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The Effects of Ownership on Exporting, Wages, and Productivity in Vietnam: Some New Evidence

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Project Summary

This project was originally designed to examine the effects of ownership on exporting decisions of Vietnamese firms. However, as Chapter 1 clarifies, the firm export data have numerous problems that require further investigation before rigorous econometric analysis of how ownership affects firm exports will be possible. This project thus carefully examines two aspects of these data issues in Chapters 1 and 2. It also includes a related analysis of how trade protection can affect firm productivity in Chapter 3.

Chapter 1 examines patterns and changes of shares of the state sector, including state-owned enterprises (SOEs) and other state entities, and foreign multinational enterprises (MNEs) in Vietnam since the mid-1990s. Because most Vietnamese are still self-employed or household workers with little or no connection to the state sector or MNEs, it is important to exclude the household sector from these comparisons. First, ownership shares vary markedly among economic activities. For example, economy-wide estimates indicate that MNEs and state sector have both been relatively small employers, but larger producers. MNEs have also become by far the largest exporters. Second, ownership shares and their trends vary substantially depending on the data source. Most conspicuously, SOE shares of non-household enterprise employment and sales have decreased rapidly since 2000. On the other hand, economy-wide estimates of state shares in non-household employment and GDP declined much more slowly. Recent discrepancies between these estimates have become so large that they almost certainly result from errors in one or more data sources. There are also smaller discrepancies between corresponding, alternative estimates of MNE shares. The extent of privatization of SOEs and its economic effects are thus ambiguous in Vietnam, creating important concerns for academics and policy makers.

Chapter 2 then examines how foreign multinational enterprises (MNEs) have grown in Vietnam's manufacturing and trade industries, and tries to shed light on how MNE takeovers of Vietnamese firms have affected employment, and wages between 2000 and 2012. Although the scale of MNE activity has been substantial and grown in recent years, there are substantial discrepancies in measures of MNE shares from alternative sources and uncertainty over the actual share of MNEs in Vietnamese production or employment. On the other hand, the

number of MNE takeovers has been very small and they appear to have played only a small role in changes of MNE shares. Rather, changes in MNE shares have resulted primarily from the entry and exit MNEs and changes in the scale of MNE activity.

Chapter 3 then investigates the how effective protection and firm ownership affected firm productivity in Vietnam during 2005-2010. In labour-intensive industries and industries with intermediate labour intensity, the level of effective protection in an industry had a significantly negative effect on firm productivity. Multinational enterprise (MNE) joint ventures (JVs) and state-owned enterprises (SOEs) had consistently higher productivity than private firms, with productivity usually being highest in JVs. Wholly-foreign MNEs (WOs) also had significantly higher productivity than private firms in 2005-2007, but lower productivity than JVs or SOEs, and in 2008-2010, WO-private differentials were insignificant. In capital-intensive industries, the pattern of productivity differentials (highest in JVs, followed by SOEs, WOs, and private firms) was similar in the earlier period, but not in the latter period or when all years were included in the sample. The level of effective protection also did not have a significant, independent effect on firm productivity in capital-intensive industries.

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Contents

Chapter 1
Exporting and the importance of SOEs and MNEs in Vietnam

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1.1. Introduction

Many previous studies, policy documents, and compilations of official statistics have documented the rapid growth of foreign multinational enterprises (MNEs) in Vietnam after the substantial reforms (*Doi Moi*) that began in 1986 and stabilization of the economy in the mid-1990s. These sources often primarily rely on two distinct data sources, economy-wide estimates of GDP (from national accounts), employment (from labor force surveys), and exports or imports (from customs' trade data), on the one hand, and estimates of firm turnover, employment, and other activities (including trade in recent years) collected by enterprise surveys, on the other.

These data consistently suggest that ownership shares vary among economic activities in Vietnam. For example, both economy-wide and firm data indicate that MNE export shares have been conspicuously large, while corresponding shares of non-household GDP or firm sales have been smaller; in other words, MNEs have had relatively high export propensities (export-production ratios). Similarly, the state sector, including state-owned enterprises (SOEs) and other state entities, has accounted for larger shares of non-household production than employment, and SOEs have had higher shares of firm sales than employment; in other words, average labor productivity has been relatively high in SOEs compared to the average. However, economy-wide and firm data also differ in important respects. For example, the firm data suggest that SOE shares of firm turnover and employment fell rapidly in 2000-2014, but corresponding state shares of non-household GDP or employment declined slowly. MNE shares of firm sales also rose more slowly than corresponding shares of non-household GDP.

After a brief literature review which illustrates the economic importance of analyzing ownership-related issues (Section 2), this paper first carefully compares alternative estimates of state or SOE shares and MNE of non-household production and employment from economy-wide and enterprise data (Section 3). Because predominantly rural households and self-employed workers continue to account for about one-third of GDP and over three-fourths of employment in Vietnam, the household sector is carefully excluded.[1] Section 4 then reviews economy-wide evidence on MNE shares of exports for 1995-2015 and presents new compilations of firm export data for 2011-2012. Both sources indicate that MNEs account for relatively large export shares of and have high export propensities. The firm also data indicate that wholly-foreign MNE (WFs), which now account for the vast majority of MNE activity, make particularly large contributions to exports. However, the analysis reveals several important problems in firm export data for these and other years, and the analysis focuses on identifying potential causes and how they might be addressed in subsequent research. Finally, we highlight the important policy implications emerging from the literature and the empirical analyses (Section 5), before concluding (Section 6).

1.2. Literature Review

Theory and empirical evidence suggest MNEs are likely to possess relatively large amounts of generally knowledge-based, intangible, firm-specific assets related to production technology, marketing, and entrepreneurship. Those assets should make MNEs more productive than non-MNEs (Buckley and Casson 1992; Casson 1987; Caves 2007; Dunning 1993; Rugman 1980, 1985). This is reflected by larger firm size, higher factor productivity and factor returns, and/or higher capital or technology intensity in MNEs.

[1] The large household sector reflects Vietnam's status as a relatively low-income developing economy (per capita GDP of US$2,052 in 2013; General Statistics Office various years b). The household share of exports is not known but is probably close to zero.

Previous evidence from large, heterogeneous samples of Vietnam's manufacturing firms in many industries is broadly consistent with the hypothesis that MNEs had relatively high total factor productivity (TFP) after accounting for factor intensities and scale, among other firm- and industry-level characteristics (Athukorala and Tien 2012; Ramstetter and Phan 2013). However, when more homogenous samples of firms were analyzed in manufacturing groups, MNE-private and SOE-private differentials were often insignificant or inconsistent.

Similar evidence is common for large heterogeneous samples of Chinese manufacturing firms (Wang and Wang 2015) and manufacturing plants in Indonesia (Takii 2004), for example. On the other hand, evidence for manufacturing plants in Malaysia and Thailand (Haji Ahmad, 2010; Menon, 1998; Oguchi et al. 2002; Ramstetter 2004) indicates that MNE-local differentials in productivity levels or growth were often small and/or insignificant, even in large heterogeneous samples. Industry-level results from Indonesia, Malaysia, and Thailand also suggest that insignificant productivity differentials were common.

Related research on wages paid by manufacturing firms in Vietnam (Nguyen 2015; Nguyen and Ramstetter 2015a, 2015b), as well as manufacturing plants in Indonesia (Lipsey and Sjöholm 2004; Ramstetter and Narjoko 2013) and Malaysia (Ramstetter 2014), provide stronger evidence that MNEs tend to pay relatively high wages, even at the industry level and after the educational background of workers, worker occupation, and other firm- or plant-level characteristics are controlled for. MNE-local or MNE-private wage differentials were also relatively large for high-wage, white-collar (non-production) workers in Indonesia and Vietnam. Hale and Long (2011) found a similar pattern for a small sample of Chinese firms, but that foreign ownership had no effect on wages of relatively low-wage, ordinary workers.

In contrast to MNEs, economists since Adam Smith have long assumed that SOEs tend to be more inefficient than private firms because SOE managers have relatively weak incentives to minimize costs or maximize revenues. If this inefficiency leads to low labor productivity,

for example, then SOEs are likely to pay relatively low wages. However, previous empirical evidence suggests that SOEs often pay relatively high wages and have relatively high productivity in Vietnam (Ramstetter and Phan 2013; Nguyen 2015; Nguyen and Ramstetter 2015a, 2015b) and elsewhere (Brown et al., 2004, 2005; Djankov and Murrell 2002; Megginson, and Netter 2001). Governments often choose to establish SOEs in relatively high-productivity, high-wage industries such as steel. This is an important reason SOEs may have relatively high productivity or wages in samples covering several heterogeneous industries. However, even within the steel industry, for example, firm-level evidence suggests that SOEs or former SOEs were among the most efficient and profitable producers in China, Korea and Taiwan in the 1990s (Ramstetter and Movshuk 2005).

MNEs may also tend to export more than non-MNEs because exporting firms are more productive than non-exporters and MNEs have relatively high productivity. However, it is very difficult to sort out the direction of causality. Does high productivity lead to exporting, or does exporting force firms to become more productive, or does causality run both directions (Bernard and Jensen 2004, Melitz 2003)? Perhaps more importantly, MNEs make large investments in international marketing networks and have extensive experience with international trade. Accumulation of related, generally intangible assets is another key reason that firms become able to export relatively cheaply (Roberts and Tybout 1997). Thus, even if ownership-related productivity differentials are not pervasive, MNEs may have higher export propensities than non-MNEs. This is an important story told by previous studies suggesting that MNE-local differentials in export-sales ratios often remain highly significant statistically after accounting for plant-level characteristics such as factor intensity, scale, and vintage in Indonesia (Ramstetter 1999; Ramstetter and Takii 2006; Sjöholm and Takii 2006) and Thailand (Ramstetter 1994; Ramstetter and Umemoto 2006).

Another important story relates to evidence that export propensities tend to be highest

among wholly-foreign MNEs or MNEs with very large foreign ownership shares of 90 percent or more, and that these ownership-related differences often remain statistically significant after accounting for related firm- or plant-level characteristics in Vietnam, Indonesia, and Thailand.[2] Similarly, Moran (2001) argues that MNE affiliates which are well integrated into the parent's network are likely to contribute more to host economies than affiliates which are isolated from the parent-controlled network by ownership restrictions or local content requirements.

The evidence also suggests that the extent of foreign ownership is strongly related to exporting but not to productivity.[3] This in turn suggests that MNE parents restrict access of their minority-owned affiliates to exporting networks more than access to technology-related assets. This may result because MNEs in Vietnam and other developing economies often use relatively simple technologies in labor-intensive assembly. Correspondingly, the risk of leaking sophisticated technologies through minority-owned affiliates is often relatively small. On the other hand, the risks of minority-owned affiliates oversupplying export markets are often larger and MNEs sometimes forbid local partners in minority-foreign affiliates from exporting the MNE's products.

Particularly in the 1980s and 1990s, several developing economies in Southeast Asia and elsewhere relaxed ownership restrictions and local content requirements for MNEs exporting large portions of output. Thus, strong correlations between foreign ownership shares and export propensities may result from policy biases, as well as MNE strategies. Vietnam is an interesting case because there have been few formal foreign ownership restrictions after the promulgation of the first foreign investment law in 1988, soon after *Doi Moi*. Nonetheless,

[2] See Phan and Ramstetter (2009) on Vietnam, Ramstetter (1999) and Ramstetter and Takii (2006) on Indonesia, and Ramstetter (1994) and Ramstetter and Umemoto (2006) on Thailand.

[3] Moran's argument also suggests that productivity should be higher in MNEs with relatively large foreign ownership shares, but the evidence is often inconsistent with this latter hypothesis in Indonesia (Takii 2004), Thailand (Ramstetter 2004), or Vietnam (Ramstetter and Phan 2013), for example.

implementation and formal policy sometimes diverged, with government officials effectively limiting foreign ownership shares in some cases, especially before the promulgation of the Enterprise Law in 2000. This bias weakened after the Law's subsequent implementation (Van Arkadie and Mallon 2003), reforms related to the implementation of the Bilateral Trade Agreement between Vietnam and the United States in 2001, the implementation of the ASEAN Free Trade Agreement in 2005, and further reforms related to Vietnam's WTO accession in early 2007. Thus, if WFs still tend to export relatively large portions of output in Vietnam, the main cause is probably MNE strategy, not policy bias.

1.3. Estimates of Production and Employment by Owner

This section compares economy-wide estimates of non-household production (GDP from the national accounts) and employment (from labor force survey publications and revised series on the web) and corresponding estimates from the enterprise surveys (published compilations, supplemented with unpublished compilations from underlying firm-level data). It emphasizes how recent, substantial declines of SOE shares of firm activity during 2000-2014, contrast with much smaller declines in state shares of corresponding, economy-wide estimates. Definitional and methodological differences are potentially important and the section analyzes how they might contribute to discrepancies. As emphasized in the introduction, households and the self-employed are carefully excluded from the comparisons.

1.3.1. Production Estimates

In 2000, state shares of non-household GDP and SOE shares of firm sales (from published compilations) were similar (57 vs. 55 percent) and MNE shares of both measures were identical (20 percent, Table 1). MNE shares of both measures remained similar at 19-22 percent through 2005. However, as early as 2004, the SOE share of firm sales was 10

percentage points lower than the state share of non-household GDP (46 vs. 56 percent), and this discrepancy widened to 20 percentage points or more from 2007. By 2014, the SOE share of firm sales was only 22 percent, but the corresponding state share of non-household GDP remained close to one-half. MNE shares of non-household GDP also increased more rapidly than shares of firm sales. Discrepancies between these shares reached 7-9 percentage points in 2008-2011, before falling back to 5 percentage points in 2013-2014, when MNEs accounted for about one-fourth of firm sales and 30-31 percent of non-household GDP.

Because state/SOE and MNE shares of non-household GDP and firm sales were similar in 2000, private shares were also similar at 23 and 25 percent, respectively (Table 1). However, the private share of non-household GDP subsequently declined from 22-24 percent in 1998-2009 to 20-21 percent in 2010-2015 (Table 1).[4] In marked contrast, private shares of firm sales almost doubled in 2000-2007, from 25 to 47 percent, before stabilizing at about one-half in 2008-2014. What is responsible for these discrepancies and their explosive growth?

Perhaps most importantly, the extent to which state shares of non-household GDP include non-SOE activities of the government and other state organizations is ambiguous. The substantial widening of discrepancies between state shares of non-household GDP and SOE shares of firm sales suggests that direct production by non-SOE state entities grew rapidly after the mid-2000s. However, the inability to identify precisely which non-SOE state entities have become so large creates suspicion that estimation error may also be involved.

There are several potentially important sources of measurement error. Because it is important to publish GDP estimates in a timely fashion, GDP must be estimated rapidly, often on the basis of relatively incomplete information. This is why preliminary and revised GDP estimates often differ greatly. Vietnam contrasts with many economies because GDP estimates are published relatively rapidly and differences between preliminary and revised

[4] Part of this decline may also be related to the exclusion of "products taxes less subsidies on production" from ownership-based estimates of GDP from 2010 forward.

estimates are usually relatively small. This creates the impression that Vietnam's GDP estimates may rely on relatively incomplete information and embody large errors as a result.

Although processing detailed firm surveys requires more time than estimating GDP, Vietnam's enterprise data are available relatively quickly and coverage is relatively comprehensive.[5] Compilations of firm sales (or employment) are also straightforward. If firms report data accurately, sums can be compiled directly from survey questionnaires. Alternatively, if firms tend to underreport sales because they fear accurate reporting could result in tax difficulties, for example, sums can be adjusted to reflect the probable extent of underreporting. Here it is important that underreporting by MNE and SOEs is likely to be relatively small because these firms are often prominent and underreporting easy to discover. On the other hand, the reverse may be true for most private firms, which tend to be relatively small. Correspondingly, SOE and MNE shares of firm sales may be overestimated in the firm data, even though comparisons to GDP data suggest the opposite pattern for recent years.

Previous studies (Ramstetter and Phan 2013; Ramstetter and Nguyen 2016) have also highlighted potentially important problems encountered when compiling unpublished, firm-level data from enterprise surveys. For example, especially in earlier years, the firm-level data included several records with duplicate ID tags and duplicate or near duplicate records. Numerous firms also reported obviously unrealistic or economically meaningless data. Compilations from the firm-level data often differ from published compilations because they omit firms reporting unrealistic or meaningless data.[6] Another, rarely discussed problem is

[5] Enterprise surveys cover all non-household firms with over 10 employees in all industries, but exclude household firms and organizations other than firms, and collect limited information from firms with 10 or fewer employees (Jammal et al, 2006).

[6] For example, a number of firms report non-positive turnover or employment. Our compilations excluding these firms for 2000-2014 suggest an average of 2.3 percent lower firm sales than the published compilations used in Table 1. However, there were large fluctuations in these differentials, with our compilations yielding 8 to 11 percent lower sums in 2006-2008 and 2014, and 4 percent larger sums in 2001 and 2013. Unrealistic fluctuations in key variables also appear to be obvious input errors in some cases. For example, some firms may report sales growth rates of 10 percent in year 1, 1000 percent in year 2, and 20 percent in year 3, but employment growth rates of 12 percent, 15 percent and 17 percent,

how firm IDs are defined when takeovers occur (after takeover, the larger firm's ID is retained, but the smaller firm's ID is deleted). As a result, it is very difficult, if not impossible, to identify takeovers in the firm-level data. However, despite these problems, our substantial experience using the firm data leads us to believe they generally provide a relatively reliable and comprehensive picture of aggregate firm performance.

It is also potentially important that firm sales include intermediate expenditures on parts, materials, energy and utilities, and some services, which GDP or value added excludes. For example, MNEs often have relatively low ratios of value added to sales, especially in key processing industries like electronics, footwear, and apparel. Thus, MNE shares of sales might exceed corresponding shares of value added.[7] On the other hand, ratios of intermediate expenditures to sales are not likely to change dramatically over time. Thus, this definitional difference probably cannot explain the widening of discrepancies between alternative estimates of SOE and MNE shares observed in Table 1.

Differences in ownership classifications are also potentially important. Notably, the national accounts data do not clarify how they classify joint ventures (JVs) involving SOEs and MNEs. Published compilations of the enterprise data classify all MNE JVs as MNEs and a small group of private joint stock companies "having capital of state" as private. Survey questionnaires define the latter group as joint stock companies "having state capital ≤ 50%" and ask for the share of state capital, but several firms explicitly report zero state shares.[8]

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respectively. Most firms reporting unrealistic or unusual data are small, partially because it is easier to identify and correct obvious mistakes in data for relatively prominent, large firms.

[7] One would like calculate firm value added directly, but enterprise surveys do not collect necessary, firm-level information on intermediate costs. The General Statistics Office has approximate estimates of value added for major products of firms, but they use industry-level input-output coefficients. Correspondingly, estimates for several firms yield negative value added or apparently unrealistic value-added per worker levels (Ramstetter and Phan 2013).

[8] For example, after samples were limited to firms with positive employment and turnover, the 2014 data contained 1,472 firms with 397,077 workers in this category (96 and 98 percent of published estimates [General Statistics Office 2016], respectively), of which 117 firms with 18,709 workers reported 0 shares and 1 firm with 213 workers did not report the state share.

