Small Business Economics, 2008, Volume 31, Number 4, Pages 395-407

The Impact of Foreign Direct Investment on New Firm Survival in the UK: Evidence for Static v. Dynamic Industries

Andrew Burke[†]*, Holger Görg** and Aoife Hanley**

*Bettany Centre for Entrepreneurial Performance & Economics, Cranfield School of Management, UK and Max Planck Institute for Economics, Germany

**University of Nottingham, UK

Abstract

The paper examines the impact of Foreign Direct Investment (FDI) on the survival of business start-ups. FDI has potential for both negative displacement/competition effects as well as positive knowledge spillover and linkage effects on new ventures. We find a net positive effect for the whole dataset. However, a major contribution of the paper is to outline and test an argument that this effect is likely to be comprised of a net negative effect in dynamic industries (high churn: firm entry plus exit relative to the stock of firms) alongside a net positive effect in static (low churn) industries. We find evidence to support this view. The results identify new effects of globalisation on enterprise development with associated challenges for industrial policy.

JEL classification: F20, L11, L25, M13

Keywords: new firms, foreign direct investment, dynamic industries

[†]**Corresponding author:** Professor Andrew Burke, Bettany Chair & Director, The Bettany Centre for Entrepreneurial Performance and Economics, Cranfield School of Management, Cranfield University, MK43 0AL, UK. , andrew.burke@cranfield.ac.uk

Acknowledgements: The Authors would like to thanks two anonymous referees who provided very useful comments and which have helped improve the paper. Financial support from Nottingham University through Grant No. NLF A2 RBL6 and from the Leverhulme Trust through Grant No. F114/BF is gratefully acknowledged..

1 Introduction

There has recently been much interest by policy makers into the potential effects of globalisation on developed and developing economies. Of all the drivers of globalisation - trade, migration of workers, and foreign direct investment (FDI) - the last is probably the most visible. It is also likely to be, at the margin, the most important aspect of globalisation in economic terms. For instance, over the last decades global FDI flows have grown at least twice as fast as trade, now well exceeding \$500 billion and resulting in a total stock of more than \$8 trillion (United Nations, 2004). It is, therefore, not surprising that a lot of academic research has been directed towards investigating the potential impact of FDI and multinationals (MNEs) on economic development of host countries.

Much of the academic work has focussed on the question of detecting "productivity spillovers" from multinationals, i.e., whether or not domestic firms increase their productivity through learning and competition from MNEs. Recent examples include Aitken and Harrison (1999) and Girma et al. (2001) who examine spillovers in Venezuela and the United Kingdom, respectively. Related work has examined the macroeconomic link between FDI and growth in cross-country growth regressions (Borensztein et al., 1998; Alfaro et al., 2004) as well as the potential wage effects of multinationals in the domestic economy (Lipsey and Sjöholm, 2004; Girma and Görg, 2007).

What has been largely neglected in this literature is an analysis of the link between multinational enterprises and the survival of plants or firms in the host country. This is an important topic, however, not only because plant survival shapes the competitive landscape of the economy, but also because the persistence of jobs is linked to the survival of plants. Both of these issues can be expected to impact on welfare in the economy.

The aim of this paper is to examine the effect of inward FDI on the survival expectations of incumbents in the host country. Theoretically, there are a number of possible effects. On the one hand, if inward FDI leads to technology spillovers then incumbents may learn from multinationals, improve their productivity and subsequently also their survival prospects in the market. FDI may provide linkage opportunities for new ventures to sell products/services to foreign firms. On the other hand since FDI increases competition in the domestic economy, multinationals may steal business from incumbents and drive these out of the market. In this case, inward FDI will lead to reduced survival probabilities for firms that are competing with multinationals in the host economy. We investigate this issue empirically using data for new plant ventures from the UK Office of National Statistics (ONS) comprising of the population of VAT registered businesses from 1997-2002. This data spans services as well as manufacturing industries.

The empirical evidence on the impact of FDI on firm survival is rather limited. Bernard and Sjöholm (2003) and Görg and Strobl (2003a) examine whether there are differences in survival probabilities between domestic and foreign owned firms and find that affiliates of foreign multinationals are more likely to exit than domestic firms when controlling for a number of plant and industry characteristics. These studies use plant level data for Indonesia and Ireland, respectively.[1] To our knowledge, there is only one paper that investigated in detail the effect of inward FDI on survival of domestic incumbents by Görg and Strobl (2003b). They use Irish plant level data to examine the effect of the presence of multinationals on the survival of domestic plants and find that there are some positive effects on domestic plants, in line with the idea that firms benefit from technology spillovers from MNEs and are, thus, able to increase their survival prospects.

Our paper extends this literature by providing comprehensive evidence for the United Kingdom, one of the major economies in Europe. Compared to the aforementioned study by Görg and Strobl (2003b) which focuses on Ireland, our analysis of the UK not

[1] Bernard and Jensen (2004) undertake a related study investigating differences in survival for domestic plants and US multinationals in the US. They do not consider foreign multinationals in the US, however.

only provides a much larger dataset but also a country with a relatively more developed economy so that FDI might be expected to have greater potential for displacement/competition effects with domestic enterprise in the same industry. By contrast, in Ireland FDI often entailed the creation of new industry sectors in the economy. Our data also have the important advantage that they cover services as well as manufacturing, while the previous literature only used data for manufacturing. This is an important improvement given the increasing importance of services in most industrialised economies. This leads us to the first motivation for writing the paper which is to test for the existence of a dominant influence of FDI on new firm survival.

Hypothesis 1. The net effect of FDI on the survival of new ventures is likely to be comprised of positive knowledge spill over and linkage effects being offset against negative competition effects.

Apart from data differences with earlier work, we also propose and test the possibility that foreign ownership may have a distinctive impact on new venture performance in static *versus* dynamic markets. Fotopoulos and Spence (1998) in discussing inter-industry heterogeneity, distinguishing between static and dynamic markets and refer to the drivers of this heterogeneity: time invariant differences in innovation and sunk costs. They justify the application of turbulence measures (sum of entry and exit) by referring to a wealth of papers all observing a positive correlation between firm entry and exit.[2] As such, turbulence should be an internally consistent measure as other studies have all noted a positive correlation between entry and exit even when this relationship appears counter-intuitive. Specifically, Dunne and Roberts (1991) find that high profits cause both high industry entry as well as high exit from the industry.

[2] Fotopoulos and Spence (1998) give a good review of papers which observe positive correlations between firm entry and exit.

