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ABSTRACT

Import Competition and Exit in Business Services Sectors*

Business services firms are increasingly under pressure from foreign competition. We develop an oligopolistic competition model that studies the effect of trade liberalization on exit and sectoral restructuring in the business services sector. We assume that firms are heterogeneous in their marginal costs, allowing the model to predict domestic M&A and exit by closedown, as well as foreign M&A. The model is brought to detailed French firm-level data on exit and M&A in the business services sector. The empirical analysis confirms that due to greater import penetration, French service firms exit by closedown and by M&A. Contrary to previous findings for manufacturing, we show that imports from high-income countries cause the majority of this exit, helping to inform the ongoing debate regarding the dangers of services trade liberalization.

JEL Classification: F1, L1 and L8

Keywords: services trade, exit, import competition, oligopoly, firm-level data

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1 Introduction

Due to vastly decreased communication costs and advanced technologies, the threat to domestic firms and workers from foreign competition is no longer restricted to the manufacturing sector. Amiti and Wei [2004] document that imports of computer and information plus other business services rose in the US from 0.1 percent of GDP in 1983 to 0.4 percent in 2003, and from 0.9 percent to 1.2 percent in the UK. Despite the 2003 figures still representing relatively small shares of overall economic activity, the specter of services outsourcing haunts workers across the developed world. The popular fear of services imports seems for the moment to resemble something of a fear of the unknown. As Rajan and Wei [2004] put it: “The difficulty of controlling the spread of outsourcing, and the worry it could expand dramatically, contribute to the fears of white collar workers”.

The focus of this paper is on the adjustment that services firms face due to greater import penetration. We study the business services sectors because they constitute the largest share of world services trade and these services can be supplied remotely from the source country (Hoekman [2006]). The empirical literature on the impact of import competition on domestic firms has exclusively dealt with manufacturing industries up to now. The literature has found significant evidence of intra-industry adjustment to trade liberalization, often through firm exit.¹ Yet, little is known about the effect of greater import penetration in services sectors.

The trade literature has long recognized the potential benefit from services trade liberalization.² As stated by Hoekman [2006] “*there is increasing evidence that services liberalization (...) may be an important determinant of trade volumes, the distributional effects of trade, and economy-wide growth*”.³ However, any statement on the potential gains from services trade liberal-

¹ There is a large literature on the US-Canada Free Trade Agreement which finds exit due to tariff cuts (see Gu et al. [2003], Head and Ries [1999], Baggs [2005] for evidence of exit by closedown, and Breinlich [2008] for evidence of M&A). Bernard et al. [2006b] find that in the US, tariff cuts lead to the exit of less productive firms, as do Bernard et al. [2003]. On the contrary, Pavcnik [2002] finds no evidence that in Chile, import-competing sectors experienced more exit than export-oriented sectors after trade liberalization. Papers estimating the impact of import penetration, rather than tariff cuts, on survival of manufacturing firms, include Greenaway et al. [2008] Bernard et al. [2006a] and Raff and Wagner [2009]. All papers find that import penetration leads to increased firm exit.

² Francois [1990] shows how services help to coordinate activities in order to aid realization of scale economies; Arnold et al. [2006] show that services liberalization increases Czech manufacturing firms’ performance; Arnold et al. [2008] similarly find that access to services increases African firms’ productivity; Debaere et al. [2010] show that increased service availability increases firms’ ability to source inputs internationally.

³ Hoekman [2006], p.1.

ization should be informed by recent heterogeneous firm trade models that suggest that trade liberalization does not benefit all firms. Guided by these insights from manufacturing studies, this paper provides the first evidence on the impact of import penetration on the exit of business services firms.

We pursue a partial equilibrium two-country model that follows Neary [2007]. His model assumes Cournot competition and allows for strategic interaction between symmetric firms, explaining cross-border M&A activity. Neary's model is constructed to investigate the impact of trade liberalization on sectoral restructuring. We depart from Neary [2007] by assuming that firms are heterogeneous with respect to their marginal costs. Trade liberalization in our model does not only generate cross-border M&A but also domestic M&A and exit by closedown of the least efficient firms. As in Raff and Wagner [2009], the policy variable of our model is import penetration. It affects the cut-off level of marginal costs that separates firms that will closedown from firms that will produce.

We estimate the predictions of the model using detailed firm-level data on French business services sectors from 1999 to 2004. We identify two exit modes: closedown and M&A. Contrary to the existing literature, we do not infer firms' closedown from the data. Rather, we use data on legal exit. The data are taken from BODACC, a daily French official bulletin that has legal information on firm receivership and bankruptcy.⁴ We use the date of the judicial decision to identify firm's closure. We retrieve information on M&A from the EAE and LIFI databases.⁵ The EAE database has information on the balance sheet and income statement of all firms located in France with more than 20 employees. The LIFI database has information on the ownership structure of French firms. We use it to identify the year of domestic and foreign takeovers.

From our analysis of French data we find that import penetration increases the likelihood of exit by closedown and buy-out through M&A. Concerning the type of M&A, we find that import penetration triggers much more foreign M&A than domestic M&A. The behavior of firms is also affected by the geographical origin of import competition. Contrary to the findings of the manufacturing literature, we find a higher probability of exit through M&A due to greater import penetration from OECD countries. This indicates that fears regarding low-wage competition from Asian countries may be misplaced in the French context.

The rest of the paper is structured as follows. In Section 2 we provide theoretical expectations for why import competition in services leads to firm exit and M&A activity, Section 3 describes the data and presents descriptive statistics,

⁴ BODACC: Bulletin Officiel des Annonces Civiles et Commerciales.