Questionnaires also ask the state share in private limited companies, but published compilations do not clarify that a few firms in this large group have state capital.[9] In order to investigate whether reclassifying these SOE JVs as SOEs might explain the widening discrepancies between state shares of non-household GDP and SOE shares of firm sales, shares of all SOE-private JVs (defined as all private joint stock and private limited companies with positive state shares) and MNE-SOE JVs (which are classified separately) were calculated from unpublished, firm-level data.[10]

In 2000-2006, MNE-SOE JVs were relatively large, accounting for 10-12 percent of sales by firms with positive sales and employment, but this share fell to as low as 2-4 percent in 2012-2014 (Table 1). In other words, the vast majority of sales by MNE JVs were from JVs with SOEs. However, because their shares declined to low levels, reclassifying MNE-SOE JVs as SOEs cannot explain the increasingly large discrepancies between SOE shares of firm sales and state shares of non-household GDP. Similarly, after rising from 5 to 7 percent in 2005-2008, shares of SOE-private JVs also fell to 4-5 percent in 2012-2014. Thus reclassifying SOE-private JVs also cannot explain the widening discrepancies either.

1.3.2. Employment Estimates and Comparisons of Production and Employment Shares

Comparisons of non-household employment estimates from the Labor Force Surveys (LFS, including updated series available on the web) and enterprise data also suggest that state shares (56 percent in 2007, 44-47 percent in 2009-2014, and 39 percent in 2015) were much larger than corresponding SOE shares of enterprise employment (21-24 percent in 2007-2009

[9] 2014 data contained 210,234 firms with 3,586,497 workers in this category (82 and 95 percent of published estimates [General Statistics Office 2016], respectively), of which 893 firms with 26,588 workers reported positive state shares.

[10] Both of these estimates probably overestimate the extent of state control because state shares are very small (9 percent or less) in several SOE-private JVs (e.g., 744 of 893 limited companies and 124 of 1,354 joint stock companies), and MNEs dominate in many MNE-SOE JVs.

and 18-22 percent in 2010-2014, Table 2).[11] Here again, this presumably results primarily because the LFS estimates of state employment (4.8-5.5 million in 2007 and 2009-2014) include numerous state workers that didn't work for SOEs (2.1-2.2 million workers, according the enterprise surveys). However, LFS estimates of total non-household employment were remarkably similar to enterprise employment (11.2-12.3 versus 10.9-12.1 million in 2011-2014). It is also difficult to understand why discrepancies between the two state/SOE share estimates were smaller in 2009-2010 (26-28 percentage points) than other years (32 percentage points) because this suggests that non-SOE state entities counterintuitively reduced employment just after the World Financial Crisis.

In 2010-2014, economy-wide (LFS) estimates of MNE employment shares (15-17 percent) were substantially smaller than corresponding enterprise estimates (22-28 percent), which contrasts with patterns observed for MNE production, Table 2).[12] These discrepancies also increased during this period. On the other hand, both economy-wide (GDP and LFS) estimates suggest much smaller private shares than the firm data. Private shares were 59-61 percent of firm employment, but only 38-39 percent of non-household employment.

The most reasonable conclusion one can make from careful examination of Tables 1 and 2 is that there are often large discrepancies between economy-wide (GDP and LFS) estimates of state and MNE shares and corresponding estimates of SOE and MNE shares of firm activity, and these discrepancies have grown in recent years. The largest source of these discrepancies is probably that many state workers are not employed by SOEs. However, the precise magnitudes and institutions involved in non-SOE state activity are unclear. Moreover, there are discrepancies in trends of SOE and MNE production shares that are difficult to explain,

[11] Alternative, presumably revised, time series estimates of state and MNE employment are also available on the web from General Statistics Office (various years b) and usually indicate somewhat higher employment in these groups than the original LFS publications (Table 2). However, discrepancies among these two sources are relatively small, except for MNEs in 2007.

[12] The analysis of MNE employment focuses on the post 2010 period because published estimates in the LFS were smaller than revised estimates on the web for 2007 and 2009.

except perhaps by measurement error.

It is also important that ownership shares of production and employment differed substantially and relatively consistently. For example, state shares of non-household GDP and SOE shares of firm sales exceeded corresponding shares of non-household and firm employment in all years. Thus, average labor productivity (non-household GDP or firm sales per employee, Table 3) was consistently lower in private firms than in SOEs, for example. The scope of these differentials was also similar (52-54 percent lower for non-household GDP per worker and 44-54 percent lower for sales per employee) in 2010-2014.[13] These differentials partially reflect the large size of SOEs and their concentration in capital-intensive industries, while most private firms are relatively small and more labor-intensive.

Economy-wide estimates also suggest that MNEs consistently had the highest GDP per worker (113-319 percent higher than SOEs in 2000-2004 and 48-80 percent higher thereafter, Table 3). However, patterns of enterprise sales per worker differed. SOEs had higher labor productivity by this measure than all MNEs or private firms in 2005-2014, but MNEs had the highest in 2000-2004. MNEs also had lower sales per worker than private firms in 2008-2011.

The firm data also indicate stark differences between MNE-JVs, particularly MNE-SOE JVs, and WFs. WFs had lower sales per worker than SOEs in all years and lower productivity than private firms in most (2002-2014, Table 3). Relatively low labor productivity in WFs, reflects their importance in generally labor-intensive assembly of major exports such as electronics, footwear, and apparel. On the other hand, MNE-SOE JVs, which are classified as MNEs in published compilations, had the highest sales per worker of all ownership groups. In other words, MNE-SOE JVs accounted for substantially larger shares of firm sales than employment (3-12 vs. 1-3 percent Tables 1-2).

[13] Estimates for the non-household private sector are only calculated for 2010-2015 because estimates for 2007 and 2009 appear less reliable than for other years and data for other years are not available. Revised "web" estimates of employment are used for SOEs and MNEs (see Table 2).

1.4. Exports by Owner

Economy-wide estimates from commodity trade data show that both MNE export values and the MNE shares of Vietnam's exports rose rapidly over the last two decades. MNE shares increased particularly rapidly from 27 percent in 1995 to 45-47 percent in 2001-2002 and then 55 percent in 2004 (Table 4).[14] Reflecting the effects of the 2008-2009 World Financial Crisis, MNE shares fell from 57-58 percent in 2005-2007 to 53-55 percent in 2008-2010. In 2009, export values also shrunk by 12 percent for MNEs, but only 5.1 percent for non-MNEs. After the crisis, rapid increases resumed with MNE shares rising to 63-67 percent in 2012-2014 and 71 percent in 2015. In short, MNE export shares were conspicuously large and grew rapidly.

A similar series compiled from monthly trade data reports shows that oil accounted for 30-40 percent of MNE exports in 2005-2008, but under 10 percent since 2013 and only 2 percent in 2015 (Table 4). Correspondingly, MNE shares of non-oil exports were substantially lower than shares of all exports in 2005-2006 (45-46 percent vs. 57-58 percent). This difference became much smaller in recent years, even in years when oil prices and oil export values were still relatively high (e.g., 60 vs. 63 percent in 2012, 65-66 vs. 67 percent in 2013 and 2014). The vast majority of non-oil exports are manufactures, which grew particularly rapidly.

Because MNE shares of exports were much larger than corresponding shares of production, export propensities were much larger in MNEs than in non-MNEs (Table 4). For example, after 1995, export-GDP ratios have always been larger than 1 in MNEs, increasing to slightly over 2 in 2004-2007 and over 3 in 2014-2015. Although these ratios increased in most years, there was a particularly steep decline in 2009, following a more modest decline the year previous, again reflecting the strong effects of the World Financial Crisis on MNE exports. Differentials between MNEs and non-MNEs were relatively stable in 1995-2002 when

[14] It is not possible to exclude the household sector from export share estimates, but households and the self-employed probably accounted for very few exports.

export-GDP ratios were 4.7-5.8 times larger in MNEs. The differentials increased markedly thereafter (to over 7 times larger in 2005-2006 and 2011-2012 and over 9 times in 2013-2015), but were relatively small during the 2008-2009 crisis years (5.4-5.8 times larger).

Export-GDP ratios are less accurate measures of export propensities than export-sales or export-output ratios, for example, because they mix a measure including intermediate costs (exports) and another measure excluding them (GDP or value added).[15] As mentioned above, processing MNEs probably have higher ratios of intermediate cost to sales or output in industries like electronics, apparel, and footwear. Thus, export propensity differentials between MNEs and non-MNEs may be smaller than depicted in Table 4 if measured more precisely as export-sales or export-output ratios. Nonetheless, trends in all of these export-production ratios are usually highly correlated. Thus, Table 4 provides strong evidence that MNEs have substantially higher export propensities than non-MNEs in Vietnam.

Correspondingly, manufactured exports have accounted for most of the growth in Vietnam's exports in recent years. Using a broad definition of manufacturing exports designed to be consistent with the Vietnam Standard Industrial Classification (VSIC), manufacturing exports increased from under $9 billion in 2000 to over $58 billion in 2010, and manufacturing's share of total exports increased from 61 to 81 percent (Table 5).[16] Using a common but narrower definition of manufacturing exports which excludes many food- and resource-intensive exports by manufacturing firms (the sum of Sections 5 to 8 of the Standard International Trade Classification [SITC]), the increase was even more rapid, from 43 to 65 percent. This share continued to increase rapidly to 76 percent in 2014. Typical labor-intensive manufactures (e.g., food, textiles, apparel, footwear, furniture, and miscellaneous manufactures) were among the most important exports through 2010. However, by 2014,

[15] Export-GDP ratios often exceed 1 in small, open economies like Vietnam for this reason.

[16] The VSIC is similar to the International Standard Industrial Classification (ISIC), but more detailed in some categories. The older, 1993 version (VSIC93) is similar to ISIC revision 3 while the newer, 2007 version (VSIC07) is similar to ISIC revision 4.

electric and electronic machinery became by far the largest category.

Recent enterprise surveys for 2010-2014 have included questions about the value of firm-level exports, which allow more precise and detailed examination of ownership-related differences in export propensities than previously possible. The compilations in Tables 6-8 is one of the first attempts to examine these data carefully, but they probably raise more questions than they answer. For example, obvious, large errors result if one sums reported firm exports for 2010 and 2013-2014. In 2013, exports reported by medium-large firms with 20 or more employees sum to $989 billion or almost 7.5 times the $132 billion in total merchandise exports reported in commodity trade data (Tables 4-5). Sums of firm exports for 2010 ($149 billion) and 2014 ($348 billion) were also more than twice the corresponding totals reported in merchandise trade data. Although it is impossible to clarify the reason for these large discrepancies, initial inspection of the firm-level data suggests unrealistically large exports were recorded for several firms in some years.[17]

This initial compilation focuses on 2011-2012, for which firm export totals appear more realistic. Firm totals were also larger than merchandise totals in these years, by 13 and 10 percent, respectively (Table 6). Double counting of merchandise exports passing through more than one firm or inclusion of service receipts in firm exports are two potential causes of discrepancies between the firm-level and merchandise totals. Timing-related discrepancies are also potentially important.[18] The relatively small differentials in 2011-2012 might be related to these factors, but they almost certainly are not the cause of the large discrepancies observed in 2010 and 2013-2014.

The firm export data for 2011 and 2012 also imply some very strange trends and patterns,

[17] For example some large exporters report exports that were 1000s of times larger in only one year than in other years. Although this is not impossible, reporting or input error is a more likely cause in many cases. Much more extensive inspection of firm-level data, including comparisons to trends of related indicators (e.g. sales, employment, fixed assets) is required before more definitive conclusions can be reached.

[18] Because accounting criteria differ for firms and customs officials, they may record the same export in different years.

especially when compared to the merchandise export data, which are based on relatively precise customs' records. First, the growth of firm exports in 2012 was much lower (15 percent) than the growth of merchandise exports (31 percent, Tables 5, 6). Second, if 73 percent of food, beverage, and tobacco exports are assumed to be processed manufactures as published estimates for 2010 indicate, broadly defined shares of manufactures in merchandise exports were 78 percent in 2011 and 81 percent 2012 (Table 5). These shares are similar to shares of manufacturing firms in firm exports (76 percent in 2011, 85 percent in 2012), though firm data indicate a substantially larger increase between 2011 and 2012 (Table 6). The data are also consistent in suggesting that shares of electronic and electronic machinery (16 percent of merchandise exports in 2011, 24 percent in 2012) and of computing, electronic, and electric machinery (18 and 20 percent, respectively) were the largest.[19]

On the other hand, shares of apparel in merchandise exports were much larger (14 and 13 percent, respectively, Table 5) than shares of apparel firms (8 and 7 percent, respectively, Table 6). There were also very large, seemingly implausible fluctuations in several industry shares of firm exports; conspicuous examples include wood products (10 and 1 percent, respectively), motor vehicles (4 and 9 percent, respectively), and furniture (2 and 9 percent, respectively). Firm export values doubled or were halved in 2012 in nine of the 17 manufacturing industries identified in Table 6. Although there are plausible reasons for these fluctuations in some cases, they often appear to result from data reporting or input errors, or inconsistent industry classifications of major exporting firms.[20] These problems need to be examined closely at the firm level before plausible, rigorous analyses can be conducted with

[19] Following revision 3 of the Industrial Standard Industrial Classification (ISIC), the older (1993) version Vietnam Standard Industrial Classification (VSIC93) had four 2-digit categories (VSIC93=30, 31, 32, 33) in this category but the newer, 2007 version (VSIC07, similar to ISIC revision 4) had only two related categories (26 and 27). These two groups do not correspond exactly, but are similar.

[20] For example, reclassification of major exporters (e.g., Samsung affiliates) from electric machinery to computers is a likely cause of fluctuations in these two categories. Similarly, reclassification from wholesale trade to manufacturing also appears important.

the firm export data.

Compilations of firm exports by owner in Table 7 also suggest the MNE share of firm exports, including both WFs and MNE JVs, was substantially larger than the corresponding share of merchandise exports in Table 5 for 2012 (72 vs. 63 percent), but similar in 2011 (56 vs. 57 percent). WFs accounted for the majority of firm exports in both years (59 percent in 2012, and 54 percent in 2011). WF shares were larger in manufacturing, around two-thirds. WF shares were conspicuously large (90 percent or more) in the computer and electronic machinery and electric machinery industries in both years. On the other hand, WF shares were relatively low in food products and similar to shares of overall manufacturing in textiles, apparel, and leather and footwear, for example.

Private firms were the second largest source of firm exports in most years, accounting for about one-fifth of exports in 2011-2012 (Table 7). Private firm shares of manufacturing firm exports were slightly smaller, reflecting relatively large shares in wholesale trade, which increased from 31 percent in 2011 to over one-half in 2012. Private shares were also conspicuously large in food product manufacturing. Private shares of exports in other important manufacturing industries such as textiles, apparel, rubber and plastics were relatively large in some years, but small in others.

Between 2011 and 2012, there were large fluctuations in the shares SOEs and MNE JVs that mirrored each other (Table 7). In 2012, MNE JV shares were larger, 13 vs. 8 percent, but in 2011, SOE shares were much larger 23 vs. 2 percent. Because that most MNE JVs with large sales involve SOEs partners, it seems likely that classification of a few large exporters as SOEs in 2011, but as MNE JVs in 2012, might explain much of this variation. SOE shares were large in wholesale trade (a little over two-fifths) and in mining, especially in 2011 when mining firm exports were small (Table 6). SOE shares were also conspicuously large in wood products in 2011 but small in 2012, and this was a large cause of the fall in total SOE exports

in 2012. In contrast, MNE JV shares of mining were small in 2011 but large in 2012, again suggesting that reclassification or addition of a large oil JV might cause observed fluctuations. On the other hand, MNE JV shares were also relatively large in both years in other transportation machinery and non-metallic mineral products.

Finally, although there are obvious, large, and unrealistic fluctuations and patterns observed in the firm data, distributions of firms by export propensity (Table 8) are consistent with expectations and data from other Southeast Asian economies in suggesting WFs tend to export large proportions (90% or more) of their turnover more often than other ownership groups. For example, these export-specializing firms accounted for about one-third of all WFs and even larger shares of manufacturing WFs (39-40 percent, Table 8). Particularly large shares were observed in apparel (55-57 percent), leather and footwear (59-62 percent), computers and electronic machinery (50-52 percent), and furniture (55-62 percent). Firms with high export propensities also accounted for relatively large shares of MNE JVs (9-12 percent in all industries, 14-23 percent in manufacturing), but much smaller shares of SOEs or private firms (1-2 percent in all industries; 4-6 percent in manufacturing). Nonetheless, here again, if one examines the manufacturing industry-level data, several fluctuations are difficult to explain. They often occur in industries with relatively small samples of SOEs and MNE JVs (fewer than 20 medium-large firms).[21]

1.5. Three Policy Implications

There are at least three important policy implications emerging from this simple analysis. First, the labor force data reemphasize the important fact that over three-fourths of Vietnam's workers are self-employed or work in households. Most of these workers are unaffected by the emerging corporate sector, which is still in its infancy in many respects. Correspondingly,

[21] In contrast, the smallest industry-level samples were 42 for WFs and 72 for private firms.

policy makers need to understand that performance of Vietnam's corporate sector, including that of SOEs or MNEs, has little direct effect on the vast majority of Vietnam's workers. Indirect effects through linkages are also probably weak, though indirect effects on competition in both output and labor markets are probably more important. There is also good reason to think that the rapidly growing private sector (according to the firm data) will become increasingly important for Vietnamese workers over the next decade or two. This transition will be closely related to the modernization of Vietnam's economy and further reductions in traditional agriculture and services.

Second, the large discrepancies between alternative data sources confound efforts to evaluate Vietnam's progress toward its avowed goal of privatization. In this respect, it is important for the Vietnamese government to clarify the sources of alternative measures of SOE or state sector production and employment. Are there important definitional issues involved that we have failed to understand? Or is the non-SOE state sector really as large as comparisons of state sector estimates from labor force surveys and national accounts and corresponding SOE estimates from the enterprise data imply? Perhaps more importantly, what is responsible for the relatively slow declines in the state sector's share of economy-wide, non-household employment and GDP, compared to the rapid declines of SOE shares of enterprise employment and turnover? Until these questions can be answered more definitively, isn't it very difficult to evaluate the degree of progress toward privatization, much less the economic effects of such efforts?

We agree that further privatization is important for Vietnam and that progress has been relatively slow (World Bank 2011 23-50; 2014 26-27; 2015 23-24). Privatization can be particularly beneficial when it results from expansion of private firms in relatively competitive markets, because it will help improve Vietnam's competitiveness and increase growth. On the other hand, several of Asia's more efficient enterprises have been or are SOEs

and the state sector must play an important role regulating and/or producing in markets affected by externalities (e.g., markets for public goods and services). Thus, although privatization is usually wise, there are exceptions. In this context, the important point is that economists and policy makers often lack sufficient information to evaluate the extent of privatization and its economic effects in Vietnam (and other economies).

Third, it is important for policy makers to recognize that the economic roles of MNEs and SOEs often differ greatly among economic activities. The variation in relative size of MNEs is particularly conspicuous. MNEs, most of which are WFs, make particularly large contributions to international trade, especially exporting. Relatively large investments by MNEs in international marketing networks which reduce transactions costs of exporting are particularly important. MNEs' relatively large contribution to imports is also important because many of these imports are advanced capital goods and sophisticated intermediate inputs that facilitate increased productivity of end users.[22] The large involvement of MNEs in Vietnam's trade also implies that MNEs will be important agents in any attempt to liberalize trade, either unilaterally or as part of some free trade area agreement.

In contrast, MNE contributions to production are more modest and MNE shares of total employment are small, especially if household enterprises and the self-employed are included. Similarly, SOEs make important contributions to production but smaller contributions to employment. This highlights the enclave nature of both SOEs and MNEs in modern Vietnam, and suggests the need to facilitate migration of household and self-employed workers to modern enterprises, the vast majority of which are likely to be private.

