gamma\bar{\lambda}}{1-\gamma}\left(\frac{n_h\left[\pi_h(0,\tau)-\pi_h(\frac{n_f}{2},\tau)\right]}{\frac{n_f}{2}\pi_m(\frac{n_f}{2},\tau)}\right)$ and the threshold value before the lobby is still given by $\widehat{\lambda}(\tau) = \frac{\bar{\lambda}(1-\gamma)}{1-\gamma\bar{\lambda}}\widehat{\lambda}^s(\tau)$. Note $\widehat{\lambda}^s(\tau)$ differs from $\widetilde{\lambda}^s(\tau)$ only in that all n_f are replaced by $\frac{n_f}{2}$ in the expression. Therefore $\widehat{\lambda}^s(\tau) > \widetilde{\lambda}^s(\tau)$ due to (1) and (4). However,

[23] In Section 2 of Chapter 3 in my dissertation, I explore the impact of the regional heterogeneity in domestic firms' productivities on FDI.

if a provincial government expects to have full FDI, its threshold value is still given by $\widetilde{\lambda}^s(\tau)$ instead of $\widehat{\lambda}^s(\tau)$ after the lobby.

FDI supply is now determined by (40), which is reduced to (7) in the symmetric equilibrium. So when $\phi = 0$, FDI is chosen only if

$$\lambda \leq 1 - \frac{\pi_f(\frac{n_f}{2}, \tau)}{\pi_m(\frac{n_f}{2}, \tau)}. \tag{49}$$

We assume

$$\frac{\pi_f(x,\tau)}{\pi_m(x,\tau)} \text{ is independent of } x, \text{ for any } x \in [0, n_f], \tag{50}$$

which can be veri...ed in our general equilibrium setting.

Suppose the pro...t tax rate satis...es (49) so that it's small enough to admit positive FDI supply. When $\lambda \in (\widetilde{\lambda}^s(\tau), \widehat{\lambda}^s(\tau))$, there exists no symmetric equilibrium, however, there exists an asymmetric equilibrium in which one province absorbs full FDI while the other has no FDI. When $\lambda \notin (\widetilde{\lambda}^s(\tau), \widehat{\lambda}^s(\tau))$, the symmetric equilibrium does exist, in which the equilibrium FDI still bifurcates:

$$n^*_{m,1} = n^*_{m,2} = \begin{cases} \frac{n_f}{2}, & if \quad \widehat{\lambda}^s(\tau) \leq \lambda \leq 1 - \frac{\pi_f(\frac{n_f}{2},\tau)}{\pi_m(\frac{n_f}{2},\tau)} \\ 0, & otherwise \end{cases}. \tag{51}$$

When $\lambda \in (\widetilde{\lambda}^s(\tau), \widehat{\lambda}^s(\tau))$, no symmetric equilibrium exists because any provincial government k strictly would prefer 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. Therefore there exists one and only one pure-strategy asymmetric equilibrium, in which one provincial government completely blocks any FDI by setting its ϕ su¢ ciently large while the other provincial government sets ϕ equal to zero and attracts full FDI. If $\lambda \geq \widehat{\lambda}^s(\tau)$, 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. The optimal decisions for the provincial governments in the symmetric equilibrium are therefore given by

$$\phi_1^* = \phi_2^* = \begin{cases} \text{any value su¢ ciently large to block FDI}, & if \quad \lambda \leq \widetilde{\lambda}^s(\tau) \\ 0, & if \quad \widehat{\lambda}^s(\tau) \leq \lambda \leq 1 - \frac{\pi_f(\frac{n_f}{2},\tau)}{\pi_m(\frac{n_f}{2},\tau)} \\ \text{any value on } [0,\infty), & if \quad \lambda > 1 - \frac{\pi_f(\frac{n_f}{2},\tau)}{\pi_m(\frac{n_f}{2},\tau)} \end{cases},$$

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

$$FDI_j^* = \begin{cases} B(1) \text{ or } B(2), & if \quad \lambda < 1 - \frac{\pi_f(\frac{n_f}{2},\tau)}{\pi_m(\frac{n_f}{2},\tau)},\ \phi_1 = \phi_2 = 0 \\ A, & if \quad \begin{array}{c} \lambda \leq 1 - \frac{\pi_f(\frac{n_f}{2},\tau)}{\pi_m(\frac{n_f}{2},\tau)},\ \phi \text{ is su¢ ciently large or} \\ \lambda > 1 - \frac{\pi_f(\frac{n_f}{2},\tau)}{\pi_m(\frac{n_f}{2},\tau)} \end{array} \\ A, \text{or } B(1), \text{ or } B(2), & if \quad \lambda = 1 - \frac{\pi_f(\frac{n_f}{2},\tau)}{\pi_m(\frac{n_f}{2},\tau)}, \phi_1 = \phi_2 = 0, \end{cases}. \tag{52}$$

