GPN2016-011

NUS National University of Singapore
Global Production Networks Centre
Faculty of Arts & Social Sciences
http://gpn.nus.edu.sg

GPN Working Paper Series

Host-Country Financial Development and Multinational Activity

L. Kamran Bilir, Davin Chor & Kalina Manova

Oct 2016

Host-Country Financial Development and Multinational Activity*

L. Kamran Bilir†
University of Wisconsin – Madison

Davin Chor
National University of Singapore

Kalina Manova
University of Oxford,
NBER and *CEPR*

October 14, 2016

Abstract

This paper evaluates the influence of host-country financial development on the global operations of multinational firms. Using detailed U.S. data, we provide evidence that host-country financial development increases entry by multinational affiliates, while also decreasing affiliate sales in the local market relative to the parent country and third-country destinations. These effects are more pronounced in industries that depend more on external sources of financing. The patterns are consistent with the combination of two effects of financial development: 1) a *competition effect* that reduces affiliate revenues in the host market due to increased entry by domestic firms, and 2) a *financing effect* that encourages affiliate entry and activity in the host country due to affiliates' improved access to external finance.

Keywords: Financial development, multinational activity, FDI, heterogeneous firms, credit constraints.

JEL Classification: F12, F23, F36, G20

*We thank Pol Antràs, Bruce Blonigen, Elhanan Helpman, Beata Javorcik, Catherine Mann, Marc Melitz, Daniel Trefler, Jonathan Vogel, David Weinstein, Daniel Xu, Stephen Yeaple and Bill Zeile for their valuable feedback. Thanks also to audiences at Georgetown, Harvard, LMU Munich, Toronto, the World Bank, CUHK, HKPU, UIBE, the 2008 CESifo-NORFACE Seminar, the 2009 Asia Pacific Trade Seminars, the 2009 Midwest International Economics Group Meeting, the 2012 AEA Annual Meeting, the 2013 West Coast Trade Workshop, the 2013 Princeton IES Workshop, the 2013 NBER ITI Summer Institute, the 2013 Brandeis Summer Workshop, and ERWIT 2014. We acknowledge C. Fritz Foley and Stanley Watt, who contributed to earlier versions of this paper. Mari Tanaka provided excellent research assistance. The statistical analysis was conducted at the Bureau of Economic Analysis, U.S. Department of Commerce, under arrangements that maintain legal confidentiality requirements. The views expressed are those of the authors and do not reflect official positions of the U.S. Department of Commerce.

†L. Kamran Bilir: University of Wisconsin – Madison, kbilir@ssc.wisc.edu. Davin Chor: National University of Singapore, davinchor@nus.edu.sg. Kalina Manova (corresponding author): Department of Economics, University of Oxford, Manor Road Building, Manor Road, OX1 3UQ, UK, manova@stanford.edu.

1 Introduction

Multinational firms (MNCs) account for two-thirds of international trade and provide a key channel through which capital and technology flow across borders. These firms manage increasingly complex operations, basing offshore affiliates in multiple countries and serving multiple markets from each location. But, to an often surprising extent, affiliate operations are financed by external entities located in the affiliate country: among affiliates of U.S.-based multinationals, nearly two-thirds of affiliate debt is raised in the host country, while U.S. headquarters hold only one-sixth of affiliate debt.[1] This observation strongly suggests that multinational firms may be responsive to changes in the efficiency of capital markets abroad, and importantly, raises the question of whether countries seeking to attract multinational activity can expect financial market reforms to influence the local activity of foreign firms.

This paper provides evidence that financial development in the affiliate host country indeed impacts multinational activity. Using detailed data from the Bureau of Economic Analysis (BEA) on U.S.-based multinational firms during 1989-2009, we establish three sets of empirical regularities. First, countries with high levels of financial development attract more subsidiaries from the United States. Second, financial development influences the distribution of affiliate sales across destination markets. Stronger financial institutions in the host country raise aggregate affiliate sales to the local market, to the United States, and to third-country destinations. At the level of the individual affiliate, by contrast, exports to the United States and other markets increase, but local sales decline. Third, the share of affiliates' local sales in total sales declines with host-country financial development, while the shares of return sales to the United States and export-platform sales to other countries rise; these patterns hold at both the aggregate and affiliate levels.

We rationalize these empirical regularities within a conceptual framework featuring two distinct effects of host-country financial development. The first is the *competition effect*: In the presence of credit market frictions, an improvement in host-country financing encourages entry by domestic firms, raising local competition for the affiliates of foreign multinationals. This reduces local sales by multinational affiliates and, conditional on survival, implies increased affiliate exports to the home and third-country markets. The second effect that host-country financial development exerts is the *financing effect*, which encourages firms' use of host-country financing to support affiliate operations. By reducing borrowing costs, this effect stimulates entry by multinational affiliates, raising the aggregate volume of multinational activity in the host country implementing financial reforms. Importantly, these two effects provide an explanation for why aggregate measures of affiliate sales can rise with host-country financial development, even while surviving affiliates reduce sales to the local market.[2]

The data reveal impacts of host-country financial development on multinational activity that are economically significant. Our results imply that improving a country's financial conditions by one standard deviation is on average associated with a 10.6% increase in the number of foreign affiliates and a 17.4% expansion in aggregate affiliate sales. Sales adjust differentially across markets, however, so that the

[1] See Feinberg and Phillips (2004) and related evidence in Section 2.2.

[2] These mechanisms and predictions are formalized in a model presented in the Appendix.

share of affiliate sales to the host market falls by 2.5 percentage points, while the shares of exports to the United States and to third-country destinations rise by 1 and 1.5 percentage points respectively.

These estimates result from specifications that control for other determinants of multinational activity including market size, factor costs, economic development, broad institutional quality, export-platform market potential, as well as costs of domestic entry, of affiliate entry, and of exporting. Our primary measure of financial development is the amount of bank credit available to the private sector relative to host-country GDP, a standard proxy in the literature which reflects the strength of underlying financial institutions and their ability to support financial contracting. We also report similar results using alternative measures related to stock market capitalization and financial reforms.

To address potential endogeneity in our measure of financial development, we use variation in external finance dependence across sectors, similar to Rajan and Zingales (1998). The premise of this identification strategy is that technologically-determined reliance on outside capital defines firms' sensitivity to credit availability, but less so to general institutional or economic conditions. For example, we find that in response to the above one standard deviation improvement in financial development, the number of foreign affiliates and aggregate affiliate sales grow respectively 4.3% and 10.2% more in the industry at the 75^{th} percentile by external finance dependence relative to that at the 25^{th} percentile. Additional robustness checks confirm that these results are not driven by other industry characteristics that may be correlated with financial vulnerability. As a further test, we also allow for unobserved country or firm characteristics by introducing country, country-year, or firm fixed effects in the sales-shares specifications. The results show that host-country financial conditions contribute to the observed variation in multinational activity across sectors and time within countries, as well as across countries and sectors within firms.

This paper contributes to a growing literature studying the impact of financial frictions on firm operations. Existing evidence indicates that financial development improves aggregate growth by increasing entry by credit-constrained firms, as well as encouraging technology adoption and expansion along the intensive margin (King and Levine 1993, Rajan and Zingales 1998, Beck 2003, Beck et al. 2005, Aghion et al. 2007, Hsu et al. 2014). Financial reforms also raise firms' export participation and aggregate export volumes, with effects concentrated among small firms and in sectors relatively reliant on external capital (Manova 2008, Amiti and Weinstein 2011, Manova 2013).[3] We incorporate these insights into our analysis of financial market imperfections, and consider their implications for the competitive environment and multinational firms' activity across countries at different levels of financial development.

We also extend a separate line of research on the role of host-country financial conditions for FDI. MNC affiliates tend to be less constrained and thus more responsive to growth opportunities than domestic firms (Desai et al. 2008, Manova et al. 2015), but nevertheless react to changes in local financial conditions. Multinationals are also known to use financial markets opportunistically: They raise external finance in the host economy when possible, and access capital markets abroad or obtain direct financing from the parent company otherwise. Parent funding, however, does not fully compensate for the shortfall in local

[3] Credit and collateral conditions moreover affect the outward FDI decisions of firms, as seen for example from the experience of Japanese firms in the 1990s (Raff et al. 2016).

financing in host countries with weak financial systems (Desai et al. 2004).[4] We build on these earlier papers by considering not only MNCs' financing practices, but also their entry and sales decisions. We suggest that credit conditions can forestall the entry of a margin of prospective multinationals who fall just shy of the productivity cutoff to undertake FDI. Active multinationals, on the other hand, need not be constrained in their access to local financing, since they are productive enough to credibly commit to repay their liabilities to host-country financial institutions.[5]

Our paper adds to recent studies examining multinational firms' complex global strategies. Ramondo et al. (2016), for example, analyze the importance of horizontal, vertical and export-platform motives for U.S. multinationals. This literature has developed models that accommodate these hybrid activities and deliver predictions for trade flows and multinational operations that can be evaluated empirically (Yeaple 2003a,b, Markusen and Venables 2007, Arkolakis et al. 2012, Ramondo and Rodriguez-Clare 2013, Irarrazabal et al. 2013, Tintelnot 2016).[6] Our work indirectly speaks to the relative importance of these three FDI motives: One interpretation of our findings is that, *ceteris paribus*, stronger financial institutions in the host nation reduce the incentives to pursue FDI for horizontal motives, and instead favor vertical and export-platform motives.[7]

Finally, the competition effect we highlight relates to prior work on the interaction between foreign affiliates and domestic firms in FDI host countries. Multinationals may crowd out local producers by raising competition (Aitken and Harrison 1999, De Backer and Sleuwaegen 2003), but they can also generate productivity spillovers and nudge indigenous companies to remove X-inefficiencies, especially when local financial markets are strong (Alfaro et al. 2004, Haskel et al. 2007). For this, the literature has identified several specific channels, including knowledge spillovers through labor turnover (Poole 2013) and improvements in the provision of intermediate inputs (Javorcik 2004, Javorcik and Spatareanu 2009, Arnold et al. 2011).[8] Consistent with the idea that multinational affiliates generate positive spillovers for the local economy, the data suggest host countries that experienced a larger increase in U.S. MNC affiliate sales between 1989 and 2009 also recorded higher growth in GDP per capita over that period (Appendix Figure 1).[9] While the literature has primarily emphasized the implications of FDI for the

[4] Firms with the capacity to do so may in fact vertically integrate their suppliers located in financially less-developed countries, to alleviate the constraints that these suppliers face (Bustos 2007, Antràs et al. 2009, Carluccio and Fally 2012). See also Buch et al. (2009) who argue that financially-constrained firms are less likely to choose horizontal FDI over direct exporting because of the higher associated fixed costs.

[5] Our analysis also contributes to research on the impact of broader institutional frictions on FDI. While we focus on financial institutions, other recent studies have emphasized the effects of contractual imperfections, investor protection laws, and intellectual property rights on multinational activity (Antràs 2003, Branstetter et al. 2006, Bénassy-Quéré et al. 2007, Bernard et al. 2010, Antràs and Chor 2013, Bilir 2014). Similar to Antràs and Caballero (2009), our approach emphasizes the equilibrium interaction between FDI and trade flows in the presence of financial frictions.

[6] Yeaple (2013), Chapter 3, provides a review of this growing literature on hybrid models of FDI. It is conceptually challenging to write down a tractable multi-country model that accommodates horizontal, vertical and export-platform motives for FDI simultaneously, given the large number of combinatorial possibilities that a multinational firm would face in such a general setting. In a world with N countries, the number of possible combinations of production locations is already 2^N, even before considering the sales and export destination decisions of each affiliate that is established.

[7] See also Fillat et al. (2015) who demonstrate that the spatial dimension of U.S. MNC affiliate activity is consistent with risk diversification motives.

[8] See also Alviarez (2015), who indicates that multinational entry can directly increase aggregate productivity even in the absence of technological spillovers to domestic firms, as the former are on average more productive than the latter.

[9] This positive association holds in a regression setting, even when controlling for initial GDP per capita or when consid-

host economy, we also highlight how local financial development and increased competition by domestic firms can affect the activity of foreign multinationals.

The rest of the paper proceeds as follows. Section 2 develops a conceptual framework, to introduce the intuition for the competition and financing effects, as well as to outline the predictions for the range of outcome measures of MNC activity we consider. Section 3 then outlines the estimation strategy for uncovering these effects of host-country financial development. Section 4 describes the data used, while Sections 5 and 6 report the empirical findings. The last section concludes. The formal model and other appendix material are available in a supplementary online resource.

2 Conceptual Framework

We propose two mechanisms through which the financial development of a host country can affect firms' decision to locate a production affiliate there and, conditional on doing so, the distribution of the affiliate's sales across markets. We refer to these two mechanisms as the *competition effect* and the *financing effect*. Other forces may also be important, but for clarity, we emphasize these two channels, both of which work through the entry of domestic and multinational firms in response to host-country financial reform.

Suppose that firms operate in a multi-country world, each producing a differentiated variety and selling to consumers that view product varieties as imperfect substitutes. Suppose further that all firms face common fixed costs of entry, domestic production, exporting, and FDI, as well as iceberg trade costs, but are heterogeneous in their exogenous productivity. Firms thus sort into different operation modes, giving rise to productivity cutoffs for domestic production, exporting, and FDI. The Appendix provides an example of one such environment, formalizing the intuition using a three-country model with heterogeneous firms that builds on Helpman et al. (2004) and Grossman et al. (2006).[10]

Two types of establishments may coexist in a given host economy: domestic firms and affiliates of multinational companies headquartered in another (home) country. Each prospective multinational (indexed by a) decides whether to enter and set up an affiliate in the host country. Conditional on entry, the affiliate's total output $TOT(a)$ is determined through imperfect competition among firms in each market. This total output is a combination of affiliate sales in the host country (horizontal sales) $HOR(a)$, exports to the headquarters country (return sales) $RET(a)$, and exports to other markets (platform sales) $PLA(a)$, where $TOT(a) \equiv HOR(a) + RET(a) + PLA(a)$; note that the framework allows for the possibility that sales to some of these markets could be zero.[11] Assume factor costs in the

ering non-overlapping five-year intervals (Columns 1 and 3, Appendix Table 1). Of interest, the composition of affiliate sales also appears to be correlated with economic growth. Host countries exhibit greater GDP per capita growth when there is a larger rise in the share of U.S. MNC affiliate sales destined for the local market (see Appendix Figure 1, and Columns 2 and 4 of Appendix Table 1); this holds when controlling for the growth over the same period in aggregate affiliate sales.

[10] As in Helpman et al. (2004), the industry equilibrium in the Appendix model features a sorting pattern in which the most productive home-country firms conduct FDI, a relatively less productive set of firms opt instead to export, while an even less productive margin of firms remains purely domestic or even exits. In addition to financial considerations, the model features standard determinants of MNC activity such as factor costs, market size, and various overhead costs.

[11] For example, Fillat et al. (2015) report that affiliates with only horizontal sales, i.e., with $HOR(a) > 0$ and $RET(a) = PLA(a) = 0$, are empirically relevant in the BEA data on U.S. multinational affiliate activity abroad. There are even affiliates that report only horizontal sales to local unaffiliated parties (Ramondo et al. 2016).

host country are low enough to ensure that some firms wish to establish a foreign affiliate, but that only sufficiently productive firms do so, bearing the high fixed affiliate set-up cost.

Suppose now that all firms require external capital to fund certain upfront costs that must be incurred before manufacturing can commence and sales revenues can be generated. Such a need may arise even among established firms when corporate governance frictions imply that they cannot retain sufficient earnings to fund future activities and must instead distribute them as dividends or profits to stakeholders. For concreteness, suppose that firms need external finance to cover their fixed costs of production and any fixed costs of exporting or FDI should these additional activities be pursued.

To highlight the role of host-country credit market frictions, we assume that the headquarters country has efficient capital markets and no credit constraints. In other words, a multinational firm can access financing at its headquarters for any home-country production at an interest rate exogenously set on international capital markets. However, home-country financiers may *or may not* be willing to fund affiliate operations abroad. We consider each of these two cases in turn. The financing effect we propose will emerge precisely from comparing multinational activity across these two scenarios.

By contrast, assume that external financing in the FDI host economy is subject to credit market frictions.[12] For host-country firms, these frictions generate a productivity cutoff for gaining access to external finance: The most productive domestic firms succeed in securing credit to begin production, since they earn sufficiently high profits to find it individually rational to honor their debt repayment. On the other hand, firms falling just below this cutoff are unable to obtain external financing even though they could generate a positive operating profit, due to their inability to commit against an opportunistic default. The credit constraints that this margin of domestic firms face in the host country will generate the competition effect we identify.[13]

2.1 The Competition Effect

Consider the impact of a host-country financial reform that raises firms' pecuniary cost of default. Assume first that multinationals have access to efficient capital markets at home and that financiers there are willing to fully fund their global operations. Multinationals thus choose to source affiliate financing from the home market, as less-efficient host-country institutions imply a higher effective cost of capital there.

By discouraging opportunistic default, host-country financial reform thus lowers the productivity cutoff required for domestic firms to obtain the external capital needed to commence production, as a new margin of relatively less productive firms can now also credibly commit to repay their loans. This promotes entry by domestic firms, raising competition in the host economy for both domestic and

[12] For example, the imperfect enforceability of financial contracts or collateral claims may expose lenders to default risk if debtors can hide their financial resources, as in Aghion et al. (2005). Firms would then be able to borrow only if they can credibly commit to repay their loans.

[13] Note that the financing and competition effects will remain operative under alternative assumptions about the micro-foundations of financial market imperfections or the degree of such imperfections across countries. For instance, they will obtain as long as financial frictions are more severe in the FDI host country than in the multinationals' home country, even if the latter too has an inefficient financial system. It is also not crucial whether credit under-provision is due to endogenous default risk, asymmetric information between borrowers and lenders, or some other form of credit market failure.

multinational firms. As a result, local demand for each differentiated variety decreases.

Within this framework, host-country financial development affects three sets of multinational activity outcomes that are observed in the data. First, facing increased competition from domestic firms, the least productive multinational affiliates exit and the number N of affiliates in the host country thereby declines. Note that for continuing affiliates, this decline in N also tends to reduce the competition they face in the home and third-country markets.[14]

Second, conditional on survival, each affiliate's sales $HOR(a)$ to the now more competitive local market fall, while its export sales $RET(a)$ and $PLA(a)$ rise to the now less competitive parent and third-country destinations.[15] The net effect of these adjustments on the subsidiary's total sales $TOT(a)$ is ambiguous, but the predictions for the underlying sales ratios are not: the share of horizontal sales $HOR(a)/TOT(a)$ falls, while the shares of return $RET(a)/TOT(a)$ and platform sales $PLA(a)/TOT(a)$ both rise.

Third, financial reform has implications for aggregate affiliate sales across all active affiliates in the host country. Denote by HOR, RET, PLA and TOT the aggregate counterparts of the above affiliate-level sales variables. In the case of aggregate horizontal sales, both the intensive margin (the local sales of each surviving affiliate) and the extensive margin (the number of affiliates) contracts, and HOR consequently declines. In the case of aggregate return and platform sales, however, the increase on the intensive margin moves in the opposite direction to the exit of affiliates on the extensive margin, so that the implications for RET, PLA, and by extension TOT, are potentially ambiguous.[16] As market competition in the host country intensifies relative to that in other markets, the composition of aggregate affiliate sales nevertheless inherits the properties of the composition of individual affiliate sales: the aggregate share of horizontal sales HOR/TOT falls, while the aggregate return and platform sales shares, RET/TOT and PLA/TOT, both rise.

These outcome-specific effects of host-country financial development are summarized as empirical hypotheses in the first column of Table 1, under the "Competition Effect with No/Weak Financing Effect" heading. Before proceeding further, it is worth noting one caveat: The entry of more domestic firms in the host country would in principle raise the demand for factors of production, and hence increase factor returns such as local wages. To the extent that this translates into higher local demand for the varieties produced by multinational affiliates, this could dampen the observed decrease in the horizontal sales share.[17] It is thus important that our subsequent empirical analysis includes controls for host-country factor costs throughout all specifications to hold this effect constant.

[14] This holds under the condition that domestic firms from the host country either do not export to the home and third-country markets or if they do, that these exports do not expand significantly; see the Appendix model for a discussion of this issue.

[15] If one of these sales values were initially zero, these predictions would be replaced by a weak statement on the direction of change instead of a strict fall or rise.

[16] The three-country model in the Appendix is a case in which the contraction on the extensive margin dominates the expansion on the intensive margin, such that RET, PLA and hence TOT all decline.

[17] We further discuss how the endogenous response of local factor prices might mute the competition effect in the context of the three-country model that we develop in the Appendix. The numerical exercises there indicate that the labor force in the host country would need to be considerably smaller than that in the multinationals' home country in order for the competition effect to be reversed.

2.2 The Financing Effect

We next consider how host-country financial development can affect MNC activity not only through the competition effect, but also through a direct financing channel.

This aspect of our framework builds on evidence indicating that low levels of financial development in a host economy pose a potentially significant obstacle to firms seeking to establish an affiliate there. As an example, a recent report on Japanese firms highlights the challenges they face in funding would-be profitable operations in emerging markets in Asia, especially when they are small or medium-sized enterprises (Oba 2012).[18] Firms prefer local financing because home-country financing exposes them to exchange rate risk, while also tying up liquid funds and collateralizable assets that could be otherwise deployed. However, accessing external capital in the host country is often difficult and costly, especially when local financial institutions are underdeveloped and prospective MNCs have no pre-existing business relationships. Japanese firms lament that they face strict collateral requirements from local banks, who also insist on supporting guarantees from Japanese banks. These firms thus face limits on the quantum of bank loans they can obtain, while also encountering difficulties in raising capital through other means such as local bond or equity markets. This experience of Japanese firms has been echoed elsewhere. Financing by local banks in emerging economies is often insufficient, expensive, and of shorter duration. This can altogether deter entry, as was the case for one U.S. telecommunications firm interested in Russia (Gordin 2011). Indeed, countries have implemented financial sector reforms in part to stimulate FDI inflows, such as measures to tighten accounting standards, strenghten financial contract enforcement, or relax restrictions on foreign bank entry and cross-border bank alliances.[19]

Complementing the above, the recent academic literature has found systematic empirical evidence that host-country conditions affect MNCs' financing practices.[20] A broad message from this work is that multinational firms use both internal and external capital markets opportunistically to minimize their cost of capital, in the presence of frictions that prevent them from perfectly arbitraging differences in the costs of external capital across countries. As a result, MNC affiliates often obtain significant amounts of external finance in their host country and are responsive to local financing conditions. Among U.S. multinational firms, for example, Feinberg and Phillips (2004) report that during 1983-1996, close to two-thirds of the debt of their subsidiaries abroad was raised locally, while funding from the parent company accounted for an additional 16%. These numbers have remained stable over time: using BEA data corresponding to more recent years, we find that the average share of host-country affiliate debt was 0.64 in 1999 and 0.66 in 2004, with a standard deviation of about 0.30 in both years (see Table 2).[21]

[18] This is consistent with evidence that smaller firms generally have less access to external finance than larger companies (Guiso et al. 2004).

[19] Some examples: A 2002 OECD report on Russia identified banking sector reforms, improving financial transparency, and strengthening accounting standards as critical to increasing FDI inflows (Ogutco 2002). Japanese MNCs often rely on the overseas network of Japan's megabanks, and the alliances of regional Japanese banks with local lenders such as Thailand's Kasikorn Bank and Bangkok Bank (Oba 2012). Following the 1997-1998 Asian crisis, Korea experienced a large FDI inflow after lifting barriers on foreign ownership of land and real estate, these being key collateralizable assets for raising local financing (US Department of State 2015).

[20] See Foley and Manova (2015) for a detailed review.

[21] Detailed information on affiliate financing practices was not collected by the BEA after the 2004 benchmark survey.

In addition, this use of local financing is known to adjust when host-country financial institutions are more developed. Desai et al. (2004) and Antràs et al. (2009) show that U.S. MNC affiliates use less external debt in host economies with lower levels of private credit and weaker creditor rights protection. Conversely, in such host countries, U.S. MNC parents finance a bigger share of affiliate assets and hold a higher share of affiliate equity. Local financial conditions moreover appear to influence the scale of MNC operations, suggesting that MNC subsidiaries do not perfectly compensate for limited access to capital in their host country with alternative sources of funding. For U.S. affiliates abroad, Desai et al. (2004) estimate that greater borrowing from the parent substitutes for only three-quarters of the shortfall in external borrowing induced by weak local credit markets.[22] Although multinational subsidiaries are likely to be less resource-constrained than domestic firms, this body of evidence nevertheless suggests that various margins of multinational activity and sales would be responsive to changes in host-country financing conditions.[23]

Motivated by this evidence, we consider the implications of host-country financial reform, allowing multinationals to respond not only to competition from domestic firms, but also to the availability of local finance. In particular, suppose that home-country financiers are unwilling to fully finance affiliate costs incurred abroad.[24] In this environment, host-country financial development exerts a financing effect that significantly alters the response of multinational activity as follows.

First, when multinational affiliates rely on host-country financial markets for some of their financing, they can raise sufficient credit to operate only if they are productive and profitable enough to commit to repay their local debts. An improvement in host-country financial development now lowers the productivity cutoff for pursuing FDI, and thereby facilitates entry not only by more domestic firms, but also by more foreign subsidiaries. In particular, FDI becomes feasible for a margin of relatively smaller, less productive multinational firms. If this effect is sufficiently strong, it reverses the earlier prediction of a decline in the extensive margin of MNC activity: the number of affiliates N would in fact increase.[25]

Second, the competition effect remains active and may even be amplified. Host-country financial

[22] Along similar lines, Feinberg and Phillips (2004) argue that MNCs operating in countries with less developed capital markets and greater restrictions on FDI are less able to reallocate activity across their affiliates in response to differential growth shocks. Note that the headline figures cited from Feinberg and Phillips (2004) and Desai et al. (2004) are not inconsistent with each other. The two-thirds figure from Feinberg and Phillips (2004) is a raw unconditional mean of the share of affiliate financing obtained from unaffiliated host-country sources. In contrast, Desai et al. (2004)'s three-quarters figure is based on a multivariate regression that estimates the causal effect of a reduction of affiliate financing obtained from non-parent sources on financing obtained from the parent, where the former is instrumented by host-country credit conditions.

[23] Unlike MNCs, domestic producers rely on both internal finance and external finance raised in their domestic capital market, as imperfect contractibility and asymmetric information across borders make it difficult for them to access external capital markets abroad. Domestic firms are thus more financially constrained, more dependent on the availability of local financing, and less responsive to growth opportunities than MNC subsidiaries (Desai et al. 2008, Manova et al. 2015).

[24] This could be due to institutional frictions: Affiliate assets might not be fully collateralizable, due to expropriation risk or difficulties in enforcing cross-border claims; there might be asymmetric information when lenders do not observe how firms manage operations or customize production processes to local conditions; and local creditors could have an advantage in monitoring debtors' activity relative to home-country financiers. As a result, parent-country financiers would either not fully supply the funding needs of MNC affiliates or would charge higher interest rates for MNC activities abroad than for their operations at home.

[25] Note that these changes could also occur even when MNCs do not borrow in the host economy, if improvements in financial contractibility and the enforceability of collateral claims were to lead home-country creditors to reduce the interest rates they offer.

development intensifes competition in the local market and lowers demand more steeply for each variety because of the increased entry of both domestic and foreign firms. This leads to a reduction in the horizontal sales of individual MNC affiliates, both in levels, $HOR(a)$, and as a share of total sales, $HOR(a)/TOT(a)$. It correspondingly implies a rise in the platform and return sales shares, $PLA(a)/TOT(a)$ and $RET(a)/TOT(a)$. However, the direction of change for the levels of $PLA(a)$, $RET(a)$, and hence $TOT(a)$, cannot be determined as precisely, since this depends on the extent to which the entry of more MNC affiliates raises competition back in the home- and third-country markets.

Third, the expansion in MNC activity along the extensive margin can now be strong enough to dominate any contractions along the intensive margin of individual affiliate sales. The aggregate sales levels in any market, HOR, RET, PLA and TOT, can therefore all rise. At the same time though, the overall composition of these aggregate sales is still governed by the competition effect, so that HOR/TOT falls, while RET/TOT and PLA/TOT both increase.

The above implications of host-country financial development are summarized in the second column of Table 1, under the "Competition Effect with Strong Financing Effect" case. This column lists the combined impact of these two forces when the financing effect is sufficiently powerful to overturn the competition effect on the number of MNC affiliates and aggregate affiliate sales. Should the financing effect be present but relatively weak, the implications would instead follow those described in column 1.

3 Empirical Strategy

The conceptual framework of Section 2 motivates our empirical analysis of the impact of host-country financial development on U.S. multinational activity abroad. This section describes the estimation framework we use to evaluate it in the data.

3.1 First estimating equation

We examine the influence of host-country financial institutions on multinational activity using the following baseline specification:

$$MNC_{ikt} = \alpha + \beta\, FD_{it} + \Gamma X_{it} + \varphi_k + \varphi_t + \epsilon_{ikt}, \tag{3.1}$$

where MNC_{ikt} characterizes the activity of U.S.-based multinational firms in host country i and industry k in year t, and FD_{it} is the financial development of country i in year t. The main coefficient of interest, β, captures the impact of host-country financial conditions on multinational activity.

We estimate equation (3.1) with three sets of outcome variables, MNC_{ikt}: 1) the number of foreign affiliates, N_{ikt}; 2) aggregate affiliate sales to each destination market, HOR_{ikt}, PLA_{ikt} and RET_{ikt}, and across all markets, TOT_{ikt}; and 3) the share of aggregate affiliate sales to each destination, $\frac{HOR_{ikt}}{TOT_{ikt}}$, $\frac{PLA_{ikt}}{TOT_{ikt}}$ and $\frac{RET_{ikt}}{TOT_{ikt}}$. We assess the implications for individual firms with an affiliate-level version of (3.1) using two additional sets of outcomes: 4) affiliate-level sales by destination, $HOR_{ikt}(a)$, $PLA_{ikt}(a)$ and $RET_{ikt}(a)$, and across all markets, $TOT_{ikt}(a)$; and 5) the share of affiliate-level sales to each destination, $\frac{HOR_{ikt}(a)}{TOT_{ikt}(a)}$, $\frac{PLA_{ikt}(a)}{TOT_{ikt}(a)}$ and $\frac{RET_{ikt}(a)}{TOT_{ikt}(a)}$.

Based on the conceptual framework in Section 2, we expect host-country financial development to have distinct effects across the different dimensions of multinational activity. These depend on the presence and relative strength of the competition and financing effects. For clarity in the discussion below, we label the coefficient β for regressions involving multinationals' horizontal, platform and return sales as β_{HOR}, β_{PLA} and β_{RET}, respectively.

First, if active and dominant, the competition effect arises as host-country financial development induces entry by domestic firms. The resulting increase in local competition then reduces affiliate-level sales revenues in the host country $HOR_{ikt}(a)$, consistent with $\beta_{HOR} < 0$. Furthermore, the shares of affiliate-level and aggregate sales to the host market, $\frac{HOR_{ikt}(a)}{TOT_{ikt}(a)}$ and $\frac{HOR_{ikt}}{TOT_{ikt}}$, both decline, while the shares of export sales to the parent country and to third-country destinations, $\frac{RET_{ikt}(a)}{TOT_{ikt}(a)}$, $\frac{RET_{ikt}}{TOT_{ikt}}$, $\frac{PLA_{ikt}(a)}{TOT_{ikt}(a)}$ and $\frac{PLA_{ikt}}{TOT_{ikt}}$ all rise. These latter effects would be consistent with $\beta_{HOR} < 0$, $\beta_{PLA} > 0$ and $\beta_{RET} > 0$ for the regressions involving affiliate-level and aggregate sales shares.[26]

Second, if active and dominant, the financing effect implies that host-country financial development raises the aggregate level of MNC activity, as more multinational firms can access capital in the host country when the financing environment there improves. The number of offshore affiliates, N_{ikt}, and aggregate affiliate sales to each destination, HOR_{ikt}, PLA_{ikt}, RET_{ikt} and TOT_{ikt}, would then all grow with financial development in i. Finding $\beta > 0$ for each of these outcome variables would thus be consistent with the presence of the financing effect, while $\beta < 0$ would indicate that it is either moot or small relative to the competition effect.

The baseline specification (3.1) incorporates a number of important controls that account for the role of other determinants of multinational activity. The formal model in the Appendix illustrates the mechanisms through which these might operate, in terms of how they would influence the export-versus-FDI decision of prospective multinational firms. We thus include in X_{it} a series of host-country covariates that reflect local characteristics other than FD_{it} that would affect MNC decisions, such as controls for aggregate demand, factor costs, and various costs of entry, production, trade and FDI. Since our empirical analysis focuses on the global activity of U.S.-based firms, all relevant characteristics of the parent country are subsumed by year fixed effects, φ_t; these also account for temporal changes in global macroeconomic conditions. Finally, industry fixed effects, φ_k, absorb cross-sector differences in parameters such as aggregate expenditure shares, demand elasticities, and production, trade and FDI costs. The error term ϵ_{ikt} captures any residual factors that shape MNC operations. We cluster standard errors by host country, to allow for correlated shocks across observations at the country level.

[26] The affiliate-level and aggregate sales shares sum to 1 by definition. Accordingly, the coefficients on any given right-hand side variable sum to 0 across the specifications for the three sales shares. However, each regression still delivers independent information, namely whether the effect of financial development on each outcome is significantly different from 0. Note that there are no efficiency gains from estimating the three equations simultaneously as seemingly unrelated regressions, since each includes the same set of explanatory variables and is run on the same set of observations.

3.2 Second estimating equation

In equation (3.1), β is identified from the variation in financial institutions across host countries and over time. The X_{it} controls absorb the role of country characteristics that affect multinational activity and that may be correlated with financial development. If all such covariates are included in X_{it}, β isolates the independent effect of FD_{it} on MNC_{ikt} and is not subject to omitted variable bias. Separately, reverse causality is less likely to be an empirical concern given the range of dependent variables MNC_{ikt} we consider: Even should FD_{it} respond to aggregate MNC activity (N_{ikt} and TOT_{ikt}), it is less clear how the shares of affiliate sales by destination market would affect FD_{it}. Moreover, host-country financial development is plausibly exogenous from the perspective of an individual multinational affiliate.

Nevertheless, a realistic concern is that countries strengthen financial institutions while implementing broader institutional or economic reforms that also affect multinational firms. If the latter changes are unobserved, the estimates of β may reflect the influence of both financial development and these omitted country characteristics.[27] To establish the causal effect of financial development on MNC activity, we therefore introduce a second estimating equation that incorporates cross-industry variation in sensitivity to financial development:

$$MNC_{ikt} = \alpha + \beta\, FD_{it} + \gamma\, FD_{it} \times EFD_k + \Gamma X_{it} + \varphi_k + \varphi_t + \epsilon_{ikt}. \tag{3.2}$$

Here, EFD_k identifies the external finance dependence of industry k, and the coefficients β and γ jointly capture the impact of FD_{it} on MNC_{ikt}. Following Rajan and Zingales (1998), this approach builds on the premise that technological differences across industries generate differential requirements for outside capital. Firms in sectors with high external finance dependence tend to face high upfront costs, which impose liquidity constraints and raise the need for outside funding. As a result, improvements in host-country financial conditions would be expected to trigger systematically larger competition and financing effects on multinational companies active in financially more sensitive industries.[28]

We anticipate the coefficients β and γ to share the same sign for each respective outcome variable. Importantly, γ has a clear interpretation even in the presence of omitted country characteristics. In addition, in Section 6.5, we report results from estimating (3.2) with country-year fixed effects φ_{it}, in which γ isolates the impact of financial development separately from that of both observed and unobserved country-year covariates.

We view equations (3.1) and (3.2) as providing complementary evidence. Specification (3.1) estimates the effect of FD_{it} on the average industry in an economy. This is relevant for aggregate welfare, but potentially subject to estimation biases. Specification (3.2) by contrast offers cleaner identification in view of potential omitted variables and reverse causality, but is less relevant to aggregate outcomes since it reflects only differential (i.e., reallocation) effects across sectors. The empirical findings described in Section 5 below are summarized in the 'Data' column of Table 1.

[27] Note however that X_{it} will include GDP per capita and rule of law, alleviating concerns that β captures the effect of overall economic development and broader institutional reforms rather than that of financial development.

[28] This is formally established as a result in the Appendix model, where industries with higher fixed costs of production are considered more dependent on external sources for their financing needs.

4 Data Description

Implementing the empirical framework in Section 3 requires measures of multinational activity, host-country financial institutions, and industries' external finance dependence. The data and measurement approaches are described below.

4.1 U.S. multinational activity

We construct the dependent variables, MNC_{ikt}, in specifications (3.1) and (3.2) using firm-level data on the global operations of U.S.-based multinationals from the Bureau of Economic Analysis (BEA). The BEA Survey of U.S. Direct Investment Abroad provides information on U.S. parent firms and their foreign affiliates on an annual basis during our sample period, 1989-2009. The data are most comprehensive in scope and coverage in benchmark years, namely 1989, 1994, 1999, 2004 and 2009.[29,30] We therefore compute aggregate outcome variables for benchmark years only, but study the entire panel in affiliate-level regressions.[31]

An important element of this dataset is its detailed record of U.S. multinationals' affiliate sales. In addition to each subsidiary's total revenues, $TOT(a)$, the BEA reports: 1) local sales in the host country, $HOR(a)$, 2) exports to the United States, $RET(a)$, and 3) exports to other destinations, $PLA(a)$.[32] We use these as direct measures of horizontal, return and export-platform sales, as well as to calculate sales shares. Because we observe the primary industry affiliation of each parent company, we are also able to compute aggregate outcomes MNC_{ikt} by host country and year for 220 NAICS 4-digit industries.

Table 2 summarizes the pattern of affiliate sales as observed in this BEA data. In aggregate, the total revenues of U.S. multinational affiliates amount to \$561 million in the average country-industry-year triplet. The typical affiliate sells primarily to its local market (75%), while earning a smaller share of revenues from exports to the United States (7%) and to third countries (18%). This composition varies substantially across affiliates and years: The standard deviations around these three means are 36%, 20% and 31%, respectively. As illustrated in Figure 1, subsidiaries selling in only one of the three destinations capture 22% of U.S. multinationals' global sales, while affiliates serving all three destinations contribute

[29] In a typical benchmark year, the survey covers over 99% of affiliate activity by total assets, total sales, and total U.S. FDI. In case of missing survey responses, the BEA may report imputed values; these are flagged and we exclude them from the analysis.

[30] Any U.S. person having direct or indirect ownership or control of ten percent or more of the voting securities of an incorporated foreign business enterprise or an equivalent interest in an unincorporated foreign business enterprise at any time during a benchmark fiscal year is considered to have a foreign affiliate. However, for very small affiliates that do not own another affiliate, parents are exempt from reporting with the standard survey form. Foreign affiliates are required to report separately unless they are in both the same country and three-digit industry. Each affiliate is considered to be incorporated where its physical assets are located.

[31] We have verified that the affiliate-level results also hold in the subsample restricted to benchmark years.

[32] Affiliate sales by destination are observed only for majority-owned affiliates. We therefore restrict the sample to affiliates for which the U.S. parent firm has direct or indirect ownership or control of more than 50 percent of the voting securities. There are changes over time in the affiliate size thresholds above which sales by destination need to be reported, but we have checked that our findings hold when we run our analysis restricting to observations from each single benchmark year. The sum of the reported local, U.S. and third-country sales falls short of the total sales recorded for a handful of affiliates. To ensure that the sales shares described below sum to 1 across sales destinations, we calculate total sales by summing the three sales components and use this sum in our analysis. All results are robust to instead using the raw data.

over 52%. Multinational firms also locate production facilities across a broad set of countries. In 2009 for example, 1,892 parent companies operated 14,804 affiliates in 142 countries. In an average year, there are 1,465 U.S. parents each managing 4.18 foreign affiliates, with some large corporations maintaining many more subsidiaries (standard deviation: 9.78).