The question we address is whether the empirical weight of the positive and negative influences of FDI may be expected to vary between dynamic and static industries. FDI usually entails introducing innovation to a recipient economy where the technology has already been commercially successful in the overseas economy. Dynamic markets are typically characterised by high rates of churn (firm entry plus exit relative to the stock of firms) which tends to be higher at earlier stages of the diffusion of innovation in an industry (Klepper, 1996). In these markets, new ventures are often innovative and have been shown to be an important means through which new technology is introduced (Audretsch, 1995a, and Geroski, 1995; Beesley and Hamilton, 1984). Similarly, in these markets consumer demand and hence competitive advantage, depends much more on differences in product/service characteristics than price (Agarwal and Bayus, 2002). By contrast lower churn (more static) industries are associated with later stages of innovation diffusion where commoditisation and price competition become more prevalent. Bhide (2000) shows that new ventures are more likely to be imitative in low innovation industries. Therefore, if both new ventures and foreign firms are more likely to be engaging in innovation in dynamic industries, and if at the same time differences in innovation represent the focal point for competition in such industries, then the relationship between foreign ownership and new venture survival is more likely to be competitive – hence, a greater chance of being negative. By contrast in static industries new ventures are more imitative and hence have more scope to benefit from knowledge spillovers from foreign firms[3].

[3]It is important to point out that dynamic/turbulent markets are not synonymous with high growth markets. This is particularly true at very early stages of industry development when prior to the major growth phase entry plus exit is often quite high relative to a very small stock of existing firms. Likewise, in declining industries turbulence can be high when exiting large firms free up segments of the market which can provide viable customer bases for small new entrants. If these exiting firms are mainly foreign firms then one might expect a negative correlation between FDI and new venture survival. By contrast, if as is often the case FDI in declining industries represents the most efficient international firms maximising their core competencies in mature markets (often through the use of economies of scope which means diversifying into niches formally occupied by small firms) then this is likely to pose a threat to new ventures thereby again generating a negative effect from FDI on survival. Thus, even in declining turbulent/dynamic industries there are reasons

Hypothesis 2. The net effect of FDI on new venture survival is more likely to be negative in dynamic markets and positive in static markets.

The rest of the paper tests these hypotheses and is structured as follows. The source and nature of the data is described in the next section. This followed in section 3 by a discussion of the econometric methodology and motivation for the control variables. The results are presented in section 4 and the paper then closes with conclusions.

2 Data

Our data is drawn from the Inter-Departmental Business Register (IDBR) database at the UK Office for National Statistics.[4] This register captures VAT registered businesses and as such comprises about 98 percent of UK business activity.[5] The advantage of using data from the register is twofold. Firstly it is highly representative, given that it covers almost the population of UK firms and does not suffer from biases induced by sampling. This latter point is especially important in duration studies, where over-sampling of large firms in comparison to small firms underestimates the real amount of movement in an economy, since entry and exit is mostly a small firm phenomenon. Secondly, the register identifies businesses at the *local unit* level. Barnes and Martin (2002) define this as the "individual site or workplace (factory, shop etc.) at which activity takes place" (p. 37). When extracting our data, we used the restriction that the data only include firms where the local unit identifier (lowest aggregation level) was the same as the enterprise identifier

to believe that Hypothesis 2 might hold. Later, in the empirical analysis we also control for industry growth/decline by including of a right hand side variable measuring industry sales growth/decline.

[4] Access to this data is possible under controlled conditions on site at ONS offices.
[5] See Barnes and Martin (2002) for an overview of this data and the ARD data referred to below.

(higher aggregation level).[6] This ensured that our data was comprised entirely of single plant firms so exit implies firm as well as plant closure.[7]

However, representativeness and research relevance come at a cost so while the IDBR contains a reasonably exhaustive listing of all firms from all sectors of the UK economy, knowledge about the features of these firms is limited to sectoral and employment information. To remedy this information shortfall, we import information at a *sectoral* level on wages and market structure from the Annual Respondents Database (ARD), which is essentially a subset of establishments in the IDBR. This lets us describe the composition of the sector in which our firms operate and report, inter alia, industry concentration ratios.

Our data extends for a 6 year period, 1997 to 2002.[8] Focussing on this period is due to one important reason: since 1997, the ARD data cover services as well as manufacturing industries in the UK, while before that year only manufacturing data was available. We analyse data from 1997 onwards. However, this translates into a relatively short year survival horizon for the cohort of firms who appear in the data for the first time. Data for 1997 is essentially used as a criterion that allows us to identify new entrants (present in 1998 but not in 1997) and data for 2002 allows us to identify real, uncensored exits (present in 2001 but not in 2002). Accordingly, we limit our duration analysis to a 3 year time

[6] For example an enterprise with an enterprise identifier 122 could be composed of 2 local units with local unit identifiers 133 and 144 respectively. When the local unit is a single plant firm, it is denoted by the same identifier. In this example both the enterprise and local unit identifier would be 122.
[7] It should be made clear that the data we use here from the Office of National Statistics has not been used in any published analysis before. This data is not the more commonly known Annual Respondent's Database (ARD) Barnes and Martin (2002) which comprises a stratified sample of UK firms. We use the more exhaustive Inter Departmental Business Register (IDBR) which covers all UK VAT registered businesses which as of 2006 has been made more accessible to researcher via the new Business Structure Database.
[8] We have had to limit our data to the 1998 cohort for two reasons. Firstly, there was no earlier data at the Office for National Statistics on services. Secondly, we were size limitations using the IDBR data. There is potential for future work to use multiple cohorts although this would necessitate longer panels, given the need to identify and attribute the effects of macroeconomic shocks.

window when we have accounted for left- and right-hand side censoring and represented failures that arise in 1998 (entry year) as happening at the beginning of the following year.[9]

Fortunately, given the high level of attrition of start-ups in the earliest phases of their operation (almost 50 percent of start-ups exited within these 3 years) even within a relatively short time span we manage to capture a high level of early stage exits.[10] This pattern most likely arises from our ability to include low quality, under-capitalised, start-ups when using the IDBR data. Given the comprehensive nature of the data, we are confident that this data is representative.

Since our analysis focuses on exit from industry sectors, we first report exit levels for the cohort of UK plants entering in 1998, tracking the number of exits from 1998 until 2001.[11] Table 1 presents the development of industry level exit rates, calculated as number of exiting firms in industry *j* relative to the total number of firms in the industry. The average percentage of exits across all firms in the database is about 8 percent per year.[12] This average is slightly higher in manufacturing than in services sector. Overall, this suggests that only a minority of firms across the broad spectrum of UK industry exits in any year. As such, dynamism at a sectoral level appears to happen at the fringes of industry in general, and an examination of all industry exits suggests a high amount of inertia. Our numbers compare well with UK data for 1974- 1979 compiled by Cable and Schwalbach (1991) and quoted in Cable (1998). Cable and Schwalbach estimated entry to be 6.5 percent and exit to be slightly lower at 5.1 percent.

