Bring the boys back home:
The impact of foreign divestments on local firms

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Abstract

Divestments by foreign multinationals are an important phenomenon that is largely neglected in the literature. We use firm level panel data from China to estimate the impact of such divestments on the performance of domestic firms in the local economy. To the best of our knowledge, there is no empirical study that has looked at these effects. Our results suggest that, overall, domestic firms may be able to benefit from divestments by foreign firms through spillovers. We find evidence suggesting that the positive overall effect for private firms is driven by movement of workers from the divested firm to the local firm, as well as by a reduction in competition reducing crowding out. By contrast, local firms are negatively affected by loss of technology transfer and customer-supplier relationships with foreign firms. While most effects are short-lived, the negative impact on technology transfer persists over time.

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1 Introduction

In the post-covid world, many governments, who supported business through the pandemic, have started putting pressure on firms to bring jobs back to their home country. At the same time, Covid highlighted the vulnerability of lengthy supply chains, as did seemingly trivial events such as one ship getting stuck in the Suez canal. Similarly, the world appears to be entering a "new normal" phase of changing geopolitical relations impacting on firms, and particularly on international location decisions to an extent that we have not seen since the second world war[1].

This appears to be the continuation of a recent trend, with UNCTAD (2024) reporting not only a decline in global investment, but an increase in overall divestments, attributed to changes in firm strategy (see also Borga et al., 2020). This trend is likely to be exacerbated by policy, which in many countries over the last decade has moved towards more protectionist tones. As a case in point, the US trade war with China, commenced in 2018, and intensified recently, is likely to cast a long shadow.[2] Forbes magazine has argued that as a result of this trade war, US companies increasingly pull out of China.[3] In other words, they divest of their affiliates in China through either selling to a local owner or closing the affiliate, and move production facilities elsewhere. Such divestments, of course, have an impact on the local economy in the host country, in this case China. The nature and direction of such effects is not clear, though, and this is what we look at in this paper.

The typical policy response to the threat of divestment is to focus on the threats to employment. In this paper we argue that this partial evaluation fails to capture many of the threats, and domestic opportunities that may be caused by large scale foreign exit. We argue that one cannot simply see divestment as the opposite of investment. While demand effects, for labour, capital and intermediate goods of divestment may mirror those of investment, the supply side effects may vary significantly. That is to say that skills and knowledge which have already become embedded in the local economy will not simply leave with the foreign investor.

There is an extant literature on the effects from *incoming* FDI on local firms, prominent examples of which are Aitken and Harrison (1999), Javorcik (2004), Barrios et al. (2011) or Gorodnichenko et al. (2020). The basic idea behind this literature is that foreign firms are assumed to have a firm-specific-asset that gives it an advantage vis-à-vis purely

[1] For further discussion of this see Bhaumik et al (2025).

[2] https://www.reuters.com/business/chinese-exporters-brace-rat-race-shift-away-us-2025-02-13/ accessed 3rd March 2025

[3] https://www.forbes.com/sites/kenrapoza/2020/04/07/new-data-shows-us-companies-are-definitely-leaving-china/?sh=2c55b6cb40fe, accessed 7 January 2021

domestic firms and foreign owned firms often have better innovative performance than local firms (Girma et al., 2015). This asset (such as technology or knowledge) has some of the characteristics of a public good and can be transferred easily between firms (Görg and Strobl, 2001). The literature then argues that local firms may be subject to positive learning effects when multinationals locate in the host country, as the firm specific asset can spill-over to domestic firms through technology transfer, labour mobility, imitation or input-output linkages. Moreover, the competitive environment in the local economy will change, which may hurt domestic firms through crowding-out effects (Aitken and Harrison, 1999).

Divestments by multinationals may reverse some – though not all - of these effects (Fang et al., 2022, Mohr et al, 2020, Javorcik and Poelhekke, 2017). Let us consider this in a simple conceptual framework (Figure 1), which takes as its basis the conceptual framework for understanding knowledge flows and spillovers from Driffield et al (2010). A divestment by a foreign firm firstly means that this firm will disperse of part or all of its assets in the host country. These may or may not be bought by other firms in the domestic economy. This reduction in operations by the foreign firm means, in the short term, a reduction in output that the firm produces. It also means an end to knowledge transfer from the parent to the local affiliate. In turn while spillovers from the affiliate to the local economy, based on previous knowledge flows may continue, spillovers fuelled by further knowledge flows are curtailed. Simultaneously, any reduction in output also means a reduction in labour demand by the firm. What are the implications of these factors for local firms in the vicinity – that may have previously benefited from spillovers from the foreign firm?

Firstly, the reduction in output leads to a change in the competitive environment. The foreign firm as an important competitor scales down their engagement which can crowd-in domestic firms in a reversal of the above-mentioned crowding-out effect. Hence, local firms may sell more and improve their competitive position in terms of increased market shares. However, also in a reversal of positive effects, the reduction in output by the foreign firm reduces input-output linkages with domestic supplier and customer firms. These are, hence, likely to be hurt by the divestment.

Secondly, if one considers the models of international knowledge transfer via FDI (see for example Glass and Saggi, 2002, Fosfuri et al., 2001) then divestment implies a cessation in transfer of knowledge from the parent to the affiliate. This in turn stops the positive knowledge transfer to the domestic economy in the form of spillovers, reducing the capacity of local firms to generate new knowledge themselves.

Thirdly, a divestment by a foreign firm and the resulting decrease in output produced may reduce labour demand in the firm. One possible benefit of this is that more skilled workers will be available to the domestic sector at a lower price, following the fall in labour demand. These workers will embody some of the knowledge and

technological know-how from the foreign firm, which can then be adopted in the domestic firm that hired the workers (Fosfuri et al., 2001). This can lead to positive spillovers to the local firms which employ these workers, as shown empirically by, e.g., Görg and Strobl (2005) or Balsvik (2011). While only relatively few workers may leave a multinational while it still operates, a divestment is similar to a "mass lay-off" with workers being freed to look for new employment possibilities. All of these laid-off workers embody some degree of knowledge from the multinational which can be usefully applied in the new local firm. Hence, positive spillovers through labour mobility can be expected after divestment. This is hence a potential channel that is not the opposite of an investment effect but one through which divestments may positively affect local firms' performance.

Put together, this discussion shows that what may happen to domestic firms once multinationals pull out of the host economy is an empirical question. Disappearance of technology transfer and likely fewer input-output links will have adverse implications, while less crowding out and more labour mobility may be positive for local firms.

To the best of our knowledge, there is no empirical study that has looked at these effects empirically in detail or collectively. Si and Luo (2024) explore the productivity effects of divestment, but only consider the knowledge transfer effects in buyer-supplier relationships rather than the wider basket of effects outlined above. This is the void we attempt to fill in this paper. We use firm level panel data from China to estimate the impact of divestments by foreign firms on the performance of domestic firms in the local economy. Specifically, we use a strategy similar to that used to look at spillovers from inward FDI on local firms, but rather than calculating the importance of new or existing multinationals in an industry we look at the share of divested foreign affiliates in an industry-location. We investigate how changes in this share affect the performance of local firms, measured in terms of productivity. As in the FDI spillovers literature, we consider effects in the same industry and location, as well as in vertically related industries to capture input-output linkages.

By looking at the impact of foreign divestments on the performance of local firms our paper brings together three strands of literature. The first is the already mentioned literature on spillovers from inward foreign investments. Here our contribution is to look at the other side of the coin, namely the pulling out of foreign owners. This may not necessarily be the exact opposite of spillovers from inward FDI in particular because of the highlighted role of labour mobility. The second strand is the recent and growing literature on mass lay-offs from large firms (examples being Jofre-Monseny et al., 2018, Foote et al., 2015, Eliason and Storrie, 2006), which mainly focuses on labour market effects of such events. In contrast, we consider the implications for the performance of local firms. Moreover, there are a number of studies on the impact of divestments, though they look either at the implications for the parent company that

undertakes the divestment (e.g., Zschoche, 2016, Engel and Procher 2013) or at the effect on the divested affiliate (Fang et al., 2022, Mohr et al., 2020, Javorcik and Poelhekke, 2017). We, instead, look at the effect of the divestment on other local firms in the domestic economy.

Our findings show that there is an overall positive effect of foreign divestment on local firms' productivity in the same industry and location. To identify this effect, we use an instrumental variables approach utilizing arguably exogenous changes to Chinese FDI policy across sectors, similar to Lu et al. (2017). Our main result is robust to a number of alternative specifications and estimation methods. We also attempt to investigate the importance of various channels that may be driving these effects as suggested by the literature on FDI spillovers. We find evidence suggestive of positive effects stemming from worker mobility and a reduction in competition. By contrast, we find evidence in line with negative effects through divestments on technology transfer. Furthermore, divestments in vertically related industries have negative effects on domestic firms' performance, in line with the idea that severing customer-supplier linkages hurt domestic firms.

The remainder of the paper is structured as follows. Section 2 describes our empirical approach, and Section 3 introduces the data used. We discuss our estimation results in Section 4 and dig into the possible mechanisms driving these results in Section 5. Finally, Section 6 concludes.

