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Foreign Fast Seconds and Market Contestability in Emerging Economies: Implications for Domestic Welfare

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Abstract

We develop a model of foreign firm entry into a product differentiated domestic market in which the foreign firm has a brand for which domestic consumers are willing to pay a premium. In this light, the foreign firm plays a role similar to what some have called a "fast second." We find that the impact of such entry depends critically on the extent of contestability in the domestic market. However, even when the market is fully contestable, foreign entry leaves total domestic welfare unchanged. The foreign competition simply results in domestic producer surplus being transferred to domestic consumers. In all other cases, domestic surplus falls in the wake of foreign entry. Further, a policy of preventing foreign entry altogether yields higher domestic welfare than one of permitting such entry even though the former induces more of the inefficiently excess entry and accompanying sunk costs typically associated with spatial models of product differentiation. Our results cast some doubt on the wisdom of emerging economies opening up to foreign firms unless entry is accompanied by substantial transfers.

Key Words: fast second, product differentiation, contestability

JEL Classification Codes: L5, O14, O25

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1. Introduction

Emerging markets economies often present profitable opportunities for entry by large multinational firms domiciled in developed economies. Such entry has the potential to bring important gains to the emerging economy consumers as well. Yet at the same time, such foreign direct investment (FDI) also poses a risk in that it will typically induce exit by domestic firms. In turn, this can result in not only the loss of profit from such firms but also lead to increased concentration and less competition with additional adverse consequences for domestic consumers. Theoretical models that investigate this possibility include Ono (1990), Richardson (1998), and Bjorvatn (2000). The question has also motivated empirical work on specific non-tradable markets in which FDI has focused, most notably, the banking sector where the introduction of large scale FDI has typically been followed by domestic firm exit and substantially increased concentration in Latin America an Central Europe. These include studies by Clarke, Cull, and Martinez Peria (2001) and Gelos and Roldos (2002), and Mkrtchyan (2005). While these studies generally find that increased concentration has been associated with lower price-cost margins, this does not necessarily imply a rise in domestic welfare when some of the surplus is being transferred to foreign producers.

This paper builds on the theoretical literature by making use of a recent model developed by Norman, Pepall, and Richards (2008) [NPR]. Unlike the papers cited above, this analysis does not set the domestic market structure arbitrarily but instead works out the equilibrium number of domestic firms both before and after the entry of a foreign rival. Moreover, the initial entrants into the domestic market rationally anticipate the later foreign entry and the impact this has on their probability of survival. Here, some domestic firms exit in the face of foreign competition not because of foreign predation, as in Bjorvatn (2000), but because the foreign brand is well-known and regarded as superior to domestic brands. In other words, the foreign brand plays a role similar to that

of a "fast second" as identified by Geroski and Markides (2004), and enters the home market after it has been established by domestic firms. Our analysis potentially applies to many settings. It may for example illuminate the success of McDonald's in penetrating many emerging economy markets such as Brazil, where it quickly became the largest fast food proprietor with a market share of 25 per cent in a country with a highly competitive fast food sector [Luxner (2002)] and Asia, where it has also had great success [Watson (1997)]. Our analysis may also apply to the banking sector where global banks have entered liberalizing transitional economies and quickly become dominant. In Armenia for example, privatization first led to the entry of numerous domestic banks. When later the domestic market was opened to foreign firms, HSBC entered, expanded rapidly and soon gained a dominant market share [Dabler-Norris and Floerkemeier (2007), and Mkrtchyan (2005)]

The model has two periods. For our purposes, we may think of the first period as that in which only domestic firms enter and compete but, do so with the knowledge that the market will be opened later to entry by a foreign firm with a well-known brand. The second period then examines the equilibrium in the period in which the foreign branded firm is active in the domestic market.

Our analysis addresses two issues. First, we consider how the domestic surplus changes from the first period, in which there are only domestic firms, to the second period, after foreign entry. From the perspective of empirical analysis, this may be the relevant thought experiment as it provides an evaluation of the actual experience of foreign entry.

Our second exercise then turns to the question as to how the domestic surplus would be different over the model's two periods if in fact foreign entry were precluded to begin with. As is well known, markets with monopolistic competition tend to encourage excessive entry. When the later entry of a foreign, well-known brand is anticipated, however, that initial entry is dampened, i.e., fewer domestic firms enter the market if they anticipate facing a foreign giant after liberalization. Hence, if an emerging economy were to commit to a policy of never permitting foreign entry, the tendency for excessive domestic entry will be strengthened. We therefore examine the domestic surplus over two periods when such entry is permitted, as in the first case, and when it is not.

To preview our results briefly, both experiments suggest that purely domestic considerations raise considerable doubt about opening the home market to FDI. Typically, any gains to domestic consumers do not outweigh the losses to domestic producers. Equally important, however, we find that a critical factor for assessing the impact of foreign entry is the extent to which the market is contestable by which we mean the ability of domestic firms that exit in the wake of foreign entry to re-enter the market easily given the proper price incentive. We also find that whatever the impact of FDI on domestic welfare, liberalization and opening up of the domestic economy is always potentially Pareto-improving from a global perspective. The foreign surplus gain always outweighs any domestic surplus loss.

2. The Model: Foreign Entrants as Fast Seconds in a Monopolistically Competitive Market

Consider the conventional model of monopolistic competition in the circle spatial setting pioneered by Salop (1979). The circle is normalized to a length of one. Consumers are located continuously around the circle with density D. A consumer at location s most prefers a version of the good located at the same spot, and that consumer's utility declines as the product variety she purchases is more distant from location s and also with the price of the good. To be precise, each consumer s obtains a surplus obtained from buying a product with specification x at price $p(x)$ given by:

$$U(x,s) = V - p(x) - t|x - s| \tag{1}$$

Each firm incurs a fixed cost F and a constant marginal cost of c for producing its basic product. That is, each firm's primary costs are described by:

$$C(q_i) = cq_i + F \tag{2}$$

Following MacLeod, Norman and Thisse (1988) and Norman and Thisse (1996, 1999), each firm produces a basic product of type x identified by its location on the circle at a marginal cost set, without loss of generality, to zero. In addition, as in the flexible manufacturing model of Eaton and Schmidt (1994) and also the fast second model of NPR (2008), we further permit each firm to have an ability to customize or version its basic product to the needs of an individual consumers at a cost r

per unit of distance [Shapiro and Varian (1998)]. That is, the marginal cost of producing the version x_i given the basic product x is:

$$MC_i(x_i, x) = r|x_i - x| \tag{3}$$

We assume that $r < t$, otherwise firms will not find it profitable to version their basic products. As in NPR we also assume that $r \leq 1$.

The ability to version or customize at cost r effectively means that firms can price discriminate as shown by MacLeod, Norman, and Thisse (1988). The reason is that once firms control the delivery of their product to specific locations, i.e., once firms can customize their product, they cannot commit to non-discriminatory (fob) pricing. If firm i attempts to employ fob pricing it will allow a rival firm j to undercut firm i's delivered price at any location (product-variety) for which firm j's production plus versioning cost is less than firm i's delivered price.[1] In other words, offering versioned products at discriminatory prices becomes a dominant strategy for all firms, which in turn means that the differences in the prices paid by different consumers do not fully reflect the differences in the customizing costs. In this respect, the parameter r is a useful indicator of the intensity of price competition. As r falls, each firm's products substitute more effectively for those of even "distant" rivals and prices are driven closer to marginal cost.