⁵ EAE: Enquête Annuelle d'Entreprises. LIFI: Enquête sur les liaisons financières entre sociétés.

Section 4 presents results of econometric analysis, while Section 5 concludes.

2 Theoretical Framework

We introduce a model that shows how trade liberalization can induce exit by both closedown and M&A. Our model builds on the oligopolistic competition model of Neary [2007]. His model generates cross-border M&A as a result of trade liberalization. We follow the first part of Neary’s analysis by developing a partial equilibrium model. We assume Cournot competition in homogeneous products with an exogenous number of firms. We depart however from Neary’s model by assuming that firms have asymmetric marginal costs. In our model, trade liberalization induces exit by closedown cross-border and domestic M&A. The proofs of all propositions are in the appendix.

2.1 Autarky

In what follows, we briefly describe the autarky equilibrium characterizing the market in two separated economies, Home and Foreign. In autarky, the equilibrium number of firms is n at home and n^* in the foreign country. We denote the total number of firms in the integrated economy, $\bar{n} = n + n^*$.⁶

Firms face barriers to entry that are exogenous and engage in strategic interaction.⁷ With n firms, the Cournot-Nash autarky equilibrium of a particular firm i is defined as follows:

$$y_i^{CN} = \frac{a - nc_i + \sum_{j \neq i} c_j}{n + 1} \quad (1)$$

$$p^{CN} = \frac{a + \sum_i c_i}{n + 1} \quad (2)$$

which yields an equilibrium profit of $\pi_i^{CN} = \left(\frac{a - nc_i + \sum_{j \neq i} c_j}{n + 1} \right)^2$. As in Neary [2007], the profit is proportional to the square of output since we abstract from fixed costs. Thus a positive level of profits is equivalent to a positive level of output. Assuming asymmetric marginal costs, the most efficient firm produces

⁶ Variables referring to the foreign country are denoted by an asterisk, and variables referring to the world as a whole are denoted by an overbar.

⁷ There may be technological or “knowledge” barriers to entry. The threat of cut-throat competition by incumbent firms can hold other firms out of the industry.

the largest quantity and has the largest profit. Since profits are proportional to output, we use equation (2) to establish the condition for producing a positive amount of output in autarky. The condition is expressed in equation (3):

$$c_i \leq \frac{a + \sum_{j \neq i} c_j}{n} \quad (3)$$

The above equation establishes that if the marginal cost of firm i is lower or equal to $(a + \sum_{j \neq i} c_j) / n$, then it survives and produces a positive amount of output. This condition can also be interpreted as an *exit by closedown* condition in autarky. Whenever firm i has a marginal cost that is greater than the threshold level of equation (3) it exits the market by closedown.

In autarky, n and n^* are the equilibrium number of firms if and only if there is no incentive to merge. Firms will not merge provided that the number of competing firms is sufficiently large and the level of heterogeneity in their marginal costs sufficiently small. We provide the condition for this to hold in Appendix B.

2.2 Trade liberalization, exit by closedown and M&A

We now consider the impact of trade liberalization between Home and Foreign. Following trade liberalization, firms engage in Cournot competition on an integrated world market. In each country, the market structure is characterized by oligopolistic competition between heterogeneous firms. We assume the distribution of the marginal costs to be such that:

$$\begin{aligned} c &\in (0, c_n] \\ c^* &\in (0, c_n^*] \end{aligned}$$

where c and c^* represent the range of marginal costs at home and abroad, respectively. The trade equilibrium is one where some foreign firms have an incentive to take over the least efficient home firms (foreign M&A) and where the more efficient domestic firms take over other domestic firms (domestic M&A). To obtain this particular outcome, the ranking of marginal costs should be such that the most productive firm exists only in the foreign country.⁸

⁸ More precisely, these rankings will also determine the order of the restructuring activities (foreign and domestic M&As) that occur in the domestic country. This ordering allows us to be consistent with the assumption that the interval of domestic marginal cost is sufficiently tight. This assumption is needed for the “no M&A in autarky” condition in Appendix B to hold.

We begin by describing the determination of the Cournot-Nash equilibrium in a single international oligopolistic industry. We assume that there are no transport costs or other trade barriers. The equilibrium output and price of home firm i is the following:

$$y_i(n, n^*) = \frac{a - c_i(n + n^*) + \sum_{j \neq i} c_j + \sum_i c_i^*}{n + n^* + 1} \quad (4)$$

$$p(n, n^*) = \frac{a + \sum_i c_i + \sum_i c_i^*}{n + n^* + 1} \quad (5)$$

Equation (4) shows that the quantity produced by firm i in the home country is decreasing in its own marginal cost, but it is increasing in other domestic or foreign firms' marginal costs. We see from equation 5 that the equilibrium price decreases with trade liberalization. Rearranging equation (4), we can establish the condition so that firm i decides to produce a positive amount of the good, which is:

$$c_i \leq \frac{a + \sum_{j \neq i} c_j + \sum_i c_i^*}{n + n^*} \quad (6)$$

Equation (6) shows that domestic profitability requires that the unit costs of firm i do not exceed a weighted average of the demand intercept and the average cost of domestic and foreign firms. This weight is decreasing in the total number of firms in this integrated economy.

From equations (6) and (3), we can now compare the cut-off marginal cost after trade liberalization and in autarky. We formally state in Appendix C that the cut-off marginal cost after trade liberalization is smaller than the one in autarky. Trade liberalization leads to the exit by closedown.