---

[9] As is customary in survival analyses of this type with 'simultaneous' entry and exit.
[10] Ideally, we would be able to identify the disappearance of a VAT registration number as a genuine closure (failure) or alternatively merger in order to isolate mergers from our sample (See Persson, 2004). Owing to the nature of our data, we opt for the convention of defining exit from the database as closure.
[11] We cannot calculate the value of exits for 2002 because firm's survival is right censored at this date.
[12] This compares with an average of 6.5% found by Baldwin and Gorecki (1991) for Canadian manufacturing industries. Dunne and Hughes (1994) report an average death rate of 20.5% in their UK data for 1975-85, however, their data comprises only a sample of 2000 quoted and unquoted companies (mainly large) in the UK financial and non-financial companies.

[Table 1. near here]

This inertia seen across UK industry masks the dynamism that arises within cohorts of new ventures, however. Accordingly, we would expect that annual exit rates *within* the grouping of new ventures should be much higher, given the greater financial fragility and unproven track-record of new ventures. **Figures 1 and 2** trace the survival rates for our 1998 cohort of UK firms as a Kaplan-Meier function, according to whether foreign penetration is high or low, for dynamic and static industries respectively. Our measure for foreign penetration, *'high_foreign'* is based on the percentage of employment in foreign multinationals over total employment in the industry, and *'high_foreign'* is defined as 1 if this ratio exceeds the mean. Attrition is recorded for 3 analysis times and this corresponds to 1999, 2000 and 2001 respectively.[13] The accompanying Wilcox Log-rank test is also given. We can see from both figures that almost 25 percent of entrants have died in the year following entry, culminating in a rate of around 50 percent for the third year of existence, an exit rate in line with others documented for UK manufacturing industries.[14]

We see from **Figure 1** that firms entering dynamic industries with above average rates of presence of foreign multinationals ('*high_foreign'* = 1) have lower survival probabilities. This adverse effect of FDI in dynamic industries on new entrants is also evidenced in the Log-rank test where expected failure is less than actual failure. In Figure 2 we observe that penetration by foreign firms is less injurious when the industry is classified as static. We still witness higher firm failure rates when FDI rates are higher. However, the disparity in survival rates between firms entering either high or low FDI industries is

[13] A convention in duration analyses of this type is to treat all failures in the year of entry as having occurred at the beginning of the next year. Accordingly all failure times for entry at time t are treated as failures arising in t+1.

[14] Our attrition rate for the 1998 cohort (1st three years), corresponds with other UK exit rates: 42 percent after 2 years cited by Scarpetta (2001) for the early 1990's and 45 percent in Disney et al., (2003) for the period 1986 to 1991. However, note that these studies only relate to manufacturing industries.

less marked. The accompanying Log-rank test which has a lower test statistic than that seen for the previous figure, shows that the difference in survival rates is not so pronounced for static industries as FDI varies.

[Figures 1 and 2 near here]

3 Modelling Plant Survival using a Hazard Function

Of course, the Kaplan-Meier survival function does not take account of the auxiliary role of other covariates in influencing survival and hence is merely illustrative. It has been established in the empirical IO literature that there are many factors that can possibly affect plant survival. In order to properly disentangle the role of plant and industry specific factors from that of the presence of MNCs on the survivability of plants we turn to a semi-parametric modelling of plants' hazard rates. We initially estimate a survival function in a sample comprising all industries and then proceed to separate estimates for dynamic (high firm churn) and static (low firm churn) industries.

Following the related empirical literature (for example, Audretsch and Mahmood, 1995, Mata and Portugal, 1994) we utilise a Cox proportional hazard model as our equation to be estimated.[15] The Cox proportional hazard model does not require any restrictive assumptions regarding the baseline hazard, such as for instance a Weibull or lognormal specification. This is appropriate for our purposes, as our main interest is not in the estimation of the underlying baseline hazard but in the effect of the presence of MNCs on plant survival. As pointed out in the literature on survival analysis, the semi-parametric

[15] We used STATA version 9.2 for all estimations. The Cox Proportional Hazard model for the estimations was invoked using the standard *stcox* procedure in STATA.

modelling approach of the Cox proportional hazard model is advantageous if the parametric form of the underlying baseline hazard function is not known with certainty.

The Cox proportional hazard model specifies the hazard function $h(t)$ to be the following:

$$h(t) = h_0(t)e^{(X\beta)} \tag{1}$$

where $h(t)$ is the rate at which plants exit at time t given that they have survived in t-1, h_0 is the baseline hazard function (the parametric form of which is not specified) when all of the covariates are set to zero, and X is a vector of plant and industry characteristics postulated to impact on a plant's hazard rate. The following covariates are included:

Size is the plant's start up size in terms of employment and is included since it can be considered a stylised fact that small plants generally have lower probabilities of survival than large plants (for example, Audretsch and Mahmood, 1995; Mata and Portugal, 1994). The premise is intuitive, larger plants are likely to have greater resources and hence be better able to exploit market opportunities and fend off competition. Caves (1998) refers to the gap between "fringe entry", where a firm is undercapitalised at start-up, and the cost of sustainable entry. The wider this gap, the higher is the probability that an undercapitalised firm fails post entry.

C5 denotes the five firm concentration ratio of sector *j*, measured in terms of firms' sales shares. Again, the expectation of the effect of market concentration on survival is not clear-cut. Higher market concentration may lead to higher price-cost-margins in the industry which, ceteris paribus, should increase a plant's probability of survival. In industries where firms compete more on innovation than price, the same point may hold true if dominant firms have become X-inefficient (Leibenstein, 1966) and hence slack, complacent or insufficiently vigilant in managing their innovation activities. However, plants in highly concentrated markets may be subject to fierce aggressive behaviour by dominant rivals with monopolistic power which may reduce chances of new venture survival.

Growth is the net sectoral (sales) growth rate. Audretsch (1991) argues that industry growth may elevate the price above the long-run average cost, i.e., increase firms' price-cost-margin which would, all other things equal, affect survival rates positively. The sectoral growth rate also allows us to control for other sector specific cyclical effects which may impact on plant survival. However, in markets with emerging technologies with underlying economies of scale (for example, network effects) the pressure for business shakeouts only really emerges when the market has grown enough to allow economies of scale effects to kick-in. In such circumstances, a rapidly growing market could have a negative effect on new venture survival. Thus, overall we have ambiguous priors about the actual empirical relationship between industry growth and plant survival.