As in NPR, we envision a market divided into two periods each of which has two stages. In the first stage of the first period, n^e domestic entrepreneurs enter a product market in the emerging market economy that at present is not open to direct investment by foreign firms. However, these domestic entrepreneurs do recognize that such a firm will enter later with some probability. In the second stage of the first period, the domestic firms compete in prices thereby establishing a domestic market equilibrium and an associated surplus for domestic producers and domestic consumers. In the first stage of the second period, we allow for domestic market liberalization and hence the possible late entry of a foreign firm. The distinctive feature of the NPR analysis that we borrow here is that this

[1] See Lederer and Hurter (1986) and MacLeod, Norman and Thisse (1988) for earlier analysis along these lines. Varian and Shapiro (1998) discuss how versioning has been facilitated by e-commerce.

foreign firm comes with a well-known brand or quality advantage, which is endogenous but precisely measurable as a premium that domestic consumers are willing to pay for this firm's product over comparable domestic brands. The final stage of the second period then describes the outcome of the competition in prices in the domestic market given the presence of the foreign "brand-stretcher, e.g., HSBC.

To give the later entrant some brand advantage requires that NPR address the measure of brand strength. For this purpose, they draw on the work of previous research including Baldinger and Rubinson (1996), Krishnan (1996), and Gomez, McLaughlin, and Wittink (2003), that finds a strong link between willingness-to-pay for a specific brand and observed market characteristics such as market share or market penetration defined as the fraction of consumers who have ever tried the firm's product and which, itself is closely associated with market share. A similar approach can be found in both Court, Leiter, and Loch (1999) and in Pepall and Richards (2002). As the market share of each pioneer firm is $1/n$ at the end of period 1 it is natural to use this as a measure of the brand strength of the domestic firms in the home market. However, the "fast second" firm b, that already has an established brand in an external market so, the strength of its brand identity in the market in question depends on a variety of factors including consumer attitudes and just how "close" the brand stretcher's product is to the good or service sold by the initial n firms.

We follow NPR in that we capture the variable brand strength of the later, brand-stretching entrant by assuming that it is given by the random variable α drawn from a uniform distribution ranging from 0 to 1. The difference is that unlike NPR, we focus on the brand-stretcher as a foreign firm. Accordingly, the market proceeds as follows. After the first period in which n domestic firms settle the market, nature randomly selects a foreign firm with brand strength α to enter the domestic market, so that $\alpha - 1/n$ is the relative brand advantage of the foreign firm. As a result, liberalization does not automatically lead to foreign entry as $\alpha > 1/n$ is required for this to happen. However, when such entry does occur, we assume that the maximum value placed on the foreign firm's product is no longer V, but $V + \alpha - 1/n$, where again α is a random variable reflecting the foreign firm's brand

advantage. Hence, consumer s gets surplus from consuming the foreign brand stretcher's product with specification x_b offered at price $p(x_b)$:

$$U(x_b, s) = V + \left(\alpha - \frac{1}{n}\right) - p(x_b) - t|x_b - s| \qquad (4)$$

The brand advantage of the foreign firm allows it to "stretch" its brand into the domestic market and compete effectively despite charging higher prices than a domestic firm. In particular, if the price for any consumer for a particular product of the brand-stretcher is less than $\alpha - 1/n$ higher than price of the same product produced by a domestic firm, then the consumer prefers the foreign firm's product. This makes the foreign firm a powerful competitor when it enters the market as it can drive out a number of the original domestic firms. Of course, domestic firms anticipate this when the domestic market is first privatized. These firms work out the expected chance of survival and expected profit in the fourth stage of the game after the foreign brand stretcher enters and competes with domestic firms. Their initial entry decision then reflects their expected profit over the two periods—the first when there is no foreign competitor and the second when there is.[2]

3. Domestic Market Equilibrium Before the Foreign Firm Enters

From Eaton and Schmitt (1994), the Bertrand-Nash equilibrium prices if n firms compete with versioned products and symmetrically locate on the circle is:

$$p_i^*(s) = min\left(V, max\left(r|x_i - s|, \min_{j \neq i} r|x_j - s|\right)\right) \qquad \forall i = 1,...,n \qquad (5)$$

Moreover, since the sunk cost F is the total costs over all periods, we can allocate it evenly to each period and ignore it in compare of surplus between periods. Since the sunk costs are incurred in stage 1, this means that each firm has a period 1, stage 2 profit of

$$\pi_i^2 = \frac{d_0 r}{2n^2} \qquad (6)$$

[2]NPR have the market growing over time so that the density around the circle is increasing from stage 2 to stage 4. Such growth undoes the ceteris paribus assumption needed to isolate the impact of foreign entry on the domestic surplus. Therefore, we have reworked the NPR analysis for the case of zero market growth so that the only change between periods 1 and 2 is the entry of the foreign brand stretcher.

Hence, the total domestic producer surplus in period 1 is:

$$\pi_i^2 = \frac{d_0 r}{2n} \tag{7}$$

As in NPR, we assume that V is high enough that all consumers buy the good (the market is covered). In stage 2, consumer surplus for consumers buying products from one individual firm is:

$$CS_i^2 = \frac{1}{n}\left(V - \frac{3r}{4n}\right)d_0 \tag{8}$$

Hence, the total consumer surplus in stage 2 of period 1 is:

$$CS^2 = n \cdot \frac{1}{n}\left(V - \frac{3r}{4n}\right)d_0 = \left(V - \frac{3r}{4n}\right)d_0 \tag{9}$$

4. The Domestic Market After Entry of the Foreign Firm

NPR show that when the brand stretcher enters, the relative profitability of locating between two existing firms, on the one hand, and locating at the same position as an existing firm, on the other, may depend on whether the initial number of firms is odd or even, although the difference between the two cases is extremely small. However, they also show that for a reasonable subset of V values there is a very slight advantage to entry at the same location as a preexisting firm is more profitable.[3] In this paper, we have stayed with this assumption that when it enters, the foreign brand-stretcher locates at the spot of a pre-existing existing domestic firm.[4] Since it has a product that consumer definitely prefer and since it has the same versioning cost as the pre-existing firm, such entry will definitely drive that domestic firm from the market so long as the brand-stretcher's price to any consumer s formerly served by the domestic firm does not exceed $r|s - x_b| + \alpha - 1/n$.[5]

[3]The intuition is that by locating at the spot of an initial firm, the brand-stretcher is certain to drive at least one competitor out of the market, while this cannot be guaranteed if it locates between two pre-existng ones.

[4]We have worked also worked out the case of entry between existing domestic firms. As NPR suggest, this has no material effect on our findings. Note too that we model the foreign firm as entering *de novo* so as to preserve its brand identity and therefore its brand advantage. .

[5]Like NPR, we consider the entry of only one of a number of potential foreign firms. While modeling the outcome with more than one foreign entrant is of interest it complicates the analysis considerably. We would need to model the joint probability distribution of each of the foreign firms' brand strengths, as well as the point of entry of each such firm in the

Of course, the profit of the two nearest neighbors will also be affected. Here, one of two possibilities then exists. There may again exist a set of prices set by the foreign brand stretcher at which the domestic firms are unable to operate profitably and so will exit. Alternatively, the firms may be able to operate profitably but only by lowering their prices to offset the foreign firm's brand advantage. If the two immediate neighbors do exit, then the next two closest firms on either side of the point of foreign entry will now compete directly with the foreign brand stretcher, and the same possibilities of exit or remaining to compete with the brand-stretcher arise again. Note though that when the unraveling ends so that there is a surviving domestic firm on either side of the foreign brand-stretcher, those domestic firms that lie even further away are insulated from the foreign firm's entry. That is, for surviving domestic firms that are not immediately next to the foreign brand stretcher, life in the second period goes on as it did in the first. The effect of versioning/price discrimination is to localize all competition so that for any one firm, the relevant competition comes only from its two closest competitors.

