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Regional Investment Liberalization and FDI

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Abstract

The proliferation of regional economic integration makes an economic assessment of regional investment liberalization ever more important for policy. This paper conducts a counterfactual policy experiment to simulate the response of heterogeneous multinational firms to a regional decline in investment costs. We find that regional integration yields a welfare gain for integrating economies through the entry of new multinational firms and expansion of offshore production by incumbent multinationals. While the effects of regional integration differ significantly by individual firms, the most productive firms benefit from a variety of regional integrations through intensive-margin growth. Additionally, regional integration could significantly discourage the foreign direct investment (FDI) activity of parent firms headquartered in a country that is not participating in regional integration.

Keywords: Regional integration, Investment liberalization, FDI, Firm heterogeneity

JEL classification: F15, F21, F23

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1. Introduction

Recent decades have seen the proliferation of regional economic integration. The number of regional trade agreements (RTAs) has grown since the early 1990s, and according to the World Trade Organization (WTO), 354 RTAs were in force by January 2013. In addition to tariff reductions, the scope of recent RTAs has been extended to the protection of foreign direct investment (FDI). For instance, the North American Free Trade Agreement (NAFTA) grants a settlement mechanism for investor disputes, such as those arising from labor or environmental regulations; and American multinationals have filed over twenty claims under this scheme (Akhtar and Weiss, 2013). Such protection clauses should decrease uncertainty costs for multinationals to manage offshore production.

Legal schemes for FDI in regional integration have also been extended from investment protection to investment liberalization. For example, the Association of South East Asian Nations (ASEAN) signed the ASEAN Investment Guarantee Agreement (AIGA) in 1987 to provide a legal framework for investor protection, including adequate compensation for expropriation and an investor-state dispute settlement mechanism. In 2009, the ASEAN Comprehensive Investment Agreement (ACIA) was signed to cover provisions on national and most-favored-nation treatment. By adopting a single negative-list approach, this agreement aims to eliminate foreign-ownership restrictions in a wide range of industries within the ASEAN member countries. Thus, the level and scope of investment liberalization has expanded in the process of regional integration.

Regional investment liberalization serves to reduce investment costs for foreign investors in partner countries, but keeps these costs unchanged for those in non-partner countries. As a result, discriminatory investment liberalization could promote FDI within the integrating region, partly through production shifting, at the expense of FDI within the non-integrating region (Baldwin et al., 1999; Blomström and Kokko, 1997). With the proliferation of RTAs, it is even more important to make a quantitative assessment of these economic impacts. In this study, we seek to investigate the impact of regional investment liberalization on FDI by simulating the response of heterogeneous multinational firms to a *regional* decline in investment costs.

As regional integration is an aggregate shock that occurs in specific markets and affects individual firms, we need to link aggregate shocks with firm-level responses. To this end, we adopt a structural approach to conduct a series of counterfactual experiments in a general equilibrium framework. Specifically, we draw on our prior work in Arita and Tanaka (2013), which calibrates the firm-heterogeneity model of

Eaton, Kortum, and Kramarz (2011, EKK hereafter) to match data on Japanese multinational firms. The calibrated model enables us to examine counterfactual changes in multinational activity resulting from regional integration.

In designing policy experiments, we divide 43 sample economies into North and South according to the World Bank Income Classification. We first consider the scenarios in which Japan participates in regional integration with North (North-North) and South (North-South). In these experiments, multinationals are headquartered in the integrating region. Second, we consider policy experiments in which Japan does not participate in regional integration with other economies across North-North, North-South, and South-South. In these cases, multinationals are headquartered outside the integrating region. Comparing these experiments, we can illustrate whether the participation of a home country in regional integration affects multinational activity headquartered in that country.

We also separately examine fixed and variable costs of foreign production to shed light on the type of investment liberalization in regional integration. Arguably, investment protection reduces uncertainty associated with variable costs in offshore production, whereas investment liberalization eliminates a constraint to foreign ownership associated with fixed costs. Based on these policy experiments, we simulate counterfactual changes in multinational activity across productivity levels of parent firms at the extensive and intensive margin. Therefore, the firm-level simulation provides a rich array of analyses about FDI creation and diversion arising from economic integration.

The main results of our policy experiments can be summarized as follows. First, regional investment liberalization is likely to generate a welfare gain for integrating economies, which increases with the number of participating economies and the scope of investment liberalization. Second, regional investment liberalization tends to encourage the entry of new multinational firms and expand multinational production. However, the non-participation of a headquarters country in regional integration could discourage the FDI activity of its firms because of increased competition abroad from other integrating economies. Finally, these effects differ significantly for individual firms. In particular, the most productive firms penetrate foreign markets widely and benefit from a variety of regional integrations through the growth of foreign production at the intensive margin.

With the proliferation of RTAs, there are a growing number of related studies on the impact of RTAs on FDI. Theoretical studies such as Motta and Norman (1996), Montout and Zitouna (2005), Ranjan (2006), and Kim (2007) examine the impact of economic

integration on FDI and trade in a three-country setting. Despite some variations in assumptions, these studies demonstrate that regional integration induces firms in a non-integrated country to set up a plant in an integrated country. In addition, integrating countries are more likely than the non-integrating country to gain from FDI creation. These results are derived by relating an intra-regional reduction in *trade* costs to firm-level decisions between FDI and export in serving regional markets. In contrast, our study relates an intra-regional decline in *investment* costs to firm-level decisions regarding whether or not and how much to produce across integrating and non-integrating markets.

Empirical studies have generally shown that RTAs have a positive impact on FDI in integrating areas. Baldwin et al. (1999) is a pioneering work to simulate investment creation and diversion due to the 1989 Single Market program in the European Union (EU). They find that discriminatory liberalization causes production shifting from non-integrating to integrating regions because of a change in rental rates across regions. Consistent with the results, Barrell and Pain (1999) show that U.S. manufacturing FDI increased in the four largest EU economies after 1989. In the case of NAFTA, MacDermott (2007) shows that FDI flows to member countries increased after the signature of NAFTA. Tekin-Koru and Waldkirch (2010) further demonstrate that intra-regional FDI increased within the member countries, that is, FDI from the U.S. and Canada to Mexico increased. Moreover, Park and Park (2008) find a positive impact of RTAs on inward FDI in East Asia. While these empirical studies shed light on aggregate FDI in integrating countries, we examine whether the impact of regional integration on FDI differs across heterogeneous *firms*.

As the welfare impact of regional integration is a crucial policy question, Ranjan (2006) examines the welfare effects of RTAs in a three-country setting with horizontal multinational activity.[1] The study finds that welfare improves in an integrated area; furthermore, a non-integrated area can also gain from RTAs when horizontal FDI prevails in equilibrium. In contrast, we quantify the welfare effects by a real wage change across countries. With a variety of policy experiments, we can shed light on the welfare impact of different types of regional integration on integrating and non-integrating countries.

It must be mentioned that we focus on firm-level decisions of whether or not to engage in foreign production, thereby leaving out other important aspects of economic

[1] Egger et al. (2007) do not explicitly focus on regional liberalization, but present a comprehensive welfare analysis of trade and investment liberalization in the two-country model with knowledge capital by Markusen (2002).

integration. Specifically, we do not consider the effects of market expansion and a decline in intra-regional trade costs within the integrating region.[2] These effects should affect export-platform FDI originating from the non-integrating region, because multinational firms have an incentive to locate a production plant in the low-cost integrated market and export to other integrating markets (Motta and Norman, 1996). While complex FDI strategies have been theoretically examined by prior studies such as Ekholm et al. (2007), Grossman et al. (2006), and Yeaple (2003), the impact of regional integration on complex FDI strategies is empirically investigated by Baltagi et al. (2008) using a spatial econometric approach. Regarding market expansion effects, Altomonte (2007) and Chen (2009) show that regional integration enhances the market potential of participating economies, thereby attracting more FDI from a non-participating country.