Proposition 1. *More firms exit the market by closedown under trade liberalization than under autarky.*

This proposition holds since we assume that the marginal cost of the least efficient domestic firm is higher than the average marginal costs in the foreign country.

2.2.1 Mergers and Acquisitions

We extend the model to show how trade liberalization can also lead to foreign and domestic merger waves. Our next proposition entails two parts. One con-

siders the impact of trade liberalization on foreign M&A and the other deals with the impact of trade liberalization on domestic M&A.

Considering foreign M&A, we decide to impose the same structure on how firms opt to merge as in Neary [2007]. We assume that (i) only bilateral mergers can occur and that (ii) a merger must yield a surplus which is sufficient to compensate both participating firms.⁹

As in Neary [2007], cross-border M&As rely on the cost differences between firms located in the two countries. Our contribution is to allow for cost differences not only across countries but also within each country. It turns out that these differences generate an incentive for foreign as well as domestic bilateral mergers. Both types of mergers are profitable only if a low-cost firm acquires a high-cost one. Consider the incentive for a takeover of a home firm by a foreign firm. The gain from cross-border merger is given by the increase in the operating profits for the foreign firm, less the cost of acquiring the home firm:

$$G_{FH}(n, n^*) = y^*(n-1, n^*)^2 - y^*(n, n^*)^2 - y(n, n^*)^2 \quad (7)$$

where we use the fact that in Cournot oligopoly profits are proportional to the square of output.¹⁰

Using Lemma 1 from Appendix A and rewriting equation (7), we highlight in Appendix D the condition for foreign M&A to be profitable. The marginal cost of the acquired home firm has to be sufficiently high for G_{FH} to be strictly positive.

Proposition 2.1. (Foreign M&A) *Trade liberalization makes a foreign takeover of a domestic firm profitable, $G_{FH} > 0$.*

The myopic merger criterion G_{FH} is strictly positive provided that the unit cost of the acquired firm, c_i , exceeds a weighted average of the demand intercept and the cost of other firms. The proof of proposition 2.1 is in Appendix D.

Turning to domestic M&A, we allow for the same structure as above, namely M&A takes place if it yields positive net gains. Contrary to Neary [2007] we assume that firms have asymmetric costs. These cost differences generate an incentive for a takeover of a home firm by another home firm. Using subscripts

⁹ As in Neary [2007] a necessary condition for a merger is a strictly positive gain for the acquiring firm and the absence of forward-looking behavior. This latter fact makes the merger decision optimal ex-post: no individual firm may opt to engage in a takeover if it believes that another firm will do so first. For the purpose of this paper we will skip the consideration of forward-looking behavior.

¹⁰ The cost of acquiring the Home firm is assumed to be equal to the initial domestic firm profits.

“1” and “2” to denote the acquiring and the acquired firms respectively, we can establish the gain from domestic merger:

$$G_{12}^H(n, n^*) = y_1(n-1, n^*)^2 - y_1(n, n^*)^2 - y_2(n, n^*)^2 \quad (8)$$

as before it is given by the increase in the operating profits for the firm “1”, less the cost of acquiring the home firm “2”.

Proposition 2.2. (Domestic M&A) *Trade liberalization makes a domestic takeover of a domestic firm profitable, $G_{12}^H > 0$.*

The myopic merger criterion G_{12}^H is strictly positive provided that the unit cost of the acquired firm, c_2 , exceeds a weighted average of the demand intercept and the cost of other firms. We provide the proof of Proposition 2.2 in Appendix E.

3 Data and Empirical Model

The theoretical framework suggests that firms will exit the market due to trade liberalization. In the econometric analysis, we will study the impact of trade liberalization on exit choice using detailed firm-level data for the French business services sector.

3.1 Econometric specification

We aim to empirically estimate the propositions derived in Section 2. Our empirical analysis is modeled as a multinomial logit strategy which is structured as in equation (9):

$$Pr(Dep_{it} = j) = \frac{e^{\beta_j' x_{it}}}{1 + \sum_{k=1}^3 e^{\beta_k' x_{it}}} \quad (9)$$

The base category, $Dep_{it} = 0$, consists of firms that do not exit the market. We code $Dep_{it} = 1$ when the firm exits by closedown at time t and $Dep_{it} = 2$ when the firm is acquired at time t by a domestic firm and $Dep_{it} = 3$ when it is acquired by a foreign firm. x_{it} is a vector of firm and sector characteristics and time, 3-digit sector and regional dummies. The sector and regional dummy

variables account for unobserved sectoral and spatial characteristics such as local competition and unobserved sector concentration. All specifications use clustered standard errors at 4-digit sector level since sector specific variables are repeated over firms' exit strategies (Angrist and Pischke [2008]).

3.2 Identifying the Exit Modes

Our dependent variable is the exit decision of a firm in the business services sectors. Our empirical model considers two main exit modes: closedown and (domestic and foreign) M&A. The existing literature has inferred firm's closedown from panel data using the information on attrition. Rather, we use data on legal exit. The data are taken from BODACC, a daily French official bulletin that has legal information on firm receivership and bankruptcy.¹¹ We use the date of the judicial decision to identify firm's closure. In Appendix F, we show that the yearly closure rate is about four to seven times higher when it is predicted from the data than when it is taken from legal exit data. We are confident that our data more accurately capture the closure decision.