NPR find that the unraveling described above is substantial. That is, the brand-stretcher's entry leads to considerable exit by the initial entrant firms. While they work with cases in which the market grows either by a little or a lot from period one to period two, we work with the case in which there is no growth so that comparisons of the domestic surplus before and after foreign entry are purged of any growth effects. We then determine the equilibrium number of initial entrants n^e such that each such firm makes zero expected profit over the two market periods given the probability of foreign entry and the domestic firms exit exactly as in NPR. The analytics behind our results are virtually identical to those in NPR and are described in the Appendix. Despite the changed assumption of market growth, we find substantially similar results for initial entry and subsequent exit in the wake of entry by a brand-advantaged firm.

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domestic market. We believe that the main insights of our model would remain even after allowing for two entrants. In particular, the ability of domestic firms to re-enter and so to police foreign firm pricing will still play a critical role in determining the net benefits of FDI for the domestic economy.

Our market structure results are shown in Table 1. Here, we show the equilibrium number of initial domestic entrants n^e and the number of these expected to survive n^s for various values of r and firm fixed cost relative to market density F/d_0, given the distribution of α, which is taken to be uniform between 0 and 1. As can be seen, the survival rate is typically quite low, typically on the order of one in five for any substantial number of initial domestic firms. This is especially the case for low versioning cost values r. When r is small, the brand-stretching foreign firm can fashion its product to reach even those consumers who are distant from its point of entry and, with its brand advantage, sell at a profit-making price that forces many competitors to leave the market.

NPR make the assumption that the firms that exit cannot reenter. These firms face a reentry cost that makes such reentry unprofitable. In turn, this means that they recognize that if they were to remain in the market, the brand-stretcher would set prices at which they could not sell any output and therefore, they exit and thereby leave the brand stretcher free to set higher prices knowing that reentry is not possible. We call this the *incontestable market* outcome.

In contrast, we also consider the *contestable market* outcome. In this scenario, firms that exit can reenter freely. The sunk cost of entry was incurred in the first period and is no longer a factor. Here, the possible reentry of such firms acts to constrain the pricing of the brand stretcher even though these firms are no longer actually in the market. For any consumer that it serves, the brand stretcher now can charge a price no greater that $\alpha - 1/n$ above the versioning cost of the nearest potential reentrant.

The difference in the contestable and incontestable cases is illustrated by Figures 1 and 2. In each case, the two dark solid lines indicates the price charged to the consumer with the higher line reflecting the prices of the foreign brand-stretcher b. The lighter lines indicate the cost of supplying that version by other firms. Figure 1 illustrates the contestable case. Here, the price of the brand-advantaged foreign firm traces a saw tooth pattern that rises until it reaches the maximum distance from the location of a former domestic $1/2n^e$ firm that has now exited. From there the foreign firm's

price must fall to prevent re-entry by such a firm. The lowest value for the foreign brand stretcher's price occurs at the location of a former domestic firm. At such a point, the domestic firm would re-enter and profitably serve the consumer at that location if the foreign firm ever sets a price above $(\alpha - 1/n^e)$. From such a point on, the foreign firm can raise its price until it begins to get closer to the next location of a domestic firm (that may have exited). The foreign fast second price then follows this rising and falling pattern across the span of the market that it serves.

In contrast, Figure 2 illustrates the incontestable case, which is identical to that modeled by NPR. Here, the foreign firm need not fear any re-entry of now exited domestic firms. As a result, the price it can charge rises linearly as the distance from the nearest surviving domestic firm and therefore the cost of its nearest rival in serving such customers grows.

Note that in either the contestable or incontestable market outcome, an identical number of firms exit. This is because the set of brand-stretcher prices necessary to drive these firms out is the same in either case. The difference is that in the contestable market case, the brand stretcher is compelled to maintain these prices while in the incontestable case, the brand stretcher's ability to set these prices is enough to eliminate these competitors *a priori* and permanently so that they leave and the foreign firm can charge higher prices without fear of attracting competition. Recognizing this, the following proposition follows immediately.

> *Proposition 1*: If the domestic market is contestable, then in those cases in which a foreign-brand stretcher actually enters, the total domestic surplus is unchanged from what it was prior to such entry.
>
> *Proof*: In the post-entry world there are two kinds of consumers, those who continue to be served by domestic firms and those served by the foreign brand-stretcher. Further, in the contestable market case, those who continue to buy a domestic good continue to buy it from the same domestic firm from which they bought prior to the foreign entry. Otherwise, the price would rise above versioning cost of an exited firm and invite re-entry. Hence, the total surplus resulting from any domestic sale to a consumer s remains at the same level as it was

prior to the foreign entry, namely, $V - r|s - x_i|$, where x_i is the location of the nearest domestic firm. This surplus will include both a consumer and a producer component. Now consider the domestic surplus generated by the foreign brand stretcher's sales to domestic consumers. The consumer surplus on such sales is $V + \alpha - 1/n - p_b$, where p_b is the price set by the foreign firm. Because versioning individualizes each transaction, the foreign brand-stretcher will set this price as high as possible. However, as noted above, when the domestic market is contestable this price to any consumer *s* cannot be larger than $r|s - x_i| + \alpha - 1/n$, where x_i is the location of the nearest potential entrant, namely, the domestic firm that formerly served consumer *s*. Hence, the consumer surplus generated by the sales of the foreign firm's product to any domestic consumer *s* is: $V + \alpha - 1/n - \left(r|s - x_i| + \alpha - 1/n\right)r|s - x_i| = V - r|s - x_i|$. Thus, the total domestic surplus generated by each foreign firm sale is: $V - r|s - x_i|$, exactly as it was before foreign entry. Of course, the domestic producer surplus from such transactions is zero.

In short, the foreign brand-stretcher's entry does not change the total domestic surplus if the market is contestable, yet it does alter the distribution of that surplus. In particular, on those sales made by the foreign firm, all of the domestic surplus now accrues to consumers. Thus, the actual entry by the foreign brand stretcher raises domestic consumer surplus and lowers domestic producer surplus, even though it leaves the total domestic surplus unchanged. Note too, that since the foreign brand stretcher earns a profit, its entry into the emerging economy domestic market is unambiguously Pareto-improving from a global viewpoint.

If the domestic market is incontestable, the results will obviously be different. In this case, we have the following proposition.

Proposition 2: If the domestic market is incontestable, actual entry by a foreign brand-stretcher will reduce the total surplus earned by domestic consumers and producers.

Proof: The proof follows immediately from the proof of Proposition 1. For all those sales made by surviving domestic producers, the total surplus is the same as it was before foreign entry. However, because the constraint of potential re-entry is no longer present, sales by the foreign brand stretcher now occur at a higher price. Hence, the surplus to domestic consumers from such sales is less than it was in the contestable case, while the domestic producer surplus on such sales again falls to zero. Since the contestable market enjoyed the same total surplus as the incontestable one before foreign entry, and since the contestable market maintains that surplus after foreign entry, the fact that the incontestable market yields less domestic surplus than the contestable one in the wake of foreign entry implies that that domestic surplus declines unambiguously after the foreign brand stretcher enters the domestic market.