The rest of this paper is organized as follows. Section 2 summarizes our methodological framework for conducting a counterfactual analysis. Section 3 describes the setup of policy experiments in which regional barriers in direct investment are reduced. In Section 4, we present the benchmark results of regional integration across policy experiments. In Section 5, we discuss the results of policy experiments that distinguish variable and fixed costs in regional integration. In Section 6, we conclude.

2. **Theoretical Framework**

This section presents the theoretical framework for counterfactual experiments. We discuss the key elements of the framework that closely follows EKK (2011) here and provide a summary of the methodological framework in Appendix A.[3]

Based on the EKK model of heterogeneous firms in international trade, we allow firms to serve foreign markets solely via local production, that is, horizontal FDI. By excluding the role of trade, we preclude a variety of alternative choices for firms in serving abroad.[4] However, this simplification enables us to avoid complex firm-level decisions and to focus on the choice between home and foreign production.

The EKK model is based on the monopolistic competition framework. Goods are differentiated and a single firm produces a unique good j with efficiency $z_i(j)$. There are N countries that have a continuum of potential producers. A firm in home country i

[2] While prior work such as Kitwiwattanachai et al. (2010) often adopts a computable general equilibrium model to analyze the impact of RTAs in a wide range of industries, we focus on the manufacturing sector.

[3] See further details of the methodology in Arita and Tanaka (2013).

[4] As multinational firms may engage in exports, Irarrazabal et al. (2013) consider intra-firm trade between parents and their foreign affiliates, whereas Tintelnot (2012) examines exports of foreign affiliates.

that invests and produces in host country *n* will incur unit costs as follows:

$$c_{ni}(j) = \frac{w_n d_{ni}}{z_i(j)}, \tag{1}$$

where w_n is the factor cost in country *n* and d_{ni} is an iceberg form of efficiency loss, such as the management costs incurred by local plants in implementing production technology abroad. A firm incurs no additional cost in implementing its production technology at home. Since each firm receives a random productivity draw from a Pareto distribution, a measure of potential producers with efficiency of at least z is as follows:

$$\mu_i^Z(Z \geq z) = T_i z^{-\theta}, \quad z > 0, \tag{2}$$

where T_i is the average level of efficiency in country *i*. The parameter θ is a distribution parameter of firm productivities for $\theta > 0$.

Each country has the standard CES (constant elasticity of substitution) preferences over differentiated goods with the elasticity of substitution between any two goods given by $\sigma > 1$. We obtain the following demand function:

$$X_n(j) = \alpha_n(j) \left(\frac{p_n(j)}{P_n}\right)^{-(\sigma-1)} X_n, \tag{3}$$

where $X_n(j)$ is the sales by firm *j* in country *n*, X_n is the aggregate demand for manufacturing varieties, and P_n is the CES price index. We assume that $\theta - 1 > \sigma$. $\alpha_n(j)$ is an unobservable demand shock for firm *j* selling in country *n*. A firm *j* enters market *n* by paying a fixed cost to establish a production plant as follows:

$$E_{ni}(j) = E_{ni}\varepsilon_n(j), \tag{4}$$

where E_{ni} is the general fixed cost, such as administrative setup costs, that is constant for all firms. $\varepsilon_n(j)$ is an idiosyncratic fixed cost specific to firm *j* entering market *n*. In this setting, firm *j* from country *i* will generate the following net profits in market *n*:

$$\pi_{ni}(j) = \left(1 - \frac{c_{ni}(j)}{p_n(j)}\right) \alpha_n(j) \left(\frac{p_n(j)}{P_n}\right)^{-(\sigma-1)} X_n - E_{ni}\varepsilon_n(j). \tag{5}$$

With monopolistic competition and Dixit-Stiglitz preferences, each firm maximizes its profit by charging a constant markup $\bar{m} = \sigma/(\sigma - 1)$ over its unit cost $c_{ni}(j)$ such that $p_n(j) = \bar{m}c_{ni}(j)$. Its total gross profit is proportional to demand with a factor of $1/\sigma$, yielding $X_n(j)/\sigma$. Thus, firm *j* will enter market *n* if and only if its operating profit is sufficient to overcome the fixed entry cost as follows:

$$\eta_n(j) \left(\frac{p_n(j)}{P_n}\right)^{-(\sigma-1)} \frac{X_n}{\sigma} \geq E_{ni}, \tag{6}$$

where $\eta_n(j) = \alpha_n(j)/\varepsilon_n(j)$ is an entry shock to firm *j* that invests in market *n*.

From equation (6), the entry hurdle condition shows that firm *j* in country *i* enters the market if and only if its unit cost is less than the threshold entry cost as follows:

$$c_{ni}(j) \leq \bar{c}_{ni}(j), \tag{7}$$

where

$$\bar{c}_{ni}(j) = \left(\eta_n(j)\frac{X_n}{\sigma E_{ni}}\right)^{1/(\sigma-1)}\frac{P_n}{\bar{m}}. \tag{8}$$

A lower value of $\bar{c}_{ni}(j)$ indicates a less attractive market for multinational production. Substituting the constant markup price and equation (8) into equation (3), we express the latent sales conditional on entry as follows:

$$X_{ni}(j) = \frac{\alpha_n(j)}{\eta_n(j)}\,\sigma E_{ni}\left(\frac{\bar{c}_{ni}(j)}{c_n(j)}\right)^{\sigma-1} \tag{9}$$

Conditional on entry, equation (9) dictates the volume of sales by firms in that market. Equations (7), (8), and (9) provide the main predictions about the structure of heterogeneous multinational firms. That is, firms with high productivity are more likely than those with low productivity to (i) invest in a larger number of markets, (ii) penetrate the less attractive markets, and (iii) yield larger sales per market.

To conduct counterfactuals, we modify the general equilibrium in EKK (2011) to set up the model in which producers serve their home country through domestic production and foreign countries through FDI. The general equilibrium is set up such that production and consumption across countries are connected through FDI activity. Equilibrium in the world market for manufacturers leads to a system of equations that can be solved for changes in wages and prices resulting from an exogenous change in variable and fixed FDI costs. We calculate welfare changes as measured by real wages because of adjustments in aggregate prices and wages.

When a host market reduces FDI costs for other markets, it would lead to an increase in FDI inflows to the host market from other markets that have a higher average level of technology. More productive multinationals engage in domestic production and average price levels decline through better access to cheaper goods. Moreover, an increase in inward FDI would also lead to an increase in demand for manufactured goods. As manufacturing uses labor in the host market, the increased demand for labor should increase nominal wages. Therefore, falling price and rising wage levels could together lead to welfare gains in the host market, as measured by an increase in real wages.

3. Policy Experiments

We design a variety of policy experiments to assess the impact of regional investment liberalization on FDI. Our sample consists of 43 economies, including the rest of the world. To distinguish regional integration, we classify the sample economies

as North or South according to the World Bank Income Classification.[5] Thus, there are 22 North and 21 South economies. This allows us to examine different combinations of economies in regional integration, that is, North-North, North-South, and South-South. The differences in income levels are crucial for our examination—a higher level of outward FDI in North as compared to South may generate varying effects through income effects across policy experiments.