We furthermore include a measure of production cost, namely the median wage in the industry as an explanatory variable. The expectation is that higher costs, all other things being equal, reduce profitability and, hence survival prospects.

Most importantly from our point of view, *foreign presence* is a proxy for the presence of multinationals in a sector and is defined as the share of employment by MNCs in sector j at time t. This variable is supposed to capture the effects of multinationals on firm survival. If positive spillover or linkage effects occur, the presence of MNCs should have a positive effect on firm survival. If the competition effect is prevalent, we would expect a negative effect on firm survival. We also test to see whether the dominance of either effect varies as we move from a static to a dynamic industry. This is motivated by the aforementioned body of empirical research which indicates key differences between static and dynamic industries in terms of the importance of innovation as the focal point of competition and the extent to which new ventures engage in innovation. Thus, the degree to which net displacement effects (from innovative foreign firms to domestic enterprise) exist or vary between dynamic and static industries is a core motivation in this analysis.

All sector specific variables are calculated at the 3 digit SIC 92 level. Table 2 provides some summary statistics on the included variables. Contrary to what we expect, when we report the summary statistics independently for dynamic and static industries, dynamic industries exhibit a higher foreign presence (which is what we expect) but also lower average industry growth than static industries. Our key variable measuring the importance of foreign multinationals for all firms, *foreign presence,* shows a mean value of about 14 percent. This proportion of foreign sectoral FDI shows some variation, rising to over 15 percent for dynamic industries and falling to just over 13 percent for static industries.[16]

[Table 2 near here]

Table 3 shows the breakdown in entry and exit rates for selected industry subsectors. The exit statistics are particularly interesting with high attrition rates for Clothing (18), Electronic devices (33), Construction (45), Car sales (50) and Real Estate (70). Overall failure is high for the 3 year period, with generally the highest failure arising early on (failure rates tail off significantly in the third year).

[Table 3 near here]

4. Results

The results of estimating different variations of the hazard model described in equation (1) using data for the total sample are presented in Table 4. All estimations are stratified by two digit industry, which allows for equal coefficients of the covariates across

[16] The appendix includes a correlation table for these variables.

strata (sectors), but baseline hazards unique to each stratum (sector). As can be seen, the Wald tests provide satisfactory support for our model specifications. In interpreting the results one should recall that our dependent variable is the hazard rate, i.e., a negative coefficient on an independent variable implies that it reduces the rate of hazard, thus increasing chances of survival, all other things equal.

[Table 4 near here]

Overall we have about half a million observations for our Cox regressions, corresponding to approximately 179,000 firms of which 77,000 fail during the 3 year observation window.

The significance and sign of the control variables are fairly familiar. In column (1) we see that Industry Growth promotes new venture survival which is consistent with a view that faster growing industries provide better revenue opportunities for new ventures. Column (2) outlines the results for the sample when we include the 5-firm concentration ratio. The 5 firm concentration ratio variable has a significant effect in reducing new firm survival as one would expect if new firms are vulnerable to large incumbents with monopolistic power. [17]

Column (3) gives the results for our pooled survival analysis when we include our measure of foreign firm penetration in the 3-digit sector. Our results suggest that an increase in the importance of foreign owned firms in the sector has a positive effect on firm survival, i.e., lowers the hazard of exiting. Although we report the results for Z-values, the corresponding hazard rates for foreign presence and C5 are 0.996 and 1.0002 respectively. This suggests that a 10 percentage point increase in foreign presence leads to a reduction in the hazard rate by 4 percent i.e. ((1-0.996) * 10 = 0.04). In other words there is a 4 percent reduction in the conditional probability of exiting. The effect of foreign firms in

[17] We originally included a variable measuring Minimum Efficient Scale (MES), median industry wages and the Coefficient of Variation (CV). However, collinearity between our concentration measure C5 and MES made it redundant. Also the CV was highly collinear with our measure for FDI.

the 3-digit sector, is greater than the effect of the concentration ratio in terms of its economic significance. For the 5-firm concentration ratio (C5), the hazard rate for the model in column 3 suggests that an increase in C5 by 10 percent leads to an increase in the hazard rate by (0.0002 * 10 =) 0.2 percent. Hence, the effect of foreign presence on hazard rates is non-trivial.

In column (4) we include an additional covariate, the Coefficient of Variation calculated for the size variable on the intuition that we need to account for the possibility that different sized firms co-exist when industry cost curves are L-shaped (Baldwin, 1998: Caves and Porter, 1980).[18] A significantly negative sign for the Coefficient of Variation variable indicates that greater size diversity helps survival. This makes sense when we consider that minimum efficient scale can occur at relatively low output levels, allowing new entrants to survive despite their smaller size relative to incumbents. It is also notable that the inclusion of this variable does not change our result on the effect of FDI on survival.

In column (5) we interact the foreign presence variable with the C5 in order to examine whether the effect of multinationals differs according to the level of industry concentration. The reason we test for this influence is to assess whether the negative competition effect and the positive spillover and linkages effects from foreign ownership vary by industry concentration. FDI is usually undertaken by large foreign firms and hence may be more of a threat to the dominant firms in an industry. In a highly concentrated industry new ventures are less likely to be peripheral fringe firms and hence more influenced by the dominant form of competition occurring in the market. However, we do not find a statistically significant effect of the interaction terms in this model.

---

[18] This variable was calculated as $Cv = \sigma/\mu$ where σ is the size standard deviation for the 3-digit sector and μ the average size.

[Table 5 near here]

In Table 5 we split the sample into dynamic and static industries. We define a dummy variable equal to one if an industry is dynamic. It is defined as such if entry and exit rates combined equal or exceed 20 percent of the stock of firms. This corresponds to the 75th percentile of the distribution of aggregate entry and exit rates.[19] In line with our intuition that there is higher firm attrition in a dynamic compared to a static industry, we see that approximately 44 percent of start-ups in the dynamic industry (26,878/ 61,720) failed during the 3 year observation period. The figure for failure in static industries was 33 percent (50,206 / 151,367).

Our results highlight some stark differences in terms of the role of foreign ownership in the survival function of new ventures in dynamic and static industries. Consistent with what we saw earlier in the Kaplan-Meier figures and accompanying Wilcox statistics, foreign ownership exerts a negative influence on new plant survival in dynamic industries (Table 5, columns 3 and 5). The net effect of FDI in static industries is less clear cut (Table 5, columns 8 and 10). In static industries the effect of FDI on new venture survival is moderated by the level of concentration in the industry. The finding indicates that the combined positive influence of knowledge spillovers and linkages is outweighed by negative competition effects in dynamic industries. This finding is consistent with a view suggested by the aforementioned evidence in the existing IO empirical literature that in dynamic industries both new ventures and foreign firms are more likely to be direct competitors.