4.2 Host-country financial development

Our primary measure of host-country financial development is the total amount of bank credit extended to the private sector as a share of GDP, available from Beck et al. (2009). This is an outcome-based measure that captures the actual availability of external capital in an economy, and also implicitly reflects the extent to which local institutions support formal lending activity and enforce financial contracts. It is arguably the most commonly-used indicator for this purpose in the trade, growth and finance literatures.[33] We nevertheless demonstrate the robustness of our results to several alternative measures of financial development in Section 6.1.

Financial development varies significantly across the 95 host countries and 21 years in our sample (Table 2, Appendix Table 2). The mean value of FD_{it} in the panel is 0.51, with a standard deviation of 0.44. Notice that the cross-sectional dispersion of FD_{it} exceeds its time-series variation: While the standard deviation of private credit across countries was 0.62 in 2009, it was only 0.15 for the average economy over the 1989-2009 period.

4.3 Industries' external finance dependence

Industries' external finance dependence, EFD_k, is measured following Rajan and Zingales (1998). We calculate EFD_k as the share of capital expenditures not financed with internal cash flows from operations using data on all publicly-listed U.S. companies in sector k from Compustat North America.[34] This aims to capture industries' inherent need for outside capital given technologically-determined cash flow and investment structures. There is significant variation in observed external finance dependence across the 220 industries in the sample (mean: 0.42, standard deviation: 2.74).

Constructing EFD_k with U.S. data has three distinct advantages. First, the United States has a well-developed financial system; companies' observed behavior thus plausibly approximates optimal financing practices. Second, industries' financial sensitivity is not measured endogenously with respect to host-country financial conditions. Finally, estimating γ in (3.2) requires only that the true rank ordering of external finance dependence remains relatively stable across countries. The level of EFD_k may therefore differ across countries without impacting the interpretation of γ, although measurement error could bias our results downwards.

[33] This measure is also well-grounded in the theoretical model in the Appendix. There, it is shown that the value of private credit to GDP monotonically increases with the parameter in the model that governs the degree of financial frictions in the FDI host country.

[34] We first compute the external finance dependence ratio for each firm over the 1996-2005 period. We calculate EFD_k as the median such ratio across all firms in sector k; sectors with fewer than ten firms are dropped.

4.4 An Illustrative Example

As a first step towards examining the effects of host-country financial conditions on MNC activity, we provide an illustrative example in Figure 2. We compare the pattern of U.S. multinational operations in three host countries whose levels of financial development correspond approximately to the 50th, 60th and 75th percentiles in our 1989-2009 panel: Brazil in 1999, Chile in 1994, and Norway in 1989.

Figure 2 reveals two patterns. First, the value of aggregate MNC affiliate sales (scaled by host-country market size) increases with host-country financial development. Second, the share of MNC affiliate sales going to the local economy declines steadily with host-country financial development, while the shares of MNC affiliate sales to the MNC parent country (the U.S.) and to third-country destinations both rise. While only suggestive, this example indicates that host-country credit conditions might indeed influence the level and composition of FDI, and anticipates the results of our formal analysis below.

5 Main Results

5.1 Affiliate presence and number of multinational affiliates

We first examine how the financial environment of the host country affects the number of U.S. multinational affiliates. Columns 1 and 6 of Table 3 provide estimates of equations (3.1) and (3.2), in which MNC_{ikt} is an indicator equal to one if at least one foreign subsidiary is active in country i and sector k during year t.[35] Economies with strong financial institutions are significantly more likely to attract multinational activity. Moreover, the effect of financial development is systematically stronger in industries more reliant on external finance. We report OLS regressions, but the results are nearly identical if we instead adopt a probit specification (available on request). We observe similar patterns in Columns 2 and 7, where the dependent variable is the log number of affiliates in country i, industry k and year t. Conditional on multinational presence, financially advanced countries thus host more affiliates, particularly in financially more dependent sectors.

Referring back to the empirical hypotheses set out in Table 1, these results are consistent with the presence of a financing effect that is strong enough to overturn the competition effect on the extensive margin of multinational activity. Our findings are also statistically and economically significant. On average, a one standard deviation increase in private credit generates a 10.6% increase in the number of MNC subsidiaries. This impact is 4.3% higher in the industry at the 75$^{\text{th}}$ percentile by external finance dependence relative to the industry at the 25$^{\text{th}}$ percentile.

The discussion of the competition and financing effects in Section 2 accommodates the possibility that some MNC affiliates might serve all three markets of interest (host, home and third countries), while others might not. Columns 3-5 and 8-10 confirm empirically that FD_{it} and its interaction with EFD_k both have a similar positive association with the number of subsidiaries that sell to each of these three

[35] The regression sample in Columns 1 and 6 includes all country-sector-year triplets that host at least one MNC affiliate in at least one year in the panel. In all other columns, the sample includes all country-sector-year triplets with a positive number of MNC affiliates.

destinations.

5.2 Level of aggregate affiliate sales

We next evaluate the impact of host-country credit conditions on the scale of MNC operations at the aggregate level. In Table 4, we estimate (3.1) and (3.2) defining MNC_{ikt} to be the combined log revenues TOT_{ikt} of all foreign affiliates in country i and industry k during year t. We also consider log aggregate sales separately by destination, HOR_{ikt}, PLA_{ikt} and RET_{ikt}.

The patterns found once again fall in line with the strong financing effect case in Table 1: Aggregate MNC sales increase with local financial development, both in total and to each market. The economic magnitudes of these relationships are substantial. A one-standard-deviation improvement in FD_{it} expands total affiliate revenues by 17.4% in the average industry (Column 4). These effects are magnified in financially dependent sectors, with an additional differential increase of 10.2% between the 75$^{\text{th}}$ and 25$^{\text{th}}$ percentile industries based on EFD_k (Column 8). Breaking down these aggregate revenues by destination, we also observe positive coefficients for local sales, third-country platform sales and return sales to the United States. While the level effect of FD_{it} is precisely estimated only for return and total sales, the interaction terms are highly significant across all four aggregate sales measures (Columns 5-8).

5.3 Composition of aggregate affiliate sales

We also assess the influence of host-country financial development on the composition of aggregate MNC sales across destinations. Should the competition effect be present, subsidiaries would become more export-oriented following improvements in host-country financial development and sell a smaller share of their output to the local market as competition there intensifies. Importantly, this result is independent of the financing effect and holds whether or not multinationals rely on local credit for their operations. Table 5 provides the corresponding estimates.

The three dependent variables in Table 5 capture the fraction of aggregate affiliate sales destined for the local market $\frac{HOR_{ikt}}{TOT_{ikt}}$, the United States $\frac{RET_{ikt}}{TOT_{ikt}}$, and third countries $\frac{PLA_{ikt}}{TOT_{ikt}}$. We find evidence strongly consistent with the competition channel: MNC subsidiaries direct a smaller share of their sales to the local economy when it has mature credit markets, while sending a larger share to the United States and to third countries. These patterns are more pronounced in financially more vulnerable sectors. As for the magnitude of these effects, consider a host nation where access to capital improves from the 10$^{\text{th}}$ to the 90$^{\text{th}}$ percentile in the sample. Based on the point estimates from Columns 4-6, this change would be associated with a decline in the share of horizontal sales by 5.5 percentage points in the typical industry, with the impact 1.9 percentage points bigger for the industry at the 90$^{\text{th}}$ percentile by external finance dependence relative to that at the 10$^{\text{th}}$ percentile. The corresponding increase in the shares of platform and return sales to the U.S. would be 3.5 and 2.0 percentage points, with the effects being 1.4 and 0.4 percentage points larger when comparing the 90$^{\text{th}}$ percentile industry by EFD_k relative to the 10$^{\text{th}}$ percentile industry.

5.4 Level of individual affiliate sales

We next examine the implications of host-country financial development at the level of the individual affiliate. We expect subsidiaries in financially more advanced hosts to sell less locally due to the competition mechanism. In the absence of the financing effect, such subsidiaries would also sell more to the United States and to third countries. With local financing, however, the latter two export flows would move in the same direction, although they may either expand or decline (c.f., Table 1).

Table 6 shows that at the affiliate level, log local sales, $HOR_{ikt}(a)$, indeed decrease significantly in host-country financial development (Columns 1 and 4). By contrast, log sales to the United States, $RET_{ikt}(a)$, and to third-country destinations, $PLA_{ikt}(a)$, both rise with FD_{it}, such that the overall impact on log total sales, $TOT_{ikt}(a)$, is indistinguishable from zero. These effects appear to be more intense in financially more sensitive industries.

It is instructive to compare the pattern of response in affiliate-level sales in Table 6 against that for aggregate sales in Table 4. Host-country financial development is associated with a decline in horizontal sales and an insignificant effect on total sales at the intensive margin of affiliate level activity, which is consistent with the competition effect. At the aggregate level, however, Table 4 instead reveals a strong positive effect on both horizontal and total sales. These two sets of findings can be jointly rationalized if financial development has a positive effect on the extensive margin of FDI in the host country, as would be the case if the financing effect on MNC entry were strong. This would moreover be in line with the earlier evidence in Table 3 pointing to the positive effect of financial development on the number of affiliates present in the host country. Taken together, these results are therefore consistent with the presence of both the competition effect and a strong financing effect on multinational activity.

5.5 Composition of individual affiliate sales

Finally, we study the composition of affiliate-level sales across destinations. In Table 7, we estimate (3.1) and (3.2) setting the dependent variable to be the share of subsidiary revenues earned in the host country $\frac{HOR_{ikt}(a)}{TOT_{ikt}(a)}$, in the United States $\frac{RET_{ikt}(a)}{TOT_{ikt}(a)}$, and in third markets $\frac{PLA_{ikt}(a)}{TOT_{ikt}(a)}$. In line with the findings in Table 5 for aggregate sales shares, the results point to the relevance of the competition effect: Affiliates based in financially more advanced countries sell a smaller fraction of output locally compared with affiliates in financially less developed economies. By contrast, affiliates export a higher proportion of output to third-country destinations and to the United States, with platform sales responding slightly more than return sales. These patterns are amplified in sectors with higher requirements for external capital.

The regressions also indicate that host-country financial development exerts a similar marginal effect on aggregate MNC sales shares as on the sales shares of individual affiliates: The point estimates on FD_{it} in Table 7 are slightly smaller than those in Table 5, but the difference is typically not statistically significant. In unreported results, we have confirmed that the effect of financial development is in fact invariant across the firm size and productivity distributions. In other words, while MNC sales shares might vary across affiliates in a given host country for reasons unrelated to financial frictions, they exhibit the same sensitivity to financial conditions. While this need not be a general feature of the competition effect, the model in the Appendix shows that it can arise under standard assumptions about consumer demand and firm heterogeneity.

5.6 Control variables

The results above obtain in the presence of an extensive set of controls, X_{it}. We briefly discuss now the estimated effects that we find for these controls.

Across Tables 3-7, we document a pervasive role for host-country aggregate demand as measured by log GDP from the Penn World Tables (PWT) Version 7.0. Large economies attract more multinational activity (Tables 3, 4 and 6) and capture a bigger share of foreign affiliates' sales (Tables 5 and 7). This is consistent with a market-size effect that raises the propensity for horizontal FDI. The size of all third-country markets potentially served by an affiliate in country i is indirectly covered by the combination of i's own GDP and year fixed effects that subsume global and U.S. GDP.

We proxy for factor costs in the recipient country with its log GDP per capita from the PWT, as well as its stocks of physical and human capital per worker.[36] We record positive coefficients for income per capita in the sales level regressions (Table 4), but little role for factor endowments. Of note, controlling for GDP per capita helps ensure that we identify the impact of financial development separately from that of overall economic development.

We take into consideration the role of different fixed costs of firm entry, exporting and FDI that might impact MNC activity in general equilibrium. Year fixed effects implicitly account for the fixed costs of firm entry in the United States that indirectly influences the number of U.S. multinationals. To the extent that the fixed costs of domestic firm entry and production in a host country are a function of its factor costs and market size, these fixed costs are also controlled for.

We recognize that trade costs might impact the choice between exporting and FDI. We control for the distance between host country i and the U.S. with i's log bilateral distance to the United States (from CEPII) and a set of 11 time-varying dummy variables for regional trade agreements (RTAs) between the U.S. and i, such as NAFTA.[37] We proxy trade costs between the host country and potential third-country markets with indicators for i's membership in 8 major multilateral agreements, such as the E.U.[38] The estimates suggest that distance to the United States deters the level of multinational activity (Tables 3 and 4), but has only a limited impact on the composition of MNC sales (Table 5). Although we do not report these in full, the RTA coefficients tend to conform to expected patterns. For example, we find a

[36] We construct these covariates following the methodology of Hall and Jones (1999). For physical capital, we apply the perpetual inventory method to data from the PWT, setting the initial capital stock equal to $I_0/(g+d)$, where I_0 is investment in the initial year, g is the average growth rate of investment over the first ten years, and $d = 0.06$ is the assumed depreciation rate. For human capital, this is calculated as the average years of schooling from Barro and Lee (2010), weighted by the Mincerian returns to education function adopted by Hall and Jones (1999).

[37] The United States participates in 11 RTAs: US-Israel, NAFTA, US-Jordan, US-Singapore, US-Chile, US-Australia, US-Morocco, CAFTA-DR (Dominican Republic-Central America), US-Bahrain, US-Peru, US-Oman.

[38] The multilateral trade agreements included are: GATT/WTO, EU = European Union, EFTA = European Free Trade Area, CARICOM = Caribbean Community, CACM = Central American Common Market, ASEAN = Association of Southeast Asian Nations, ASEAN-China, Mercosur. All information on membership in trade agreements is from Rose (2004), augmented with direct reference to the World Trade Organization's website.

positive and significant effect of E.U. membership on the export-platform share of affiliate revenues, with a consequent decrease in the shares of both horizontal and return sales.[39] By contrast, affiliates located in NAFTA member countries report a significantly higher share of return sales to the U.S.

Finally, we capture the role of FDI costs with two proxies at the host-country level: the average corporate tax rate faced by foreign firms, computed using BEA data on observed tax incidence, and a rule of law index from the *International Country Risk Guide* which gauges the security of foreign direct investments. Consistent with profit-shifting motives, multinationals appear more likely to direct sales away from host countries with high corporate taxes towards the United States instead. Similarly, rule of law tends to be positively correlated with the share of local sales, but negatively associated with export sales shares. Of note, controlling for rule of law allows us to isolate the effect of financial institutions from that of the broader institutional context.

6 Alternative Specifications and Robustness

The results described in Section 5 are robust to a wide set of alternative specifications. In the interest of space, we present in this section additional evidence using the aggregate and affiliate-level sales shares only, as our conceptual framework in Section 2 has the sharpest predictions for these outcomes. (Corresponding sensitivity analyses for affiliate presence and sales levels are available upon request.)

6.1 Alternative measures and specifications

We first demonstrate in Table 8 that the findings are robust to alternative measures of host-country financial development. As a broader indicator of access to debt financing, we use credit extended by banks and other financial institutions as a share of GDP (from Beck et al. 2009). Since equity financing provides an alternative source of capital, we also study stock market capitalization, defined as the total value of publicly-listed shares normalized by GDP (from Beck et al. 2009). Finally, we exploit a binary variable equal to one in all years after a country has undergone various financial reforms deemed necessary for a well-functioning financial system, such as removing excessively high reserve requirements, interest controls, and entry barriers in the banking sector (from Abiad et al. 2010). We find reassuringly similar results with each measure.

In Appendix Table 3, we address the fact that many affiliates report zero activity in one of the three sales categories. Specifically, we verify that our results hold under tobit estimation. We also confirm that our findings are not driven by the behavior of small firms contributing little to overall multinational activity. We record comparable coefficients in Appendix Table 4 when we adopt weighted least squares estimation with log total affiliate sales as weights.

[39] Given the distinctiveness of the E.U. as an integrated economic region with low trade barriers, a natural concern is that the E.U. host countries might be driving our results for the effect of host-country financial development on affiliates' export-platform sales. Appendix Table 7 however confirms that this is not the case: Our findings continue to hold when the sales-shares regressions are run using only the sub-sample of non-E.U. host countries.

6.2 Additional Controls

Table 9 further shows the results to be robust to introducing three country-level controls that augment the set of variables in X_{it}. To capture the export-platform potential of country i, we construct the log average GDP of all destinations excluding i and the United States, weighted by their inverse bilateral distance from i (à la Blonigen et al. 2007). This measure of export-platform potential thus combines elements of both the size of third-country markets and the cost of serving them from an affiliate in i. We find that affiliates in hosts with greater export-platform potential indeed sell a smaller share of output locally and a larger share to third countries, with no corresponding effect on the share of return sales to the United States.

We also exploit information on barriers to firm entry in host nation i from the World Bank *Doing Business Report*. We use the first principal component of the log nominal cost (scaled by GDP per capita), the log number of procedures and the log number of days required to establish a new business in i as an additional control.[40] These directly measure the cost of domestic firm entry in the FDI recipient country, and are plausibly also correlated with the fixed cost of FDI activity there. Similarly, we include the first principal component of the log nominal cost per shipping container, the log number of procedures and the log number of days involved in exporting from country i.[41] This provides another proxy for the trade costs incurred by MNC affiliates located in i when selling to other markets. We find no evidence that these bureaucratic barriers shape the composition of MNC sales. Importantly, controlling for these three additional country variables does not affect our main results for host-country financial development; the estimated effects on the sales shares to each destination market in fact remain relatively stable when comparing Table 9 against Table 5.

In principle, the external finance dependence interactions help us to isolate the channel through which financial development influences the pattern of multinational sales, but this interpretation can be compromised if EFD_k instead picked up the effect of other pertinent sector characteristics. To allay this concern, we show in Appendix Table 5 that the findings from regression specification (3.2) are robust to including a further interaction term between FD_{it} and the capital or skill intensity of industry k.[42] Along similar lines, using firm-level regressions based on (3.2), Appendix Table 6 verifies that the main findings are intact even after controlling for the interaction between FD_{it} and the log total sales of the parent firm, the ratio of parent R&D expenditures to sales, or the affiliate average wage.[43] In other words, the results we have uncovered are robust to the possibility that larger, more research-intensive, or more skill-intensive multinationals might also require more external financing.

[40] These data are available for a subset of the countries in our sample starting in 2003. We use the average 2003-2009 value for each country in our regressions for the full 1989-2009 panel of BEA data.

[41] These data are available for a subset of the countries in our sample starting in 2006. We use the average 2006-2009 value for each country in our regressions for the full 1989-2009 panel of BEA data.

[42] The measures of capital and skill intensity are computed from the NBER CES Manufacturing Dataset, as the log real capital stock divided by total employment and log number of nonproduction workers divided by total employment respectively.

[43] Each of these control variables is calculated directly from the BEA data, for each multinational parent or affiliate.

6.3 Alternative explanations: entry barriers and export finance

Economies with advanced financial markets tend also to have low barriers to firm entry. The composition of multinationals' affiliate sales across destinations may therefore respond to the degree of competition that affiliates face from domestic producers due to these low entry costs. While still consistent with the idea that competition in the host-country consumer market determines the nature of FDI activity, such an effect would be unrelated to credit conditions. The results in Table 9 above indicate that this alternative mechanism is unlikely to explain our findings, since we control directly for entry costs with measures of the cost of doing business.[44]

Separately, the prior literature has documented that firms' export activity is more dependent on external capital than is production for the domestic market (Manova 2013). Moreover, our estimates above (as well as Desai et al. 2004) suggest that multinationals rely in part on host-country capital to finance foreign operations. Should financial development in the host improve access to capital, affiliates may be not only more likely to enter, but also more export-intensive conditional on entry. Importantly, this would result from the higher sensitivity of exporting to financial frictions, rather than from the competition effect *per se*.

Beyond the robust evidence we presented in Table 9 when conditioning on export costs from each host country, we further consider the export-finance mechanism by controlling for multinational affiliates' financing practices in equations (3.1) and (3.2). The BEA records each subsidiary's total current liabilities and long-term debt, as well as the fraction of this debt held by the U.S. parent firm, by host-country lenders, or by other entities. Should the credit environment in the host country determine affiliates' export intensity purely through the export-finance mechanism, controlling for affiliates' financing structure would turn the β and γ coefficients insignificant, particularly when the dependent variable is the share of sales exported to the U.S. or to third-country markets. Contrary to this, the effect of financial development on the market composition of affiliate sales remains qualitatively the same when we control for the fraction of local borrowing in their debt in Table 10.[45]

6.4 Unobserved firm heterogeneity

A potentially important category of omitted variables pertains to unobserved parent-firm characteristics. Multinational companies might differ in their productivity, and along other dimensions that affect production and sales decisions such as managerial practices, labor skill, R&D intensity or financial health. Such unobserved firm characteristics, as well as variation in a firm's product appeal across countries, may influence the composition of affiliate sales across destinations.

To accommodate this possibility, Table 11 adds parent-firm fixed effects to our baseline specifications.

[44] This is in the spirit of Nunn and Trefler (2013) who advocate for distinguishing between the effects of entry costs and financial development in explaining country export patterns.

[45] Specifically, we control for the share of affiliate financing obtained from non-affiliated entities in the host country, using a one-year lag. We have verified that these results are robust to controlling instead for affiliates' total leverage (scaled by total assets) or the share of loans provided by the parent company. The sample size in Table 10 is substantially reduced because only affiliates above a minimum size threshold report their financing practices.

The role of financial development is now identified from the variation in credit conditions across the affiliates of the same multinational that are based in different countries and/or in different years. We continue to observe coefficients for the main effect of FD_{it} that are consistent with the earlier Table 7 results, although only the effect on the local sales share is significant at the 10% level, while that for the platform and return sales shares is marginally insignificant (Columns 1-3). We obtain strongly significant results for all three sales shares when examining the differential effect across industries with different degrees of external financing needs (Columns 4-6).[46] In other words, a given multinational tends to orient its affiliates in financially advanced economies towards return sales and export-platform activities. By contrast, it uses subsidiaries in financially less developed host countries to serve the local market to a greater degree.

6.5 Cross-section vs time-series variation

We conclude by exploring the relative importance of the cross-country and time-series variation in financial development for observed FDI patterns. In Table 12, we add host-country fixed effects to baseline specifications (3.1) and (3.2). For the average industry, we find that this leads to imprecise estimates for the effects on the local and third-country sales shares, while the effect on the U.S. sales share remains significant (Columns 1-3). When we take into account the cross-industry variation in external finance dependence, we document large and significant impacts of FD_{it} on all three sales shares that are in line with the competition effect (Columns 4-6). Moreover, the interaction terms retain their sign and significance when we include both industry dummies and country-year fixed effects (Columns 7-9), where the latter subsume the main effect of FD_{it}.[47]

These findings suggest that financial market imperfections explain the pattern of multinational activity across countries and industries, as well as across industries within a country over time or within a country-year pair. Improvements in host-country financial development are thus associated with reallocations in the composition of affiliate sales across industries, with the direct effect on the average industry being more moderate. The latter may, however, also be substantial if financial reforms are more dramatic than those typically seen in the data. This caveat is warranted since our identification power hinges on the much larger variance in FD_{it} across countries, compared to the average within-country experience (Appendix Table 2).

7 Conclusion

This paper contributes to the literature examining how conditions in recipient countries affect multinational activity. Using comprehensive data on U.S. multinational activity abroad, we uncover several novel effects of financial development in the host economy. Financially advanced countries attract more MNC subsidiaries. Strong financial institutions in the host country also raise aggregate affiliate sales to the

[46] We obtain similar results when restricting the sample to parent firms with five or more affiliates.

[47] We have also verified that consistent patterns obtain in the cross-section of countries within a given benchmark year, as well as if we isolate the pure time-series dimension with country fixed effects but no time dummies.

local market, to the United States, and to third-country destinations. For individual affiliates, however, exports to the United States and to other markets are increased, but local sales are reduced. Yet both in the aggregate and at the affiliate levels, the share of local sales in total affiliate sales falls with host-country financial development, while the shares of U.S. and third-country sales increase. This suggests that financial development in the host country is a key institutional characteristic that dampens the horizontal motive for undertaking FDI, while favoring vertical and export-platform forms of multinational activity instead.

We propose that these empirical regularities are consistent with two effects of financial development on multinational activity in the presence of capital market imperfections: 1) a *competition effect* that reduces affiliate revenues in the local market due to increased entry by domestic firms; and 2) a *financing effect* that encourages MNC entry and activity in the host country due to improved access to external financing for MNC affiliates. These effects point to important factors governing MNCs' global operations, and have policy implications for developing countries seeking to attract FDI as a means to technology transfer and foreign capital inflows.

There remains much scope for further research. While we have focused on the effects of local credit conditions on FDI patterns, more work is needed to understand how foreign affiliates and domestic firms interact in capital markets. Our findings also suggest that the state of the financial system in different countries might affect the organizational and operational structure of global supply chains. A promising direction for future work is to examine the effects of local economic conditions and financial policy on multinational firm behavior, taking into account these firms' global affiliate network.

8 References

Abiad, Abdul, Enrica Detragiache, and Thierry Tressel, (2010), "A New Database of Financial Reforms," *IMF Staff Papers* 57(2): 281-302.

Aghion, Philippe, Thibault Fally, and Stefano Scarpetta, (2007), "Credit Constraints as a Barrier to the Entry and Post-Entry Growth of Firms," *Economic Policy* 22(52): 731-779.

Aghion, Philippe, Peter Howitt, and David Mayer-Foulkes, (2005), "The Effect of Financial Development on Convergence: Theory and Evidence," *Quarterly Journal of Economics* 120(1): 173-222.

Aitken, Brian J., and Ann E. Harrison, (1999), "Do Domestic Firms Benefit from Foreign Direct Investment? Evidence from Venezuela," *American Economic Review* 89(3): 605-618.

Alfaro, Laura, Areendam Chanda, Sebnem Kalemli-Ozcan, and Selin Sayek, (2004),"FDI and Economic Growth: The Role of Local Financial Markets," *Journal of International Economics* 64(1): 89-112.

Amiti, Mary, and David Weinstein, (2011), "Exports and Financial Shocks," *Quarterly Journal of Economics* 126(4): 1841-1877.

Antràs, Pol, (2003), "Firms, Contracts, and Trade Structure," *Quarterly Journal of Economics* 118(4): 1375-1418.

Antràs, Pol, and Ricardo Caballero, (2009), "Trade and Capital Flows: A Financial Frictions Perspective," *Journal of Political Economy* 117(4): 701-744.

Antràs, Pol, and Davin Chor, (2013), "Organizing the Global Value Chain," *Econometrica* 81(6): 2127-2204.

Antràs, Pol, Mihir Desai, and C. Fritz Foley, (2009), "Multinational Firms, FDI Flows and Imperfect Capital Markets," *Quarterly Journal of Economics* 124(3): 1171-1219.

Arkolakis, Costas, Natalia Ramondo, Andrés Rodríguez-Clare, and Stephen Yeaple, (2013), "Innovation and Production in the Global Economy," NBER Working Paper #18972.

Arnold, Jens M., Beata S. Javorcik, and Aaditya Mattoo, (2011), "Does Services Liberalization Benefit Manufacturing Firms? Evidence from the Czech Republic," *Journal of International Economics* 85(1): 136-146.

Barro, Robert, and Jong-Wha Lee, (2010), "A New Data Set of Educational Attainment in the World, 1950-2010," NBER Working Paper #15902.

Beck, Thorsten, (2003), "Financial Dependence and International Trade," *Review of International Economics* 11(2): 296-316.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine, (2009), "Financial Institutions and Markets across Countries and over Time – Data and Analysis," World Bank Policy Research Working Paper #4943.

Beck, Thorsten, Asli Demirgüç-Kunt, and Vojislav Maksimovic, (2005), "Financial and Legal Constraints to Firm Growth: Does Size Matter?" *Journal of Finance* 60(1): 137-177.

Bénassy-Quéré, Agnès, Maylis Coupet, Thierry Mayer, (2007), "Institutional Determinants of Foreign Direct Investment," *World Economy* 30(5): 764-782.

Bernard, Andrew, J. Bradford Jensen, Stephen J. Redding, and Peter K. Schott, (2010), "Intrafirm Trade and Product Contractibility," *American Economic Review: Papers and Proceedings* 100(2): 444-448.

Bilir, L. Kamran, (2014), "Patent Laws, Product Lifecycle Lengths, and Multinational Activity," *American Economic Review* 104(7): 1979-2013.

Blonigen, Bruce A., (2005), "A Review of the Empirical Literature on FDI Determinants,"*Atlantic Economic Journal* 33(4): 383-403.

Blonigen, Bruce A., Ronald B. Davies, Glen R. Waddell, and Helen Naughton, (2007), "FDI in Space: Spatial Autoregressive Relationships in Foreign Direct Investment," *European Economic Review* 51(5): 1303-1325.

Branstetter, Lee, Raymond Fisman, and C. Fritz Foley, (2006), "Do Stronger Intellectual Property Rights Increase International Technology Transfer? Empirical Evidence from U.S. Firm-Level Panel Data," *Quarterly Journal of Economics* 121(1): 321-349.

Buch, Claudia, Iris Kesternich, Alexander Lipponer, and Monika Schnitzer, (2009), "Financial Constraints and the Margins of FDI," CEPR Discussion Paper 7444.

Bustos, Paula, (2007), "FDI as a Source of Finance in Imperfect Capital Markets: Firm-Level Evidence from Argentina," Pompeu Fabra University - CREI mimeo.

Carluccio, Juan, and Thibault Fally, (2012), "Global Sourcing under Imperfect Capital Markets," *Review of Economics and Statistics* 94(3): 740-763.

De Backer, Koen, and Leo Sleuwaegen, (2003), "Does Foreign Direct Investment Crowd Out Domestic Entrepreneurship?" *Review of Industrial Organization* 22(1): 67-84.

Desai, Mihir A., C. Fritz Foley, and Kristin J. Forbes, (2008), "Financial Constraints and Growth: Multinational and Local Firm Responses to Currency Depreciations," *Review of Financial Studies* 21(6): 2857-2888.

Desai, Mihir A., C. Fritz Foley, and James R. Hines Jr., (2004), "A Multinational Perspective on Capital Structure Choice and Internal Capital Markets," *Journal of Finance* 59(6): 2451-2487.

Feinberg, Susan, and Gordon Phillips, (2004), "Growth, Capital Market Development and Competition for Resources within MNCs," NBER Working Paper #9252.

Fillat, Jose L., Stefania Garetto, and Lindsay Oldenski, (2015), "Diversification, Cost Structure, and the Risk Premium of Multinational Corporations," *Journal of International Economics* 96(1): 37-54.

Gordin, Alexander, (2011), "How to Find Financing for an Overseas Venture," *Business Finance*, businessfinancemag.com.

Grossman, Gene, Elhanan Helpman, and Adam Szeidl, (2006), "Optimal Integration Strategies for the Multinational Firm," *Journal of International Economics* 70(1): 216-238.

Guiso, Luigi, Paola Sapienza, and Luigi Zingales, (2004), "Does Local Financial Development Matter?" *Quarterly Journal of Economics* 119(3): 929â€"969.

Hall, Robert, and Charles Jones, (1999), "Why Do Some Countries Produce So Much More Output Per Worker Than Others?" *Quarterly Journal of Economics* 114(1): 83-116.

Helpman, Elhanan, Marc J. Melitz, and Stephen R. Yeaple, (2004), "Exports Versus FDI with Heterogeneous Firms," *American Economic Review* 94(1): 300-316.

Hsu, Po-Hsuan, Xuan Tian, and Yan Xu, (2014), "Financial Development and Innovation: Cross-Country Evidence," *Journal of Financial Economics* 112(1): 116-135.

Irarrazabal, Alfonso, Andreas Moxnes, and Luca David Opromolla, (2013), "The Margins of Multinational Production and the Role of Intra-firm Trade," *Journal of Political Economy* 121(1): 74-126.

Javorcik, Beata S., and Mariana Spatareanu, (2009), "Tough Love: Do Czech Suppliers Learn from Their Relationships with Multinationals?" *Scandinavian Journal of Economics* 111(4): 811-833.

King, Robert, and Ross Levine, (1993), "Finance and Growth: Schumpeter Might Be Right," *Quarterly Journal of Economics* 108(3): 717-737.

Manova, Kalina, (2008), "Credit Constraints, Equity Market Liberalizations and International Trade," *Journal of International Economics* 76(1): 33-47.

Manova, Kalina, (2013), "Credit Constraints, Heterogeneous Firms, and International Trade", *Review of Economic Studies* 80(2): 711-744.

Manova, Kalina, Shang-Jin Wei, and Zhiwei Zhang (2015), "Firms Exports and Multinational Activity under Credit Constraints," *Review of Economics and Statistics* 97(3): 574-588.

Markusen, James R., and Anthony Venables, (2007), "Interacting Factor Endowments and Trade Costs: A Multi-Country, Multi-Good Approach to Trade Theory," *Journal of International Economics* 73(2): 333-354.

Nunn, Nathan and Daniel Trefler (2013), "Domestic Institutions as a Source of Comparative Advantage." NBER Working Paper #18851.

Oba, Yoshiyuki, (2012), "Japanese SMEs' Asian Dreams: The Bottleneck is Financing," *Japan Business Press*, jbpress.ismedia.jp/articles/-/36011.

Ogutcu, Mehmet, (2002), "Attracting Foreign Direct Investment for Russia's Modernization: Batting Against the Odds," OECD.

Poole, Jennifer P., (2013), "Knowledge Transfers from Multinational to Domestic Firms: Evidence from Worker Mobility," *Review of Economics and Statistics* 95(2): 393-406.

Raff, Horst, Michael Ryan, and Frank Stahler, (2016), "Financial Frictions and Foreign Direct Investment: Evidence from Japanese Microdata," mimeo.

Rajan, Raghuram, and Luigi Zingales, (1998), "Financial Dependence and Growth," *American Economic Review* 88(3): 559-586.

Ramondo, Natalia, Veronica Rappoport, and Kim Ruhl, (2016), "Intra-firm Trade and Vertical Fragmentation in U.S. Multinational Corporations" *Journal of International Economics* 98(1): 51-59.

Ramondo, Natalia, and Andrés Rodríguez-Clare, (2013), "Trade, Multinational Production, and the Gains from Openness," *Journal of Political Economy* 121(2): 273-322.

Rose, Andrew, (2004), "Do We Really Know that the WTO Increases Trade?" *American Economic Review* 94(1): 98-114.

Tintelnot, Felix, (2016), "Global Production with Export Platforms," *Quarterly Journal of Economics*, forthcoming.

U.S. Department of State, (2015), "Investment Climate Statements 2015".

Yeaple, Stephen R., (2003a), "The Role of Skill Endowments in the Structure of U.S. Outward Foreign Direct Investment," *Review of Economics and Statistics* 85(3): 726-734.

Yeaple, Stephen R., (2003b), "The Complex Integration Strategies of Multinationals and Cross Country Dependencies in the Structure of Foreign Direct Investment," *Journal of International Economics* 60(2): 293-314.

Yeaple, Stephen R., (2013), "The Multinational Firm," *Annual Review of Economics* 5: 193-217.

Table 1. Empirical Hypotheses and Results Overview

	Competition Effect + No/Weak Financing Effect	Competition Effect + Strong Financing Effect	Data
Aggregate Affiliate Activity			
Number of MNC Affiliates, *N*	–	+	+
Total Sales, *TOT*	?	+	+
Local Sales, *HOR*	–	+	+
US Sales, *RET*	?	+	+
3rd Country Sales, *PLA*	?	+	+
Local Sales / Total Sales, *HOR/TOT*	–	–	–
US Sales / Total Sales, *RET/TOT*	+	+	+
3rd Country Sales / Total Sales, *PLA/TOT*	+	+	+
Individual Affiliates			
Total Sales, *TOT(a)*	?	?	0
Local Sales, *HOR(a)*	–	–	–
US Sales, *RET(a)*	+	?	+
3rd Country Sales, *PLA(a)*	+	?	+
Local Sales / Total Sales, *HOR(a)/TOT(a)*	–	–	–
US Sales / Total Sales, *RET(a)/TOT(a)*	+	+	+
3rd Country Sales / Total Sales, *PLA(a)/TOT(a)*	+	+	+

Notes: This table summarizes the hypothesized and observed effects of host-country financial development on multinational activity there. Column 1 presents the empirical hypotheses for the case where the financing effect is either absent or weak (so that the competition effect dominates), while Column 2 presents the analogous hypotheses for the case where the financing effect is sufficiently strong. For comparison, Column 3 reports the sign of the effects actually obtained in our empirical analysis.

Table 2: Summary Statistics

	N	Mean	Standard Deviation
Country-Industry-Year Level			
Total Affiliate Sales (thousand USD)	17,811	561,256	2,450,158
Local Affiliate Sales (thousand USD)	17,811	363,112	1,502,995
3rd country Affiliate Sales (thousand USD)	17,811	147,074	1,009,672
US Affiliate Sales (thousand USD)	17,811	51,070	626,707
Local / Total sales	17,811	0.78	0.32
3rd country / Total sales	17,811	0.16	0.27
US / Total sales	17,811	0.06	0.17
Number of Affiliates	17,811	4.08	6.56
Affiliate-Year Level			
Total Affiliate Sales (thousand USD)	227,089	192,812	845,844
Local Affiliate Sales (thousand USD)	227,089	121,663	532,596
3rd country Affiliate Sales (thousand USD)	227,089	52,490	421,167
US Affiliate Sales (thousand USD)	227,089	18,659	228,768
Local / Total sales	227,089	0.75	0.36
3rd country / Total sales	227,089	0.18	0.31
US / Total sales	227,089	0.07	0.20
Debt from parent / Total Debt	195,949	0.16	0.24
Debt from host country source / Total Debt	195,949	0.65	0.30
Industry Level			
External Finance Dependence	220	0.42	2.74
Country-Year Level			
Private Credit / GDP	1,794	0.51	0.44
Private Credit (bank & other) / GDP	1,800	0.55	0.46
Stock Market Capitalization / GDP	1,442	0.56	0.68
Financial Reform Indicator	1,114	14.56	4.66
Log GDP	1,923	25.27	1.63
Log GDP per Capita	1,923	8.98	1.19
Log Distance	1,923	8.90	0.53
Corporate Tax Rate	1,923	0.18	0.15
Log K/L	1,855	10.73	1.25
Log H/L	1,882	0.84	0.25
General			
Number of Parent Companies per Year	21	1,465	304
Number of Affiliates per Parent-Year	4,724	4.18	9.78

Notes: This table summarizes multinational activity, host-country institutions, and industry characteristics across 95 countries and 220 industries for 1989-2009. External finance dependence follows the methodology of Rajan and Zingales (1998). Financial development measures are from Beck et al. (2009) and Abiad et al. (2010). GDP and GDP per capita are from the Penn World Tables, Version 7.0. Log distance between the United States and each host country is from CEPII and is time invariant. Log physical and human capital per worker (K/L and H/L) are based on the Penn World Tables and Barro and Lee (2010). All other variables are from the Bureau of Economic Analysis Survey of U.S. Direct Investment Abroad. The corporate tax rate is constructed using information on the actual tax incidence of US multinational affiliates observed in the BEA data.