Hence, the FDI bifurcation obtained in the single-province equilibrium remains valid in the two-province equilibrium. This result holds for more than two provinces. De…ne

$$\Lambda(z,\tau) \equiv \frac{1-\gamma\overline{\lambda}}{1-\gamma}\left(\frac{n_h\left[\pi_h(0,\tau)-\pi_h(z,\tau)\right]}{z\pi_m(z,\tau)}\right), \tag{53}$$

where $z \in [0, n_f]$. Note $\widehat{\lambda}^s(\tau) = \Lambda(\frac{n_f}{2},\tau)$ and $\widetilde{\lambda}^s(\tau) = \Lambda(n_f,\tau)$. 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 pro…t tax rate. More generally, in an economy with K ex ante identical provinces, where $K \geq 2$. Suppose the necessary condition for positive FDI supply $\lambda \leq 1 - \frac{\pi_f(\frac{n_f}{K},\tau)}{\pi_m(\frac{n_f}{K},\tau)}$ 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 $k \in \{1,2,...,K\}$. If $\lambda \leq \Lambda(n_f,\tau)$, then the FDI is uniquely zero in each province: $n_{m,k}^* = 0$, for all $k \in \{1,2,...,K\}$. If $\lambda \in (\Lambda(n_f,\tau), \Lambda(\frac{n_f}{K},\tau))$, no symmetric equilibrium exists. Next I will characterize asymmetric equilibrium more generally.

The following proposition shows that the FDI bifurcation at the national level is a robust result, independent of the horizontal interaction between the provinces.

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

By contradiction. Suppose there exists an asymmetric equilibrium which satis…es

$$0 < \sum_{k=1}^{K} n_{m,k}^{*} < n_f.$$

So $n_{m,k}^{*} > 0$ for some $k \in \{1, 2, ..., K\}$. 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 $\sum_{k=1}^{2} n_{m,k}^{*} < n_f$.In addition, (50) ensures that the potential foreign investors are willing to supply $n_{m,k}^{*} + \Delta$ because they are willing to supply $n_{m,k}^{*}$. 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. . ■

Again, the intuition is that each province's preference for FDI is still endogenously polarized. Therefore if the equilibrium FDI is positive, it must imply that at least one province wants as much FDI as possible. Moreover, (50) guarantees that the potential foreign investors are indeed willing to supply more FDI whenever the entry cost is set zero for any given pro…t tax rate and tari¤ rate. So positive FDI must imply full FDI. Recall in the one-province economy, a potential investor chooses to make FDI if and only if the net pro…t of making FDI exceeds the pro…t of exporting to that province. However, this result might no longer hold in the two-province economy. We can show that in some cases even when the net pro…t of making FDI in Province 1 exceeds the pro…t 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 tari¤ revenue of that country comes from Province 1, where the provincial government can only collect the pro…t tax revenues from the domestic …rms. Such a di¤erence between the one-province economy and the multiple-province economy would disappear if we relax the assumption that each investor can invest in at most one province.

It's easy to see that the non-monotonicity result remains valid because the economic trade-o¤ forces stay unchanged qualitatively in the two-province economy. The analysis remains almost the same except that $\eta(\tau)$ is now replaced by

$$\widehat{\eta}(\tau) \equiv \frac{\frac{n_f}{2}\left[\pi_m(\frac{n_f}{2}, \tau) - \pi_f(\frac{n_f}{2}, \tau)\right]}{n_h\left[\pi_h(0, \tau) - \pi_h(\frac{n_f}{2}, \tau)\right]},$$

which is smaller than $\eta(\tau)$. Therefore the new upper bound for the …scal centralization parameter $\overline{\gamma}$ will be smaller than before. The intuition is the following: since more provincial governments are competing for the same fixed pool of potential foreign investors, the provincial government's preference for FDI is dampened in general, making it more easily captured by the special interest group, therefore, the full-FDI equilibrium requires that the provincial government get a larger share of the profit tax revenue. On the other hand, the lower bound of the fiscal centralization $\widehat{\gamma}$ also goes down under some moderate conditions. This is because the central government can now always get strictly positive tariff revenues due to the model restriction that no foreign firms can make FDI in more than one provinces, hence the minimal profit tax share obtained by the central government can be lowered. These effects become stronger as the number of provinces increases. In general, we have