[19] We tested whether the sample split is appropriate. We interacted the dummy with all independent variables and ran a regression including all interaction terms on the full sample. A Wald test did not allow us to reject the hypothesis of joint statistical significance of all interaction terms and, hence, splitting the sample is appropriate.

In static industries, we find the opposite result with a net positive effect from foreign ownership on new venture survival. However, this operates through the C5 and foreign ownership interaction variable (Column 10). This indicates that negative competition effects are more likely to be overpowered by positive spillover and linkages effects when industry concentration is high.[20] This evidence supports the view that FDI is usually undertaken by large foreign firms and hence may be more a threat to the dominant firms in an industry. Thus, small new ventures do not appear to face the brunt of most of this negative competition effect leaving them to experience more of the positive linkage and spillover effects.

Combining the results of tables 4 and 5, our findings indicate that in general foreign ownership promotes the survival of new ventures – this effect being strongest in highly concentrated static industries – but that in dynamic markets the opposite is true and that foreign ownership has a net negative displacement effect. From a policy perspective, one may be tempted to take the broad conclusion that since the pooled results show FDI reduces the hazard rate for new entrants, that in general FDI is a good thing for indigenous enterprise. However, if one distinguishes between the *quantity* and *quality* of entrepreneurship (Burke et al, 2000) then a different possibility emerges. If new ventures are more innovative in dynamic industries and more imitative in static industries then a net negative displacement effect in dynamic industries is concerning because it indicates damage is concentrated on more high *quality* new ventures. Thus, it is possible that a net positive effect on *quantity* – as is apparent from the results in Table 4 – may mask a net negative impact on *quality* which seems plausible from the results in Table 5. Our data set is not rich enough to progress this line of thought but the results are enough to raise it as an issue for further research. However, we have determined that the interaction between

[20] From Table 2, the mean C5 for static industries in 1.86, hence the effect of FDI on the hazard rate for the mean industry is negative.

foreign ownership and new ventures survival is markedly different, in fact opposite, between dynamic and static markets. In terms of industrial policy, it implies a common desire to encourage FDI while simultaneously building up a long term supply of indigenous enterprise is more challenging in dynamic markets where a trade-off in terms of these objectives appears to exist – at least in the short run.

In terms of the control variables, we find the adverse effect from industry concentration in inducing higher firm failure (raising the hazard rate), in Table 4 appears in Table 5 to be more pronounced in static markets i.e. coefficients are higher. This result is consistent with a view that new ventures are more imitative in static markets and hence more vulnerable to monopolistic power of dominant incumbents. In dynamic markets, more innovative new ventures are able to differentiate themselves and so to some extent be shielded from this effect. Start-up size has a positive influence on firm survival in static industries but an insignificant effect in dynamic industries. The former result is consistent with the IO literature while the latter may reflect staged financing and the need for flexibility in dynamic, hence more uncertain/risky, industries. Bhide (2000) discusses how new ventures in innovative uncertain/risky industries adopt a pilot (small scale) launch to enable a trial an error deployment of available resources (e.g. staged financing) rather than drawing on all available resources at the time of start-up. This strategy is perfectly rational based on managing risks by hedging bets – in this case drawing down available funding to use in a new venture. In this manner, smaller size start-up may not be a handicap as such firms may be able to draw on more resources (finance) to prolong the venture if the things do not go to plan – unlike a venture who has put all its 'eggs in one basket' by backing one single strategy which was decided prior to start-up and before the firm has had real market feedback.

Industry growth has a negative influence on survival in dynamic markets which is consistent with IO theory on business shakeouts – industry growth enables economies of scale effects to kick-in and hence push out smaller new ventures. In line with this thread, static industries would normally have matured beyond the business shakeout phase and so this effect may not be expected to influential.

5. Conclusion.

The paper set out to examine the impact of foreign ownership on the survival of new ventures. The question is interesting because it has yet to be established at an empirical level whether the influence is positive, negative or neutral. In addition, this line of research has relevance to policy given that encouraging FDI and enterprise creation are cornerstones of most industrial policy. Therefore, it is interesting to assess whether these influences complement or counteract each other. Foreign firms are generally viewed as having potential for both negative displacement/competition effect as well as positive knowledge spillover and linkage effects on new ventures. Thus, the paper tests the net effect which it finds to be positive for the whole dataset. This supports hypothesis 1 which indicates the existence of an impact of FDI on new venture survival.

The paper then proposes hypothesis 2 which outlines reasons why this net effect is unlikely to be homogenous across all types of industries. It argues that the direction of these effects is particularly likely to vary between dynamic and static markets. It then proceeds to separate the data into these two types of industries and separately estimates a new venture survival equation in each case. The direction of the net effect is found to change in line with hypothesis 2 (itself motivated by the current industrial economics literature on new venture survival). We find that negative competition/displacement effects dominate in dynamic markets while positive knowledge spillover and linkage effects dominate in static industries.

The results indicate a challenge for industrial policy in dynamic markets in terms of arriving at the right balance when trading off the direct positive effect of FDI against the negative indirect effect on the survival of new ventures. This trade-off will be influenced by the extent to which policy makers discount future benefits and costs as the negative influence on new firm survival is likely to be small in current economic terms but could be potentially enormous over a longer term horizon if a 'promising start-up' that was otherwise destined for success is snuffed out of its fledgling existence before it had a chance to develop competitive resilience. This raises an issue for further research and this would also need to consider the capacity for employees of foreign owned firms to subsequently leave with high value knowledge gleaned from their former employer and set up their own ventures (Burke and To, 2001). Potentially, this may lead to a future stock of high capability ventures that may perform better than those displaced by FDI.[21]

Apart from the effects of foreign ownership the results also indicated that the influence of industry growth, firm start-up size and the level of concentration all have different (usually opposite) effects in dynamic compared to static industries. These differences are consistent with the views that the focal point of competition in terms of price versus innovation, and the main adversaries in terms of small *v.* large or small *v.* small alongside large *v.* large, are likely to vary between static and dynamic markets. Thus, our paper takes a small step for the empirical IO literature to account for a general conclusion emanating from the theoretical IO literature, namely that small differences between industries can lead to large differences in terms of the nature and impact of competition.

[21] The possibility for researchers to apply the new Business Structure Database at the UK Office for National Statistics, a formatted version of the IDBR data which we used in our analysis, makes replications of and extensions to our work a real possibility.

References

Agarwal, R. and Bayus, B.L. (2002), The Market Evolution and Sales Take Off of Product Innovations, *Management Science*, v48, n8, pp. 1024-1041.