[22] Although this paper has emphasized MNE contributions to exports, MNE import shares have also been large and rose rapidly from 18 percent in 1995-1996 to 31-37 percent in 2001-2009, and 53-59 percent in 2012-2015 (General Statistics Office, various years b).

1.6. Conclusion

This paper has examined patterns and changes of shares of states sector, including SOEs and other state entities, and MNEs in Vietnam's economy since the mid-1990s. Two major conclusions arise, the first being that shares of these ownership groups vary greatly among economic activities. Because most Vietnamese are still self-employed or household workers with little or no connection to the state sector or MNEs, it is important to exclude the household sector from these comparisons. Economy-wide estimates MNE shares of exports have been conspicuously large and risen quickly to over 70 percent in 2015. In contrast, MNE shares of non-household production (GDP) have been modest and shares of non-household employment much smaller. Similarly, the state sector, has accounted for larger shares of economy-wide non-household production than employment.

In other words, economy-wide evidence clearly suggests that MNEs and state sector have had higher average labor productivity than the modern private sector, which is defined to exclude the household sector, and that MNEs have had higher labor productivity than the state sector. In addition, ratios of exports to production have been much higher in MNEs than in the domestic (private and state) sector. Most exports come from WFs and about one-third of WFs export large shares (90%+) of their sales, compared to only about one-tenth of MNE JVs and less than 2 percent of SOEs and private firms.

Although the patterns described above seem clear and important, the second major conclusion is that careful comparisons of economy-wide estimates and estimates from enterprise data reveal important discrepancies that are difficult to explain. For example, SOE shares of firm employment and sales have decreased rapidly since 2000 and SOE export shares have been relatively small in recent years. On the other hand, state shares (including SOEs and other state entities) of non-household employment and GDP declined much more slowly and remained much larger than SOE shares of firm activities. Discrepancies between

alternative estimates of state and SOE shares have become so large they are almost certainly the result of large data errors in one or more sources. There are also important differences in alternative estimates of MNE shares, with enterprise data indicating relatively large employment shares but relatively small production shares. However, discrepancies are relatively small for MNEs.

The most important policy issues surrounding these inconsistencies probably relate to extent of privatization of SOEs in Vietnam and its economic effects, about which we know far less than economists often assert. The large discrepancies between alternative data sources and the numerous problems encountered when using the enterprise data imply that results of rigorous studies using the firm data, including numerous studies cited in this paper, may be particularly sensitive to sampling and data errors, among other problems. Unfortunately, authors are not always forthcoming about such important shortcomings. Finally, no one should forget that Vietnam's formal enterprises remain relatively small and that the majority of Vietnam's workers still have very little or no relation to the activities of SOEs or MNEs.

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Table 1: Shares of Non-Household GDP and Enterprise Turnover (percent, current dong)

	Non-Household GDP			Enterprise turnover, published				SOE JVs, unpublished	
Year	State	MNE	Pri-vate	SOEs	MNE	WFs	Private	Private	MNE
1995	63	10	27	-	-	-	-	-	-
1996	62	11	27	-	-	-	-	-	-
1997	62	14	25	-	-	-	-	-	-
1998	60	15	24	-	-	-	-	-	-
1999	58	18	24	-	-	-	-	-	-
2000	57	20	23	55	20	7	25	-	12
2001	56	20	23	51	20	8	29	-	11
2002	56	20	24	51	19	8	30	-	10
2003	56	21	23	46	20	9	34	-	11
2004	56	22	22	41	22	11	37	-	11
2005	55	22	22	39	22	11	39	5	10
2006	54	24	23	37	22	12	41	6	10
2007	52	25	23	32	21	12	47	6	8
2008	51	25	24	29	18	11	53	7	6
2009	51	25	24	27	18	12	54	6	5
2010	53	27	20	28	18	12	54	6	5
2011	52	28	20	26	20	14	54	6	5
2012	51	28	21	27	22	17	52	5	4
2013	50	30	20	25	25	20	50	4	2
2014	49	31	20	22	26	21	52	4	3
2015	49	31	20	-	-	-	-	-	-

Notes: Non-household GDP shares calculated in current prices, where 2010-2015 is from a 2010 base series excluding products taxes less subsidies on production, 2005-2009 is from a 2010 base series including products taxes less subsidies, and 1995-2004 is from a 1994 base series including products taxes less subsidies; the SOE share of enterprise turnover includes central government SOEs, local government SOEs and joint stock companies with (presumably majority) state capital; unpublished estimates are compiled from data on all firms with positive turnover and employment; SOE-private joint ventures refer to private limited and joint stock companies reporting positive state shares of 50 percent or less; MNE-SOE JVs are explicitly identified in the firm-level data and presumably include all firms with positive MNE and SOE shares.

Sources: General Statistics Office (2010, 2013, 2016, various years b).

Table 2: Total Employment and Enterprise Employment (totals in thousands, ownership shares in percent)

Year	Non-household employment						Enterprise employment, published					SOE JVs, unpublished	
	Total LFS	State LFS	State web	MNEs LFS	MNEs web	Private LFS	Total	SOEs	MNEs	WFs	Private	SOE-Private	MNE-SOE
2000	-	-	-	-	-	-	3,537	59	12	8	29	-	3
2001	-	-	-	-	-	-	3,933	54	12	9	34	-	3
2002	-	-	-	-	-	-	4,658	49	15	12	37	-	3
2003	-	-	-	-	-	-	5,175	44	17	13	40	-	2
2004	-	-	-	-	-	-	5,771	39	18	15	43	-	2
2005	-	-	-	-	-	-	6,237	33	20	16	48	5	2
2006	-	-	-	-	-	-	6,565	29	22	19	49	6	2
2007	9,058	56	55	11	17	33	7,225	24	23	20	52	7	2
2008	-	-	-	-	-	-	7,949	21	23	20	56	6	2
2009	10,283	47	49	14	15	40	8,719	21	22	19	57	6	1
2010	10,645	45	48	16	16	39	9,831	17	22	19	61	5	1
2011	11,188	47	47	15	15	38	10,896	15	23	21	61	5	1
2012	11,544	46	46	15	15	39	11,085	14	25	22	61	4	1
2013	11,610	46	46	15	15	39	11,566	14	26	24	59	4	1
2014	12,311	44	44	17	17	39	12,135	13	28	26	59	3	1
2015	13,343	39	39	17	17	45	-	-	-	-	-	-	-

Notes: For non-household employment LFS series come from Labour Force Survey reports (General Statistics Office various years c) and also exclude self-employment while web estimates come from General Statistics Office (various years b); for published enterprise data, SOE enterprises include central government SOEs, local government SOEs, and joint stock companies with (presumably majority) state capital; unpublished estimates include all firms with positve turnover and employment; SOE-private joint ventures refer to private limited and joint stock companies reporting positive state shares of 50 percent or less; MNE-SOE JVs are explicitly identified in the firm-level data and presumably include all firms with positive MNE and SOE shares. .

Sources: General Statistics Office (2010, 2013, 2016, various years b; various years c).

Table 3 Non-Household GDP per Employee and Enterprise Turnover per Employee (million current dong)

Year	Non-Household GDP per Worker			Enterprise turnover per worker, published					SOE & MNE JVs, unpublished		
	State	MNEs	Private	SOEs	MNEs	WFs	MNE JVs	Private	SOE-Private	MNE-SOE	MNE-Private
2000	39	164	-	213	397	208	843	195	-	932	335
2001	41	190	-	218	362	197	843	196	-	978	230
2002	44	173	-	270	320	178	811	212	-	1,020	154
2003	49	118	-	294	335	188	920	235	-	1,232	190
2004	56	118	-	315	358	213	1,054	257	-	1,443	245
2005	69	125	-	411	384	231	1,203	286	383	1,768	280
2006	79	129	-	526	420	273	1,293	349	380	2,016	264
2007	88	135	-	649	450	304	1,386	438	458	2,227	358
2008	112	166	-	936	543	376	1,730	664	650	2,694	424
2009	125	205	-	927	575	432	1,629	660	736	2,665	542
2010	124	189	57	1,281	658	509	1,777	714	855	3,122	674
2011	154	256	74	1,682	816	663	2,149	853	1,322	4,643	784
2012	178	306	86	1,899	911	772	2,321	877	1,159	4,009	1,103
2013	195	349	94	1,867	1,018	889	2,349	918	1,125	2,656	1,851
2014	207	342	97	1,995	1,038	922	2,328	999	1,232	4,959	1,060
2015	232	344	84	-	-	-	-	-	-	-	-

Notes and Sources: See Tables 1 and 2.

Table 4: MNE exports, MNE shares of Vietnam's merchandise exports, and export-GDP ratios in MNEs and non-MNEs

	Annual estimates					Cumulative Monthly			
	Exports		Export/GDP ratio			Exports		Non-oil exports	
Year	US$bil	% share	MNE	non-MNE	MNE/non-MNE	US$bil	% share	US$bil	% share
1995	1.473	27.03	1.127	0.205	5.508	-	-	-	-
1996	2.155	29.70	1.182	0.223	5.294	-	-	-	-
1997	3.213	34.98	1.319	0.245	5.393	-	-	-	-
1998	3.215	34.35	1.178	0.251	4.692	-	-	-	-
1999	4.682	40.57	1.333	0.272	4.893	-	-	-	-
2000	6.810	47.02	1.646	0.284	5.799	-	-	-	-
2001	6.798	45.23	1.512	0.292	5.178	-	-	-	-
2002	7.872	47.12	1.632	0.292	5.587	-	-	-	-
2003	10.161	50.43	1.776	0.295	6.015	-	-	-	-
2004	14.488	54.70	2.107	0.311	6.772	-	-	-	-
2005	18.554	57.18	2.123	0.284	7.473	18.517	57.45	11.130	44.80
2006	23.061	57.90	2.162	0.301	7.184	22.865	57.73	14.542	46.49
2007	27.775	57.19	2.115	0.323	6.542	27.832	57.52	19.355	48.50
2008	34.523	55.07	1.999	0.344	5.809	34.905	55.49	24.455	46.62
2009	30.372	53.19	1.655	0.305	5.427	29.854	52.76	23.644	46.94
2010	39.152	54.20	2.229	0.336	6.627	38.828	54.21	33.884	50.81
2011	55.124	56.88	2.597	0.366	7.104	55.114	56.87	47.873	53.39
2012	72.252	63.09	2.892	0.323	8.949	72.274	63.08	64.045	60.22
2013	88.150	66.76	2.965	0.310	9.559	88.190	66.74	80.913	64.80
2014	101.180	67.36	3.038	0.321	9.472	101.218	67.40	93.989	65.75
2015	114.267	70.53	3.190	0.294	10.852	114.274	70.52	110.619	69.84

Notes and sources: Annual data from General Statistics Office (various years b); cumulative monthly estimates from General Statistics Office (various years d); MNE shares of crude exports were 100 percent in 2005-2015; exchange rates from International Monetary Fund (2016).

Table 5: Commodity Exports by SITC and VSIC (US$ millions)

Commodity or industry, code	2000	2010	2011	2012	2014
By SITC rev 3, total	14,483	72,237	96,906	114,529	150,217
Manufactures, excluding food, etc., 5-8	6,193	46,666	62,664	78,978	114,057
Textiles, 65	299	3,061	3,770	3,894	5,330
Apparel, 84	1,821	10,390	13,149	14,443	20,174
Leather & Footwear, 61, 85	1,481	5,489	6,987	7,793	11,093
Wood manufactures, 63	93	247	312	390	655
Paper manufactures, 64	59	372	418	503	546
Plastics & Rubber, 57-58, 62	46	1,214	1,456	1,893	1,988
Non-metallic mineral products, 66	172	936	1,247	1,816	2,869
Metals & metal products, 67-69	120	2,738	3,854	4,202	5,634
Electronic & electric machinery 75-77,87-88	1,064	9,309	15,857	27,795	45,101
Non-electric machinery, 71-74	135	1,698	2,352	2,871	3,299
Road vehicles, 78	74	721	969	1,304	1,902
Other transportation machinery, 79	26	531	808	1,082	1,250
Furniture, bedding, etc., 82	232	2,960	3,140	3,640	4,712
Miscellaneous manufactures, 89	281	4,636	4,793	2,930	3,670
Other manufactures	291	2,363	3,550	4,421	5,834
Food, beverages, tobacco, 0-1	3,554	13,729	17,701	19,173	21,966
Mineral fuels, 3	3,825	7,980	11,008	11,353	9,238
Others, 2, 4, 9	912	3,862	5,533	5,024	4,956
ADDENDUM: by VSIC93 (≈ISIC rev 3), total	14,483	72,237	-	-	-
Manufactures, D	8,831	58,384	-	-	-
Food, beverages, tobacco, 15-16	2,391	10,029	-	-	-
Textiles, 17	409	5,249	-	-	-
Apparel, 18	1,696	7,941	-	-	-
Leather & footwear, 19	1,647	6,285	-	-	-
Plastics & rubber, 25	125	1,974	-	-	-
Metals & metal products, 27-28	120	2,846	-	-	-
Electronic & electric machinery, 30-33	1,101	10,014	-	-	-
Furniture, miscellaneous manufacturing, 36	400	6,452	-	-	-
Other manufacturing	943	7,594	-	-	-
Mining & quarrying, C	3,628	6,825	-	-	-

Sources: General Statistics Office (various years a), United Nations COMTRADE (2016).

Table 6: Exports and Exporting Firms with 20 or more Employees

	Values (US$ millions)		Firms (number)	
Variable, industry, VSIC07 code	2011	2012	2011	2012
All industries	109,813	126,159	7,613	7,523
-ratio to merchandise exports	1.13	1.10	-	-
Manufacturing, 10-33	83,417	107,127	6,338	6,494
Food products, 10	8,838	9,165	859	897
Textiles, 13	4,569	4,190	349	372
Apparel, 14	8,626	9,411	983	1,014
Leather & footwear, 15	5,647	8,178	341	368
Wood products, 16	10,490	1,256	335	308
Paper products, 17	449	2,661	178	187
Rubber & plastics, 22	3,111	7,653	559	559
Non-metallic mineral products, 23	983	1,285	241	257
Basic metals, 24	997	1,991	97	115
Metal products, 25	7,913	2,934	459	465
Computers, electronic machinery, 26	10,279	22,185	192	212
Electric machinery, 27	9,604	2,946	184	196
Non-electric machinery, 28	991	974	110	118
Motor vehicles, 29	4,163	11,612	108	125
Other transportation machinery, 30	1,089	1,619	99	104
Furniture, 31	2,390	11,633	562	518
Other manufacturing, 11-12, 18-21, 32-33	3,276	7,434	682	679
Agriculture, 1-3	683	536	71	64
Mining, 5-9	2,247	8,420	65	63
Wholesale trade, 45+46	22,825	8,363	876	631
Other industries	641	1,713	263	271

Sources: Authors' compilation of firm-level data supplied by General Statistics Office

Table 7: Distributions of Exports by Firms with 20 or more Employees among Ownership Groups (% of exports by industry)

	WFs		MNE JVs		SOEs		Private	
Industry; VSIC07 codes in Table 6	2011	2012	2011	2012	2011	2012	2011	2012
All industries	54.27	58.68	2.07	13.37	22.69	7.88	20.97	20.07
Manufacturing	64.72	68.41	2.65	10.54	13.78	1.74	18.85	19.31
Food products	18.81	20.69	2.17	1.91	5.28	6.81	73.74	70.59
Textiles	80.16	73.77	4.04	1.42	3.68	4.26	12.12	20.55
Apparel	52.27	69.79	1.85	2.27	2.96	1.67	42.92	26.27
Leather & footwear	76.33	69.40	3.26	2.45	1.22	0.78	19.19	27.36
Wood products	1.30	17.64	1.47	11.82	92.24	1.58	4.99	68.95
Paper products	76.12	75.69	2.24	0.88	1.26	0.13	20.38	23.29
Rubber & plastics	66.33	48.22	3.69	3.20	2.96	1.23	27.02	47.35
Non-metallic mineral products	38.97	56.63	13.63	11.68	7.16	7.68	40.24	24.01
Basic metals	58.17	76.01	7.42	4.49	0.67	0.38	33.74	19.12
Metal products	94.84	79.11	0.28	4.93	0.42	1.50	4.46	14.46
Computers, electronic machinery	99.40	98.75	0.28	1.08	0.12	0.06	0.20	0.10
Electric machinery	96.62	90.71	2.41	6.26	0.26	0.87	0.71	2.16
Non-electric machinery	90.32	91.71	2.55	0.75	1.33	1.45	5.80	6.08
Motor vehicles	96.96	25.96	2.44	73.74	0.04	0.02	0.56	0.28
Other transportation machinery	38.35	54.34	39.10	38.32	22.36	7.06	0.19	0.27
Furniture	64.17	92.22	2.97	0.79	0.58	0.18	32.28	6.81
Other manufacturing	74.82	73.65	2.98	1.85	10.45	5.05	11.75	19.44
Agriculture	5.70	8.83	0.58	0.77	91.84	88.13	1.88	2.27
Mining	3.78	0.88	1.88	65.98	90.62	31.99	3.72	1.15
Wholesale trade	23.77	5.89	0.02	0.03	45.63	43.02	30.58	51.07
Other industries	9.30	7.08	2.43	0.56	53.12	77.23	35.15	15.14

Sources: Authors' compilation of firm-level data supplied by General Statistics Office; exchange rates for converting turnover from International Monetary Fund (2016)

Table 8: Shares of Firms with 20 or more Employees Exporting 90%+ of Turnover
(% of all firms in each ownerhip-industry group)

	WFs		MNE JVs		SOEs		Private	
Industry; VSIC07 codes in Table 6	2011	2012	2011	2012	2011	2012	2011	2012
All industries	32.98	32.49	9.44	11.69	1.36	1.24	1.78	1.69
Manufacturing	39.89	39.40	19.54	23.08	4.68	3.93	5.52	5.47
Food products	25.76	30.58	12.73	23.64	10.67	7.14	8.68	8.35
Textiles	25.47	29.30	12.50	11.76	0.00	10.71	3.24	4.91
Apparel	55.73	57.44	55.88	55.56	37.93	28.57	14.78	13.73
Leather & footwear	62.45	58.98	77.78	70.00	27.27	28.57	14.48	13.85
Wood products	38.16	37.35	52.63	52.94	5.26	5.88	7.94	7.34
Paper products	24.79	24.58	25.00	50.00	0.00	0.00	1.43	1.93
Rubber & plastics	39.85	34.32	23.08	26.09	4.55	4.55	2.53	2.79
Non-metallic mineral products	26.83	26.80	3.13	12.50	0.00	0.00	1.56	1.68
Basic metals	24.14	27.14	16.67	5.00	0.00	0.00	0.72	1.92
Metal products	31.03	32.17	7.69	20.51	0.00	0.00	1.27	0.57
Computers, electronic machinery	51.66	49.79	0.00	18.18	12.50	20.00	3.09	2.73
Electric machinery	36.88	37.72	0.00	8.33	0.00	0.00	1.01	0.66
Non-electric machinery	40.96	33.00	16.67	0.00	0.00	0.00	0.93	0.98
Motor vehicles	32.06	29.63	6.67	10.00	0.00	0.00	0.00	0.00
Other transportation machinery	14.89	15.46	0.00	7.14	9.38	5.41	0.00	0.00
Furniture	58.74	55.25	60.00	69.23	0.00	0.00	11.83	10.96
Other manufacturing	34.95	34.09	9.84	5.97	0.00	0.00	1.42	2.21
Agriculture	19.23	13.21	12.50	14.29	0.27	0.00	0.05	0.00
Mining	37.50	37.50	6.67	30.77	4.05	5.06	1.26	1.38
Wholesale trade	6.47	4.91	0.00	0.00	1.58	1.53	1.21	0.77
Other industries	2.85	3.97	0.71	1.41	0.07	0.14	0.05	0.06

Sources: Authors' compilation of firm-level data supplied by General Statistics Office; exchange rates for converting turnover from International Monetary Fund (2016)

Chapter 2
Multinational Enterprise Growth and Vietnam's Employment and Wages in Manufacturing and Trade Industries: Did Takeovers Play a Role?