In an economy with $K \geq 2$ ex ante identical provinces, when the central government doesn't care about welfare ($a = 0$), the equilibrium FDI at the national level is full ($n_m^* = n_f$) when the fiscal decentralization is on some medium range($\gamma \in [\widehat{\gamma}(K), \overline{\gamma}(K)]$). Otherwise, the equilibrium FDI is zero. In addition, both $\widehat{\gamma}(K)$ and $\overline{\gamma}(K)$ decrease with K.

This proposition shows that both the FDI bifurcation and the non-monotonic impact of fiscal decentralization remain valid for an economy with arbitrar59(t)8(h)111371-16(o)10(t)9(h)-279(

3. Each provincial government k maximizes its fiscal revenue by maximizing (42), the solution to which is ϕ_k^*, given $\tau^*, \{\lambda_k^*\}_{k\in\{1,2\}}$, and ϕ_k^* is a best response to $\phi_{k'}^*, k' \neq k$, for $k, k' \in \{1,2\}$;

4. Each potential investor $j \in N$ makes the investment decision, FDI_j^*, and pricing decision $p^*(j,k)$, given $\tau^*, \{\phi_k^*, \lambda_k^*\}_{k\in\{1,2\}}$. It's a best response to all $FDI_{j'}^*, j' \in N, j' \neq j$, and all $p^*(j',k), j' \in$, $j' \neq j, k \in \{1,2\}$;

5. Each domestic firm $j \in N$ maximizes profit, the solution to which is $p^*(j,k)$, $k \in \{1,2\}$;

6. Each household maximizes the utility by choosing the right consumption subject to the budget constraint;

7. Lobby cost sharing rule θ^* and θ^* are determined through the Nash Bargaining between the two special interest groups;

8. Markets clear for domestic labor, each domestically produced and consumed com-

Appendix II-b: Pr of Lemma 6

When $\gamma \in [0, \widetilde{\gamma}]$, we have

$$\Delta(\gamma) = \frac{\gamma(1-\gamma\overline{\lambda})}{1-\gamma} n[\pi(0,\infty) - \pi(,\infty)] + (1 - \overline{\lambda} + \gamma\overline{\lambda}) n[\pi(,\tau_1^*) - \pi(0,\tau_1^*)] - A(0,\tau_1^*).$$

When $\gamma \in (\widetilde{\gamma}, \overline{\gamma}]$, we have

$$\Delta(\gamma) = \frac{\gamma(1-\gamma\overline{\lambda})}{1-\gamma} n[\pi(0,\tau_2^*) - \pi(,\tau_2^*)] + (1 - \overline{\lambda} + \gamma\overline{\lambda}) n[\pi(,\tau_1^*) - \pi(0,\tau_1^*)] - A(0,\tau_1^*).$$

$\lim_{\gamma\to\widetilde{\gamma}^+} \Delta(\gamma) = \Delta(\widetilde{\gamma})$ because $\lim_{\gamma\to\widetilde{\gamma}^+} \tau^*(\gamma) =$, so $\Delta(\gamma)$ is a continuous function on $[0, \overline{\gamma}]$. When $\gamma \in [0, \widetilde{\gamma}]$ $'(\gamma) = [\pi(,\infty)] + \overline{\lambda}[\pi(,\infty) - \pi(0,\tau_1^*)]$, where we use $(,\infty) = 0$ and the first-order condition from (25) when $a = 0$. So $\Delta'(\gamma) > 0$ if and only if $\pi(,\infty) >$ $\overline{\lambda}[\pi(0,\infty) - \pi(,\infty)]$ (18). When $\gamma \in (\widetilde{\gamma}, \overline{\gamma}]$, we can derive