We retrieve information on M&A from the EAE and LIFI databases.¹² The EAE database has information on the balance sheet and income statement of all firms located in France with more than 20 employees. In particular, it has firm-level information on firm's size (turnover), intangible assets as well as the 4-digit *NAF700* sector classification.¹³ The LIFI database has information on the ownership structure of French firms. We use it to identify the year of domestic and foreign takeovers. We define two types of M&A. A firm is subject to a M&A if its group owner identifier changes from $t - 1$ to t . A firm is subject to a domestic M&A if its group owner identifier changes from $t - 1$ to t , and if the group owner in t is of French nationality. By the same logic, we define a firm as having undergone a foreign M&A if the group owner in t is foreign, while the group owner in $t - 1$ is French.

Table 1 reports the number and percentage of exits, domestic and foreign M&As. Overall, exit accounts for around 3.9% of the total number of firms in the sample. The least common form of exit is foreign M&A at 0.7% of the total number of firms. There are twice as many closedowns as foreign M&A while there are about three times as many exits by domestic M&A as foreign M&A.

¹¹ BODACC: *Bulletin Officiel des Annonces Civiles et Commerciales*.

¹² EAE: *Enquête Annuelle d'Entreprises*. LIFI: *Enquête sur les liaisons financières entre sociétés*.

¹³ *Nomenclature d'Activité française*: nomenclature of French activities.

Table 1
Number of closedowns, domestic and foreign M&As and firms per year (share of total in parentheses)

Year	Closedowns	Domestic M&A	Foreign M&A	Sample size
2000	241 (0.8)	470 (1.5)	141 (0.5)	30669
2001	188 (1.0)	493 (2.7)	194 (1.1)	18116
2002	309 (1.2)	670 (2.5)	204 (0.8)	26754
2003	178 (1.1)	374 (2.3)	110 (0.7)	16171
2004	245 (1.0)	544 (2.1)	157 (0.6)	25626
Total	1161 (1.0)	2551 (2.2)	806 (0.7)	117336

3.3 Main Explanatory Variables

The model allows the derivation of the comparative static effects of greater import competition. We approximate trade liberalization by import penetration. It is reasonable to consider the import penetration ratio as a measure of import liberalization in the context of services trade because it probably better captures the effect of both tariff and non-tariff barriers and varies over time. We follow Greenaway et al. [2008] and define the import penetration ratio as in expression (10):

$$IC_{it} = \ln \left(\frac{IM_{it}}{PROD_{it} + IM_{it} - EX_{it}} \right) \quad (10)$$

where IM is the level of business services imports, EX is the level of business services exports and $PROD$ is the level of production, or total turnover, in sector i . The import penetration variable is computed at 4-digit level. We use data on services imports from the balance of payment statistics of the “Banque de France”. The data provide a detailed geographical breakdown of French firms’ imports of services by sector. We choose to focus on business services sectors because they are among the most dynamic sectors in France in terms of employment and trade, and are the sectors where barriers to cross-border trade have been most alleviated in recent decades.¹⁴

The denominator in expression (10) is referred to as “*absorbtion*” in sector i , i.e. the total level of consumption in France in this sector. In further analysis, we break down the import competition variable according to whether the imports are of OECD or non-OECD origin. The level of imports from each geographical source replaces IM_{it} in the numerator of expression (10).

¹⁴They include postal services apart from the services provided by *La Poste*, telecommunications, radio and television transmissions, software and IT, data treatment and processing, insurance auxiliaries, market research, management and consultancy, architecture services, engineering, technical analysis and testing, advertising, human resources, legal and accounting and photography.

The other explanatory variables are the lagged sector concentration (taken as logarithm), firm level dummies for exporters and importers, the size of the firm (log of turnover) and the log of intangible assets. Information on these variables is outlined in Appendix G. Table 2 provides the summary statistics of the variables.

Table 2
Descriptive statistics

Variable	Obs.	Mean	Std. Dev.
<i>Sector Level Variables</i>			
Import penetration (log)	117 336	0.369	1.364
Sector concentration (log)	117 336	2.999	0.479
<i>Firm Level Variables</i>			
Exporter Dummy	117 336	0.063	0.243
Importer Dummy	117 336	0.046	0.209
Size (log)	117 336	6.269	2.118
Intangible assets (log)	117 336	1.306	2.519

4 Econometric Results

4.1 Baseline

Table 3 reports the baseline empirical model. We present three specifications that includes a full set of year, sector and French “*département*” specific effects. Table 3 reports marginal effects that are estimated at sample mean. The results are robust across specifications. They consistently show that import penetration has a positive impact on exit of firms in the business services sectors. This result remains valid across all three specifications.

To aid understanding of the coefficients in Table 3, we provide some interpretations of the effects considering specification (S2) which includes the set of firm-level variables. The estimated marginal effect of the import penetration variable is positive and statistically significant. Increased import penetration raises the likelihood of exit of firms by closedown and M&A. Using the estimated marginal effects from table 3 and the mean of import penetration as in table 2, a percent increase in this variable implies an increase in the probability of exit by closedown of 0.07% ($0.0009 \times 0.369 / 0.005$).