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2.1. Introduction

Many previous studies and compilations of official statistics have documented the rapid growth of foreign multinational enterprises (MNEs) in Vietnam after the substantial reforms (*Doi Moi*) that began in 1986 and stabilization of the economy in the mid-1990s. After firm-level data from Vietnam's relatively comprehensive, annual enterprise surveys for 2000 forward became available, studies of MNEs and how they compared to or affected local firms performance also became numerous. For example, Athukorala and Tien (2012) and Ramstetter and Phan (2013) provide evidence that MNEs, especially exporting MNEs, tend to have relatively high productivity compared to local firms, but evidence was relatively weak in several industry groups. The latter study suggests that productivity spillovers from MNEs to local firms are generally weak, while Le and Pomfret (2011) indicate that only vertical spillovers are significant and Truong et al (2015) provide evidence that spillovers were relatively large in industries with low effective rates of protection and low shares of wholly foreign MNEs. Evidence on wage effects is somewhat stronger, suggesting that MNEs tend to pay relatively high wages even after accounting for numerous other differences in firm characteristics as well as worker education and occupation (Nguyen 2015, Nguyen and Ramstetter 2015a). However, there is also evidence that MNE-local wage differentials were largest for a relatively few number of highly skilled workers (Nguyen and Ramstetter 2015b).

Another set of interesting questions can be asked about how MNE takeovers affect target firms. Because MNE shares of firm turnover and employment have grown rapidly for most of

the last two decades, we assumed that MNE takeovers had been relatively common, as they were in Indonesia after the large trade reforms of 1986 and in China after the run up to its WTO accession in 2001. Substantial policy changes in Vietnam reinforced this perception because the promulgation of the Enterprise Law in late 2000 and its subsequent implementation (Van Arkadie and Mallon 2003), reforms related to the implementation of the Bilateral Trade Agreement between Vietnam and the United States in 2001 and the implementation of the ASEAN Free Trade Agreement in 2005, and further reforms related to Vietnam's own WTO accession in late 2006 all reduced previous biases against private ownership. Correspondingly, we thought that analyzing how MNE takeovers affect wages or employment in target would facilitate better understanding Vietnam's economy.

However, as we will document below, takeovers by MNEs appear to have been extremely rare during 2000-2012 in Vietnam. Not surprisingly, there were even fewer takeovers by state-owned enterprises, but somewhat more numerous takeovers by private firms. Another puzzle that emerges from comparison of the enterprise data and economy-wide estimates of GDP or employment surrounds the extent to which MNE shares have been growing and SOE or state shares have been falling, particularly the latter. Thus, after a brief review of the literature on the effects of MNE takeovers (Section 2), we first compare alternative estimates of MNE and SOE shares of Vietnam's economy and trends in those shares (Section 3). We then examine the data we have been able to compile on takeovers (Section 4) and offer some concluding remarks, focusing on the future research agenda (Section 5).

2.2. Literature Review

Theory and empirical evidence suggest MNEs are likely to possess relatively large amounts of generally knowledge-based, intangible, firm-specific assets related to production technology, marketing, and entrepreneurship that should make these firms more productive

than non-MNEs (Buckley and Casson 1992; Casson 1987; Caves 2007; Dunning 1993; Rugman 1980, 1985). This is reflected by larger firm size, higher factor productivity and factor returns, and/or higher capital or technology intensity. If labor productivity is higher in MNEs than in non-MNEs as often assumed, wages should also be higher, and MNE takeovers should also lead to higher wages. On the other hand, the effects of MNE ownership on employment levels or changes in employment are ambiguous.

In contrast, economists since Adam Smith have long assumed that SOEs will tend to be more inefficient than private firms because SOE managers have weaker incentives to minimize costs than managers of private firms. If this inefficiency leads to low labor productivity, then SOEs are likely to pay relatively low wages. In contrast, previous empirical evidence suggests that SOEs often pay relatively high wages and have relatively high productivity, both in Vietnam (Ramstetter and Phan 2007, 2013; Nguyen 2015; Nguyen and Ramstetter 2015a, 2015b) and elsewhere (Brown et al., 2004, 2005; Djankov and Murrell 2002; Megginson, and Netter 2001). Governments often choose to establish SOEs in relatively high productivity, high wage industries such as steel, this is an important reason that SOEs may have appear to have relatively high productivity or wages in samples covering several different industries. However, even within the steel industry, firm-level evidence suggests that SOEs or former SOEs were among the most efficient producers in China, Korea and Taiwan, for example (Ramstetter and Movshuk 2005).

Previous research on manufacturing firms in Vietnam (Nguyen 2015; Nguyen and Ramstetter 2015a, 2015b) and manufacturing plants in Indonesia (Lipsey and Sjöholm 2004a; Ramstetter and Narjoko 2013) and Malaysia (Ramstetter 2014) have provided strong evidence that multinational enterprises (MNEs) tend to pay relatively high wages, even after the educational background of workers, worker occupation, and other firm- or plant-level characteristics are controlled for. These studies also provide evidence that and MNE-local or

MNE-private wage differentials were relatively large for high-wage, white-collar (non-production) workers in Indonesia and Vietnam. Hale and Long (2011) also found a similar pattern for a small sample of Chinese firms, but that foreign ownership had no effect on wages of relatively low-wage, ordinary workers.

Studies of Indonesian manufacturing plants Lipsey and Sjöholm (2002), Sjöholm and Lipsey (2006), Lipsey et al. (2010) and a recent study of Chinese manufacturing firms by Wang and Wang (2015) are the only ones known to examine how changes in ownership affected wages and/or employment at the firm or plant level in developing economies. Descriptive statistics for Indonesian plants in 1975-1999 (Lipsey and Sjöholm 2002; Sjöholm and Lipsey 2006), first suggest that MNE takeovers tended to lead to higher wages or unchanged after private, manufacturing plants were taken over, but that MNEs did not target high-wage plants for takeover. Blue collar employment also tended to increase after takeover, but white collar employment generally declined.

On the other hand, fixed effects (FE) regressions suggested that MNE takeovers led to statistically significant increases in both wages and employment for both blue and white collar workers after accounting for plant characteristics such as size, input intensity, and energy intensity (Lipsey and Sjöholm 2002; Sjöholm and Lipsey 2006). Wage increases were larger for white collar workers but employment increases were larger for blue collar workers. Both takeover effects were relatively large after the drastic liberalization of Indonesian trade policy in 1985-1986 and varied substantially among specific industry groups. Propensity score matching (PSM) estimates also indicate that MNE takeovers led to employment growth, but small sample size made it impossible to examine differences among industries using this technique and PSM estimates of wage effects are not available (Lipsey et al. 2010).

Wang and Wang's (2015) study of Chinese manufacturing firms focuses more narrowly on PSM estimates comparing the effects of MNE takeovers with the effects of domestic

takeovers in an attempt to “investigate the purified effect of foreign ownership” (p. 325). In contrast to our data on Vietnam, their data suggest there were a relatively very large number of MNE takeovers (an average of over 500 per year in 2000-2007, p. 329) and a much larger number of domestic takeovers of other domestic firms (an average of 3,834 per year). Their analyses suggest that MNE takeovers led to larger increases in output, employment, and wages in target firms than did comparable domestic takeovers, but revealed no evidence of corresponding productivity improvements. Somewhat similarly, evidence that productivity is higher in manufacturing MNEs than in Vietnam’s local firms (Ramstetter and Phan 2013) is substantially weaker than the aforementioned evidence than correspondingly evidence that MNEs tend to pay relatively high wages in Vietnam, especially when estimates are performed at the industry level.

2.3. MNE and SOE or State Shares of Vietnam’s Economy

Ramstetter and Phan (2013, pp. 31-32) previously pointed out discrepancies between levels and patterns of MNE and SOE shares of firm sales (=turnover) and corresponding MNE or “State” shares of non-household GDP in 2000-2008. There are of course several important reasons for such discrepancies to exist. First, the sales variable includes intermediate consumption, while GDP excludes it. MNEs in particular are often observed to have relatively low ratios of value added to sales, especially in key processing industries like electronics and footwear, which suggests that MNE shares of sales might exceed corresponding shares of value added or GDP. Second, definitions of ownership groups may differ among data sets and sources, especially when joint ventures are involved. Third, sampling and compilation methodologies differ greatly. Fourth, the state share of GDP is likely to be larger than the SOE share of firm production because the state sector includes the government and other state-controlled organizations that produce goods and services, not just SOEs.

Compilations of firm sales are relatively straightforward. If one believes firms report sales accurately can simply sum the amounts reported by firms on survey questionnaires. Alternatively, if one believes specific groups of firms tend to underreport sales (because, for example, they fear that accurate reporting could result in tax difficulties), one can adjust sales figures for those firms. Even when firms fail to report sales, it is often possible to estimate missing values using information on other aspects of firm performance or firm performance in other years. One would also like to make similar calculations of firm-level value added but unfortunately Vietnam does not collect firm-level information on intermediate costs necessary to calculate value added.[1] Compilation of firm-level information is also time-consuming, which means that definitive firm-level data are not usually available until two years after the year they refer to, and Vietnam's enterprise survey compilations are available more quickly than similar compilations for most other economies.

GDP, on the other hand, must be estimated much more rapidly, often on the basis of relatively incomplete information. This is why preliminary GDP estimates and revised GDP estimates often differ greatly for most economies in the world, and there are often several rounds of revisions. In contrast, there are usually relatively small differences between preliminary and revised estimates of GDP for Vietnam. There is also a large difference in coverage, because GDP estimates must cover the entire economy, including all firms, households, and other public and private organizations. On the other hand, the enterprise surveys explicitly exclude organizations other than firms and household firms, and collect limited information from most small firms with 10 or fewer employees (Jammal et al, 2006).[2]

[1] The General Statistics Office does, however, provide estimates of value added for major products of firms. These estimates are calculated from product-level sales data and industry-level (5-digit level of revision 4 of the Vietnam Standard Industry Classification [VSIC] for recent years and 4-digit level of revision 3 for previous years) input-output coefficients. Presumably, these input-output are the same as those used to calculate GDP estimates.

[2] Casual inspection of the firm-level data also indicates that most firms reporting unrealistic or highly unusual data are small firms. This is not at all uncommon because the statistical agencies usually find it much easier to identify and correct obvious mistakes in data for large firms.

Despite all of these differences, estimates of MNE and SOE shares of non-household GDP and corresponding shares of firm sales were remarkably similar in 2000 (57 vs. 56 percent for SOEs and 20 percent each for MNEs, Table 1). MNE shares of both measures remained similar at 19-22 percent through 2005. However, from 2006 they diverged with MNE shares of GDP rising to 25 percent in 2007-2009 and then to 30 percent or more in 2013-2014. In contrast, MNE shares of firm sales fell to 18 percent in 2008-2009 before rebounding to 20-22 percent in 2011-2012 and 25 percent in 2013. The reasons for the divergence after 2006 are not clear.

State shares of GDP and SOE shares of firm sales fell in most years, but state shares of GDP declined very little, while SOE shares of firm sales began to decline rapidly as early as 2003 (Table 1). By 2004 the discrepancy in the two shares was over 10 percentage points (56 versus 45 percent), and the discrepancy continued to widen, reaching 20 percent points or more in 2010 (53 versus 33 percent) and 2013 (50 versus 28 percent). The widening divergence suggests that production by the government and other state-controlled organizations has grown especially rapidly after the mid-2000s. It is difficult to understand precisely which government or other state entities have been growing so quickly and reached such a large scale.

Because the GDP data indicate that state and MNE shares were relatively large, MNE shares grew relatively quickly, and state shares fell relatively slowly, they also imply that the share of private firms and other private entities was relatively small and declined in recent years, from 22-24 percent in 2000-2009 to 20-21 percent in 2010-2014 (Table 1). In marked contrast, private shares of firm sales increased markedly from 24 to 47 percent in 2000-2007, before stabilizing at 47-49 percent in 2008-2013. Here again, the reasons for the large discrepancies in trends over time are particularly difficult to understand.

The major possible definitional difference between these two sources involves the

classification of MNE joint ventures (JVs) with SOEs. Enterprise surveys suggest this group was relatively large in earlier years, accounting for 12-13 percent of firm sales in 2000-2001 and 11 percent in 2002-2005 (Table 1). However the share of MNE JVs subsequently declined to 5-6 percent in 2009-2013. To the extent that the national accounts definition of the state includes these MNE-SOE JVs (which is not clear from public information), while the enterprise survey definition is known to exclude them, this divergence can explain a small part of the discrepancies in recent years. On the other hand, if MNE-SOE JVs are reclassified as SOEs in the enterprise data, the discrepancy between alternative estimates of MNE shares widens. Moreover, reclassification cannot explain the growing discrepancies in state/SOE or MNE shares over time.

Comparisons of non-household employment estimates from the Labor Force Surveys (LFS) and enterprise employment also suggest that state shares of non-household employment reported in the LFS (56 percent in 2007, 45-47 percent in 2009-2013) were much larger than corresponding SOE shares of enterprise employment (26-30 percent in 2007-2009 and 18-22 percent in 2010-2014, Table 2). Here again, this presumably results primarily because the LFS estimates of state employment (4.8-5.5 million in 2007 and 2009-2013) include numerous state sector workers that didn't work for SOEs (2.1-2.2 million workers according the enterprise surveys). However, it is difficult to understand why the discrepancy between the two estimates was so much smaller in 2009-2010 (2.5 million workers) than in other years (2.9-3.0 million in 2007 and 2011, 3.2-3.3 million in 2012-2013). Smaller discrepancies in 2009-2010 are also counterintuitive because they suggest that the government and other non-SOE, state entities reduced employment substantially just after the World Financial Crisis.

In marked contrast to patterns observed for SOEs or MNE production, LFS estimated of foreign firm employment were substantially smaller than enterprise survey estimates after 2009 (Table 2). Moreover, enterprise survey estimates for wholly-foreign MNEs were larger

than LFS estimates for all foreign firms, especially in 2011-2013 when the discrepancy reached 35-56 percent if the LFS estimate. SOE shares of non-household employment (56 percent in 2007, 44-47 percent in 2009-2014) were thus much larger than corresponding shares of firm employment (30 percent in 2007 and 18-26 percent in 2009-2013). On the other hand, MNE shares of non-household employment (11 and 14-17 percent, respectively) were much smaller than MNE shares of firm employment (22-26 percent in 2007 and 2009-2013). Both the GDP data and LFS estimates of economy-wide employment suggest a much smaller role for private firms that the enterprise survey estimates.

It is also important to note that SOE and MNE shares of non-household GDP or firm sales tended to exceed corresponding shares of non-household employment for MNEs and SOEs, and that the gap between these shares was relatively large for MNEs. This would suggest that MNEs had the highest GDP per employee followed by SOEs and that both groups had higher GDP per employee than the economy-wide average. On the other hand, GDP per employee was relatively low in the private sector. However, if the same comparison is made using the enterprise data, shares of sales were larger than shares of employment for SOEs, but not for MNEs or private firms. In other words, sales per employee were relatively large for SOEs compared to the overall average, but this was not true for MNEs or private firms.[3]

The most important, reasonable conclusion one can make from careful examination of Tables 1 and 2 is that there are large discrepancies between GDP and LFS estimates of state and MNE shares and corresponding estimates of SOE and MNE shares from the enterprise surveys, especially in recent years. The largest source of these discrepancies is probably the fact that the state employs many workers and has substantial production outside of SOEs. However, the precise magnitude and institutions involved in this activity is unclear. Moreover,

[3] See Ramstetter and Phan (2013, Table 2 for more detailed comparisons of productivity in manufacturing industries; these comparisons suggest that MNEs generally had relatively high productivity once factor intensity and scale effects are accounted for and a lagged specification is used to partially account for simultaneity problems.

there are important discrepancies in measures of MNE production and employment that are much more difficult to explain, except by measurement error. Correspondingly, one needs to interpret the trends and levels of SOE and MNE shares observed in these data with caution, recognizing that substantial measurement errors that probably affect all estimates.

2.4. Changes in Firm Ownership, Employment, and Wages

As documented in the previous section, Vietnam experienced rapid changes in ownership patterns and related changes in production and employment structures in recent years. Perhaps the most important change has been the relatively rapid growth of the formal enterprise sector relative to the whole economy. For example, according to the LFS data underlying Table 2, the share of non-household employment in total employment increased from 20 percent in 2007 to 23 percent in 2014. If the enterprise data are used to calculate the ratio of firm employment to the total, this change appears to be even more rapid, the ratio rising from 16 percent in 2007 to 22 percent in 2011-2013. Thus, although Vietnam remains a relatively poor developing economy where households (and individual proprietorships) still account for the vast majority of employment, the formal, corporate sector has been growing relatively rapidly.

Among enterprises, MNEs have been growing relatively rapidly, while SOEs have been growing relatively slowly. Changes in the relative shares of MNEs and SOEs have three distinct causes, (1) the entry of new firms or exit of old ones, (2) changes in the scale of existing firms, and (3) changes of ownership (takeovers) of existing firms. The latter category is of particular interest for two reasons. First, many academics and policy makers believe that Vietnam can benefit from further privatization of existing SOEs. Second, as Wang and Wang (2015) emphasize in their study of Chinese firms changing ownership, studies of firms changing ownership are arguably better able to identify the effects of MNE ownership than studies which compare MNE takeovers to firms that didn't change ownership. This is because

focusing on comparisons of different groups of takeover firms can better control for the special characteristics of firms changing ownership which are not present in firms with constant ownership.

In order to identify firms changing ownership, one must first construct a panel of all firms and then identify firms changing ownership. The six columns on the right side of Table 3 reports total employment for the unbalanced panels we have been able to assemble from information on manufacturing firms and firms in trade, transport, and storage services (referred to as "trade and related services" or simply "trade" below) that were purchased from the General Statistics Office (GSO). In principle, these data should yield the same employment totals as those reported in published compilations such as General Statistics Office (2010, 2013, 2015). However, totals from the panel data are somewhat smaller than the totals from corresponding published compilations, which are reproduced in the third and fourth columns of Table 3, primarily because the panel data exclude a substantial number of firms reporting non-positive values for paid workers, compensation per worker, sales, and fixed assets.[4] Employment of panel firms include the vast majority (93 percent or more) of published totals for manufacturing firms in all years except for 2000 and 2007, when panel coverage was markedly lower (82 and 70 percent, respectively). Panel coverage of employment in trade and related services was also quite high in 2001-2003 (91 percent or more), but substantially lower in other years (58 percent in 2007, 65-67 percent in 2011-2012, and 73-79 percent in other years).