$$
\begin{aligned}
&\Delta'(\gamma) \\
&= \left[\frac{(1-\gamma\overline{\lambda})}{1-\gamma} + \frac{\gamma(1-\overline{\lambda})}{(1-\gamma)^2} \right] n_h[\pi_h(0,\tau_2^*) - \pi_h(n_f,\tau_2^*)] \\
&+ \frac{\gamma(1-\gamma\overline{\lambda})}{1-\gamma} n_h \pi'_{h2}(0,\tau_2^*) \frac{d\tau_2^*}{d\gamma} + \overline{\lambda} n_h \left[\pi_h(n_f,\tau_1^*) - \pi_h(0,\tau_1^*)\right] \\
&> \frac{\gamma(1-\overline{\lambda})}{(1-\gamma)^2} n_h[\pi_h(0,\tau_2^*) - \pi_h(n_f,\tau_2^*)] + \frac{\gamma(1-\gamma\overline{\lambda})}{1-\gamma} n_h \pi'_{h2}(0,\tau_2^*) \frac{d\tau_2^*}{d\gamma} + \overline{\lambda} n_h \left[\pi_h(0,\tau_2^*) - \pi_h(0,\tau_1^*)\right] \\
&\geq \frac{\gamma(1-\overline{\lambda})}{(1-\gamma)^2} n_h[\pi_h(0,\tau_2^*) - \pi_h(n_f,\tau_2^*)] + \frac{\gamma(1-\gamma\overline{\lambda})}{1-\gamma} n_h \pi'_{h2}(0,\tau_2^*) \frac{d\tau_2^*}{d\gamma} + \overline{\lambda} n_h \pi'_{h2}(0,\tau_2^*) \left(\tau_2^* - \tau_1^*\right),
\end{aligned}
$$

where the …rst line uses the …rst-order condition from (25) when $a = 0$ and the third line uses (6), therefore $\Delta'(\gamma) > 0$ when $\pi'_{h2}(0,\tau_2^*)$ is su¢ ciently small, which is consistent with (6) and can be veri…ed in our general-equilibrium setting in Subsection 3.5.

Appendix III: Veri…cations of the Reduced-Form Model Assumptions

The usual mark-up pricing rule from pro…t maximization implies

$$p(j)=\begin{cases} p_h \equiv \frac{\varepsilon}{\varepsilon-1}c_h, & \text{if} \quad j\in N_h \\ p_m \equiv \frac{\varepsilon}{\varepsilon-1}c_f, & \text{if} \quad j\in N_m \\ p_f \equiv \frac{\varepsilon}{\varepsilon-1}c_f w\tau, & \text{if} \quad j\in N_f/N_m \end{cases}. \tag{54}$$

The household maximization problem gives the market demand for each di¤erentiated good:

$$x(j)=\begin{cases} x_h \equiv p_h^{-\varepsilon}q^{\varepsilon-\theta}, & \text{if} \quad j\in N_h \\ x_m \equiv p_m^{-\varepsilon}q^{\varepsilon-\theta}, & \text{if} \quad j\in N_m \\ x_f \equiv p_f^{-\varepsilon}q^{\varepsilon-\theta}, & \text{if} \quad j\in N_f/N_m \end{cases}, \tag{55}$$

where q is the price index for the aggregate good x :

$$q=\left[n_h {p_h}^{1-\varepsilon}+n_m {p_m}^{1-\varepsilon}+(n_f-n_m){p_f}^{1-\varepsilon}\right]^{\frac{1}{1-\varepsilon}}. \tag{56}$$

Each …rm takes q as exogenous when making production decisions. For …rm $j\in N,$ its pro…t is

$$\pi(j)=\begin{cases} \pi_h \equiv \frac{1}{\varepsilon}p_h^{1-\varepsilon}q^{\varepsilon-\theta}, & \text{if} \quad j\in N_h \\ \pi_m \equiv \frac{1}{\varepsilon}p_m^{1-\varepsilon}q^{\varepsilon-\theta}, & \text{if} \quad j\in N_m \\ \pi_f \equiv \frac{1}{\varepsilon\tau}p_f^{1-\varepsilon}q^{\varepsilon-\theta}, & \text{if} \quad j\in N_f/N_m \end{cases}. \tag{57}$$

The total tari¤ revenue is given by

$$A(n_m,\tau)=\frac{\tau-1}{\tau}(n_f-n_m)p_f x_f. \tag{58}$$

By solving the household problem, we obtain the welfare for an average household

$$W(n_m,\tau)=L+(1-\overline{\lambda})n_h\pi_h+\frac{q^{1-\theta}}{\theta-1}. \tag{59}$$

For future reference, the total labor employment in the domestic sector is $l_h\equiv n_h x_h c_h$.