Table 3: Number of Multinational Affiliates

Dependent variable:	Indicator N > 0	Log N	Log N, local sales	Log N, 3rd ctry sales	Log N, US sales	Indicator N > 0	Log N	Log N, local sales	Log N, 3rd ctry sales	Log N, US sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fin Development	0.101	0.220	0.191	0.130	0.149	0.122	0.223	0.191	0.117	0.129
	(3.11)***	(2.28)**	(2.01)**	(1.53)	(2.00)**	(3.19)***	(2.19)**	(1.90)*	(1.23)	(1.51)
Fin Development ×						0.007	0.039	0.033	0.036	0.038
Ext Fin Dependence						(2.62)**	(3.90)***	(2.92)***	(3.09)***	(4.23)***
Log GDP	0.073	0.272	0.279	0.227	0.214	0.093	0.306	0.314	0.260	0.258
	(7.93)***	(7.37)***	(7.64)***	(6.29)***	(6.07)***	(8.93)***	(7.67)***	(7.84)***	(6.54)***	(6.55)***
Log GDP per capita	0.080	0.589	0.605	0.599	0.512	0.090	0.620	0.653	0.615	0.547
	(1.69)*	(2.89)***	(2.94)***	(2.92)***	(2.30)**	(1.60)	(2.69)***	(2.82)***	(2.58)**	(2.02)**
Log Distance to US	-0.090	-0.125	-0.127	-0.024	-0.153	-0.102	-0.121	-0.128	-0.043	-0.186
	(-2.63)***	(-2.33)**	(-2.40)**	(-0.60)	(-3.38)***	(-2.61)**	(-2.14)*	(-2.37)**	(-1.00)	(-3.63)***
Controls	Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE									
# Obs	78,916	15,531	14,991	8,845	6,896	41,630	10,435	10,109	6,565	5,049
R^2	0.44	0.53	0.53	0.47	0.44	0.48	0.56	0.56	0.50	0.47

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. OLS estimates of equations (3.1) and (3.2) are reported. The unit of observation is the country-industry-year triplet and the sample includes all benchmark years during 1989-2009. The dependent variable in columns 1 and 6 is a binary indicator equal to 1 if there is at least one US multinational affiliate present. The dependent variables in columns 2-5 and 7-10 are the log number of US multinational affiliates that are present, selling locally, exporting to third countries, or exporting to the United States respectively. Financial Development is measured by the ratio of private credit to GDP. All regressions control for log(K/L), log(H/L), Rule of Law, corporate Tax Rate, and Regional Trade Agreement (RTA) dummies. Rule of Law is from the International Country Risk Guide. The RTA dummies are from Rose (2004) and WTO. All other variables are as described in the notes to Table 2. All regressions also include industry and year fixed effects.

Table 4: Level of Multinational Affiliate Sales, Aggregate Level

Dependent variable:	Local sales	3rd ctry sales	US sales	Total sales	Local sales	3rd ctry sales	US sales	Total sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fin Development	0.233	0.376	0.756	0.350	0.148	0.403	0.684	0.298
	(1.49)	(1.51)	(3.20)***	(2.30)**	(0.95)	(1.50)	(2.61)**	(1.92)*
Fin Development × Ext Fin Dependence					0.058	0.103	0.188	0.089
					(2.70)***	(4.16)***	(6.47)***	(4.78)***
Log GDP	0.716	0.337	0.324	0.601	0.769	0.387	0.419	0.646
	(10.33)***	(3.58)***	(3.54)***	(9.02)***	(11.18)***	(3.99)***	(4.46)***	(9.69)***
Log GDP per capita	1.120	1.520	1.240	1.046	1.275	1.335	1.116	1.058
	(2.96)***	(3.16)***	(2.41)**	(2.87)***	(3.03)***	(2.57)**	(2.01)**	(2.60)**
Log Distance	-0.265	0.169	-0.508	-0.259	-0.278	0.152	-0.531	-0.233
	(-2.71)***	(1.22)	(-3.34)***	(-2.93)***	(-2.90)***	(1.14)	(-2.90)***	(-2.52)**
Controls	Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE							
# Obs	14,991	8,845	6,896	15,531	10,109	6,565	5,049	10,435
R^2	0.44	0.33	0.26	0.42	0.47	0.35	0.28	0.45

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. OLS estimates of equations (3.1) and (3.2) are reported. The unit of observation is the country-industry-year triplet and the sample includes all benchmark years during 1989-2009. The dependent variables are the log of local sales, 3rd-country sales, US sales, and total sales by all US multinational affiliates. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Table 5: Composition of Multinational Affiliate Sales, Aggregate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	-0.057	0.033	0.023	-0.058	0.037	0.021
	(-2.81)***	(1.88)*	(3.53)***	(-2.87)***	(1.99)**	(3.27)***
Fin Development × Ext Fin Dependence				-0.013	0.010	0.003
				(-3.67)***	(3.02)***	(2.28)**
Log GDP	0.033	-0.027	-0.007	0.035	-0.030	-0.005
	(4.50)***	(-4.31)***	(-2.97)***	(4.15)***	(-4.27)***	(-2.05)**
Log GDP per capita	-0.005	0.012	-0.008	0.028	-0.011	-0.017
	(-0.14)	(0.37)	(-0.58)	(0.70)	(-0.31)	(-1.28)
Log Distance	-0.011	0.020	-0.009	-0.017	0.025	-0.008
	(-0.70)	(1.98)*	(-0.95)	(-1.05)	(2.10)**	(-0.96)
Controls	Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	15,531	15,531	15,531	10,435	10,435	10,435
R^2	0.22	0.23	0.13	0.24	0.24	0.15

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. OLS estimates of equations (3.1) and (3.2) are reported. The unit of observation is the country-industry-year triplet and the sample includes all benchmark years during 1989-2009. The dependent variables are the ratio of local sales, 3rd-country sales and US sales to total sales, after the numerator and the denominator have been summed across all US multinational affiliates. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Table 6: Level of Multinational Affiliate Sales, Affiliate Level

Dependent variable:	Local sales	3rd ctry sales	US sales	Total sales	Local sales	3rd ctry sales	US sales	Total sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Fin Development	-0.153	0.237	0.470	-0.033	-0.231	0.215	0.419	-0.092
	(-2.27)**	(1.84)*	(2.95)***	(-0.64)	(-3.13)***	(1.58)	(2.51)**	(-1.69)*
Fin Development × Ext Fin Dependence					-0.001	0.044	0.126	0.014
					(-0.07)	(2.69)***	(4.35)***	(1.38)
Log GDP	0.301	-0.088	-0.080	0.143	0.363	-0.100	-0.073	0.181
	(7.66)***	(-1.46)	(-1.21)	(4.96)***	(9.45)***	(-1.67)*	(-1.07)	(7.51)***
Log GDP per capita	0.048	0.520	0.421	-0.017	0.122	0.445	0.180	-0.014
	(0.29)	(1.86)*	(1.41)	(-0.11)	(0.78)	(1.56)	(0.58)	(-0.11)
Log Distance	-0.149	0.189	-0.184	-0.087	-0.141	0.144	-0.224	-0.077
	(-3.73)***	(1.71)*	(-1.56)	(-2.35)**	(-3.42)***	(1.21)	(-1.63)	(-2.65)***
Controls	Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE							
# Obs	198,154	103,908	71,160	215,173	148,575	85,349	58,439	161,423
R^2	0.12	0.18	0.16	0.11	0.13	0.18	0.16	0.11

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. OLS estimates of equations (3.1) and (3.2) are reported. The unit of observation is the affiliate-year and the sample includes all years during 1989-2009. The dependent variables are the log of local sales, 3rd-country sales, US sales, and total sales of each US multinational affiliate. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Table 7: Composition of Multinational Affiliate Sales, Affiliate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	-0.047	0.030	0.018	-0.040	0.030	0.010
	(-2.46)**	(1.86)*	(2.20)**	(-1.90)*	(1.69)*	(1.10)
Fin Development × Ext Fin Dependence				-0.007	0.004	0.003
				(-3.87)***	(2.39)**	(1.98)*
Log GDP	0.048	-0.041	-0.008	0.050	-0.044	-0.006
	(5.35)***	(-5.78)***	(-2.52)**	(5.13)***	(-5.68)***	(-2.03)**
Log GDP per capita	-0.013	0.001	0.013	0.007	-0.011	0.004
	(-0.35)	(0.03)	(1.11)	(0.17)	(-0.31)	(0.39)
Log Distance	-0.021	0.015	0.006	-0.014	0.010	0.004
	(-1.38)	(1.45)	(0.56)	(-0.82)	(0.77)	(0.32)
Controls	Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	215,178	215,178	215,178	161,427	161,427	161,427
R^2	0.14	0.16	0.08	0.15	0.17	0.10

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. OLS estimates of equations (3.1) and (3.2) are reported. The unit of observation is the affiliate-year and the sample includes all years during 1989-2009. The dependent variables are the ratio of local sales, 3rd-country sales and US sales to total sales for each US multinational affiliate. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Table 8: Alternative Measures of Financial Development, Aggregate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Private credit by banks and other financial institutions / GDP						
Fin Development	-0.056	0.036	0.020	-0.059	0.041	0.018
	(-2.63)***	(1.94)*	(2.80)***	(-2.71)***	(2.09)**	(2.49)**
Fin Development × Ext Fin Dependence				-0.013	0.010	0.003
				(-3.65)***	(3.01)***	(2.13)**
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	15,673	15,673	15,673	10,530	10,530	10,530
R^2	0.22	0.23	0.13	0.24	0.24	0.15
Panel B: Stock market capitalization / GDP						
Fin Development	-0.038	0.024	0.014	-0.037	0.027	0.011
	(-2.64)***	(2.02)**	(3.17)***	(-2.67)***	(2.29)**	(2.61)**
Fin Development × Ext Fin Dependence				-0.009	0.008	0.002
				(-5.41)***	(4.04)***	(2.45)**
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	15,480	15,480	15,480	10,476	10,476	10,476
R^2	0.22	0.24	0.13	0.24	0.25	0.16
Panel C: Financial reform indicator						
Fin Development	-0.006	0.006	0.001	-0.006	0.006	-0.000
	(-2.10)**	(2.41)**	(0.42)	(-1.95)*	(2.31)**	(-0.11)
Fin Development × Ext Fin Dependence				-0.001	0.001	0.001
				(-3.24)***	(2.02)**	(3.46)***
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	13,323	13,323	13,323	8,985	8,985	8,985
R^2	0.22	0.23	0.14	0.23	0.24	0.15

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate Table 5 using three alternative measures of financial development: the ratio of private credit by banks and other financial institutions to GDP, the ratio of stock market capitalization to GDP from Beck et al. (2009), and an indicator variable equal to 1 in all years after a country undergoes financial reform from Abiad et al. (2010). All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Table 9: Cost of Entry, Cost of Exporting and Export Platform Potential in Host Country, Aggregate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	-0.056 (-3.50)***	0.031 (2.28)**	0.025 (3.99)***	-0.060 (-4.04)***	0.036 (2.90)***	0.024 (3.75)***
Fin Development × Ext Fin Dependence				-0.014 (-3.73)***	0.010 (3.15)***	0.003 (2.19)**
Entry Cost	0.006 (0.62)	-0.004 (-0.51)	-0.002 (-0.69)	0.010 (0.99)	-0.007 (-0.76)	-0.004 (-1.40)
Export Cost	-0.022 (-0.81)	0.031 (1.25)	-0.008 (-0.95)	-0.035 (-1.24)	0.041 (1.69)	-0.006 (-0.62)
Export Platform Potential	-0.111 (-4.16)***	0.112 (5.49)***	-0.000 (-0.02)	-0.120 (-4.47)***	0.126 (6.17)***	-0.006 (-0.59)
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	15,182	15,182	15,182	10,190	10,190	10,190
R^2	0.23	0.25	0.13	0.26	0.27	0.15

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate Table 5 adding three more controls: measures of the cost of firm entry in the host country and for the cost of exporting from the host country constructed from the World Bank Doing Business Report, as well as a measure of the host country's export-platform potential calculated using GDP and bilateral distance data from the Penn World Table and CEPII respectively. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Table 10: Use of Host-Country Financing, Affiliate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	-0.061	0.039	0.022	-0.054	0.038	0.017
	(-2.63)**	(1.82)*	(2.81)***	(-2.13)**	(1.56)	(2.27)**
Fin Development × Ext Fin Dependence				-0.008	0.005	0.002
				(-3.13)***	(2.23)**	(1.37)
Lagged Share of Local Financing	0.103	-0.084	-0.019	0.084	-0.073	-0.010
	(4.42)***	(-4.11)***	(-2.71)***	(3.78)***	(-3.69)***	(-1.46)
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# observations	22,199	22,199	22,199	16,566	16,566	16,566
R-squared	0.18	0.19	0.11	0.18	0.19	0.13

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions add one more control to the Table 7 specifications: the lagged share of affiliate financing raised in the host country from the BEA data. Only benchmark years in 1989-2009 are included. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Table 11: Parent-Firm Fixed Effects, Affiliate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	-0.033	0.023	0.010	-0.026	0.022	0.004
	(-1.94)*	(1.56)	(1.59)	(-1.44)	(1.39)	(0.58)
Fin Development × Ext Fin Dependence				-0.009	0.006	0.003
				(-5.03)***	(3.65)***	(1.99)**
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# observations	215,181	215,181	215,181	161,427	161,427	161,427
R-squared	0.27	0.27	0.24	0.28	0.27	0.24

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate Table 7 using parent firm and year fixed effects in place of industry and year fixed effects. All regressions include the full set of controls described in Table 3.

Table 12: Cross Section vs. Time Series: Country Fixed Effects, Aggregate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fin Development	0.005	-0.015	0.010	0.014	-0.020	0.006			
	(0.38)	(-1.21)	(2.04)**	(0.94)	(-1.45)	(1.24)			
Fin Development × Ext Fin Dependence				-0.012	0.009	0.003	-0.011	0.009	0.003
				(-3.46)***	(2.85)***	(2.08)**	(-3.19)***	(2.61)***	(1.87)*
Controls	Country FE, Industry FE, Year FE			Country FE, Industry FE, Year FE			Country-Year FE, Industry FE		
	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies								
# Obs	15,531	15,531	15,531	10,435	10,435	10,435	11,392	11,392	11,392
R^2	0.27	0.29	0.16	0.30	0.31	0.18	0.32	0.33	0.20

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate Table 5 adding country fixed effects to the industry and year fixed effects in columns 1-6, while including country-year fixed effects and industry fixed effects in columns 7-9. All regressions include the full set of controls described in Table 3.

Appendix Table 1: Economic Growth and Multinational Activity

Dependent variable: GDP per capita growth

Time horizon:	1989-2009		5-Year Periods in 1989-2009	
	(1)	(2)	(3)	(4)
Aggregate MNC Sales Growth	0.165*** (0.0322)	0.189*** (0.0283)	0.107*** (0.0295)	0.137*** (0.0202)
Growth in Share Local MNC Sales		0.618* (0.324)		0.193** (0.0820)
Growth in Share US MNC Sales		0.479 (0.349)		-0.131 (0.0865)
Initial log GDP per capita	-0.053 (0.0374)	-0.0576 (0.0385)	-0.015* (0.00783)	-0.020** (0.00895)
# Obs	44	38	204	164
R^2	0.549	0.593	0.199	0.325

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors in Columns 1-2 and clustered by country in Columns 3-4 appear in parentheses. The unit of observation is the country in columns 1-2 and the country-period in columns 3-4, where a period is a 5-year interval between benchmark years in 1989-2009. The dependent variable is the cumulative growth in GDP per capita over the period indicated in the row heading. The right-hand side variables are cumulative growth rates in aggregate MNC sales or in the composition of aggregate MNC sales over the concurrent period.

Appendix Table 2: Host-Country Financial Development

Country	Mean	St Dev	Country	Mean	St Dev	Country	Mean	St Dev
Algeria	0.15	0.16	Guatemala	0.21	0.08	Peru	0.17	0.08
Argentina	0.16	0.05	Guyana	0.43	0.08	Philippines	0.29	0.10
Australia	0.82	0.23	Haiti	0.13	0.02	Poland	0.25	0.09
Austria	0.99	0.10	Honduras	0.35	0.10	Portugal	1.05	0.45
Bahrain	0.41	0.07	Hong Kong	1.43	0.14	Qatar	0.29	0.04
Bangladesh	0.28	0.06	Hungary	0.38	0.14	Russia	0.19	0.12
Belgium	0.71	0.18	Iceland	0.88	0.76	Saudi Arabia	0.26	0.07
Bolivia	0.41	0.13	India	0.30	0.09	Senegal	0.20	0.04
Botswana	0.14	0.04	Indonesia	0.33	0.13	Singapore	0.92	0.12
Brazil	0.35	0.08	Iran	0.21	0.04	Slovakia	0.41	0.07
Bulgaria	0.34	0.22	Ireland	1.01	0.59	Slovenia	0.44	0.22
Cameroon	0.12	0.07	Israel	0.71	0.14	South Africa	0.63	0.10
Canada	0.96	0.24	Italy	0.71	0.18	Spain	1.05	0.42
Chile	0.55	0.12	Jamaica	0.22	0.05	Sri Lanka	0.23	0.08
Colombia	0.30	0.07	Japan	1.49	0.41	Sudan	0.04	0.02
Congo	0.06	0.05	Jordan	0.71	0.12	Sweden	0.69	0.35
Costa Rica	0.22	0.12	Kenya	0.22	0.02	Switzerland	1.61	0.07
Cote D'Ivoire	0.20	0.09	Kuwait	0.47	0.19	Syria	0.09	0.01
Croatia	0.61	0.13	Luxembourg	1.24	0.47	Tanzania	0.09	0.05
Cyprus	1.42	0.36	Malawi	0.07	0.02	Thailand	1.03	0.28
Czech Republic	0.49	0.14	Malaysia	1.09	0.22	Trinidad & Tobago	0.30	0.03
Denmark	0.97	0.70	Malta	0.97	0.15	Tunisia	0.54	0.04
Dominican Rep	0.21	0.05	Mexico	0.19	0.06	Turkey	0.17	0.07
Ecuador	0.23	0.06	Morocco	0.43	0.17	Uganda	0.05	0.02
Egypt	0.38	0.12	Netherlands	1.24	0.43	United Kingdom	1.31	0.30
El Salvador	0.35	0.09	New Zealand	1.05	0.25	Uruguay	0.32	0.15
Finland	0.69	0.14	Norway	0.64	0.09	Venezuela	0.13	0.07
France	0.91	0.09	Oman	0.34	0.04	Vietnam	0.51	0.28
Gabon	0.11	0.04	Pakistan	0.24	0.02	Yemen	0.06	0.01
Germany	1.05	0.10	Panama	0.69	0.18	Zambia	0.07	0.03
Ghana	0.08	0.04	Papua New Guinea	0.18	0.05			
Greece	0.50	0.24	Paraguay	0.22	0.05			
Panel Variation:	0.51	0.44						

Notes: This table summarizes the variation in financial development in the panel, as measured by private credit normalized by GDP. Lebanon is further included in our sample in Table 8, Panel B, where financial development is measured instead by stock market capitalization normalized by GDP.

Appendix Table 3: Tobit, Aggregate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	-0.058	0.057	0.060	-0.060	0.055	0.052
	(-2.88)***	(2.15)**	(3.42)***	(-2.92)***	(2.11)**	(3.37)***
Fin Development × Ext Fin Dependence				-0.013	0.008	0.007
				(-3.71)***	(2.13)**	(2.95)***
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# observations	15,531	15,531	15,531	10,435	10,435	10,435
R-squared	0.37	0.30	0.27	0.42	0.31	0.38

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate Table 5, but apply Tobit instead of OLS estimation. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Appendix Table 4: Weighted Least Squares, Affiliate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	-0.051	0.032	0.019	-0.046	0.034	0.012
	(-2.56)**	(1.89)*	(2.40)**	(-2.10)**	(1.80)*	(1.34)
Fin Development × Ext Fin Dependence				-0.008	0.004	0.004
				(-3.86)***	(2.39)**	(2.06)**
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# observations	210,852	210,852	210,852	159,137	159,137	159,137
R-squared	0.16	0.18	0.09	0.16	0.18	0.11

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate Table 5, but apply Weighted Least Squares instead of OLS estimation, using log total affiliate sales as weights. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Appendix Table 5: Interacting Financial Development with Other Industry Variables, Aggregate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Fin Development	0.782	-0.702	-0.080	0.088	-0.079	-0.009
	(2.31)**	(-2.41)**	(-0.67)	(0.65)	(-0.73)	(-0.17)
Fin Development ×	-0.013	0.010	0.003	-0.013	0.010	0.003
Ext Fin Dependence	(-3.72)***	(3.07)***	(2.29)**	(-3.70)***	(3.05)***	(2.29)**
Fin Development ×	-0.071	0.062	0.009			
Industry Capital Intensity	(-2.47)**	(2.51)**	(0.87)			
Fin Development ×				-0.140	0.111	0.029
Industry Skill Intensity				(-1.12)	(1.10)	(0.59)
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	10,435	10,435	10,435	10,435	10,435	10,435
R^2	0.24	0.25	0.15	0.24	0.25	0.15

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate columns 4-6 of Table 5 adding: financial development interacted with industry capital intensity, and financial development interacted with industry skill intensity. The measures of capital and skill intensity are computed from the NBER CES Manufacturing Dataset, as the log real capital stock divided by total employment, and log nonproduction workers divided by total employment respectively. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Appendix Table 6: Interacting Financial Development with Other Firm Variables, Affiliate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Fin Development	-0.066	0.020	0.045	-0.048	0.033	0.015	-0.025	0.025	-0.000
	(-0.96)	(0.39)	(1.26)	(-1.96)*	(1.57)	(1.24)	(-0.97)	(1.46)	(-0.02)
Fin Development × Ext Fin Dependence	-0.007	0.003	0.004	-0.007	0.002	0.004	-0.007	0.003	0.003
	(-3.21)***	(1.87)*	(1.90)*	(-2.86)***	(1.77)*	(1.99)**	(-3.22)***	(1.81)*	(1.84)*
Log Parent Sales	0.012	-0.011	-0.000						
	(2.26)**	(-3.07)***	(-0.13)						
Fin Development × Log Parent Sales	0.001	0.001	-0.002						
	(0.26)	(0.30)	(-0.83)						
Parent R&D / Sales				-0.017	-0.038	0.055			
				(-0.24)	(-0.62)	(2.41)**			
Fin Development × Parent R&D / Sales				-0.019	0.057	-0.038			
				(-0.27)	(1.01)	(-1.82)**			
Affiliate Wage							0.000	-0.000	-0.000
							(1.57)	(-1.23)	(-1.23)
Fin Development × Affiliate Wage							-0.000	0.000	0.000
							(-1.62)	(1.19)	(1.33)
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE								
# Obs	120,447	120,447	120,447	120,448	120,448	120,448	149,089	149,089	149,089
R^2	0.15	0.17	0.10	0.15	0.17	0.10	0.16	0.18	0.12

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate columns 4-6 of Table 7 adding: financial development interacted with log parent sales, financial development interacted with parent R&D divided by sales, and financial development interacted with the affiliate average wage compensation per worker. All firm-level variables are calculated from the Bureau of Economic Analysis Survey of U.S. Direct Investment Abroad. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Appendix Table 7: EU vs non-EU Host Countries, Aggregate Level

Dependent variable:	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales	Local sales / Total sales	3rd ctry sales / Total sales	US sales / Total sales
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: EU host countries						
Fin Development	0.006	-0.014	0.008	0.013	-0.018	0.005
	(0.21)	(-0.54)	(1.40)	(0.45)	(-0.61)	(0.83)
Fin Development × Ext Fin Dependence				-0.015	0.012	0.003
				(-2.92)***	(2.18)**	(1.52)
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	6,098	6,098	6,098	4,191	4,191	4,191
R^2	0.32	0.30	0.14	0.31	0.29	0.11
Panel B: Non-EU host countries						
Fin Development	-0.097	0.066	0.030	-0.098	0.071	0.027
	(-3.53)***	(2.60)**	(3.68)***	(-3.58)***	(2.65)***	(3.63)***
Fin Development × Ext Fin Dependence				-0.009	0.007	0.002
				(-2.14)**	(1.87)*	(1.11)
Controls	Log GDP, Log GDP per capita, Log Distance, Log K/L, Log H/L, Rule of Law, Tax Rate, RTA Dummies, Industry FE, Year FE					
# Obs	9,433	9,433	9,433	6,244	6,244	6,244
R^2	0.22	0.21	0.16	0.16	0.22	0.19

Notes: * p<0.10, ** p<0.05, *** p<0.01; t-statistics based on robust standard errors clustered by country appear in parentheses. The regressions replicate columns 4-6 of Table 5 for the EU and non-EU host country sub-samples respectively. All regressions include the full set of controls described in Table 3, as well as industry and year fixed effects.

Figure 1a
The Distribution of MNC Affiliates by Active Sales Destinations

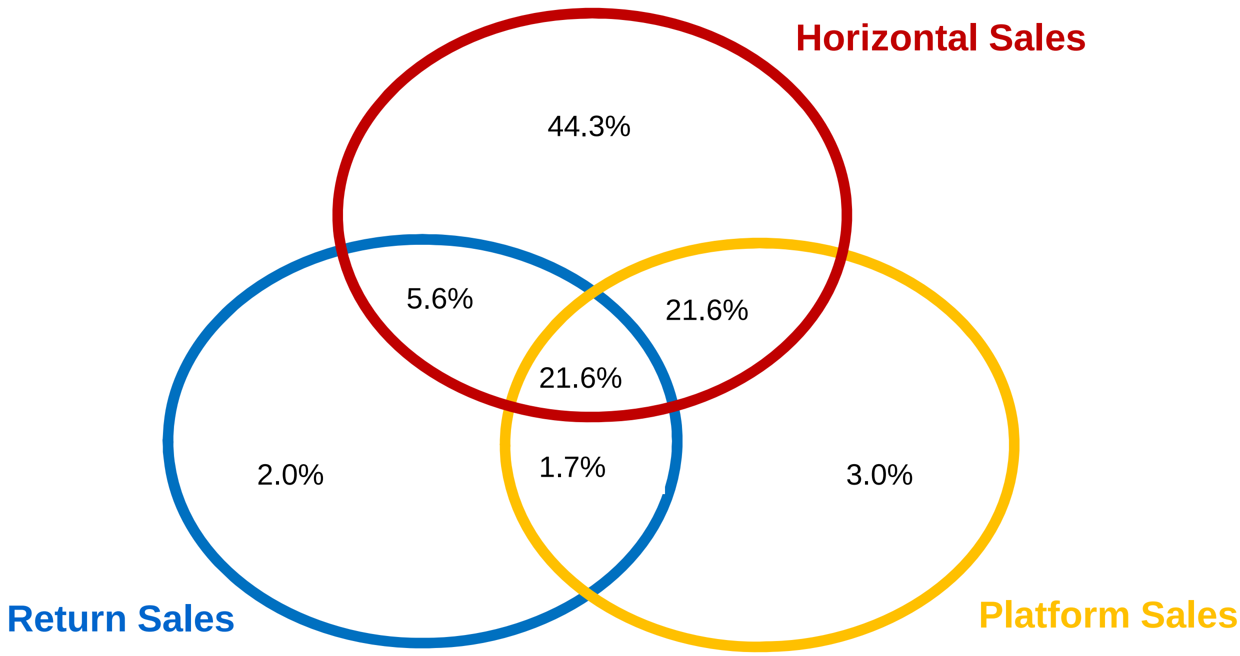
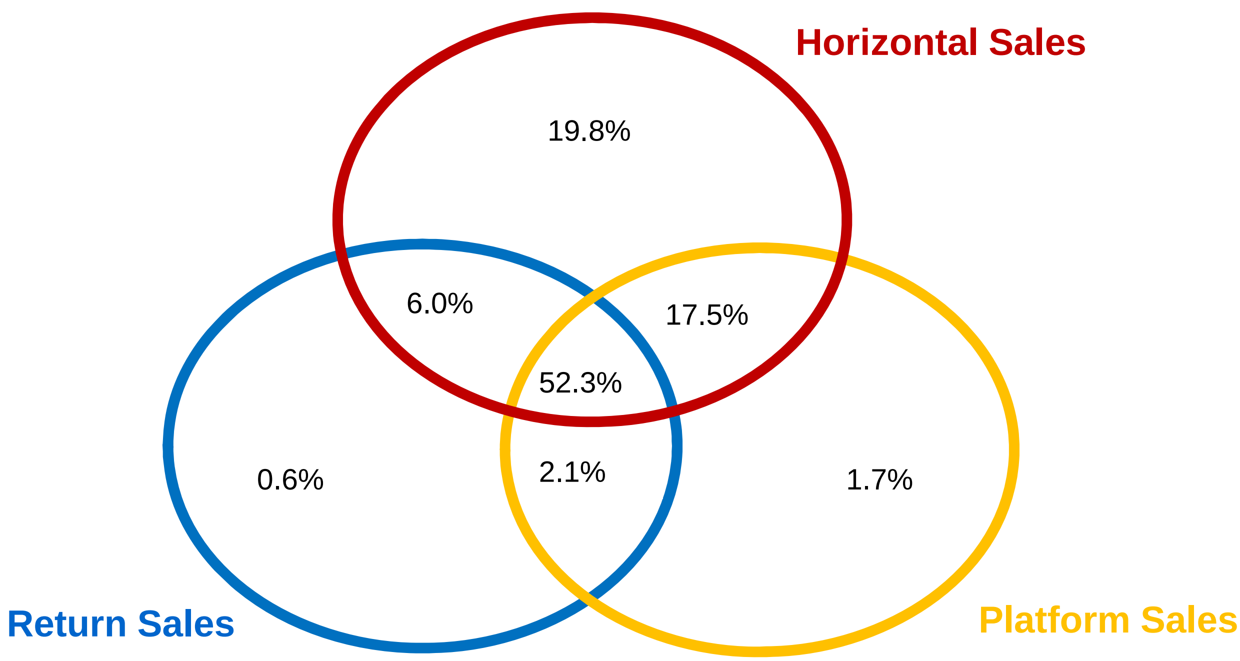
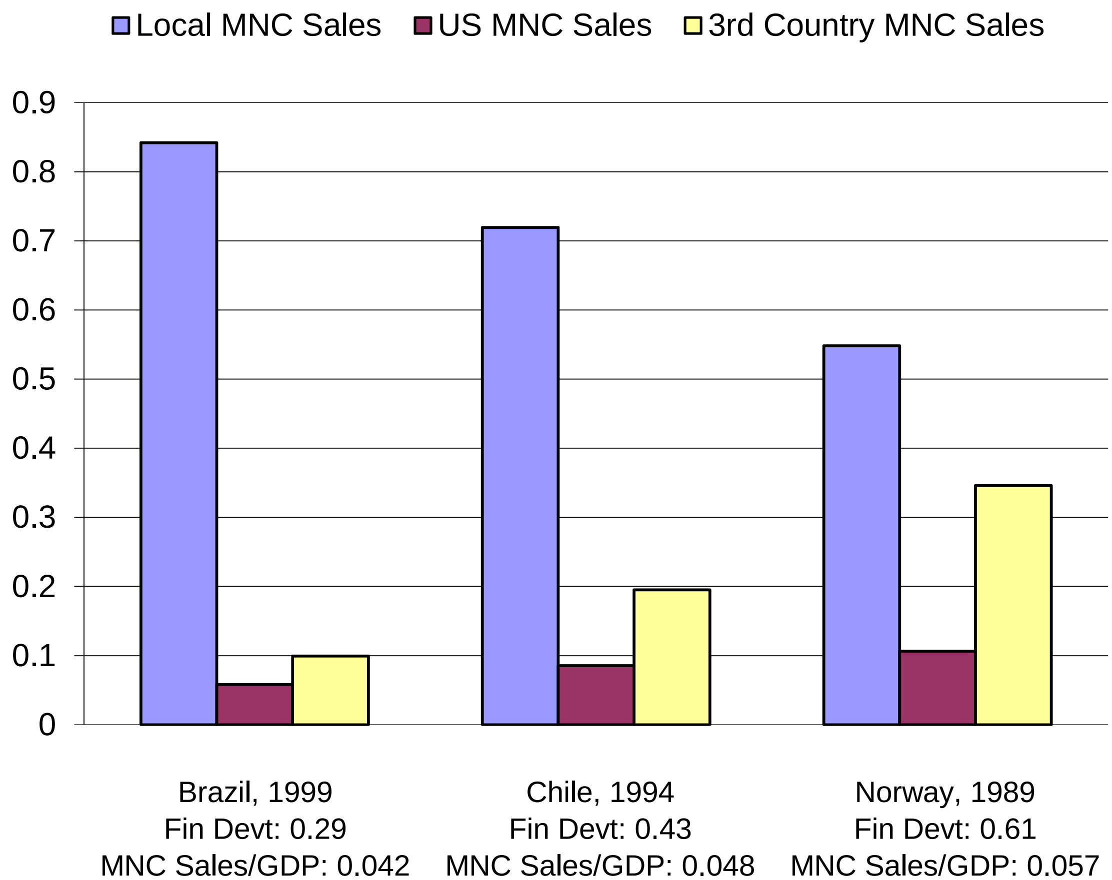


Figure 1b
The Distribution of MNC Affiliate Sales across Destinations



Notes: This figure summarizes the breakdown of multinational firms' affiliate activity by market destination in 1989. Affiliates in the red circle are engaged in horizontal sales; in the blue circle - in return sales to the US; and in the yellow circle - in export-platform sales to third-countries. Affiliates in overlapping segments of the three circles pursue multiple sales destinations. The percentages reported sum to 100%. Each segment reports the percentage share of affiliates active in a given set of destinations (Figure 1a) or the percentage share of total affiliate sales captured by affiliates in that segment (Figure 1b).

Figure 2: An Example
MNC Sales Shares in Host Countries at Different Levels of Financial Development



Notes: This figure illustrates how the level and composition of aggregate MNC affiliate sales vary across three host countries at the 50th, 60th and 75th percentiles of the distribution of financial development. Financial Development is measured by the ratio of private credit to GDP.

Appendix Figure 1: Economic Growth and Multinational Activity, 1989-2009

Figure 1a: Growth in Total MNC Sales

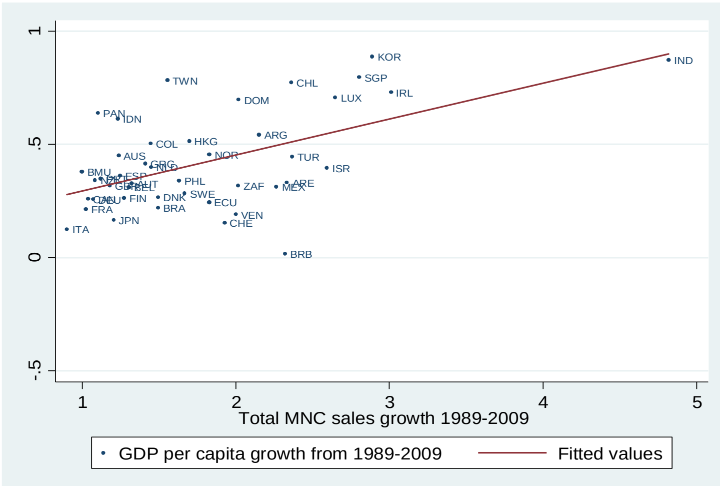


Figure 1b: Growth in the Share of Local MNC Sales

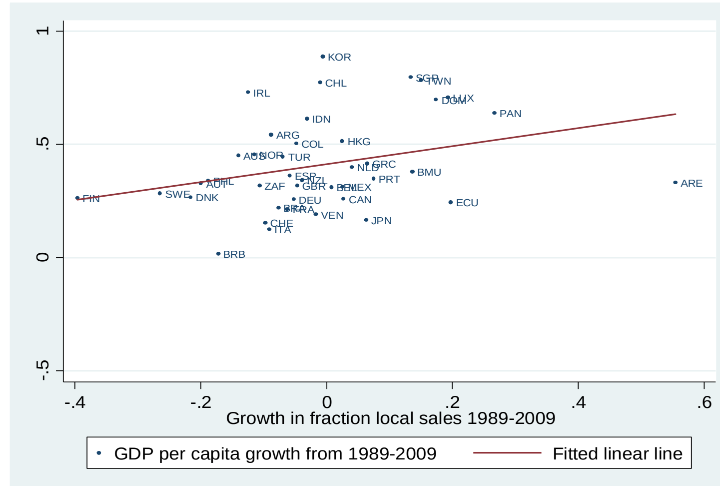


Figure 1c: Growth in the Share of US MNC Sales

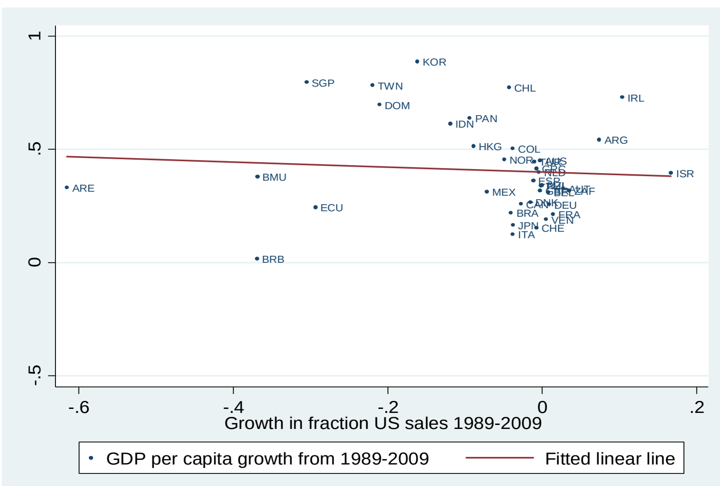
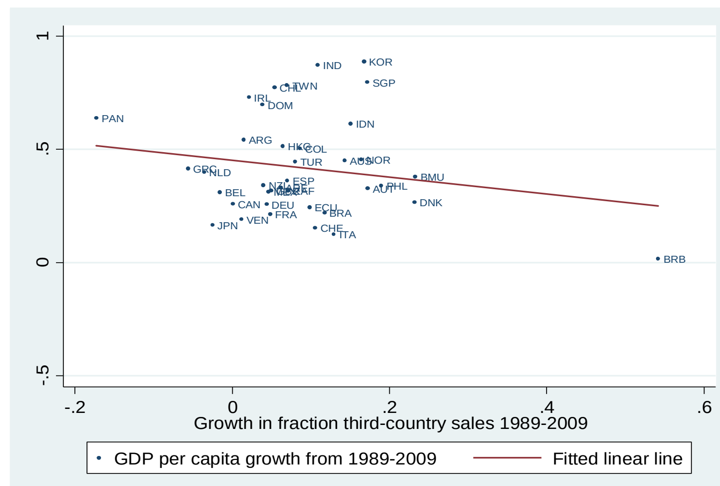


Figure 1d: Growth in the Share of 3-rd Country MNC Sales



Notes: This figure illustrates the relationship between economic growth and growth in aggregate multinational activity from 1989 to 2009 across 44 host countries. Observations are labeled by their country ISO code. Plotted on the vertical axis of each figure is the cumulative growth in GDP per capita. Plotted on the horizontal axis is the cumulative growth in aggregate MNC sales (Figure 1a), as well as the cumulative growth in the shares of aggregate MNC sales sold in the host-country market (Figure 1b), in the US (Figure 1c), and in third-country markets (Figure 1d).