Primarily because most takeovers involve relatively large firms and because data on small firms contain a relatively large number of outlier observations, we further restrict the panel samples to medium-large firms with 20 or more employees in Tables 4-10. We also exclude

[4] The existence of substantial numbers of apparently duplicate entries (i.e., numerous entries for the same firm identification code), which was especially common in earlier years in the sample, is another possible cause, though we do not know how these entries were treated in the published compilations (see Ramstetter and Phan 2007, pp. 24-25 for more details on the duplicate problem).

manufacturing firms in four outlier industries (tobacco, printing and publishing, oil and coal products, and recycling) because these industries are highly regulated, very small, and or contain firms with very unusual characteristics in Vietnam. We had also wanted to further disaggregate manufacturing firms into more homogeneous industry groups similar to the eight groups identified by Ramstetter and Phan (2013), for example. However, such disaggregation is meaningless in this context because samples of takeovers firms are extremely small.

Comparing Tables 3 and 4, medium-large firms accounted for the vast majority (94 percent or more) of panel firm employment in manufacturing and trade MNEs as well as in trade SOEs in all years and in manufacturing SOEs through 2005. Shares of medium-large firms were also relatively high (87-93 percent) for manufacturing SOEs in 2006-2012 and private manufacturing firms in all years, but much lower for private firms in trade and related services (60-78 percent). Thus, sample coverage remains relatively high for all ownership groups even after eliminating small firms with 19 or fewer workers.

Table 4 also suggests that SOEs paid the highest real wages on average, followed by MNEs, and distantly by private firms, in both manufacturing and trade. This pattern contrasts with patterns revealed in previous studies of manufacturing firms, which suggested that MNEs generally paid the highest wages. One important reason for this difference is that previous studies provided more detailed disaggregation of manufacturing industries. In other words, SOEs tend to be concentrated in relatively high-wage industries and this is a major reason they appear to pay the highest wages in Table 4. The tendency for MNEs to pay the highest wages is even stronger further if the influences of firm characteristics such as size, capital intensity, the female share of the workforce, and worker education or occupation are accounted for (Nguyen 2015, Nguyen and Ramstetter 2015a, 2015b).

Correspondingly, similar to Sjöholm and Lipsey's (2006) analysis of Indonesian plants, we initially planned to use a fixed effects estimator to estimate the wage effects of MNE

takeovers relative to firms that didn't change ownership, after controlling for such firm-level characteristics to the greatest extent possible with the panel data. Likewise, using a PSM methodology such as in Wang and Wang's (2015) analysis of MNE takeovers in Chinese manufacturing firms compared to other takeovers is potentially very useful. However, as Table 5 reveals, the number of takeovers was extremely low in Vietnam during 2000-2012, only 22 per year in sample manufacturing and 27 per year in trade and related services. Moreover, there were very few MNE takeovers, only 1.2 per year in manufacturing and 0.4 per year in trade. These MNE takeovers affected an average of only 1,418 manufacturing workers and 305 trade workers per year. Takeovers by SOEs were similarly rare but they were larger, affecting almost as many workers as the much larger number of private takeovers. 10 firms per year were also recorded as experiencing multiple ownership changes during 2000-2012. These firms are excluded from the main samples because the ownership of the takeover firm cannot be defined unambiguously and because we suspect multiple takeovers may in fact reflect data errors in several cases. Nonetheless, it remains that the extremely small number of takeovers by MNEs and SOEs renders the use either fixed effects or PSM estimators useless because they are only valid asymptotically (i.e., in very large samples).

Table 6 then shows that private takeovers tended to be substantially larger (employ more workers per firm on average) than private firms that did not change ownership in both manufacturing and trade. The same pattern was observed for MNE takeovers in trade. On the other hand, SOE takeovers in trade and both MNE and SOE takeovers in manufacturing tended to be relatively small compared to corresponding MNEs or SOEs that didn't change ownership.

More importantly, however, the information in Tables 7 and 8 further underscores the fragility of the evidence from these small samples. Table 7 report mean levels of employment and associated standard deviations, showing that mean employment levels were always

smaller than associated standard deviations. In other words, the calculations suggest that it is impossible to reject the null hypothesis that takeover firms had zero employees on average, in all five years surrounding the takeover. Table 8 reports that mean compensation per worker was usually larger than associated standard deviations, but here again the variation was so large that the null hypothesis of zero wages in all years surrounding the takeover could not be rejected for MNE takeovers in manufacturing or private takeovers in trade.

Most importantly, calculations of mean growth rates of firm-level employment (Table 9) or firm-level wages (Table 10) and associated standard deviations all revealed extremely large variation, with standard deviations usually being several times larger than their corresponding means. Thus, unlike previous studies of Chinese manufacturing firms or Indonesian manufacturing plants, the samples of takeover firms are simply too small and variation too large to yield reliable conclusions about how takeovers have affected firm employment and wages in Vietnam. Although this result is disappointing to the academic, it also reflects an important aspect of Vietnam's corporate sector. Namely, takeovers have apparently been too few and too varied in nature to have imparted systematic effects on employment and wages in Vietnamese firms.

2.5. Conclusion

This paper has examined how foreign MNEs have grown in Vietnam's manufacturing and trade industries, and shed light on how MNE takeovers of Vietnamese firms have affected employment, and wages between 2000 and 2012. As highlighted in the literature review, comparisons of employment and wages in MNE takeovers with employment and wages in firms with constant ownership, and particularly with other types of takeovers, are of particular interest to those seeking to understand the effects of foreign ownership.

Although the scale of MNE activity has been substantial in Vietnam and grown in recent

years, there are substantial discrepancies in measures of MNE shares from alternative sources and uncertainty over the actual share of MNEs in Vietnamese production or employment. On the other hand, the number of MNE takeovers has been very small and they appear to have been only a very small source of changes of MNEs shares. Rather changes in MNE shares have resulted primarily from the entry and exit MNEs and changes in the scale of existing MNE activity.

This exercise thus raises far more questions than it answers, three of which are prominent. First, why have takeovers been so rare in Vietnam? Is there a strong policy bias that prevents takeovers that has remained undetected in the recent literature? Second, alternatively, is there a problem with the data, specifically with the firm identifying codes used in the data set used in this study and many others like it? In this respect, we know several academics who have expressed reservations about the firm identifiers in the data. Assuming that takeovers are more common that these data reveal, the evidence in this paper would seem to give further credence to those reservations. Third, our method of identifying ownership changes has been at an aggregate level; that is we have focused on distinguishing three groups of owners, SOEs, MNEs, and private firms. However, the ownership variable available in the data distinguishes several types of SOEs and private firms, in addition to wholly foreign MNEs and two types of MNE JVs. Would the use of more ownership groups as in Wang and Wang's (2015) study of Chinese firms yield more meaningful results and show ownership changes to be more common? We doubt use of more ownership groups would change the number of MNE takeovers much but we certainly need to explore the answers to all of these questions in more detail before more definitive conclusions can be reached.

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Table 1: Shares of Non-Household GDP and Enterprise Turnover (percent)

Year	Non-Household GDP			Enterprise turnover, published				
	SOEs	MNEs	Private	SOEs	MNEs	MNEs 100%	MNE JVs	Private
1995	63	10	27	-	-	-	-	-
1996	62	11	27	-	-	-	-	-
1997	62	14	25	-	-	-	-	-
1998	60	15	24	-	-	-	-	-
1999	58	18	24	-	-	-	-	-
2000	57	20	23	56	20	7	13	24
2001	56	20	23	54	20	8	12	27
2002	56	20	24	54	19	8	11	28
2003	56	21	23	49	20	9	11	31
2004	56	22	22	45	22	11	11	33
2005	55	22	22	44	22	11	11	35
2006	54	24	23	42	22	12	10	36
2007	52	25	23	38	21	12	9	41
2008	51	25	24	35	18	11	7	47
2009	51	25	24	33	18	12	6	49
2010	53	27	20	33	19	13	6	49
2011	52	28	20	33	20	14	5	48
2012	51	28	21	32	22	17	5	47
2013	50	30	20	28	25	20	5	47
2014	49	31	20	-	-	-	-	-

Notes: For 2010-2014, non-household GDP also excludes product taxes less production subsidies; the SOE share of enterprise turnovers includes central government SOEs, local government SOEs and joint stock companies with state capital.

Sources: General Statistics Office (2010, 2013, 2015, various years).

Table 2: Total Employment and Enterprise Employment (thousands)

Year	Non-household employment						Enterprise employment, published					
	Total LFS	State LFS	State web	Foreign LFS	Foreign web	Private LFS	Total	SOEs	MNEs	MNEs 100%	MNE JVs	Private
2000	-	-	4,358	-	359	-	3,537	2,150	408	286	122	979
2001	-	-	4,474	-	349	-	3,933	2,229	489	364	125	1,215
2002	-	-	4,634	-	426	-	4,658	2,404	691	536	155	1,563
2003	-	-	4,919	-	753	-	5,175	2,426	860	688	173	1,889
2004	-	-	5,031	-	915	-	5,771	2,434	1,045	865	180	2,291
2005	-	-	4,967	-	1,113	-	6,237	2,318	1,221	1,028	192	2,698
2006	-	-	4,916	-	1,322	-	6,565	2,267	1,445	1,237	208	2,853
2007	9,058	5,074	4,988	968	1,562	3,017	7,225	2,190	1,686	1,459	227	3,349
2008	-	-	5,059	-	1,694	-	7,949	2,198	1,829	1,604	225	3,921
2009	10,283	4,794	5,041	1,398	1,525	4,091	8,719	2,277	1,920	1,691	229	4,522
2010	10,645	4,780	5,107	1,756	1,727	4,110	9,831	2,197	2,156	1,902	254	5,478
2011	11,188	5,251	5,251	1,700	1,700	4,238	10,896	2,165	2,551	2,289	262	6,180
2012	11,544	5,336	5,354	1,700	1,703	4,507	11,085	2,082	2,720	2,476	244	6,283
2013	11,610	5,330	5,330	1,786	1,786	4,494	11,566	2,094	3,051	2,783	268	6,421
2014	12,311	5,474	5,474	2,057	2,057	4,781	-	-	-	-	-	-

Notes: For non-household employment LFS series come from Labour Force Survey reports (General Statistics Office various years b) and also exclude self-employment while web estimates come from General Statistics Office (various years a, 2015 downloads); for enterprises, SOE enterprises include central government SOEs, local government SOEs, and joint stock companies with state capital.

Sources: General Statistics Office (2010, 2013, 2015, various years a; various years b).

Table 3: Total Employment and Enterprise Employment in Manufacturing and Trade (thousands)

Year	Total		Enterprises, published		Enterprises in panel data					
					Manufacturing			Trade, transport, strorage		
	Manu-factur-ing	Trade, trans-port, storage	Manu-factur-ing	Trade, trans-port, storage	Total	SOEs	MNEs	Total	SOEs	MNEs
2000	-	-	*1,571*	*500*	1,295	540	327	387	235	6
2001	-	-	*1,769*	*546*	1,714	662	425	538	320	7
2002	-	-	*2,166*	*627*	2,115	723	613	570	299	9
2003	-	-	*2,515*	*682*	2,450	738	778	620	284	11
2004	-	-	*2,845*	*780*	2,756	695	952	617	231	12
2005	5,031	5,884	*3,048*	*890*	2,854	601	1,058	648	216	16
2006	-	-	3,345	996	3,181	473	1,315	741	189	21
2007	5,665	6,271	3,724	1,099	2,625	383	1,098	636	170	18
2008	5,999	6,534	3,927	1,299	3,822	409	1,671	1,031	211	28
2009	6,449	6,577	4,092	1,493	4,021	425	1,751	1,151	231	30
2010	6,646	6,966	4,442	1,803	4,289	319	1,976	1,353	168	34
2011	6,973	7,242	4,872	2,027	4,620	283	2,269	1,361	217	42
2012	7,102	7,812	4,991	1,988	4,658	267	2,379	1,290	152	46
2013	7,267	8,094	5,334	2,061	-	-	-	-	-	-
2014	7,415	8,187	-	-	-	-	-	-	-	-

Notes: SOE enterprises include central government SOEs, local government SOEs, and joint stock companies with state capital; for published enterprise data, 2000-2005 estimated using growth rates of VSIC revsion 3 compilations (which yield 1-2% larger totals for manufacturing and trade in 2006-2007, and 19-20% larger totals for transport and storage) and VSIC revision 4 compilations for 2006-2013. Panel data include firms reporting non-negative paid workers, compensation per worker, turnover, and fixed assets.

Sources: General Statistics Office (2010, 2013, 2015, various years); authors' calculations (for panel data).

Table 4: Employment and Mean Compensation per Worker in Medium-Large Enterprises in Sample Industries (employment in thousands, mean wages in million dong)

	Employment						Mean real compensation per worker					
	Sample manufacturing			Trade, transport, storage			Sample manufacturing			Trade, transport, storage		
Year	SOEs	MNEs	Pri-vate	SOEs	MNEs	Pri-vate	SOEs	MNEs	Pri-vate	SOEs	MNEs	Pri-vate
2000	515	326	400	235	6.2	114	6.69	6.60	1.35	4.72	4.38	1.05
2001	629	423	586	319	6.5	156	6.94	6.37	1.36	4.95	4.18	0.92
2002	688	610	725	298	9.3	183	8.26	6.79	1.42	5.62	5.15	0.84
2003	703	775	871	283	11	227	9.95	7.32	1.55	6.61	5.40	0.92
2004	658	947	1,034	231	12	253	10.64	7.39	1.56	5.75	4.88	0.86
2005	564	1,053	1,116	215	16	293	12.24	8.34	1.71	7.65	6.08	1.00
2006	440	1,305	1,290	189	20	339	13.47	8.52	1.84	7.80	6.15	1.04
2007	355	1,091	1,055	170	18	293	14.85	8.89	2.09	10.89	7.37	1.15
2008	376	1,658	1,572	211	27	473	13.08	8.92	1.95	11.74	7.32	1.12
2009	392	1,737	1,648	230	29	533	13.80	9.04	2.17	11.34	8.69	1.24
2010	289	1,962	1,794	168	32	723	14.51	10.89	2.33	20.73	8.17	1.54
2011	249	2,254	1,865	217	40	717	16.08	11.97	2.38	16.80	7.67	1.73
2012	233	2,364	1,806	152	43	688	14.37	15.39	2.85	18.57	9.33	1.67

Note: Sample manufacturing excludes tobacco, printing and publishing, oil and coal products, and recycling. Medium-large firms are those with 20 or more paid workers, and positive compensation per worker, turnover, and fixed assets.

Source: Authors' calculations.

Table 5: Number of medium-large firms and total workers by industry and takeover status or owner

	Number of Firms per year			Total Workers per year		
Sample, industry, type	2000-06	2007-12	2000-12	2000-06	2007-12	2000-12
SAMPLE FIRMS, SINGLE TAKEOVERS						
All sample industries	50	50	50	98,597	107,928	102,904
Sample manufacturing	22	23	22	49,476	54,025	51,575
Private takeovers	21	19	20	16,463	42,678	28,562
MNE takeovers	0.0	2.7	1.2	470	2,523	1,418
SOE takeovers	1.4	1.7	1.5	32,542	8,824	21,596
Trade, transport, storage	28	27	27	49,122	53,903	51,328
Private takeovers	27	24	25	16,146	40,860	27,552
MNE takeovers	0.0	0.8	0.4	0	660	305
SOE takeovers	0.7	2.3	1.5	32,976	12,384	23,472
SAMPLE FIRMS, CONSTANT OWNERSHIP						
All sample industries	19,609	41,890	29,893	3,344,664	5,355,397	4,272,695
Sample manufacturing	9,261	17,649	13,132	2,187,367	3,438,039	2,764,601
Private	6,447	13,490	9,698	863,245	1,577,763	1,193,022
MNEs	1,771	3,614	2,622	784,100	1,612,108	1,166,258
SOEs	1,043	545	813	540,022	248,168	405,320
Trade, transport, storage	10,349	24,242	16,761	1,157,297	1,917,357	1,508,094
Private	8,554	22,908	15,179	562,661	1,522,330	1,005,585
MNEs	137	388	253	17,012	41,336	28,238
SOEs	1,658	945	1,329	577,624	353,692	474,270
EXCLUDED FIRMS IN SAMPLE INDUSTRIES						
Multiple ownership changes	9	12	10	17,832	16,978	17,438
Small size	33,491	122,466	74,556	266,834	870,093	545,261
Implausible data	6,616	15,922	10,911	78,992	144,192	109,085

Note: Sample manufacturing excludes tobacco, printing and publishing, oil and coal products, and recycling. Medium-large firms are those with 20 or more paid workers, and positive compensation per worker, turnover, and fixed assets.

Source: Authors' compilations.

Table 6: Mean workers per firm and compensation per worker in medium-large firms by industry and takeover status or owner

	Mean workers per firm			Mean compensation per worker		
Sample, industry, type	2000-06	2007-12	2000-12	2000-06	2007-12	2000-12
SAMPLE FIRMS, SINGLE TAKEOVERS						
All sample firms	420.59	412.20	416.49	16.33	24.20	20.18
Sample manufacturing	477.04	454.63	465.94	14.03	22.11	18.03
Private takeovers	385.43	504.07	460.11	13.64	21.16	18.37
MNE takeovers	365.67	225.97	242.51	25.84	30.46	29.91
SOE takeovers	544.97	383.66	504.93	14.06	21.56	15.92
Trade, transport, storage	375.79	376.95	376.35	18.15	25.95	21.92
Private takeovers	299.79	378.33	349.44	17.41	25.16	22.31
MNE takeovers	-	232.88	232.88	-	45.30	45.30
SOE takeovers	429.05	384.98	417.42	18.67	26.86	20.83
SAMPLE FIRMS, CONSTANT OWNERSHIP						
All sample firms	180.20	134.49	150.59	12.58	19.10	16.80
Sample manufacturing	247.20	209.29	223.92	11.84	17.08	15.06
Private	137.71	120.96	126.98	9.36	14.68	12.77
MNEs	455.91	543.19	507.99	19.86	26.29	23.70
SOEs	627.83	597.28	618.88	13.82	26.62	17.57
Trade, transport, storage	119.15	81.96	94.10	13.25	20.51	18.15
Private	68.86	68.18	68.38	12.16	19.53	17.33
MNEs	126.55	135.01	132.15	44.85	61.96	56.17
SOEs	410.54	466.41	428.19	16.54	32.81	21.68
EXCLUDED FIRMS IN SAMPLE INDUSTRIES						
Multiple ownership changes	308.21	232.04	268.59	18.75	25.21	22.11
Small size	7.97	7.10	7.31	10.96	17.94	16.26
Implausible data	12.61	9.06	10.18	10.63	17.18	15.21

Note: Sample manufacturing excludes tobacco, printing and publishing, oil and coal products, and recycling. Medium-large firms are those with 20 or more paid workers, and positive compensation per worker, turnover, and fixed assets.

Source: Authors' compilations.

Table 7: Mean workers per firm in medium-large takevoer firms by industry and takeover status or owner by year (t=takeover year)

Sample, industry, type	t-2	t-1	t	t+1	t+2
MEAN WORKERS PER FIRM					
All sample firms	462.58	451.12	409.25	387.27	373.53
Sample manufacturing	499.33	501.56	463.04	445.72	421.30
Private takeovers	271.00	234.58	497.04	474.29	445.53
MNE takeovers	305.54	504.21	127.50	160.06	164.65
SOE takeovers	528.83	527.25	296.20	311.40	334.20
Trade, transport, storage	432.63	410.93	365.01	339.80	334.75
Private takeovers	86.20	113.29	376.62	350.72	343.90
MNE takeovers	38.00	-	250.80	250.60	235.67
SOE takeovers	444.15	429.42	192.74	171.84	213.55
STANDARD DEVIATIONS OF WORKERS PER FIRM					
All sample firms	703.25	719.00	658.81	581.11	578.73
Sample manufacturing	698.94	740.32	697.89	650.57	621.09
Private takeovers	333.93	305.04	730.43	680.59	652.17
MNE takeovers	319.17	673.05	151.56	199.61	188.69
SOE takeovers	731.10	769.61	375.95	373.75	351.88
Trade, transport, storage	706.33	699.99	622.35	513.95	539.69
Private takeovers	99.20	136.26	638.34	526.82	554.72
MNE takeovers	1 firm	-	404.22	407.26	394.54
SOE takeovers	714.75	716.62	270.28	184.58	229.55

Note: Sample manufacturing excludes tobacco, printing and publishing, oil and coal products, and recycling. Medium-large firms are those with 20 or more paid workers, and positive compensation per worker, turnover, and fixed assets.