Total employment in the multinational sector is given by $l_m\equiv n_m x_m c_f$. The rest of the labor, $l_n\equiv L-n_h x_h c_h-n_m x_m c_f$, are employed in the numeraire sector. GDP is the total output from all the three sectors and so it given by

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

When $\lambda < 1 - \tau^{-\varepsilon} w^{1-\varepsilon}$, let (7) hold as an equality, we can derive n_m as a function of ϕ, denoted by $H(\phi)$:

$$H(\phi) = \frac{\left[\frac{\phi\varepsilon}{\left(\frac{\varepsilon}{\varepsilon-1}c_f\right)^{1-\varepsilon}(1-\lambda-\tau^{-\varepsilon}w^{1-\varepsilon})}\right]^{\frac{1-\varepsilon}{\varepsilon}} - n_h p_h^{1-\varepsilon} - n_f p_f^{1-\varepsilon}}{p_m^{1-\varepsilon} - p_f^{1-\varepsilon}}, \tag{60}$$

which indicates that the equilibrium FDI is strictly decreasing in the entry cost ϕ when the potential investors feel indifferent between FDI and export. For the provincial government's optimization (13), given τ and λ, the implied equilibrium entry cost ϕ is given by

$$\phi^* = \begin{cases} \text{any } \phi \leq \underline{\phi}, & \text{if } \lambda \geq \widetilde{\lambda}^s(\tau),\ \lambda < 1 - \tau^{-\varepsilon} w^{1-\varepsilon} \\ 0, & \text{if } \lambda \geq \widetilde{\lambda}^s(\tau),\ \lambda = 1 - \tau^{-\varepsilon} w^{1-\varepsilon} \\ \text{any } \phi \geq \overline{\phi}, & \text{if } \lambda < \widetilde{\lambda}^s(\tau),\ \lambda < 1 - \tau^{-\varepsilon} w^{1-\varepsilon} \\ \text{any } \phi > 0, & \text{if } \lambda < \widetilde{\lambda}^s(\tau),\ \lambda = 1 - \tau^{-\varepsilon} w^{1-\varepsilon} \\ \text{any } \phi \geq 0, & \text{if } \lambda > 1 - \tau^{-\varepsilon} w^{1-\varepsilon} \end{cases},$$

where

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

and

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

Now I show that all the previous assumptions made on the profit functions, tariff revenue function, welfare function are all automatically satisfied in the general-equilibrium setting in Subsection 3.5. Since the proofs are simply using brutal force and hence straightforward, I will only provide the algorithms while leaving all the algebraic details to the readers.

Based on (54) -(57), it's easy to verify that π_h, π_m, and π_f can all be written as functions of only n_m and τ. Moreover, assumptions (1) through (6), (50), (18), (31) can be all verified. From (58) we can verify assumptions (20) and (21). From (59), assumption (19) can be verified. Assumption (37) can be verified numerically with the real data. After substituting (57) into (17), we obtain

$$\eta(\tau) = \frac{(1-\tau^{-\varepsilon} w^{1-\varepsilon}) \frac{n_f}{n_h} \left(\frac{c_f}{c_h}\right)^{1-\varepsilon} \left[\frac{n_h {c_h}^{1-\varepsilon} + n_f {c_f}^{1-\varepsilon}}{n_h {c_h}^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}}\right]^{\frac{\varepsilon -}{1-\varepsilon}}}{1 - \left[\frac{n_h {c_h}^{1-\varepsilon} + n_f {c_f}^{1-\varepsilon}}{n_h {c_h}^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}}\right]^{\frac{\varepsilon -}{1-\varepsilon}}},$$

based on which we can verify (31), $\eta(\infty) < \infty$ and $0 \leq \eta(1) < \infty$.

Extensions to K-province economy is straightforward. In that case, the threshold value for the pro…t tax rate is given by

$$\Lambda(z,\tau) \equiv \left(\frac{1-\gamma\overline{\lambda}}{1-\gamma}\right)\left(\frac{n_h {c_h}^{1-\varepsilon}}{{c_f}^{1-\varepsilon} z}\right)\left(\frac{\Psi(z,\tau)}{F(z,\tau)}\right), \qquad (61)$$

where

$$\Psi(z,\tau) = \left[n_h {c_h}^{1-\varepsilon} + n_f (\tau w c_f)^{1-\varepsilon}\right]^{\frac{\varepsilon -}{1-\varepsilon}} - \left[n_h {c_h}^{1-\varepsilon} + (n_f - z)(\tau w c_f)^{1-\varepsilon} + z c_f^{1-\varepsilon}\right]^{\frac{\varepsilon -}{1-\varepsilon}};$$

$$F(z,\tau) = \left[n_h {c_h}^{1-\varepsilon} + (n_f - z)(\tau w c_\varepsilon\right.$$