Aitken, B.J. and Harrison, A.E. (1999), Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela, *American Economic Review* 89, 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, 89-112.

Audretsch, D., 1991, New-Firm Survival and the Technological Regime, *Review of Economics and Statistics*, v73, n3, pp. 441-450

Audretsch, D.B. (1995a), Innovation and Industry Evolution, MIT Press, Cambridge MA.

Audretsch, D.B. (1995b), Innovation, growth and survival, *International Journal of Industrial Organization, 13: 441-457*

Baldwin, J. and P. Gorecki, 1991, Firm Entry and Exit in the Canadian Manufacturing Sector: 1970-1982, *Canadian Journal of Economics*, v24, n2, pp. 300-323

Baldwin, J., 1998, "Were Small Producers the Engines of Growth in the Canadian Manufacturing Sector in the 1980s?", Small Business Economics, v10, n4, pp. 349-64

Barnes, M. and R. Martin, 2002, Business Data Linking: An Introduction, *Economic Trends*, n581, April 2002, Office for National Statistics

Beesley, M and R. Hamilton, 1984, "Small Firms' Seedbed Role and the Concept of Turbulence", *Journal of Industrial Economics*, v33, n2, pp. 217-31

Bernard, Andrew B. and J. Bradford Jensen (2004), Firm structure, multinationals, and manufacturing plant deaths, mimeo.

Bernard, Andrew B. and Fredrik Sjöholm (2003), Foreign owners and plant survival, NBER Working Paper 10039.

Bhide, A.V. (2000), *The Origin and Evolution of New Businesses*. Oxford University Press, New York.

Borensztein, Eduardo R., Jose De Gregorio and John-Wha Lee (1998), How does foreign direct investment affect economic growth?, *Journal of International Economics*, 45, 115–135.

Burke, A.E., FitzRoy, F.R. and Nolan, M.A. (2000). When less is more: distinguishing between entrepreneurial choice and performance. *Oxford Bulletin of Economics and Statistics*, 62: 565-587.

Burke, A.E. and To, Theodore (2001), Can reduced entry barriers worsen market performance? A model of employee entry, *International Journal of Industrial Organization*, vol 19, pp. 695-704.

Cable, J. and J. Schwalbach, 1991, “International comparisons of entry and exit” in Entry and market contestability: An international comparison. Geroski and Schwalbach (Eds.), Blackwell, pp. 257-281

Caves, R., 1998, “Industrial organization and new findings on the mobility and turnover of firms”, *Journal of Economic Literature*, vol. 36, n4, pp. 1947-82

Caves, R. and M. Porter, 1980, “The Dynamics of Changing Seller Concentration”, *Journal of Industrial Economics*, v29, n1, pp. 1-15

Dunne, P. and A. Hughes (1994), Age, size, growth and survival: UK companies in the 1980s, *Journal of Industrial Economics*, Vol. 42, pp. 115-140.

Dunne, T. and M. J. Roberts, (1991), “Variation in producer turnover across US manufacturing industries in entry and exit market contestability, eds. P.A. Geroski and J. Schwalbach, Blackwell, London, pp. 187-203

Fotopoulos, G. and N. Spence, 1998, “Entry and exit from manufacturing industies: symmetry, turbulence and simultaneity – some empirical evidence from Greek manufacturing industries, 1982 – 1988”, *Applied Economics*, v30, pp.245 - 262

Geroski, P., (1995), “What do we know about entry*?” International Journal of Industrial Organization*, v13, pp.421-440

Girma, S., Greenaway, D. and Wakelin, K. (2001), Who benefits from Foreign Direct Investment in the UK?, *Scottish Journal of Political Economy* 48, 119-133.

Girma, S. and H. Görg (2007), Evaluating the foreign ownership wage premium using a difference-in-differences matching approach, *Journal of International Economics*, forthcoming.

Görg, Holger and Eric Strobl (2003a), Footloose multinationals? *The Manchester School*, 71, 1-19.

Görg, H. and E. Strobl, (2003b), “Multinational Companies, Technology Spillovers and Plant Survival”, *Scandinavian Journal of Economics*, Vol. 105, pp.581-595

Klepper, S. (1996), Entry, Exit, Growth and Innovation over the Product Life Cycle, *American Economic Review* 86(3): 562-583.

Johnson, P. and Parker, S. (1994), The Interrelationships between Births and Deaths, *Small Business Economics*, 6(4): 283-290.

Leibenstein, H. (1966), "Allocative Efficiency and *X*-Efficiency," *The American Economic Review*, 56: 392-415.

Lipsey, Robert E. and Fredrik Sjöholm (2004), Foreign direct investment and wages in Indonesian manufacturing, *Journal of Development Economics*, 73, 415-422.

Mata, J. and Portugal, P. (1994), Life Duration of New Firms, *Journal of Industrial Economics* 42, 227-245.

Mata, J., Portugal, P. and Guimaraes, P. (1995), The Survival of New Plants: Start-up Conditions and Post-entry Evolution, *International Journal of Industrial Organization* 13, 459-482

Persson, H., 2004, 'The Survival and Growth of New Establishments in Sweden', *Small Business Economics*, v23, pp.423-440

Scarpetta, S., 2001, *OECD Economic Outlook*, n69, June, Chapter VII, Paris

United Nations (2004), *World Investment Report 2004*, Geneva: United Nations

Table 1: Mean Exit Rates by Year (standard deviation in parentheses)

Year	All sectors	Manufacturing	Services
1998	0.078 (0.052)	0.086 (0.057)	0.078 (0.053)
1999	0.088 (0.060)	0.094 (0.057)	0.088 (0.060)
2000	0.088 (0.059)	0.092 (0.059)	0.087 (0.060)
2001	0.081 (0.059)	0.083 (0.052)	0.081 (0.059)

Source: own calculations based on ONS data

Table 2: Descriptive Statistics

	All industries		Dynamic industries		Static industries	
	Means	Standard Deviations	Means	Standard Deviations	Means	Standard Deviations
C5	4.42	7.77	6.7	8.1	1.86	2.89
Foreign presence	14.17	10.43	15.6	12.1	13.5	9.622
Industry growth	16.11	122.17	14.8	206.5	16.95	35.7
Start up size	5.74	48.97	6.9	65.4	4.16	25.5