In summary, applying the NPR model to the case of a foreign brand stretcher entering an emerging domestic economy market yields one very clear result. When such entry actually occurs, domestic welfare must at best stay the same in total with a loss to producers offset by a gain to consumers. However, if the domestic market is less than perfectly contestable, such entry will reduce domestic welfare with a loss to both producers and consumers.

If foreign entry has the potential to lower domestic welfare, it is natural to ask how large this risk might be. Indeed, this step is critical to understanding the impact of foreign entry on global welfare. However, the answer to this question will depend on various parameter values and cannot be worked out *a priori*.

Table 2 shows the potential losses that emerge for the domestic economy when the market is incontestable. Here, we simulate the post foreign entry market for various values of the versioning cost parameter r and the ratio of initial fixed cost F to market size d_0. In each case, we use the average value of α consistent with the given number of domestic firms surviving foreign entry to determine the changes in domestic consumer surplus ΔCS, domestic producer surplus ΔPS, the change in the total domestic surplus ΔTS, and the foreign brand-stretcher's surplus ΔBPS. Of course,

the latter is just the foreign firm's profit in the newly-entered domestic market. Note that, in every such case, the surplus gain of the foreign producer is much larger than the domestic economy losses, so that while liberalization and foreign brand-stretching entry are welfare-reducing for the domestic economy, they are a potential Pareto improvement for the global system. However, the domestic losses are typically on the order of one-half of the foreign firm's gains. So, the required proportional transfer from the foreign firm to domestic residents necessary for an actual Pareto improvement is considerable.

5. Domestic Welfare in the Absence of Liberalization

Since domestic welfare must either stay the same or fall in the wake of brand-stretching foreign entry, it is natural to ask whether the domestic economy would be better off if it could commit to preventing such entry altogether. However, answering this question is tricky because, as noted above, the brand-stretching model used in NPR and also in this paper carries the prediction that many of the initial pioneers exit the market when the brand-advantaged firm enters. Since we assume that the initial entrants foresee this outcome and therefore recognize that their first-period profits may well not be repeated in the second period this tends to depress the volume of domestic firms entering the market in the first place. This is an important outcome because as NPR show, it tends to reverse the normally excessive amount of entry and the accompanying fixed costs associated with basic models of monopolistic competition such as Salop (1979). A prohibition against foreign entry will remove this salutary effect and therefore is not unambiguously an improvement for the domestic economy

Because the NPR model does not generally lead to closed form solutions, we address this issue by simulating the model over its two-period horizon under two alternative scenarios. The first scenario assumes that the domestic government in the emerging economy commits to a permanent prohibition on foreign entry. In this case, the number of initial domestic entrants n^p in the first period is also the number of domestic firms in the second period as there is no subsequent foreign entry to prompt the exit of domestic firms. In the second scenario, we work out the number of initial

entrants n^e and survivors n^s for the case discussed above in which the initial domestic entrants foresee the later entry of the brand-advantaged foreign firm and therefore anticipate a positive probability of exit in the second period. We then work out the total domestic surplus summed over the two model periods, again for various values of r and F/d_0.

Table 3 shows the simulation results when the domestic market is contestable. Table 4 shows the results when the domestic market is incontestable. In each case, n_p^e is the number of initial entrants when foreign entry is prevented and n_a^e is the number when it is allowed. Surveying the outcomes displayed in these two tables yields a number of clear conclusions.

First, the anticipation of market liberalization and later entry by a brand-advantaged foreign firm definitely depresses initial entry by domestic firms. Typically, n_p^e exceeds n_a^e by 15 to 20 percent, and sometimes by an even greater amount. Since, when it enters, the brand-stretching entrant induces the same number of domestic firms to exit in either case, this result is independent of the extent of contestability in the domestic market.

Second, the depressing effect that anticipated liberalization and the emergence of a brand-advantaged foreign rival have on initial domestic entry is enough to make such entry deleterious to the emerging economy's total welfare. That is, the emerging economy would be better off to commit to a prohibition of such entry altogether. In the contestable market case, the difference is small. The decline in domestic welfare that liberalization implies is on the order of one percent or less. However, for the incontestable case, the difference is on the order of 10 to 15 percent.

Finally, in all cases, the total global welfare is always larger under a liberalizing regime that permits foreign entry than one that is committed to keeping such entry out indefinitely. This is revealed by the entries in the row in each table marked total global surplus or *TS Global*. This row shows the global surplus when foreign entry is permitted and so includes the surplus realized by the foreign brand-stretching firm. In contrast, when such entry is not permitted, no foreign profits are earned and the total surplus from the market is just the domestic surplus *TS Domestic* (*Prevented*).

In every case across both tables, *TS Global* exceeds *TS Domestic* (*Prevented*). As we found in our earlier analysis, eventual trade liberalization is Pareto-improving for the world if not for the emerging economy.

6. Summary and Concluding Remarks

The opening of domestic markets to foreign entry is an important issue for transitional and emerging market economies. The anticipation of such liberalization will have implications for domestic firm behavior prior to the time of foreign entry. That entry will, in turn, have additional implications for market outcomes after the domestic economy has been opened.

We have addressed this issue using a recent model of entry by a brand-advantaged firm into a monopolistically competitive market developed by Norman, Pepall, and Richards (2008). In our version of this model, the domestic market is initially populated by relatively small entrepreneurial firms each of which correctly anticipates the later liberalization policy that permits the entry of the foreign brand-stretching firm. We then conduct two thought-experiments. One compares the change in total domestic surplus from the period before entry that after entry. This before-and-after comparison may be the relevant one for economies that experience actual entry. The other policy experiment compares domestic welfare over the two model periods combined for the case in which no foreign entry is ever permitted and the one in which it is permitted after domestic firms have established the market. In each experiment, we differentiate between the case in which the market is contestable so that domestic firms that exit in the wake of foreign entry can easily reenter, and the case in which the market is incontestable and no such entry is possible.

Somewhat contrary to our expectations, we find that opening the domestic market to foreign entry is unlikely to raise domestic welfare. However, the extent of contestability in the domestic market is crucial. At best, when the domestic market is contestable the before-and-after comparison shows that foreign entry only leaves the domestic surplus unchanged. When the market is incontestable, however, and the foreign brand-advantaged firm is less constrained by domestic reentry, the domestic surplus definitely falls. Similarly, we find that a commitment to prohibit

foreign entry over both periods yields higher domestic welfare for the emerging economy than the one that later opens the economy to foreign entry even though this option does prevent the excessive domestic entry that typically characterizes monopolistically competitive markets. Again, this domestic welfare loss is much more severe when the domestic market is incontestable.

However, while liberalization is often harmful or at least not helpful to the domestic economy overall, its effects are not uniform. In particular, when the domestic economy is contestable, such entry effectively results in a transfer of surplus from those domestic firms that exit to there former consumers. More importantly, such liberalization it is welfare enhancing on a global basis. In either thought experiment, the profit gain of the foreign brand-stretching entrant always exceeds the domestic welfare loss. So, opening the domestic economy to foreign entry is potentially Pareto-improving. That potential can of course be actualized by appropriate taxes or transfers.