We consider experiments in which a headquarters country participates in regional integration and does not participate. Specifically, Japan is the headquarters country for our firm-level dataset on Japanese multinational firms; we simulate a baseline dataset to reproduce their multinational activity. Japan's participation in economic integration should have a substantial implication for FDI decisions by Japanese multinational firms. When Japan participates in regional integration with other economies, Japanese firms would benefit from a lower barrier to offshore production within the integrating economies. In contrast, when Japan does not participate in regional integration that occurs between other economies, Japanese multinationals would not enjoy a lower investment barrier, but face increased competition in the integrating economies because of the increase in FDI activity among these economies. In this scenario, a decline in outward FDI should decrease profits earned by Japanese multinationals in foreign markets, leading to a decrease in profit repatriation to Japan. Regional integration in the other areas would eventually affect the Japanese market through income effects. Thus, the participation or non-participation of a headquarters country in regional integration could lead to strikingly different outcomes for Japanese firms engaging in foreign production.

With our sample economies in North and South, Policy 1 is the case in which Japan is integrated with North and South. In this experiment, bilateral FDI barriers are reduced uniformly among all the integrating economies. Policy 2 is that Japan is integrated with the North economies, but not with the South economies. Policy 3 is that Japan integrates with the South economies, but the North economies do not participate in this integration. Furthermore, we also design three policy experiments without Japan's participation in regional integration. In Policy 4, Japan does not integrate with the North or South economies. Policy 5 is that the North economies are integrated, but Japan and the South economies do not participate in this integration. Policy 6 is that the South economies are integrated, but Japan and the North economies do not participate.

These policy experiments assume that participating economies agree to a bilateral reduction in both fixed and variable costs of offshore production for multinationals

[5] The sample economies are listed in Appendix B.

among integrating markets. To extend the analysis, we consider the policy experiments in which either fixed or variable costs are reduced. These experiments are motivated by the fact that the scope of investment liberalization in regional integration is not uniform across recent RTAs. As seen in the recent integration processes in ASEAN, investment liberalization at an early stage of integration tends to focus on protection of foreign investors from government's expropriation and gradually shifts to the elimination of foreign-ownership restrictions in a wide range of industries. In other words, the policy focus has shifted from ex post investment barriers to ex ante investment restraints.

Although it is challenging to estimate the impact of these different aspects on actual investment costs, it should be informative to distinguish between fixed and variable costs of FDI activity. Specifically, we associate investment protection with a reduction in variable costs, because such protection should mitigate uncertainty in managing offshore production; this reduces variable costs of FDI activity. On the other hand, foreign-ownership restrictions raise an entry barrier for foreign investors, so that eliminating such restrictions can be associated with a decline in fixed costs to establish a foreign plant.

From Policy 1 through Policy 6, we assume a bilateral reduction in both fixed and variable costs by 20%. In order to examine the differences in FDI barriers, we assume a bilateral decline in either fixed or variable costs by 20% for the rest of the policy experiments with Japan's participation in integration. This extension gives us six policy experiments. In sum, we conduct 12 policy experiments that are summarized in Table 1.

---Table 1---

4. Benchmark Results

This section presents the benchmark results from Policy 1 through Policy 6 to highlight the key implications of various policy experiments. We discuss the welfare effects of regional integration, and then explain the aggregate and firm-level effects on multinational activity.

4.1. Welfare effects

Figure 1 shows welfare effects as measured by a change in real wages in each market after regional integration. Panel A presents a boxplot of real wage changes in the North and South economies, whereas Panel B shows real wage changes in the home country of hypothetical multinationals, that is, Japan. In Policy 1, Japan integrates with both North and South economies and real wages tend to increase in both regions. In this

experiment, a reduction in investment costs induces an entry of foreign firms to the North and South economies in varying degrees. Offshore production by multinationals generates a greater demand for local labor, thereby causing an upward pressure on nominal wages in the host markets. Moreover, domestic production is replaced by foreign firms originating from the high-technology country, thereby generating a downward pressure on nominal prices in the host markets. These forces combine to increase real wages in the host markets.

---Figure 1---

In Policy 2, Japan integrates with the North economies. A lower FDI barrier in North leads to an increase in real wages across these economies, but yields little influence on welfare in South. On the other hand, when Japan integrates with the South economies in Policy 3, real wages across these economies also increase, but welfare gains are relatively smaller for South than North. These distinctive results highlight the fact that bilateral outward FDI between North economies is substantially larger than that between South economies, leading to a higher welfare impact of regional investment liberalization in North-North integration.

From Policy 4 through Policy 6, Japan does not participate in regional integration. The welfare effects in North and South are similar to the corresponding experiments in Policies 1–3, with slightly more variable effects across economies in Policies 4 and 5. In sum, welfare gains are likely to occur for both North and South when these economies reduce bilateral investment costs. Comparing North-North and South-South integrations, the large presence of outward FDI in North yields a larger welfare gain for those economies.

Regarding the welfare effects in Japan, there is no substantial change in real wages for Policies 1–3. These results are in stark contrast with the large welfare gains for North and South economies through regional integration. A plausible reason is the relatively low level of inward FDI in Japan that would lead to a relatively small increase in foreign investment after integration. Thus, regional integration may have weak effects on increasing nominal wages and decreasing nominal prices in Japan. Furthermore, an increase in outward FDI from Japan expands profit repatriation from abroad, which could push up the nominal price through greater demand at home. These effects should combine to yield little change in real wages.

Under Policy 4, Japan does not participate in regional integration with North and South economies. In this case, the real wage in Japan declines significantly. However,

the results in Policies 5 and 6 indicate little change in real wages in the country, implying that Japan's participation is not the only explanation. The key feature in Policy 4 is that only Japan is left out from the comprehensive integration among the North and South economies, which is likely to encourage outward FDI from North to South. As a result, Japanese multinationals would face intense competition in the South, thereby leading to a substantial contraction of their offshore production. As Japanese multinationals decrease their foreign production, profits remitted from abroad also decline. Thus, through income effects, real wages may drop significantly in the headquarters country, that is, Japan.

4.2. Aggregate effects on multinational activity

We turn to examine the aggregate impact of regional integration on Japanese firms. In Figure 2, Panel A shows the entry of Japanese firms, whereas Panel B presents their production. The boxplot shows percentage changes of these variables across North and South economies.

---Figure 2---

In Policy 1, a reduction of investment barriers in both North and South encourages the entry of Japanese firms into these economies. While the entry of Japanese firms to the North economies is promoted by Japan-North integration in Policy 2, the entry to the South economies is encouraged by Japan-South integration in Policy 3. In contrast, the entry of Japanese firms declines when Japan does not participate in regional integration. It should be emphasized that the negative impact is more pronounced in Policy 5 than in Policy 6. That is, North-North integration discourages the entry of Japanese firms more effectively than South-South integration does. This difference is likely due to the large presence of outward FDI from the North economies.

Panel B shows the results for multinational production across policy experiments. In Policy 1, Japanese firms expand their offshore production in both North and South. Whereas offshore production by Japanese multinationals increases significantly in North economies for Policy 2, it increases substantially in South for Policy 3. When Japan does not join North-South integration in Policy 4, production by Japanese firms decreases in the majority of foreign economies, but increases in some North economies. Without Japan's participation, Japanese firms also increase their offshore production in North economies in Policy 5. These results are in stark contrast with a decline in the entry of Japanese firms. A possible explanation is that North-North integration promotes

intra-regional FDI activity substantially and generates sizeable profit repatriation among North economies. Because repatriated profits are spent on production at home, this income effect may encourage offshore production of Japanese firms.

Finally, Policy 6 shows that South-South integration has little impact on the overseas production of Japanese firms, implying that the low level of outward FDI from South would yield small income effects through a change in intra-regional FDI activity. Comparing Policy 5 and Policy 6, we can say that regional integration in other economies has a varying impact on the offshore production of Japanese firms, possibly through income effects generated by an increase in intra-regional FDI among integrating markets.