Host-Country Financial Development and Multinational Activity: Model Appendix

L. Kamran Bilir*
University of Wisconsin – Madison

Davin Chor
National University of Singapore

Kalina Manova
University of Oxford,
NBER and *CEPR*

October 15, 2016

Abstract

This Model Appendix develops a three-country model with heterogeneous firms, to formally demonstrate the *competition effect* and the *financing effect* of host-country financial development. The predictions of the model for various dimensions of multinational activity are derived, both at the level of the individual affiliate, as well as at the aggregate level (i.e., summing across all affiliates in the host country). Several extensions to more general modeling setups are discussed; these incorporate: (i) home-bias in consumption; (ii) exports of host-country varieties; (iii) endogenous host-country wages; and (iv) multiple FDI host countries.

A Model Appendix: Preamble

In this Model Appendix, we develop in full a three-country model with heterogeneous firms to analyze how host-country financial development affects the entry and sales decisions of multinational affiliates. The model is in the spirit of Helpman, Melitz and Yeaple (2004) and Grossman, Helpman and Szeidl (2006): Firms obtain a productivity draw, and subsequently sort themselves into different production modes (i.e., exports vs FDI) for servicing each country market. We introduce into this setup financial frictions in the country that is the potential FDI host, and then derive how improvements in host-country financial development would impact a series of outcome variables related to affiliate entry and sales.

The model is relatively stylized, given that its purpose is to demonstrate in a parsimonious setting how the competition and financing effects operate, and to show how these theoretical results then motivate the empirical analysis conducted in the main paper. We describe the baseline three-country setup in Section A.1 below, this being the simplest setting in which the concepts of local affiliate sales, return sales to the home country, and third-country platform sales are well-defined. Only domestic firms in the FDI host country rely on host-country financial institutions in this baseline, a setting which will isolate the *competition effect* from improvements in host-country financial development (Section A.2). We then incorporate host-country borrowing on the part of multinational affiliates, to demonstrate the richer predictions that this *financing effect* leads to (Section A.3).

*L. Kamran Bilir: University of Wisconsin – Madison, kbilir@ssc.wisc.edu. Davin Chor: National University of Singapore, davinchor@nus.edu.sg. Kalina Manova (corresponding author): Department of Economics, University of Oxford, Manor Road Building, Manor Road, OX1 3UQ, UK, kalina.manova@economics.ox.ac.uk.

Several extensions are also discussed, related to incorporating: (i) home-bias in consumption (Section A.4.1); (ii) exports of host-country varieties (Section A.4.2); (iii) endogenous host-country wages (Section A.4.3); and (iv) multiple FDI host countries (Section A.4.4). These extensions serve to illustrate how the two key effects of host-country financial development extend to more general modeling setups. Last but not least, Section A.5 discusses how the predictions of the model translate into the empirical specification that we adopt in the main paper. Detailed algebraic derivations are in the final section of this Appendix (Section B).

A.1 Baseline Model Setup

Consider a world with three countries, West, East, and South. There are two sectors in each country, one producing a homogeneous good and the other featuring a continuum of differentiated varieties. Labor is the only factor of production. The homogeneous good is manufactured under constant returns to scale. This good is freely tradable across borders, and thus serves as the global numeraire. In each country, the labor force is sufficiently large so that a strictly positive amount of the homogeneous good is produced in equilibrium. We assume for simplicity that West and East are symmetric in their underlying economic structure. However, South is less productive in the homogeneous good sector than West and East: While $1/\omega$ workers are needed to make each unit of the numeraire in South (where $\omega < 1$), only one worker is required in West and East. The nominal wage in West and East is thus 1, while the wage in South is ω. Firms manufacturing in South therefore face lower production costs.[1]

The utility function of a representative consumer in West and East (subscript $n = w, e$) is given by:

$$U_n = y_n^{1-\mu} \left(\sum_{j \in \{e,w\}} \int_{\Omega_{nj}} x_{nj}(a)^{\alpha} \; dG_j(a) \right)^{\frac{\mu}{\alpha}}, \tag{A.1}$$

while the utility function for Southern consumers (subscript s) is:

$$U_s = y_s^{1-\mu} \left(\sum_{j \in \{e,w,s\}} \int_{\Omega_{sj}} x_{sj}(a)^{\alpha} \; dG_j(a) \right)^{\frac{\mu}{\alpha}}, \quad 0 < \alpha, \, \mu < 1. \tag{A.2}$$

Utility in country i ($i \in \{w, e, s\}$) is thus a Cobb-Douglas aggregate over consumption of the homogeneous good (y_i) and differentiated varieties ($x_{ij}(a)$), where the expenditure share of the latter is equal to μ. The sub-utility derived from differentiated varieties is a Dixit-Stiglitz aggregate with a constant elasticity of substitution $\varepsilon = \frac{1}{1-\alpha} > 1$.[2]

Let $x_{ij}(a)$ denote the quantity of a country-j differentiated variety that is consumed in country i, and label the set of such varieties Ω_{ij}. When $i \neq j$, this set consists of all varieties exported by country j's firms to i, as well as any varieties produced and sold locally by country j's multinational affiliates in i. Analogously, when $i = j$, Ω_{ii} represents all indigenous varieties produced domestically, and all varieties produced by country i's multinational affiliates abroad that are then exported back to the home market. Notice that South demands varieties from all three countries, while Southern varieties do not enter the utility function of West and East. This assumption simplifies our analysis but does not detract from our main results (see Section A.4.2, which

[1] In principle, many factors influence the relative profitability of manufacturing across locations, including not only factor prices, but also institutions, trade costs, and coordination costs. We focus on a model with wage differences for simplicity, and assume that these differences are exogenous as a baseline. We have evaluated numerically a more general setting in which the homogeneous good sector is absent and ω therefore adjusts endogenously, in order to verify the extent to which the competition effect we emphasize remains active even when Southern wages adjust; see Appendix A.4.3.

[2] For now, this elasticity is the same regardless of varieties' country of origin, but we discuss in Section A.4.1 a more flexible specification in which varieties from the same country are closer substitutes than varieties from different countries.

features exports of Southern varieties to West and East).

Consumer preferences (A.1) and (A.2) imply that demand in country i for each country-j variety is $x_{ij}(a) = A_{ij}p_{ij}(a)^{-\varepsilon}$, where $p_{ij}(a)$ denotes the price of that variety in i. Given the symmetric economic structures of West and East, the aggregate demand levels, A_{ij}, in country i for varieties from j are:

$$A_{ww} = A_{ee} = A_{ew} = A_{we} = \frac{\mu E_n}{P_{ww}^{1-\varepsilon} + P_{we}^{1-\varepsilon}}, \quad \text{and} \tag{A.3}$$

$$A_{sw} = A_{se} = A_{ss} = \frac{\mu E_s}{P_{ss}^{1-\varepsilon} + 2P_{sw}^{1-\varepsilon}}, \tag{A.4}$$

where $P_{ij}^{1-\varepsilon} = \int_{\Omega_{ij}} p_{ij}(a)^{1-\varepsilon} dG_j(a)$ is the ideal price index for country-j varieties in i. Note in particular that $P_{ww}^{1-\varepsilon} = P_{ee}^{1-\varepsilon}$, $P_{ew}^{1-\varepsilon} = P_{we}^{1-\varepsilon}$ and $P_{sw}^{1-\varepsilon} = P_{se}^{1-\varepsilon}$, given the underlying assumption of symmetry between West and East. In the above, E_i denotes the total expenditure of consumers in i and $E_w = E_e = E_n$. These expenditure levels are exogenous and equal to aggregate labor income in each country.

We proceed next to describe the structure of production in each country's differentiated varieties sector. There is a continuum of firms in each country that can engage in the production of differentiated varieties. Upon paying a fixed entry cost, each such firm in country j draws a unit labor requirement a for producing its distinct variety from a distribution $G_j(a)$ that represents the technological possibilities in j. The productivity level of firm a is therefore $1/a$.

A.1.1 Financially unconstrained firms in West and East

Consider the differentiated varieties sector in West; conditions are symmetric in East.[3] After observing its unit cost draw a, each entrant in West decides whether to commence production or exit. Should the firm choose to remain active, production for the home economy incurs a per-period fixed cost of f_D units of Western labor. One can interpret this as the recurring cost of operating a manufacturing plant in West. Firms need to pay f_D upfront at the beginning of each period, but they cannot use retained earnings from previous periods because management has no control rights over these revenues and must transfer them as dividends or profits to the firm's owners. Firms therefore raise external finance by borrowing at a (gross) interest rate of $R > 1$, which is set exogenously in an international capital market. However, there are no financial frictions and hence no credit rationing in West and East.

Firms charge a constant markup over marginal costs, with the home price for a Western variety being $p_{ww}(a) = \frac{a}{\alpha}$. Individual producers take the aggregate demand levels in each country as given. Profits from domestic sales in West thus equal:

$$\pi_D(a) = (1-\alpha)A_{ww}\left(\frac{a}{\alpha}\right)^{1-\varepsilon} - Rf_D. \tag{A.5}$$

The export decision: Western firms may export to East or South (or both). Exporting to a foreign market incurs a per-period fixed cost of f_X units of Western labor (for maintaining an overseas distribution network) and a variable iceberg transport cost, $\tau > 1$. Profits from exporting to East and South are thus respectively:

$$\pi_{XN}(a) = (1-\alpha)A_{ew}\left(\frac{\tau a}{\alpha}\right)^{1-\varepsilon} - Rf_X, \quad \text{and} \tag{A.6}$$

$$\pi_{XS}(a) = (1-\alpha)A_{sw}\left(\frac{\tau a}{\alpha}\right)^{1-\varepsilon} - Rf_X. \tag{A.7}$$

[3]The corresponding equations for East can be obtained by replacing the subscript 'w' with 'e', and vice versa.

The FDI decision: Western firms may also choose to become multinationals by locating production abroad. A multinational firm would save on shipping costs on its sales in the host-country market, and would moreover lower its wage bill if it locates an affiliate in South. Such a firm could use its foreign subsidiary not only to supply the host economy, but also to export back to its parent country (West) or to the third-country market (East); we refer to these as local, return and platform sales, respectively. Should the affiliate export to either East or West, this would incur fixed and variable trade costs, f_X and τ (as in "The export decision" above), for each destination market.

Establishing a foreign subsidiary requires an upfront per-period fixed cost of f_I units of Western labor, in order to set up and maintain production facilities, as well as to manage operations remotely. While financial conditions are identical in West and East, there are financial frictions in South and the implied cost of capital there (weakly) exceeds R, in the sense that not all firms that seek financing in South will successfully obtain it. A multinational company thus has no incentive to raise capital abroad as long as Western financiers are willing to fully fund f_I. (This assumption will be relaxed in Section A.3 when we introduce the financing effect.)

A Western multinational faces in principle a wide array of options for its export-versus-FDI decision over the three markets. For this reason, multi-country models of FDI with export platforms are analytically complex (Yeaple 2003a,b, 2013, Tintelnot 2016). To illustrate the competition effect as transparently as possible, we therefore focus here on the case where: (i) Western multinationals locate affiliates only in South; and (ii) Western multinationals use the Southern plant as a global production center to serve all three markets. For this case, we derive testable implications with a clear mapping between theoretical expressions and observable data. We show in the detailed derivations in Section B.1 that two conditions on parameters guarantee that the FDI pattern we consider is indeed the optimal strategy for Western multinationals: $\tau\omega < 1$ and $f_X < f_D < f_I$. Intuitively, the fixed export cost (f_X) and the Southern wage after adjusting for transport costs ($\tau\omega$) must both be low for MNCs to optimally use South as their global production center.

Under these parameter assumptions, and taking into account revenues from all three markets, profits from FDI in South for a firm with productivity $1/a$ are therefore:

$$\pi_I(a) = (1-\alpha)A_{sw}\left(\frac{a\omega}{\alpha}\right)^{1-\varepsilon} + (1-\alpha)(A_{ww}+A_{ew})\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon} - R(f_I + 2f_X). \tag{A.8}$$

Patterns of production: Each firm's productivity level determines where it manufactures and in which markets it sells its goods. Firms produce at home for the domestic market if profits from (A.5) are positive. Solving $\pi_D(a) = 0$ pins down a_D, the maximum labor input requirement at which domestic production is profitable. Similarly, setting $\pi_{XN}(a) = 0$ yields a cutoff level, a_{XN}, below which exporting to East is profitable. Solving $\pi_{XS}(a) = 0$ delivers the analogous cutoff, a_{XS}, for exporting to South. The expression for these three thresholds are:

$$a_D^{1-\varepsilon} = \frac{Rf_D}{(1-\alpha)A_{ww}(1/\alpha)^{1-\varepsilon}}, \tag{A.9}$$

$$a_{XN}^{1-\varepsilon} = \frac{Rf_X}{(1-\alpha)A_{ew}(\tau/\alpha)^{1-\varepsilon}}, \quad \text{and} \tag{A.10}$$

$$a_{XS}^{1-\varepsilon} = \frac{Rf_X}{(1-\alpha)A_{sw}(\tau/\alpha)^{1-\varepsilon}}. \tag{A.11}$$

A fourth cutoff, a_I, delineates when FDI is feasible. Becoming a multinational is more profitable than basing production in West when $\pi_I(a) > \pi_D(a) + \pi_{XN}(a) + \pi_{XS}(a)$. Solving this as an equality delivers the following expression for a_I:

$$a_I^{1-\varepsilon} = \frac{R(f_I - f_D)}{(1-\alpha)[A_{ww}((\frac{\tau\omega}{\alpha})^{1-\varepsilon} - (\frac{1}{\alpha})^{1-\varepsilon}) + A_{ew}((\frac{\tau\omega}{\alpha})^{1-\varepsilon} - (\frac{\tau}{\alpha})^{1-\varepsilon}) + A_{sw}((\frac{\omega}{\alpha})^{1-\varepsilon} - (\frac{\tau}{\alpha})^{1-\varepsilon})]}. \tag{A.12}$$

Note that the conditions $f_I > f_D$, $\tau\omega < 1$, $\omega < 1 < \tau$ and $\varepsilon > 1$ ensure that $a_I > 0$.

Following common practice in the literature, we consider industry equilibria in which $0 < a_D^{1-\varepsilon} < a_{XN}^{1-\varepsilon} < a_{XS}^{1-\varepsilon} < a_I^{1-\varepsilon}$, using $a^{1-\varepsilon}$ as a proxy for firm productivity. This describes a sorting of Western firms across production modes that is in line with prior evidence that exporting firms tend to be more productive than non-exporters, while multinationals are on average more productive than exporters (e.g., Helpman et al. 2004). The least efficient firms with $a^{1-\varepsilon} < a_D^{1-\varepsilon}$ have labor input requirements that are too high and exit the industry upon observing their productivity draw. Firms with productivity levels between $a_D^{1-\varepsilon}$ and $a_{XN}^{1-\varepsilon}$ supply only the domestic Western market. Using (A.9) and (A.10), the assumption that $a_D^{1-\varepsilon} < a_{XN}^{1-\varepsilon}$ reduces to $\tau^{\varepsilon-1}\left(\frac{f_X}{A_{ew}}\right) > \frac{f_D}{A_{ww}}$, so that export costs must be sufficiently bigger than the fixed cost of domestic production.[4] Next, those firms that are even more productive, with $a_{XN}^{1-\varepsilon} < a^{1-\varepsilon} < a_{XS}^{1-\varepsilon}$, are able to overcome the additional costs of exporting to East, but not to South; based on (A.10) and (A.11), this simply requires that market demand for Western varieties be greater in East than in South, $A_{ew} > A_{sw}$. Firms with $a_{XS}^{1-\varepsilon} < a^{1-\varepsilon} < a_I^{1-\varepsilon}$ can further export to the smaller Southern market.[5] Finally, the most productive firms with $a^{1-\varepsilon} > a_I^{1-\varepsilon}$ conduct FDI in South. Figure A.1 provides an illustration of this industry structure that focuses on the economic relations in our three-country world. Firms with $a^{1-\varepsilon} < a_I^{1-\varepsilon}$ base their production activity in West, and export to East and possibly also to South if they are productive enough (upper panel). On the other hand, the most efficient firms with $a^{1-\varepsilon} > a_I^{1-\varepsilon}$ become multinationals. While these firms are still headquartered in West, their production is located in South, from where they service all three markets (lower panel).

A.1.2 Credit-constrained firms in South

The structure of South's differentiated varieties sector is simpler, with Southern firms producing only for domestic consumption in this baseline model. The fixed cost of domestic production is f_S units of Southern labor, and we assume as above that Southern firms borrow at the start of each period to finance these fixed costs.

However, Southern firms face credit constraints, arising from institutional weaknesses that lead to imperfect protection for lenders against default risk. Following Aghion et al. (2005), we model this moral hazard problem by assuming that firms lose a fraction $\eta \in [0, 1]$ of their appropriable profits if they choose to default. For simplicity, we take these appropriable profits to be the revenues of the firm less the variable costs that it must pay to its production workers. Thus, while it is tempting to default to avoid loan repayment, the act of hiding the firm's financial resources from lenders incurs a pecuniary cost that is increasing in the parameter η. We therefore interpret η as capturing the degree of financial development in South: When credit institutions are stronger, η is higher and it is more costly for firms to opt for default. A Southern firm with input coefficient a would default if and only if the associated profit loss is smaller than the cost of repaying the loan:

$$\eta(1-\alpha)A_{ss}\left(\frac{a\omega}{\alpha}\right)^{1-\varepsilon} < Rf_S\omega.$$

The above condition yields a productivity threshold above which firms have access to credit:

$$a_S^{1-\varepsilon} = \frac{1}{\eta}\frac{Rf_S\omega}{(1-\alpha)A_{ss}(\omega/\alpha)^{1-\varepsilon}}. \tag{A.13}$$

[4] Under the utility specification in (A.1) and (A.2) with a single elasticity of substitution, we have $A_{ww} = A_{ew}$, so this condition simplifies further to $\tau^{\varepsilon-1}f_X > f_D$. Note that this is not inconsistent with the earlier requirement that $f_X < f_D$.

[5] The parameter restriction that guarantees that $a_{XS}^{1-\varepsilon} < a_I^{1-\varepsilon}$ does not simplify neatly. Intuitively, it requires that the fixed cost of FDI, f_I, be sufficiently large so that FDI is only undertaken by the most productive firms.

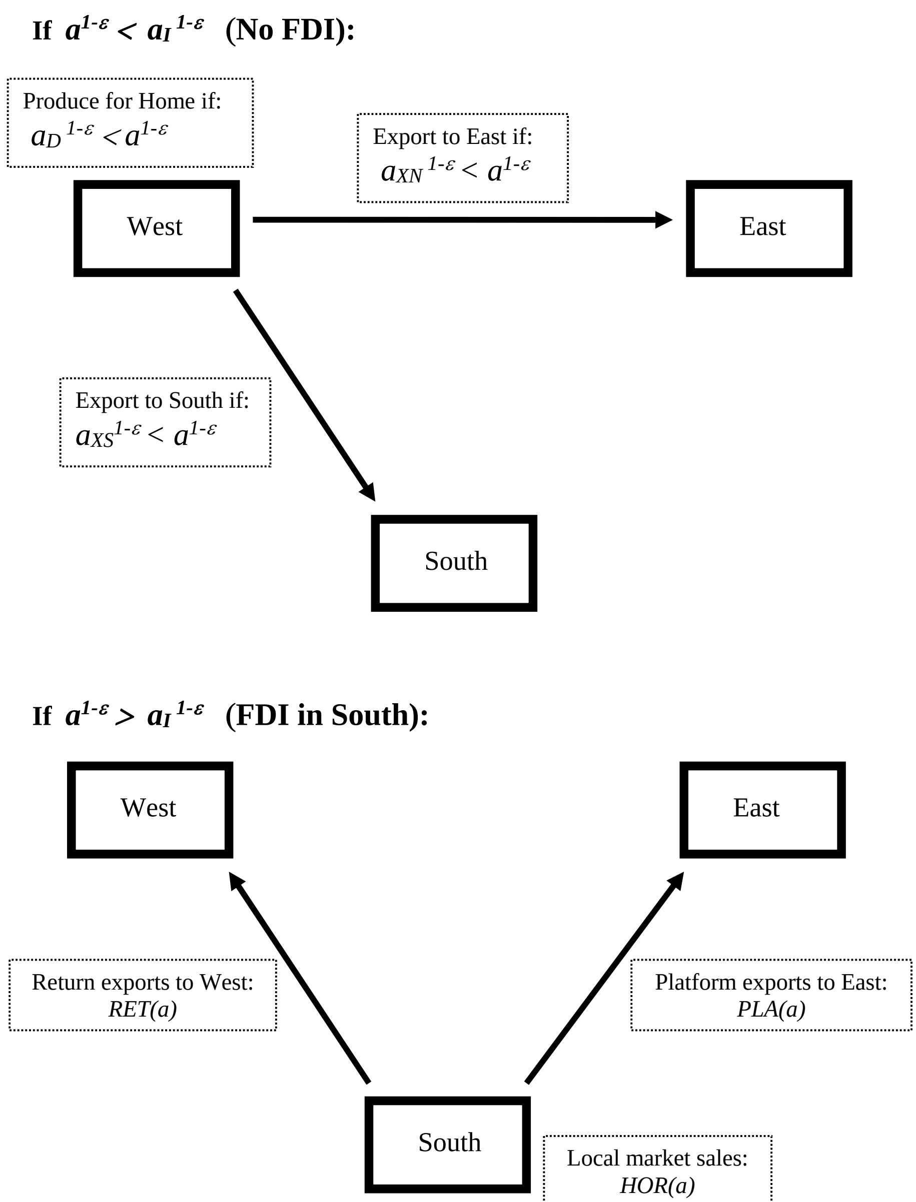


Figure 1: Modes of Operation (illustrated for Western firms)

We assume that lenders can observe a, and hence only Southern firms with $a^{1-\varepsilon} > a_S^{1-\varepsilon}$ are able to commence production. When $\eta = 1$, $a_S^{1-\varepsilon}$ is the cutoff for domestic entry that would prevail in the absence of credit market imperfections. When $\eta < 1$, however, the cutoff is higher, as some firms with productivity below $a_S^{1-\varepsilon}$ would earn positive profits following entry, but are prevented from doing so because they are unable to credibly commit to repaying their loans. As η increases toward 1, this distortion from credit constraints vanishes.

A.1.3 Industry equilibrium

The model is closed by specifying the conditions that govern firm entry in each country. Prospective entrants in country i's differentiated varieties sector incur an upfront entry cost equal to f_{Ei} units of country i labor. This is a once-off cost that firms pay before they can obtain their productivity draw.[6] On the exit side, firms face an exogenous probability, $\delta \in (0,1)$, of "dying" and leaving the industry in each period. For an equilibrium with a constant measure of firms in each country, the cost of entry must equal expected profits. Using the profit functions (A.5)-(A.8) and the cutoffs (A.9)-(A.12), and integrating the expressions for expected profits over the distribution $G_i(a)$, one can write down the free-entry conditions for Western/Eastern ($n = w, e$) and Southern firms as:

$$\begin{aligned} \delta f_{En} &= (1-\alpha)A_{ww}\left(\frac{1}{\alpha}\right)^{1-\varepsilon}(V_n(a_D)-V_n(a_I)) - Rf_D(G_n(a_D)-G_n(a_I)) \\ &\quad +(1-\alpha)A_{ew}\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XN})-V_n(a_I)) - Rf_X(G_n(a_{XN})-G_n(a_I)) \\ &\quad +(1-\alpha)A_{sw}\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XS})-V_n(a_I)) - Rf_X(G_n(a_{XS})-G_n(a_I)) \\ &\quad +(1-\alpha)\left(A_{ww}\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}+A_{ew}\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}+A_{sw}\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}\right)V_n(a_I) - R(f_I+2f_X)G_n(a_I), \quad \text{and} \end{aligned} \tag{A.14}$$

$$\delta f_{Es}\omega = (1-\alpha)A_{ss}\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}V_s(a_S) - Rf_S\omega G_s(a_S). \tag{A.15}$$

Note that $V_i(a)$ is defined by $V_i(a) = \int_0^a \tilde{a}^{1-\varepsilon}dG_i(\tilde{a})$ for $i \in \{n, s\}$.

Finally, we denote the measure of firms in country i's differentiated varieties sector by N_i.[7] The definition of the ideal price index then implies:

$$P_{ww}^{1-\varepsilon} = N_n\left[\left(\frac{1}{\alpha}\right)^{1-\varepsilon}(V_n(a_D)-V_n(a_I)) + \left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}V_n(a_I)\right], \tag{A.16}$$

$$P_{ew}^{1-\varepsilon} = N_n\left[\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XN})-V_n(a_I)) + \left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}V_n(a_I)\right], \tag{A.17}$$

$$P_{sw}^{1-\varepsilon} = N_n\left[\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XS})-V_n(a_I)) + \left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}V_n(a_I)\right], \quad \text{and} \tag{A.18}$$

$$P_{ss}^{1-\varepsilon} = N_s\left[\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}V_s(a_S)\right]. \tag{A.19}$$

The equilibrium of the model is thus pinned down by the system of equations (A.3)-(A.4) and (A.9)-(A.19) in the 15 unknowns, A_{ww}, A_{ew}, A_{sw}, A_{ss}, a_D, a_{XN}, a_{XS}, a_I, a_S, N_n, N_s, P_{ww}, P_{ew}, P_{sw} and P_{ss}. Although not all of these variables can be solved for in closed form, comparative statics results can still be derived that directly inform our empirical analysis. As is common in this literature, we assume that productivity $1/a$

[6] Our results are robust to subjecting the fixed cost of entry in South, f_{Es}, to borrowing constraints too. Intuitively, an improvement in financial development in South would still spur more entry by Southern firms, which works in the same direction as the effects in our baseline model.

[7] Following Melitz (2003), for N_i to be constant, the expected mass of successful entrants, N_i^{ent}, needs to equal the mass of firms that dies exogenously in each period, namely: $N_i^{ent} = \delta N_i$, for $i = w, e, s$.

follows a Pareto distribution with shape parameter k and support $[1/\bar{a}_i, \infty)$ for each country i.[8] With this distribution, the associated expressions for G_i and V_i are: $G_i(a) = \left(\frac{a}{\bar{a}_i}\right)^k$ and $V_i(a) = \frac{k}{k-\varepsilon+1}\left(\frac{a^{k-\varepsilon+1}}{\bar{a}_i^k}\right)$. We adopt the assumption that $k > \varepsilon - 1$, which ensures that the distribution of firm sales has a finite mean.

A.2 The Competition Effect

We can now derive how financing conditions in the host country affect various dimensions of multinational activity, by establishing how an improvement in η systematically shifts the productivity cutoffs and aggregate demand levels in each market. In the baseline where only Southern firms rely on host-country financial institutions, we will see that an increase in η promotes entry by more Southern firms, which leads to the competition effect vis-à-vis multinational affiliates.

A.2.1 Impact on industry cutoffs and market demand levels

Equations (A.13) and (A.15) pin down A_{ss} and a_S for the industry equilibrium in South. By totally differentiating these two equations, we obtain:

Lemma 1: *(i)* $\frac{da_S}{d\eta} > 0$; *and (ii)* $\frac{dA_{ss}}{d\eta} < 0$.

We relegate all detailed proofs to Section B.1, and focus instead on conveying the intuition here. When η rises, the higher cost of default in South helps to alleviate the moral hazard problem, and hence more Southern firms gain access to credit. This lowers the productivity cutoff, $a_S^{1-\varepsilon}$, for entry into the Southern differentiated varieties sector, as illustrated in the bottom panel of Figure A.2. However, the free-entry condition (A.15) requires that the expected profitability of a Southern firm remain constant. Average demand for each Southern product, A_{ss}, must subsequently fall.

Since Western, Eastern and Southern varieties are substitutes in consumption in South, the entry of more domestic firms in South will affect the differentiated varieties sector in West and East. The consequent effects on the productivity cutoffs and demand levels relevant to Western firms are described in the following lemma; by symmetry, these comparative statics also apply to Eastern firms:

Lemma 2: *When MNCs do not require host-country financing, (i)* $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} < \frac{1}{a_I}\frac{da_I}{d\eta} < 0$*; (ii)* $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} = \frac{1}{a_D}\frac{da_D}{d\eta} > 0$*; (iii)* $\frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta} < 0$*; and (iv)* $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} = \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta} > 0$.

The key shifts in Lemma 2 are illustrated in the upper panel of Figure A.2. An improvement in host-country financial development leads to the entry of more Southern varieties, and the resulting tougher competition decreases demand in South for each Western variety, A_{sw}. This raises the productivity cutoffs, $a_{XS}^{1-\varepsilon}$ and $a_I^{1-\varepsilon}$, for Western firms seeking to penetrate the Southern market either through exports or FDI. However, since the fixed cost of entry, f_{En}, remains constant, the free-entry condition (A.14) implies that total profits from sales in West and East must increase. This tilts Western firms toward serving those markets: The productivity cutoffs, $a_D^{1-\varepsilon}$ and $a_{XN}^{1-\varepsilon}$, both fall, while aggregate demand levels in West and East, A_{ww} and A_{ew}, both rise.[9]

[8] We require that $\bar{a}_s$ and $\bar{a}_n$ both be sufficiently large, so that all relevant cutoffs lie within the interior of the support of the distributions that they are drawn from. Also, our proofs do not require the same shape parameter in West and South, but we have assumed this to simplify notation.

[9] That the proportional shifts in A_{ww} and A_{ew} are equal is a feature that is relaxed in the extension in Section A.4.1.

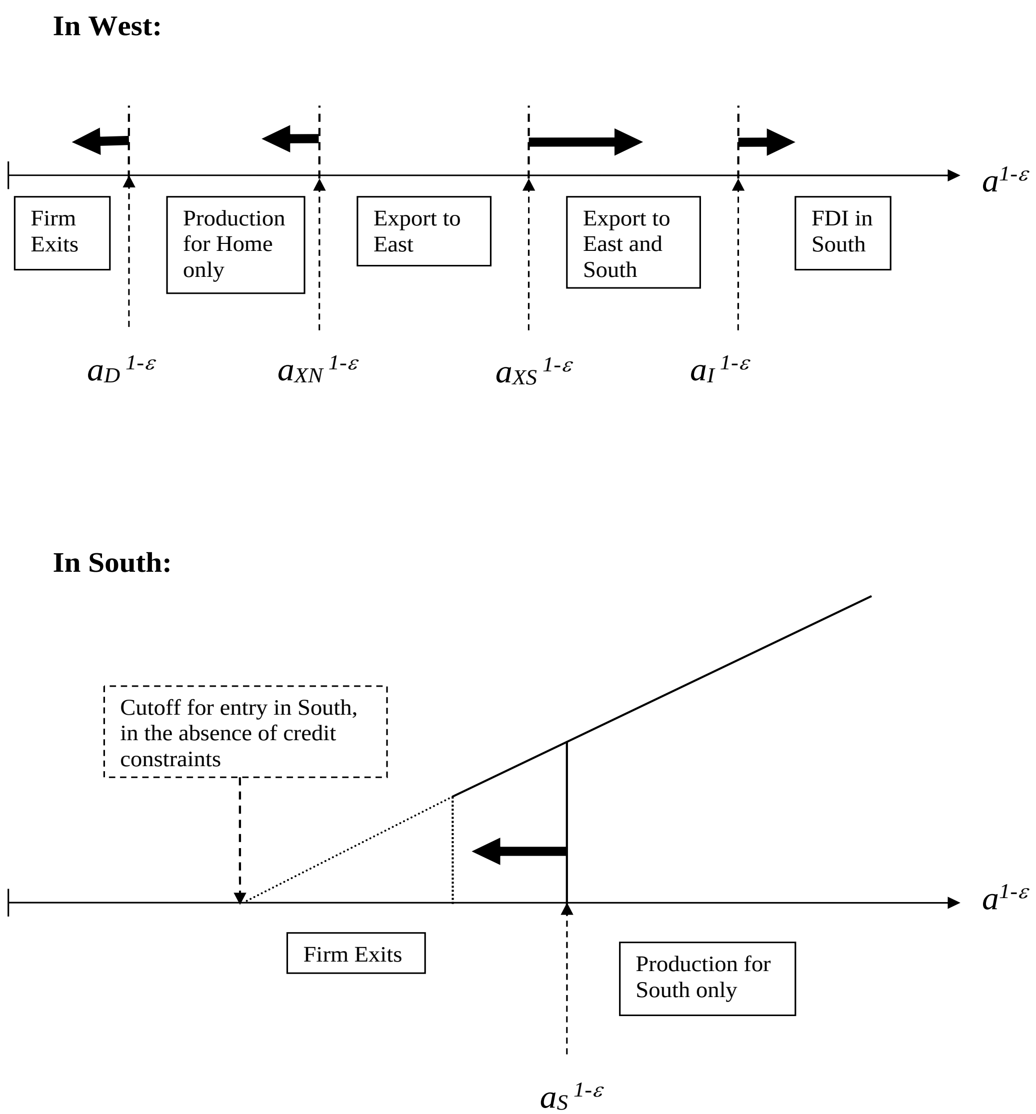


Figure 2: Response of Cutoffs to an Increase in η: Baseline Model

A.2.2 Impact on multinational affiliate sales

These shifts in the productivity cutoffs and aggregate demand levels in turn determine the impact of host-country financial development on affiliate sales. We define several sales variables of interest that are observable in the data, and which were also illustrated earlier in the lower panel of Figure A.1. For a given MNC affiliate in South with productivity $1/a$, its sales to the local market are: $HOR(a) \equiv A_{sw}\left(\frac{a\omega}{\alpha}\right)^{1-\varepsilon}$. We refer to these as horizontal sales, since they allow the multinational to avoid transport costs while servicing the Southern market. Export-platform sales to third-country destinations (in our case, East) are defined as: $PLA(a) \equiv A_{ew}\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon}$. Finally, return sales back to the Western home market are: $RET(a) \equiv A_{ww}\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon}$. The affiliate's total sales are: $TOT(a) \equiv HOR(a) + PLA(a) + RET(a)$.

Integrating these firm-level sales over the set of Western multinationals (with $a^{1-\varepsilon} > a_I^{1-\varepsilon}$) delivers the following expressions for the aggregate levels of horizontal, platform and return sales ($n = w, e$):

$$HOR \equiv N_n \int_0^{a_I} HOR(a)dG_n(a) = N_n A_{sw}\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon} V_n(a_I), \tag{A.20}$$

$$PLA \equiv N_n \int_0^{a_I} PLA(a)dG_n(a) = N_n A_{ew}\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} V_n(a_I), \quad \text{and} \tag{A.21}$$

$$RET \equiv N_n \int_0^{a_I} RET(a)dG_n(a) = N_n A_{ww}\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} V_n(a_I). \tag{A.22}$$

The measure of multinational firms is in turn given by: $N_n \int_0^{a_I} dG_n(a) = N_n G_n(a_I)$.

Using these definitions, we construct three sales shares that describe the breakdown of affiliate sales by destination:

$$\frac{HOR(a)}{TOT(a)} = \frac{HOR}{TOT} = \left(1 + \tau^{1-\varepsilon}\frac{A_{ew}}{A_{sw}} + \tau^{1-\varepsilon}\frac{A_{ww}}{A_{sw}}\right)^{-1}, \tag{A.23}$$

$$\frac{PLA(a)}{TOT(a)} = \frac{PLA}{TOT} = \left(1 + \tau^{\varepsilon-1}\frac{A_{sw}}{A_{ew}} + \frac{A_{ww}}{A_{ew}}\right)^{-1}, \quad \text{and} \tag{A.24}$$

$$\frac{RET(a)}{TOT(a)} = \frac{RET}{TOT} = \left(1 + \tau^{\varepsilon-1}\frac{A_{sw}}{A_{ww}} + \frac{A_{ew}}{A_{ww}}\right)^{-1}. \tag{A.25}$$

Note that these sales shares depend crucially on the pairwise ratios of the aggregate demand levels for Western varieties across the three different markets.

The following result states the effect of host-country financial development on each of the above measures of multinational activity.[10]

Proposition 1 *When MNCs do not require host-country financing, in response to a small improvement in financial development, η, in South:*

(i) $HOR(a)$ decreases, while both $PLA(a)$ and $RET(a)$ increase;

(ii) $\frac{HOR(a)}{TOT(a)} = \frac{HOR}{TOT}$ decreases, while both $\frac{PLA(a)}{TOT(a)} = \frac{PLA}{TOT}$ and $\frac{RET(a)}{TOT(a)} = \frac{RET}{TOT}$ increase; and

(iii) N_n, $N_n G_n(a_I)$, HOR, PLA and RET all decrease.

Proposition 1 builds directly on the logic of Lemma 2. When credit constraints are eased, the demand in South for Western goods drops due to the competition effect following the entry of more local firms. For each affiliate, this leads horizontal sales to South, as well as their share in total sales, to decline. At the same time, demand levels in East and West rise in equilibrium, so that each affiliate re-directs its sales toward those

[10]All results regarding affiliate-level sales pertain to firms that remain multinationals after the change in η.

markets. This prompts an increase in platform and return sales, both in absolute levels and relative to total sales.

In the absence of other countervailing forces, the competition effect alone would reduce the *ex ante* expected profits of Western firms. This leads to a decrease in both the measure of these firms, N_n, and the measure of multinationals, $N_n G_n(a_I)$, as stated in part (iii) of the proposition. To see how this in turn affects aggregate sales levels, we refer back to equations (A.20)-(A.22). On the extensive margin, a higher η lowers HOR, PLA and RET, by reducing N_n and raising the productivity cutoff for FDI so that $V_N(a_I)$ drops; both of these shifts reflect the exit of Western MNCs from South. In the case of horizontal sales, this negative effect is reinforced by the reduction in A_{sw}, and HOR clearly falls. As for the platform and return sales, one can see that the decline on the extensive margin can in principle be counteracted by the increase on the intensive margin in A_{ew} and A_{ww}. In more general settings, this could lead to an ambiguous prediction for the effect of host-country financial development on PLA, RET and hence TOT. In the context of our three-country model though, one can explicitly prove that the decline on the extensive margin is the dominant effect; this three-country model therefore provides an example of a setting in which PLA, RET and TOT do indeed all decrease in response to a rise in η (see Section B.1).

As we will see below, this feature of a negative extensive margin adjustment in response to improvements of host-country financial development can be relaxed by considering affiliate financing practices more closely. We consider this issue next.

A.3 The Financing Effect

In our baseline setup, Western and Eastern firms are able to secure all the outside finance they need from their home country. We now examine what happens when we consider multinationals that use some Southern financing to cover their FDI costs, so that host-country financial development can now affect MNC activity not only through the competition effect, but also through a direct financing channel. As argued in the main paper, multinational affiliates are indeed commonly observed to obtain at least some financing from host-country financing institutions (Desai et al. 2004, Feinberg and Phillips 2004). The literature has moreover reported evidence that affiliate financing practices do indeed respond by shifting towards obtaining more host-country financing when financial development in the FDI host improves (Desai et al. 2004, Antràs et al. 2009).

These patterns suggest that while MNCs can use internal capital markets to some degree, there exist market or institutional frictions that prevent them from doing so perfectly. First, fixed assets in a Southern plant might not be fully collateralizable, due to expropriation risk or difficulties in enforcing cross-border claims. Second, there might be asymmetric information between lenders and borrowers because lenders do not observe how firms manage operations or customize production processes to local conditions. If creditors can more effectively monitor debtors' activities at home than across borders, Western financiers would be at a disadvantage when assessing the value of multinationals' assets in South compared to Southern financiers. In both cases, Western financiers would either not be willing to fund all MNC operations in South or would seek higher interest rates for the financing of production in South than in West.