Our results suggest that import penetration triggers both domestic and foreign M&A, but the effect is twice as large on foreign M&A. For domestic M&A, we find an elasticity of the import competition variable of about 0.06 ($0.0018 \times 0.369 / 0.011$). Concerning the effect of import penetration on foreign

Table 3
Multinomial Logit regression: baseline (marginal effects presented)

Base Category is continuing firms; 1=Closedown 2= Domestic M&A 3= Foreign M&A						
	S1			S2		
	Closedown	Domestic M&A	Foreign M&A	Closedown	Domestic M&A	Foreign M&A
<i>Sector Level Variables</i>						
Import penetration	0.0009** (2.19)	0.0030** (2.46)	0.0002*** (4.27)	0.0009** (2.27)	0.0018** (2.31)	0.0002*** (3.23)
Sector concentration (Lag)	0.0008 (0.90)	0.0075*** (3.45)	0.0003*** (2.94)	0.0009 (0.97)	0.0045** (2.29)	0.0002* (1.65)
<i>Firm Level Variables</i>						
Exporter				-0.0012 (-1.39)	-0.0029*** (-4.27)	0.0000 (0.24)
Importer				-0.0035*** (-4.82)	-0.0039*** (-3.72)	-0.0000 (-0.09)
Size				0.0001 (0.68)	0.0041*** (7.75)	0.0002*** (7.91)
Intangible assets				-0.0000 (-0.29)	0.0003 (1.43)	0.0000 (1.26)
Observations		117336			117336	
Pseudo R^2		0.0465			0.0855	
<i>Equality test on the import penetration coefficients</i>						
$IC_{Closedown} = IC_{DomM\&A}$		0.09			0.08	
$IC_{DomM\&A} = IC_{ForM\&A}$		2.79*			3.04*	
$IC_{Closedown} = IC_{ForM\&A}$		3.01*			1.12	
Standard Errors clustered at the sector level. t-statistics in parentheses. All specifications include a full set of year, sector and French “department” dummies. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Predicted probabilities of exit at sample mean in specification (S2): $y = \Pr(\text{Closedown}) = 0.005$, $y = \Pr(\text{Dom M\&A}) = 0.011$, $y = \Pr(\text{For M\&A}) = 0.0006$.						

M&A, we find an elasticity of this variable of around 0.12 ($0.0002 \times 0.369 / 0.0006$).¹⁵ As well as exiting by closedown, we have strong evidence that firms exit due to import penetration also by being subsumed into other groups through domestic or foreign M&A.

Concerning the sector concentration variable, the effect is not statistically significant on firms’ closure decision. Firms’ exit by M&A appears to be largely affected by the level of sector concentration. An interpretation of this result is that these industries are characterized by higher mark-ups and therefore higher potential M&A profitability. The elasticity is much greater in the case of foreign M&A (22.49) than in the case of domestic M&A (1.23). An intuition on this is that foreign firms might be more productive, and as such better able to exploit M&A opportunities in concentrated industries.

¹⁵ Notice that there is a statistical difference between the estimated coefficients of import penetration on domestic and foreign M&A.

Most of the firm-level variables have no impact on the probability of exit by closedown or by foreign M&A. The firm level characteristics mostly affect the probability of domestic M&A. Neither importer nor exporter status affects the probability of exit by foreign M&A. Being an exporter or an importer reduces however the probability of exit by domestic M&A. We find that importer status negatively affects the probability of exit by closedown. Being an importer lowers the probability of exit by closedown by 0.03%. This finding that trading firms are less likely to exit seems intuitive given the vast evidence on the high performance of trading firms.

Firm exit by M&A appears to be affected positively by the size of the firm. We find an elasticity of 2.33 in the case of domestic M&A and 2.09 in the case of foreign M&A. This provides support for the “cherry-picking” idea that has been found to characterize M&A activity, i.e., purchasing firms choose high-performing targets to buy out (McGuckin and Nguyen [1995]). We do not find any significant impact of firm size on the probability to exit by closedown.

We investigate these results further. It may be the case that larger firms, exporters or importers are better able to survive the competitive forces of increased import penetration. To analyze this, we run the same regression as in specification (S2) of Table 3 and we interact the firms’ characteristics and the import penetration variables. Table 4 provides the results.

Most of the interacted terms are statistically insignificant. We find however that the interactions between the size and the import penetration variables have the expected signs, but they are only significant in the case of M&A. Being a larger firm lowers the probability of exit by M&A due to import competition. This provides evidence that “cherry-picking” does not result from greater import competition. The inclusion of the interaction terms does not affect the marginal of the direct effects of the import penetration variable on the probability to exit.

4.2 The geographical origin of import penetration

We extend our analysis on the effects of import competition by dividing imports into those coming from OECD and non-OECD countries. We run the same regressions as in the baseline model with OECD import penetration and non-OECD import penetration entering the regression in place of import competition.¹⁶ The sample size is different from Tables 3 and 4 because there are no imports from non-OECD countries in some sector-year combinations.¹⁷

¹⁶ These two “geographic import penetration” variables are calculated in exactly the same way as in equation (10), except that imports by origin replace IC_{jt} in the numerator for both variables.

Table 4
Interaction between firms' characteristics and import penetration (marginal effects presented)