Source: Authors' compilations.

Table 8: Mean compensation per worker in medium-large takeover firms by industry and takeover status or owner (t=takeover year)

Sample, industry, type	t-2	t-1	t	t+1	t+2
MEAN COMPENSATION PER WORKER					
All sample firms	17.23	19.18	20.25	21.92	22.24
Sample manufacturing	15.24	16.63	17.79	19.58	20.85
Private takeovers	13.58	17.39	16.91	18.59	20.12
MNE takeovers	22.54	21.24	31.66	36.00	35.31
SOE takeovers	15.00	16.29	17.94	18.97	17.77
Trade, transport, storage	18.85	21.21	22.27	23.83	23.36
Private takeovers	25.99	22.73	21.81	22.17	22.82
MNE takeovers	23.15	-	39.56	55.09	45.61
SOE takeovers	18.62	21.11	25.67	44.76	25.72
STANDARD DEVIATION OF MEAN COMPENSATION PER WORKER					
All sample firms	14.63	17.69	17.87	20.60	16.70
Sample manufacturing	10.97	11.58	13.66	15.33	17.24
Private takeovers	8.09	10.84	11.02	13.67	15.50
MNE takeovers	17.64	14.56	35.41	31.33	35.28
SOE takeovers	10.65	11.45	7.93	8.42	8.63
Trade, transport, storage	16.88	21.15	20.51	23.89	16.19
Private takeovers	17.53	14.54	20.83	16.33	14.99
MNE takeovers	1 firm	-	19.35	54.02	50.85
SOE takeovers	16.87	21.50	11.54	70.24	12.68

Note: Sample manufacturing excludes tobacco, printing and publishing, oil and coal products, and recycling. Medium-large firms are those with 20 or more paid workers, and positive compensation per worker, turnover, and fixed assets.

Source: Authors' compilations.

Table 9: Mean growth rates of workers in medium-large takevoer firms by industry and takeover status or owner by year (t=takeover year)

Sample, industry, type	t-2	t-1	t	t+1	t+2
MEAN GROWTH RATES OF WORKERS					
All sample firms	25.43	47.98	34.46	25.26	8.39
Sample manufacturing	34.34	66.94	53.17	41.61	2.86
Private takeovers	-2.76	756.35	1.37	0.71	-0.27
MNE takeovers	202.42	134.08	486.54	730.24	33.08
SOE takeovers	27.84	-3.57	369.46	10.15	16.65
Trade, transport, storage	18.48	32.84	19.07	11.98	12.88
Private takeovers	13.29	389.49	-4.71	11.35	6.24
MNE takeovers	-	-	284.94	-3.65	308.56
SOE takeovers	18.58	11.74	363.30	27.16	33.73
STANDARD DEVIATIONS MEAN GROWTH RATES OF WORKERS					
All sample firms	197.43	369.56	326.66	460.69	87.13
Sample manufacturing	277.38	504.40	334.37	680.16	42.99
Private takeovers	8.33	1600.61	79.28	37.26	39.22
MNE takeovers	484.57	237.48	673.23	2890.07	66.64
SOE takeovers	269.59	24.60	985.17	36.76	52.89
Trade, transport, storage	96.81	205.82	319.84	95.82	110.58
Private takeovers	23.03	681.48	53.77	97.75	58.64
MNE takeovers	-	-	539.86	8.45	682.73
SOE takeovers	97.73	103.43	1,318.70	70.77	131.92

Note: Sample manufacturing excludes tobacco, printing and publishing, oil and coal products, and recycling. Medium-large firms are those with 20 or more paid workers, and positive compensation per worker, turnover, and fixed assets.

Source: Authors' compilations.

Table 10: Mean growth rates compensation per worker in medium-large takevoer firms by industry and takeover status or owner by year (t=takeover year)

Sample, industry, type	t-2	t-1	t	t+1	t+2
MEAN GROWTH RATES OF COMPENSATION PER WORKER					
All sample firms	24.80	42.41	26.55	36.61	22.75
Sample manufacturing	26.66	32.14	27.29	42.63	28.95
Private takeovers	27.83	45.70	23.11	44.66	32.30
MNE takeovers	24.63	46.94	102.89	55.28	4.89
SOE takeovers	26.70	29.99	20.26	6.73	7.16
Trade, transport, storage	23.35	50.61	25.95	31.71	17.73
Private takeovers	55.43	143.56	24.75	27.62	18.51
MNE takeovers	-	-	43.80	32.66	17.68
SOE takeovers	22.71	45.11	42.10	103.06	4.89
STANDARD DEVIATIONS OF COMPENSATION PER WORKER GROWTH					
All sample firms	118.60	168.06	109.99	192.06	121.87
Sample manufacturing	135.02	119.12	116.23	250.04	163.78
Private takeovers	34.19	106.51	112.70	263.94	173.46
MNE takeovers	133.85	192.75	181.64	163.40	45.67
SOE takeovers	138.87	115.44	72.61	27.66	78.59
Trade, transport, storage	104.21	198.47	104.74	126.98	71.61
Private takeovers	94.53	297.97	105.88	99.20	70.88
MNE takeovers	-	-	80.65	72.47	116.33
SOE takeovers	104.44	190.21	91.57	361.26	71.13

Note: Sample manufacturing excludes tobacco, printing and publishing, oil and coal products, and recycling. Medium-large firms are those with 20 or more paid workers, and positive compensation per worker, turnover, and fixed assets.

Source: Authors' compilations.

Chapter 3:
Trade protection and productivity differentials between multinationals and local firms in Vietnamese manufacturing

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3.1 Introduction

Multinational enterprises (MNEs) are key players in the process of global economic integration and production of MNEs has tended to grow faster than production of local firms in Vietnam and many other Asian economies (Ramstetter 2012). Theory suggests that to become an MNE, a firm must first own generally intangible assets related to production technology, management skills, and marketing networks (Caves 2007, Dunning and Lundan 2008, Markusen 1991). If MNEs do indeed possess these assets in relatively large amounts, they will tend to be more productive than non-MNEs in some respect.

Although theory suggests that foreign affiliates will have higher productivity than non-MNEs, previous empirical evidence is mixed. For example, analyses of large, heterogeneous samples of manufacturing plants in Mexico (Blomström 1986) and Indonesia (Takii 2004), or manufacturing firms in Vietnam (Athukorala and Tran 2012; Ramstetter and Phan 2013) found MNEs tended to have relatively high productivity. However, industry-level analyses for Indonesia and Vietnam suggested that MNE-local productivity differentials were insignificant when production function parameters were allowed to vary among industries. Moreover, evidence for manufacturing plants in Malaysia (Haji Ahmad 2010; Menon 1998; Oguchi et al. 2002) and Thailand (Ramstetter

2004) suggested small and generally insignificant differentials in productivity levels or growth, in large heterogeneous samples and/or at the industry level.

This paper makes two contributions. First, the paper examines how industry-level effective protection affected firm productivity and ownership-related productivity differentials. In small, open economies like Vietnam, which cannot affect world prices and depend on imports for many intermediate and capital goods, standard trade theory and related evidence suggests that higher protection will increase costs and reduce firm productivity.[1] Because MNEs account for disproportionately large shares of exports and imports in Vietnam (and thus have relatively high trade propensities), protection-related productivity effects are likely to be larger in MNEs than in local firms, reducing MNE-local differentials.[2] In contrast, there is evidence that high protection may weaken productivity spillovers from MNEs in Vietnam (Truong et al. 2015). If this is the case, MNE-local productivity differentials may actually be larger in industries with high protection. To our knowledge, this paper provides some of the first empirical evidence about the effect of protection on MNE-local productivity differentials.

Second, because previous evidence for Vietnam is only available through 2006, and Vietnam joined the World Trade Organization (WTO) in January 2007 after instituting further, extensive trade and investment reforms in 2005-2006, it is important to evaluate the extent of productivity differentials among MNEs, SOEs, and local firms in more recent years. This paper analyses productivity in Vietnam's manufacturing firms during 2005-2010, both in large heterogeneous samples of all manufacturing firms and in smaller, more homogeneous industry groups

[1] For example, Athukorala and Chand (2000) find that U.S. MNEs created larger productivity gains in countries with relatively low protection. In a related study, Balasubramanyam *et al*. (1996) found that foreign direct investment led to larger increases in growth in export-promoting economies than in import-substituting ones.
[2] In 2005-2010, MNEs accounted for 53-58 percent of Vietnam's exports and 34-44 percent of imports, but only 20-24 percent of non-household GDP (General Statistics Office 2016b).

distinguished by labour intensity. Vietnam is an interesting case study because policies have been designed to attract foreign MNEs after the *doi moi* reform in 1986, partially because it was believed that foreign MNEs could help improve productivity.

After a more detailed review of the literature (Section 2), data on ownership and productivity of Vietnamese manufacturing firms are reviewed (Section 3). The empirical model is then presented (Section 4) and empirical results analysed (Section 5), before concluding (Section 6).

3.2 Literature review

As described in the introduction, foreign MNEs in developing economies are expected to be more productive than local firms or plants in developing economies like Vietnam, largely because MNEs possess relatively large amounts of firm-specific assets related to production technology, marketing networks, and management know-how than non-MNEs, and most local firms are non-MNEs. However, the empirical evidence on this point is mixed, especially for manufacturing plants in Malaysia and Thailand. Evidence from large samples of plants or firms in many manufacturing industries in Indonesia and Vietnam is more consistent with the hypothesis that MNEs have relatively high productivity, but evidence is much weaker when all production function coefficients are allowed to vary among more homogeneous industry groups.

Productivity differentials between foreign MNEs and local firms may be insignificant for at least four reasons. First, MNEs in Vietnam and other developing economies MNEs often engage in assembly, using relatively simple, standardized production technology. In such cases, production technology in MNE affiliates is often similar to technology in local firms. Moreover, even if MNEs do introduce new technologies, local firms are often able to imitate them quickly.

Second, MNE parents may be reluctant to allow minority-owned affiliates access to the MNE's intangible assets related to production technology because they fear leakage of corporate knowledge (Caves 2007). This is one reason researchers like Moran (2001) argue that affiliates which are closely integrated into the parent are likely to be more productive and beneficial to host economies than affiliates which are isolated from the parent network by ownership restrictions or import content requirements, for example. If this is true, wholly-owned MNEs (WOs) or other affiliates (e.g., over 90 percent) with large foreign ownership shares should have better access to the MNE's firm-specific assets and be more productive than MNE joint ventures (JVs) with smaller foreign ownership shares, especially minority-foreign JVs.

However, empirical evidence regarding this issue is also unclear. For example, in large samples of Indonesian manufacturing plants, Takii (2004) found that majority-foreign MNEs had significantly higher productivity than minority-foreign plants or local plants, which had the lowest productivity. However, these differentials were not usually significant at the industry level. Similarly, Blomström and Sjöholm (1999) and Takii and Ramstetter (2005) found that productivity was often relatively low in MNE plants with relatively large foreign ownership shares in Indonesia. Other evidence for Thai plants (Ramstetter 2004) and Vietnamese firms (Nguyen et al. 2006) is similar. In contrast, Ramstetter and Phan (2013) found that wholly-owned MNEs (WOs) were generally more productive than MNE joint ventures (JVs) in Vietnam, but that there was substantial variation in results among industries and sub-periods.[3]

Third, productivity spillovers occur when MNE presence affects the productivity of local firms and operate through at least three major channels. Forward or backward linkages between

[3] Other studies for Belgium in 1990-1995 (De Backer and Sleuwaegen, 2003) and Romania in 1998-2003 (Javorcik and Spatareanu 2008) found that productivity in JVs improved faster than in WOs.

MNEs and local firms constitute the first channel, though backward linkages are usually thought to be more important in this respect (Dunning and Lundan 2008). Labour mobility is a second channel, and can be especially important when relatively skilled workers move from MNEs to local firms or to start up new local firms (Chen 1983; Görg and Strobl 2005; Katz 1987; Kohpaiboon 2006a). Third, MNE presence often increases competition and encourages domestic firms to improve efficiency, often by imitating MNEs (Kokko 1994; Wang and Blomström 1992). When these spillovers occur, local firm productivity improves, and productivity differentials between MNEs and local firms become smaller.

The theory of immiserisation (Bhagwati 1968, 1973; Brecher and Findlay 1983; Brecher and Alejandro 1977) and related empirical and policy literature (Athukorala and Chand 2000; Balasubramanyam et al. 1996; Moran 2001) also suggests that firm productivity and/or spillovers from MNEs are likely to be reduced when import protection is high. This is because protection distorts resource allocation and reduces motives for productivity improvement in all firms, including MNEs.[4] Studies of India (Kathuria (2002), Thailand (Kohpaiboon, 2003; 2006b), and Uruguay (Kokko et al. 2001) all provide evidence that spillovers from MNEs tended to be larger when protection was relatively low. For Vietnam, Truong et al. (2015) provide evidence that high effective rates of protection have negative effects on both local firm productivity and spillovers from MNEs.[5]

[4] Empirical estimates of spillovers are notorious for large variation among host economies, industries, and time periods, as well as estimation methodologies. For example, in studies of Vietnam, Nguyen et al.(2006) find "little evidence of positive spillover effects at the firm level", but "no signs of negative spillover effect either". This result is generally consistent with more comprehensive results from Ramstetter and Phan (2013). On the other hand, Pham (2008) finds generally positive spillovers that were largest in Hanoi and Ho Chi Minh City, while Le and Pomfret (2011) find positive backward spillovers in manufacturing, but negative horizontal spillovers.

[5] These results also indicate that WOs generate negative productivity spillovers to local private firms, while JVs generate positive spillovers.

Fourth, productivity estimates are sensitive to specification, estimation technique, and data errors. Estimates for Vietnam are particularly vulnerable because data on intermediate expenditures are not collected at the firm level and must be estimated with substantial error for some firms (see details in Section 3). In contrast, evidence of positive and significant wage differentials between MNEs and local firms in Vietnamese manufacturing (Nguyen and Ramstetter 2015a, 2015b) is stronger than evidence of productivity differentials both in large heterogeneous samples and in more homogeneous industry-level samples. Similarly evidence of significant wage differentials is relatively strong for manufacturing plants in Indonesia (Lipsey and Sjöholm 2004; Ramstetter and Narjoko 2013), Malaysia (Ramstetter 2014), and Thailand (Matsuoka-Movshuk and Movshuk 2006; Ramstetter 2004). This evidence is important because variation in wages is closely related to variation in labour productivity, and may indicate that productivity estimates are less robust than earnings' estimates.

3.3 Productivity differentials and import protection in Vietnam

This study utilizes firm-level data underlying annual enterprise surveys conducted for 2005-2010 (General Statistics Office various years). The dataset includes all non-household firms with 10 or more employees and samples of smaller firms. Because we want to compare generally large MNEs with local firms, many of which are very small and cannot be meaningfully compared with MNEs, we exclude enterprises with less than 20 employees. We also exclude firms in the tobacco, printing and publishing, oil and coal, and recycling industries because they have few firms or MNEs and/or are subject to strict government regulation that isolates them from market forces. Because the firms do not report intermediate expenditures, they are estimated from on firm-level data on revenues from major products and corresponding, estimated

input-output ratios by detailed (4- to 6-digit) industry. Value added estimates are imprecise because firm-level input-output ratios differ from industry averages and because all products of some diversified firms are not included.

The dataset included duplicate observations, which probably resulted from different plants of multi-plant firms reporting the same firm-level information. Records were defined as duplicates if firms reported the same values for seven variables: total workers, female workers, initial fixed assets, ending fixed assets, registered capital, turnover (=total revenue), and intermediate expenditure. One firm was retained from each set of duplicates. Because lagged values of fixed assets and employment are required, 2004 data were processed similarly. Firms reporting non-positive employment, fixed assets, turnover, and/or value added were dropped, though most of these firms had less than 20 employees. The resulting dataset had 11,721 manufacturing firms in 2005 and 18,060 in 2010, creating an unbalanced panel of 43,333 observations for 2005-2010.

Primarily because many firms were small and/or estimates of intermediate consumption were unavailable or unrealistic, the panel's samples were substantially smaller than the totals reported in published compilations (e.g., 21,876 manufacturing firms in 2005 and 45,472 in 2010; General Statistics Office 2010, 2013, 2016a). Perhaps more importantly, the panel's coverage varied over time and among indicators. For example, sales of all sample firms increased from 571 trillion dong in 2005 to 818 trillion dong in 2007, but fell to 532 trillion dong in 2008, before increasing to 1,432 trillion dong in 2009 and 1,822 trillion dong in 2010 (Table 1). Similarly, employment of sample firms was much lower in 2008 (1.6 million) than in 2005-2007 (2.7-3.0 million) or 2009-2010 (3.7-3.9 million). Thus, ratios of panel firm sales and employment to published totals was lower in 2007 and especially in 2008 (69 and 34 percent, respectively, for sales and 72 and 40 percent, respectively, for employment) than in other years (73-79 percent for sales and 88-92

percent for employment).[6] Caution is thus necessary when interpreting time trends observed in the panel (Table 1), especially around 2008 when the panel's coverage was unusually low. In other words, the large declines observed in 2008 probably result primarily from changes in sample coverage, not from actual changes in firm sales or employment. On the other hand, the panel's coverage was rather comprehensive in other years.

Both published compilations (General Statistics Office 2010, 2013, 2016a) and the panel (Table 1) are consistent in indicating that shares of WOs and private firms in total firm sales and employment generally increased, while shares of SOEs and JVs (many of which involve an SOE partner) declined during this period. The increases in private and WO shares are related to policy changes, especially the promulgation of the Enterprise Law in 2000, several subsequent revisions to the law, as well as related laws and decrees. A unified Investment Law was finally promulgated in 2005. Removal of strong policy biases that penalized local private firms and favoured SOEs was the most important result of these policy changes.[7] It also became easier to establish WOs after they were allowed to become shareholding companies in 2003.

This paper analyses large heterogeneous samples of all manufacturing firms and three smaller, more homogeneous samples of industry groups classified by factor intensity.[8] WO sales were distributed relatively equally with the labour-intensive category being largest in 2005-2007 and the capital-intensive group being largest in 2008-2010 (Table 1). JV and SOE sales were

[6] For 2005-2008, these panel samples are somewhat smaller (14-15 percent of sales, 4-5 percent of employment) than similar samples reported in Ramstetter and Phan (2013, p. 31), but display similar trends.
[7] Private firms had no clear, general, legal grounds for existence before 2000 (Van Arkadie and Mallon 2003)
[8] Labour-intensive industries are textiles, apparel, leather and footwear, wood products, non-electric machinery, precision machinery, and furniture & miscellaneous manufacturing. Capital-intensive industries are rubber & plastics, basic metals, electrical machinery, communication machinery, motor vehicles, and other transport machinery. Industries with intermediate intensity are food & beverages, paper products, chemicals, non-metallic mineral products, and metal products. We use a 2-digit classification of revision 3 of Vietnam's Standard Industrial Classification, which is very similar to the International Standard Industrial Classification.

concentrated in the intermediate intensity and capital-intensive groups. As a result, WOs accounted for about half of the sales and employment of all firms in labour-intensive industries, as well as one-third of sales and just under half of employment in capital-intensive industries. JV shares of sales were largest in capital-intensive industries (about one-fourth to one-third), but corresponding shares of employment were much smaller.