To incorporate this feature, we assume Western financiers are willing to fully fund the domestic and export activities of Western firms, but only a fraction f_D/f_I of their fixed FDI costs. What will be important is that the multinational must raise funding for part of f_I from South; that this amount equals $f_I - f_D$ is convenient, but not material for the financing effect to operate.[11] In this environment, MNCs will optimally raise the maximum possible amount of external finance f_D in West, and borrow the shortfall $f_I - f_D$ in South's

[11] Our results would be reinforced if the fraction of financing raised in South, f_D/f_I, were to plausibly increase with the level of Southern financial development.

imperfect capital markets. As in Section A.1.2, defaulting on Southern debt obligations incurs a cost equal to a fraction $\eta \in [0,1]$ of appropriable profits. Since the firm's outside option is to move production back to West, we assume appropriable profits from the perspective of Southern lenders are simply operating profits from FDI less operating profits from manufacturing in West.[12] A multinational with productivity $a^{1-\varepsilon}$ would therefore default on its Southern loan if:

$$\eta(1-\alpha)\left[A_{ww}\left(\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{a}{\alpha}\right)^{1-\varepsilon}\right)+A_{ew}\left(\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau a}{\alpha}\right)^{1-\varepsilon}\right)+A_{sw}\left(\left(\frac{a\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau a}{\alpha}\right)^{1-\varepsilon}\right)\right]<R(f_I-f_D),$$

namely when the cost of default on the left-hand side is less than the cost of repaying creditors. Setting the above as an equality and rearranging, one obtains a modified FDI cutoff, $\tilde{a}_I^{1-\varepsilon}$, given by:

$$\tilde{a}_I^{1-\varepsilon}=\frac{1}{\eta}a_I^{1-\varepsilon}, \tag{A.26}$$

where $a_I^{1-\varepsilon}$ is the FDI threshold from (A.12) in the baseline model. Since $\eta \in [0,1]$, credit market imperfections in the host country (weakly) raise the productivity cutoff that Western firms need to clear before FDI becomes feasible.[13] Western firms with $a^{1-\varepsilon} > \tilde{a}_I^{1-\varepsilon}$ are able to obtain local financing, and hence undertake FDI. But there is a margin of prospective MNCs – firms with productivity between $a_I^{1-\varepsilon} < a^{1-\varepsilon} < \tilde{a}_I^{1-\varepsilon}$ – who are unable to raise the necessary funds from Southern lenders to set up an affiliate. Note that this formulation represents one particular way to model why MNC financing practices would respond to host-country financial conditions, and there are potentially other ways to approach this. What is key is that even if host-country financing does not operate in the particular way described above, the composition of affiliates' total financing could still shift towards the host country when local financial conditions there improve. This would be the case, for example, if multinationals arbitrage differences in the cost of capital across countries, subject to information and contractual frictions between lenders and borrowers across borders. This would generate similar theoretical predictions as Proposition 2 below.

A.3.1 Impact on industry cutoffs and market demand levels

In this setting, an increase in η continues to facilitate entry by Southern firms, but it also has further implications for the Western industry:

Lemma 3: *When MNC affiliates require host-country financing, (i)* $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} > 0$*; (ii)* $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} < 0$*; (iii)* $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} = \frac{1}{a_D}\frac{da_D}{d\eta} > \frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}$*; (iv)* $\frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta} < 0$*; and (v)* $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} = \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta} > \frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta}$.

Compared with Lemma 2, a key difference is that an improvement in host-country financial development now leads instead to a *leftward* shift in the FDI cutoff, $\tilde{a}_I^{1-\varepsilon}$, as illustrated in Figure A.3. This occurs because an increase in η has a *financing effect* that makes credit accessible and FDI feasible for a larger margin of Western firms. It is nevertheless still the case that $\frac{da_{XS}}{d\eta} < 0$ and $\frac{dA_{sw}}{d\eta} < 0$: Overall, the Southern market does become more competitive, not only because of the entry of more local firms, but also because there are now a larger margin of MNC affiliates present there.[14] The productivity cutoff for Western firms exporting to South,

[12] While there are alternative ways of defining what constitutes appropriable profits, our general insights would hold so long as the productivity cutoff for FDI by Western firms is higher the more severe financial constraints in South are.

[13] We therefore maintain our assumption on the ordering of the productivity cutoffs: $0 < a_D^{1-\varepsilon} < a_{XN}^{1-\varepsilon} < a_{XS}^{1-\varepsilon} < \tilde{a}_I^{1-\varepsilon}$.

[14] Holding all other parameters of the model constant, and starting with the same initial η, both $\frac{da_{XS}}{d\eta}$ and $\frac{dA_{sw}}{d\eta}$ would in fact be larger in magnitude in the presence of the financing effect, when compared against the baseline case with only the competition effect. The reason is intuitive: With the financing effect, host-country financial development induces more entry not just of domestic firms, but also of MNC affiliates, so that the aggregate demand faced by any Western firm in South falls further. As a result, the productivity cutoff that must be surpassed before exporting to South can occur rises more than it would in the absence of the

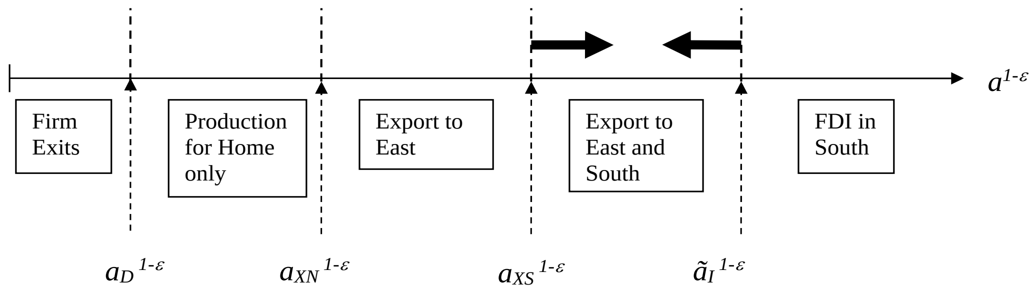


Figure 3: Response of Cutoffs to an Increase in η: With Host-Country Borrowing by MNCs

$a_{XS}^{1-\varepsilon}$, thus shifts to the right, while the market demand level faced by each Western firm in South falls. While the direction of change for $a_D^{1-\varepsilon}$ and $a_{XN}^{1-\varepsilon}$ depends on parameter values, it can be shown that the impact on a_D and a_{XN} is less negative than that on a_{XS}.[15] This in turn allows us to compare the proportional changes in A_{ww}, A_{ew} and A_{sw}. Intuitively, the response of the $a_D^{1-\varepsilon}$ and $a_{XN}^{1-\varepsilon}$ cutoffs is muted compared to that of $a_{XS}^{1-\varepsilon}$, as the former two correspond to Western firms that are less directly affected by the degree of competition in South.

A.3.2 Impact on multinational affiliate sales

We now consider the implications for the pattern of affiliate sales. Referring back to the expressions in (A.23)-(A.25) and applying Lemma 3, one can see that the relative shifts in A_{ww}, A_{ew} and A_{sw} induced by an improvement in η once again lead to a decrease in the horizontal sales share, $\frac{HOR(a)}{TOT(a)}$, as well as an increase in the platform and return sales shares, $\frac{PLA(a)}{TOT(a)}$ and $\frac{RET(a)}{TOT(a)}$. These responses are aligned with the baseline model and indicative of the competition effect. While the increase in η clearly lowers the horizontal sales levels, $HOR(a)$, of individual affiliates, the model does not deliver a similarly sharp prediction for the effects on platform sales $PLA(a)$ or return sales $RET(a)$. The reason for this latter ambiguity is as follows. Whether $PLA(a)$ and $RET(a)$ increase or decrease is pinned down by whether the corresponding market demand levels in West and East, A_{ww} and A_{ew}, rise or fall. (Bear in mind that $A_{ww} = A_{ew}$ due to the symmetry between West and East.) On the one hand, the fact that each Western firm experiences a decline in the aggregate demand level A_{sw} it faces from South would suggest that the demand level it faces in West and East would have to rise, in order to satisfy the free-entry condition. (This would in fact necessarily be the case if there were no adjustment in the FDI cutoff, $\tilde{a}_I$.) On the other hand, the fact that there are now potentially more Western firms that can tap into the lower production wages in South means that West and East could also become more competitive markets for affiliates seeking to export back to the home or third-country markets. The net effect on the platform and return sales of a given affiliate, and hence also on the total sales $TOT(a)$ at the affiliate level, is thus in principle ambiguous.

Importantly, the financing effect alters the behavior of *aggregate* multinational activity from the baseline model in Section A.2. An improvement in host-country financial development now facilitates the entry of more MNC affiliates into South, as indicated by the leftward shift in the $\tilde{a}_I^{1-\varepsilon}$ cutoff described in Lemma 3. This increase in multinational activity on the extensive margin can in fact be large enough to dominate any shifts

financing effect.

[15]For example, setting $R = 1.07$, $\varepsilon = 3.8$, $L_n = L_s = 1$, $f_D = 0.2$, $f_X = 0.15$, $f_I = 4$, $f_S = 0.1$, $f_{En} = f_{Es} = 1$, $\tau = 1.4$, $\omega = 0.6$, $\bar{a}_N = \bar{a}_S = 25$, $k = 4$, $\delta = 0.1$, $\mu = 0.5$ and $\eta = 0.5$ delivers an equilibrium with the desired sorting pattern of the productivity cutoffs ($a_D = 13.42$, $a_{XN} = 10.62$, $a_{XS} = 6.30$ and $\tilde{a}_I = 5.25$), in which: $\frac{1}{a_D}\frac{da_D}{d\eta} = \frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} = -4.34 < 0$. However, when we raise ω to 0.8 and lower τ to 1.2 (holding the other parameter values constant), we obtain $a_D = 13.57$, $a_{XN} = 12.53$, $a_{XS} = 10.87$, $\tilde{a}_I = 4.27$, and $\frac{1}{a_D}\frac{da_D}{d\eta} = \frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} = 0.83 > 0$. The Matlab code for computing the equilibrium is available on request.

in the respective market demand levels, A_{sw}, A_{ew} and A_{ww}, in the expressions for HOR, PLA and RET in (A.20)-(A.22), so that the net effect is an increase in all three aggregate sales levels. In particular, this will always turn out to be the case when the initial level of financial development in the host country is sufficiently high. (See Section B.1 for the proof.) This stands in direct contrast to the earlier predictions in part (iii) of Proposition 1 of the baseline model; there, with only the competition effect operative, an increase in η could only result in the exit of Western MNCs on the extensive margin and hence a decline in the aggregate level of multinational activity.

We summarize the predictions in the presence of host-country borrowing as follows:

Proposition 2 *When MNC affiliates require host-country financing, in response to a small improvement in financial development, η, in South:*

(i) $HOR(a)$ *decreases, while the effects on both* $PLA(a)$ *and* $RET(a)$ *are ambiguous;*

(ii) $\frac{HOR(a)}{TOT(a)} = \frac{HOR}{TOT}$ *decreases, while both* $\frac{PLA(a)}{TOT(a)} = \frac{PLA}{TOT}$ *and* $\frac{RET(a)}{TOT(a)} = \frac{RET}{TOT}$ *increase; and*

(iii) if the initial level of host-country financial development is sufficiently high, $N_n G_n(\tilde{a}_I)$, HOR, PLA *and* RET *all increase.*

The sufficient condition specified in part (iii) of this proposition warrants some discussion. Intuitively, when the initial level of η is high, improvements in host-country financial development trigger a modest amount of entry by Southern firms, as the initial distortion imposed by financial frictions is small. The decline in Southern demand for Western varieties, A_{sw}, is in turn too small to counteract the tendency for more Western multinationals to locate in South as credit there becomes more accessible. The competition effect will then be dominated by the financing effect, so that aggregate levels of multinational activity increase. Note that this sufficient condition is very mild in practice. In footnote 15, we have already provided an example of a valid parametrization of the model with $\eta = 0.5$ (much below the upper bound of 1), in which $N_n G_n(\tilde{a}_I)$, HOR, PLA and RET all rise with small increases in η.[16] Our extensive quantitative explorations indicate that η needs to be even lower *and* one of the other parameters has to lie far outside of conventional ranges in order to generate a numerical counter-example in which part (iii) of Proposition 2 does not hold (see Section B.1 for a more detailed discussion).

A.4 Four Extensions

We briefly explore four extensions of the model in this subsection. These allow us to discuss the robustness of the competition and financing effects, when plausible modifications are made to certain key features of the setup.

A.4.1 The home-bias effect

In the model presented earlier, platform and return sales respond identically to host-country financial development, even though this does not hold strictly in the data. While there are various ways to relax this from a modeling perspective, one approach that is analytically tractable (and which preserves much of the underlying symmetry in our framework) is to introduce home bias in consumer preferences. Specifically, assume the utility

[16] For the first parametrization in footnote 15, we get: $\frac{d}{d\eta} N_n G_n(\tilde{a}_I) = 0.57$, $\frac{d}{d\eta} HOR = 0.72$ and $\frac{d}{d\eta} PLA = \frac{d}{d\eta} RET = 2.06$.

functions in each country ($n = w, e$) are now:

$$U_n = y_n^{1-\mu} \left[\sum_{j \in \{e,w\}} \left(\int_{\Omega_{nj}} x_{nj}(a)^\alpha \, dG_j(a) \right)^{\frac{\beta}{\alpha}} \right]^{\frac{\mu}{\beta}}, \text{ and} \tag{A.27}$$

$$U_s = y_s^{1-\mu} \left[\sum_{j \in \{e,w,s\}} \left(\int_{\Omega_{sj}} x_{sj}(a)^\alpha \, dG_j(a) \right)^{\frac{\beta}{\alpha}} \right]^{\frac{\mu}{\beta}}. \tag{A.28}$$

In contrast to (A.1) and (A.2), the sub-utility derived from differentiated varieties is now a two-tiered CES function. We assume that the elasticity of substitution for varieties from the same country exceeds the elasticity of substitution for varieties from different countries, ($\varepsilon = \frac{1}{1-\alpha} > \phi = \frac{1}{1-\beta} > 1$). This translates into home bias, as varieties are closer substitutes if they bear the same nationality/country-of-origin. (This identity of the variety travels with the firm regardless of the location where the variety is produced, through its product design and attributes.)

Under this richer utility specification, an improvement in Southern financial development once again spurs entry by domestic firms and increases competition for Western varieties. However, we can show that demand for Western products now increases proportionally more in East than in West ($\frac{1}{A_{ew}} \frac{dA_{ew}}{d\eta} > \frac{1}{A_{ww}} \frac{dA_{ww}}{d\eta} > 0$), while the $a_{XN}^{1-\varepsilon}$ cutoff falls proportionally more than the $a_D^{1-\varepsilon}$ cutoff ($\frac{1}{a_{XN}} \frac{da_{XN}}{d\eta} > \frac{1}{a_D} \frac{da_D}{d\eta} > 0$). In the detailed derivations in Section B.2, we prove that Proposition 1 remains true in its entirety. However, a further prediction can now be added:

Proposition 3 *With home bias in consumer preferences, (i)* $\frac{d}{d\eta} PLA(a) > \frac{d}{d\eta} RET(a)$*; (ii)* $\frac{d}{d\eta} \frac{PLA(a)}{TOT(a)} = \frac{d}{d\eta} \frac{PLA}{TOT} > \frac{d}{d\eta} \frac{RET(a)}{TOT(a)} = \frac{d}{d\eta} \frac{RET}{TOT}$*; and (iii)* $\frac{d}{d\eta} PLA > \frac{d}{d\eta} RET$.

The increase in multinational affiliates' export-platform sales now exceeds that of their return sales to West. Intuitively, a Western MNC faces tougher competition in its own home market than in East. This occurs because other Western varieties are closer substitutes in consumption than Eastern varieties, and a margin of Western firms (with productivity $a_D^{1-\varepsilon} < a^{1-\varepsilon} < a_{XN}^{1-\varepsilon}$) sell only at home but not in East.

A.4.2 Southern exports

We next extend the model to allow Western and Eastern consumers to demand Southern varieties. With this feature, Southern firms can now exert competitive pressure on Western and Eastern manufacturers not only in South, but also in their respective home markets. Below, we briefly sketch how we incorporate Southern exporting, and discuss how this qualifies some of the previous predictions; a detailed exposition is in Section B.3.

Assume that Southern firms can export by incurring the iceberg trade cost, $\tau > 1$, as well as an upfront fixed cost of $f_{X,ws}$ units of Southern labor to serve each of the markets West and East. Southern firms that export require external finance for $f_{X,ws}$, and face credit constraints in raising this capital just as they do for their domestic operations. Financial development in South thus increases domestic firm entry, and also enables more Southern firms to export. This raises competition in the goods markets in all three countries, but to different degrees. Because the equilibrium in South's differentiated varieties sector now includes a feedback effect from demand in West and East, we analyze this case through computational examples.[17]

In the baseline where multinationals do not use host-country finance, the presence of Southern exports may weaken but in general preserves the results described in Proposition 1. Improving financial institutions in South

[17] We build these examples using the parameterizations in footnote 15. In particular, we examine values of $f_{X,ws}$ that lie between the fixed cost of exporting for Western firms (f_X) and the fixed cost of FDI (f_I).

continues to increase competition in that market, so that affiliates direct sales away from the local economy and toward other countries. This competition effect remains operative even when we extend the model to require multinationals to seek host-country financing. The conclusions in parts (i) and (ii) of Proposition 2 for the sales levels and sales shares of individual affiliates, as well as for the aggregate sales shares, are thus qualitatively unaffected. However, the effects on the aggregate levels of MNC activity are now ambiguous: The direct competition that Southern exports pose in West and East can lead to a decline in N_n, so that the number of affiliates and the aggregate sales levels can decrease. Our numerical exercises indicate that this is more likely to happen when Southern firms face a lower trade cost $f_{X,ws}$, since Southern exports would then have a larger impact on competition in West.

A.4.3 Endogenous host-country wages

Up to this point, we have made the assumption that the host-country wage, ω, is pinned down exogenously by the marginal product of labor in the homogeneous-good sector. This facilitated the analytical tractability of the model, allowing us to highlight the effects of interest without considering feedback effects from the host-country labor market. We now consider the implications of relaxing this assumption.

To do so, consider the special case of the baseline model in which $\mu = 1$ in the utility functions of both Northern and Southern consumers, (A.1) and (A.2). We continue to adopt the wage in North as the numeraire. Setting $\mu = 1$ effectively shuts down the homogenous-good sector, so that the Southern wage ω is now determined endogenously by a labor market clearing condition in South:

$$\begin{aligned} L_s &= N_s A_{ss} \left(\frac{\omega}{\alpha}\right)^{-\varepsilon} V_s(a_S) + N_s R f_S G_s(a_S) + \delta N_s f_{Es} \\ &\quad + 2N_n \left[A_{ww} \tau \left(\frac{\tau\omega}{\alpha}\right)^{-\varepsilon} + A_{ew} \tau \left(\frac{\tau\omega}{\alpha}\right)^{-\varepsilon} + A_{sw} \left(\frac{\omega}{\alpha}\right)^{-\varepsilon} \right] V_n(a_I). \end{aligned} \tag{A.29}$$

This equates the Southern labor supply to the total use of labor in that economy. Note that the expression on the right-hand side of the first line of (A.29) corresponds to the use of Southern labor by Southern firms, including the labor that is used to service the domestic fixed cost of production and domestic entry. (In particular, the number of Southern entrants in each period is equal to the number who exit exogenously, i.e., δN_s, in order for the number of Southern firms to be constant in the steady state.) The second line of (A.29) in turn corresponds to the use of Southern labor by the multinational affiliates of Western and Eastern firms.[18]

With Southern wages now adjusting endogenously, an improvement in host-country financial development that spurs more Southern entry will raise the overall demand for labor in South and thus lead to a rise in ω. Intuitively, the rise in Southern incomes can now dampen and even offset the decline in Southern demand for Western varieties, A_{sw}, thus muting the competition effect. To examine this possibility, we have explored numerical examples given that the model is less tractable to solve analytically when wages are endogenous. As a baseline, when adopting parameter values similar to those from the previous extension on Southern exporting, we continue to find that improvements in host-country financial development reduce the share of sales to the local market, while raising the return and export-platform sales shares. It is only when the Southern labor force is lowered to be smaller in size than the Northern workforce that we observe sharp enough rises in ω that offset the competition effect completely so that the local sales share instead rises with η. (We elaborate on these computational examples in Section B.4.)

[18] As an implication of Walras' Law, it is straightforward to show that the labor market clearing condition for North is redundant in the system of equations that defines the model equilibrium.

A.4.4 Multiple host countries

In a last extension, we show how the key insights can also be applied in a setting with multiple host countries. Consider a setup that maintains the structure of West and East from Section A.1, but that now allows for two Southern countries ($s1$ and $s2$) as potential FDI hosts. Assume that country $s1$ is more financially developed than $s2$ ($0 < \eta_{s2} < \eta_{s1} < 1$), but that $s1$ and $s2$ are identical in all other respects. As in the baseline model, let $s1$ and $s2$ each have a differentiated varieties industry whose products are in demand only in their respective domestic markets. We consider situations in which multinationals from West (likewise East) choose to undertake FDI in either $s1$ or $s2$, and subsequently use the Southern production plant to serve all four economies. Horizontal and return sales in either $s1$ or $s2$ are defined once again as sales in the local market and to the parent country (West) respectively; however, platform sales now comprise the sum of exports to East and to the other Southern country.

In Section B.5, we show that the competition effect – in particular, its implications for the horizontal, return and platform sales shares – directly applies to the variation across the host countries. Because of its higher financial development, $s1$ will feature more local firms than $s2$, and be a more competitive market environment for multinational affiliates based there, *ceteris paribus*. As a result, the horizontal sales share in $s1$ will be smaller than that in $s2$, while the return and platform sales shares will instead be larger. We further show how a comparison of affiliate sales levels between $s1$ and $s2$ can be made, once some additional structure is introduced that allows firms with the same productivity level to potentially undertake FDI in either host economy. This is the case when each prospective multinational observes an idiosyncratic profit shock in each host country that influences the location it ultimately chooses for its affiliate. In this setting, the qualitative predictions of Propositions 1 and 2 regarding sales levels extend to the cross-section of countries with different levels of financial development.

A.5 Mapping to the Empirics

Taking guidance from the above modeling exercise, Table 1 in the main paper organizes the predictions on the effects of host-country financial development on each of the variables related to MNC entry and sales (both at the affiliate and aggregate level) that we have examined. The first column in that table summarizes the shifts we would expect when the Competition Effect is the dominant force and the Financing Effect is weak (or even absent). These correspond to the predictions listed in Proposition 1. Note that this column in the table indicates an ambiguous effect on aggregate return, platform and total sales (RET, PLA and TOT), in line with the discussion in A.2 that the direction of change for these variables could be positive in settings that are more general than our stylized three-country model. The second column in Table 1 lists the predictions when the Financing Effect is instead strong, as in Proposition 2 above.

Two comments are in order regarding how the modeling framework here translates into the empirical specifications that are reported in the main paper. First, in our empirics, we adopt a commonly-used measure of financial development, namely the ratio of private credit to GDP in the host economy. The use of this measure can be supported within the context of our model, since it can be shown that the counterpart of the private credit to GDP ratio is in fact increasing in η in the model. (This statement is true both in the baseline without MNC host-country financing, as well as in the richer version of the model where affiliates use host-country financing; see B.1.)

Second, we also run regressions in the empirical work in which we further exploit cross-industry variation in external finance dependence, to show that the effects of host-country financial development are accentuated in industries that exhibit a high dependence on external sources of credit. This empirical specification can be justified within the context of the above modeling framework, if we view f_S as capturing the degree of external finance dependence of a particular industry: It can be shown that the cross-partial of each outcome variable of interest with respect to η and f_S will inherit the same sign as its partial derivative with respect to η. (See B.1 for the derivation of this property.)

B Detailed Derivations

B.1 Proofs for the Baseline Model

The FDI decision. We show that the two conditions, $\tau\omega < 1$ and $f_X < f_D < f_I$, are sufficient to guarantee that the optimal strategy for Western multinationals will be as follows: (i) highly productive Western firms conduct FDI only in South but not in East; and (ii) Western multinationals use their Southern plant as a global production center to serve all three markets.

Consider first a Western firm that already operates a multinational affiliate in South. It is then automatically more profitable to use this affiliate as an export platform to East, rather than servicing East via direct exports from West, or via direct FDI in East. This follows from the inequality:

$$(1-\alpha)A_{ew}\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon} - Rf_X \;>\; \max\left\{(1-\alpha)A_{ew}\left(\frac{\tau a}{\alpha}\right)^{1-\varepsilon} - Rf_X,\; (1-\alpha)A_{ew}\left(\frac{a}{\alpha}\right)^{1-\varepsilon} - Rf_I\right\},$$

which holds since $\tau\omega < 1 < \tau$ and $f_X < f_I$ (bearing in mind that $1-\varepsilon < 0$). In particular, this rules out the possibility of the MNC establishing affiliates in both South and East.

Next, conditional on setting up a Southern affiliate, we can further deduce that it is optimal to use this affiliate to supply even the firm's home market. This follows from:

$$(1-\alpha)A_{ww}\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon} - Rf_X \;>\; (1-\alpha)A_{ww}\left(\frac{a}{\alpha}\right)^{1-\varepsilon} - Rf_D,$$

which holds since $\tau\omega < 1$ and $f_X < f_D$. Thus, it is more profitable to produce in South and export to West than to incur the higher fixed cost and wages of production at home.

It remains to check that the optimal decision for a Western firm that becomes a multinational is to locate its overseas affiliate in South, rather than in East. For this, we compare the total profits from servicing all three countries out of an affiliate in South versus an affiliate in East:

$$\begin{aligned}
&(1-\alpha)A_{ww}\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon} - Rf_X + (1-\alpha)A_{ew}\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon} - Rf_X + (1-\alpha)A_{sw}\left(\frac{a\omega}{\alpha}\right)^{1-\varepsilon} - Rf_I \\
&\quad > \max\left\{(1-\alpha)A_{ww}\left(\frac{a}{\alpha}\right)^{1-\varepsilon} - Rf_D,\; (1-\alpha)A_{ww}\left(\frac{\tau a}{\alpha}\right)^{1-\varepsilon} - Rf_X\right\} \\
&\quad\quad + (1-\alpha)A_{ew}\left(\frac{a}{\alpha}\right)^{1-\varepsilon} - Rf_I + (1-\alpha)A_{sw}\left(\frac{\tau a}{\alpha}\right)^{1-\varepsilon} - Rf_X.
\end{aligned}$$

Note that if FDI is undertaken in East, the home market (West) can be supplied either through domestic production or exports from East, while South would be serviced by exports from either West or East. The expression on the right-hand side of the above inequality captures total profits from this alternative production mode. It is straightforward to check that the above inequality holds when $\tau\omega < 1$, $\omega < 1$, $\omega < \tau$ and $f_X < f_D$. It is thus not optimal for a Western firm to conduct FDI in East.

In sum, the conditions $\tau\omega < 1$ and $f_X < f_D < f_I$ guarantee that the FDI decision is in effect a decision over whether to relocate the firm's global production center to South, with only headquarter activities retained in West. ■

Proof of Lemma 1. Log-differentiating (A.13) and (A.15), one obtains:

$$\begin{aligned}(\varepsilon-1)\frac{da_S}{a_S} &= \frac{d\eta}{\eta}+\frac{dA_{ss}}{A_{ss}}, \quad \text{and}\\ 0 &= a_S^{\varepsilon-1}V_s(a_S)\frac{dA_{ss}}{A_{ss}}+[a_S^{\varepsilon-1}V_s'(a_S)-\eta G_s'(a_S)]da_S.\end{aligned}$$

To derive the second equation above, we used the fact that $(1-\alpha)A_{ss}(\omega/\alpha)^{1-\varepsilon}=(1/\eta)a_S^{\varepsilon-1}Rf_S\omega$, which holds from the expression for $a_S^{1-\varepsilon}$ in (A.13). Solving these two equations simultaneously yields:

$$\begin{aligned}\frac{da_S}{d\eta} &= \frac{1}{\eta}\frac{a_S^{\varepsilon-1}V_s(a_S)}{(\varepsilon-1)a_S^{\varepsilon-2}V_s(a_S)+[a_S^{\varepsilon-1}V_s'(a_S)-\eta G_s'(a_S)]}, \quad \text{and}\\ \frac{dA_{ss}}{d\eta} &= -\frac{A_{ss}}{\eta}\frac{a_S^{\varepsilon-1}V_s'(a_S)-\eta G_s'(a_S)}{(\varepsilon-1)a_S^{\varepsilon-2}V_s(a_S)+[a_S^{\varepsilon-1}V_s'(a_S)-\eta G_s'(a_S)]}.\end{aligned}$$

Applying Leibniz's rule to $V_s(a_S)=\int_0^{a_S}\tilde{a}^{1-\varepsilon}dG_s(\tilde{a})$, we have: $a_S^{\varepsilon-1}V_s'(a_S)=G_s'(a_S)$. Hence, $a_S^{\varepsilon-1}V_s'(a_S)-\eta G_s'(a_S)=(1-\eta)G_s'(a_S)>0$, since $\eta\in(0,1)$ and $G_s'(a)>0$. Since $\varepsilon>1$, it follows that $\frac{da_S}{d\eta}>0$ and $\frac{dA_{ss}}{d\eta}<0$.

While the above proof holds for any cdf $G_s(a)$, it is straightforward to show for the case of the Pareto distribution, $G_s(a)=(a/\bar{a}_s)^k$, that the above derivatives can be written more simply as:

$$\frac{da_S}{d\eta} = \frac{a_S}{\eta}\frac{1-\rho_S}{\varepsilon-1}, \quad \text{and} \tag{B.1}$$

$$\frac{dA_{ss}}{d\eta} = -\frac{A_{ss}}{\eta}\rho_S. \tag{B.2}$$

Here, ρ_S is a constant that depends only on parameter values: $\rho_S\equiv\frac{(1-\eta)\frac{k-\varepsilon+1}{\varepsilon-1}}{1+(1-\eta)\frac{k-\varepsilon+1}{\varepsilon-1}}\in(0,1)$. These are convenient expressions that we use frequently in the rest of the proofs. ■

Proof of Lemma 2. We take the remaining equations that define the industry equilibrium in West – (A.3)-(A.4), (A.9)-(A.12), (A.14) and (A.16)-(A.19) – and differentiate them. First, log-differentiating (A.9)-(A.11) yields:

$$(\varepsilon-1)\frac{da_D}{a_D} = \frac{dA_{ww}}{A_{ww}}, \tag{B.3}$$

$$(\varepsilon-1)\frac{da_{XN}}{a_{XN}} = \frac{dA_{ew}}{A_{ew}}, \quad \text{and} \tag{B.4}$$

$$(\varepsilon-1)\frac{da_{XS}}{a_{XS}} = \frac{dA_{sw}}{A_{sw}}. \tag{B.5}$$

Since $A_{sw}=A_{ss}$, it immediately follows from (B.2) and (B.5) that $\frac{dA_{sw}}{d\eta}=\frac{dA_{ss}}{d\eta}<0$, and hence that:

$$\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}=-\frac{1}{\eta}\frac{\rho_S}{\varepsilon-1}<0. \tag{B.6}$$

This establishes part (iii) of the lemma.

We next differentiate the free-entry condition for West, (A.14):

$$
\begin{aligned}
0 \;=\; & \left[(1-\alpha)A_{ww}\left(\left(\frac{1}{\alpha}\right)^{1-\varepsilon}V_n(a_D)+\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right)V_n(a_I)\right)\right]\frac{dA_{ww}}{A_{ww}} \\
& +\left[(1-\alpha)A_{ew}\left(\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}V_n(a_{XN})+\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)V_n(a_I)\right)\right]\frac{dA_{ew}}{A_{ew}} \\
& +\left[(1-\alpha)A_{sw}\left(\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}V_n(a_{XS})+\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)V_n(a_I)\right)\right]\frac{dA_{sw}}{A_{sw}} \\
& +\left[(1-\alpha)A_{ww}\left(\frac{1}{\alpha}\right)^{1-\varepsilon}V_n'(a_D)-Rf_DG_n'(a_D)\right]da_D \\
& +\left[(1-\alpha)A_{ew}\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}V_n'(a_{XN})-Rf_XG_n'(a_{XN})\right]da_{XN} \\
& +\left[(1-\alpha)A_{sw}\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}V_n'(a_{XS})-Rf_XG_n'(a_{XS})\right]da_{XS} \\
& +\Bigg[(1-\alpha)\Bigg(A_{ww}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right)+A_{ew}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right) \\
& +A_{sw}\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)\Bigg)V_n'(a_I)-R(f_I-f_D)G_n'(a_I)\Bigg]da_I. \qquad \text{(B.7)}
\end{aligned}
$$

Focus first on the term involving da_D on the right-hand side of (B.7). We make use of the fact that: (i) $(1-\alpha)A_{ww}(1/\alpha)^{1-\varepsilon} = a_D^{\varepsilon-1}Rf_D$, which comes from equation (A.9); and (ii) $a^{\varepsilon-1}V_n'(a) = G_n'(a)$ for all $a \in (0, \bar{a}_n)$, which holds from Leibniz's Rule. With these, one can show that the coefficient of da_D in (B.7) reduces to 0. An analogous argument implies that the coefficients of da_{XN}, da_{XS} and da_I are all also equal to 0. Turning to the terms involving $\frac{dA_{ww}}{A_{ww}}$, $\frac{dA_{ew}}{A_{ew}}$ and $\frac{dA_{sw}}{A_{sw}}$, one can use the expressions for the price indices in (A.16)-(A.18) to re-write (B.7) as:

$$\rho_1\frac{dA_{ww}}{A_{ww}}+(1-\rho_1)\frac{dA_{ew}}{A_{ew}}+\frac{1-\rho_2}{2}\frac{E_s}{E_n}\frac{dA_{sw}}{A_{sw}}=0,$$

where we define: $\rho_1 = \frac{P_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}+P_{ew}^{1-\varepsilon}}$ and $\rho_2 = \frac{P_{ss}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}+2P_{sw}^{1-\varepsilon}}$. Note that $\rho_1, \rho_2 \in (0,1)$. A quick substitution from (B.3)-(B.5) then implies:

$$\rho_1\frac{da_D}{a_D}+(1-\rho_1)\frac{da_{XN}}{a_{XN}}+\frac{1-\rho_2}{2}\frac{E_s}{E_n}\frac{da_{XS}}{a_{XS}}=0. \qquad \text{(B.8)}$$

Intuitively, the free-entry condition requires that a rise in demand in any one market for the Western firm's goods must be balanced by a decline in demand from at least one other market. Since $A_{ww} = A_{ew}$, we have $\frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta} = \frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta}$, and hence from (B.3) and (B.4), we have $\frac{1}{a_D}\frac{da_D}{d\eta} = \frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$. Substituting this and the expression for $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}$ from (B.6) into (B.8), we obtain:

$$\frac{1}{a_D}\frac{da_D}{d\eta}=\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}=\frac{1}{\eta}\frac{E_s}{E_n}\frac{1-\rho_2}{2}\frac{\rho_S}{\varepsilon-1}>0. \qquad \text{(B.9)}$$

It follows from (B.3) and (B.4) that: $\frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta} = \frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} > 0$. This establishes parts (ii) and (iv) of the lemma.

Finally, we turn to part (i) in the statement of Lemma 2. Log-differentiating (A.12) yields:

$$(\varepsilon-1)\frac{da_I}{a_I}=\frac{A_{ww}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right)\frac{dA_{ww}}{A_{ww}}+A_{ew}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)\frac{dA_{ew}}{A_{ew}}+A_{sw}\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)\frac{dA_{sw}}{A_{sw}}}{A_{ww}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right)+A_{ew}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)+A_{sw}\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)}.$$

We replace $\frac{dA_{ww}}{A_{ww}}$, $\frac{dA_{ew}}{A_{ew}}$ and $\frac{dA_{sw}}{A_{sw}}$ using (B.3)-(B.5). Making use also of the expressions: (i) for A_{ww}, A_{ew} and A_{sw} from (A.3)-(A.4); and (ii) for $P_{ww}^{1-\varepsilon}$, $P_{ew}^{1-\varepsilon}$ and $P_{sw}^{1-\varepsilon}$ from (A.16)-(A.18); and simplifying extensively, one can show that:

$$\frac{da_I}{a_I} = \frac{\rho_1(1-\Delta_1)\frac{da_D}{a_D} + (1-\rho_1)(1-\Delta_2)\frac{da_{XN}}{a_{XN}} + \frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3)\frac{da_{XS}}{a_{XS}}}{\rho_1(1-\Delta_1) + (1-\rho_1)(1-\Delta_2) + \frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3)}, \tag{B.10}$$

where we define:

$$\begin{aligned}
\Delta_1 &= \frac{\left(\frac{1}{\alpha}\right)^{1-\varepsilon} V_n(a_D)}{\left(\frac{1}{\alpha}\right)^{1-\varepsilon} V_n(a_D) + (\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{1}{\alpha}\right)^{1-\varepsilon})V_n(a_I)}, \\
\Delta_2 &= \frac{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XN})}{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XN}) + (\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon})V_n(a_I)}, \quad \text{and} \\
\Delta_3 &= \frac{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XS})}{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XS}) + (\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon})V_n(a_I)}.
\end{aligned}$$

Thus, $\frac{da_I}{a_I}$ is a weighted average of $\frac{da_D}{a_D}$, $\frac{da_{XN}}{a_{XN}}$ and $\frac{da_{XS}}{a_{XS}}$. Note that $\Delta_1, \Delta_2, \Delta_3 \in (0,1)$. Moreover, using the above definitions, we have: $sign\{\Delta_1 - \Delta_2\} = sign\{(\omega^{1-\varepsilon} - 1)V_N(a_D) - ((\tau\omega)^{1-\varepsilon} - 1)V_N(a_{XN})\} > 0$. This inequality holds as: $V_N(a_D) > V_N(a_{XN}) > 0$ (since $a_D > a_{XN}$), and $\omega^{1-\varepsilon} - 1 > (\tau\omega)^{1-\varepsilon} - 1 > 0$. Analogously, we have: $sign\{\Delta_2 - \Delta_3\} = sign\{(\omega^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_{XN}) - ((\tau\omega)^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_{XS})\} > 0$. This is again positive as: $V_N(a_{XN}) > V_N(a_{XS}) > 0$ (since $a_{XN} > a_{XS}$), and $\omega^{1-\varepsilon} - \tau^{1-\varepsilon} > (\tau\omega)^{1-\varepsilon} - \tau^{1-\varepsilon} > 0$. In sum, we have: $1 > \Delta_1 > \Delta_2 > \Delta_3 > 0$. We further define: $\Delta_d = \rho_1(1-\Delta_1) + (1-\rho_1)(1-\Delta_2) + \frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3) > 0$, which is the denominator in (B.10). We now substitute into (B.10) the expressions for $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}$, $\frac{1}{a_D}\frac{da_D}{d\eta}$ and $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$ from (B.6) and (B.9). After simplifying, one obtains:

$$\frac{1}{a_I}\frac{da_I}{d\eta} = \frac{1}{\eta}\frac{1}{\Delta_d}\frac{E_s}{E_n}\frac{1-\rho_2}{2}\frac{\rho_S}{\varepsilon-1}\left[\Delta_3 - \rho_1\Delta_1 - (1-\rho_1)\Delta_2\right] < 0. \tag{B.11}$$

That this last expression is negative follows from the fact that $\rho_1, \rho_2, \Delta_1, \Delta_2, \Delta_3 \in (0,1)$, and that $\Delta_1 > \Delta_2 > \Delta_3$. Moreover, (B.6) and (B.11) imply:

$$\begin{aligned}
\frac{1}{a_I}\frac{da_I}{d\eta} - \frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} &= \frac{1}{\eta}\frac{1}{\Delta_d}\frac{\rho_S}{\varepsilon-1}\left[\frac{E_s}{E_n}\frac{1-\rho_2}{2}(\Delta_3 - 1) + \Delta_d\right] \\
&= \frac{1}{\eta}\frac{1}{\Delta_d}\frac{\rho_S}{\varepsilon-1}\left[\rho_1(1-\Delta_1) + (1-\rho_1)(1-\Delta_2)\right] \\
&> 0.
\end{aligned}$$

Thus, $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} < \frac{1}{a_I}\frac{da_I}{d\eta} < 0$, which completes the proof of the lemma. ■

Proof of Proposition 1. Recall the definitions of $HOR(a)$, $PLA(a)$ and $RET(a)$ from Section A.2. Lemma 2 then implies that when η improves, $HOR(a)$ falls (since $\frac{dA_{sw}}{d\eta} < 0$), $PLA(a)$ increases (since $\frac{dA_{ew}}{d\eta} > 0$), and $RET(a)$ increases (since $\frac{dA_{ww}}{d\eta} > 0$). This establishes part (i) of the proposition.