	Closedown	Domestic M&A	Foreign M&A
Base Category is continuing firms; 1=Closedown 2= Domestic M&A 3= Foreign M&A			
<i>Sector Level Variables</i>			
Import penetration	0.0009** (2.12)	0.0025** (2.57)	0.0003*** (3.96)
Sector concentration	0.0010 (0.93)	0.0042** (2.08)	0.0002 (1.38)
<i>Firm Level Variables</i>			
Exporter	-0.0011 (-1.23)	-0.0031*** (-3.98)	-0.0000 (-0.07)
Importer	-0.0036*** (-4.41)	-0.0038*** (-3.88)	-0.0000 (-0.30)
Size	0.0001 (0.66)	0.0044*** (8.62)	0.0003*** (8.62)
Intangible assets	-0.0000 (-0.32)	0.0002 (1.10)	0.0000 (1.22)
<i>Interaction of Import Penetration with:</i>			
× Exporter	-0.0009 (-0.93)	0.0002 (0.30)	0.0001 (1.08)
× Importer	-0.0008 (-0.43)	-0.0001 (-0.09)	0.0001 (1.00)
× Size	-0.0001 (-1.08)	-0.0007* (-1.77)	-0.0001** (-2.18)
× Intangible assets	0.0001 (1.36)	0.0001 (1.02)	-0.0000 (-0.25)
Observations		117336	
Pseudo R^2		0.0874	
<i>Equality test on the import penetration coefficients</i>			
$IC_{Closedown} = IC_{DomM\&A}$		0.19	
$IC_{DomM\&A} = IC_{ForM\&A}$		4.78**	
$IC_{Closedown} = IC_{ForM\&A}$		4.83**	
Standard Errors clustered at the sector level. t-statistics in parentheses. All specifications include a full set of year, sector and French "department" dummies. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$			

From a policy point of view, it is notable that the effects on the probability of exit are only significant for OECD competition, and only for M&A activity, and not for exit by closedown. This indicates that imports from developed countries have a stronger reallocative effect on the French business services

¹⁷ Mostly for services related to human resources, architecture and data treatment and processing

Table 5
OECD versus Non-OECD import penetration (marginal effects presented)

Base Category is continuing firms; 1=Closedown 2= Domestic M&A 3= Foreign M&A						
	S1			S2		
	Closedown	Domestic M&A	Foreign M&A	Closedown	Domestic M&A	Foreign M&A
<i>Sector Level Variables</i>						
OECD import penetration	0.0006 (1.27)	0.0040** (2.09)	0.0006*** (4.30)	0.0006 (1.38)	0.0020* (1.83)	0.0003*** (3.27)
Non-OECD import penetration	0.0005 (1.32)	0.0002 (0.17)	-0.0000 (-0.39)	0.0004 (1.34)	0.0004 (0.66)	-0.0000 (-0.19)
Sector concentration	0.0006 (0.65)	0.0085*** (3.01)	0.0006*** (2.59)	0.0006 (0.75)	0.0048** (2.08)	0.0003 (1.45)
<i>Firm Level Variables</i>						
Exporter				-0.0010 (-1.64)	-0.0030*** (-3.99)	0.0000 (0.31)
Importer				-0.0026*** (-4.76)	-0.0039*** (-3.58)	-0.0000 (-0.17)
Size				0.0000 (0.59)	0.0042*** (7.06)	0.0003*** (7.42)
Intangible assets				-0.0001 (-0.52)	0.0003 (1.38)	0.0000 (1.12)
Observations		109486			109486	
Pseudo R^2		0.04891			0.0867	
<i>Equality test on the import penetration coefficients</i>						
$IC_{Closedown} = IC_{DomM\&A}$		0.37			0.00	
$IC_{DomM\&A} = IC_{ForM\&A}$		3.32*			4.10**	
$IC_{Closedown} = IC_{ForM\&A}$		3.88**			2.15	
Standard Errors clustered at the sector level. t-statistics in parentheses. All specification include a full set of year, sector and French “department” dummy. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$						

sectors than imports from developing countries.

This finding may suggest that services are different from manufacturing goods in this respect - studies such as Greenaway et al. [2008] and Bernard et al. [2006a] have shown that firms in the manufacturing sector in Sweden and the US, respectively, are more likely to exit as a result of competition from *low-wage countries*. The results of Table 5 suggest that policy makers should not apply the logic fitting the manufacturing sector to import competition in services. In services, it seems that competition from similarly wealthy countries has a more important effect on local firm survival.

5 Conclusion

There is much debate at the moment regarding the potential effects of trade liberalization in services on developed economies. We contribute to this debate by analyzing the effect of services import competition on firms in France from 1999 to 2004, the first study to analyze such effects using services firm-level data.

We have identified three ways in which firms can exit: closedown, bought out in a domestic M&A, or bought out in a foreign M&A. We show that import competition in business services leads to significant intra-sector restructuring. The effect of import competition on both firms' exit and buy-out by M&A is shown to be positive and statistically significant. Interestingly, the estimated elasticity for import penetration with respect to foreign M&A is twice as large as the one for domestic M&A. In showing this, we contribute to a nascent literature on international trade in services at the firm level by showing that firm takeovers are an important channel of intra-sector reallocation.

Contrary to the literature on manufacturing, we show that it is not low-wage competition which has the largest effect on local firms. We find larger and significant coefficients on exit by M&A for import competition from the OECD, but not otherwise. This suggests that thus far, in France, the effect of foreign competition has been most severely felt from wealthy competitor countries, as opposed to from countries such as India, which are the subject of much popular discussion. This result can help inform debate on the realities of the globalization of services and its consequences.

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Appendices

In what follows we provide the calculus underlying the propositions. We start by stating Lemma 1, which gives the effects on the surviving firms' outputs of takeovers that eliminate a subset of home firms. Appendices A to E are related to the propositions in the model, while Appendices F and G are related to the empirical part.

A Lemma 1

In this Appendix, we compute the change in output produced by a particular firm as a consequence of the closedown of one firm. This result is used in the proofs of Appendices .