Source: own calculations based on ONS data

Table 3: Breakdown of data for selected sectors

	Entry rate for 1998 cohort as % UK firms			Exit rate as % of 1998 cohort starts			% exiting each year		
	No.	mean	std. dev.	Exits	survivors	Overall percentage that fail	1999	2000	2001
Manufacture of Food (15)	823	12.2	2.2	281	507	36%	15%	12%	8%
Textiles (17)	611	11.3	3.4	235	383	38%	16%	12%	9%
Clothing (18)	1300	17.9	1	484	606	44%	20%	14%	10%
Footwear (19)	116	10.8	2.7	46	71	39%	18%	11%	10%
Timber products (20)	802	11	3	262	576	31%	12%	11%	8%
Publishing (22)	3879	14.9	6.1	1458	2684	35%	15%	12%	9%
Rubbers and plastics (25)	660	9.7	1.8	212	455	32%	13%	11%	8%
Glass and ceramics (26)	626	14.2	2.7	224	422	35%	17%	12%	6%
Iron and steel (27)	247	10.2	2.3	84	153	35%	13%	16%	7%
Metal products (28)	2717	9.4	1.2	904	1991	31%	13%	10%	8%
Machinery (29)	1039	8	1.7	404	770	34%	12%	12%	10%
Electrical equip. (31)	513	10	2.4	198	366	35%	14%	12%	10%
Radio and TV equip. (32)	298	10.3	0.5	136	200	40%	16%	13%	11%
Electronic and optical devices (33)	405	7.3	1.3	258	272	49%	20%	15%	13%
Motor vehicles (34)	291	11.3	1.1	116	195	37%	17%	12%	9%
Other transport equip. (35)	304	12.1	3.2	117	193	38%	16%	12%	10%
Furniture (36)	2749	15.8	3.7	961	1881	34%	15%	11%	8%
Electricity (40)	56	31.1	2.1	82	112	42%	20%	13%	9%
Construction (45)	22940	0.25	2	22	30	42%	23%	10%	10%
Vehicle retail (50)	7400	11.3	3	12976	13517	49%	21%	15%	13%
Other wholesale (51)	14638	13.3	3.2	2526	4880	34%	15%	12%	8%
Transport (60)	5153	0.1	1.4	5656	9061	38%	18%	13%	8%
Other transport (61)	172	15.2	2.4	1946	3341	37%	17%	13%	7%
Air transport (62)	184	22	3.5	51	107	32%	17%	7%	8%
Travel agents (63)	1914	14.2	5.5	59	117	34%	18%	9%	7%
Post (64)	3456	33.6	1.5	769	1219	39%	18%	12%	9%
Real estate (70)	7825	15	5.7	1108	977	53%	15%	21%	17%
Rental (71)	2396	20.4	4.3	2411	5890	29%	12%	9%	8%
Consultancy (72)	30009	2.3	7.5	12577	22509	36%	13%	13%	10%
R&D (73)	270	10.1	0.35	97	198	33%	15%	8%	10%
Professional (74)	41684	3.6	8.8	14321	26856	35%	14%	12%	9%
Education (80)	5490	35.7	8.5	1846	3821	33%	14%	11%	7%
Nursing (85)	7614	24.8	7.5	2523	5431	32%	11%	13%	8%
Cinemas (92)	8631	9.8	9.2	3038	6153	33%	14%	11%	8%

Notes:
For reasons of data confidentiality, some sectors were not reported where there was a risk of individual firms being identified.

Table 4: Hazard function for all industries

	(1)	(2)	(3)	(4)	(5)
startup size	0.44	-0.62	-0.65	-0.76	-0.62
	(8.9E-5)	(8.4E-5)	(8.5E-5)	(8.6E-5)	(8.4E-5)
3-digit industry growth	-4.78***	-2.23**	-2.45***	-4.11***	-2.49***
	(1.2E-4)	(1.2E-4)	(1.2E-4)	(1.4E-4)	(1.2E-4)
C5		18.93***	19.62***	19.83***	11.61***
		(8.4E-6)	(8.4E-6)	(9.04E-06)	(1.3E-5)
Coefficient of size variation				-4.26***	
				(3.4e-3)	
foreign presence in 3-digit industry			-4.72***	-3.37***	-4.73***
			(6.1E-4)	(6.3E-4)	(7.2E-4)
foreign presence * C5					1.37
					(4.66E-07)
Number of observations	543,263	541,785	541,742	541,742	541,742
Number of firms	179,311	179,008	178,998	178,998	178,998
Number of failures	77,084	76,783	76,774	76,774	76,774
Wald test statistic	23.10	384.33	414.20	435.70	415.92
Wald test (p-value)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

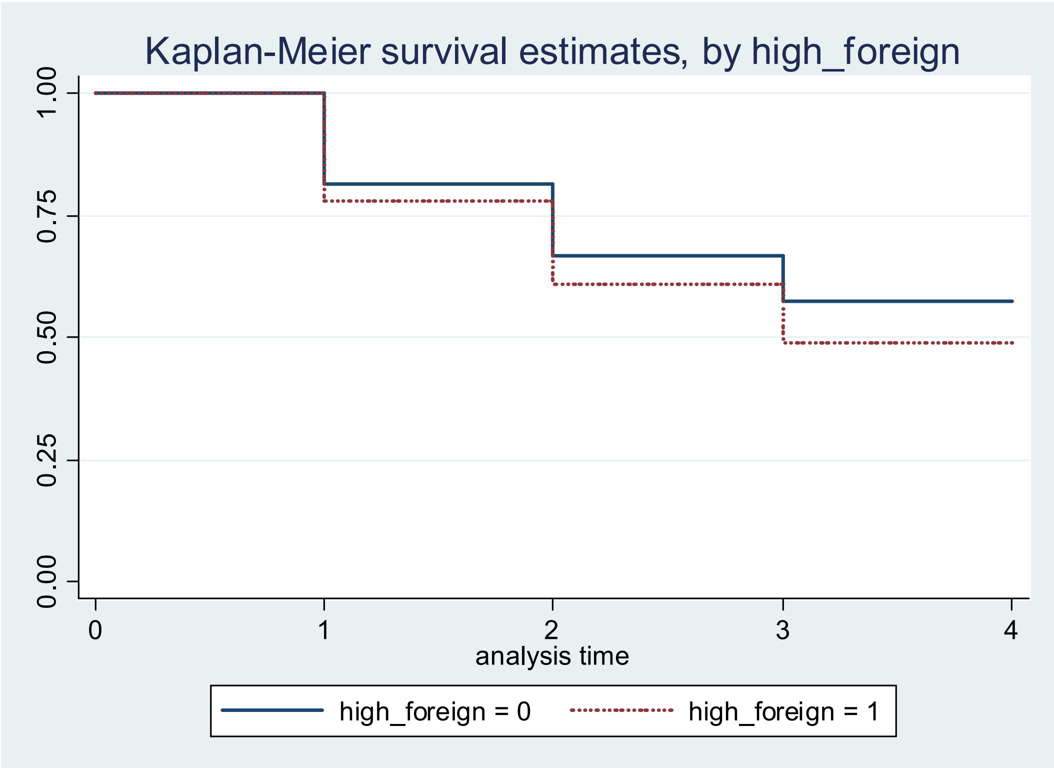
Notes:
(a) Heteroskedasticity consistent standard error in parentheses. Z-values reported where negative value implies a reduction in death hazard i.e. an increase in survival
(b) *** , ** and * imply Z-value significant at 1, 5 and 10 per cent level, respectively.
(c) baseline hazard stratified by sector