We offer the model as a stylized consideration of liberalization and the opening of emerging market economies. Clearly, the model's formal structure may limit its strict application to the real world. Nevertheless, we believe that the model does have practical insights. It appears, for example, to fit cases like the Armenian one very well. There, the transition in banking proceeded first by privatization, which led to a great influx of new domestic banking firms. This was later followed by an opening of the economy to foreign entry at which point HSBC entered and claimed over twenty-five percent of the market for deposits [Dabler-Norris and Floerkemeier (2007)] while numerous domestic firms exited in the process. Our results emphasize that the domestic outcome in such cases depend critically on the degree of domestic market contestability. They also demonstrate the potential that such entry has to be welfare-enhancing for both domestic and foreign residents if accompanied by appropriate taxes and transfers.

7. *References*

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8. Appendix

Denote a domestic firm to the "left hand side" of the foreign brand stretcher as firm *j* with basic product x_j. Whether there are initially $n = 2m$ or $n = 2m + 1$ early entrants, $j \leq m$ and the distance between *b* and *j* is $j(n) = j/n$.

8.1 The Impact of Foreign Entry on Former Decisions of Domestic Early Entrants

Firm *j* faces three possible outcomes in the wake of *b*'s entry. One is that nothing changes. This will happen if there is at least one firm in both directions between *j* and *b* because price discrimination completely localizes all competition. The second possible outcome is that the competition with *b* is so intense that firm *j* exits. The final possibility is that all the domestic firms between *j* and *b* exit so that *j* is the left-hand survivor that directly competes with *b*. For this last case, consider a consumer *s* whose most preferred product specification is $s \in [x_j, x_b]$. The maximum price at which firm *j* can sell successfully to this consumer is:

$$p_j(s) = r|x_b - s| - \left(\alpha - \frac{1}{n}\right) \qquad s \in [x_j, x_b] \tag{A1}$$

On the other hand, the minimum price at which firm *j* can sell to this consumer and earn a non-negative profit is:

$$p_j(s) = r|x_j - s| \qquad s \in [x_j, x_b] \tag{A2}$$

Beyond this interval, i.e., for consumers to the left of *j*, prices are unaffected by *b*'s entry.

Denote the domestic firm on which the brand-advantage foreign firm locates as firm 0. So long as $\alpha - 1/n < 0$ firm 0 survives into the second period and earns a stage 4 profit of:

$$\pi_0^4(n, r, \alpha) = d_0 r / 2n^2 \tag{A3}$$

Otherwise firm 0 exits. Now if $\alpha - 1/n \geq rj/n$ then it is clear that the maximum price that firm *j* can charge consumer *s* is less than the minimum price at which it can earn any profit over the entire interval between firm *j* and firm *b*. Hence, in this case, firm *j* exits and earns nothing while if

$\alpha - 1/n \le r(j-1)/n$ it is unaffected by the foreign brand-stretcher and earns $\pi_j^4 = \frac{rd_0}{2n^2}$ in stage four.

Finally, suppose that $\alpha - 1/n \in [r(j-1)/n,\ rj/n)$. Then domestic firm $j \ge 1$ is the nearest neighbor to the foreign fast second to survive. Firm j earns the stage four profit:

$$\pi_j^4(n,r,\alpha) = \frac{d_0}{2n}\left(\frac{1}{n} + \frac{rj}{n} - \alpha\right) \qquad for\ 1 \le j \le m\ (or\ m+1) \tag{A4}$$

When a domestic entrepreneur makes its entry decision in the first stage of period 1, it does not know the value of α, the brand strength of the foreign fast second that may enter at a later date. Instead, each initial entrepreneur knows that there is a population of established foreign firms each with a brand strength α uniformly distributed on the interval [0, 1]. Nature randomly selects one potential fast second from this population and, if α is sufficiently high, foreign FDI occurs.

To calculate the expected profit of a domestic firm after entry by the "fast second" foreign firm b, we consider first the case where the number of domestic firms n is odd, with $n = 2m + 1$. Next we label the domestic firms such that the firm on which the foreign brand-advantage firm locates is 0, the first firm to the left of b's entry point is 1, the second firm is 2 and so on. Now consider the expected profit of domestic firm $j \le m$ in the final stage of the game. For firm 0 this is:

$$E(\pi_0^4) = \frac{rd_0}{2n^2}\int_0^{\frac{1}{n}} d\alpha \tag{A5}$$

For firm $1 \le j \le m$ expected profit is:

$$E(\pi_j^4) = \frac{rd_0}{2n^2}\int_0^{\frac{1}{n}+\frac{r(j-1)}{n}} d\alpha + \frac{d_0}{2n}\int_{\frac{1}{n}+\frac{r(j-1)}{n}}^{\frac{1}{n}+\frac{rj}{n}}\left(\frac{1}{n} + \frac{rj}{n} - \alpha\right)d\alpha \tag{A6}$$

The first term in (A6) is j's expected profit given that firm $j-1$ remains in the market and the second term is expected profit given that firm $j-1$ exits in stage 3 but firm j does not. Equation (A6) simplifies to:

$$E\left(\pi_j^4\right)=\frac{rd_0}{2n^3}\left(1+r\left(j-1\right)\right)+\frac{r^2d_0}{4n^3} \tag{A7}$$

On the other hand if the number of domestic firms n is even with $n = 2m + 2$ equations (A4) and (A7) hold for $j \leq m$. Now consider firm $m + 1$, the firm furthest from the foreign brand-stretcher. This firm's expected profit in the fourth stage in this case is:

$$E\left(\pi_{m+1}^4\right)=\frac{rd_0}{2n^2}\int_0^{\frac{1}{n}+\frac{rm}{n}}d\alpha+\frac{d_0}{2r}\int_{\frac{1}{n}+\frac{rm}{n}}^{\frac{r}{2}+\frac{1}{n}}\left(\frac{r}{2}+\frac{1}{n}-\alpha\right)^2d\alpha=\frac{d_0r\left(6+r\left(3n-4\right)\right)}{12n^3} \tag{A8}$$

The actual location of the foreign fast second along the circle is uncertain. Entry can occur with equal probability on any domestic firm. As a result, each domestic firm has a probability $1/n$ of being the unlucky one, earning expected profit in stage 4 given by (A5). If n is odd equal to $2m + 1$, a domestic entrepreneur i has probability $1/n$ of being $j < m$ firms to the left of the entry point and $1/n$ of being j firms to the right of the entry point. In other words, if n is odd, firm i has an overall probability $2/n$ of being the jth-nearest firm to the foreign brand stretcher, with expected profit given by (A7). If n is even $= 2m + 2$ there is the further $1/n$ probability that the foreign firm will choose the one entry spot that is furthest from the domestic firm, earning expected profit given by (A8).