Table 2 compares value added per worker, among ownership and industry groups. Consistent with previous evidence through 2006 (Ramstetter and Phan 2013, p. 34), JVs had the highest labour productivity in most years and industry groups, with particularly large differentials in the capital-intensive and intermediate groups through 2007. WOs also had relatively high labour productivity in the labour-intensive group through 2007 and intermediate group through 2008, but relatively low productivity in the capital-intensive group in all years. SOE-private differentials were also positive and relatively large in the labour-intensive and intermediate groups through 2008. In 2009-2010, most differentials declined substantially and the WO-private differential turned negative. The trend toward smaller differentials resulted from increases of labour productivity in private firms and may indicate the maturation of the private sector. On the other hand, the marked increase of SOE-private and JV-private differentials in the capital-intensive group is much more difficult to explain. The large, discrete changes in these differentials suggest that the sampling changes may have influenced the trends observed.

In contrast to average labour productivity, average value added-fixed asset ratios tended to be relatively low in SOEs, WOs, and JVs, reflecting relatively high capital intensity in these groups (Table 3). WO-private differentials were consistently negative in all groups and years with one exception, labour-intensive industries in 2005. JV and SOE differentials were also negative in almost all years in the labour-intensive and intermediate groups, but consistently positive in the

capital-intensive group. In other words, average capital productivity was consistently highest in private firms in the labour-intensive and intermediate groups, but generally lower in the capital-intensive group. As with labour productivity, average capital productivity in private firms increased markedly in 2009 and 2010 in the labour-intensive and intermediate groups, but not in the capital-intensive group

Tariffs are a key policy instrument Vietnam uses to restrict imports. The average, nominal tariff rate declined continuously from 13 percent in 2005 to 5.7 percent in 2010 and the mean rate for manufactures fell from 12 to 6.9 percent, respectively (CIEM 2010). Among manufactures, tariffs on apparel, footwear, ceramics, automobiles, and motorcycles remained relatively high in 2010. However, Vietnam's tariff structure in Vietnam is cascading, which means that tariffs are generally higher on final goods than on inputs. Correspondingly, nominal tariff rates do not reflect the resource allocation effects of tariffs, which are more accurately measured with effective rates of protection (ERPs, Table 4). During 2006-10, ERPs also declined, reflecting the gradual removal of many tariff barriers. Declines were particularly large in the labour-intensive textiles and apparel industries. In general, Vietnam appears to have maintained relatively high effective protection in industries in which it is usually thought to have a comparative advantage (e.g., textiles, apparel, leather, footwear and food processing).

3.4 The model

Simple comparisons of average factor productivities in Tables 2 and 3 are partial and do not account for the influences of factor intensity and firm size. In order to provide a more comprehensive comparison, we follow the previous literature reviewed above and estimate total factor productivity (TFP) using translogarithmic (translog) production functions. The translog is

used because it allows both the marginal rate of technical substitution and economies of scale to vary with production levels. The constant in this equation is interpreted as TFP. Production (Y_{ij}) is measured as the log of value added in firm i operating in industry j. Capital and labor inputs are measured as the logs of fixed asset book values (K_{ij}) and the number of employees (L_{ij}), respectively. Real values of Y and K are calculated using deflators of industrial output defined at the 2-digit level of the Vietnam's standard industrial classification (VSIC). Value added, capital, and labour are standardized to minimize problems related to multicollinearity.

The MNE-private differential in TFP is measured as the coefficient on an intercept dummy identifying MNEs (MNE_{ij}). If the coefficient on MNE_{ij} is positive and significant, it means that MNEs had significantly higher TFP than private firms, after accounting for firms' scale and use of capital and labour. Because SOEs are also important and likely to have relatively high productivity according to previous studies, a dummy variable for SOEs (SOE_{ij}) is also included. The coefficient on this variable reflects the size and significance of SOE-private productivity differentials, while the constant measures TFP in private firms. Because ownership dummies are time-invariant for most firms, pooled ordinary least squares (OLS) or random effects' estimators are required to estimate productivity differentials.[9] Although both estimates yield qualitatively similar results, the analyses below focus on random effects estimates because Breusch and Pagan tests indicated that they were preferable to pooled OLS results (available from the authors) in all samples examined. Finally, a set of time dummies was included to capture changes in the economic environment over time.[10]

[9] If a fixed-effects estimator is used, coefficients on ownership dummies reflect the productivity effects of changes in ownership, not productivity differentials.
[10] Coefficients on time dummies are omitted from the results presented below but are available from the authors.

The level of effective protection in an industry (TP_j, percent) is included to capture the negative effects protection is likely to have on firm productivity. The possibility that high ERPs can affect MNE-private productivity differentials is considered by interacting TP_j with MNE_{ij}. The degree of competition in each industry is also controlled for by including the four-firm concentration ratio ($CR4_j$=sales of the four largest firms to all firm sales in industry j in percent). The resulting model is:

$$Y_{ij} = \beta_o + \beta_1(MNE_{ij}) + \beta_2(SOE_{ij}) + \beta_3(TP_j) + \beta_4(MNE_{ij} \times TP_j) + \beta_5(CR4_j) + \beta_6 + \beta_7(L_{ij}) + \beta_8(L_{ij})^2 + \beta_9(K_{ij}) + \beta_{10}(K_{ij})^2 + \beta_{11}(L_{ij} \times K_{ij}) + \varepsilon_{ij} \quad (Eq.1)$$

Consistent with previous estimates for Vietnam, the MNE-private and SOE-private productivity differentials (β_1 and β_2) are generally expected to be positive. We also expect independent effect of trade protection (measured by β_3) to be negative. On the other hand, as explained in the introduction, the interaction of MNE ownership and trade protection (measured by β_4) has indeterminate effects. The effect of industry concentration (measured by β_5) is also unclear a priori.[11] Marginal factor productivities calculated from equation (1) are expected to be positive, consistent with basic production theory.

As discussed above, productivity may differ in WOs and JVs. To analyse related differences, including the possibility that interactions with ERPs also differ, the MNE dummy is replaced with two dummy variables identifying WOs and JVs (WO_{ij}, JV_{ij}) in an alternative specification:

[11] Evidence from Kamien and Schwartz (1982) and Kohpaiboon (2006b) suggests market concentration is positively correlated with firm productivity in developing countries but previous evidence for Vietnam suggests concentration was generally an insignificant determinant of firm productivity in 2001-2006 (Ramstetter and Phan 2013).

$$Y_{ij} = \gamma_0 + \gamma_1(WO_{ij}) + \gamma_2(JV_{ij}) + \gamma_3(SOE_{ij}) + \gamma_4(TP_j) + \gamma_5(WO_{ij} \times TP_j) + \gamma_6(JV_{ij} \times TP_j) + \gamma_7(CR4_j) + \gamma_8(L_{ij}) + \gamma_9(L_{IJ})^2 + \gamma_{10}(K_{ij}) + \gamma_{11}(K_{ij})^2 + \gamma_{12}(L_{ij} \times K_{ij}) + \varepsilon'_{ij} \quad (Eq.2)$$

The model is estimated for the whole sample period (2005-2010) and two sub-periods 2005-2007 and 2008-2010 because Vietnam joined the WTO in January 2007 and the growth of Vietnam's economy and manufacturing sector slowed in the latter period. Estimates are first performed in large heterogeneous samples of firms in all sample industries and then in subsamples of industry groups distinguished by factor intensity.

3.5 Results

When equations (1) and (2) are estimated large, heterogeneous samples of all firms, Wald tests indicate that differences between coefficients on WO_{ij} and JV_{ij} were statistically significant in all estimates (Table 5). Differences between interaction coefficients on $WO_{ij} \times TP_j$ and $JV_{ij} \times TP_j$ were statistically significant when all six years were included and in the latter period, but not in the earlier period. Thus, we focus on estimates of equation (2).

Regardless of the specification, effective protection had a significantly negative effect on productivity in all firms during all periods (Table 5, left side). In contrast, concentration had inconsistent effects on productivity, similar to results for previous years (Ramstetter and Phan, 2013). Its effects were insignificant in the latter period, weakly significant and negative at the 10 percent level in the earlier period, and highly significant at 1 percent level but positive if all years are combined in the sample.

JV-private differentials were the largest ownership differentials in all periods and highly significant. WO-private differentials were positive, highly significant and second largest in 2005-2007. They were also highly significant in 2005-2010, but slightly smaller than SOE-private differentials, which were also positive and highly significant in all periods and second largest in the latter period as well. Results are thus broadly consistent with results from previous years, in suggesting that both MNEs and SOEs tended to have relatively high productivity, and that productivity was highest in JVs. The results are also consistent with previous studies in suggesting that productivity differentials varied substantially among relatively short sub-periods.

Coefficients on the MNE-ERP interaction variables were positive and significant for WOs when all years were included and in the latter period, but insignificant in the earlier period. For JVs, interaction coefficients were negative and significant in the earlier period, but insignificant in the latter period and when all years were included. Thus, if estimates are performed in large, heterogeneous samples, the effects of ERP levels on MNE-private productivity differentials vary among sub-periods for both WOs and JVs.[12]

Estimates for all sample manufacturing industries assume identical production technologies in sub-groups, for example, labour-intensive and capital-intensive industries and industries with intermediate intensity. However, Ramstetter and Phan (2013) found that many production function parameters varied markedly among seven industry groups in 2001-2006, suggesting that this assumption is unrealistic in Vietnamese manufacturing. Thus, we estimate equations (1) and (2) in three alternative subsamples distinguished by labour-intensity.

[12] Similarly, estimates of equation (1) indicate that the effects of the overall MNE-ERP interaction varied among sub-periods; it was significantly positive in 2005-2010, significantly negative in 2005-2007, and insignificant in 2008-2010.

Partially because they contained over two-thirds of the observations in the panel, results for labour-intensive industries resemble results for all industries in important respects (Table 5, right side). Wald tests indicate that equation (2) is generally preferable so we focus on those results. High ERPs again had a consistent, significant, and negative effect on productivity in all firms. In contrast, concentration's effect was inconsistent; insignificant in the two sub-periods, but significantly positive when all years were included. JV-private differentials were significantly positive in all three periods and JVs had the highest productivity in the earlier period and when all years were included in the sample. In these two periods, SOE-private differentials were also significant and the second largest. In the latter period, SOE-private differentials remained significant and were larger than JV-private differentials. WO-private differentials were insignificant in the latter period, but significantly positive in the earlier period and when all years were included. They were the smallest of all ownership-related differentials, but similar to SOE-private differentials in the earlier period.

On the other hand, interactions of ERP levels and MNE-private productivity differentials had insignificant effects, with two exceptions (Table 5). When all years were included, WO-private differentials were significantly larger in industries with high protection, but this effect was insignificant in the two sub-periods.[13] In contrast, JV-private differentials were significantly lower in industries with high protection in the earlier period, but this effect was insignificant in the latter period and when all years were included.

When estimated in smaller samples of industries with intermediate intensity, equation (1) was preferred when all years were included (Table 6, left side). Results indicate that MNE- and SOE-

[13] Estimates of equation (1) reveal a similar pattern, reflecting the fact that most MNEs are WOs.

private differentials were both significantly positive but that MNEs had the highest productivity. The independent effects of ERPs were significantly negative and concentration had a weakly significant (at 10%) and positive effect on productivity. However, the effects interacting ERPs and MNE ownership were insignificant.

However, when estimates were made for the two sub-periods, equation (2) was generally preferred (Table 6). JVs had the highest productivity in both sub-periods all samples, followed by WOs in the earlier period, but the WO-private differential was insignificant in the latter period. SOE-private differentials were consistently positive and significant, but smaller than both JV- and WO-private differentials when they were significant. High industry-level ERPs again led to significantly lower productivity in all firms, but interactions of ERPs and WO- or JV-private productivity differentials were never significant at standard levels. Concentration's effects were significantly negative in the earlier period but positive and weakly significant in the latter period.

Results for capital-intensive industries contrasted to other results by indicating that the independent effects of protection on firm productivity were insignificant in the latter period and when all years are included, though they were significantly negative in the early period (Table 6, right side). Wald tests indicate equation (2) was generally preferred, and the JV-private differentials were significantly positive and the largest in the earlier period and when all years were included. WO-private and SOE-private differentials were also significantly positive in the earlier period, with WOs having higher productivity. However, in the latter period, all ownership-related differentials were insignificant at the 5 percent level in the latter period, though WO-private differentials were negative an weakly significant at the 10 percent level. In addition, ERPs never significantly affected MNE-private productivity differentials and the effects of concentration were insignificant in all estimates.

3.6 Conclusion, policy implications, and the research agenda

This paper examined the effects of effective protection and ownership on firm productivity in Vietnam in 2005-2010. In large samples of firms in labour-intensive industries and smaller samples of firms in industries with intermediate intensity three consistent findings were obtained. First, the level effective protection in an industry usually had a significantly negative effect on productivity in all firms. Second, JVs and SOEs had higher productivity than private firms, with productivity being the highest in JVs with one exception, labour-intensive industries in the latter period. Third, WOs also had significantly higher productivity than private firms in 2005-2007, but WO-private differentials were insignificant in 2008-2010. When estimates were made for capital-intensive industries, the pattern of productivity differentials (highest in JVs, followed by SOEs, WOs, and lastly by private firms) was similar in the earlier period, but not in the latter period or when all years were included in the sample. Perhaps more importantly, the level of effective protection did not have a significant independent effect on firm productivity in capital intensive industries.

These results reinforce the findings of Ramstetter and Phan (2013) in suggesting that one must take industry heterogeneity very seriously when estimating production functions parameters because they are likely to differ markedly among industry groups. This is particularly the case when considering how effective protection is related to MNE-private productivity differentials. In labour-intensive industries, there was some indication that WO-private differentials were relatively large (when all years are included) in industries with high effective protection, while JV-private differentials were relatively small (in the earlier period). However, in capital-intensive industries and industries of intermediate intensity, MNE-private differentials were

never significantly affected by industry-level protection. Thus, effective protection's independent effect was strong and negative in labour-intensive industries and industries with intermediate intensity, but its effect on MNE-local productivity differentials was weak.

The most important policy inference emerging from this exercise is that all firms in Vietnam's labour-intensive industries and industries with intermediate intensity can improve productivity if effective protection is reduced. If one realizes that these groups contain most of Vietnam's exporting firms, and that Vietnam's exporters import a large portion of their inputs and capital goods, this finding makes perfect sense. Thus, although multilateral agreements involving such as the Trans-Pacific Partnership are not likely to be implemented, Vietnam's policy makers should recognize that firms operating in Vietnam could benefit from lower protection. On the other hand, in the post-WTO (latter) period firms in capital-intensive industries do not share such characteristics and would not have benefitted as much from lower effective protection.

Finally, it must be emphasized that these results need to be interpreted with caution and further research is warranted to clarify the relationships examined. First and foremost, it would be helpful to examine aspects of firm performance other than productivity. This is particularly warranted in the Vietnamese case because intermediate expenditure estimates are approximate and subject to large errors. Other measures such as profitability and wages, for example, can be estimated directly from the firm-level data with much smaller error. Second, these and previous results have suggested that heterogeneity among industries and time periods is particularly important in Vietnam. Because the level of aggregation is still relatively high in the three subsamples used in this study, it might be interesting to examine similar issues in more disaggregated samples, though this would complicate the analysis of effective protection's

effects. Alternatively, one might want to group industries or firms by alternative criteria or periods. Extending the analysis past 2010 would also be highly desirable.

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Table 1 Total revenue and employee of firms by ownership and level of capital intensity

Owner, industry group	Total revenue (trillion dong)						Number of employees (thousands)					
	2005	2006	2007	2008	2009	2010	2005	2006	2007	2008	2009	2010
Private firms												
Manufacturing, sample industries	120	153	189	162	420	520	1178	1315	1125	684	1659	1774
Labour-intensive industries	23	25	31	22	80	69	604	671	555	343	757	816
Intermediate intensity	56	76	96	83	213	275	465	527	457	257	728	762
Capital intensive industries	41	53	62	56	127	176	110	116	114	84	173	196
Excluded industries	90	112	126	81	306	399	12	14	13	11	20	22
SOEs												
Manufacturing, sample industries	138	146	149	100	211	222	520	441	335	225	395	293
Labour-intensive industries	25	27	22	19	25	27	216	186	123	90	131	95
Intermediate intensity	79	83	85	56	118	134	222	175	138	86	164	130
Capital intensive industries	34	36	42	26	69	61	83	80	74	49	100	68
Excluded industries	22	22	21	21	47	111	35	33	27	25	33	30
Wholly-foreign MNEs												
Manufacturing, sample industries	202	275	324	175	576	812	961	1165	1156	607	1582	1780
Labour-intensive industries	80	115	118	47	186	250	706	835	830	418	1085	1212
Intermediate intensity	60	76	101	52	208	262	107	131	126	66	177	197
Capital intensive industries	63	85	104	76	182	301	148	199	200	123	320	372
Excluded industries	0	1	1	1	2	3	2	6	3	3	7	7
MNE joint ventures												
Manufacturing, sample industries	111	127	156	95	225	268	76	79	73	49	97	95
Labour-intensive industries	10	10	11	6	12	16	61	71	62	33	62	65
Intermediate intensity	45	54	63	48	91	104	40	40	41	25	49	47
Capital intensive industries	56	63	83	42	121	147	34	38	31	23	47	47
Excluded industries	2	3	4	3	7	9	1	1	1	1	1	0

Source: Authors' compilations from General Statistics Office (various years).

Table 2 Mean value added per worker of firms (million 1994 dong, % differentials)

Owner, industry group	2005	2006	2007	2008	2009	2010
Private firms (million 1994 dong)						
Manufacturing, sample industries	18.1	28.3	46.0	44.4	119.8	120.7
Labour-intensive industries	10.3	11.6	22.0	23.5	76.2	82.5
Intermediate capital industries	20.9	22.2	58.3	55.3	147.8	145.1
Capital intensive industries	49.6	51.4	139.7	98.8	59.3	69.9
SOEs-private differentials, %						
Manufacturing, sample industries	90.06	34.28	38.91	24.32	-1.75	11.52
Labour-intensive industries	84.47	66.38	24.09	32.77	18.50	5.21
Intermediate capital industries	82.78	77.93	45.97	35.44	-11.23	1.79
Capital intensive industries	20.56	55.25	-35.22	-35.43	128.67	180.11
WO-private differentials, %						
Manufacturing, sample industries	68.51	14.84	71.09	40.09	-66.28	-59.90
Labour-intensive industries	49.51	37.07	43.18	0.00	-66.80	-47.27
Intermediate capital industries	36.36	45.50	13.38	28.39	15.83	-1.72
Capital intensive industries	-30.04	-26.26	-40.66	-17.31	-30.02	-29.90
JV-private differentials, %						
Manufacturing, sample industries	369.06	244.88	366.09	137.84	23.87	11.76
Labour-intensive industries	104.85	73.28	86.36	37.87	-14.04	-50.67
Intermediate capital industries	388.52	364.41	255.23	162.57	12.79	-1.31
Capital intensive industries	183.27	266.15	229.92	31.07	279.26	248.35

Source: Authors' compilations from General Statistics Office (various years).