For part (ii), from (A.23), one can see that $\frac{d}{d\eta}\frac{HOR(a)}{TOT(a)} < 0$, since both $\frac{A_{ww}}{A_{sw}}$ and $\frac{A_{ew}}{A_{sw}}$ increase with η. On the other hand, from (A.24) and (A.25), we have $\frac{d}{d\eta}\frac{PLA(a)}{TOT(a)} = \frac{d}{d\eta}\frac{RET(a)}{TOT(a)} > 0$, since $\frac{A_{sw}}{A_{ew}}$ is decreasing in η and $\frac{A_{ww}}{A_{ew}} = 1$.

For part (iii), we first need an expression for $\frac{1}{N_n}\frac{dN_n}{d\eta}$. Start by log-differentiating (A.3):

$$\frac{dA_{ww}}{A_{ww}} = -\rho_1\frac{dP_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}} - (1-\rho_1)\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}}. \tag{B.12}$$

Equations (A.16) and (A.17) in turn provide us with the log-derivatives of the two price indices that appear on the right-hand side of (B.12):

$$\frac{dP_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}} = \frac{dN_n}{N_n} + (k-\varepsilon+1)\left(\Delta_1 \frac{da_D}{a_D} + (1-\Delta_1)\frac{da_I}{a_I}\right), \quad \text{and} \tag{B.13}$$

$$\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}} = \frac{dN_n}{N_n} + (k-\varepsilon+1)\left(\Delta_2 \frac{da_{XN}}{a_{XN}} + (1-\Delta_2)\frac{da_I}{a_I}\right). \tag{B.14}$$

We now substitute: (i) from (B.13) and (B.14) into (B.12); (ii) from (B.3) into the left-hand side of (B.12); and (iii) the expressions for $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}$, $\frac{1}{a_D}\frac{da_D}{d\eta}$ and $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$ from (B.6) and (B.9) into (B.12). After some algebra, this yields:

$$\begin{aligned}
\frac{1}{N_n}\frac{dN_n}{d\eta} &= \frac{1}{\eta}\frac{1}{\Delta_d}\frac{E_s}{E_n}\frac{1-\rho_2}{2}\frac{\rho_S}{\varepsilon-1}\Big[-(\varepsilon-1)\Delta_d \\
&\quad -(k-\varepsilon+1)\left(\Delta_3(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2)) + \frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\Delta_3)(\rho_1\Delta_1+(1-\rho_1)\Delta_2\right)\Big] \\
&< 0.
\end{aligned}$$

Note that we make use here of the fact that $k-\varepsilon+1>0$. As a_I also decreases in response to an increase in η, it follows that an improvement in Southern financial development decreases both the measure of Western/Eastern firms, N_n, and the "number" of multinationals, $N_nG_n(a_I)$. The further effect that this has on aggregate platform sales in (A.21) can be computed from:

$$\begin{aligned}
\frac{d}{d\eta}\ln PLA &= \frac{1}{N_n}\frac{dN_n}{d\eta} + (\varepsilon-1)\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} + (k-\varepsilon+1)\frac{1}{a_I}\frac{da_I}{d\eta} \\
&= \frac{1}{\eta}\frac{1}{\Delta_d}\frac{E_s}{E_n}\frac{1-\rho_2}{2}\frac{\rho_S}{\varepsilon-1}(k-\varepsilon+1)\Big[(\Delta_3-\rho_1\Delta_1-(1-\rho_1)\Delta_2) \\
&\quad -\left(\Delta_3(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2)) + \frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\Delta_3)(\rho_1\Delta_1+(1-\rho_1)\Delta_2\right)\Big] \\
&< 0,
\end{aligned}$$

where recall from equation (B.11) that $\Delta_3-\rho_1\Delta_1-(1-\rho_1)\Delta_2$ is indeed negative. Looking back at the definitions in (A.20)-(A.22), and making use of parts (iii) and (iv) of Lemma 2, we then have: $\frac{d}{d\eta}\ln PLA = \frac{d}{d\eta}\ln RET > \frac{d}{d\eta}\ln HOR$. Hence, the aggregate sales levels HOR, PLA and RET all decrease in response to an improvement in η. ■

Proof of Lemma 3. First, observe that the equilibrium for South's differentiated varieties industry is still determined by (A.13) and (A.15) as in the baseline model. Thus, Lemma 1 holds and the expressions for $\frac{da_S}{d\eta}$ and $\frac{dA_{ss}}{d\eta}$ from (B.1) and (B.2) still apply. As for the Western industry, only two equations are affected relative to the baseline model when we differentiate the equilibrium system. The first of these is the equation obtained from log-differentiating the new FDI cutoff, (A.26):

$$\Delta_d\frac{d\tilde{a}_I}{\tilde{a}_I} = \frac{\Delta_d}{\varepsilon-1}\frac{d\eta}{\eta} + \rho_1(1-\Delta_1)\frac{da_D}{a_D} + (1-\rho_1)(1-\Delta_2)\frac{da_{XN}}{a_{XN}} + \frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3)\frac{da_{XS}}{a_{XS}}. \tag{B.15}$$

The additional term, $\frac{\Delta_d}{\varepsilon-1}\frac{d\eta}{\eta}$, on the right-hand side captures the direct effect that Southern financial development has on Western firms. The second equation that is affected is the free-entry condition. In the manipulation of (B.7), we now need to bear in mind that the coefficient of the term in $d\tilde{a}_I$ is no longer equal to 0. This is because:

$$
\begin{aligned}
& (1-\alpha)\left[A_{ww}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right)+A_{ew}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)+A_{sw}\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)\right]V_n'(\tilde{a}_I) \\
& \quad -R(f_I-f_D)G_n'(\tilde{a}_I) \\
= \; & (1-\alpha)(1-\eta)\left[A_{ww}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right)+A_{ew}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}-\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)+A_{sw}\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}\right)\right]V_n'(\tilde{a}_I)
\end{aligned}
$$

where the last step follows from using the definition of $\tilde{a}_I^{1-\varepsilon}$ from (A.26) to substitute out for $R(f_I - f_D)$, as well as from using Leibniz's rule to replace $G_n'(\tilde{a}_I)$ with $\tilde{a}_I^{\varepsilon-1}V_n'(\tilde{a}_I)$. We now follow analogous algebraic steps as in the proof of Lemma 2, in particular, substituting in the definitions of the price indices (A.16)-(A.18), as well as the definitions of ρ_1 and Δ_d. This allows us to rewrite the derivative of the free-entry condition as:

$$\rho_1\frac{da_D}{a_D}+(1-\rho_1)\frac{da_{XN}}{a_{XN}}+\frac{1-\rho_2}{2}\frac{E_s}{E_n}\frac{da_{XS}}{a_{XS}}+(1-\eta)\,\frac{k-\varepsilon+1}{\varepsilon-1}\Delta_d\frac{d\tilde{a}_I}{\tilde{a}_I}=0. \tag{B.16}$$

Since the expression for $a_{XS}^{1-\varepsilon}$ in (A.11) remains unchanged, one can quickly see from the proof of Lemma 2 that we still have $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}=-\frac{1}{\eta}\frac{\rho_S}{\varepsilon-1}$ as in equation (B.6). Likewise, the same argument in the proof of Lemma 2 implies that $\frac{1}{a_D}\frac{da_D}{d\eta}=\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$. Substituting these two properties into (B.15) and (B.16), this leaves us with a system of two linear equations in the two unknowns, $\frac{1}{a_D}\frac{da_D}{d\eta}$ and $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}$. Solving these two equations simultaneously then yields:

$$\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} = \frac{1}{\eta}\frac{1-\rho_T}{\varepsilon-1}\left[1-\rho_S\frac{E_s}{E_n}\frac{1-\rho_2}{2}\frac{\rho_1\Delta_1+(1-\rho_1)\Delta_2-\Delta_3}{\Delta_d}\right] \tag{B.17}$$

$$\frac{1}{a_D}\frac{da_D}{d\eta} = \frac{1}{\eta}\left[-\rho_T+\frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\rho_T)\left(\rho_S-(1-\rho_S)(1-\eta)\frac{k-\varepsilon+1}{\varepsilon-1}(1-\Delta_3)\right)\right] \tag{B.18}$$

where ρ_T is defined by: $\rho_T \equiv \frac{(1-\eta)\frac{k-\varepsilon+1}{\varepsilon-1}(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))}{1+(1-\eta)\frac{k-\varepsilon+1}{\varepsilon-1}(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))} \in (0,1)$.

Examining (B.17), note that: (i) $\rho_1\Delta_1+(1-\rho_1)\Delta_2-\Delta_3>0$, since $\Delta_1,\Delta_2>\Delta_3$; and moreover (ii) $\frac{E_s}{E_n}\frac{1-\rho_2}{2}(\rho_1\Delta_1+(1-\rho_1)\Delta_2-\Delta_3)<\frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\Delta_3)<\Delta_d$, since $\Delta_1,\Delta_2<1$. These two facts imply that: $\frac{E_s}{E_n}\frac{1-\rho_2}{2}\frac{\rho_1\Delta_1+(1-\rho_1)\Delta_2-\Delta_3}{\Delta_d}\in(0,1)$. Since we also have $\rho_S\in(0,1)$, it follows from (B.17) that $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}>0$, as claimed in part (i) of Lemma 3. We have also already seen that: $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}=-\frac{1}{\eta}\frac{\rho_S}{\varepsilon-1}<0$, which is part (ii) of the lemma.

As for (B.18), the sign of $\frac{1}{a_D}\frac{da_D}{d\eta}=\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$ is in principle ambiguous: The two numerical examples in footnote 15 illustrate that this derivative can be either positive or negative. We can nevertheless evaluate the following:

$$\frac{1}{a_D}\frac{da_D}{d\eta}-\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}=\frac{1}{\eta}\left[\rho_S-\rho_T+\frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\Delta_3)\rho_S(1-\rho_T)\Delta_3\right]. \tag{B.19}$$

Using the definitions of ρ_S and ρ_T, we have: $\rho_S-\rho_T=\rho_S(1-\rho_T)\left[1-\rho_1(1-\Delta_1)-(1-\rho_1)(1-\Delta_2)\right]>0$, since: $\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2)<\rho_1+(1-\rho_1)=1$, and $\rho_S,\rho_T\in(0,1)$. Inspecting (B.19), we have $\frac{1}{a_D}\frac{da_D}{d\eta}-\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}>0$, which establishes part (iii) of Lemma 3. As for parts (iv) and (v) of the lemma, these follow immediately from applying (B.3)-(B.5). ■

Proof of Proposition 2. As in the proof of Proposition 1, $\frac{d}{d\eta}HOR(a)$, $\frac{d}{d\eta}PLA(a)$ and $\frac{d}{d\eta}RET(a)$ respectively inherit the signs of $\frac{dA_{sw}}{d\eta}$, $\frac{dA_{ew}}{d\eta}$ and $\frac{dA_{ww}}{d\eta}$. Lemma 3 then implies that $\frac{dA_{sw}}{d\eta}>0$, but also that $\frac{dA_{ew}}{d\eta}$ and $\frac{dA_{ww}}{d\eta}$ cannot be conclusively signed. This establishes part (i) of this proposition.

Furthermore, part (v) of Lemma 3 implies that $\frac{A_{ww}}{A_{sw}}$ and $\frac{A_{ew}}{A_{sw}}$ are both increasing in η. Referring back to the definitions of the sales shares in (A.23)-(A.25), we immediately have $\frac{d}{d\eta}\frac{HOR(a)}{TOT(a)}<0$ and $\frac{d}{d\eta}\frac{PLA(a)}{TOT(a)}=$

$\frac{d}{d\eta}\frac{RET(a)}{TOT(a)} > 0$. This pins down part (ii) of the proposition.

For part (iii), we first write down the derivatives of the aggregate variables of interest. Observe that the expressions for the log-derivatives of A_{ww}, $P_{ww}^{1-\varepsilon}$ and $P_{ew}^{1-\varepsilon}$ in equations (B.12)-(B.14) remain valid in the model with host-country financing. Eliminating $\frac{dP_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}}$ and $\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}}$ from these equations and using (B.3), we have:

$$\begin{aligned}\frac{1}{N_n}\frac{dN_n}{d\eta} &= -(\varepsilon-1)\frac{da_D}{a_D} - (k-\varepsilon+1)\left[\rho_1\left(\Delta_1\frac{1}{a_D}\frac{da_D}{d\eta} + (1-\Delta_1)\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\right)\right.\\ &\qquad\left. +(1-\rho_1)\left(\Delta_2\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} + (1-\Delta_2)\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\right)\right]. \qquad (B.20)\end{aligned}$$

In turn, how the number of multinationals, $N_nG_n(\tilde{a}_I)$, responds to η is given by: $\frac{d}{d\eta}\log N_nG_n(\tilde{a}_I) = \frac{1}{N_n}\frac{dN_n}{d\eta} + \frac{G_n'(\tilde{a}_I)\tilde{a}_I}{G_n(\tilde{a}_I)}\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} = \frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}$, where $\frac{G_n'(a)a}{G_n(a)} = k$ for the Pareto distribution. Using (B.20), together with the fact that $\frac{1}{a_D}\frac{da_D}{d\eta} = \frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$, this yields:

$$\begin{aligned}\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} &= \left[-(\varepsilon-1) - (k-\varepsilon+1)\left(\rho_1\Delta_1 + (1-\rho_1)\Delta_2\right)\right]\frac{1}{a_D}\frac{da_D}{d\eta}\\ &\quad + \left[k - (k-\varepsilon+1)\left(\rho(1-\Delta_1) + (1-\rho_1)(1-\Delta_2)\right)\right]\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\\ &= \left[(\varepsilon-1) + (k-\varepsilon+1)\left(\rho_1\Delta_1 + (1-\rho_1)\Delta_2\right)\right]\left(\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right). \qquad (B.21)\end{aligned}$$

Note that it is straightforward to verify that: $(\varepsilon-1) + (k-\varepsilon+1)\left(\rho_1\Delta_1 + (1-\rho_1)\Delta_2\right) = k - (k-\varepsilon+1)\left(\rho(1-\Delta_1) + (1-\rho_1)(1-\Delta_2)\right) > 0$. It thus suffices to determine the sign of $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}$. For this, substitute in the expressions for these derivatives from (B.17) and (B.18). Some algebra leads to:

$$\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta} = \frac{1}{\eta}\frac{1}{\varepsilon-1}\left[1 - \rho_S(1-\rho_T)\frac{\frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\Delta_3)}{\Delta_d}\left(\rho_1\Delta_1 + (1-\rho_1)\Delta_2 + \frac{E_s}{E_n}\frac{1-\rho_2}{2}\Delta_3\right)\right]. \qquad (B.22)$$

As for the effect on aggregate horizontal sales, we differentiate (A.20) with respect to η. Making use of (B.5), we have:

$$\begin{aligned}\frac{d}{d\eta}\ln HOR &= \frac{1}{N_n}\frac{dN_n}{d\eta} + (\varepsilon-1)\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} + (k-\varepsilon+1)\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\\ &= \frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - (\varepsilon-1)\left(\frac{1}{a_D}\frac{da_D}{d\eta} - \frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}\right) - (\varepsilon-1)\left(\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right)\\ &= \frac{1}{\eta}\left[1 - \rho_S(1-\rho_T)\frac{\frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\Delta_3)}{\Delta_d}\left(\rho_1\Delta_1 + (1-\rho_1)\Delta_2 + \frac{E_s}{E_n}\frac{1-\rho_2}{2}\Delta_3\right)\right.\\ &\qquad\left. -\rho_S(1-\rho_T)\frac{\rho_1\Delta_1 + (1-\rho_1)\Delta_2 + \frac{E_s}{E_n}\frac{1-\rho_2}{2}\Delta_3}{\frac{k-\varepsilon+1}{\varepsilon-1}(\rho_1\Delta_1 + (1-\rho_1)\Delta_2)}\right]. \qquad (B.23)\end{aligned}$$

Note that in the penultimate step, we substituted in for $\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}$ using (B.21), for $\frac{1}{a_D}\frac{da_D}{d\eta} - \frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}$ using (B.19), for $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}$ using (B.22), and then simplified extensively.

Likewise, differentiating (A.21) with respect to η and using (B.3), we have:

$$\begin{aligned}\frac{d}{d\eta}\ln PLA = \frac{d}{d\eta}\ln RET &= \frac{1}{N_n}\frac{dN_n}{d\eta} + (\varepsilon-1)\frac{1}{a_D}\frac{da_D}{d\eta} + (k-\varepsilon+1)\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\\ &= \frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - (\varepsilon-1)\left(\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right)\\ &= (k-\varepsilon+1)\left(\rho_1\Delta_1 + (1-\rho_1)\Delta_2\right)\left(\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right). \qquad (B.24)\end{aligned}$$

Once again, we have made use of the expression for $\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}$ in (B.21) to arrive at (B.24). In particular, observe from (B.21) and (B.24) that the measure of multinationals, aggregate platform sales and aggregate return sales all move in the same direction when η changes.

It remains for us to analyze the sign of the derivatives in (B.21), (B.23) and (B.24). Recall the definition: $\rho_S \equiv \frac{(1-\eta)^{\frac{k-\varepsilon+1}{\varepsilon-1}}}{1+(1-\eta)^{\frac{k-\varepsilon+1}{\varepsilon-1}}}$. When $\eta = 1$, we thus have $\rho_S = 0$, in which case it quickly follows from (B.22) that $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta} > 0$, and hence that $\frac{d}{d\eta}\ln N_nG_n(a_I)$, $\frac{d}{d\eta}\ln PLA$, $\frac{d}{d\eta}\ln RET > 0$. Moreover, inspecting (B.23), we would also have $\frac{d}{d\eta}\ln HOR > 0$. By continuity, it follows that $\frac{d}{d\eta}\ln N_nG_n(a_I)$, $\frac{d}{d\eta}\ln HOR$, $\frac{d}{d\eta}\ln PLA$ and $\frac{d}{d\eta}\ln RET$ must all be positive in a neighborhood of η, so that $N_nG_n(a_I)$, HOR, PLA and RET are increasing in host-country financial development if the initial level of η is sufficiently high. This establishes part (iii) of the proposition.

It is useful to point out here that some form of a sufficient condition is indeed required in the statement of part (iii) of the proposition. Examining the expression for $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}$ in (B.22) more closely, one can see that $\rho_S, 1-\rho_T, \frac{E_s}{E_n}\frac{1-\rho_2}{2}(1-\Delta_3)/\Delta_d \in (0,1)$, but that we cannot explicitly bound $\rho_1\Delta_1+(1-\rho_1)\Delta_2+\frac{E_s}{E_n}\frac{1-\rho_2}{2}\Delta_3$ between 0 and 1, even though $\Delta_1, \Delta_2, \Delta_3 \in (0,1)$. That said, it is actually not easy to find parameter values for which $N_nG_n(a_I)$, HOR, PLA or RET end up decreasing in η, even when we set the initial level of η to be very small. As an example, consider the set of parameter values: $R = 1.07$, $\varepsilon = 3.8$, $L_n = L_s = 1$, $f_D = 0.2$, $f_X = 0.15$, $f_S = 0.1$, $f_{En} = f_{Es} = 1$, $\tau = 1.3$, $\omega = 0.7$, $\bar{a}_N = \bar{a}_S = 25$, $k = 4$, $\delta = 0.1$, $\mu = 0.5$ and $\eta = 0.01$. While this features a low η, it turns out that it is also necessary to set the remaining parameter f_I to be very high to generate a counter-example to part (iii) of the proposition. In particular, when $f_I = 1000$, we have an equilibrium with $a_D = 14.41$, $a_{XN} = 12.28$, $a_{XS} = 12.23$ and $\tilde{a}_I = 0.20$, in which $\frac{d}{d\eta}HOR = -0.89 < 0$. This value of f_I is of course exceedingly large relative to the other fixed cost parameters. But attempting to reduce the value of f_I to 100 results in an equilibrium in which the order of two of the cutoffs gets reversed, specifically $a_{XN} = 12.18$ and $a_{XS} = 12.23$. ■

The relationship between private credit and η. Consider first the baseline model where MNCs do not require host-country financing. The model counterpart of our empirical measure of private credit over GDP is: $N_sG(a_S)f_S\omega/(\omega L)$, this being the total amount borrowed by domestic firms, divided by the total labor income in South. Since f_S, ω, and L are fixed, our task is to show that $N_sG_s(a_S)$, the "number" of successful entrants in the Southern industry, is increasing in η.

First, log-differentiate the ideal price index, $P_{ss}^{1-\varepsilon}$, given by (A.19):

$$\frac{1}{N_s}\frac{dN_s}{d\eta} = \frac{1}{P_{ss}^{1-\varepsilon}}\frac{dP_{ss}^{1-\varepsilon}}{d\eta} - (k-\varepsilon+1)\frac{1}{a_S}\frac{da_S}{d\eta}. \tag{B.25}$$

We therefore have: $\frac{d}{d\eta}\log N_sG_s(a_S) = \frac{1}{N_s}\frac{dN_S}{d\eta} + \frac{G_s'(a_S)a_S}{G_s(a_S)}\frac{1}{a_S}\frac{da_S}{d\eta} = \frac{1}{N_s}\frac{dN_S}{d\eta} + k\frac{1}{a_S}\frac{da_S}{d\eta} = \frac{1}{P_{ss}^{1-\varepsilon}}\frac{dP_{ss}^{1-\varepsilon}}{d\eta} + (\varepsilon-1)\frac{1}{a_S}\frac{da_S}{d\eta}$, where we have made use of (B.25) to obtain the last expression. We have seen from Lemma 1 that $\frac{da_S}{d\eta} > 0$. As $\varepsilon > 1$, it will thus suffice to show that $\frac{1}{P_{ss}^{1-\varepsilon}}\frac{dP_{ss}^{1-\varepsilon}}{d\eta} > 0$, in order to conclude that $\frac{d}{d\eta}\log N_sG_s(a_S) > 0$.

For this, we log-differentiate (A.4) to obtain: $\frac{dA_{sw}}{A_{sw}} = -\rho_2\frac{dP_{ss}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}} - (1-\rho_2)\frac{dP_{sw}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}}$. Substituting in the expression for $\frac{dA_{sw}}{A_{sw}}$ from (B.5) into this last equation, and rearranging, gives:

$$\rho_2\frac{1}{P_{ss}^{1-\varepsilon}}\frac{dP_{ss}^{1-\varepsilon}}{d\eta} = -(\varepsilon-1)\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} - (1-\rho_2)\frac{1}{P_{sw}^{1-\varepsilon}}\frac{dP_{sw}^{1-\varepsilon}}{d\eta}. \tag{B.26}$$

Now, log-differentiating (A.18) yields:

$$\frac{1}{P_{sw}^{1-\varepsilon}}\frac{dP_{sw}^{1-\varepsilon}}{d\eta} = \frac{1}{N_n}\frac{dN_n}{d\eta} + (k-\varepsilon+1)\left(\Delta_3\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} + (1-\Delta_3)\frac{1}{a_I}\frac{da_I}{d\eta}\right). \tag{B.27}$$

Since $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} < 0$ and $\frac{1}{a_I}\frac{da_I}{d\eta} < 0$ from Lemma 2, and $\frac{1}{N_n}\frac{dN_n}{d\eta} < 0$ from Proposition 1, it follows that: $\frac{1}{P_{sw}^{1-\varepsilon}}\frac{dP_{sw}^{1-\varepsilon}}{d\eta} < 0$. From (B.26), we immediately have: $\frac{1}{P_{ss}^{1-\varepsilon}}\frac{dP_{ss}^{1-\varepsilon}}{d\eta} > 0$, so that $\frac{d}{d\eta}\log N_s G_s(a_S) > 0$, and we indeed have total private credit extended in South increasing with η in our baseline model.

As for the extension with local borrowing by MNCs, the private credit to GDP ratio in South is now given instead by: $[2N_nG_n(\tilde{a}_I)(f_I - f_D) + N_sG_s(a_S)f_S\omega]/(\omega L)$, where the numerator takes into account total lending to multinational affiliates from both East and West, as well as to Southern domestic firms. Under the sufficient condition assumed for part (iii) of Proposition 2 – that the initial level of host-country financial development be sufficiently high – we have already seen that the "number" of multinational affiliates $N_nG(\tilde{a}_I)$ will be increasing in η. We now show that when the initial level of η is sufficiently high, this increase in $2N_nG_n(\tilde{a}_I)$ will dominate any movements in $N_sG_s(a_S)$ in the numerator of the private credit to GDP ratio.

Log-differentiating the expression for the private credit to GDP ratio, we get:

$$\begin{aligned}
& \frac{2\left(\frac{dN_n}{d\eta}G_n(\tilde{a}_I) + N_nG_n'(\tilde{a}_I)\frac{d\tilde{a}_I}{d\eta}\right)(f_I - f_D) + \left(\frac{dN_s}{d\eta}G_s(a_S) + N_sG_s'(a_S)\frac{da_S}{d\eta}\right)f_S\omega}{2N_nG_n(\tilde{a}_I)(f_I - f_D) + N_sG_s(a_S)f_S\omega} \\
= & \frac{2N_nG_n(\tilde{a}_I)(f_I - f_D)\left(\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\right) + N_sG_s(a_S)f_S\omega\left(\frac{1}{N_s}\frac{dN_s}{d\eta} + k\frac{1}{a_S}\frac{da_S}{d\eta}\right)}{2N_nG_n(\tilde{a}_I)(f_I - f_D) + N_sG_s(a_S)f_S\omega} \\
\propto & \left(\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\right) + \frac{N_sG_s(a_S)f_S\omega}{2N_nG_n(\tilde{a}_I)(f_I - f_D)}\left(\frac{1}{N_s}\frac{dN_s}{d\eta} + k\frac{1}{a_S}\frac{da_S}{d\eta}\right),
\end{aligned} \qquad \text{(B.28)}$$

where '$\propto$' denotes equality up to a positive multiplicative term. We thus focus on pinning down the sign of (B.28) in the neighborhood of $\eta = 1$. Using (B.21) and (B.22), and setting $\eta = 1$, we have: $\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} = 1 + \frac{k-\varepsilon+1}{\varepsilon-1}(\rho_1\Delta_1 + (1-\rho_1)\Delta_2)$. Next, since (A.4), (A.18) and (A.19) are unchanged in the extension with host-country financing, equations (B.25), (B.26) and (B.27) remain valid, so that:

$$\begin{aligned}
\frac{1}{N_s}\frac{dN_s}{d\eta} + k\frac{1}{a_S}\frac{da_S}{d\eta} &= -\frac{\varepsilon-1}{\rho_2}\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} - \frac{1-\rho_2}{\rho_2}\frac{1}{P_{sw}^{1-\varepsilon}}\frac{dP_{sw}^{1-\varepsilon}}{d\eta} + (\varepsilon-1)\frac{1}{a_S}\frac{da_S}{d\eta} \\
&= -\frac{\varepsilon-1}{\rho_2}\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} + (\varepsilon-1)\frac{1}{a_S}\frac{da_S}{d\eta} \\
&\quad -\frac{1-\rho_2}{\rho_2}\left(\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta} + (k-\varepsilon+1)\left(\Delta_3\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} + (1-\Delta_3)\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\right) - k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\right).
\end{aligned}$$

We now make use of the following properties: (i) $\frac{1-\rho_2}{\rho_2} = \frac{2P_{sw}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}}$ from the definition of ρ_2; (ii) $\frac{1}{a_S}\frac{da_S}{d\eta} = \frac{1}{\eta}\frac{1-\rho_S}{\varepsilon-1}$ from (B.1); (iii) $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} = -\frac{1}{\eta}\frac{\rho_S}{\varepsilon-1}$ from the proof of Lemma 3; (iv) the expression for $\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}$ in (B.21); and (v) the expression for $\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}$ in (B.17). Evaluating these at $\eta = 1$ and following some algebra, one obtains: $\frac{1}{N_s}\frac{dN_s}{d\eta} + k\frac{1}{a_S}\frac{da_S}{d\eta} = 1 - \frac{2P_{sw}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}}\frac{k-\varepsilon+1}{\varepsilon-1}(\rho_1\Delta_1 + (1-\rho_1)\Delta_2 - \Delta_3)$. We further use the expressions for the ideal price indices in (A.18) and (A.19) to simplify the following:

$$\begin{aligned}
\frac{N_sG_s(a_S)f_S\omega}{2N_nG_n(\tilde{a}_I)(f_I - f_D)}\frac{2P_{sw}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}} &= \frac{(G_s(a_S)/V_s(a_S))f_S\omega}{(G_n(\tilde{a}_I)/V_n(\tilde{a}_I))(f_I - f_D)}\frac{1}{1-\Delta_3}\frac{\omega^{1-\varepsilon} - \tau^{1-\varepsilon}}{\omega^{1-\varepsilon}} \\
&= \frac{f_S\omega/a_S^{1-\varepsilon}}{(f_I - f_D)/\tilde{a}_I^{1-\varepsilon}}\frac{1}{1-\Delta_3}\frac{\omega^{1-\varepsilon} - \tau^{1-\varepsilon}}{\omega^{1-\varepsilon}} \\
&= \frac{A_{ss}(\omega^{1-\varepsilon} - \tau^{1-\varepsilon})}{A_{ww}((\tau\omega)^{1-\varepsilon} - 1) + A_{ew}((\tau\omega)^{1-\varepsilon} - \tau^{1-\varepsilon}) + A_{sw}(\omega^{1-\varepsilon} - \tau^{1-\varepsilon})}\frac{1}{1-\Delta_3},
\end{aligned}$$

where we have substituted in the expressions for $a_S^{1-\varepsilon}$ in (A.13) and $\tilde{a}_I^{1-\varepsilon}$ in (A.26) for this last step. Since $A_{ss} = A_{sw}$, we thus have: $\frac{N_sG_s(a_S)f_S\omega}{2N_nG_n(\tilde{a}_I)(f_I - f_D)}\frac{2P_{sw}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}} < \frac{1}{1-\Delta_3}$.

Applying the above properties to (B.28), we find that evaluated at $\eta = 1$:

$$
\begin{aligned}
& \left(\frac{1}{N_n}\frac{dN_n}{d\eta}+k\frac{1}{\tilde{a}_I}\frac{d\tilde{a}_I}{d\eta}\right)+\frac{N_sG_s(a_S)f_S\omega}{2N_nG_n(\tilde{a}_I)(f_I-f_D)}\left(\frac{1}{N_s}\frac{dN_s}{d\eta}+k\frac{1}{a_S}\frac{da_S}{d\eta}\right) \\
= \;& 1+\frac{k-\varepsilon+1}{\varepsilon-1}\left(\rho_1\Delta_1+(1-\rho_1)\Delta_2\right)+\frac{N_sG_s(a_S)f_S\omega}{2N_nG_n(\tilde{a}_I)(f_I-f_D)}\left(1-\frac{2P_{sw}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}}\frac{k-\varepsilon+1}{\varepsilon-1}\left(\rho_1\Delta_1+(1-\rho_1)\Delta_2-\Delta_3\right)\right) \\
> \;& \frac{k-\varepsilon+1}{\varepsilon-1}\left(\rho_1\Delta_1+(1-\rho_1)\Delta_2\right)-\frac{1}{1-\Delta_3}\frac{k-\varepsilon+1}{\varepsilon-1}\left(\rho_1\Delta_1+(1-\rho_1)\Delta_2-\Delta_3\right) \\
\propto \;& \left(\rho_1\Delta_1+(1-\rho_1)\Delta_2\right)(1-\Delta_3)-\left(\rho_1\Delta_1+(1-\rho_1)\Delta_2-\Delta_3\right) \\
= \;& \Delta_3\left(1-\rho_1\Delta_1-(1-\rho_1)\Delta_2\right).
\end{aligned}
$$

But this last expression is clearly positive, since $\Delta_1, \Delta_2 \in (0,1)$. By a continuity argument, this allows us to conclude that $[2N_nG_n(\tilde{a}_I)(f_I-f_D)+N_sG_s(a_S)f_S\omega]/(\omega L)$ is increasing in η when the initial level of η is sufficiently high. ■

Cross-industry heterogeneity. We show that the effects of host-country financial development in our model will hold particularly for industries that have a higher financing requirement, as captured by f_S. Under the assumption that firm productivities within each industry follow a Pareto distribution, we have from (B.1) and (B.2) that $sign\left(\frac{d^2a_S}{d\eta df_S}\right)=sign\left(\frac{da_S}{df_S}\right)$ and $sign\left(\frac{d^2A_{ss}}{d\eta df_S}\right)=-sign\left(\frac{dA_{ss}}{df_S}\right)$. To pin down the signs of these derivatives with respect to f_S, we totally differentiate (A.13) and (A.15) to obtain:

$$
\begin{aligned}
(\varepsilon-1)\frac{da_S}{a_S} &= -\frac{df_S}{f_S}+\frac{dA_{ss}}{A_{ss}}, \quad \text{and} \\
0 &= a_S^{\varepsilon-1}V_s(a_S)\frac{dA_{ss}}{A_{ss}}+\left(a_S^{\varepsilon-1}V_s'(a_S)-\eta G_s'(a_S)\right)da_S-\eta G_s(a_S)\frac{df_S}{f_S} \\
&= a_S^{\varepsilon-1}V_s(a_S)\frac{dA_{ss}}{A_{ss}}+(1-\eta)a_SG_s'(a_S)\frac{da_S}{a_S}-\eta G_s(a_S)\frac{df_S}{f_S}.
\end{aligned}
$$

Note that we have applied Leibniz's rule to the definition of $V_s(a_S)$, as in the proof of Lemma 1, in the last step above. Solving these two equations simultaneously yields:

$$
\begin{aligned}
\frac{1}{a_S}\frac{da_S}{df_S} &= -\frac{1}{f_S}\frac{a_S^{\varepsilon-1}V_s(a_S)-\eta G_s(a_S)}{(\varepsilon-1)a_S^{\varepsilon-1}V_s(a_S)+(1-\eta)a_SG_s'(a_S)}, \quad \text{and} \\
\frac{1}{A_{ss}}\frac{dA_{ss}}{df_S} &= \frac{1}{f_S}\left[1-\frac{(\varepsilon-1)a_S^{\varepsilon-1}V_s(a_S)-(\varepsilon-1)\eta G_s(a_S)}{(\varepsilon-1)a_S^{\varepsilon-1}V_s(a_S)+(1-\eta)a_SG_s'(a_S)}\right].
\end{aligned}
$$

Looking at the numerator on the right-hand side of the above expression for $\frac{1}{a_S}\frac{da_S}{df_S}$, observe that: $a_S^{\varepsilon-1}V_s(a_S)=a_S^{\varepsilon-1}\int_0^{a_S}a^{1-\varepsilon}G_s'(a)da=a_S^{\varepsilon-1}\left[a_S^{1-\varepsilon}G_s(a_S)-\int_0^{a_S}(1-\varepsilon)a^{-\varepsilon}G_s(a)da\right]>\eta G_s(a_S)$, which implies that $\frac{1}{a_S}\frac{da_S}{df_S}<0$. Next, from the equation for $\frac{1}{A_{ss}}\frac{dA_{ss}}{df_S}$, we have: $0<(\varepsilon-1)a_S^{\varepsilon-1}V_s(a_S)-(\varepsilon-1)\eta G_s(a_S)<(\varepsilon-1)a_S^{\varepsilon-1}V_s(a_S)+(1-\eta)a_SG_s'(a_S)$, which in turn means that $\frac{1}{A_{ss}}\frac{dA_{ss}}{df_S}>0$.

We can thus conclude that $\frac{d^2a_S}{d\eta df_S}<0$ and $\frac{d^2A_{ss}}{d\eta df_S}<0$. In particular, the fact that $\frac{d^2A_{ss}}{d\eta df_S}$ inherits the same negative sign as $\frac{dA_{ss}}{d\eta}$ is crucial, as it also means that $sign\left(\frac{d^2A_{sw}}{d\eta df_S}\right)=sign\left(\frac{dA_{sw}}{d\eta}\right)$. The effects of host-country financial development on the market demand levels, and hence the respective sales shares in (A.23)-(A.25), are therefore stronger in industries with a higher f_S. ■

B.2 Model Extension: Home-bias in consumption

We establish that Proposition 1 in our baseline model continues to apply in this extension. We also provide the proof of Proposition 3, which allows for a differential response of platform versus return sales to changes in host-country financial development.

Model Setup. Recall that we modify the utility functions for $n = w, e$ (West and East) and for s (South) to:

$$U_n = y_n^{1-\mu} \left[\sum_{j \in \{e,w\}} \left(\int_{\Omega_{nj}} x_{nj}(a)^{\alpha} \, dG_j(a) \right)^{\frac{\beta}{\alpha}} \right]^{\frac{\mu}{\beta}}, \text{ and} \tag{B.29}$$

$$U_s = y_s^{1-\mu} \left[\sum_{j \in \{e,w,s\}} \left(\int_{\Omega_{sj}} x_{sj}(a)^{\alpha} \, dG_j(a) \right)^{\frac{\beta}{\alpha}} \right]^{\frac{\mu}{\beta}}, \tag{B.30}$$

where $0 < \beta < \alpha < 1$. We denote the elasticity of substitution for varieties from the same country by $\varepsilon = \frac{1}{1-\alpha}$, and the elasticity of substitution for varieties from different countries by $\phi = \frac{1}{1-\beta}$. Note that $\varepsilon > \phi > 1$, so that varieties from the same country are closer substitutes than varieties drawn from different countries.

Maximizing (B.29) and (B.30) subject to the standard budget constraints, one obtains that demand in country i for a variety from country j is: $x_{ij}(a) = A_{ij} p_{ij}(a)^{-\varepsilon}$. The aggregate market demand levels are now given by:

$$A_{ww} = A_{ee} = \frac{\mu E_n P_{ww}^{\varepsilon-\phi}}{P_{ww}^{1-\phi} + P_{ew}^{1-\phi}}, \tag{B.31}$$

$$A_{ew} = A_{we} = \frac{\mu E_n P_{ew}^{\varepsilon-\phi}}{P_{ww}^{1-\phi} + P_{ew}^{1-\phi}}, \tag{B.32}$$

$$A_{sw} = A_{se} = \frac{\mu E_s P_{sw}^{\varepsilon-\phi}}{P_{ss}^{1-\phi} + 2P_{sw}^{1-\phi}}, \quad \text{and} \tag{B.33}$$

$$A_{ss} = \frac{\mu E_s P_{ss}^{\varepsilon-\phi}}{P_{ss}^{1-\phi} + 2P_{sw}^{1-\phi}}. \tag{B.34}$$

In contrast to the baseline model, we no longer have $A_{ww} = A_{ew}$ and $A_{sw} = A_{ss}$. This is precisely due to the introduction of the additional elasticity of substitution, ϕ. In particular, when $\varepsilon = \phi$, the above collapses back to the demand expressions from our baseline model.