Let n and $n-\tilde{n}$ be the number of home firms before and after trade respectively. Using the equilibrium output, equation (4), we can show that closing down $n - \tilde{n}$ home firms increases the output of the remaining home firm i by the following amount:

$$y_i(\tilde{n}, n^*) - y_i(n, n^*) = \frac{n - \tilde{n}}{\tilde{n} + n^* + 1} [y_i(n, n^*) + c_i] \quad (\text{A.1})$$

where c_i is the marginal cost of firm i . This condition can be derived for all the existing firms. Equation (A.1) shows that the increase in output for firm i is proportional to a constant times the initial output of firm i plus a constant times the marginal cost of firm i .

Lemma 1 *Closing down $n - \tilde{n}$ home firms increases the output of the remaining firms by a constant times the initial output of each firm accounting for its marginal cost.*

Similarly, we can compute the increase in the output of the particular foreign firm i^* due to closing down $n - \tilde{n}$ home firms

$$y_i^*(\tilde{n}, n^*) - y_i^*(n, n^*) = \frac{n - \tilde{n}}{\tilde{n} + n^* + 1} [y_i^*(n, n^*) + c^*] \quad (\text{A.2})$$

Equation (A.2) shows that closing down $n - \tilde{n}$ home firms increases the output of the foreign firms because of a concentration effect (it is proportional to the initial level of output and to marginal cost of each firm).

B Condition for there to be no M&A in autarky

We provide the mathematics behind the condition for there to be no M&A in autarky. To do that we need to show that the gain from domestic M&A in autarky turns out to be negative. Let n and $n - 1$ be the number of home firms before and after domestic turnover in autarky. The post-takeover output of a particular home firm, $y(n - 1)$, is proportional to its pre-takeover output, $y(n)$. Thus, closing down home firm 2 increases the output of home firm 1 by the following amount:

$$y_1(n - 1) - y_1(n) = \frac{1}{n}[y_1(n) + c_1] \quad (\text{B.1})$$

Equation (B.1) shows that the increase in output for firm 1 is proportional to a constant times the initial output of firm 1 plus a constant times the marginal cost of firm 1.

The gain from a domestic takeover of firm 1 over firm 2 occurring in autarky is:

$$G_{12}(n) = y_1(n - 1)^2 - y_1(n)^2 - y_2(n)^2$$

To simplify, we set y_2 to be proportional to y_1 , so that $y_2(n) = \alpha y_1(n)$ where $\alpha < 1$. Since firm 2 is less productive than firm 1, $y_2 < y_1$ and thus α is set to be smaller than 1. The gain function $G_{12}(n)$ can then be written as ¹⁸:

$$G_{12}(n) = y_1(n - 1)^2 - y_1(n)^2 - \underbrace{\alpha^2 y_1(n)^2}_{y_2(n)^2}$$

Inside $G_{12}(n)$ we then use equation (B.1) to have an expression for $y_1(n - 1)$, to get:

$$G_{12}(n) = \left(\frac{1+n}{n} \left(y_1(n) + \frac{c_1}{1+n} \right) \right)^2 - (1 + \alpha^2) y_1(n)^2$$

Simplifying the above expression so that $y_1(n) + \frac{c_1}{1+n}$ is expressed as $y_1(n) \beta$ where $\beta > 1$, yields:

$$G_{12}(n) = y_1(n)^2 \left[\beta^2 \left(\frac{1+n}{n} \right)^2 - (1 + \alpha^2) \right] \quad (\text{B.2})$$

Equation (B.2) is proportional to:

$$G_{12}(n) \propto \beta^2 + \beta^2 n^2 + 2\beta^2 n - n^2 - n^2 \alpha^2$$

¹⁸ There are different ways to derive this and the following conditions. We choose to exploit the proportionality rule to make the expressions straightforward to interpret.

$G_{12}(n)$ is negative for small value of β and large value of α . Thus if the number of competing firms is sufficiently large and if the level of heterogeneity in their marginal costs is small (α close to one), there is no incentive to merge in autarky.

C Proof of Proposition 1

In what follows, we compare equations 3 and 6 and establish that exit by closedown with trade is larger than in autarky:

$$\frac{a + \sum_{j \neq i} c_j + \sum_i c_i^*}{n + n^*} > \frac{a + \sum_{j \neq i} c_j}{n} \quad (\text{C.1})$$

Solving equation (C.1) for $\sum_i c_i^*$ yields that equation (3) is strictly greater than (6) if and only if:

$$\sum_i c_i^* < c_j^{\text{autarky}} n^* \quad (\text{C.2})$$

where c_j^{autarky} is the marginal cost of the less productive firm. Dividing both sides by n^* :

$$\frac{1}{n^*} \sum_i c_i^* < \frac{1}{n^*} c_j^{\text{autarky}} n^* \quad (\text{C.3})$$

which can be rewritten as:

$$\bar{c}^* < c_j^{\text{autarky}} \quad (\text{C.4})$$

This inequality holds because we set that the marginal cost of the least productive firm at home is higher than the average marginal costs in the foreign country.