The foregoing implies that the expected profit to a domestic firm i in the final stage of the last period is:

$$\begin{aligned} E\left(\Pi_i^4\right)&=\frac{1}{n}E\left(\pi_0^2\right)+\frac{2}{n}\sum_{j=1}^{m}E\left(\pi_j^2\right) && \text{if } n=2m+1\\ E\left(\Pi_i^4\right)&=\frac{1}{n}E\left(\pi_0^2\right)+\frac{2}{n}\sum_{j=1}^{m}E\left(\pi_j^2\right)+\frac{1}{n}E\left(\pi_{m+1}^2\right) && \text{if } n=2m+2 \end{aligned} \tag{A9}$$

When a foreign firm plays the role of a fast second and offers a product in the domestic market bearing its brand, it changes that market's structure. This evolution can be identified by solving for the initial number of domestic firms that enters in the first stage of period 1and the likelihood of their survival through the final period of the game. Given the standard free-entry condition, the equilibrium number of domestic firms that enters in stage 1 is the number of entrants n^e for which

expected profit $\pi_i^2 + E\left(\Pi_i^4\right)$ is just sufficient to cover the fixed costs of entry F. From above, the expected profit of a domestic firm is:

$$E\left(\Pi\left(r,F,n\right)\right)=\begin{cases}\dfrac{rd_0\left(18+r\right)}{96}-F & if\ \ n=2\\ \dfrac{rd_0\left[n^2\left(4+r\right)+2n\left(2-r\right)+r\right]}{8n^4}-F\ \ if\ n=2m+1\\ \dfrac{rd_0\left[3n^2\left(4+r\right)+12n+\left(12-5r\right)\right]}{24n^4}-F\ \ if\ n=2m+2\end{cases} \qquad \text{(A10)}$$

NPR solve for the value n^e that satisfies the profit conditions $E\left(\Pi\left(r,F,n^e\right)\right)\geq 0$ and $E\left(\Pi\left(r,F,n^e+1\right)\right)<0$. However, even though the equilibrium number of domestic firms, n^e, is homogeneous of degree one in the parameter F/d_0, which is the ratio of sunk cost per consumer, solving for the equilibrium number of firms still involves two parameters F/d_0 and r, which makes the equations in (A10) are too complex to permit an analytical solution for n^e. We therefore follow their approach and use numerical simulations to describe the equilibrium number of domestic firms n^e.

However, for any given number of initial domestic firms n^e, the expected number of these that survive the foreign firm's entry of the fast second in the beginning of the game's second period is straightforward. Consider an early entrant firm $j \geq 1$ that is the jth nearest firm to the brand-stretching entrant. This firm will continue to operate in the final stage of the game if and only if $\frac{r\left(j-1\right)}{n}+\frac{1}{n}>\alpha$, since only then can the firm sell at a positive price. NPR then show that for the respective cases where $n^e = 2m+1$, if n^e is odd, and where $n^e = 2m+2$ is even, the expected number of domestic firms that will survive brand-stretching entry n^s is:

$$n^s=\begin{cases}E\left(n^s\middle|n^e=2m+1\right)=\int_0^{\frac{1}{n}} n\,d\alpha+\sum_{j=1}^{m}\int_{\frac{r(j-1)}{n}+\frac{1}{n}}^{\frac{rj}{n}+\frac{1}{n}}\left(2m-2j+1\right)d\alpha=1+\dfrac{r\left(n^e-1\right)^2}{4n^e}\\ E\left(n^s\middle|n^e=2m+2\right)=E(n^s\middle|n^e=2m+1)+\int_{\frac{rm}{n}+\frac{1}{n}}^{\frac{r}{2}+\frac{1}{n}} d\alpha=1+\dfrac{r\left(n^e-1\right)^2}{4n^e}+\dfrac{r}{2n^e}\end{cases} \qquad \text{(A11)}$$

Note that because survival depends only on the firm being able to sell at a positive price it is independent of market growth. Note further that given that $r < 1$, it follows that $n^s \le 1 + n^e/4$. For example, if the number of domestic firms were $n^e = 9$, then *at most* three of these firms could be expected to survive in the wake of brand-stretching entry.

8.2 The Consequence on Welfare of Producers and Consumers

Many domestic producers leave after foreign firm enters. Domestic producers the earn same operating profit $\frac{rd_0}{2n^2}$ as before if they survive. Many exit however. Also, for the two firms that survived closest to the fast second, the stage four profit is only $\pi_j^4(n,r,\alpha) = \frac{d_0}{2n}\left(\frac{1}{n} + \frac{rj}{n} - \alpha\right)$.

Considering the profit for the foreign brand-stretcher, the price charged by the foreign firm at the edge between the first survivor and the brand stretcher is:

$$p_j = \frac{1}{2}\left(\frac{rj}{n} + \alpha - \frac{1}{n}\right) \qquad \text{(A12)}$$

Suppose the distance from the location of the first survivor firm j to where firm j has the price that can compete with the brand-stretching firm over its brand-stretching effect is D_j. Then solving for D_j yields:

$$D_j = \frac{1}{2}\left[\frac{j}{n} - \frac{1}{r}\left(\alpha - \frac{1}{n}\right)\right] \qquad \text{(A13)}$$

Therefore, the brand stretcher's market share is the distance from its landing location to this border:

$$D_f = \frac{1}{2}\left[\frac{j}{n} + \frac{1}{r}\left(\alpha - \frac{1}{n}\right)\right] \qquad \text{(A14)}$$

Thus, the profit of the brand-stretching firm is

$$\pi_f = \begin{cases} \left[2\left(\frac{j}{n} - D_j \right) p_j \right] d_0, Incontestable \\ \left[\left(p_j + \frac{r}{2n} + \alpha - \frac{1}{n} \right) \left(\frac{1}{2n} - D_j \right) + \frac{2j-1}{2n} \left(\frac{r}{2n} + 2\alpha - \frac{2}{n} \right) - p_j \left(\frac{j}{n} - D_j \right) \right] d_0, Contestable \end{cases} \quad \text{(A15)}$$

Hence, the total producer surplus is domestic surplus plus the foreigner's from equation (6), (A4), (A8), and (A15)

$$PS_{total} = \begin{cases} \pi_f + \pi_D = \pi_f + 2 \cdot \pi_j + 2(m-j) \cdot \pi_i & if \quad n = 2m+1 \\ \pi_f + \pi_D = \pi_f + 2 \cdot \pi_j + 2(m-j) \cdot \pi_i + \pi_{m+1} & if \quad n = 2m+2 \end{cases} \quad \text{(A16)}$$

Some consumers still buy from the same firms they bought from before the foreign firm entered and at same prices. But some consumers now buy from the foreign brand-stretcher. Also, because the brand-stretcher leads many domestic firms to leave, the marginal consumer between the brand-stretcher and one of the domestic firms closest to the foreign firm are now a long distance from any particular firm. So, versioning costs to serve these consumers are very high. These consumers have a higher price to pay. We need to calculate surplus for all these different consumers to ask what happens to total consumer surplus under the new equilibrium.

To work out what happens after the foreign brand-stretcher comes in we can select values of brand strength αthat would be consistent with these numbers of firms happen. Specifically, for firm *j*, if value of α drops into the range between 0 and $\frac{1}{n} + \frac{r(j-1)}{n}$, its profit will not be affected by the brand-stretching firm's entry, however, if value of α is greater than $\frac{1}{n} + \frac{r(j-1)}{n}$ but less than $\frac{1}{n} + \frac{rj}{n}$, it will be the first survivor to the brand-stretcher, when value of α goes beyond $\frac{1}{n} + \frac{rj}{n}$, firm *j* will exit the market and earn nothing. Because of this determination of the behavior of each firm from different value of α, it is able to find a lower and upper bound of value of α when the numbers of early entrants and survivors are given. Under this range of value of α, the profits and consumer

surplus can be found within a lower and upper bound. Our calculations in the text use the average of these upper and lower bounds.