Table 5: Industry dynamism differences

	Dynamic industry					Static industry				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
startup size	1.51	1.51	1.53	1.53	1.55	-2.67***	-2.99***	-2.98***	-2.92***	-2.97***
	(9.3E-5)	(9.1E-5)	(9.1E-5)	(9.2E-5)	(9.0E-5)	(3.2E-4)	(3.0E-4)	(3.0E-4)	(3.1E-4)	(3.1E-4)
3-digit industry growth	4.53***	4.71***	4.56***	3.46***	4.59***	-1.50	0.15	-0.16	3.16***	-0.54
	(1.8E-4)	(1.8E-4)	(1.8E-4)	(1.8E-4)	(1.8E-4)	(1.6E-4)	(1.7E-4)	(1.7E-4)	(3.1E-4)	(1.8E-4)
C5		4.25***	2.95***	5.23***	1.26		6.33***	6.34***	5.02***	9.98***
		(1.1E-5)	(1.1E-5)	(1.3E-5)	(1.7E-5)		(2.4E-5)	(2.4E-5)	(2.5E-5)	(4.2E-5)
Coefficient of Variation				-4.76***					3.94***	
				(5.1E-3)					(7.4E-3)	
foreign presence in 3-digit industry			4.94***	5.92***	3.16***			-0.96	-0.81	3.02***
			(8.0E-4)	(8.2E-4)	(1.0E-3)			(1.1E-3)	(1.1E-3)	(1.3E-3)
foreign presence * C5					1.02					-6.71***
					(6.0E-7)					(2.2E-6)
Number of observations	139,243	137,765	137,730	137,730	137,730	404,020	404,020	404,012	404,012	404,012
Number of firms	61,720	61,402	61,393	61,393	61,393	151,367	151,367	151,362	151,362	151,362
Number of failures	26,878	26,577	26,569	26,569	26,569	50,206	50,206	50,205	50,205	50,205
Wald test statistic	22.77	41.07	66.29	90.83	67.87	9.34	49.6	50.37	65.82	113.89
Wald test (p-value)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

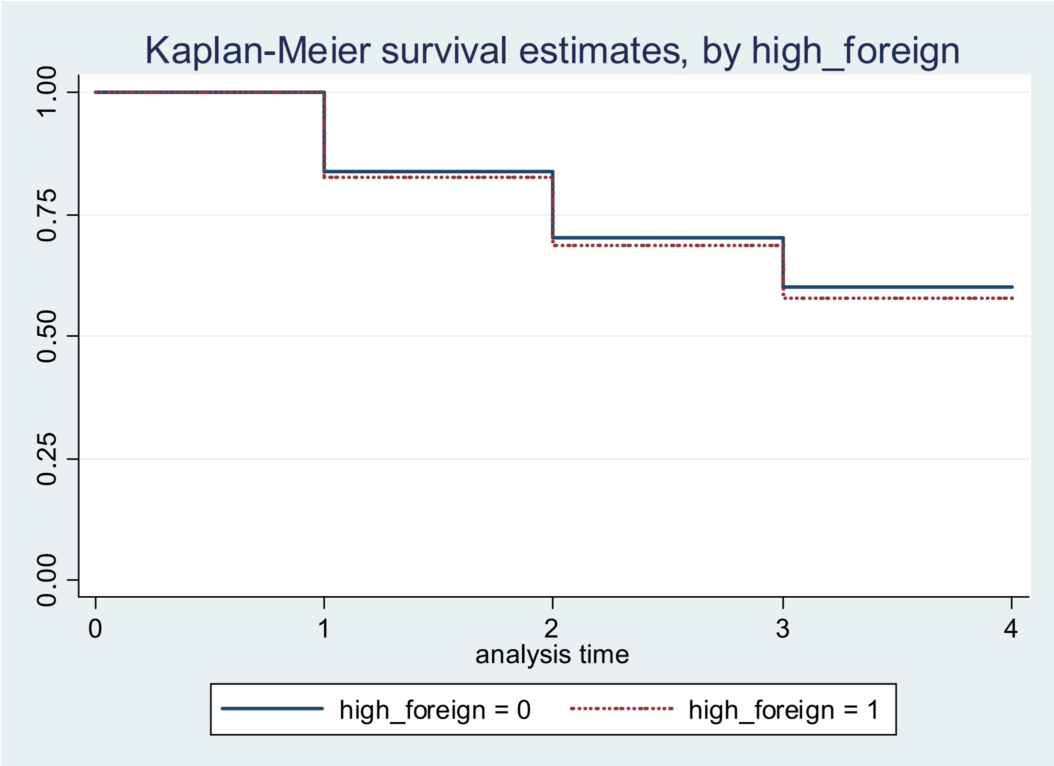
Notes:
(a) Heteroskedasticity consistent standard error in parentheses. Z-values reported where negative value implies a reduction in death hazard i.e. an increase in survival
(b) *** , ** and * imply Z-value significant at 1, 5 and 10 per cent level, respectively.
(c) baseline hazard stratified by sector

Figure 1: Survival with foreign firm penetration in dynamic markets



	Observed events (failure)	Expected events (failure)	Sum of ranks
high foreign penetration	17623	16153.72	74741967
χ^2 (1)	343.29		
Pr χ^2	0.00		

Figure 2: Survival with penetration from foreign firms in static markets



	Observed events (failure)	Expected events (failure)	Sum of ranks
high foreign penetration	30105	29064	1.448E-08
χ^2 (1)	76.82		
Pr χ^2	0.00		

Appendix: Correlation table

	Startup size	c5	Industry growth	Median wage	MES	Foreign presence	Exit rate
Startup size	1.0000						
c5	0.0959*	1.0000					
Industry growth	-0.0053*	0.0001	1.0000				
Median wage	0.2441*	0.4082*	-0.0234*	1.0000			
MES	-0.0088*	-0.0210*	-0.0043*	-0.0751*	1.0000		
Foreign presence	0.0133*	0.1841*	0.0161*	0.0536*	-0.1689*	1.0000	
Exit rate	0.0489*	0.4734*	-0.0126*	0.2858*	-0.2051*	0.1386*	1.0000