4.3. Firm-level effects on multinational activity

This section discusses the influence of regional integration on multinational activity at the firm level. Before proceeding to discuss the counterfactual results, we show the baseline results in Table 2. Given a set of new firm-specific shocks and the estimated structural parameters, we simulate a set of hypothetical firms to match the data on Japanese manufacturing firms in 2006. To highlight the role of firm heterogeneity, the hypothetical firms are aggregated according to productivity percentiles. As is predicted by theory, the number of multinational firms increases with firm-level productivity. In total, there are 1,734 multinationals. No multinationals belong to the bottom 10% group whereas 937 multinationals do to the top 10% group. As all the firms in the top 1% invest abroad, the top 10% group accounts for 54% of multinational firms. In terms of average production at home and abroad, more productive firms are more likely than less productive firms to generate larger production in both domestic and foreign markets. The average production in the top 1% is especially large. Overall, these features of the baseline results highlight the crucial role of firm heterogeneity in analyzing the impact of regional investment liberalization on FDI activity.

---Table 2---

Table 3 presents the results for the extensive margin of multinational activity for Policies 1–6. When Japan integrates with North and South in Policy 1, firms across productivity levels start to enter foreign markets. We observe no counterfactual percentage change for the top 1% firms, because all the firms in this group have already invested abroad. As the baseline number of multinationals is smaller in the lower productivity group, the percentage increase at the extensive margin is larger for less

productive firms. These results can also be observed in Policies 2 and 3, highlighting the FDI creation effects of regional integration at the extensive margin. Comparing the results between Policies 2 and 3, we find that Japan-South integration increases the extensive margin of multinational activity more significantly than Japan-North integration. The reason is that entry barriers in South are relatively smaller than in North, which magnifies the positive effects of regional integration on the foreign entry of firms.

---Table 3---

When Japan does not participate in North-South integration in Policy 4, there is a negative impact on the foreign entry of firms. In particular, increased competition abroad resulting from regional integration has a disproportionately large impact on less productive firms. On the other hand, there is no impact on the entry of multinationals in the top 1%. Despite the increased competition, the most productive firms appear to overcome the entry hurdle, at least in some foreign economies. These results are also observed in Policies 5 and 6, suggesting that the exclusion of a headquarters country from regional integration results in FDI diversion effects at the extensive margin.

Table 4 presents the results for the intensive margin of multinational activity. In Policy 1, there is an increase in firms' average offshore production across productivity levels. The positive impact appears to be more pronounced for less productive firms, but the firm-level effects are not always clear-cut for different levels of demand shocks across productivity groups. However, it must be emphasized that the absolute level of average production is substantially larger for firms with high productivity, implying that similar percentage changes could translate into a sizeable increase in offshore production for more productive firms. In Policies 2 and 3, the percentage change in average production seems to be relatively large for less productive firms. Comparing Japan-North and Japan-South integrations, the former experiment yields a larger impact on average offshore production. The difference should be mainly because North economies have a larger market size than South economies, thereby yielding larger demand effects for multinational production.

---Table 4---

Finally, we discuss the results of the scenarios where Japan does not participate in integration. In contrast with the extensive margin, increased competition abroad does

not necessarily decrease the intensive margin of multinational production across individual firms. In fact, there is an increase in the intensive margin for some productivity groups under Policies 4–6. While regional integration in other economies does not necessarily decrease average offshore production, the top 1% firms increase their intensive margin across these experiments. In particular, North-North integration contributes to expanding their production levels more significantly than South-South integration. The most productive firms would face intensified competition in foreign markets, but they also benefit from income effects among integrating economies that are a result of growing intra-regional FDI activity. Thus, their intensive margin could increase in these experiments.

5. The Type of Regional Investment Liberalization

We proceed to examine the question of whether the type of regional investment liberalization affects the relationship between regional integration and multinational activity. Specifically, we associate investment protection with a reduction in variable FDI costs and investment liberalization with a decline in fixed FDI costs. Thus, this section aims to examine the varying effects of fixed and variable costs in regional integration. We focus on the key results of the experiments conducted for Policies 7–12.

Figure 3 presents a boxplot of real wage changes in North and South economies. Under Policies 7 and 8, Japan integrates with both North and South. A key distinction is that fixed costs of offshore production decline in Policy 7, whereas variable costs drop in Policy 8. As is evident from the boxplots, real wages tend to increase more prominently in Policy 8. These differences can also be observed in other policy experiments. In Policies 9 and 10, Japan integrates with North. A reduction in variable costs of FDI activity in Policy 10 produces larger welfare gains than that in fixed costs in Policy 9. Additionally, regional integration of Japan with South yields a greater increase in South economies in Policy 12 than it does in Policy 11.

---Figure 3---

Why are welfare gains likely to be greater for a regional decline in variable FDI costs? To shed light on this issue, we need to look at the response of multinational activity to fixed and variable costs. Figure 4 presents the aggregate effects on multinational activity in North and South for Policies 7–12. Panel A shows a boxplot of percentage changes in the entry of Japanese firms to North and South economies. Consistent with the results in Policy 1, Policies 7 and 8 show that the entry of Japanese

firms increases in integrating economies, with a pronounced impact in South economies. In Policies 9 and 10, a reduction in fixed costs appears to have a larger positive impact than that in variable costs on entry in the North. In Policies 11 and 12, a reduction in variable costs seems to yield a greater positive impact than that in variable costs on entry in the South. Nevertheless, the difference between fixed and variable costs is not necessarily remarkable in terms of the entry of multinational firms.

---Figure 4---

Panel B presents a boxplot of percentage changes in the local production of Japanese firms in North and South. Comparing the results between Policies 7 and 8, we find that a reduction in variable costs yields a significantly larger impact on multinational production. These patterns are also observed in other policy experiments. The positive impact on offshore production in North is substantially larger in Policy 10 than in Policy 9. Furthermore, the offshore production in South increases more prominently in Policy 12 than in Policy 11. Comparing Japan-North integration with Japan-South integration, we find that the positive impact of falling variable costs tends to be larger in the former case.

In sum, these results suggest that a reduction in variable costs has a pronounced impact on the local production of multinational firms, but does not necessarily produce a remarkable impact on the entry of multinational firms. These differences should lead to a substantial expansion along the intensive margin of multinational activity, rather than at the extensive margin. As a result, the intensive-margin growth through regional integration is translated into larger welfare gains in integrating economies.

Given the difficulty in sorting out the differences between fixed and variable barriers, what can we learn from the findings? While we may construe different types of liberalization as either a reduction in fixed or variable costs, in practice, a specific type of liberalization is likely manifested as a reduction in both types of barriers. Even though it is beyond the scope of this paper to quantitatively identify the distinction between these types of barriers, we point out that more research is needed to investigate an impact of policy reforms on the level of investment barriers. If investment liberalization leads to a larger reduction in fixed costs in terms of foreign-ownership restrictions and other entry regulations, we expect that the policy primarily benefits small- and medium-sized firms that are at the tipping point of engaging in multinational activity. Alternatively, if investment liberalization is tailored to improve protection for incumbent firms, only the largest multinationals might be the beneficiaries. As our

findings show, the different policy instruments entail different implications for welfare gains from regional investment liberalization.

6. Conclusion

Regional economic integration has proliferated in recent decades. Together with tariff reductions, investment protection and liberalization have been widely negotiated among participating members. This study conducts a variety of policy experiments to investigate the relationship between regional investment liberalization and FDI activity. To conduct a counterfactual analysis, we employ the calibrated model of firm heterogeneity and examine firm-level decisions between domestic and foreign production in response to a regional decline in investment costs. The policy experiments show that regional investment liberalization tends to generate welfare gains for integrating economies through an expansion of multinational activity among integrating regions. In particular, the most productive firms seize the economic opportunity to expand their foreign production.