The rest of the equations for the equilibrium system remain the same as in the baseline model. For completeness, we reproduce them below:

$$a_D^{1-\varepsilon} = \frac{Rf_D}{(1-\alpha)A_{ww}(1/\alpha)^{1-\varepsilon}} \tag{B.35}$$

$$a_{XN}^{1-\varepsilon} = \frac{Rf_X}{(1-\alpha)A_{ew}(\tau/\alpha)^{1-\varepsilon}} \tag{B.36}$$

$$a_{XS}^{1-\varepsilon} = \frac{Rf_X}{(1-\alpha)A_{sw}(\tau/\alpha)^{1-\varepsilon}} \tag{B.37}$$

$$a_I^{1-\varepsilon} = \frac{R(f_I - f_D)}{(1-\alpha)[A_{ww}((\frac{\tau\omega}{\alpha})^{1-\varepsilon} - (\frac{1}{\alpha})^{1-\varepsilon}) + A_{ew}((\frac{\tau\omega}{\alpha})^{1-\varepsilon} - (\frac{\tau}{\alpha})^{1-\varepsilon}) + A_{sw}((\frac{\omega}{\alpha})^{1-\varepsilon} - (\frac{\tau}{\alpha})^{1-\varepsilon})]} \tag{B.38}$$

$$a_S^{1-\varepsilon} = \frac{1}{\eta}\frac{Rf_S\omega}{(1-\alpha)A_{ss}(\omega/\alpha)^{1-\varepsilon}} \tag{B.39}$$

$$\begin{aligned}
\delta f_{En} = {} & (1-\alpha)A_{ww}\left(\frac{1}{\alpha}\right)^{1-\varepsilon}(V_n(a_D) - V_n(a_I)) - Rf_D(G_n(a_D) - G_n(a_I)) \\
& +(1-\alpha)A_{ew}\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XN}) - V_n(a_I)) - Rf_X(G_n(a_{XN}) - G_n(a_I)) \\
& +(1-\alpha)A_{sw}\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XS}) - V_n(a_I)) - Rf_X(G_n(a_{XS}) - G_n(a_I)) \\
& +(1-\alpha)\left(A_{ww}\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} + A_{ew}\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} + A_{sw}\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}\right)V_n(a_I) - R(f_I + 2f_X)G_n(a_I)
\end{aligned} \tag{B.40}$$

$$\delta f_{Es}\omega = (1-\alpha)A_{ss}\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}V_s(a_S) - Rf_S\omega G_s(a_S) \tag{B.41}$$

$$P_{ww}^{1-\varepsilon} = N_n\left[\left(\frac{1}{\alpha}\right)^{1-\varepsilon}(V_n(a_D) - V_n(a_I)) + \left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}V_n(a_I)\right] \tag{B.42}$$

$$P_{ew}^{1-\varepsilon} = N_n\left[\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XN}) - V_n(a_I)) + \left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}V_n(a_I)\right] \tag{B.43}$$

$$P_{sw}^{1-\varepsilon} = N_n\left[\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}(V_n(a_{XS}) - V_n(a_I)) + \left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}V_n(a_I)\right] \tag{B.44}$$

$$P_{ss}^{1-\varepsilon} = N_s\left[\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}V_s(a_S)\right] \tag{B.45}$$

The equilibrium is thus pinned down by the 15 equations (B.31)-(B.45) in the 15 endogeneous variables: A_{ww}, A_{ew}, A_{sw}, A_{ss}, a_D, a_{XN}, a_{XS}, a_I, a_S, N_n, N_s, P_{ww}, P_{ew}, P_{sw} and P_{ss}.

Proposition 1 continues to hold. It is clear that (B.39) and (B.41) once again pin down the equilibrium for South's differentiated varieties industry. Since these equations are unchanged from the baseline model, this means that Lemma 1 holds, namely that $\frac{da_S}{d\eta} > 0$ and $\frac{dA_{ss}}{d\eta} < 0$.

We next show that a modified version of Lemma 2 now describes the subsequent impact on the industry equilibrium in West (and East):

Lemma 2A: *In the extended model with home-bias in consumption, (i)* $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} < \frac{1}{a_I}\frac{da_I}{d\eta} < 0$*; (ii)* $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} > \frac{1}{a_D}\frac{da_D}{d\eta} > 0$*; (iii)* $\frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta} < 0$*; and (iv)* $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} > \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta} > 0$.

In response to a small increase in η, we now have the proportional shift in the a_{XN} cutoff exceeding that in the a_D cutoff, and hence the proportional increase in A_{ew} exceeding that in A_{ww}.

We proceed to prove this modified lemma. To provide a heuristic roadmap, we will take the remaining 13 equations that define the Western industry equilibrium – (B.31)-(B.33), (B.35)-(B.38), (B.40), and (B.42)-(B.45) – and log-differentiate them. We then reduce the resulting system to a set of four equations in the four unknowns, $\frac{da_D}{a_D}$, $\frac{da_{XN}}{a_{XN}}$, $\frac{da_{XS}}{a_{XS}}$ and $\frac{da_I}{a_I}$. From this, we can determine the comparative statics with respect to η for the Western industry cutoffs, and hence for the other endogenous variables as well.

First, log-differentiating (B.35), (B.36) and (B.37) yields:

$$(\varepsilon-1)\frac{da_D}{a_D} = \frac{dA_{ww}}{A_{ww}}, \tag{B.46}$$

$$(\varepsilon-1)\frac{da_{XN}}{a_{XN}} = \frac{dA_{ew}}{A_{ew}}, \quad \text{and} \tag{B.47}$$

$$(\varepsilon-1)\frac{da_{XS}}{a_{XS}} = \frac{dA_{sw}}{A_{sw}}. \tag{B.48}$$

Since $\varepsilon > 1$, this implies: $sign(\frac{da_D}{d\eta}) = sign(\frac{dA_{ww}}{d\eta})$, $sign(\frac{da_{XN}}{d\eta}) = sign(\frac{dA_{ew}}{d\eta})$, and $sign(\frac{da_{XS}}{d\eta}) = sign(\frac{dA_{sw}}{d\eta})$.

Similarly, log-differentiating (B.38) yields:

$$(\varepsilon-1)\frac{da_I}{a_I} = \frac{A_{ww}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right)\frac{dA_{ww}}{A_{ww}} + A_{ew}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)\frac{dA_{ew}}{A_{ew}} + A_{sw}\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)\frac{dA_{sw}}{A_{sw}}}{A_{ww}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{1}{\alpha}\right)^{1-\varepsilon}\right) + A_{ew}\left(\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right) + A_{sw}\left(\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon}\right)}.$$

We replace $\frac{dA_{ww}}{A_{ww}}$, $\frac{dA_{ew}}{A_{ew}}$ and $\frac{dA_{sw}}{A_{sw}}$ by the expressions in (B.46)-(B.48). Making use also of the expressions for A_{ww}, A_{ew} and A_{sw} from (B.31)-(B.33), and for $P_{ww}^{1-\varepsilon}$, $P_{ew}^{1-\varepsilon}$ and $P_{sw}^{1-\varepsilon}$ from (B.42)-(B.44), and simplifying extensively, one can show that:

$$\frac{da_I}{a_I} = \frac{\rho_1(1-\Delta_1)\frac{da_D}{a_D} + (1-\rho_1)(1-\Delta_2)\frac{da_{XN}}{a_{XN}} + \frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3)\frac{da_{XS}}{a_{XS}}}{\rho_1(1-\Delta_1) + (1-\rho_1)(1-\Delta_2) + \frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3)}, \tag{B.49}$$

where we now define: $\rho_1 = \frac{P_{ww}^{1-\phi}}{P_{ww}^{1-\phi}+P_{ew}^{1-\phi}}$ and $\rho_2 = \frac{P_{ss}^{1-\phi}}{P_{ss}^{1-\phi}+2P_{sw}^{1-\phi}}$. Note that in contrast to the proof for the baseline model, the definitions of ρ_1 and ρ_2 now involve ϕ, instead of ε. We nevertheless still have $\rho_1, \rho_2 \in (0,1)$. Recall also the following definitions, which we retain from the proof for the baseline model:

$$\Delta_1 = \frac{\left(\frac{1}{\alpha}\right)^{1-\varepsilon} V_n(a_D)}{\left(\frac{1}{\alpha}\right)^{1-\varepsilon} V_n(a_D) + (\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{1}{\alpha}\right)^{1-\varepsilon})V_n(a_I)}, \tag{B.50}$$

$$\Delta_2 = \frac{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XN})}{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XN}) + (\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon})V_n(a_I)}, \quad \text{and} \tag{B.51}$$

$$\Delta_3 = \frac{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XS})}{\left(\frac{\tau}{\alpha}\right)^{1-\varepsilon} V_n(a_{XS}) + (\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon} - \left(\frac{\tau}{\alpha}\right)^{1-\varepsilon})V_n(a_I)}. \tag{B.52}$$

Note that in the proof of Lemma 2, we showed that $1 > \Delta_1 > \Delta_2 > \Delta_3 > 0$.

Next, we differentiate the free-entry condition for West, (B.40). Following the algebraic manipulations used in the proof of Lemma 2, we once again obtain:

$$\rho_1\frac{da_D}{a_D} + (1-\rho_1)\frac{da_{XN}}{a_{XN}} + \frac{1-\rho_2}{2}\frac{E_s}{E_n}\frac{da_{XS}}{a_{XS}} = 0. \tag{B.53}$$

A quick implication is that the three cutoffs a_D, a_{XN} and a_{XS} cannot all move in the same direction.

We move on to log-differentiate the market demand expressions in (B.31)-(B.34):

$$\frac{dA_{ww}}{A_{ww}} = \left((1-\rho_1)\frac{\phi-1}{\varepsilon-1} - 1\right)\frac{dP_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}} - (1-\rho_1)\frac{\phi-1}{\varepsilon-1}\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}}, \tag{B.54}$$

$$\frac{dA_{ew}}{A_{ew}} = \left(\rho_1\frac{\phi-1}{\varepsilon-1} - 1\right)\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}} - \rho_1\frac{\phi-1}{\varepsilon-1}\frac{dP_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}}, \tag{B.55}$$

$$\frac{dA_{sw}}{A_{sw}} = \left(\rho_2\frac{\phi-1}{\varepsilon-1} - 1\right)\frac{dP_{sw}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}} - \rho_2\frac{\phi-1}{\varepsilon-1}\frac{dP_{ss}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}}, \quad \text{and} \tag{B.56}$$

$$\frac{dA_{ss}}{A_{ss}} = \left((1-\rho_2)\frac{\phi-1}{\varepsilon-1} - 1\right)\frac{dP_{ss}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}} - (1-\rho_2)\frac{\phi-1}{\varepsilon-1}\frac{dP_{sw}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}}. \tag{B.57}$$

Meanwhile, log-differentiating the ideal price indices (B.42)-(B.44) gives us:

$$\frac{dP_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}} = \frac{dN_n}{N_n} + (k-\varepsilon+1)\left(\Delta_1 \frac{da_D}{a_D} + (1-\Delta_1)\frac{da_I}{a_I}\right), \tag{B.58}$$

$$\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}} = \frac{dN_n}{N_n} + (k-\varepsilon+1)\left(\Delta_2 \frac{da_{XN}}{a_{XN}} + (1-\Delta_2)\frac{da_I}{a_I}\right), \quad \text{and} \tag{B.59}$$

$$\frac{dP_{sw}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}} = \frac{dN_n}{N_n} + (k-\varepsilon+1)\left(\Delta_3 \frac{da_{XS}}{a_{XS}} + (1-\Delta_3)\frac{da_I}{a_I}\right), \tag{B.60}$$

where we have made use of the fact that $\frac{aV_n'(a)}{V_n(a)} = k-\varepsilon+1$ for the Pareto distribution.

Using Cramer's Rule, we now invert (B.56) and (B.57) to obtain:

$$\frac{dP_{sw}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}} = \left(-\rho_2\frac{\phi-1}{\varepsilon-\phi}-1\right)\frac{dA_{sw}}{A_{sw}} + \rho_2\frac{\phi-1}{\varepsilon-\phi}\frac{dA_{ss}}{A_{ss}}, \quad \text{and} \tag{B.61}$$

$$\frac{dP_{ss}^{1-\varepsilon}}{P_{ss}^{1-\varepsilon}} = \left(-(1-\rho_2)\frac{\phi-1}{\varepsilon-\phi}-1\right)\frac{dA_{ss}}{A_{ss}} + (1-\rho_2)\frac{\phi-1}{\varepsilon-\phi}\frac{dA_{sw}}{A_{sw}}. \tag{B.62}$$

Setting (B.60) equal to (B.61) then implies:

$$\frac{dN_n}{N_n} = \rho_2\frac{\phi-1}{\varepsilon-\phi}\frac{dA_{ss}}{A_{ss}} - \left[(\varepsilon-1)\left(\rho_2\frac{\phi-1}{\varepsilon-\phi}+1\right) + (k-\varepsilon+1)\Delta_3\right]\frac{da_{XS}}{a_{XS}} - (k-\varepsilon+1)(1-\Delta_3)\frac{da_I}{a_I}. \tag{B.63}$$

We now plug this expression for $\frac{dN_n}{N_n}$ into (B.58) and (B.59), and substitute the subsequent expressions for $\frac{dP_{ww}^{1-\varepsilon}}{P_{ww}^{1-\varepsilon}}$ and $\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}}$ into (B.54) and (B.55). Finally, replacing $\frac{dA_{ww}}{A_{ww}}$ and $\frac{dA_{ew}}{A_{ew}}$ with the expressions in terms of $\frac{da_D}{a_D}$ and $\frac{da_{XN}}{a_{XN}}$ from (B.46) and (B.47) respectively, one obtains after some rearrangement:

$$\begin{aligned}
\frac{\rho_2}{k-\varepsilon+1}\frac{\phi-1}{\varepsilon-\phi}\frac{dA_{ss}}{A_{ss}} &= \left[\left((1-\rho_1)\frac{\phi-1}{\varepsilon-1}-1\right)\Delta_1 - \frac{\varepsilon-1}{k-\varepsilon+1}\right]\frac{da_D}{a_D} - (1-\rho_1)\frac{\phi-1}{\varepsilon-1}\Delta_2\frac{da_{XN}}{a_{XN}} \\
&\quad + \left[\frac{\varepsilon-1}{k-\varepsilon+1}\left(\rho_2\frac{\phi-1}{\varepsilon-\phi}+1\right)+\Delta_3\right]\frac{da_{XS}}{a_{XS}} \\
&\quad + \left[(\Delta_1-\Delta_3)-(\Delta_1-\Delta_2)(1-\rho_1)\frac{\phi-1}{\varepsilon-1}\right]\frac{da_I}{a_I}, \quad \text{and}
\end{aligned} \tag{B.64}$$

$$\begin{aligned}
\frac{\rho_2}{k-\varepsilon+1}\frac{\phi-1}{\varepsilon-\phi}\frac{dA_{ss}}{A_{ss}} &= -\rho_1\frac{\phi-1}{\varepsilon-1}\Delta_1\frac{da_D}{a_D} + \left[\left(\rho_1\frac{\phi-1}{\varepsilon-1}-1\right)\Delta_2 - \frac{\varepsilon-1}{k-\varepsilon+1}\right]\frac{da_{XN}}{a_{XN}} \\
&\quad + \left[\frac{\varepsilon-1}{k-\varepsilon+1}\left(\rho_2\frac{\phi-1}{\varepsilon-\phi}+1\right)+\Delta_3\right]\frac{da_{XS}}{a_{XS}} \\
&\quad + \left[(\Delta_2-\Delta_3)+(\Delta_1-\Delta_2)\rho_1\frac{\phi-1}{\varepsilon-1}\right]\frac{da_I}{a_I}.
\end{aligned} \tag{B.65}$$

(B.49), (B.53), (B.64), and (B.65) give us four equations in the four unknowns, $\frac{da_D}{a_D}$, $\frac{da_{XN}}{a_{XN}}$, $\frac{da_{XS}}{a_{XS}}$ and $\frac{da_I}{a_I}$. To pin down the comparative statics explicitly, note that equating (B.65) and (B.64) implies:

$$\frac{da_I}{a_I} = \frac{1}{\Delta_1-\Delta_2}\left[\left(\Delta_1 + \frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\frac{da_D}{d_D} - \left(\Delta_2 + \frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\frac{da_{XN}}{d_{XN}}\right]. \tag{B.66}$$

Meanwhile, using (B.53) to eliminate $\frac{da_{XS}}{a_{XS}}$ from (B.49) delivers:

$$\frac{da_I}{a_I} = -\frac{\rho_1(\Delta_1-\Delta_3)\frac{da_D}{a_D} + (1-\rho_1)(\Delta_2-\Delta_3)\frac{da_{XN}}{a_{XN}}}{\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2)+\frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3)}. \tag{B.67}$$

For convenience, let us define: $\Delta_d = \rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2)+\frac{1-\rho_2}{2}\frac{E_s}{E_n}(1-\Delta_3) > 0$, which is the denominator in (B.67). Then, setting (B.66) equal to (B.67) and rearranging, one obtains:

$$
\begin{aligned}
0 \quad = \quad & \left[\rho_1(\Delta_1-\Delta_3)(\Delta_1-\Delta_2)+\Delta_d\left(\Delta_1+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\right]\frac{da_D}{a_D} \\
& +\left[(1-\rho_1)(\Delta_2-\Delta_3)(\Delta_1-\Delta_2)-\Delta_d\left(\Delta_2+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\right]\frac{da_{XN}}{a_{XN}}. \qquad \text{(B.68)}
\end{aligned}
$$

Since $\Delta_1-\Delta_2, \Delta_1-\Delta_3>0$, it follows that the coefficient of $\frac{da_D}{a_D}$ in (B.68) is positive. Moreover, using the definition of Δ_d, one can see that the coefficient of $\frac{da_{XN}}{a_{XN}}$ is strictly smaller than: $(1-\rho_1)(\Delta_2-\Delta_3)(\Delta_1-\Delta_2)-(1-\rho_1)(1-\Delta_2)\Delta_2$, which itself is already negative, since: $1-\Delta_2>\Delta_1-\Delta_2>0$, and $\Delta_2>\Delta_2-\Delta_3>0$. Thus, the coefficient of $\frac{da_{XN}}{a_{XN}}$ in (B.68) is negative. Since the linear combination in (B.68) is equal to 0, it follows that $sign(\frac{da_D}{d\eta})=sign(\frac{da_{XN}}{d\eta})$.

We require one more equation in $\frac{da_D}{a_D}$ and $\frac{da_{XN}}{a_{XN}}$ in order to pin down their common sign. For this, substitute the expression for $\frac{da_I}{a_I}$ from (B.67) and that for $\frac{da_{XS}}{a_{XS}}$ from (B.53) into (B.64) to obtain:

$$
\begin{aligned}
\frac{\rho_2}{k-\varepsilon+1}\frac{\phi-1}{\varepsilon-\phi}\frac{dA_{ss}}{A_{ss}} \quad = \quad & \Bigg[\left((1-\rho_1)\frac{\phi-1}{\varepsilon-1}-1\right)\Delta_1-\frac{2\rho_1}{1-\rho_2}\frac{E_n}{E_s}\left(\frac{\varepsilon-1}{k-\varepsilon+1}\left(\rho_2\frac{\phi-1}{\varepsilon-\phi}+1\right)+\Delta_3\right) \\
& -\frac{\varepsilon-1}{k-\varepsilon+1}-\left((\Delta_1-\Delta_3)-(\Delta_1-\Delta_2)(1-\rho_1)\frac{\phi-1}{\varepsilon-1}\right)\frac{\rho_1(\Delta_1-\Delta_3)}{\Delta_d}\Bigg]\frac{da_D}{a_D} \\
& +\Bigg[-(1-\rho_1)\frac{\phi-1}{\varepsilon-1}\Delta_2-\frac{2(1-\rho_1)}{1-\rho_2}\frac{E_n}{E_s}\left(\frac{\varepsilon-1}{k-\varepsilon+1}\left(\rho_2\frac{\phi-1}{\varepsilon-\phi}+1\right)+\Delta_3\right) \\
& -\left((\Delta_1-\Delta_3)-(\Delta_1-\Delta_2)(1-\rho_1)\frac{\phi-1}{\varepsilon-1}\right)\frac{(1-\rho_1)(\Delta_2-\Delta_3)}{\Delta_d}\Bigg]\frac{da_{XN}}{a_{XN}}. \qquad \text{(B.69)}
\end{aligned}
$$

Note that $(\Delta_1-\Delta_3)-(\Delta_1-\Delta_2)(1-\rho_1)\frac{\phi-1}{\varepsilon-1}>0$, since: $\Delta_1-\Delta_3>\Delta_1-\Delta_2>0$, $1-\rho_1\in(0,1)$, and $\frac{\phi-1}{\varepsilon-1}\in(0,1)$. These conditions also imply that: $(1-\rho_1)\frac{\phi-1}{\varepsilon-1}-1<0$. It is then straightforward to see that the coefficients of both $\frac{da_D}{a_D}$ and $\frac{da_{XN}}{a_{XN}}$ in (B.69) are negative. From Lemma 1, recall that $\frac{dA_{ss}}{d\eta}<0$. It follows then from (B.69) that $sign(\frac{da_D}{d\eta})=sign(\frac{da_{XN}}{d\eta})>0$.

Rearranging (B.68) now implies:

$$
\frac{\frac{1}{a_D}\frac{da_D}{d\eta}}{\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}}=\frac{-(1-\rho_1)(\Delta_2-\Delta_3)(\Delta_1-\Delta_2)+\Delta_d\left(\Delta_2+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)}{\rho_1(\Delta_1-\Delta_3)(\Delta_1-\Delta_2)+\Delta_d\left(\Delta_1+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)}. \qquad \text{(B.70)}
$$

It is easy to verify that the numerator of (B.70) is positive but smaller than the denominator; in particular, this is a consequence of $\Delta_1>\Delta_2$. It follows that $\frac{1}{a_D}\frac{da_D}{d\eta}/\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}\in(0,1)$, so that: $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}>\frac{1}{a_D}\frac{da_D}{d\eta}>0$, as stated in part (i) of Lemma 2A. Part (iii) of the lemma then holds immediately from (B.46) and (B.47).

As for part (ii) of the lemma, observe that (B.53) implies:

$$
\frac{da_{XS}}{a_{XS}}=-\frac{2}{1-\rho_2}\frac{E_n}{E_s}\left(\rho_1\frac{da_D}{a_D}+(1-\rho_1)\frac{da_{XN}}{a_{XN}}\right)<0. \qquad \text{(B.71)}
$$

At the same time, it is clear from (B.67) that $\frac{da_I}{a_I}<0$. Now, subtracting (B.71) from (B.67) yields:

$$
\frac{da_I}{a_I}-\frac{da_{XS}}{a_{XS}}=\left(-\frac{\Delta_1-\Delta_3}{\Delta_d}+\frac{2}{1-\rho_2}\frac{E_n}{E_s}\right)\rho_1\frac{da_D}{a_D}+\left(-\frac{\Delta_2-\Delta_3}{\Delta_d}+\frac{2}{1-\rho_2}\frac{E_n}{E_s}\right)(1-\rho_1)\frac{da_{XN}}{a_{XN}}. \qquad \text{(B.72)}
$$

One can check directly that: $\frac{2}{1-\rho_2}\frac{E_n}{E_s}\Delta_d>1-\Delta_3>\Delta_1-\Delta_3,\Delta_2-\Delta_3$. The coefficients of $\frac{da_D}{a_D}$ and $\frac{da_{XN}}{a_{XN}}$ from this last equation are thus both positive, from which we can conclude that: $\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta}<\frac{1}{a_I}\frac{da_I}{d\eta}<0$. Finally, part (iv) follows from the fact that $\frac{da_{XS}}{a_{XS}}$ and $\frac{dA_{sw}}{A_{sw}}$ share the same sign (from (B.48)). This concludes the proof of Lemma 2A.

We now proceed to establish that Proposition 1 continues to apply in the extended model with home-bias in the utility specification. Recall the definitions of $HOR(a)$, $PLA(a)$ and $RET(a)$ from Section A.2. From these, it is clear that the effects of η on the affiliate-level sales values are pinned down respectively by the derivatives of A_{sw}, A_{ew} and A_{ww} with respect to η. Lemma 2A then implies that when Southern financial development improves, $HOR(a)$ falls (since $\frac{dA_{sw}}{d\eta} < 0$), $PLA(a)$ increases (since $\frac{dA_{ew}}{d\eta} > 0$), and $RET(a)$ increases (since $\frac{dA_{ww}}{d\eta} > 0$). This establishes part (i) of the proposition.

Next, recall the expressions for the sales shares by destination listed in equations (2.23)-(2.25). One can see that $\frac{d}{d\eta}\frac{HORI(a)}{TOT(a)} < 0$, since both $\frac{A_{ww}}{A_{sw}}$ and $\frac{A_{ew}}{A_{sw}}$ increase with η. On the other hand, we have $\frac{d}{d\eta}\frac{PLAT(a)}{TOT(a)} > 0$, since both $\frac{A_{sw}}{A_{ew}}$ and $\frac{A_{ww}}{A_{ew}}$ are decreasing in η. (That $\frac{d}{d\eta}\frac{A_{ww}}{A_{ew}} < 0$ follows from $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} > \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta} > 0$.) It remains to show that $\frac{d}{d\eta}\frac{RET(a)}{TOT(a)} > 0$ as well. From equation (2.25), it suffices to show that $\tau^{\varepsilon-1}\frac{A_{sw}}{A_{ww}} + \frac{A_{ew}}{A_{ww}}$ decreases with η:

$$\begin{aligned}
\frac{d}{d\eta}\left(\tau^{\varepsilon-1}\frac{A_{sw}}{A_{ww}} + \frac{A_{ew}}{A_{ww}}\right) &\propto \tau^{\varepsilon-1}A_{sw}\left(\frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta} - \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}\right) + A_{ew}\left(\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} - \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}\right) \\
&\propto \tau^{\varepsilon-1}\frac{A_{sw}}{A_{ew}}\left(\frac{1}{a_{XS}}\frac{da_{XS}}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right) + \left(\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right),
\end{aligned}$$

where '$\propto$' denotes equality up to a positive multiplicative term. Note that we have used (B.46)-(B.48) in the last step above. We now replace $\frac{da_{XS}}{d\eta}$ using the expression in (B.71). Also, based on the definitions from (B.31) and (B.32), one can show that: $\frac{A_{sw}}{A_{ew}} = \frac{E_s}{E_n}\frac{1-\rho_2}{2(1-\rho_1)}\frac{P_{ew}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}}$. Performing these substitutions and rearranging, we obtain:

$$\frac{d}{d\eta}\left(\tau^{\varepsilon-1}\frac{A_{sw}}{A_{ww}} + \frac{A_{ew}}{A_{ww}}\right) \propto -\left[1 + \tau^{\varepsilon-1}\frac{A_{sw}}{A_{ew}}\left(\frac{E_n}{E_s}\frac{2\rho_1}{1-\rho_2} + 1\right)\right]\frac{1}{a_D}\frac{da_D}{d\eta} + \left[1 - \tau^{\varepsilon-1}\frac{P_{ew}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}}\right]\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}.$$

In this last equation, the coefficient of $\frac{1}{a_D}\frac{da_D}{d\eta}$ is clearly negative. As for the coefficient of $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$, using the expressions for $P_{ew}^{1-\varepsilon}$ and $P_{sw}^{1-\varepsilon}$ from (B.43) and (B.44), we have:

$$\begin{aligned}
1 - \tau^{\varepsilon-1}\frac{P_{ew}^{1-\varepsilon}}{P_{sw}^{1-\varepsilon}} &= 1 - \tau^{\varepsilon-1}\left[\frac{\tau^{1-\varepsilon}V_N(a_{XN}) + ((\tau\omega)^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_I)}{\tau^{1-\varepsilon}V_N(a_{XS}) + (\omega^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_I)}\right] \\
&= \frac{\tau^{1-\varepsilon}(V_N(a_{XS}) - V_N(a_I)) - (V_N(a_{XN}) - V_N(a_I))}{\tau^{1-\varepsilon}V_N(a_{XS}) + (\omega^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_I)} \\
&< \frac{(\tau^{1-\varepsilon} - 1)(V_N(a_{XN}) - V_N(a_I))}{\tau^{1-\varepsilon}V_N(a_{XS}) + (\omega^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_I)} \\
&< 0.
\end{aligned}$$

The second-to-last step relies on the fact that $V_N(a_{XN}) > V_N(a_{XS})$ (since $a_{XN} > a_{XS}$), while the last step follows from $\tau^{1-\varepsilon} < 1$ and $V_N(a_{XN}) > V_N(a_I)$ (since $a_{XN} > a_I$). The coefficient of $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}$ is thus negative as well. Since $\frac{da_D}{d\eta}, \frac{da_{XN}}{d\eta} > 0$, this implies: $\frac{d}{d\eta}\left(\tau^{\varepsilon-1}\frac{A_{sw}}{A_{ww}} + \frac{A_{ew}}{A_{ww}}\right) < 0$. Hence, $\frac{RET(a)}{TOT(a)}$ increases with η.

It remains for us to prove part (iii) of the proposition, which contains the implications of host-country financial development for the various aggregate measures of multinational activity. To pin down the effect on N_n, we solve for $\frac{dN_n}{N_n}$ from (B.59). First, applying Cramer's Rule to (B.54) and (B.55), we have:

$$\frac{dP_{ew}^{1-\varepsilon}}{P_{ew}^{1-\varepsilon}} = \rho_1\frac{\phi-1}{\varepsilon-\phi}\left(\frac{dA_{ww}}{A_{ww}} - \frac{dA_{ew}}{A_{ew}}\right) - \frac{dA_{ew}}{A_{ew}} = (\varepsilon-1)\left[\rho_1\frac{\phi-1}{\varepsilon-\phi}\left(\frac{da_D}{a_D} - \frac{da_{XN}}{a_{XN}}\right) - \frac{da_{XN}}{a_{XN}}\right]. \quad \text{(B.73)}$$

Substituting from (B.73) into (B.59), replacing $\frac{da_I}{a_I}$ with the expression from (B.66), and rearranging yields:

$$
\begin{aligned}
\frac{1}{k-\varepsilon+1}\frac{dN_n}{N_n} \quad = \quad & \left[\rho_1 \frac{\phi-1}{\varepsilon-\phi}\frac{\varepsilon-1}{k-\varepsilon+1} - \frac{1-\Delta_2}{\Delta_1-\Delta_2}\left(\Delta_1 + \frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\right]\frac{da_D}{a_D} \\
& + \left[-\left(\rho_1\frac{\phi-1}{\varepsilon-\phi}+1\right)\frac{\varepsilon-1}{k-\varepsilon+1} - \Delta_2 + \frac{1-\Delta_2}{\Delta_1-\Delta_2}\left(\Delta_2 + \frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\right]\frac{da_{XN}}{a_{XN}}.
\end{aligned}
$$

To determine the sign of $\frac{dN_n}{N_n}$, divide the right-hand side of the above by $\frac{da_{XN}}{a_{XN}}$, and substitute in the expression for $\frac{da_D}{a_D}/\frac{da_{XN}}{d_{XN}}$ from (B.70). After some algebra, one can show that $sign(\frac{dN_n}{d\eta})$ is given by the sign of:

$$
\begin{aligned}
& -\left(\Delta_2 + \frac{\varepsilon-1}{k-\varepsilon+1}\right)\left[\Delta_d\left(\Delta_1 + \frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right) + \rho_1(\Delta_1-\Delta_2)(\Delta_1-\Delta_3)\right] \\
& \quad -\rho_1\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\phi-1}{\varepsilon-\phi}(\Delta_1-\Delta_2)\left[\rho_1(\Delta_1-\Delta_3)+(1-\rho_1)(\Delta_2-\Delta_3)+\Delta_d\right] \\
& \quad +(1-\Delta_2)\left[\left(\Delta_2+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\rho_1(\Delta_1-\Delta_3) + \left(\Delta_1+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)(1-\rho_1)(\Delta_2-\Delta_3)\right] \\
< \quad & -\left(\Delta_2 + \frac{\varepsilon-1}{k-\varepsilon+1}\right)\left[(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))\left(\Delta_1 + \frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right) + \rho_1(\Delta_1-\Delta_2)(\Delta_1-\Delta_3)\right] \\
& \quad -\rho_1\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\phi-1}{\varepsilon-\phi}(\Delta_1-\Delta_2)(1-\Delta_3) \\
& \quad +(1-\Delta_2)\left[\left(\Delta_2+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)\rho_1(\Delta_1-\Delta_3) + \left(\Delta_1+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right)(1-\rho_1)(\Delta_2-\Delta_3)\right], \qquad \text{(B.74)}
\end{aligned}
$$

where the inequality comes from applying: $\Delta_d > \rho_1(1-\Delta_1) + (1-\rho_1)(1-\Delta_2)$. We now collect all the terms in (B.74) in which $\frac{\varepsilon-1}{k-\varepsilon+1}$ does not appear. These are:

$$
\begin{aligned}
& -\Delta_2\left[(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))\Delta_1 + \rho_1(\Delta_1-\Delta_2)(\Delta_1-\Delta_3)\right] + (1-\Delta_2)\left[\Delta_2\rho_1(\Delta_1-\Delta_3) + \Delta_1(1-\rho_1)(\Delta_2-\Delta_3)\right] \\
= \quad & -\Delta_3\left[\rho_1\Delta_2(1-\Delta_1) + (1-\rho_1)\Delta_1(1-\Delta_2)\right] \\
< \quad & 0.
\end{aligned}
$$

This term is negative, since $\rho_1, \Delta_1, \Delta_2, \Delta_3 \in (0,1)$. Similarly, we collect the remaining terms in (B.74), all of which involve $\frac{\varepsilon-1}{k-\varepsilon+1}$, as follows:

$$
\begin{aligned}
& -\frac{\varepsilon-1}{k-\varepsilon+1}\left[(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))\left(\Delta_1+\frac{\varepsilon-1}{k-\varepsilon+1}\frac{\varepsilon-1}{\varepsilon-\phi}\right) + \rho_1(\Delta_1-\Delta_2)(\Delta_1-\Delta_3)\right. \\
& \quad +\Delta_2(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))\frac{\varepsilon-1}{\varepsilon-\phi} \\
& \quad \left. +\rho_1\frac{\phi-1}{\varepsilon-\phi}(\Delta_1-\Delta_2)(1-\Delta_3) - \frac{\varepsilon-1}{\varepsilon-\phi}(1-\Delta_2)(\rho_1(\Delta_1-\Delta_3)+(1-\rho_1)(\Delta_2-\Delta_3))\right] \\
< \quad & -\frac{\varepsilon-1}{k-\varepsilon+1}\left[(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))\Delta_1 + \rho_1(\Delta_1-\Delta_2)(\Delta_1-\Delta_3) + \frac{\phi-1}{\varepsilon-\phi}\rho_1(\Delta_1-\Delta_2)(1-\Delta_3)\right. \\
& \quad \left. +\Delta_2(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))\frac{\varepsilon-1}{\varepsilon-\phi} - \frac{\varepsilon-1}{\varepsilon-\phi}(1-\Delta_2)(\rho_1(\Delta_1-\Delta_3)+(1-\rho_1)(\Delta_2-\Delta_3))\right] \\
= \quad & -\frac{\varepsilon-1}{k-\varepsilon+1}\left[\rho_1(1-\Delta_1)\Delta_2 + (1-\rho_1)\Delta_1(1-\Delta_2) + \frac{\varepsilon-1}{\varepsilon-\phi}\Delta_3(\rho_1(1-\Delta_1)+(1-\rho_1)(1-\Delta_2))\right] \\
< \quad & 0,
\end{aligned}
$$

since $\frac{\varepsilon-1}{k-\varepsilon+1} > 0$. This completes the proof that $\frac{dN_n}{d\eta} < 0$. As $\frac{da_I}{d\eta}$ is also negative, we thus have $\frac{1}{N_n}\frac{dN_n}{d\eta} + k\frac{1}{a_I}\frac{da_I}{d\eta} < 0$, so that $\frac{d}{d\eta}\log N_n G_n(a_I) < 0$.

Finally, we derive the effects of changes in η on the aggregate sales variables defined in equations (2.20)-(2.22). Since $V_n(a)$ is an increasing function for all $a \in (0, \bar{a}_n)$, an improvement in η leads to a decrease in a_I, and hence in $V_n(a_I)$. Also, we have just seen that N_n decreases in η. To show that HOR, PLA and RET all decline in η, it therefore suffices to prove that PLA is declining in η, since $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} > \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}, \frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta}$. From (2.21), we have:

$$\begin{aligned}
\frac{d}{d\eta}\ln(PLA) &= \frac{1}{N_n}\frac{dN_n}{d\eta} + \frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} + \frac{V_N'(a_I)a_I}{V_N(a_I)}\frac{1}{a_I}\frac{da_I}{d\eta} \\
&= (\varepsilon-1)\left[\rho_1\frac{\phi-1}{\varepsilon-\phi}\left(\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right) - \frac{1}{a_{XN}}\frac{da_{XN}}{d\eta}\right] \\
&\quad -(k-\varepsilon+1)\left(\Delta_2\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} + (1-\Delta_2)\frac{1}{a_I}\frac{da_I}{d\eta}\right) + (\varepsilon-1)\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} + (k-\varepsilon+1)\frac{1}{a_I}\frac{da_I}{d\eta} \\
&= -(\varepsilon-1)\rho_1\frac{\phi-1}{\varepsilon-\phi}\left(\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} - \frac{1}{a_D}\frac{da_D}{d\eta}\right) - (k-\varepsilon+1)\Delta_2\left(\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} - \frac{1}{a_I}\frac{da_I}{d\eta}\right) \\
&< 0.
\end{aligned}$$

To get from the first line above to the second, we have used the expression for $\frac{dN_n}{d\eta}$ from (B.59), and substituted for $\frac{dP_{ew}^{1-\varepsilon}}{d\eta}$ using (B.73). We have also used (B.46) and (B.47) to substitute for $\frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}$ and $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta}$ wherever these terms appear. Finally, we have used the fact that $\frac{V_N'(a_I)a_I}{V_N(a_I)} = k-\varepsilon+1$ for the Pareto distribution. The last step establishing that $\frac{d}{d\eta}\ln(PLA) < 0$ follows from $\frac{1}{a_{XN}}\frac{da_{XN}}{d\eta} > \frac{1}{a_D}\frac{da_D}{d\eta} > \frac{1}{a_I}\frac{da_I}{d\eta}$, bearing in mind that $\phi - 1 > 0$ and $k-\varepsilon+1 > 0$. Thus, when η increases, the contraction in the extensive margin captured by the fall in N_n and $V_N(a_I)$ is larger in magnitude than the increase in sales on the intensive margin due to the rise in the demand level, A_{ew}. This concludes our proof that Proposition 1 continues to hold in the extended model with home-bias in consumption. ∎

Proof of Proposition 3. For part (i) of the proposition, from the definitions of $PLA(a)$ and $RET(a)$, we have:

$$\frac{d}{d\eta}(PLA(a) - RET(a)) = (1-\alpha)\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon} A_{ww}\left(\frac{A_{ew}}{A_{ww}}\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} - \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}\right).$$

We show first that $\frac{A_{ew}}{A_{ww}} > 1$. From (B.31) and (B.32), we have:

$$\frac{A_{ew}}{A_{ww}} = \left[\frac{V_N(a_D) + ((\tau\omega)^{1-\varepsilon}-1)V_N(a_I)}{\tau^{1-\varepsilon}V_N(a_{XN}) + ((\tau\omega)^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_I)}\right]^{\frac{\varepsilon-\phi}{\varepsilon-1}}. \tag{B.75}$$

Observe that:

$$\begin{aligned}
& V_N(a_D) + ((\tau\omega)^{1-\varepsilon}-1)V_N(a_I) - \left(\tau^{1-\varepsilon}V_N(a_{XN}) + ((\tau\omega)^{1-\varepsilon} - \tau^{1-\varepsilon})V_N(a_I)\right) \\
=\ & V_N(a_D) - V_N(a_I) - \tau^{1-\varepsilon}(V_N(a_{XN}) - V_N(a_I)) \\
>\ & (1-\tau^{1-\varepsilon})(V_N(a_{XN}) - V_N(a_I)) \\
>\ & 0,
\end{aligned}$$

where the second-to-last step uses the fact that $V_N(a_D) > V_N(a_{XN})$ (since $a_D > a_{XN}$), while the final step holds because $\tau^{1-\varepsilon} < 1$. Since the exponent, $\frac{\varepsilon-\phi}{\varepsilon-1}$, is positive (as $\varepsilon > \phi > 1$), it follows that $\frac{A_{ew}}{A_{ww}} > 1$, as claimed. We thus have:

$$\frac{d}{d\eta}(PLA(a) - RET(a)) > (1-\alpha)\left(\frac{\tau a\omega}{\alpha}\right)^{1-\varepsilon} A_{ww}\left(\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} - \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}\right) > 0,$$

since $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} > \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}$ from Lemma 2A.