2 Estimation Specification

2.1 Basic estimation model

In order to estimate the impact of divestments on local firms, we follow the literature on spillovers from foreign direct investments. The basic idea in that literature is to gauge how performance – usually measured as productivity – of domestic firm *i* is impacted by the presence of foreign firms in the industry j (where j could be either the same or vertically related industries) and location k. Foreign presence is then usually measured in terms of the share of employment in foreign owned firms in industry *j* and location *k* (e.g., Aitken and Harrison, 1999, Barrios et al., 2011, Newman et al. 2015).

We start off with this idea, but instead of considering foreign investments our focus is on foreign divestments. Hence, we measure the importance of foreign divestments in industry *j* and location *k*. To be more specific, we estimate a baseline model of the following form

$$lny_{ijkt} = \alpha_0 + \alpha_1 FDS_{jkt} + \boldsymbol{X'_{ijkt}}\beta + d_i + d_{jt} + d_{kt} + \varepsilon_{ijkt} \quad (1)$$

where i, j, k and t denote the firm, four-digit industry, municipality and year respectively. y_{ijkt} measures the performance of firm i in industry j and municipality k, $\boldsymbol{X_{ijkt}}$ is a vector of time varying control variables, which are described in more detail below. To control for further unobservables, full sets of four-digit industry respectively province specific time trends (d_{jt}, d_{kt}) as well as firm fixed effects (d_i) are included. The remaining error term is clustered at four-digit industry – municipality level. As our concern is the impact of foreign divestments on local firms, we estimate this model only for firms *i* that are in purely domestic private ownership.

FDS_{jkt} is the key dependent variable indicating the share of employment in foreign divested firms (B) relative to all firms (foreign and domestic) in the four-digit industry – municipality cell. It is defined as

$$FDS_{jkt} = \frac{\sum_{i \in B} for_{it} * employment_{ijkt-1}}{\sum_i employment_{ijkt}} \quad (2)$$

Note that the summation in the denominator excludes firm i. The employment of foreign divested firms is weighted by the firm's actual foreign ownership share for_{it}.[4]

Divestment can occur through two means: either the full closure of the affiliate, or the selling of an affiliate to a domestic owner – an issue we come back to later. If divestment is through closing the affiliate, then the unit disappears from the data set. Hence, closure in time *t* implies disappearance from the data set in t as well. As this means that we cannot observe employment in divested firms in time *t* if the firm is closed in time t, we measure employment in divested affiliates in *t*-1.

To measure the performance of domestic firms we focus on productivity. This is, in the first instance done by estimating an augmented production function (as in e.g., Javorcik, 2004). In this case, y in equation (1) is defined as (log) output, and the vector of controls X includes (log) employment, capital stock and intermediate inputs. In order to take account of the well-known simultaneity problem in the estimation of productivity, and to allow for further heterogeneity, we also implement the approach of Levinsohn and Petrin (2003) to calculate TFP from the residual of a simple production function. We then use this TFP measure as an alternative dependent variable. Furthermore, we use profitability and the debt to asset ratio as further alternatives in a robustness check below.

The identifying assumption in equation (1) is that conditional on covariates included in the model – in particular firm fixed effects - changes in FDS are exogenous to changes

[4] As a robustness check we also use an alternative definition, where we use a dummy indicating foreign ownership rather than the foreign ownership share. This does not change results substantively. Results are not reported here to save space but are available from the authors.

in domestic firms' performance. Much of the literature is based on this assumption (e.g., Aitken and Harrison, 1999; Javorcik, 2004). Whether or not this assumption is realistic depends on the choice of control variables. We control for four-digit industry and province time effects in order to allow for sectoral or geographic characteristics driving divestment. Crucially, we also control for further variables varying by industry-municipality-time. These are the employment share in foreign owned firms (the variable generally included in analyses of spillovers from FDI) in the industry-municipality (FS_{jkt}), the degree of industry j's concentration in k measured by the Hirschman-Herfindahl Index, the scale of industry j in municipality k measured by log of total production, competition from state-owned firms of industry j in k measured by the production share of SOEs, and the employment share of closed domestic firms to control for mass lay-offs in the industry-municipality. At the firm level, we include time invariant fixed effects as well as the firm's export share and firm age.

2.2 Instrumental variables approach

Even with this battery of time varying and time invariant control variables one may still question whether the identifying assumption holds. There may be unobservable variables that are not strongly correlated with the controls and hence may introduce endogeneity bias. Existing empirical studies on the determinants of divestments show that deteriorations in economic conditions in the host country, in terms of growth, labor cost, employment protection or institutional quality (Benito, 1997, Belderbos and Zou, 2006, Dewit et al., 2018, Song, 2014), or adverse changes in the subsidiaries themselves regarding, e.g., ownership structure, human capital, productivity, or international performance (Mata and Portugal, 2000; Engel et. al.,2013; Tan and Sousa, 2017) may affect a multinational firm's divestment decision. This suggests that foreign firms may be more likely to pull out of industries or locations that face worsening conditions, and in these industries or locations domestic firms may also be performing poorly. Hence, not controlling for such likely selection would induce a negative bias.

In order to assuage such concerns, we follow an instrumental variables strategy as introduced by Lu et al. (2017) which exploits changes in China's FDI policy following WTO accession. In 1995 China established a Catalogue for the Guidance of Foreign Investment Industries, with some amendments added in 1997. This Catalogue classifies narrowly defined industries or products into four categories related to the treatment of foreign investment: (i) supported, (ii) permitted, (iii) restricted and (iv) prohibited. Due to pressure to comply with commitments for WTO accession, this Catalogue was changed further in 2002. Given the nature of the pressure to change, these amendments can arguably be seen as exogenous (Lu et al., 2017). We use these changes in FDI regulations in 2002 as an instrument for the key regressor FDS_{jkt}.

To define the instrument, we obtain information on changes in FDI regulation by

comparing the 1997 and 2002 version of the Catalogue, i.e., products changing between the aforementioned four categories. This is done by assigning scores to each category: prohibited category (score 0), restricted category (score 1), permitted category (score 2), supported category (score 3). Hence, each product has two scores assigned, one before (1997) and one after the policy change in 2002. We then calculate the difference in scores before and after the change. This gives us a measure that can take on values between -3 (supported in 1997, prohibited in 2002) and 3 (prohibited in 1997, supported in 2002). We then map the detailed products in the Catalogue to four-digit industries using ASIE/Chinese Industry Classification (CIC).[5,6] The instrument is then calculated as equal to the calculated change in score for all years after 2002, and zero before.[7]

We would expect that this instrument is strongly correlated with foreign divestment. The correlation should be negative: the more open an industry becomes for FDI, the less divestment we would expect to take place. We check the nature of the correlation in the first stage estimations.

Our key identifying assumption is that the policy change is exogenous, i.e., China was not in a position select specific sectors to open more. If it were the case that China picked particularly well (or poorly) performing sectors, this may invalidate this assumption. While this instrument exogeneity is not testable, we provide in Table A2 in the appendix information – at the two digit level – on the number of four digit sectors that became more or less open, and also contrast this to size and growth of the industry. As can be seen, while some high growth sectors (e.g., general equipment manufacturing) did indeed become more open other sectors with similar growth rates did not (e.g., furniture manufacturing). Also, sectors with more moderate growth performances also show a move towards more openness (e.g., chemical products). Hence, in line with Lu et al. (2017) we are reasonably confident that our instrumental variable can help to

[5] In 2003, a new industry classification system (GB/T 4754-2002) was adopted in China to replace the old classification system (GB/T 4754-1994) that has been used from 1995 to 2002. We use the concordance table constructed by Brandt, Van Biesebroeck and Zhang (2012) to get a consistent industry code over our sample period. After excluding Mining and Quarrying, Logging, Electricity, Gas and Water Supply, Repairing from our investigation, there are 480 4-digit industry manufacturing categories left in CIC.

[6] Table A1 in the appendix shows the distribution of the measure between -3 and 3. A complication in the calculation of the instrumental variable arises from the fact that for a small number of four digit industries we have more than one product. In this case we use the minimum score assigned to products in the industry as the basis for calculating the change. This, however, only affects 25 four digit industries. We also carried out robustness checks dropping these 25 industries from our sample. The results, which are available on request, are similar to those reported below, indicating that the 25 industries are not driving our findings.

[7] Lu et al. (2017) define an instrument as 1 if a product has become more "encouraged" and zero if there was no change in classification. Our definition uses more variation by considering the direction and severity of the change.

identify a causal effect of divestments at the industry-municipality level on local firms' productivity.

3 Data

We use firm level data from the Annual Survey of Industrial Enterprises (ASIE) for Chinese manufacturing covering the period 1998 to 2007. ASIE is constructed and maintained by the National Bureau of Statistics of China (NBSC) and reports the key financial data for all firms that are state-owned and for those that are private owned and have sales values of more than 5 million RMB (around USD 800,000). The included companies account for an estimated 85–90 percent of total output in manufacturing.

Following Cai and Liu (2009) and Feenstra et. al. (2014), and guided by the General Accepted Accounting Principles, we delete observations in our data set if any of the following rules are violated: (i) the total assets must be higher than the liquid assets; (ii) the total assets must exceed the total fixed assets; (iii) the total assets must exceed the net value of the fixed assets. We also drop observations with fewer than 10 employees as well as those were firms report non-sensical information on the establishment year. Finally, we only use data on private domestic firms in our analysis and drop state-owned enterprises, as the latter behave very differently to private firms.