Our simulation results provide some policy implications for regional investment liberalization. First, the welfare impact of regional integration tends to increase with the number of integrating economies. Second, the participation of North economies contributes to a larger welfare gain through an increase in intra-regional FDI activity. Third, welfare gains from regional integration tend to increase when the scope of investment liberalization includes fixed and variable costs of multinational production. In particular, an elimination of policy barriers to local production by firms is likely to generate a greater welfare gain for host markets through intensive-margin growth.

Finally, we mention some areas for future research. We aim to demonstrate the varying effects of various policy experiments, but we have not analyzed specific types of RTAs. The reason is the lack of a reliable dataset to describe the impact of regional investment liberalization on variable and fixed costs of FDI activity. A reliable estimate of such relationships is crucial for investigating the plausible magnitude of the impact of RTAs. Moreover, there is a need to extend our model to incorporate the simultaneous effects of a decrease in both trade and investment barriers on multinational production at the firm level.

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Table 1. A Summary of Policy Experiments for Regional Integration

Policy No.	Japan's Participation	Integrating Members		Policy Change in Bilateral FDI Costs	
		North	South	Fixed Cost	Variable Cost
Policy 1	Yes	Yes	Yes	20% decline	20% decline
Policy 2	Yes	Yes	No	20% decline	20% decline
Policy 3	Yes	No	Yes	20% decline	20% decline
Policy 4	No	Yes	Yes	20% decline	20% decline
Policy 5	No	Yes	No	20% decline	20% decline
Policy 6	No	No	Yes	20% decline	20% decline
Policy 7	Yes	Yes	Yes	20% decline	Constant
Policy 8	Yes	Yes	Yes	Constant	20% decline
Policy 9	Yes	Yes	No	20% decline	Constant
Policy 10	Yes	Yes	No	Constant	20% decline
Policy 11	Yes	No	Yes	20% decline	Constant
Policy 12	Yes	No	Yes	Constant	20% decline

Table 2. Baseline Results

Initial Productivity Group (percentile)	Number of Domestic Firms	Number of Multinationals	Number of All Firms	Domestic Production per Domestic Firm	Foreign Production per Multinational	Total Production per Firm
0-10	1,318	0	1,318	12.2	-	12.2
10-20	1,307	11	1,318	13.9	0.6	13.8
20-30	1,303	15	1,318	15.6	0.9	15.4
30-40	1,290	28	1,318	16.6	0.7	16.3
40-50	1,284	33	1,317	21.4	0.9	20.9
50-60	1,247	71	1,318	24.8	1.3	23.6
60-70	1,210	107	1,317	31.6	1.7	29.2
70-80	1,146	171	1,317	32.9	2.9	29.0
80-90	957	360	1,317	54.7	5.7	41.3
90-99	380	806	1,186	275.6	38.2	114.3
99-100	0	131	131	-	586.5	956.8
All	11,441	1,734	13,174	36.4	63.8	40.0

Note: Production is measured in billions of Yen.

Table 3. Results for Extensive Margin of Multinational Firms

Initial Productivity	Counterfactual change from baseline (%)					
Group (percentile)	Policy 1	Policy 2	Policy 3	Policy 4	Policy 5	Policy 6
0-10	.	.	.	.	.	.
10-20	240.0	33.3	262.5	-50.0	-11.8	-11.1
20-30	185.7	56.5	236.7	-33.3	-4.0	-7.7
30-40	242.4	81.3	275.0	-39.1	-5.6	-5.9
40-50	190.9	50.0	208.3	-41.2	-13.3	-5.0
50-60	136.6	36.4	202.9	-31.3	-5.4	-1.7
60-70	120.6	37.6	143.9	-34.1	-6.7	-6.5
70-80	121.1	27.2	126.9	-34.3	-4.8	-4.8
80-90	78.6	34.6	91.8	-22.8	-4.8	-2.1
90-99	20.2	14.6	20.6	-9.0	-1.8	-1.5
99-100	0.0	0.0	0.0	0.0	0.0	0.0
All	61.5	23.4	71.5	-18.0	-3.2	-2.3

Table 4. Results for Intensive Margin of Multinational Firms

Initial Productivity	Counterfactual change from baseline (%)					
Group (percentile)	Policy 1	Policy 2	Policy 3	Policy 4	Policy 5	Policy 6
0-10	.	.	.	.	.	.
10-20	55.0	133.9	5.1	67.5	5.0	-14.9
20-30	135.4	163.0	138.7	11.6	-6.6	-8.4
30-40	242.1	51.8	57.4	-19.5	0.2	-10.0
40-50	129.3	150.8	109.2	-14.0	1.6	-2.5
50-60	106.5	190.2	30.4	23.2	-11.0	-13.0
60-70	150.6	111.6	20.0	18.4	-2.2	-4.3
70-80	95.5	93.0	47.1	10.7	-2.3	-1.9
80-90	106.1	80.4	46.3	20.4	-4.4	-5.0
90-99	98.5	55.4	30.5	12.8	-2.7	-2.1
99-100	67.2	51.2	21.2	17.7	7.5	0.8
All	19.7	28.9	-20.3	38.7	6.6	1.7