The consumer surplus for consumers buying products from the survivor *j* who is also the nearest surviving firm to the brand-stretcher:

$$CS_j = \left[\left(\frac{1}{2n} + D_j \right) V - \frac{rD_j^{\,2}}{2} - \frac{r}{8n^2} - \frac{rD_j}{n} \right] d_0 \qquad \text{(A17)}$$

When only one of the first domestic entrants is left though, the consumer surplus for consumers buying from this firm is:

$$CS_{m+1} = \left[\frac{V}{r} \left(\frac{r}{2} + \frac{1}{n} - \alpha \right) - \frac{3}{4r} \left(\frac{r}{2} + \frac{1}{n} - \alpha \right)^2 \right] d_0 \qquad \text{(A18)}$$

The consumer surplus enjoyed by consumers by the brand-stretching foreign firm is:

$$CS_f = \begin{cases} \left[2V - r\left(D_j + \frac{j}{n} \right) \right] \cdot \left(\frac{j}{n} - D_j \right) d_0, \; Incontestable \\ \left[\left(\frac{j}{n} - D_j \right) \left(V + \alpha - \frac{1}{n} \right) - \left(p_j + \frac{r}{2n} + \alpha - \frac{1}{n} \right) \left(\frac{1}{2n} - D_j \right) + \frac{2j-1}{2n} \left(\frac{r}{2n} + 2\alpha - \frac{2}{n} \right) \right] d_0, \; Contestable \end{cases} \qquad \text{(A19)}$$

Total domestic surplus after foreign entry is the combination of domestic producer surplus plus the consumer surplus from equation (8), (A17), (A18), and (A19)

$$CS_{total} = \begin{cases} CS_f + 2 \cdot CS_j + 2(m-j) \cdot CS_i & if \quad n = 2m+1 \\ CS_f + 2 \cdot CS_j + 2(m-j) \cdot CS_i + CS_{m+1} & if \quad n = 2m+2 \end{cases} \qquad \text{(A20)}$$

8.3 Welfare when foreign entry is prevented

Consider now three such adjacent firms, *j*-1, *j*, and *j* + 1, where *j* is the middle firm. With a versioning cost of *r* per unit of distance, the price to any consumer located midway between firm *j* and either of its two closest rivals must be just sufficient to cover the cost of delivering a versioned product to that location, namely, *r* / 2*n*. The price that firm *j* can charge to customers located closer than 1/2*n* then rises linearly to a maximum of *r* / *n* that it can charge to a consumer precisely at its

own location *j* without being undercut by either of its rivals. It is straightforward to show then that firm *j* serves d_0/n consumers at an average price of $3r / 4n$. Similarly, abstracting from fixed costs *F*, the firm incurs a versioning cost of zero to service consumers at location *j*, but this cost rises linearly in either direction to $r/2n$. Hence, its operating cost on average is $r / 4n$. Total profit for the *j*th firm given that there are *n* firms total is:

$$\pi_j^2(r,n) = \pi_j^4(r,n) = \left(\frac{3r}{4n} - \frac{r}{4n}\right)\frac{d_0}{2n^2} - F = \frac{rd_0}{2n^2} - F \qquad \text{(A21)}$$

Because this is a two-period model, we can double the profit expression in equation (A21) but not fixed cost *F* to obtain the total two-period profit:

$$\pi_j^{2,4}(r,n) = 2 \cdot \frac{rd_0}{2n^2} - F = \frac{rd_0}{n^2} - F \qquad \text{(A22)}$$

The equilibrium number of firms n_p^e is the value such that overall profit for each firm is zero. Hence,

$$n_p^e(r,F) = \left(\frac{rd_0}{F}\right)^{1/2} \qquad \text{(A23)}$$

Since this assumption implies a producer surplus of zero, the total surplus in any period will just be the surplus that goes to consumers. This is the total value of all goods consumed is $d_0 V$ less the revenue received by firms which is just their total cost. Hence

$$TS_p^{2,4} = \left(V - \frac{r}{4n_p^e}\right)d_0 \qquad \text{(A24)}$$

Table 1
Number of Initial Entrants and Number that Survives in Wake of Later Entry by Brand-Advantaged Firm

		r									
		0.25		0.5		0.75		0.875		1.00	
		n^e	n^s	n^e	n^s	n^e	n^s	n^e	n^s	n^e	n^s
F/d_0	0.001	12	2	17	3	21	5	23	6	25	7
	0.002	8	1	12	2	15	3	16	4	18	5
	0.005	5	1	7	2	9	2	10	3	11	3
	0.010	4	1	5	1	6	2	7	2	8	3
	0.025	2	1	3	1	4	2	4	2	5	2
	0.050	0	0	2	1	3	1	3	1	3	1

Figure 1
Prices After Entry by the Brand-Advantaged Foreign Firm—Contestable Case

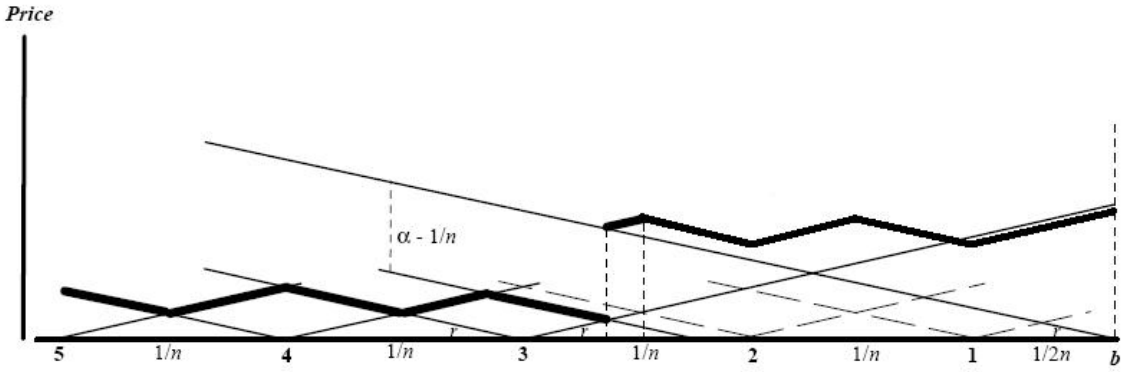

Figure 2
Prices After Entry by the Brand-Advantaged Foreign Firm—Incontestable Case