Our definition of divestment encompasses both divestment by closure or by selling to domestic owners. Hence, a divestment occurs (i) if a firm is foreign owned in t-1 but disappears from the data in t, or (ii) if a firm that is foreign owned in t-1 changes its register type to domestic in t. Table 1 shows the timing of the divestments, distinguishing the two divestment types, and also reports the employment associated with divested firms. There are 51,452 divestments in our data, which represent roughly 15 percent of foreign owned firms. These divestments are associated with roughly 3.2 million jobs, accounting for about 16 percent of employment in foreign owned firms.

[Table 1 here]

As pointed out in the discussion of the instrumental variables in Section 2, Chinese FDI policy classifies industries into four categories with respect to their treatment of foreign firms. In "encouraged" and "permitted" categories, foreign investment can take the form of either wholly foreign owned affiliates or joint ventures between foreign and Chinese owners. In the "restricted" categories investments have to be through joint ventures, though exceptions are possible (Chen, 2011). In our data we observe both divestments by previously fully foreign owned affiliates as well as by shared ownership. Table A3 in the appendix gives the distribution of divestments by ownership. This shows that roughly half of all divestments relate to fully owned foreign affiliates.

The definition of our key dependent and independent variables used in the analysis, along with summary statistics are presented in the appendix Table A4.

4 Empirical results

4.1 Baseline regression

We present our baseline regression results in Table 2. The first column reports coefficients from an OLS regressions of equation (1), to establish a benchmark. The results show that the coefficient on FDS is close to zero and not statistically significant. This may not be too surprising as we argued above that the OLS result is likely to be biased due to negative selection at the industry-municipality level – even after including a large number of controls. Hence, we would expect the OLS coefficient to underestimate the true effect of FDS on firm performance.

In order to deal with this issue we turn to the IV estimate in column 2. The results of the first stage estimation show that the instrument is statistically significant and negatively correlated with FDS. In other words, as industries become more welcoming to FDI, the share of divestments by foreign firms decreases, which is as expected. The instrument also passes standard weak instrument tests.

In the IV estimation, the coefficient on FDS is statistically significant and positive. In other words, we find that increasing divestments in an industry-municipality affect productivity of local firms positively.[8] Taking the point estimates at face value, the coefficient in column 2 suggests that a doubling of FDS (which would be an increase by around 2 percentage points, see Table 2) yields an increase in productivity by about 11 percent (2 * 0.058 = 0.116). The estimate is hence not only statistically but also economically significant.[9]

A potential concern with the estimation in column 2 is that it also includes FS, the industry-municipality share of employment in foreign owned firms. This variable itself is also likely to be endogenous and affected by the instrument (Lu et al., 2017). As a first solution to this problem we simply drop FS from the estimation. The results of this exercise (column 3) show that the coefficient on the FDS variable remains very similar indicating that our finding of positive spillovers from divestments is unlikely to be biased due to the inclusion of FS.

Still, we also go a step further and treat FS itself as endogenous. In this case we have

[8] We are cautious to point out that for the interpretation of these effects we need to keep in mind that what we are finding is a Local Average Treatment Effect (LATE) that is relevant for domestic firms in the regions that were affected by the instrument (i.e., the policy change) – see Mogstad et al. (2018).

[9] In a robustness check, which is not reported here to save space, we add four-digit industry * province dummies. This does not change our results – the coefficient estimation on FDS is 0.0557 (statistically significant at 1 percent level). This is not surprising as this time-invariant dummy will be absorbed by the firm fixed effect for firms that do not move their location-industry. As this robustness check involves the inclusion of a large number of dummies, which is computationally cumbersome, we therefore refrain from including these dummies in the further analysis.

two endogenous variables, FDS and FS and we also need at least two instruments. We therefore calculate an additional instrument as the mean value of the score for the three-digit industry to which four-digit industry *j* belongs. We would expect this instrument also to be correlated with FDS and FS in the four-digit industries. The first stage results show that the two instruments are both statistically significant. The second stage results return a statistically significant and positive coefficient for FDS which is only marginally smaller in magnitude to the estimate reported in column (2). This, thus, supports our finding of a positive effect of foreign divestment in an industry-municipality on the productivity of local firms.

In the estimation thus far we only consider contemporaneous effects of foreign divestment on productivity in the same period. Hence, we assume a fairly immediate adjustment within firms. In order to see whether these effects remain in the longer term, we perform regressions where we consider one and two period lags. These are reported in columns (5) and (6). Indeed, we find that the effects peter out fairly quickly. The coefficients reduce in statistical significance (though not necessarily in magnitude) over time and are statistically insignificant after two years.

[Table 2 here]

4.2 Robustness

The definition of FDS used in the analysis thus far pools two modes of divestment: an ownership change from foreign to domestic, or a complete closure of a foreign affiliate. The latter may be somewhat noisy since our data are not a complete Census but only include private firms with sales of at least 5 million RMB. A drop below this threshold may (but does not necessarily have to) imply that a firm, even if it still exists, does not remain in the sample. In order to check whether this is likely to cause a problem in our analysis, we perform an alternative estimation where FDS is calculated including only foreign firms with sales of more than 800,000 USD in t-1 (which is close to the cut-off used in the sampling for ASIE, see section 3 above). In the appendix Table A5, we can see that our results are robust to this change in definition.

In order to ascertain whether our results are dependent on our one-step measure of productivity from an augmented production function we, in Table A6 in the appendix, present estimations that use alternative dependent variables. First of those is a measure of TFP calculated as the residual from a production function using the Levinsohn and Petrin (2003) estimation technique.[10] The others are measures of financial health of a firm, in particular profitability and the liquid asset ratio. The results show that these variables are also positively impacted by FDS. These results are in line with the idea

[10] The production functions are estimated by two digit industry.

that divestments increase the performance of local firms, suggesting that our results in Table 2 are not just an artefact of measurement.

5 Mechanisms

As discussed in our conceptual framework in the introduction, there are a number of possible ways that sector-location level foreign divestment could impact on the performance of local firms, namely, through the movement of labor from divested affiliates to local domestic firms (positive), a reduction in market competition (positive effect), the disappearance of technology transfer (negative) and a loss of backward and forward linkages (negative). We turn to further analysis in the next section in order to gauge the possible importance of these mechanisms.

5.1 Worker mobility

A divestment by a foreign firm, in particular if it is through closing the plant completely, will set free workers which may then move to domestic firms. These workers will embody some of the knowledge and technological know-how from the foreign firm, which can then be adopted in the domestic firm that hired the workers (Fosfuri et al., 2001). This is hence a potential channel through which divestments may positively affect local firms' performance.

In order to study such a mechanism we would ideally need linked employer-employee data, which would allow us to trace movements of workers between firms (as in, e.g., Balsvik, 2011; Görg and Strobl, 2005). Then we could identify workers that leave divested affiliates of foreign multinationals, see which domestic firms they move to, and analyse the implications for the local firms. Unfortunately, such data are not available to us.

Still, looking at changes in firm level employment may give us a first impression of whether or not this channel is likely to be important. Hence, we investigate the impact of foreign divestment on contemporaneous employment growth in local firms in the industry-municipality. This is done in Table 3. We find a positive and statistically significant coefficient on FDS for private firms, indicating that employment growth in local firms picks up as a result of divestments happening (column 1).

[Table 3 here]

Looking at overall employment growth of course does not allow us to say anything about the composition of workers. One may expect that workers moving from foreign to domestic firms bring additional skills, which should raise the average skill intensity in the local firm. While we do not have direct information on skills, we can look at the wage premium in a firm as an indicator reflecting skill composition (e.g., Chen et al., 2017). We use the difference between the average wage in a firm and the average wage

in the industry as a measure of the skill premium. Using this as an alternative dependent variable produces results reported in column (4) of Table 3. Here we also find a positive and statistically significant coefficient, suggesting that the firm-specific skill composition improves following divestments in the industry-region.

These two positive effects – while certainly no conclusive proof - are consistent with the idea that workers from divested foreign affiliates move to local private firms, thus boosting their employment and skill composition. As with the productivity effects, we find that the impact is immediate and peters out over time (columns 2-3 and 5-6).

5.2 Competition

Another channel we consider is changes in the level of competition. Divestments by foreign firms may reduce the potential crowding out of local firms on the domestic market which is generally argued to be an important negative factor of the presence of foreign investment in an industry (Aitken and Harrison, 1999). While such competition effects are difficult to identify, we firstly look at changes in local firms' domestic market shares as a result of divestments.

This is done in Table 4, where the dependent variable in column (1) is the domestic sales of firm *i* relative to total domestic sales in the industry-region. Results show that an increase in FDS has a positive effect on local firms' share of the domestic market. This supports the conjecture that local firms were inhibited by competition from foreign multinationals, and this pressure is lifted once the foreign affiliate leaves. Results in columns (2) and (3) again show that these effects are short-lived.

In column (4) we use as alternative measure of market concentration the Hirschman-Herfindahl index based on domestic market shares in the industry-region. The results show that market concentration increases as a result of FDS, supporting the result in column (1).

[Table 4 here]

5.3 Loss of technology transfer

While the overall estimated effect of foreign divestment in the local firm's industry is positive (from Table 2), one may perhaps expect negative effects through the loss of technology transfer. Such technology transfer, or rather the disruption of it, is of course not observable to the researcher. In order to approximate this issue empirically, we start from the idea voiced by Audretsch and Feldman (1996, p. 630) that "More than most other economic activities, innovation and technological change depend upon new economic knowledge". In the case of technology transfer taking place, the multinationals provide this "new economic knowledge" which is then transferred to local firms who in turn implement it to generate "innovation and technological change".