For part (ii) of the proposition, applying the quotient rule to the expressions for $\frac{PLA(a)}{TOT(a)}$ and $\frac{RET(a)}{TOT(a)}$ from

(2.24) and (2.25) respectively, one obtains after some simplification that:

$$\begin{aligned}\frac{d}{d\eta}\left[\frac{PLA(a)}{TOT(a)} - \frac{RET(a)}{TOT(a)}\right] &\propto \tau^{\varepsilon-1}\frac{A_{sw}}{A_{ew}}\left(1-\frac{A_{ew}}{A_{ww}}\right)\frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta} + 2\left(\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} - \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}\right) \\ &\quad + \tau^{\varepsilon-1}\frac{A_{sw}}{A_{ew}}\left(\frac{A_{ew}}{A_{ww}}\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} - \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta}\right) \\ &> 0,\end{aligned}$$

where the last inequality follows from: $\frac{1}{A_{ew}}\frac{dA_{ew}}{d\eta} > \frac{1}{A_{ww}}\frac{dA_{ww}}{d\eta} > 0 > \frac{1}{A_{sw}}\frac{dA_{sw}}{d\eta}$ (Lemma 2A), and $\frac{A_{ew}}{A_{ww}} > 1$.

Finally, part (iii) of the proposition can be established using the definitions for PLA and RET in equations (2.21) and (2.22), and following analogous steps to the proof used for part (i) above. ■

B.3 Model Extension: Exporting of Southern varieties

In the baseline model, producers of Southern differentiated varieties do not engage in sales to consumers in either West or East. We now relax this assumption, and consider the implications of allowing Southern firms to engage in exporting to these other markets. This introduces a new feedback effect: Southern varieties can now compete directly not just in the host-country market, but in West and East's home markets as well. Even with this additional consideration, we show through a series of computational examples that many of the implications of host-country financial development from our baseline model continue to be operative and relevant.

Model Setup. To incorporate Southern exporting into our model, consumers in West and East need to have a positive demand level for Southern varieties. We therefore introduce Southern varieties (subscript s) into the utility function for $n = w, e$ (West and East) as follows:

$$U_n = y_n^{1-\mu}\left(\sum_{j\in\{e,w,s\}}\int_{\Omega_{nj}} x_{nj}(a)^{\alpha}\, dG_j(a)\right)^{\frac{\mu}{\alpha}}. \quad \text{(B.76)}$$

The utility function for Southern consumers remains as in the baseline model, and is reproduced below:

$$U_s = y_s^{1-\mu}\left(\sum_{j\in\{e,w,s\}}\int_{\Omega_{sj}} x_{sj}(a)^{\alpha}\, dG_j(a)\right)^{\frac{\mu}{\alpha}}. \quad \text{(B.77)}$$

Recall that $0 < \alpha, \mu < 1$, and that $\varepsilon = \frac{1}{1-\alpha} > 1$.

Together with the standard budget constraints, (B.76) and (B.77) imply that the demand in country i for a country-j variety is given by: $x_{ij}(a) = A_{ij}p_{ij}(a)^{-\varepsilon}$, where the aggregate market demand levels are:

$$A_{ww} = A_{ee} = A_{ew} = A_{we} = A_{ws} = A_{es} = \frac{\mu L_n}{P_{ww}^{1-\varepsilon} + P_{we}^{1-\varepsilon} + P_{ws}^{1-\varepsilon}}, \quad \text{and} \quad \text{(B.78)}$$

$$A_{sw} = A_{se} = A_{ss} = \frac{\mu\omega L_s}{P_{ss}^{1-\varepsilon} + 2P_{sw}^{1-\varepsilon}}. \quad \text{(B.79)}$$

Note that we have introduced the notation A_{ws} and A_{es} to denote respectively the aggregate demand levels in West and East for Southern varieties. We analogously define $P_{ws} = P_{es}$ to be the ideal price index for the Southern varieties that are consumed in West and East respectively.

Turning to the structure of the differentiated varieties industry in West/East, we retain here the setup from our baseline model. This means that the productivity cutoff expressions that were listed in equations (A.9)-(A.12) earlier in Section A.1 continue to apply.

As for the differentiated varieties industry in South, firms can enter as before into production for the domestic market by paying a fixed cost equal to f_S units of local labor. These firms face financial constraints and the corresponding no-default condition from Section A.1.2 of the baseline model implies that the productivity cutoff for entering into production, $a_S^{1-\varepsilon}$, is given once again by (A.13). Southern firms now have the further option to export their output to West and East if they are sufficiently productive. We assume that this involves a familiar iceberg trade cost, $\tau > 1$, while also incurring a fixed cost of $f_{X,ws}$ units of Southern labor per market to commence exporting. This Southern exporting activity is however affected by credit constraints, as South is the less financially-developed country and prospective exporters need to raise the financing for $f_{X,ws}$ from Southern financial markets. In the event of a default, we assume that Southern financiers are able to appropriate only a fraction $\eta \in (0,1)$ of the operating profits from exporting (revenues less variable costs) from the firm. The corresponding no-default condition is thus:

$$\eta(1-\alpha)A_{ws}(\tau\omega/\alpha)^{1-\varepsilon} < Rf_{X,ws}\omega.$$

A simple rearrangement of the above implies the following cutoff, $a_{X,ws}^{1-\varepsilon}$, for exporting to commence:

$$a_{X,ws}^{1-\varepsilon} = \frac{1}{\eta}\frac{Rf_{X,ws}\omega}{(1-\alpha)A_{ws}(\tau\omega/\alpha)^{1-\varepsilon}}. \tag{B.80}$$

We adopt the natural ordering of productivity cutoffs, $0 < a_D^{1-\varepsilon} < a_{X,ws}^{1-\varepsilon}$, so that only the most productive Southern firms are able to engage in direct exporting. Given the symmetry between West and East, firms with $a^{1-\varepsilon} > a_{X,ws}^{1-\varepsilon}$ will export to both of these countries.

We close the model by spelling out the free entry conditions and the expressions for the ideal price indices. As the industry structure in West/East is unchanged, the free entry condition there continues to be given by (A.14). On the other hand, the corresponding condition for South now needs to take into further account the *ex ante* expected profits from exporting:

$$\begin{aligned} f_{Es}\omega &= \frac{1}{\delta}\Bigg[(1-\alpha)A_{ss}\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon}V_s(a_S) - Rf_S\omega G_s(a_S) \\ &\qquad \ldots + (1-\alpha)(A_{ws}+A_{es})\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}V_s(a_{X,ws}) - 2Rf_X\omega G_s(a_{X,ws})\Bigg]. \end{aligned} \tag{B.81}$$

For the ideal price indices, $P_{ww}^{1-\varepsilon}$, $P_{ew}^{1-\varepsilon}$, $P_{sw}^{1-\varepsilon}$ and $P_{ss}^{1-\varepsilon}$ continue to be given by (A.16)-(A.19). There is one additional index for the prices of Southern varieties that are exported in West/East, and this is given by:

$$P_{ws}^{1-\varepsilon} = N_s\left[\left(\frac{\tau\omega}{\alpha}\right)^{1-\varepsilon}V_s(a_{X,ws})\right]. \tag{B.82}$$

Bear in mind that $G_i(a) = \left(\frac{a}{\bar{a}_i}\right)^k$ and $V_i(a) = \frac{k}{k-\varepsilon+1}\left(\frac{a^{k-\varepsilon+1}}{\bar{a}_i^k}\right)$, as these are from the Pareto distribution.

The equilibrium of the three-country model is now defined by equations (B.78), (B.79), (A.9)-(A.13), (B.80), (A.14), (B.81), (A.16)-(A.19) and (B.82). There are altogether 15 endogenous variables: A_{ww}, A_{ss}, a_D, a_{XN}, a_{XS}, a_I, a_S, $a_{X,ws}$, N_n, N_s, P_{ww}, P_{ew}, P_{sw}, P_{ss} and P_{ws}. Note that relative to our baseline model, we have introduced only one new exogenous parameter, $f_{X,ws}$, in this extension. Intuitively, $f_{X,ws}$ governs the extent to which firms in West/East are shielded from the direct competition posed by Southern exporters.

Computational examples. The comparative statics of the above extension are cumbersome to study analytically, in large part because the equilibrium for the Southern FDI host country cannot be solved for in isolation from the feedback effect that arises from demand in West/East for South's exports. (Previously, the

Southern equilibrium was pinned down by just two equations in Lemma 1.) We thus explore the behavior of the model with Southern exporting computationally; the Matlab code used for this exercise is available on request.

We focus first on the following parametrization which is based on the numerical example we provided in footnote 15 of this Appendix: $R = 1.07$, $\varepsilon = 3.8$, $L_n = L_s = 1$, $f_D = 0.2$, $f_X = 0.15$, $f_I = 4$, $f_S = 0.1$, $f_{En} = f_{Es} = 1$, $\tau = 1.4$, $\omega = 0.6$, $\bar{a}_N = \bar{a}_S = 25$, $k = 4$, $\delta = 0.1$, $\mu = 0.5$, $\eta = 0.5$ and $f_{X,ws} = 1.5$. In particular, $f_{X,ws}$ is set here at a value intermediate between the export fixed cost faced by firms headquartered in West/East, f_X, and the FDI fixed cost, f_I. With these parameter values, we obtain $a_D = 14.20$, $a_{XN} = 13.11$, $a_{XS} = 8.42$ and $a_I = 4.98$, as well as $a_S = 12.34$ and $a_{X,ws} = 6.09$. This clearly satisfies the desired ordering of the productivity cutoffs in both West/East and South. Moreover, we obtain:

- $\frac{d}{d\eta} \ln HOR(a) = -1.23 < 0$, and $\frac{d}{d\eta} \ln PLA(a) = \frac{d}{d\eta} \ln RET(a) = 0.14 > 0$;
- $\frac{d}{d\eta} \ln \frac{HOR(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{HOR}{TOT} = -1.10 < 0$, and $\frac{d}{d\eta} \ln \frac{PLA(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{PLA}{TOT} = \frac{d}{d\eta} \ln \frac{RET(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{RET}{TOT} = 0.27 > 0$; and
- $\frac{d}{d\eta} \ln N_n G_n(a_I) = -5.46 < 0$, $\frac{d}{d\eta} \ln HOR = -6.34 < 0$, and $\frac{d}{d\eta} \ln PLA = \frac{d}{d\eta} \ln RET = -4.97 < 0$.

Even with the introduction of Southern exporting, these comparative statics remain in line with the statement of Proposition 1 of our baseline model (in the absence of host-country financing): An improvement in host-country financial development leads to a decrease in affiliate sales to the local market, and an increase in return sales to West and platform sales to East, both in terms of the level of an individual affiliate's sales and in their shares out of total sales. However, the competition effect in the host-country market leads to a decrease in the number of affiliates on the extensive margin, and a reduction in the levels of aggregate horizontal, platform and return sales.

It is worth pointing out that the above comparative statics are reinforced as we raise $f_{X,ws}$, holding all else constant (details available on request). This should not come as a surprise: When $f_{X,ws} \longrightarrow \infty$, we have $a_{X,ws} \longrightarrow 0$, and the extension with Southern exporting reduces back to the baseline model. Intuitively, if $f_{X,ws}$ is high, exporting from South to West/East is difficult except for the very most productive Southern firms, and this limits the extent to which Southern varieties can compete in the markets in West/East. In such a situation, the effects of host-country financial development would clearly be similar to what we have derived for our baseline model.

We turn next to discuss the case where multinationals require host-country financing, as this serves to further illustrate the role of $f_{X,ws}$ in governing the strength of the feedback effect from Southern exporting. Recall that the expression for the FDI cutoff is now replaced by:

$$\tilde{a}_I^{1-\varepsilon} = \frac{1}{\eta} a_I^{1-\varepsilon}, \tag{B.83}$$

where a_I is given by (A.12). The extent of host-country financial development now has a direct effect on the FDI cutoff, while all other equations in the equilibrium system remain unchanged.

We first retain the above parameterization with $f_{X,ws} = 1.5$ and compute the equilibrium for the model with host-country financing *and* Southern exporting. For this, we obtain: $a_D = 14.27$, $a_{XN} = 13.18$, $a_{XS} = 8.34$ and $\tilde{a}_I = 3.88$, as well as $a_S = 12.23$ and $a_{X,ws} = 6.12$, so that the ordering of the cutoffs is preserved. We also have:

- $\frac{d}{d\eta} \ln HOR(a) = -1.14 < 0$, and $\frac{d}{d\eta} \ln PLA(a) = \frac{d}{d\eta} \ln RET(a) = 0.07 > 0$;
- $\frac{d}{d\eta} \ln \frac{HOR(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{HOR}{TOT} = -0.98 < 0$, and $\frac{d}{d\eta} \ln \frac{PLA(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{PLA}{TOT} = \frac{d}{d\eta} \ln \frac{RET(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{RET}{TOT} = 0.23 > 0$; and

- $\frac{d}{d\eta} \ln N_n G_n(\tilde{a}_I) = -2.97 < 0$, $\frac{d}{d\eta} \ln HOR = -5.76 < 0$, and $\frac{d}{d\eta} \ln PLA = \frac{d}{d\eta} \ln RET = -4.55 < 0$.

Observe in particular that the competition effect is still relevant. An increase in η leads once again to the host-country market becoming a more competitive environment, so that an individual affiliate's sales to the local market decline (both in levels and in shares), while its return and platform sales both increase. These directions of change are consistent with the statement of parts (i) and (ii) of Proposition 2 (with host-country financing) in Section A.3.

In contrast, we now observe that the number of multinationals, as well as the aggregate levels of horizontal, platform and return sales all decrease, contrary to part (iii) of Proposition 2. This decrease is driven by the fact that with Southern exporting, Southern firms now compete directly in the markets in West and East. An improvement in η that leads to more entry of Southern firms can thus prompt the exit of firms from West/East – in the above numerical example, we in fact have $\frac{d}{d\eta} \ln N_n = -5.32 < 0$ – so that the various aggregate dimensions of multinational activity conducted by firms from West/East all decline. Put otherwise, the increased competition with Southern firms, if sufficiently intense, can result in a decrease in the extensive margin of multinational activity that counteracts the financing effect.

As pointed out earlier however, raising $f_{X,ws}$ has the effect of moderating the extent to which the competition from Southern exporters affects the equilibrium number of firms in West/East. For example, raising $f_{X,ws}$ to 5, one obtains: $a_D = 13.88$, $a_{XN} = 12.82$, $a_{XS} = 9.99$ and $\tilde{a}_I = 4.13$, as well as $a_S = 14.65$ and $a_{X,ws} = 3.27$. Moreover, we have:

- $\frac{d}{d\eta} \ln HOR(a) = -0.51 < 0$, and $\frac{d}{d\eta} \ln PLA(a) = \frac{d}{d\eta} \ln RET(a) = 0.04 > 0$;
- $\frac{d}{d\eta} \ln \frac{HOR(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{HOR}{TOT} = -0.39 < 0$, and $\frac{d}{d\eta} \ln \frac{PLA(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{PLA}{TOT} = \frac{d}{d\eta} \ln \frac{RET(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{RET}{TOT} = 0.16 > 0$; and
- $\frac{d}{d\eta} \ln N_n G_n(\tilde{a}_I) = 2.29 > 0$, $\frac{d}{d\eta} \ln HOR = 0.01 > 0$, and $\frac{d}{d\eta} \ln PLA = \frac{d}{d\eta} \ln RET = 0.56 > 0$.

In particular, we now find that the number of multinationals, as well as the aggregate sales levels all rise in respond to a small increase in η, consistent with our original financing effect being stronger.

To sum up, in this extension with Southern exporters, we have continued to find through various computational examples that host-country financial development has a familiar competition effect. The host-country market becomes a more competitive environment for those multinationals from West/East that remain present there, and so the horizontal sales share of these affiliates decreases, while their platform and return sales shares increase. In contrast with the baseline model, we do find that the added competition that Southern exporters pose to Western/Eastern firms means that it is now possible for N_n to decrease when η increases even when multinationals require host-country financing. A decrease in N_n would tend to diminish the effect that η has on the extensive margin of multinational activity in South, as well as on the aggregate sales variables, HOR, PLA and RET, thus counteracting the financing effect. That said, if such Southern exporting effects are strong, then this should work against our finding the positive correlations between host-country financial development and the aggregate measures of multinational activity which we report in the main paper.

B.4 Model Extension: Endogenous Wages

The extended model with endogenous Southern wages is the case where $\mu = 1$ in our baseline model. The equilibrium is then pinned down by the previous system of equations (A.3)-(A.4) and (A.9)-(A.19), together with the additional labor market clearing condition (A.29). In particular, this last equation serves to pin down the additional endogenous variable, i.e., the Southern wage ω, in the equilibrium system.

Computational examples. We base this discussion around the parameter values from the previous extension on Southern exporting in Section B.3, namely: $R = 1.07$, $\varepsilon = 3.8$, $L_n = L_s = 1$, $f_D = 0.2$, $f_X = 0.15$, $f_I = 4$, $f_S = 0.1$, $f_{En} = f_{Es} = 1$, $\tau = 1.4$, $\bar{a}_N = \bar{a}_S = 25$, $k = 4$, $\delta = 0.1$, $\eta = 0.5$ and $f_{X,ws} = 1.5$. We consider the baseline model without the financing effect, to focus on how endogenous host-country wages would affect the competition effect, although it should be clear that these implications would carry over even in the richer version of the model with the financing effect.

With the parameter values listed above, the equilibrium wage ω in South is pinned down endogenously and equal to 0.87. Moreover, in response to a small change in η, we obtain:

- an increase in the Southern wage, $\frac{d}{d\eta} \ln \omega = 0.04$; and
- $\frac{d}{d\eta} \ln \frac{HOR(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{HOR}{TOT} = -0.16 < 0$, and $\frac{d}{d\eta} \ln \frac{PLA(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{PLA}{TOT} = \frac{d}{d\eta} \ln \frac{RET(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{RET}{TOT} = 0.15 > 0$.

This baseline set of parameters therefore yields implications for the sales shares that are in line with the competition effect.

Next, consider the effect of progressively lowering L_s, so that the equilibrium wage would rise more steeply in respond to increases in demand for Southern labor. Indeed, we find that the competition effect is dampened and eventually can be overturned; in particular, we find that L_s needs to be lowered into the vicinity of $L_s = 0.6$, where we obtain:

- a larger proportional increase in the wage, $\frac{d}{d\eta} \ln \omega = 0.54$; and
- $\frac{d}{d\eta} \ln \frac{HOR(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{HOR}{TOT} = 0.86 > 0$, and $\frac{d}{d\eta} \ln \frac{PLA(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{PLA}{TOT} = \frac{d}{d\eta} \ln \frac{RET(a)}{TOT(a)} = \frac{d}{d\eta} \ln \frac{RET}{TOT} = -0.81 < 0$.

B.5 Model Extension: Multiple host countries

In this Appendix, we show how our model can be extended to speak to a comparison across multiple host countries with different levels of financial development. The effects that we have highlighted, particularly the competition effect, are thus relevant for understanding the cross-sectional variation in multinational activity as well.

It should be clear that the number of combinatorial possibilities for a given firm's export-versus-FDI decision increase considerably when there is more than one possible host country. The approach we take seeks to be as parsimonious as possible for the sake of tractability. We consider a setup that is identical to our baseline model from Section A.1, except that there are now two Southern countries that can host multinationals that emerge from West/East. We refer to the Southern countries as '$s1$' and '$s2$', these being the subscripts that we use to index the two countries. Both Southern countries are identical in all respects except their level of financial development. In particular, the nominal wage is $\omega < 1$ in both $s1$ and $s2$, and this is pinned down by the marginal product of labor in the homogeneous goods sector in each country. Each Southern country also has a differentiated varieties industry, with firms that are heterogeneous in their productivity levels. The structure of this industry in both countries is identical to that for South in Section A.1.2, except that the level of financial development in $s1$ is higher than that in $s2$. In other words, we assume that $0 < \eta_2 < \eta_1 < 1$ without loss of generality.

On the demand side, we maintain the baseline assumption that consumers in West/East only desire differentiated varieties from the Western and Eastern industries (as well as the homogeneous good). The utility function for consumers from $n = w, e$ is thus given once again by:

$$U_n = y_n^{1-\mu} \left(\sum_{j\in\{e,w\}} \int_{\Omega_{nj}} x_{nj}(a)^{\alpha}\ dG_j(a) \right)^{\frac{\mu}{\alpha}}, \tag{B.84}$$

where $0 < \alpha, \mu < 1$. On the other hand, consumers in each Southern country derive utility from Western/Eastern varieties, as well as from the varieties of their respective domestic industries; for simplicity, they do not consume the varieties made by the other Southern country. In other words, utility in each si, where $i = 1, 2$, is given by:

$$U_{si} = y_{si}^{1-\mu} \left(\sum_{j\in\{e,w,si\}} \int_{\Omega_{si,j}} x_{si,j}(a)^{\alpha}\ dG_j(a) \right)^{\frac{\mu}{\alpha}}. \tag{B.85}$$

Solving the standard utility maximization problem then implies the following expressions for the aggregate market demand levels:

$$A_{ww} = A_{ee} = A_{ew} = A_{we} = \frac{\mu L_n}{P_{ww}^{1-\varepsilon} + P_{we}^{1-\varepsilon}}, \quad \text{and} \tag{B.86}$$

$$A_{si,w} = A_{si,e} = A_{si,si} = \frac{\mu\omega L_s}{P_{si,si}^{1-\varepsilon} + 2P_{si,w}^{1-\varepsilon}}. \tag{B.87}$$

Note that $A_{si,si}$ is now the demand level in country si for its domestic differentiated varieties, while $A_{si,w}$ and $A_{si,e}$ are the corresponding demand levels for the varieties from West and East respectively. From (B.87), these are functions in particular of the ideal price indices for country-si varieties consumed domestically, $P_{si,si}$, and for Western/Eastern varieties consumed in si, $P_{si,w}$.

We examine first the equilibria in the two Southern differentiated varieties industries. Following the industry structure from our baseline model, the productivity cutoff for domestic entry in each Southern country, which we denote by $a_{Si}^{1-\varepsilon}$ for $i = 1, 2$, is given by:

$$a_{Si}^{1-\varepsilon} = \frac{1}{\eta_i} \frac{Rf_S\omega}{(1-\alpha)A_{si,si}(\omega/\alpha)^{1-\varepsilon}}. \tag{B.88}$$

Analogously, we can write down the free entry condition in each country si ($i = 1, 2$) as:

$$f_{Es}\omega = \frac{1}{\delta}\left[(1-\alpha)A_{si,si}\left(\frac{\omega}{\alpha}\right)^{1-\varepsilon} V_s(a_{S,i}) - Rf_S\omega G_s(a_{S,i})\right]. \tag{B.89}$$

Inspecting (B.88) and (B.89), it follows as a quick corollary of Lemma 1 that when $\eta_1 > \eta_2$, we must have $A_{s1,s1} < A_{s2,s2}$. This is intuitive since *ceteris paribus*, the country with the higher level of financial development would facilitate more entry by local firms, so that the aggregate demand level faced by each firm would be lower. From (B.87), we thus have: $A_{s1,w} < A_{s2,w}$.

We turn next to the differentiated varieties sector in West/East. In keeping with the spirit of our baseline model, we focus on situations in which if a firm from West (likewise East) decides to undertake FDI in either one of the Southern countries, then that Southern facility will be used as the global production center for that firm from which all four markets will be serviced, including the other Southern country. (In particular, we assume that the fixed cost of FDI, f_I, is sufficiently large so that the multinational will never seek to establish more than one foreign affiliate.)

For ease of exposition, we adopt the perspective of a firm headquartered in West; the situation for a firm from East is entirely symmetric. Suppose that this firm has productivity $1/a$. If this Western firm undertakes

FDI in host country si, where $i \in \{1,2\}$, then the horizontal, platform and return sales of its affiliate in si are given explicitly by:

$$HOR_{si}(a) = A_{si,w}\,(a\omega/\alpha)^{1-\varepsilon}\,, \quad \text{(B.90)}$$
$$PLA_{si}(a) = (A_{e,w} + A_{sj,w})\,(\tau a\omega/\alpha)^{1-\varepsilon}\,, \quad \text{and} \quad \text{(B.91)}$$
$$RET_{si}(a) = A_{w,w}\,(\tau a\omega/\alpha)^{1-\varepsilon}\,, \quad \text{(B.92)}$$

where $j \in \{1,2\}$ and $j \neq i$. (In other words, we use the subscript 'sj' to refer to variables relevant to the Southern country where the firm does not undertake FDI.) From (B.97)-(B.99), the corresponding destination-specific shares out of total sales are therefore:

$$\frac{HOR_{si}(a)}{TOT_{si}(a)} = \left(1 + \frac{\tau^{1-\varepsilon}(A_{ww} + A_{e,w} + A_{sj,w})}{A_{si,w}}\right)^{-1}, \quad \text{(B.93)}$$
$$\frac{PLA_{si}(a)}{TOT_{si}(a)} = \left(1 + \frac{A_{si,w} + \tau^{1-\varepsilon}A_{w,w}}{\tau^{1-\varepsilon}(A_{e,w} + A_{sj,w})}\right)^{-1}, \quad \text{and} \quad \text{(B.94)}$$
$$\frac{RET_{si}(a)}{TOT_{si}(a)} = \left(1 + \frac{A_{si,w} + \tau^{1-\varepsilon}(A_{e,w} + A_{sj,w})}{\tau^{1-\varepsilon}A_{w,w}}\right)^{-1}. \quad \text{(B.95)}$$

(Note that: $TOT_{si}(a) = HOR_{si}(a) + PLA_{si}(a) + RET_{si}(a)$.) Observe that these sales shares are identical across all firms, as they do not depend on a. Hence, the expressions in (B.93)-(B.95) are also equal to the horizontal, platform and return sales shares aggregating across all multinational affiliates from West that are present in country si.

We now make use of the fact that $A_{s1,w} < A_{s2,w}$ when $\eta_1 > \eta_2$. Also, bear in mind that each firm from West takes the aggregate demand levels, $A_{w,w}$, $A_{e,w}$, $A_{s1,w}$ and $A_{s2,w}$, as given. In particular, these demand levels are unaffected by the decision of the firm to undertake FDI in either $s1$ or $s2$. Applying some straightforward algebra on (B.93)-(B.95), it immediately follows that: $\frac{HOR_{s1}(a)}{TOT_{s1}(a)} < \frac{HOR_{s2}(a)}{TOT_{s2}(a)}$, $\frac{RET_{s1}(a)}{TOT_{s1}(a)} > \frac{RET_{s2}(a)}{TOT_{s2}(a)}$ and $\frac{PLA_{s1}(a)}{TOT_{s1}(a)} > \frac{PLA_{s2}(a)}{TOT_{s2}(a)}$. In words, we recover the essence of the competition effect in a cross-country comparison across host countries. Where financial development is higher, the local market is a more competitive environment, so that the share of horizontal sales is lower, while the return and platform sales shares are higher. With this multiple host country setup, the implications of host-country financial development for the sales shares of MNC affiliates thus continue to hold in the cross-section. (Incidentally, in this extension, we also break the symmetry in the magnitudes of the return and platform sales shares, since platform sales would also include sales to the other Southern country.)

We now turn to the task of comparing affiliate and aggregate sales levels across the different host countries. As mentioned in Section A.4.4, this requires that we introduce more structure to the model: For the affiliate-level comparison to be one that "holds all else constant", the model should allow for different multinationals with the same productivity level $1/a$ to potentially choose to locate in either $s1$ or $s2$. There are various modeling strategies for achieving this, and we present one such possibility here based on allowing for idiosyncratic realizations of profit shocks from locating in each respective host country.

Consider first an initial setting in which MNCs do not require host-country financing. Western firms that are contemplating FDI now face both a systematic and a stochastic component to the profits they will earn from locating in either host country. The systematic component is known in advance, and is equal to their sales less variable and fixed costs from basing production in the host country in question. However, there is now an additive stochastic component to these profits, denoted by ν_{s1} and ν_{s2} in the respective host countries; one can view these as firm-specific idiosyncratic costs that are ex-ante uncertain, the precise values of which are only revealed after the firm has made a decision to pursue FDI. To be clear on the timing of events, a Western firm first obtains its productivity draw $1/a$, on the basis of which it makes an irreversible decision whether or not to become a multinational. If it should choose to pursue FDI, it then observes the stochastic draws of ν_{s1} and ν_{s2}, from which it decides which of $s1$ or $s2$ to locate its affiliate in. Firms that choose not to engage in FDI can either exit, remain purely domestic, or service the foreign markets through exporting, although for the purposes of this extension, the details of these options are less important.[19]

For a firm that chooses FDI, the realized profits from locating its production affiliate in $s1$ and $s2$ are given respectively by:

$$\begin{aligned}\pi_{I,s1}(a) &= (1-\alpha)\left(A_{s1,w}+\tau^{1-\varepsilon}(A_{w,w}+A_{e,w}+A_{s2,w})\right)\left(\frac{a\omega}{\alpha}\right)^{1-\varepsilon}-Rf_I+\nu_{s1}\\ \pi_{I,s2}(a) &= (1-\alpha)\left(A_{s2,w}+\tau^{1-\varepsilon}(A_{w,w}+A_{e,w}+A_{s1,w})\right)\left(\frac{a\omega}{\alpha}\right)^{1-\varepsilon}-Rf_I+\nu_{s2}.\end{aligned}$$

In the above, we specify ν_{s1} and ν_{s2} to be iid shocks drawn from a standard Gumbel distribution. Using the well known properties of the extreme-value distribution, some simple algebra leads to the following expression for the probability, p_{s1}, that $\pi_{I,s1}(a) > \pi_{I,s2}(a)$ and hence that $s1$ will be chosen as the host country:

$$p_{s1} = \frac{\exp\{(1-\alpha)\left(A_{s1,w}+\tau^{1-\varepsilon}A_{s2,w}\right)(a\omega/\alpha)^{1-\varepsilon}\}}{\exp\{(1-\alpha)\left(A_{s1,w}+\tau^{1-\varepsilon}A_{s2,w}\right)(a\omega/\alpha)^{1-\varepsilon}\}+\exp\{(1-\alpha)\left(A_{s2,w}+\tau^{1-\varepsilon}A_{s1,w}\right)(a\omega/\alpha)^{1-\varepsilon}\}}. \qquad \text{(B.96)}$$

Since $A_{s1,w} < A_{s2,w}$, we can deduce that $A_{s1,w}+\tau^{1-\varepsilon}A_{s2,w} < A_{s2,w}+\tau^{1-\varepsilon}A_{s1,w}$, and hence that $p_{s1} < 1-p_{s1}$. There is thus a larger probability that the profits from locating in $s2$ will exceed the profits from locating in $s1$, since $s1$ features a more competitive goods market by virtue of its higher level of financial development. By the law of large numbers, a fraction p_{s1} (respectively, $p_{s2} \equiv 1-p_{s1}$) of Western firms with productivity $1/a$ will choose $s1$ (respectively, $s2$) as their host country. In turn, a Western firm with productivity $1/a$ will choose to become a multinational if it finds that its expected profits from undertaking FDI, given by $E[\max\{\pi_{I,s1}(a), \pi_{I,s2}(a)\}]$, exceed that from instead retaining production at home and exporting from there to all the other foreign markets. Note that the preceding expectation will have to be evaluated over the distribution of the iid profit shocks, ν_{s1} and ν_{s2}. We do not work out this expectation explicitly, as it suffices for our purposes that this will yield a unique cutoff value which we call $a_{I,twoS}$.[20] In other words, the most productive Western firms, with a productivity draw $1/a > 1/a_{I,twoS}$, will then venture into FDI, and will decide on either $s1$ or $s2$ for their host country after observing their realizations of ν_{s1} and ν_{s2}.

We now compare the sales levels of two distinct affiliates with the same productivity $1/a$ that are nevertheless located in different host countries. From equations (B.90)-(B.92), and the fact that $A_{s1,w} < A_{s2,w}$, it follows immediately that: $HOR_{s1}(a) < HOR_{s2}(a)$, $PLA_{s1}(a) > PLA_{s2}(a)$ and $RET_{s1}(a) = RET_{s2}(a)$. At the affiliate level, we therefore recover the implication that the horizontal sales level will be lower and the platform sales level higher in the host country where financial conditions are better. (Admittedly, the mapping of predictions into the cross-section is not perfect, as we now have that the level of return sales to West would be identical for the affiliates in the two host countries.)

The extra structure of the distributional assumption on the ν_{si}'s further allows us to compare the sales levels aggregated across multinational affiliates in the two host countries. Based on our discussion above, the measure of affiliates in country si $(i = 1, 2)$ is given precisely by: $p_{si}N_nG_n(a_{I,twoS})$. We can also write down

[19] The irreversibility of the FDI decision could be justified if there were a component of ν_{s1} and ν_{s2} that needs to be incurred as a cost when these stochastic shocks are first observed. For example, one could think of the ν_{si}'s as a learning cost to discover one's true profitability in each host country, and that a part of these costs becomes sunk once the realizations of ν_{s1} and ν_{s2} are learnt.

[20] To be fully precise, $a_{I,twoS}$ will be pinned down in conjunction with a free-entry condition for West.

the aggregate levels of horizontal, platform and return sales in each si as:

$$HOR_{si} = p_{si} A_{si,w} (\omega/\alpha)^{1-\varepsilon} V_n(a_{I,twoS}), \quad (B.97)$$

$$PLA_{si} = p_{si}(A_{e,w} + A_{sj,w}) (\tau\omega/\alpha)^{1-\varepsilon} V_n(a_{I,twoS}), \quad \text{and} \quad (B.98)$$

$$RET_{si} = p_{si} A_{w,w} (\tau\omega/\alpha)^{1-\varepsilon} V_n(a_{I,twoS}), \quad (B.99)$$

Since $p_{s1} < p_{s2}$, we immediately have that the measure of affiliates is lower in the more financially-developed host, $s1$. Moreover, from (B.92), it is clear that $RET_{s1} < RET_{s2}$. Next, using the additional fact that $A_{s1,w} < A_{s2,w}$, we have from (B.90) that $HOR_{s1} < HOR_{s2}$. Finally, to compare PLA_{s1} and PLA_{s2}, observe from (B.96) that:

$$\frac{p_{s1}}{p_{s2}} = \frac{\exp\{(1-\alpha)\left(A_{s1,w} + \tau^{1-\varepsilon}A_{s2,w}\right)(a\omega/\alpha)^{1-\varepsilon}\}}{\exp\{(1-\alpha)\left(A_{s2,w} + \tau^{1-\varepsilon}A_{s1,w}\right)(a\omega/\alpha)^{1-\varepsilon}\}} = \frac{\exp\{(1-\alpha)A_{s1,w}(1-\tau^{1-\varepsilon})(a\omega/\alpha)^{1-\varepsilon}\}}{\exp\{(1-\alpha)A_{s2,w}(1-\tau^{1-\varepsilon})(a\omega/\alpha)^{1-\varepsilon}\}} < \frac{A_{s1,w}}{A_{s2,w}},$$

where the last inequality comes from applying the fact that: (i) $\exp\{x\}/x$ is an increasing function in x for all $x > 1$; and (ii) $A_{s1,w} < A_{s2,w}$. (Note that we need to ensure through a suitable normalization that $(1-\alpha)\left(A_{s1,w} + \tau^{1-\varepsilon}A_{s2,w}\right)(a\omega/\alpha)^{1-\varepsilon}$ and $(1-\alpha)\left(A_{s2,w} + \tau^{1-\varepsilon}A_{s1,w}\right)(a\omega/\alpha)^{1-\varepsilon}$ both exceed 1, so that property (i) can be applied. This can be achieved by assuming that the labor endowment in each host country is sufficiently big.) From the above, we have that: $p_{s1}A_{s2,w} < p_{s2}A_{s1,w}$, which together with (B.91) implies that $PLA_{s1} < PLA_{s2}$. In sum, we find that comparing the two FDI hosts, the country with the higher level of financial development features fewer affiliates and lower aggregate sales levels; this provides the analogue to part (iii) of Proposition 1.

Last but not least, we briefly discuss the case where multinationals require host country financing. Observe that the expressions for the sales shares in (B.93)-(B.95) and for the sales levels of individual affiliates in (B.90)-(B.92) remain valid even when MNCs seek local financing, as long as the affiliates being compared are both able to secure this financing from the respective host country institutions. The same arguments as above can then be applied to show that $s1$ will still be a more competitive market environment than $s2$, so that $A_{s1,w} < A_{s2,w}$. One can then quickly see that the following comparisons still hold: $\frac{HOR_{s1}(a)}{TOT_{s1}(a)} < \frac{HOR_{s2}(a)}{TOT_{s2}(a)}$, $\frac{RET_{s1}(a)}{TOT_{s1}(a)} > \frac{RET_{s2}(a)}{TOT_{s2}(a)}$, $\frac{PLA_{s1}(a)}{TOT_{s1}(a)} > \frac{PLA_{s2}(a)}{TOT_{s2}(a)}$ and $HOR_{s1}(a) < HOR_{s2}(a)$. These cross-sectional implications are consistent with parts (i) and (ii) of Proposition 2.

With host-country financing, the analysis for aggregate measures of multinational activity is in general more complicated in terms of the cases that would need to be enumerated. For example, it is possible that some prospective multinationals would be productive enough to receive funding in country $s1$, but not in $s2$. However, a clear comparison can nevertheless be made in the limiting case where $\eta_2 \longrightarrow 0$. In this situation, the cost of default would approach zero in $s2$. In the limit, there would therefore be no affiliates in $s2$, although there would be a positive measure in $s1$. The number of multinational affiliates, as well as the aggregate levels of horizontal, platform and return sales, would clearly be higher in the more financially-developed host country $s1$ than in $s2$. In sum, when host-country financing is required, the qualitative prediction that the aggregate level of multinational activity would be higher in $s1$ is preserved when financial development in $s2$ is sufficiently low.