Figure 1. Real Wage Changes

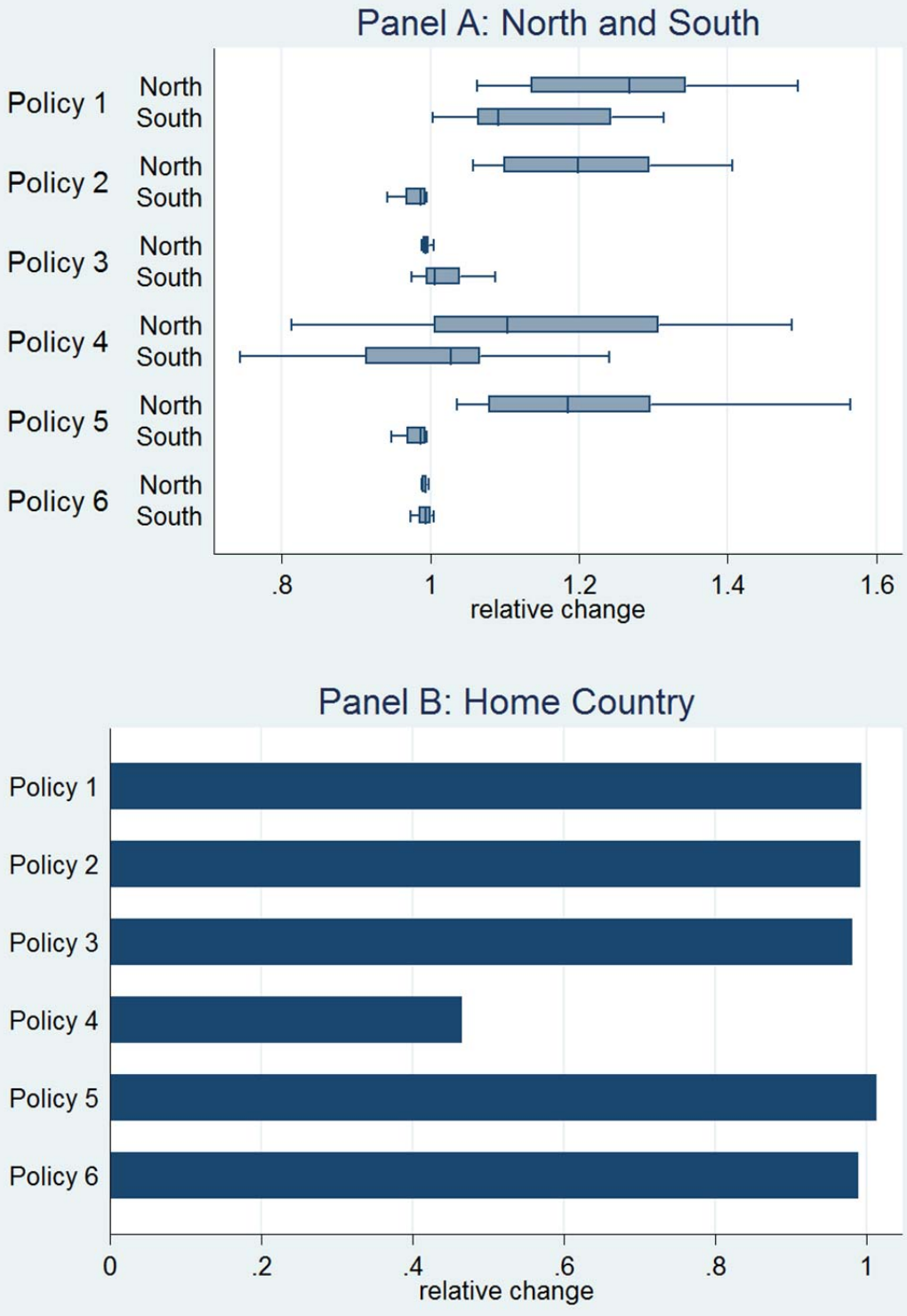
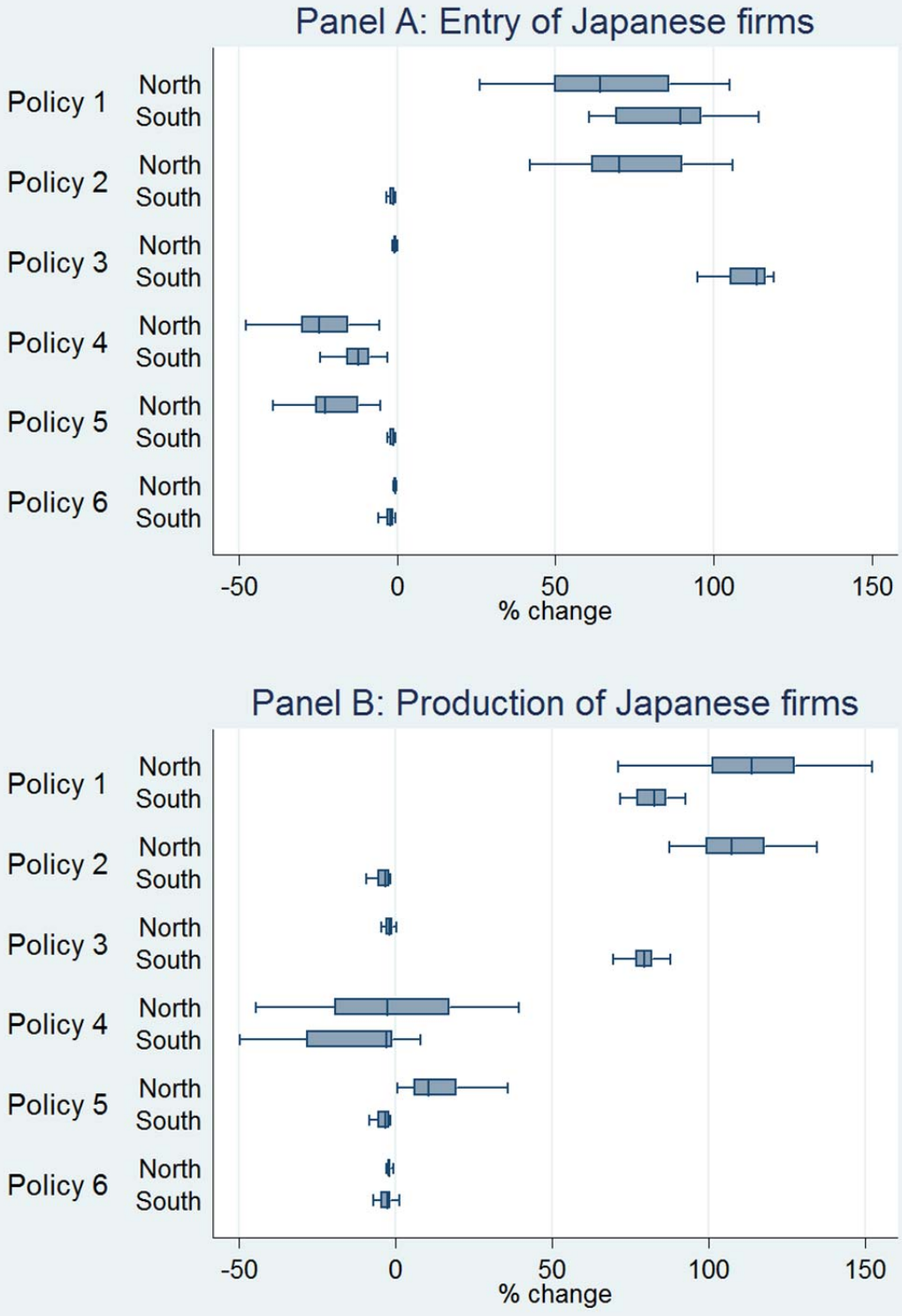