In order to measure such innovation activity on the part of the local firms, we use data on new patent applications. These are available from the Chinese State Intellectual Property Office and we link them to the ASIE dataset.[11] The idea is that technology transfer from foreign multinationals provides new knowledge to local firms which can then lead to new patent applications. Once this technology transfer stops (as a result of divestments) new knowledge ceases to come in, affecting negatively the ability to innovate and produce new patents. This does not necessarily imply a reduction in productivity in the short run, though, as the stock of technology available to the local firms remains constant. However, the knowledge already embodied in the workers may move with them to domestic firms, perhaps fostering patenting.

The results provided in Table 5 show that increases in FDS negatively affect new patent applications by local firms in the same industry-municipality (column 1). Note that we have information on three types of patenting - invention, utility and design patents, respectively. In terms of content, invention patents are likely to be the most technology intensive of the three types, followed by utility patents and then design patents. The results in column (1) include all three types, while column (4) only considers the more "innovative" invention patents. Results are fairly similar in both columns, however.

Looking at the longer term in columns (2) and (3) suggests that these negative effects persist over time. This is in contrast to the other aspects we looked at thus far, which all suggested immediate adjustments that then peter out. Here we find that the effect of divestments on generating new knowledge may be more persistent, reducing innovation activity even in the longer run.

[Table 5 here]

What may be driving these negative effects – given that we have argued above that there may be movement of skilled workers from the foreign divested firm to local firms. They bring with them established knowledge, but the transfer of cutting edge knowledge from the multinational to the divested affiliate has stopped. Also, much of patenting relies on collaboration with partners, and these networks may have been destroyed by the divestment. In Table A7 in the appendix we just consider patents that have more than one inventor, i.e., that were generated in a collaborative effort with partners. We can see that foreign divestment in the industry-municipality reduces the number of collaboratively generated patents, which supports our conjecture.

5.4 Backward and forward dis-linkages

In the literature on spillovers from foreign direct investment, vertical input-output

[11] We match the firm name in ASIE with the patent assignee name first, then aggregate the total number of patent applications by firm and year using an algorithm as in He et al., (2016).

relationships are generally considered as the most important channel for positive effects (e.g., Havranek and Havrankova, 2011). In our empirical model thus far, the share of divestments is calculated for the same industry and municipality in which firm i operates. In order to see whether such vertical linkages are also important channels for effects through divestments, we therefore turn to calculating FDS for vertically related industries.

To do so we follow the established literature (e.g., Görg and Strobl, 2002, Javorcik, 2004, Barrios et al., 2011) to calculate upstream and downstream linkages. Specifically, we generate industry's backward and forward foreign divestment variables as

$$FDS\_B_{jkt} = \sum_{m\ if\ m \neq j} a_{jm} \times FDS_{mkt} \tag{4}$$

$$FDS\_F_{jkt} = \sum_{m\ if\ m \neq j} a_{mj} \times FDS_{mkt} \tag{5}$$

where a_{jm} is the ratio of sector j's output supplied to sector m and vice versa for a_{mj}. The input-output information is compiled from China's 2002 Input–Output Table.

In order to allow for the possible endogeneity of these new regressors, we calculate instruments for FDS_B_{jkt} and FDS_F_{jkt} as $\sum_{m\ if\ m \neq j} a_{jm} \times Treatment_m \times Post02_t$ and $\sum_{m\ if\ m \neq j} a_{mj} \times Treatment_m \times Post02_t$, respectively.

The estimation results including divestments in backward and forward related industries are shown in Table 6. Importantly, the inclusion of these vertical variables does not affect the sign or significance of the effect of divestments in the same industry, which remains positive. Turning to the vertical FDS variables we find that there are negative effects from both divestments in forward and backward vertically related industries, that is, from divestments in industries to which local firms supply inputs and to which they sell output. In particular the negative impact through forward linkages also persists in the longer term (columns 2 and 3).

[Table 6 here]

5.5 Distinguishing exits and sales divestments

As we pointed out above, our definition of FDS combines two modes of divestment: an ownership change from foreign to domestic through a sale to a domestic owner, or a complete closure and exit of a foreign affiliate. In Table A8 we distinguish these two

types of divestments and calculate two different measures of FDS by sale and by exit, respectively. Including both of them in regressions using the modes we estimated above shows that we only find statistically significant effects in line with our earlier results for divestments by sale. They increase productivity by local firms, employment growth (though not statistically significant), wage premium and local market share, and reduce patent activity in local firms in the industry-municipality. This is not the case for divestments by exit.

An explanation may be the different characteristics of the two divestments. As we show in the appendix Table A9, firms that are divested through sale were, before the divestment, on average larger, more productive, with a higher skill level and higher market share than divestments by exit. In other words, they performed better. There is also some indication that divestments by sales have less patenting activity than exit divestments, though this difference is not statistically significant.

6 Conclusions

This paper presents an empirical analysis of the impact of divestments by foreign owned firms on the productivity performance of domestic firms. Divestments by multinationals are important and increasing, yet neglected by the literature thus far. We fill this gap in the literature, using firm level data for China. To the best of our knowledge, there is no empirical study that has looked at these effects in detail.

We estimate the impact of divestments by foreign firms using a strategy similar to that used to look at spillovers from inward FDI on local firms, where we calculate the employment share of divested affiliates in an industry-location. We then investigate how changes in this share affect the performance of local firms, using changes in Chinese FDI policy as instruments.

Our results suggest that, overall, private domestic firms may be able to benefit from divestment of foreign firms through spillovers. This result is robust to a number of different specifications. In a first stab at possible mechanisms driving such results, we look at four issues that the literature on FDI spillovers suggests: worker mobility, technology transfer, competition, and customer-supplier linkages. We find evidence suggesting that the positive overall effect for local firms is possibly driven by movement of workers from the divested firm to the local firm, as well as by a reduction in competition reducing crowding out. By contrast, firms are negatively affected by loss of technology transfer and customer-supplier relationships with foreign firms. While most effects are short-lived, the negative impact on technology transfer (measured using patent data) persists over time perhaps suggesting that, in the longer term, the loss of technology may be problematic.

A further exploration of the mechanisms may be useful in order to obtain a more detailed picture of how firms adjust to divestments. For example, with linked employer-

employee data one may be in a position to provide more detail on labour mobility from foreign divested to domestic firms. Also, more extensive information on technology transfer may be useful to investigate that channel in more detail. This provides promising avenues for further research.

From a policy perspective our paper aims to stimulate debate on the impact of foreign divestments for host countries, a much-neglected topic but one likely to gain in importance with the backlash against globalization experienced in recent years. As our analysis shows, such divestments do not necessarily imply that the host country be hurt by the disappearance of the foreign companies. This is an important point to consider, not only for China, but also for other host country governments in developing and emerging economies that have relied heavily on attracting foreign direct investment to stimulate their economic development.

References

Aitken, B. J., and Harrison A. E. 1999. Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. American Economic Review, 89 (3): 605–618.

Audretsch, D.B., and Feldman, M.P., 1996. R&D Spillovers and the Geography of Innovation and Production, American Economic Review, 86(3): 630–640.

Balsvik, R., 2011, Is labor mobility a channel for spillovers from multinationals? Evidence from Norwegian manufacturing, Review of Economics and Statistics, 93(1): 285–297.

Barrios, S., Görg, H., and Strobl, E., 2011. Spillovers through backward linkages from multinationals: Measurement matters!, European Economic Review, 55(6), 862-875

Belderbos R, Zou J. 2006. Foreign investment, divestment and relocation by Japanese electronics firms in East Asia, Asian Economic Journal, 20(1): 1–27.

Benito, G. 1997. Divestment of foreign production operations. Applied Economics, 29(10): 1365–1378.

Bhaumik, S.K. Driffield, N. Estrin, S. and Razeq, Z.M. (2025) Geopolitical alignment, outside options, and inward FDI: An integrated framework and policy pathways. Journal of International Business Policy, forthcoming

Borga M., Ibarlucea-Flores P., and Sztajerowska, M., 2020. Divestment Decisions by Multinational Enterprises: Trends, Impacts, and Drivers – A Cross-country Firm-level Perspective, OECD Working Papers on International Investment, No. 2019/03, OECD Publishing, Paris.

Cai, H., Liu, Q. 2009. Competition and corporate tax avoidance: Evidence from Chinese industrial firms. Economic Journal, 119(537): 764-795.

Chen, B., Yu, M., Yu, Z. 2017. Measured skill premia and input trade liberalization: Evidence from Chinese firms. Journal of International Economics, 109: 31-42.

Chen, C., 2011. The development of China's FDI laws and policies after WTO accession. In: Golley, J., Song, L. (Eds.). Rising China: Global Challenges and Opportunities, ANU E Press, 85–98.

Dewit, G., Görg, H., and Temouri, Y., 2018. Employment Protection and Firm Relocation: Theory and Evidence. Economica, 86(344): 663–688.