D Proof of Proposition 2.1

In this appendix, we show on what depends the gain from foreign M&A. We consider the gain from a takeover of a home firm, H , by a foreign firm, F . This gain is described by the following equation:

$$G_{FH}(n, n^*) = y^*(n-1, n^*)^2 - y^*(n, n^*)^2 - y(n, n^*)^2 \quad (\text{D.1})$$

Using equation (A.2) inside the above equation yields

$$G_{FH} = \left[\frac{1}{\bar{n}} (y^*(n, n^*) + c^*) + 2y^*(n, n^*) \right] \left[\frac{1}{\bar{n}} (y^*(n, n^*) + c^*) \right] - y(n, n^*)^2 \quad (\text{D.2})$$

To simplify this expression, we set $y^*(n, n^*) = \rho y(n, n)$, where $\rho > 1$, and that

$$\begin{aligned} y^*(n, n^*) + c^* &= \rho y(n, n^*) + c^* \\ &= \rho k y(n, n^*) \end{aligned} \quad (\text{D.3})$$

Using equations D.3 and equation (D.2), we derive the following expression:

$$G_{FH} = \frac{1}{\bar{n} + 1} y(n, n^*) \left\{ c - \frac{a - \sum_{j \neq i} c_j - \sum_i c_i^*}{\bar{n}} + \left(\rho k + \frac{2\rho}{\bar{n}} \right) \frac{k\rho}{\bar{n}^2} \right\} \quad (\text{D.4})$$

where $c + \left(\rho k + \frac{2\rho}{\bar{n}} \right) \frac{k\rho}{\bar{n}^2}$ will determine whether or not undertaking foreign M&A is profitable.

From equation (D.4) we see that G_{FH} is strictly positive if and only if:

$$c + \left(\rho k + \frac{2\rho}{\bar{n}} \right) \frac{k\rho}{\bar{n}^2} > \frac{a - \sum_{j \neq i} c_j - \sum_i c_i^*}{\bar{n}} \quad (\text{D.5})$$

The sign of G_{FH} depends on the marginal cost of the acquired firm, c , on how large the output of the foreign firm is, ρ , and on k , a measure of marginal cost asymmetries.

E Proof of Proposition 2.2

Next, consider the gain from domestic takeover under trade liberalization. A takeover of home firm 2 by home firm 1, meets the myopic merger criterion $G_{12}^H > 0$, if and only if

$$G_{12}^H(n, n^*) = y_1(n-1, n^*)^2 - y_1(n, n^*)^2 - y_2(n, n^*)^2 > 0 \quad (\text{E.1})$$

Using equation (A.1) inside the above equation yields:

$$G_{12}^H = \left[\frac{1}{\bar{n}} (y_1(n, n^*) + c_1) + 2y_1(n, n^*) \right] \left[\frac{1}{\bar{n}} (y_1(n, n^*) + c_1^*) \right] - y_2(n, n^*)^2 \quad (\text{E.2})$$

To simplify the above expression we set $y_1(n, n^*) = \theta y_2(n, n^*)$, where $\theta > 1$ and that

$$\begin{aligned} y_1(n, n^*) + c_1^* &= \theta y_2(n, n^*) + c_1 \\ &= \theta s y_2(n, n^*) \end{aligned} \quad (\text{E.3})$$

Using these tricks inside the gain function G_{12}^H , equation (E.1), gives us the following expression:

$$G_{12}^H = \frac{1}{\bar{n} + 1} y_2(n, n^*) \left\{ c_2 - \frac{a - \sum_{j \neq i} c_j - \sum_i c_i^*}{\bar{n}} + \left(2\theta + \frac{\theta s}{\bar{n}} \right) \frac{s\theta(\bar{n} + 1)}{\bar{n}^2} \right\} \quad (\text{E.4})$$

where $c_2 + \left(2\theta + \frac{\theta s}{\bar{n}} \right) \frac{s\theta(\bar{n} + 1)}{\bar{n}^2}$ will determine whether or not undertaking domestic M&A is profitable.

From equation (E.4), we see that G_{12}^H is strictly positive if and only if:

$$c_2 + \left(2\theta + \frac{\theta s}{\bar{n}} \right) \frac{s\theta(\bar{n} + 1)}{\bar{n}^2} > \frac{a - \sum_{j \neq i} c_j - \sum_i c_i^*}{\bar{n}} \quad (\text{E.5})$$

It depends on the marginal cost of the acquired firm, c_2 , on the output advantage for the home acquiring firm, θ , and on the importance of marginal cost asymmetries, s .

F Identification of Exit

Most studies that identify the exit of firms must rely on inference from observation of attrition in panel data. One advantage of our study is the availability of data on the date of legal closedown of firms. To illustrate the importance of this data source, we introduce the *Stojan* database for comparison. This is a database that contains very little firm-level economic information, but is filled out by all firms in France. We identify “survey exit” as a firm that stops reporting in year t in *Stojan* and continues not to report from then on. Table F.1 reports the difference in the number of exits recorded each year using the two methodologies. We see that the level of exit inferred from the survey data is anything from 3 to 7 times larger than that from the legal data source. It is clear from the table that even using a panel data set that supposedly covers all firms in operation may not be optimal and may lead to overestimation of exit.

Table F.1
Number of exits per year (share in parentheses)

	Survey Exit	Legal Exit
2000	2860	241
2001	1081	188
2002	2343	309
2003		178

G Data sources of explanatory variables

- **Import penetration.** We compute the ratio of business services imports over absorption. The trade data are taken from the Balance of Payment statistics (various years). The level of production is approximated by the sector turnover. The data are taken from the EAE (various years).
- **Sector concentration.** We calculate the ratio of the outputs of the 4 largest firms to the output in their sector. The numerator is the sum of the output of the top five firms in sector i and the denominator is total output of sector i . Source: EAE services (various years).

$$C4_{it} = \ln \left(\frac{\sum_{k=1}^4 X_{kit}}{\sum_{k=1}^n X_{kit}} \right)$$

- **Exporter and importer.** We define two dummy variables for internationalization status of the firm. The dummy variables take a value of 1 whenever the firm is trading services at time t . The data are taken from the Balance of Payment statistics.
- **Size (turnover of the firm), intangibles assets.** The variables are taken from the EAE services (various years).