Figure 2. Aggregate Impacts in North and South



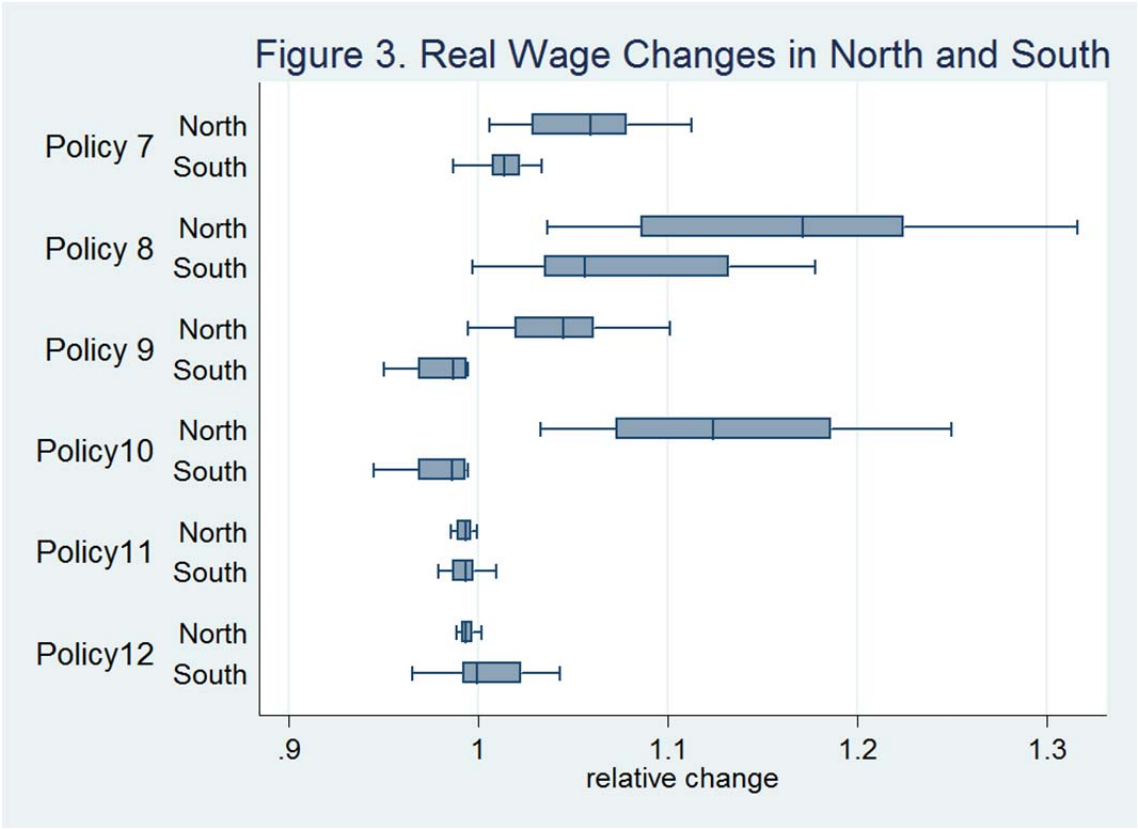
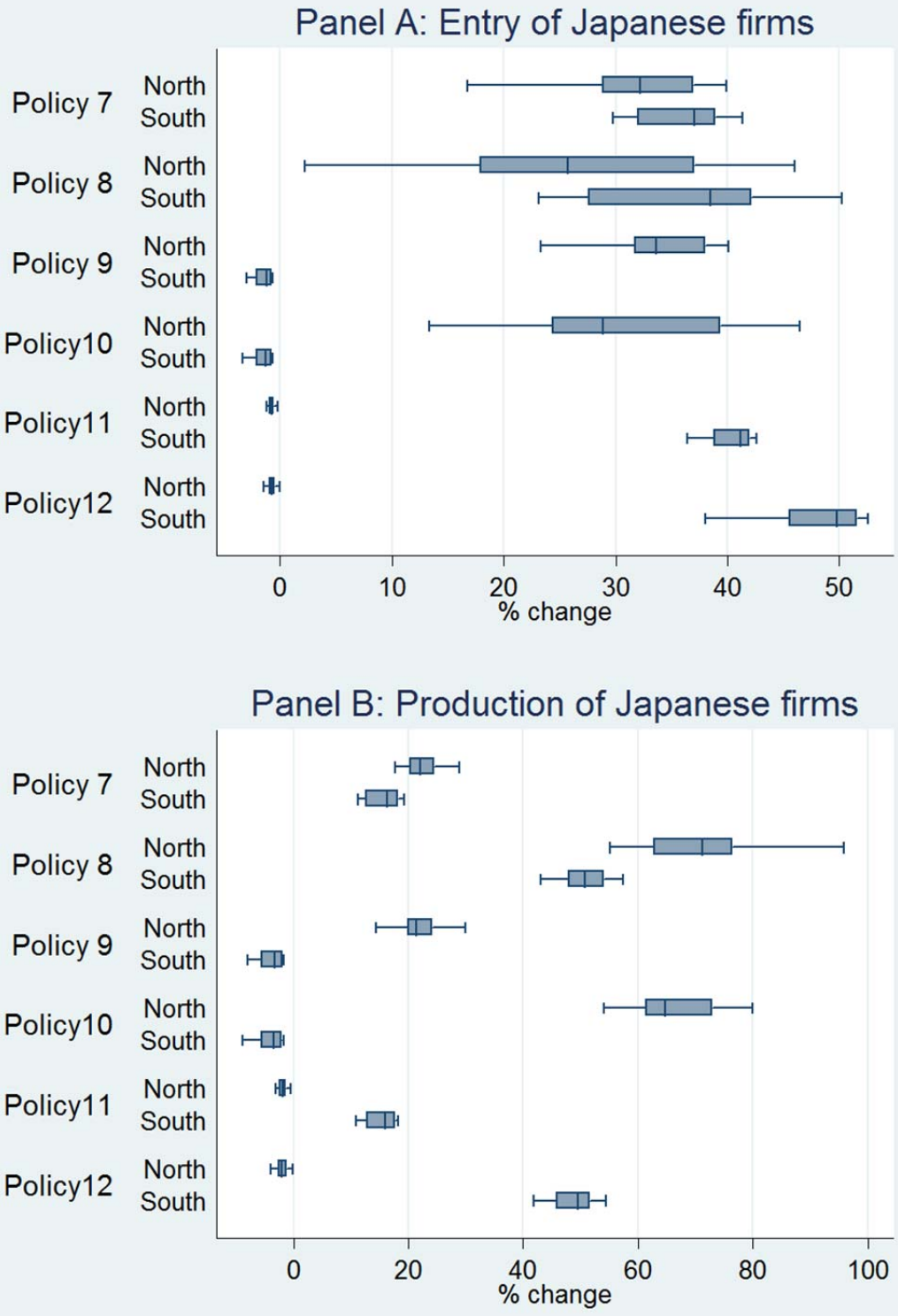


Figure 3. Real Wage Changes in North and South
Policy 7
North
South
Policy 8
North
South
Policy 9
North
South
Policy10
North
South
Policy11
North
South
Policy12
North
South
.9
1
1.1
1.2
1.3
relative change

Figure 4. Aggregate Impacts in North and South



Appendix A

A1. Calibration

To calibrate the model, the entry and sales conditions are re-specified. To isolate the heterogeneous component of unit costs, we define standardized unit costs as follows:

$$u(j) = T_i z_i(j)^{-\theta}. \tag{A1}$$

By connecting the country-level parameters in equation (8) with the total number of firm entries N_{ni}, we express the entry hurdle as follows:

$$u(j) \leq \bar{u}_{ni}\big(\eta_n(j)\big) = N_{ni}{\kappa_2}^{-1}\eta_n(j)^{\tilde{\theta}}, \tag{A2}$$

where $\tilde{\theta} = \theta/(\sigma-1) > 1$ and $\kappa_2 = \int \eta^{\tilde{\theta}}\, g_2(\eta)d\eta$. $\bar{u}_{ni}(\cdot)$ is a standardized entry hurdle in market *n* for potential producer *j* in country *i*. $\tilde{\theta}$ is the heterogeneity in observed sales, with a lower value indicating a larger dispersion in sales across firms. Conditional on entry, the sales condition for firm *j* in market *n* is rewritten as

$$X_{ni}(j) = \frac{\alpha_n(j)}{\eta_n(j)}\bar{\mathrm{X}}_{ni}\frac{\kappa_2}{\kappa_1}\big(\upsilon_{ni}(j)\big)^{-1/\tilde{\theta}}, \tag{A3}$$

where $\bar{\mathrm{X}}_{ni}$ is the average sales in market *n* of foreign affiliates by multinationals from country *i*, $\kappa_0 = \tilde{\theta}/\big(\tilde{\theta}-1\big)$, and $\kappa_1 = \kappa_0 \iint \alpha_n(j)\eta_n(j)^{(\tilde{\theta}-1)}\, g(\alpha,\eta)d\alpha d$. We assume that the parameter $\upsilon_{ni}(j) = u(j)/\bar{u}_{ni}\big(\eta_n(j)\big)$ follows a uniform distribution on $[0,1]$.