Driffield, N Love, J.H. and Menghinello, S. (2010) The Multinational Enterprise as a Source of International Knowledge Flows: Direct Evidence from Italy. Journal of International Business Studies, 41 (2) pp. 350-359

Eliason, M., and Storrie, D., 2006. Evidence on the Long-Term Effects of Job Displacement, Journal of Labor Economics, 24(4): 831–856.

Engel, D., Procher, V., and Schmidt, C., 2013. Does firm heterogeneity affect foreign

market entry and exit symmetrically? Empirical evidence for French firms. Journal of Economic Behavior & Organization, 85: 35–7.

Fang, G., H. Görg, A. Hanley, H. Mao, 2022, Foreign Divestment – Crisis or Chance for China's Innovation Edge?, China & World Economy, 30(6), pp. 1–33.

Feenstra, R. C., Li, Z., Yu, M. 2014. Exports and credit constraints under incomplete information: Theory and evidence from China. Review of Economics and Statistics, 96(4): 729–744.

Foote, A., Grosz, M., and Stevens, A. H., 2015. Locate Your Nearest Exit: Mass Layoffs and Local Labor Market Response, National Bureau of Economic Research Working Paper, No. w21618

Fosfuri, A., Motta, M. and Rønde, T., 2001. Foreign Direct Investment and Spillovers through Workers' Mobility, Journal of International Economics 53, 205–222.

Girma S, Gong Y, Görg H, et al. Investment liberalisation, technology take-off and export markets entry: Does foreign ownership structure matter?. Journal of Economic Behavior & Organization, 2015, 116: 254-269.

Glass, A. J., & Saggi, K. (2002). Multinational firms and technology transfer. Scandinavian Journal of Economics, 104(4), 495-513.

Görg, H., and Strobl, E., 2001. Multinational companies and productivity spillovers: A meta-analysis, Economic Journal, 111(475): F723–F739.

Görg, H., and Strobl, E., 2002. Multinational companies and indigenous development: An empirical analysis, European Economic Review, 46(7): 1305–1322.

Görg, H., and Strobl, E., 2005. Spillovers from foreign firms through worker mobility: an empirical investigation, Scandinavian Journal of Economics, 107(4): 693–709.

Gorodnichenko, Y., Svejnar, J., and Terrell, K., 2020. Does Foreign Entry Spur Innovation?, European Economic Review 121, 103343

Havranek, T., and Havrankova, Z., 2011, Estimating Vertical Spillovers from FDI: Why Results Vary and What the True Effect Is, Journal of International Economics 85(2): 234–244.

He, Z., W. Tong, T., Zhang, Y., and He, W., 2016. Construction of a Database Linking SIPO Patents to Firms in China's Annual Survey of Industrial Enterprises 1998~2009. https://www.researchgate.net/publication/311323404_Construction_of_a_Database_Linking_SIPO_Patents_to_Firms_in_China's_Annual_Survey_of_Industrial_Enterprises_1998-2009.

Javorcik, B.S., 2004. Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages, American Economic Review, 94(3): 605–627.

Javorcik B, and Poelhekke S., 2017. Former foreign affiliates: Cast out and outperformed? Journal of the European Economic Association, 15(3): 501–539.

Jofre-Monseny, J., Sanchez-Vidal, M., and Viladecans-Marsal, E., 2018. Big plant closures and local employment, Journal of Economic Geography, 18 (1), 187–211

Levinsohn J, and Petrin A., 2003. Estimating production functions using inputs to control for unobservables, The Review of Economic Studies, 70(2): 317–341.

Lu, Y., Tao, Z., Zhu, L. 2017. Identifying FDI spillovers, Journal of International Economics, 107(7): 75-90.

Mata J, and Portugal P., 2000. Closure and divestiture by foreign entrants: the impact of entry and post-entry strategies, Strategic Management Journal, 21(5): 549–562.

Mogstad, M., A. Santos and A. Torgovitsky, 2018, Using Instrumental Variables for Inference About Policy Relevant Treatment Parameters, Econometrica, 86(5), 1589-1619

Mohr, A., Konara, P., and Ganotakis, P. 2020. Explaining the performance of divested overseas subsidiaries, International Business Review, 29(1): 101602.

Newman, C., Rand, J., Talbot, T., and Tarp, F., 2015. Technology Transfers, Foreign Investment and Productivity Spillovers, European Economic Review, 76: 168–187.

Si, C., Luo, C. The productivity spillover effect of foreign divestment: Evidence from Chinese industrial enterprises[J]. Journal of Asian Economics, 2024, (95): 101824.

Song, S., 2014. Unfavorable market conditions, institutional and financial development, and exits of foreign subsidiaries, Journal of International Management, 31(2): 455–471.

Tan, Q., and Sousa, C., 2018. Performance and business relatedness as drivers of exit decision: A study of MNCs from an emerging country, Global Strategy Journal, 8(4): 612–634.

UNCTAD. 2024. World Investment Report 2024, United Nations, Geneva.

Zschoche, M., 2016. Performance Effects of Divesting Foreign Production Affiliates: A Network Perspective, Long Range Planning, 49(2): 196–206.

Figure 1: Simple conceptual framework

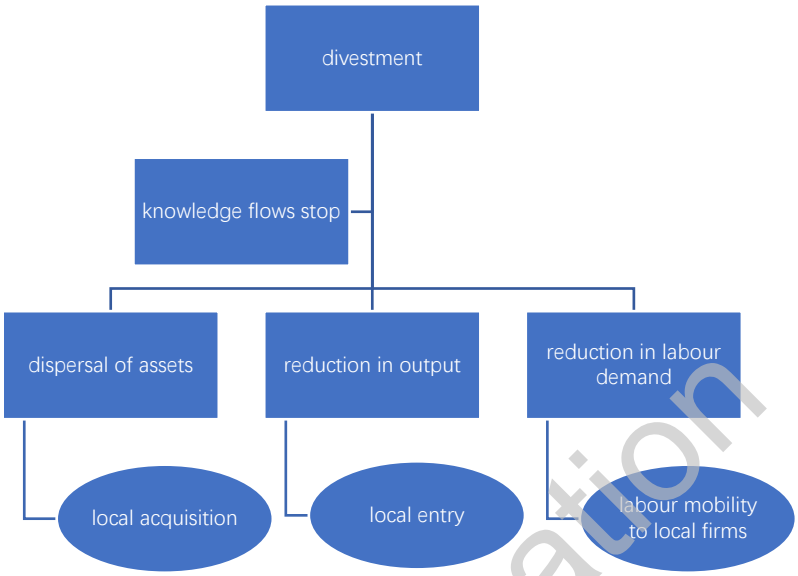

Table 1: Yearly number and share of divested foreign firms

Number of divested foreign firms and share of all foreign firms				
year	foreign divested firms	closed foreign firms	sold-out foreign firms	Share of total foreign firms
1999	4389	2856	1533	18.21%
2000	3701	2384	1317	14.33%
2001	4469	2980	1489	15.70%
2002	3871	2232	1639	12.56%
2003	3839	2033	1806	10.96%
2004	5898	3745	2153	11.48%
2005	8312	5105	3207	16.35%
2006	6451	3247	3204	11.79%
2007	10522	7389	3133	19.13%
Total	51452	31971	19481	14.45%
employment of divested foreign firms and share of all foreign firms (thousands)				
1999	1073.36	500.05	550.50	14.39%
2000	934.35	475.51	447.11	12.05%
2001	1133.39	602.62	527.31	13.48%
2002	924.08	376.02	539.85	10.14%
2003	907.79	347.15	557.60	9.08%
2004	1412.52	707.86	673.34	11.77%
2005	1930.55	931.48	989.93	11.84%
2006	1520.84	556.69	959.19	8.59%
2007	3204.29	2108.17	1095.33	16.18%
total	13041.17	6605.54	6340.16	12.02%

Note: Firms with foreign share more than 25% are defined as foreign firms.

Table 2
The impact of foreign divestment on private firm's output

	(1)	(2)	(3)	(4)	(5)	(6)
	lny_{ijt}	lny_{ijt}	lny_{ijt}	lny_{ijt}	lny_{ijt+1}	lny_{ijt+2}
FDS_{jkt}	-0.0000	0.0578***	0.0557***	0.0499***	0.2014*	0.0381
	(-0.35)	(2.61)	(2.74)	(2.62)	(1.93)	(0.98)
FS_{jkt}	0.0002***	-0.0004		0.0009	0.0024	0.0040
	(2.84)	(-1.29)		(0.57)	(0.48)	(1.60)
				First-stage estimation		
		FDS_{jkt}	FDS_{jkt}	FDS_{jkt}	FS_{jkt}	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}
$Treatment_j \times Post02_t$		-0.0994***	-0.1057***	-0.0792**	-1.4318***	-0.0528*	-1.3446***	-0.0624*	-1.4959***
		(-3.30)	(-3.52)	(-2.27)	(-15.16)	(-1.69)	(-13.67)	(-1.74)	(-14.81)
$Mean\_FDI\_score_{jt}$				-0.0598	1.7491***	-0.0158	1.9002***	-0.0492	2.0536***
				(-1.19)	(13.48)	(-0.36)	(14.21)	(-0.93)	(15.41)
Sanderson-Windmeijer multivariate F test		10.89 [0.0010]	12.36 [0.0004]	11.74 [0.0006]	133.12 [0.0000]	4.76 [0.0291]	63.83 [0.0000]	8.10 [0.0044]	219.24 [0.0000]
Underidentification test (Kleibergen-Paap rk LM statistic)		10.93 [0.0009]	12.39 [0.0004]	11.79 [0.0006]		4.73 [0.0296]		7.99 [0.0047]	
Weak-instrument-robust inference (Anderson-Rubin Wald test)		19.02 [0.0000]	19.91 [0.0000]	10.03 [0.0000]		10.73 [0.0000]		2.35 [0.0953]	
Other variables	YES	YES	YES	YES		YES		YES	
Industry dummies╳Year	YES	YES	YES	YES		YES		YES	
Province dummies╳Year	YES	YES	YES	YES		YES		YES	
Firm fixed effect	YES	YES	YES	YES		YES		YES	
Observations	1040423	949556	949556	949556		649295		442840	

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively. Standard error term clustered at industry-city level. Column (1) shows the result of OLS.