Feenstra (2002) estimate this structural parameter ε by using China's 1990-1995 cross-province panel data. The estimated value for ε is 2.05 and it becomes 3.31 if adjusted for the export data. θ by assumption needs to satisfy $1 < \theta < \varepsilon$. There's no sensible point estimation for it in Branstetter and Feenstra, so it's a free parameter in our investigation. I choose $\theta = 1.8$ but will experiment with other values. Branstetter and Feenstra (2002) …nd that the welfare weight a is about one half of the weight on the pro…ts of the domestic …rms based on the 1990-1995 China's provincial data. That ratio is between one-…fth and one -twelfth when the data from 1985 to 1990 is also incorporated. It means that the ratio increased by more than 2.5 to 6 times in 1990-1995 compared with the previous …ve years. This weight ratio is $\frac{1-\bar{\lambda}+\gamma\bar{\lambda}}{a}$ in our model, which implies that $a = 0.434$ if the ratio was still one half. In the past 15 years, China's market-orientated policy change has been even more dramatic and a large fraction of the state-owned enterprises have gone bankrupt or been restructured into private …rms, so it's reasonable to expect a to be much larger than 0.434 in 2004. I assume a has increased at the same speed as before so I choose $a = 1.302$ by setting the weight ratio equal to 1.5. I also experiment with other values including $a = 0.434$. 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.

The following describes the real data for the endogenous variables in the model. $n^*_{m,k} : n_h$ is the equilibrium number of foreign-invested …rms in province $k \in \{1, 2\}$ versus the domestic …rms in that province, measured by the numbers of the industrial …rms in 2004. There are two provinces in the model thus $n^*_{m,k} : n_h$ is $\frac{n_f}{2} : n_h$ if the full-FDI symmetric political equilibrium is reached and zero otherwise. λ^* is the pro…t-tax rate on the foreign-invested …rms in both provinces since the equilibrium is symmetric. According to China's tax rule, the pro…t tax rate should be 30% for general coastal open regions but 15% for special economic zones. According to Pricewaterhouse Coopers (2006) World Tax Summaries, China's corporate tax rate on foreign …rms was 33.0%. There is no precise estimation for this variable. So I use subjective judgement and take the interval (0.15, 0,20) as the more reasonable range. Tari¤ rate τ^* is 1.104 according to the Import and Export Tari¤ Rules of the People's Republic of China(2004). Labor allocations in domestic …rms versus foreign-invested …rms $l_h : l_m$ are measured using the total employment in the industrial sector in 2004. 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. $n_h\pi_h : n^*_{m,k}\pi_m$ are measured by the total pro…t ratio between domestic industrial …rms and the foreign-invested industrial …rms.

θ. Table A5 presents the results of our experiment with parameter θ. Recall we impose $\theta \in (0, \varepsilon)$ for our model.

Table A5: 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

We see that the equilibrium FDI remains unchanged with the change of θ, which suggests that the government policies toward FDI are always su¢ ciently 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 tari¤ revenue by increasing the tari¤ rate. The pro…t 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 pro…t tax rate on the multinational …rms without scaring them away. Mathematically, since $1 - \lambda^*_k - \tau^{*-\varepsilon} w^{1-\varepsilon} = 0$ holds whenever the equilibrium FDI is positive, the pro…t tax rate must change in the same direction with the tari¤ rate.

The main data sources for India are the Economic Survey data provided by India's Ministry of Finance (2006-2007), the 2003-2004 Annual Survey of Industries data provided by India's Ministry of Statistics and Program Implementation, UNCTAD, PricewaterhouseCoopers (2006) and Penn World Table version 6.2. $\gamma = 0.38$ is calculated as the central government's net tax revenue minus the customs and then divided by the total non-tari¤ 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 pro…t tax share because the direct tax is far less important than indirect tax in India's tax system as well documented in the literature. $\overline{\lambda} = 0.36$ 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 unavailable. 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 experiment with 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.

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 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 central government's goal function, which is $\frac{1-\bar{\lambda}+\gamma\bar{\lambda}}{a}$. In the real world, India's domestic 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 stated-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. When all these considerations are taken into account, it's absolutely possible that a for India is smaller than that of China although India is indeed more democratic. Given the estimate for a is unavailable for India in 2004, I will set it equal to China's value in the benchmark calibration merely for the convenience of comparison and also for highlighting the importance of the two country's difference in some other dimensions.

As mentioned in the main text, the new parameter s is introduced 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).