To parameterize κ_1 and κ_2, $g(\alpha,\eta)$ is assumed to be joint lognormal with zero means, variances (σ_α and σ_η), and correlation ρ. Thus, we can express κ_1 and κ_2 as follows:

$$\kappa_1 = \left[\frac{\tilde{\theta}}{\tilde{\theta}-1}\right] exp\left[\frac{\sigma_\alpha + 2\rho\sigma_\alpha\sigma_\eta(\tilde{\theta}-1) + \sigma_\eta(\tilde{\theta}-1)^2}{2}\right], \tag{A4}$$

$$\kappa_2 = exp\left[\frac{(\tilde{\theta}\sigma_\eta)^2}{2}\right]. \tag{A5}$$

Taken together, the entry and sales conditions are governed by four structural parameters: heterogeneity in observed sales $\tilde{\theta}$, variance in sales σ_α, variance in entry shocks σ_η, and their correlation ρ. We denote the set of these structural parameters as

$$\Theta = (\tilde{\theta}, \sigma_\alpha, \sigma_\eta, \rho)$$

We estimate a set of optimal structural parameters by calibrating the model to match firm-level data in Japan. Specifically, we use microdata pertaining to the Basic Survey of Japanese Business Structure and Activities conducted by the Japanese Ministry of Economy, Trade, and Industry (METI), which covers all business firms with 50 employees or more and capital of 30 million yen or more. To link foreign affiliate sales with Japanese parent firms, we use microdata pertaining to the Survey of Overseas Business Activities conducted by METI, which covers the multinational parent firms

that are headquartered in Japan and own at least one foreign business enterprise. For calibration, we primarily use the sample on manufacturing multinational firms in 2006, which consists of 2,032 parent firms with 7,626 foreign affiliates. However, the figures for domestic sales are missing for some parent firms, making it difficult to measure a linkage between domestic and foreign sales for them. After excluding these firms, we have 1,656 parent firms in the sample.

We employ the simulated method of moments for estimation. In the first step, we use the entry and sales conditions in equations (A2) and (A3) to simulate an artificial producer *s* by generating its efficiency draw $u(s)$, sales shock $\alpha_n(s)$, and entry shock $\eta_n(s)$. With an initial guess for the structural parameters and aggregate data on Japanese multinationals, we produce a dataset of hypothetical firms, including the market entry and affiliate sales across markets. Second, we construct a set of moment conditions from simulated multinationals and actual Japanese multinationals. We define a vector of deviations between actual and hypothetical moments for outcome *k*:

$$y(\Theta) = m^k - \hat{m}^k(\Theta). \tag{A6}$$

Following the theoretical implications, we choose four moment conditions: pecking order strings, affiliate sales distributions across markets, parent sales distribution in Japan, and multinational production intensity. Stacking a vector of moment conditions, we minimize the objective function with respect to the structural parameters as follows:

$$\widehat{\Theta} = \arg\min_{\Theta}\{[m^k - \hat{m}^k(\Theta)]' \ [m^k - \hat{m}^k(\Theta)]\}. \tag{A7}$$

To mitigate the influence of noisier segments of the data, we exclude markets with less than 10 foreign affiliates from the estimation. The best fit is obtained for the following structural parameters with bootstrapped standard errors in parenthesis:

$\tilde{\theta}$	σ_a	σ_η	ρ
1.99	1.64	0.39	-0.62
(0.43)	(0.07)	(0.31)	(0.34)

The parameters are quite similar in magnitude to the corresponding estimates for French exporters in EKK (2011). Additionally, we check the robustness of the benchmark estimates by estimating the parameters alternatively for all the markets, without the pecking order of entry from the moment conditions, and the data in 1996. These checks demonstrate the robustness of the benchmark estimates to the sample and moments.

A2. Validation

To examine whether the calibrated model can be used to replicate real multinational activity reasonably well, we conduct internal and external validation of the model. Given the estimated parameters, we first simulate a new dataset of multinational activity

and compare the simulated moments with the moments from the estimation sample. We find a fairly good fit of the data between simulated and actual moments, suggesting that the model is able to closely replicate the in-sample moments of the actual data.

However, the internal validation may not support the predictive power of the model about multinational activity in an environment with significantly different FDI barriers. For external validation, we reproduce out-of-sample predictions of Japanese multinational activities in 2006 with our parameters estimated on the 1996 data. Using the 2006 data to parameterize N_{nJ} and $\overline{\mathrm{X}}_{nJ}$ with the 1996 parameter estimates, we simulate an artificial set of multinationals from the entry and sales conditions for simulated firm *s* as follows:

$$u(s) \leq \bar{u}_n\big(\eta_n(s)\big) = N_{nJ}^{2006}{\kappa_2}^{-1}\eta_n(s)^{\tilde{\theta}}, \tag{A8}$$

$$X_{nJ}(s) = \overline{\mathrm{X}}_{nJ}^{2006}\frac{\alpha_n(s)}{\eta_n(s)}\frac{\kappa_2}{\kappa_1}\left(\frac{u(s)}{\bar{u}_n(s)}\right)^{-1/\tilde{\theta}}. \tag{A9}$$

Comparing the number of simulated and actual firms according to the moment conditions, we find that the model fit is fairly good along various dimensions of multinational activities, such as the sales distribution across markets.

A3. General Equilibrium

Each country is endowed with labor, which is mobile within countries, but immobile across countries. Intermediates are a Cobb-Douglas combination of labor and intermediates. Final output is non-traded and a Cobb-Douglas combination of manufactured goods and labor. Fixed cost for FDI is paid by labor. Profits accrue to the headquarters countries of producers. As consumers own equal shares of each firm headquartered in their country, the profits are redistributed equally among the consumers. A country's GDP is equal to its total wage from production in its own country and its total profit from abroad. Lastly, some countries are net receivers for FDI, implying that they incur FDI deficits.

Solving for prices and wages jointly, we calculate counterfactual changes in the entry and affiliate sales of Japanese firms across markets, $\hat{X}_{nJ}^{C}$ and $\hat{N}_{nJ}^{C}$. Given these counterfactual changes, we use the entry and sales conditions in equations (A2) and (A3) to specify the corresponding counterfactual conditions for firm-level behaviors as follows:

$$u(s) \leq \bar{u}_{nJ}^{C}\big(\eta_n(s)\big) = N_{nJ}^{C}{\kappa_2}^{-1}\eta_n(s)^{\tilde{\theta}}, \tag{A10}$$

$$X_{nJ}^{C}(s) = \overline{\mathrm{X}}_{nJ}^{C}(s)\frac{\alpha_n(j)}{\eta_n(j)}\frac{\kappa_2}{\kappa_1}\left(\frac{u(s)}{\bar{u}_n^{C}(s)}\right)^{-1/\tilde{\theta}}. \tag{A11}$$

Holding the structural parameters fixed, we next simulate a set of artificial firms on the

basis of equations (A10) and (A11). Throughout the counterfactuals, we fix productivity draws and entry/sales shocks specific to each firm. Thus, all changes in firm-level activity relative to the baseline stem solely from a change in aggregate FDI barriers.

Appendix B

B1. A List of Sample Economies

North		South	
Economy	Income	Economy	Income
Japan	High income: OECD	Turkey	Upper middle income
United States	High income: OECD	Argentina	Upper middle income
United Kingdom	High income: OECD	Brazil	Upper middle income
Austria	High income: OECD	Chile	Upper middle income
Denmark	High income: OECD	Mexico	Upper middle income
France	High income: OECD	Peru	Upper middle income
Germany	High income: OECD	Malaysia	Upper middle income
Italy	High income: OECD	South Africa	Upper middle income
Netherlands	High income: OECD	Russian Federation	Upper middle income
Sweden	High income: OECD	Egypt, Arab Rep.	Lower middle income
Canada	High income: OECD	India	Lower middle income
Finland	High income: OECD	Indonesia	Lower middle income
Portugal	High income: OECD	Pakistan	Lower middle income
Spain	High income: OECD	Philippines	Lower middle income
Australia	High income: OECD	Thailand	Lower middle income
New Zealand	High income: OECD	Vietnam	Lower middle income
Israel	High income: OECD	China + Hong Kong	Lower middle income
Korea, Rep.	High income: OECD	Bangladesh	Low income
Hungary	High income: OECD	Myanmar	Low income
Poland	High income: OECD	Lao PDR	Low income
Singapore	High income: non-OECD	Cambodia	Low income
Taiwan	High income		