Table 3

Labour mobility: The impact of foreign divestment on local firms' employment growth

	(1) emp_growth_{ijt}	(2) emp_growth_{ijt+1}	(3) emp_growth_{ijt+2}	(4) $wage\_premium_{ijt}$	(5) $wage\_premium_{ijt+1}$	(6) $wage\_premium_{ijt+2}$
FDS_{jkt}	0.0575**	0.0008	-0.0111	0.1746***	0.2716**	0.0252
	(2.05)	(0.03)	(-0.60)	(2.95)	(2.09)	(0.79)
FS_{jkt}	-0.0014	-0.0012	0.0012	0.0021	-0.0038	-0.0031
	(-0.69)	(-0.88)	(0.97)	(0.46)	(-0.61)	(-1.63)
First-stage estimation						
	FDS_{jt} FS_{jt}	FDS_{jt} FS_{jt}	FDS_{jt} FS_{jt}	FDS_{jt} FS_{jt}	FDS_{jt} FS_{jt}	FDS_{jt} FS_{jt}
$Treatment_j \times Post02_t$	-0.0555 -1.3924***	-0.0524* -1.3445***	-0.0676* -1.4994***	-0.0764** -1.4317***	-0.0521* -1.3439***	-0.0627* -1.4946***
	(-1.47) (-13.16)	(-1.67) (-13.66)	(-1.88) (-14.61)	(-2.20) (-15.14)	(-1.66) (-13.66)	(-1.75) (-14.80)
$Mean\_FDI\_score_{jt}$	-0.0537 1.6628***	-0.0176 1.8999***	-0.0450 2.0654***	-0.0604 1.7472***	-0.0175 1.9000***	-0.0518 2.0522***
	(-0.97) (11.63)	(-0.40) (14.22)	(-0.85) (15.21)	(-1.21) (13.46)	(-0.39) (14.22)	(-0.98) (15.40)
Sanderson-Windmeijer multivariate F test	6.43 92.20 [0.0112] [0.0000]	4.89 71.66 [0.0270] [0.0000]	8.44 184.85 [0.0037] [0.0000]	11.35 136.18 [0.0008] [0.0000]	4.83 71.06 [0.0280] [0.0000]	8.45 229.22 [0.0037] [0.0000]
Underidentification test (Kleibergen-Paap rk LM statistic)	6.43 [0.0115]	4.86 [0.0274]	8.33 [0.0039]	11.40 [0.0007]	4.80 [0.0285]	8.33 [0.0039]
Weak-instrument-robust inference (Anderson-Rubin Wald test)	5.07 [0.0063]	0.42 [0.6577]	0.59 [0.5568]	20.89 [0.0000]	19.53 [0.0000]	1.71 [0.1801]
Other variables	YES	YES	YES	YES	YES	YES
Industry dummies╳Year	YES	YES	YES	YES	YES	YES
Province dummies╳Year	YES	YES	YES	YES	YES	YES
Firm fixed effect	YES	YES	YES	YES	YES	YES
Observations	697585	649295	434873	948586	648851	442663

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively. Standard error term clustered at industry-city level.

Table 4
Competition: The role of the domestic market share

	(1) $dom\_sale\_share_{ijt}$		(2) $dom\_sale\_share_{ijt+1}$		(3) $dom\_sale\_share_{ijt+2}$		(4) hhi_{jkt}	
FDS_{jkt}	1.4198**		0.7697		-0.1466		0.0062**	
	(2.06)		(0.85)		(-0.33)		(2.19)	
FS_{jkt}	0.4233***		0.0171		-0.0460		0.0028	
	(3.11)		(0.18)		(-0.61)		(0.77)	
	First-stage estimation (dependent variable: FDS_{jt}/FS_{jt})							
	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}
$Treatment_j \times Post02_t$	-0.1289	-1.4314***	-0.0808	-1.3399***	-0.1490**	-1.4885***	0.2577	-0.8643***
	(-1.52)	(-15.13)	(-1.35)	(-13.60)	(-2.05)	(-14.72)	(0.83)	(-15.98)
$Mean\_FDI\_score_{jt}$	-0.1902	1.7432***	-0.0803	1.8886***	-0.0991	2.0386***	-2.2475***	2.0594***
	(-1.46)	(13.42)	(-0.66)	(14.11)	(-0.66)	(15.29)	(-3.31)	(27.19)
Sanderson-Windmeijer multivariate F test	8.15 [0.0043]	218.11 [0.0000]	3.61 [0.0573]	212.70 [0.0000]	7.42 [0.0065]	161.88 [0.0000]	9.55 [0.0020]	13.41 [0.0003]
Underidentification test (Kleibergen-Paap rk LM statistic)	8.12 [0.0044]		2.88 [0.0897]		5.72 [0.0168]		7.64 [0.0057]	
Weak-instrument-robust inference (Anderson-Rubin Wald test)	13.85 [0.0000]		0.52 [0.5974]		0.30 [0.7373]		14.82 [0.0000]	
Other variables	YES		YES		YES		YES	
Industry dummies╳Year	YES		YES		YES		YES	
Province dummies╳Year	YES		YES		YES		YES	
Firm fixed effect	YES		YES		YES		YES	
Observations	947542		647927		441912		333713	

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively. HHI is the Herfindahl-Hirschman Index in the industry-city level. Standard error term clustered at industry-city level.

Table 5

Technology transfer: Effect of divestments on patenting in local firms

	(1) $ln\ (1+patent_{ijt+1})$		(2) $ln\ (1+patent_{ijt+2})$		(3) $ln\ (1+patent_{ijt+3})$		(4) $ln\ (1+inv_{ijt+1})$	
FDS_{jkt}	-0.0534***		-0.0511***		-0.0408***		-0.0454***	
	(-2.86)		(-2.74)		(-2.83)		(-2.81)	
FS_{jkt}	0.0018		0.0015		0.0019		0.0019	
	(0.83)		(0.71)		(1.14)		(1.04)	
First-stage estimation								
	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}
$Treatment_j \times Post02_t$	-0.1352***	-1.2948***	-0.1352***	-1.2948***	-0.1352***	-1.2948***	-0.1352***	-1.2948***
	(-3.29)	(-10.68)	(-3.29)	(-10.68)	(-3.29)	(-10.68)	(-3.29)	(-10.68)
$Mean\_FDI\_score_{jt}$	-0.0081	1.7443***	-0.0081	1.7743***	-0.0081	1.7743***	-0.0081	1.7443***
	(-0.13)	(10.13)	[-0.13]	(10.13)	[-0.13]	(10.13)	(-0.13)	(10.13)
Sanderson-Windmeijer multivariate F test	13.06	41.27	13.06	41.27	13.06	41.27	13.06	41.27
	[0.0003]	[0.0000]	[0.0003]	[0.0000]	[0.0003]	[0.0000]	[0.0003]	[0.0000]
Underidentification test (Kleibergen-Paap rk LM statistic)	12.95 [0.0003]		12.95 [0.0003]		12.95 [0.0003]		12.95 [0.0003]	
Weak-instrument-robust inference (Anderson-Rubin Wald test)	10.90 [0.0000]		9.54 [0.0001]		10.86 [0.0000]		10.10 [0.0000]	
Other variables	YES		YES		YES		YES	
Industry dummies╳Year	YES		YES		YES		YES	
Province dummies╳Year	YES		YES		YES		YES	
Firm fixed effect	YES		YES		YES		YES	
Observations	837418		837418		837418		837418	

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively. $patent_{ijt+1}$ indicates all three kinds of patent, i.e. inventing patent, utility patents, design patents. inv_{ijt+1} means inventing patents. $patent\_col_{ijt+1}$ indicates patents collaborating with other identities. inv_col_{ijt+1} means inventing patents collaborating with other indentities. Standard error term clustered at industry-city level. We use the patent number of time t+1 to allow for that patent application often lag behind R&D activity.