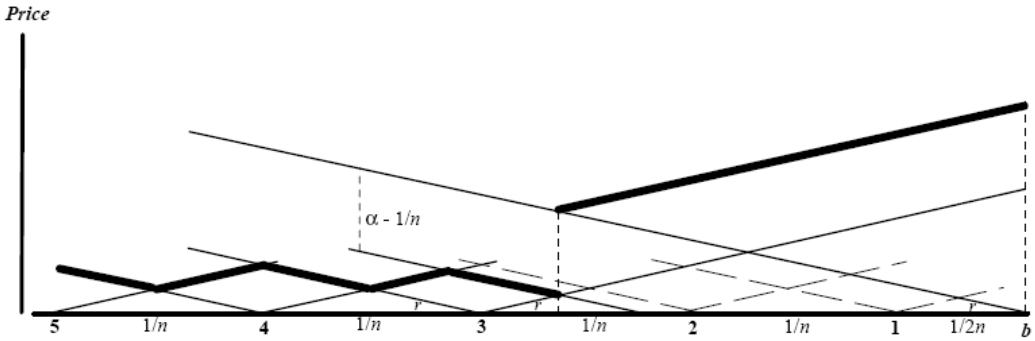

Table 2
Domestic Welfare Loss After Entry by Brand-Stretching Foreign Firm When Market is Incontestable

			r				
			0.25	**0.5**	**0.75**	**0.875**	**1.00**
F/d $_0$	**0.001**	*ΔCS*	−0.0383	−0.0779	−0.1013	−0.1116	−0.1217
		ΔPS Domestic	−0.0095	−0.0130	−0.0145	−0.0149	−0.0152
		ΔTS Domestic	−0.0479	−0.0909	−0.1158	−0.1265	−0.1369
		ΔPS Foreign	0.0959	0.1821	0.2317	0.2535	0.2740
	0.002	*ΔCS*	−0.0400	−0.0766	−0.1085	−0.1113	−0.1188
		ΔPS Domestic	−0.0146	−0.0191	−0.0217	−0.0222	−0.0216
		ΔTS Domestic	−0.0547	−0.0957	−0.1302	−0.1335	−0.1404
		ΔPS Foreign	0.1104	0.1918	0.2608	0.2675	0.2816
	0.005	*ΔCS*	−0.0275	−0.0459	−0.0926	−0.0875	−0.1121
		ΔPS Domestic	−0.0225	−0.0306	−0.0370	−0.0350	−0.0372
		ΔTS Domestic	−0.0500	−0.0765	−0.1296	−0.1225	−0.1493
		ΔPS Foreign	0.1025	0.1556	0.2616	0.2472	0.2996
	0.010	*ΔCS*	−0.0195	−0.0550	−0.0534	−0.0804	−0.0703
		ΔPS Domestic	−0.0273	−0.0450	−0.0521	−0.0536	−0.0469
		ΔTS Domestic	−0.0469	−0.1000	−0.1055	−0.1339	−0.1172
		ΔPS Foreign	0.0977	0.2050	0.2135	0.2723	0.2383
	0.025	*ΔCS*	0.0156	−0.0139	−0.0029	−0.0034	−0.0400
		ΔPS Domestic	−0.0469	−0.0694	−0.0703	−0.0820	−0.0800
		ΔTS Domestic	−0.0313	−0.0833	−0.0732	−0.0854	−0.1200
		ΔPS Foreign	0.0781	0.1806	0.1523	0.1777	0.2500
	0.05	*ΔCS*	N/A	0.0313	−0.0208	−0.0243	−0.0278
		ΔPS Domestic	N/A	−0.0938	−0.1042	−0.1215	−0.1389
		ΔTS Domestic	N/A	−0.0625	−0.1250	−0.1458	−0.1667
		ΔPS Foreign	N/A	0.1563	0.2708	0.3160	0.3611

Table 3
Domestic and Global Welfare When Foreign Entry is Allowed or Prevented—Contestable Case

			r				
			0.25	**0.5**	**0.75**	**0.875**	**1**
F/d_0	**0.001**	n_p^e	16	22	27	30	32
		n_a^e	12	17	21	23	25
		n^s	2	3	5	6	7
		TS Domestic Diff. (A-P)	−0.0014	−0.0018	−0.0021	−0.0022	−0.0023
		TS Global Diff. (A-P)	0.0468	0.0895	0.1140	0.1247	0.1349
	0.002	n_p^e	11	16	19	21	22
		n_a^e	8	12	15	16	18
		n^s	1	2	3	4	5
		TS Domestic Diff. (A-P)	−0.0021	−0.0028	−0.0028	−0.0035	−0.0025
		TS Global Diff. (A-P)	0.0535	0.0935	0.1280	0.1307	0.1387
	0.005	n_p^e	7	10	12	13	14
		n_a^e	5	7	9	10	11
		n^s	1	2	2	3	3
		TS Domestic Diff. (A-P)	−0.0036	−0.0054	−0.0052	−0.0050	−0.0054
		TS Global Diff. (A-P)	0.0489	0.0737	0.1267	0.1196	0.1454
	0.010	n_p^e	5	7	9	9	10
		n_a^e	4	5	6	7	8
		n^s	1	1	2	2	3
		TS Domestic Diff. (A-P)	−0.0031	−0.0071	−0.0117	−0.0069	−0.0063
		TS Global Diff. (A-P)	0.0477	0.0979	0.0977	0.1314	0.1148
	0.025	n_p^e	3	4	5	6	6
		n_a^e	2	3	4	4	5
		n^s	1	1	2	2	2
		TS Domestic Diff. (A-P)	−0.0104	−0.0104	−0.0123	−0.0216	−0.0083
		TS Global Diff. (A-P)	0.0365	0.0868	0.0697	0.0741	0.1217
	0.05	n_p^e	2	3	4	4	4
		n_a^e	0	2	3	3	3
		n^s	0	1	1	1	1
		TS Domestic Diff. (A-P)	N/A	−0.0208	−0.0156	−0.0182	−0.0208
		TS Global Diff. (A-P)	N/A	0.0729	0.1302	0.1519	0.1736

Table 4
Domestic and Global Welfare When Foreign Entry is Allowed or Prevented—Incontestable Case

			r				
			0.25	**0.5**	**0.75**	**0.875**	**1**
F/d $_0$	**0.001**	n_p^e	16	22	27	30	32
		n_a^e	12	17	21	23	25
		n^s	2	3	5	6	7
		TS Domestic Diff. (A-P)	−0.0492	−0.0926	−0.1177	−0.1288	−0.1391
		TS Global Diff. (A-P)	0.0468	0.0895	0.1140	0.1247	0.1349
	0.002	n_p^e	11	16	19	21	22
		n_a^e	8	12	15	16	18
		n^s	1	2	3	4	5
		TS Domestic Diff. (A-P)	−0.0568	−0.0983	−0.1328	−0.1368	−0.1430
		TS Global Diff. (A-P)	0.0535	0.0935	0.1280	0.1307	0.1387
	0.005	n_p^e	7	10	12	13	14
		n_a^e	5	7	9	10	11
		n^s	1	2	2	3	3
		TS Domestic Diff. (A-P)	−0.0536	−0.0819	−0.1348	−0.1275	−0.1541
		TS Global Diff. (A-P)	0.0489	0.0737	0.1267	0.1196	0.1454
	0.010	n_p^e	5	7	9	9	10
		n_a^e	4	5	6	7	8
		n^s	1	1	2	2	3
		TS Domestic Diff. (A-P)	−0.0500	−0.1071	−0.1159	−0.1409	−0.1234
		TS Global Diff. (A-P)	0.0477	0.0979	0.0977	0.1314	0.1148
	0.025	n_p^e	3	4	5	6	6
		n_a^e	2	3	4	4	5
		n^s	1	1	2	2	2
		TS Domestic Diff. (A-P)	−0.0417	−0.0938	−0.0826	−0.1037	−0.1283
		TS Global Diff. (A-P)	0.0365	0.0868	0.0697	0.0741	0.1217
	0.05	n_p^e	2	3	4	4	4
		n_a^e	0	2	3	3	3
		n^s	0	1	1	1	1
		TS Domestic Diff. (A-P)	N/A	−0.0833	−0.1406	−0.1641	−0.1875
		TS Global Diff. (A-P)	N/A	0.0729	0.1302	0.1519	0.1736