Table 6
The disruption of backward and forward linkages on local private firms

	(1) lny_{ijt}	(2) lny_{ijt+1}	(3) lny_{ijt+2}
FDS_{jkt}	0.0414***	0.3513**	0.0057
	(2.71)	(3.67)	(0.11)
FS_{jkt}	-0.0004	0.0338***	0.0065*
	(-0.28)	(2.67)	(1.95)
FDS_B_{jkt}	-0.0143*	-1.8401***	0.1026
	(-1.76)	(-2.93)	(0.76)
FDS_F_{jkt}	-0.0266*	0.2809	-0.4885***
	(-1.81)	(1.12)	(-5.14)

First-stage estimation

	FDS_{jkt}	FS_{jkt}	FDS_B_{jkt}	FDS_F_{jkt}	FDS_{jt}	FS_{jt}	FDS_B_{jkt}	FDS_F_{jkt}	FDS_{jt}	FS_{jt}	FDS_B_{jkt}	FDS_F_{jkt}
$Treatment_j \times Post02_t$	-0.0483***	-1.4294***	0.0439***	0.0573***	-0.0153***	-1.3781***	-0.0233***	-0.0094***	-0.0142***	-1.5359***	-0.0181***	-0.0066***
	(-3.29)	(-15.27)	(7.63)	(9.38)	(-3.63)	(-14.04)	(-14.76)	(-6.02)	(-2.84)	(-15.15)	(-10.65)	(-3.79)
$Mean\_FDI\_score_{jt}$	0.0545**	1.9128***	0.0413***	0.0079	0.0931***	1.9589***	0.0211***	0.0267***	-0.0823***	2.0844***	0.0193***	0.0230***
	(2.37)	(15.45)	(4.41)	(0.88)	(13.55)	(15.07)	(8.36)	(10.19)	(-10.69)	(15.93)	(7.44)	(8.53)
$FDS\_B\_IV_{jkt}$	-11.3420***	-10.8155***	-14.8655***	-18.0318***	-3.0893***	-7.4362***	-0.6382***	-0.0472*	-4.4091***	-5.9950***	-2.0736***	-0.6319***
	(-26.56)	(-11.83)	(-67.02)	(-31.14)	(-45.28)	(-6.97)	(-17.56)	(-1.77)	(-48.61)	(-5.20)	(-42.05)	(-15.86)
$FDS\_F\_IV_{jkt}$	-20.0946***	-2.5377**	-6.4679***	-3.5136***	1.4927***	9.5042***	0.5139***	-0.2725***	-0.0256	12.9519***	0.4657***	-0.6657***
	(-16.34)	(-2.78)	(-11.29)	(-14.92)	(19.27)	(8.46)	(13.89)	(-14.40)	(-0.26)	(10.31)	(9.59)	(-25.60)
Sanderson-Windmeijer multivariate F test	92.15 [0.0000]	103.91 [0.0000]	111.48 [0.0000]	90.16 [0.0000]	19.25 [0.0000]	17.41 [0.0000]	19.76 [0.0000]	106.15 [0.0000]	147.10 [0.0000]	140.97 [0.0000]	191.94 [0.0000]	699.32 [0.0000]
Underidentification test	80.28 [0.0000]				16.96 [0.0000]				134.57 [0.0000]			

(Kleibergen-Paap rk LM statistic)			
Weak-instrument-robust inference (Anderson-Rubin Wald test)	80.47 [0.0000]	15.95 [0.0000]	17.23 [0.0000]
Other variables	YES	YES	YES
Industry dummies×Year	YES	YES	YES
Province dummies×Year	YES	YES	YES
Firm fixed effect	YES	YES	YES
Observations	943875	644697	438857

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively.
Standard error term clustered at industry-city level.

Appendix

Table A1
FDI regulation change across industries

FDI change score	4-digit industry counts	Share of total 4-digit industry
-3	0	0.00%
-2	4	0.83%
-1	9	1.88%
0	384	80.00%
1	57	11.88%
2	25	5.21%
3	1	0.21%

Table A2: Industries' FDI regulation change and employment size and growth

2-digit industry	industry name	industry name (in Chinese)	Amount of sub-group (4-digit industry)	Amount of sub-groups became more open	Amount of sub-groups became less open	Average employment before 2002 (in million)	Average employment after 2002 (in million)	Employment growth after 2002
13	Agri-food processing industry	农副食品加工业	17	7	1	12.71	18.41	45%
14	Food manufacturing	食品制造业	20	2	1	6.02	7.57	26%
15	Beverage manufacturing	饮料制造业	13	4	1	4.61	5.13	11%
16	Tobacco products industry	烟草制品业	3	0	0	0.43	0.25	-43%
17	Textile industry	纺织业	21	0	0	18.55	37.91	104%
18	Textile, clothing, footwear and headwear manufacturing	纺织服装、鞋、帽制造业	3	0	0	11.72	21.24	81%
19	Leather, fur, feather (down) and their products	皮革、毛皮、羽毛(绒)及其制品业	11	2	0	5.96	11.31	90%
20	Wood processing and wood, bamboo, rattan, palm and grass products	木材加工及木、竹、藤、棕、草制品业	10	1	0	4.70	10.57	125%
21	Furniture manufacturing	家具制造业	5	0	0	2.98	6.34	113%

22	Paper and paper products	造纸及纸制品业	6	1	0	9.81	15.31	56%
23	Printing and reproduction of recording media	印刷业和记录媒介的复制	5	0	2	7.60	10.24	35%
24	Education and sporting goods manufacturing	文教体育用品制造业	17	0	0	4.29	7.91	85%
25	Petroleum processing, coking and nuclear fuel processing industry	石油加工、炼焦及核燃料加工业	4	0	0	2.31	4.34	88%
26	**Chemical raw materials and chemical products manufacturing**	化学原料及化学制品制造业	35	7	1	27.32	46.74	**71%**
27	Pharmaceutical manufacturing	医药制造业	7	1	3	8.21	12.65	54%
28	Chemical fibre manufacturing	化学纤维制造业	7	2	0	2.08	3.61	74%
29	Rubber Products	橡胶制品业	9	0	0	4.88	8.38	72%
30	Plastic products industry	塑料制品业	10	0	0	18.08	35.39	96%
31	Non-metallic mineral products industry	非金属矿物制品业	31	0	1	41.87	59.90	43%
32	Ferrous metal smelting and rolling processing industry	黑色金属冶炼及压延加工业	4	0	1	10.10	19.06	89%
33	**Non-ferrous metal smelting and rolling processing industry**	有色金属冶炼及压延加工业	18	8	1	7.67	16.29	**112%**

34	Metal Products	金属制品业	24	2	1	26.37	46.16	75%
35	**General equipment manufacturing**	通用设备制造业	33	6	0	31.03	68.74	**121%**
36	**Special equipment manufacturing**	专用设备制造业	51	7	0	21.34	36.26	70%
37	**Transportation equipment manufacturing**	交通运输设备制造业	27	10	0	23.93	40.48	69%
39	**Electrical machinery and equipment manufacturing**	电气机械及器材制造业	28	9	0	29.14	57.88	**99%**
40	**Communication equipment, computer and other electronic equipment manufacturing**	通信设备、计算机及其他电子设备制造业	21	9	0	16.69	34.21	**105%**
41	Instrumentation and cultural and office machinery manufacturing	仪器仪表及文化、办公用机械制造业	25	3	0	6.99	14.39	**106%**
42	Craft and other manufacturing industries	工艺品及其他制造业	15	2	0	13.64	21.21	56%
All industries			480	83	13	381.02	677.90	78%

Table A3

Divestments and ownership shares

Type	Firm number	Share of all divested firms	Average foreign share before divestment
All divested firms	51452	100.00%	71.79%
Wholly foreign owned	24529	47.67%	100.00%
Majority foreign owned	8897	17.29%	69.45%
Minority foreign owned	18026	35.03%	34.56%

Table A4
Data description

Variables	Meaning	Obs	Mean	Min	Max
Firm level dependent variables					
lny_{ijkt}	log of output	1040423	9.95	0.00	18.59
tfp_{ijkt}	Total factor productivity	1034650	9.28	-0.86	16.72
$profit\_r_{ijkt}$	ratio of profit to total output	1040423	0.03	-0.77	0.31
$liquid\_ratio_{ijkt}$	Share of liquid asset to total asset, in %	1040423	57.56	7.27	98.07
emp_growth_{ijt}	Employment growth rate	762238	-0.07	-0.90	0.45
$wage\_premium_{ijt}$	The gap of firm's average wage in log minus industry average wage in log	1039434	0.30	-7.26	9.12
$dom\_sale\_share_{ijt}$	The share of firm's sale value to industry-city sale value, in %	1038448	18.08	0.00	100.00
$ln\ (1 + patent_{ijt+1})$	The log of 1 plus patent applications in t+1	933336	0.02	0.00	8.73
$ln\ (1 + inv_{ijt+1})$	The log of 1 plus inventing patent applications in t+1	933336	0.01	0.00	8.66
$ln\ (1 + patent\_col_{ijt+1})$	The log of 1 plus collective patent applications in t+1	933336	0.00	0.00	6.08
$ln\ (1 + inv\_col_{ijt+1})$	The log of 1 plus collective inventing patent applications in t+1	933336	0.00	0.00	5.54
Firm level independent variables					
lnL_{ijkt}	log of employment	1040423	4.60	2.30	11.93
lnK_{ijkt}	log of fixed capital	1040423	8.16	0.00	18.15
$lnInter_{ijkt}$	log of intermediate inputs	1040423	9.65	0.00	18.30
Exp_r_{ijkt}	Export ratio to total output	1040423	0.11	0.00	1.00
$lnage_{ijkt}$	log of age	1040423	1.80	0.00	4.08
Industry level independent variables					
FDS_{jkt}	Employment share of divested foreign firms, in %	1040423	1.72	0.00	51.94
FDS_s_{jkt}	Employment share of foreign firms divested by selling, in %	1040423	0.65	0.00	19.51
FDS_e_{jkt}	Employment share of foreign firms divested by exit, in %	1040423	0.94	0.00	37.17
FDS_800_{jkt}	Employment share of divested foreign firms after excluding divested firms with sales value less than 800 million, in %	1040423	1.49	0.00	46.83
FDS_B_{jkt}	Backward dis-linkage caused by foreign divestment, in %	1034650	1.18	0.00	14.57
FDS_F_{jkt}	Forward dis-linkage caused by foreign divestment, in %	1034650	1.18	0.00	15.15
FS_{jkt}	Employment share of foreign owned firms, in %	1040423	24.60	0.00	95.98
$Treatment_j \times Post02_t$	The interaction term of the change of FDI regulation with 2002 year dummy	1040423	0.14	-2.00	3.00
$Mean\_FDI\_score_{jt}$	FDI regulation score	1040423	2.13	0.00	3.00
$FDS\_B\_IV_{jkt}$	IV for FDS_B_{jkt}	1034650	0.03	-0.08	0.13
$FDS\_F\_IV_{jkt}$	IV for FDS_F_{jkt}	1034650	0.04	0.00	0.14
$lnprod_{jkt}$	log of total production	1040423	17.80	8.83	21.22
HHI_{jkt}	Herfindahl-Hirschman Index	1040423	0.02	0.00	1.00
SOE_share_{jkt}	Output share of SOE enterprises	1040423	0.11	0.00	1.00
$Dom\_exit\_share_{jkt}$	employment share of closed domestic firms	1040423	0.08	0.00	2.46

Table A5

Robustness check on the measurement of foreign divestment

	(1)	
	lny_{ijt}	
FDS_800_{jkt}	0.0323**	
	(2.09)	
FS_{jkt}	0.0021	
	(1.21)	
	First-stage estimation	
	FDS_800_{jkt}	FS_{jkt}
$Treatment_j \times Post02_t$	-0.0913	-1.4318***
	(-1.11)	(-15.16)
$Mean\_FDI\_score_{jt}$	-0.2035	1.7491***
	(-1.60)	(13.46)
Sanderson-Windmeijer multivariate F test	6.92	234.53
	[0.0085]	[0.0000]
Underidentification test (Kleibergen-Paap rk LM statistic)	6.88 [0.0087]	
Weak-instrument-robust inference (Anderson-Rubin Wald test)	10.03 [0.0000]	
Other variables	YES	
Industry dummies╳Year	YES	
Province dummies╳Year	YES	
Firm fixed effect	YES	
Observations	949556	

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively. Standard error term clustered at industry-city level.

Table A6

The impact of foreign divestment on other performance measures of local private firms

	(1) TFP_{ijt}		(2) $Profit\_rate_{ijt}$		(3) $Liquid\ asset\ ratio_{ijt}$	
FDS_{jkt}	0.0993**		0.0124**		3.1354**	
	(2.01)		(2.33)		(2.54)	
FS_{jkt}	0.0115***		0.0004		0.0080	
	(3.47)		(0.97)		(0.09)	
First-stage estimation						
	FDS_{jkt}	FS_{jkt}	FDS_{jkt}	FS_{jkt}	FDS_{jkt}	FS_{jkt}
$Treatment_j \times Post02_t$	-0.0463	-1.5995***	-0.0421	-1.5506***	-0.0421	-1.5506***
	(-1.27)	(-16.52)	(-1.17)	(-16.15)	(-1.17)	(-16.15)
$Mean\_FDI\_score_{jt}$	-0.0942*	2.2675***	-0.1025**	2.1887***	-0.1025**	2.1887***
	(-1.81)	(18.28)	(-1.98)	(17.53)	(-1.98)	(17.53)
Sanderson-Windmeijer multivariate F test	10.50 [0.0012]	228.10 [0.0000]	10.92 [0.0010]	185.17 [0.0000]	10.92 [0.0010]	185.17 [0.0000]
Underidentification test (Kleibergen-Paap rk LM statistic)	10.52 [0.0012]		10.93 [0.0009]		10.93 [0.0009]	
Weak-instrument-robust inference (Anderson-Rubin Wald test)	14.70 [0.0000]		5.88 [0.0028]		8.53 [0.0002]	
Other variables	YES		YES		YES	
Industry dummies╳Year	YES		YES		YES	
Province dummies╳Year	YES		YES		YES	
Firm fixed effect	YES		YES		YES	
Observations	943875		949556		949556	

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively. Standard error term clustered at industry-city level.

Table A7
Effect of divestments on collaborative patenting of local firms

	(1) $ln\ (1 + patent\_col_{ijt+1})$		(2) $ln\ (1 + inv\_col_{ijt+1})$	
FDS_{jkt}	-0.0071**		-0.0087**	
	(-1.96)		(-2.24)	
FS_{jkt}	0.0006		0.0004	
	(1.23)		(0.73)	
	FDS_{jt}	FS_{jt}	FDS_{jt}	FS_{jt}
$Treatment_j \times Post02_t$	-0.1352***	-1.2948***	-0.1352***	-1.2948***
	(-3.29)	(-10.68)	(-3.29)	(-10.68)
$Mean\_FDI\_score_{jt}$	-0.0081	1.7443***	-0.0081	1.7443***
	(-0.13)	(10.13)	(-0.13)	(10.13)
Sanderson-Windmeijer multivariate F test	13.06 [0.0003]	41.27 [0.0000]	13.06 [0.0003]	41.27 [0.0000]
Underidentification test (Kleibergen-Paap rk LM statistic)	12.95 [0.0003]		12.95 [0.0003]	
Weak-instrument-robust inference (Anderson-Rubin Wald test)	3.01 [0.0493]		4.00 [0.0184]	
Other variables	YES		YES	
Industry dummies╳Year	YES		YES	
Province dummies╳Year	YES		YES	
Firm fixed effect	YES		YES	
Observations	837418		837418	

Table A8

Discussion of divestment by sale and exit

	(1) lny_{ijt}	(2) emp_growth_{ijt}	(3) $wage\_premium_{ijt}$	(4) $dom\_sale\_share_{ijt}$	(5) $ln\,(1+patent_{ijt+1})$
FDS_s_{jkt}	0.0843***	0.0688	0.2639***	7.5737***	-0.0914***
	(2.68)	(1.48)	(2.95)	(2.63)	(-2.69)
FDS_e_{jkt}	-0.0367	-0.0247	-0.1052	-3.1113	-0.0281
	(-1.06)	(-0.52)	(-1.26)	(-0.92)	(-0.79)
First-stage estimation					
	FDS_s_{jkt} FDS_e_{jkt}	FDS_s_{jkt} FDS_e_{jkt}	FDS_s_{jkt} FDS_e_{jkt}	FDS_s_{jkt} FDS_e_{jkt}	FDS_s_{jkt} FDS_e_{jkt}
$Treatment_j \times Post02_t$	-0.1289 -1.4314***	0.0366** 0.0250	-0.0532*** 0.0291	-0.0532*** 0.0257	-0.0531*** 0.0267
	(-1.52) (-15.13)	(-2.24) (0.92)	(-3.65) (1.13)	(-3.64) (0.99)	(-3.64) (1.03)
$Mean\_FDI\_score_{jt}$	-0.1902 1.7432***	-0.0208 -0.0809**	-0.0130 -0.0934***	-0.0135 -0.0919***	-0.0138 -0.0930***
	(-1.46) (13.42)	(-0.78) (-2.24)	(-0.53) (-2.73)	(-0.55) (-2.67)	(-0.57) (-2.71)
Sanderson-Windmeijer multivariate F test	8.15 [0.0043] 218.11 [0.0000]	6.76 [0.0093] 4.12 [0.0424]	17.13 [0.0000] 7.15 [0.0075]	15.25 [0.0001] 6.69 [0.0097]	15.72 [0.0001] 6.90 [0.0086]
Underidentification test (Kleibergen-Paap rk LM statistic)	8.12 [0.0044]	3.97 [0.0464]	7.12 [0.0076]	6.64 [0.0100]	6.84 [0.0089]
Weak-instrument-robust inference (Anderson-Rubin Wald test)	13.85 [0.0000]	1.58 [0.2060]	12.77 [0.0000]	6.06 [0.0023]	12.11 [0.0000]
Other variables	YES	YES	YES	YES	YES
Industry dummies╳Year	YES	YES	YES	YES	YES
Province dummies╳Year	YES	YES	YES	YES	YES
Firm fixed effect	YES	YES	YES	YES	YES
Observations	949556	697585	948586	947542	949556

Notes: t-statistic in parentheses; *, **, *** indicate statistical significance at 10, 5 and 1 percent level, respectively. Standard error term clustered at industry-city level.

Table A9

Performance of foreign divested affiliates by sale and by exit

Performance	Measurement	By sale	By exit	Difference	T value
Scale	Log term of production	10.34	10.31	0.03**	2.02
TFP	Total productivity	9.53	9.47	0.06***	5.76
Wage premium	The gap between firm's average wage and 2-digit industry level wage	0.09	0.02	0.07***	14.12
Patent application	Number of Patent application	0.22	0.30	-0.08	-1.39
Locally market share	Firm's sales value to the sale value of 4-digit industry and city level.	18.82	12.4292	6.3908***	29.96