Table 3 Mean value added per fixed asset of firms (ratios, % differentials)

Owner, industry group	2005	2006	2007	2008	2009	2010
Private firms						
Manufacturing, sample industries	2.97	3.13	6.19	5.56	14.40	16.50
Labour-intensive industries	3.33	3.27	5.78	5.36	17.10	15.70
Intermediate capital industries	2.84	2.98	6.91	6.00	13.80	19.30
Capital intensive industries	0.92	0.83	1.73	1.48	1.17	1.36
SOEs-private differentials, %						
Manufacturing, sample industries	22.90	-28.75	-58.16	-56.47	-60.00	-64.91
Labour-intensive industries	-53.15	-43.43	-56.75	-45.52	-68.36	-63.69
Intermediate capital industries	100.70	-54.36	-61.51	-64.83	-61.30	-67.46
Capital intensive industries	163.04	602.41	50.87	33.11	538.46	224.26
WO-private differentials, %						
Manufacturing, sample industries	-24.58	-59.42	-59.61	-51.08	-82.22	-80.97
Labour-intensive industries	0.90	-52.60	-51.21	-29.66	-76.26	-66.05
Intermediate capital industries	-55.99	-55.70	-58.18	-59.83	-86.81	-84.97
Capital intensive industries	-58.70	-53.01	-48.55	-55.41	-56.41	-61.03
JV-private differentials, %						
Manufacturing, sample industries	-48.82	-41.21	-38.29	-35.61	-56.25	-79.09
Labour-intensive industries	-34.23	-37.00	-48.44	9.89	-58.89	-78.28
Intermediate capital industries	-60.56	-59.40	-57.02	-53.00	-58.70	-86.58
Capital intensive industries	91.30	201.20	287.86	225.00	433.33	272.06

Source: Authors' compilations from General Statistics Office (various years).

Table 4 Effective rate of protection in manufacturing

Industry group	2006	2007	2008	2009	2010
Labour-intensive industries	40.1	24.6	23.4	21.9	21.1
Textiles	61.8	17.9	18.3	18.6	18.8
Apparel	135.7	58.0	58.4	57.7	57.5
Leather and footwear	46.3	55.8	50.3	44.7	41.1
Wood and wood products	-2.3	-2.2	-2.6	-3.0	-2.9
Non-electric machinery	-5.7	-5.1	-4.8	-4.7	-4.8
Precision machinery	-2.9	-2.8	-2.9	-2.9	-2.8
Furniture, miscellaneous manufacturing	47.7	50.8	46.9	43.1	41.1
Intermediate capital intensity	18.7	18.1	16.9	15.7	14.9
Food and beverages	29.9	28.8	27.3	25.8	24.4
Paper and paper products	23.6	22.4	20.8	19.4	18.3
Chemicals	10.1	10.0	9.30	8.70	8.2
Non-metallic mineral products	29.5	28.4	26.0	23.6	23.0
Fabricated metals	0.60	0.90	1.20	0.8	0.8
Capital-intensive industries	16.5	16.2	15.0	13.9	12.8
Rubber and plastic products	35.3	35.1	32.2	29.3	26.7
Basic metals	-1.00	-0.70	-0.70	-0.60	-0.60
Electrical machinery	5.90	5.80	5.80	5.30	5.10
Communication machinery	3.90	3.20	1.60	1.00	0.20
Motor vehicles	34.1	32.9	30.8	28.9	26.9
Other transport machinery	20.9	21.2	20.3	19.3	18.3

Source: Authors' calculations from data in Vergano et al. (2010).

Table 5 Coefficients on main variables and key indicators from random effects estimates of productivity differential in all sample industries and labour-intensive industries

	All industries						Labour-intensive industries					
Variable, indicator	2005-10		2005-07		2008-10		2005-10		2005-07		2008-10	
Equation (1)												
MNE	0.124	a	0.234	a	0.045	c	0.087	a	0.181	a	0.047	
SOE	0.105	a	0.143	a	0.210	a	0.127	a	0.161	a	0.261	a
MNE*TP	0.015	a	-0.012	a	0.020		0.019	a	-0.003		0.014	
CR4	0.011	a	-0.006	c	0.008		0.007		-0.006		0.003	
TP	-0.049	a	-0.041	a	-0.110	a	-0.045	a	-0.036	a	-0.108	a
Observations	42,588		20,169		22,419		29,200		14,645		14,555	
R-squared	0.51		0.64		0.43		0.50		0.61		0.41	
Breusch&Pagan	11,407	a	7,093	a	8,642	a	8,521	a	5,032	a	1,693	a
Equation (2)												
WO	0.109	a	0.191	a	-0.004		0.065	a	0.153	a	0.004	
JV	0.302	a	0.408	a	0.339	a	0.202	a	0.304	a	0.246	a
SOE	0.107	a	0.144	a	0.210	a	0.127	a	0.161	a	0.260	a
WO*TP	0.019	a	-0.006		0.030		0.022	a	0.001		0.022	
JV*TP	-0.003		-0.011	a	-0.004		-0.001		-0.008	a	0.002	
CR4	0.011	a	-0.006	c	0.008		0.007	a	-0.006		0.003	
TP	-0.049	a	-0.042	a	-0.110	a	-0.045	a	-0.036	a	-0.108	a
Observations	42,588		20,169		22,419		29,200		14,645		14,555	
R-squared	0.52		0.64		0.44		0.50		0.61		0.41	
Breusch&Pagan	11,088	a	7,015		8,714		8,407	a	5,032	a	1,693	a
Wald, Ho: WO=JV	45.7	a	40.7	a	34.1	a	9.18	a	0.11		6.84	a
Wald, Ho: WO*TP=JV*TP	17.4	a	1.16		3.89	a	14.4	a	2.35	a	0.83	

Notes: a, b, and c indicate the coefficient or statistic is significant at the 1%, 5%, and 10% levels, respectively; for fuller results, please see Appendix Tables 4 and 5.

Table 6 Coefficients on main variables and key indicators from random effects estimates of productivity differential in industries with intermediate intensity and capital-intensive industries

	Intermediate intensity						Capital-intensive industries					
Variable, indicator	2005-10		2005-07		2008-10		2005-10		2005-07		2008-10	
Equation (1)												
MNE	0.134	a	0.169	a	0.093	c	0.037		0.314	a	-0.087	
SOE	0.072	b	0.072	b	0.175	a	0.012		0.111	b	0.083	
MNE*TP	0.008		-0.011		-0.013		0.029		-0.036		0.053	
CR4	0.015	c	-0.021	b	0.024	c	0.013		-0.003		-0.006	
TP	-0.042	b	-0.053	a	-0.098	b	-0.037		-0.055	b	-0.039	
Observations	8,089		3,536		4,553		5,299		1,988		3,311	
R-squared	0.43		0.58		0.37		0.44		0.60		0.38	
Breusch&Pagan	1,984	a	1,319	a	412	a	1,131	a	770	a	274	a
Equation (2)												
WO	0.109	a	0.108	a	0.028		-0.010		0.277	a	-0.119	c
JV	0.309	a	0.476	a	0.548	a	0.238	a	0.383	a	0.109	
SOE	0.075	b	0.074	b	0.174	a	0.017		0.117	a	0.090	
WO*TP	0.011		-0.002		0.012		0.028		-0.036		0.036	
JV*TP	-0.004		-0.015		-0.066		0.015		0.005		0.058	
CR4	0.014	c	-0.021	b	0.024	c	0.013		-0.003		-0.006	
TP	-0.042	b	-0.054	a	-0.098	b	-0.036		-0.055	b	-0.035	
Observations	8,089		3,536		4,553		5,299		1,988		3,311	
R-squared	0.43		0.59		0.37		0.45		0.60		0.39	
Breusch&Pagan	1,854	a	1,271	a	398	a	1,063	a	757	a	254	a
Wald, Ho: WO=JV	0.85		23.6	a	17.4	a	12.2	a	1.74	c	3.64	a
Wald, Ho: WO*TP=JV*TP	0.70		0.52		2.61	a	0.25		2.40	a	0.16	

Notes: a, b, and c indicate the coefficient or statistic is significant at the 1%, 5%, and 10% levels, respectively; for fuller results, please see Appendix Tables 6 and 7.

Appendix Table 1a: Total revenue of firms (trillion dong)

Private firms	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	120.5	153.5	189.5	161.9	420.1	519.8
Labour-intensive industries	23.3	25.2	30.8	22.4	79.6	69.4
Textiles	6.1	7.2	8.3	5.3	10.6	14.5
Apparel	5.4	5.8	7.5	5.2	15.1	23.9
Leather and footwear	4.3	4.2	6.8	7.3	11.8	15.9
Wood and wood products	0.4	0.4	0.3	0.4	0.6	0.6
Non-electric machinery	0.1	0.6	0.1	0.1	0.6	0.1
Precision machinery	6.0	6.1	6.7	3.8	39.7	12.4
Furniture, micellaneous manufacturing	1.0	1.0	1.2	0.2	1.2	2.0
Intermediate intensity	56.1	75.6	96.4	83.3	213.3	274.7
Food and beverage	7.9	11.2	11.6	8.8	22.8	33.0
Paper and paper products	10.9	14.9	14.3	7.9	36.2	36.0
Chemicals	9.4	13.2	17.4	15.9	35.8	51.1
Non-metallic mineral products	13.3	16.8	19.8	21.9	45.8	63.8
Fabricated metal products	14.5	19.5	33.3	28.8	72.7	90.8
Capital intensive industries	41.2	52.7	62.2	56.3	127.2	175.7
Rubber and plastics products	14.5	18.6	20.4	15.7	48.8	65.4
Basic metals	16.0	16.8	20.1	19.9	35.3	53.5
Office and computing machinery	5.6	10.4	13.0	11.0	20.2	29.2
Electrical machinery	1.2	1.6	1.1	0.7	2.2	4.1
Communication machinery	2.0	3.1	5.3	6.5	15.8	16.6
Motor vehicles	0.1	0.1	0.1	0.1	0.1	0.1
Other transport machinery	1.8	2.1	2.3	2.4	4.8	6.8
Excluded industries	90.3	111.5	126.2	81.4	306.1	399.4
Tobacco products	7.9	11.2	12.5	13.3	24.1	31.5
Publishing and printing products	73.1	89.6	103.0	59.3	260.0	336.0
Coke, refined petroleum products	9.2	10.5	10.3	8.7	21.4	31.7
Recycling	0.2	0.2	0.4	0.1	0.6	0.2

Appendix Table 1a: Total revenue of firms (trillion dong) (continued)

SOEs	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	138.4	146.2	149.2	100.4	211.5	222.0
Labour-intensive industries	25.5	26.7	22.2	18.8	24.5	27.0
Textiles	9.2	9.3	7.8	6.1	8.4	10.2
Apparel	7.7	8.1	8.1	6.6	6.7	8.6
Leather and footwear	1.6	1.4	1.0	1.0	1.4	0.9
Wood and wood products	2.4	1.8	1.5	0.6	1.6	2.5
Non-electric machinery	2.0	3.4	1.9	2.3	4.0	3.1
Precision machinery	0.1	0.1	0.1	0.1	0.1	0.1
Furniture, micellaneous manufacturing	2.5	2.6	1.9	2.1	2.4	1.7
Intermediate intensity	79.4	83.1	84.8	55.6	117.9	134.3
Food and beverage	34.3	34.0	35.5	22.0	38.9	45.3
Paper and paper products	4.6	3.4	4.4	0.5	4.3	4.4
Chemicals	17.6	19.8	21.1	18.2	31.2	32.1
Non-metallic mineral products	18.8	18.4	20.2	11.2	33.5	39.8
Fabricated metal products	4.1	7.6	3.6	3.8	10.0	12.7
Capital intensive industries	33.5	36.4	42.2	26.0	69.1	60.6
Rubber and plastics products	3.3	3.5	5.3	3.6	7.7	9.1
Basic metals	9.9	11.6	11.8	3.6	21.8	25.8
Office and computing machinery	0.0	0.0	0.0	0.0	0.0	0.0
Electrical machinery	5.3	6.9	7.5	6.4	9.2	11.5
Communication machinery	2.2	2.4	3.1	2.2	2.4	1.7
Motor vehicles	3.1	3.5	3.9	3.6	13.8	4.3
Other transport machinery	9.6	8.6	10.5	6.6	14.2	8.4
Excluded industries	21.9	21.9	20.6	20.9	46.5	111.1
Tobacco products	14.8	14.6	12.5	11.4	22.6	26.5
Publishing and printing products	7.1	7.3	8.0	9.5	10.8	10.6
Coke, refined petroleum products	0.0	0.0	0.1	0.0	13.1	74.0
Recycling						0.0

Appendix Table 1a: Total revenue of firms (trillion dong, continued)

WO	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	202.2	275.2	324.0	174.8	575.7	812.4
Labour-intensive industries	79.5	114.8	118.4	47.2	185.6	249.9
Textiles	14.6	38.6	24.2	5.3	40.0	54.2
Apparel	13.3	17.0	17.3	10.8	33.7	44.8
Leather and footwear	26.4	29.7	33.7	15.5	49.0	65.2
Wood and wood products	2.2	2.0	3.1	0.6	3.1	4.5
Non-electric machinery	5.6	3.9	9.0	4.2	11.9	19.2
Precision machinery	1.7	1.9	5.2	2.1	9.7	10.5
Furniture, micellaneous manufacturing	15.7	21.7	25.9	8.7	38.2	51.5
Intermediate intensity	59.6	75.6	101.4	51.7	207.9	262.0
Food and beverage	31.8	37.6	53.6	26.0	104.0	126.0
Paper and paper products	3.7	5.2	6.7	4.0	11.2	16.1
Chemicals	11.1	15.4	19.0	8.4	51.4	61.0
Non-metallic mineral products	4.2	4.4	4.9	3.3	9.3	10.4
Fabricated metal products	8.8	13.0	17.2	10.1	32.0	48.5
Capital intensive industries	63.1	84.8	104.2	75.8	182.2	300.5
Rubber and plastics products	9.3	15.1	16.9	10.7	32.2	46.3
Basic metals	3.2	4.4	7.8	6.1	13.1	31.9
Office and computing machinery	14.2	20.8	25.1	24.2	36.9	43.1
Electrical machinery	13.6	17.9	22.2	13.2	31.7	47.8
Communication machinery	7.9	11.3	10.3	8.5	29.8	77.8
Motor vehicles	6.3	8.7	10.6	7.8	17.8	23.9
Other transport machinery	8.5	6.5	11.3	5.3	20.7	29.7
Excluded industries	0.4	0.8	0.6	0.7	2.1	2.9
Tobacco products	0.0	0.0	0.0	0.0	0.0	0.0
Publishing and printing products	0.4	0.5	0.6	0.7	1.8	2.6
Coke, refined petroleum products	0.0	0.3	0.0	0.0	0.2	0.3
Recycling	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Table 1a: Total revenue of firms (trillion dong, continued)

Joint-ventures	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	111.0	126.6	156.5	95.5	225.0	267.7
Labour-intensive industries	9.6	10.1	10.7	6.2	12.4	16.1
Textiles	1.6	1.7	2.2	1.7	1.8	3.0
Apparel	1.2	1.2	1.3	1.7	2.6	3.1
Leather and footwear	3.2	4.1	4.5	1.2	3.8	4.3
Wood and wood products	1.3	1.4	1.1	0.6	1.7	2.7
Non-electric machinery	1.0	0.4	0.2	0.3	0.8	1.1
Precision machinery	0.2	0.2	0.2	0.2	0.3	0.3
Furniture, micellaneous manufacturing	1.1	1.2	1.3	0.6	1.3	1.5
Intermediate intensity	45.2	53.6	62.9	47.6	91.5	104.2
Food and beverage	18.5	21.4	28.4	18.4	52.4	58.2
Paper and paper products	0.2	0.2	0.3	0.3	0.3	0.3
Chemicals	14.0	16.6	14.7	11.0	5.8	7.5
Non-metallic mineral products	7.9	9.7	11.3	11.9	23.2	25.0
Fabricated metal products	4.6	5.7	8.2	6.0	9.8	13.2
Capital intensive industries	56.2	62.9	82.8	41.6	121.2	147.4
Rubber and plastics products	2.4	1.7	4.6	1.5	5.8	7.9
Basic metals	6.4	5.9	8.8	6.9	12.4	16.4
Office and computing machinery	0.0	0.0	0.0	0.0	0.0	0.0
Electrical machinery	4.3	6.8	7.8	5.7	9.9	9.0
Communication machinery	8.2	8.8	10.3	8.9	10.3	11.2
Motor vehicles	15.0	13.3	17.9	5.6	26.6	34.6
Other transport machinery	19.9	26.4	33.4	13.0	56.2	68.3
Excluded industries	1.9	3.1	4.1	2.7	7.1	9.5
Tobacco products	0.7	1.6	2.5	0.2	4.1	5.7
Publishing and printing products	0.0	0.1	0.1	0.1	0.2	0.0
Coke, refined petroleum products	1.1	1.4	1.6	2.4	2.8	3.7
Recycling	0.0	0.0	0.0	0.0	0.0	0.0

Appendix table 1b Total employees of firms (thousands)

Private firms	2005	2006	2007	2008	2009	2010
Manufacturing	1177.8	1314.5	1125.5	683.6	1658.6	1774.4
Manufacturing, sample industries	1177.8	1314.5	1125.5	683.6	1658.6	1774.4
Labour-intensive industries	603.6	671.4	554.8	343.4	757.0	816.3
Textiles	61.2	72.6	52.5	29.6	79.8	84.2
Apparel	183.3	209.8	185.8	152.4	274.0	305.1
Leather and footwear	157.3	166.0	152.2	67.8	151.2	167.8
Wood and wood products	69.2	68.4	52.8	33.5	78.2	78.0
Non-electric machinery	21.0	20.7	20.4	17.5	29.4	30.0
Precision machinery	2.4	2.1	1.8	1.7	2.4	2.2
Furniture, micellaneous manufacturing	109.3	131.7	89.3	41.0	142.0	148.8
Intermediate intensity	464.6	527.0	456.9	256.7	728.2	762.0
Food and beverage	224.8	258.6	221.0	105.8	353.7	362.2
Paper and paper products	40.0	41.0	32.9	20.9	50.6	54.6
Chemicals	29.5	32.8	34.3	25.8	55.9	59.6
Non-metallic mineral products	118.9	136.0	113.4	63.2	183.5	199.1
Fabricated metal products	51.3	58.5	55.3	40.9	84.5	86.5
Capital intensive industries	109.6	116.2	113.8	83.6	173.4	196.2
Rubber and plastics products	51.8	50.1	46.4	38.1	70.7	81.8
Basic metals	14.8	18.4	18.5	12.5	34.1	36.1
Office and computing machinery	0.4	0.4	0.2	0.2	0.3	0.7
Electrical machinery	10.6	15.4	17.2	13.1	21.2	34.9
Communication machinery	3.9	5.6	3.3	2.4	4.8	5.8
Motor vehicles	7.4	7.9	8.0	5.4	11.8	12.9
Other transport machinery	20.8	18.3	20.1	11.9	30.5	24.1
Excluded industries	11.8	14.1	13.3	10.6	20.1	22.1
Tobacco products	0.2	0.1	0.2	0.1	0.1	0.1
Publishing and printing products	9.6	11.7	11.3	10.0	17.8	20.3
Coke, refined petroleum products	0.8	0.6	0.7	0.3	0.8	0.9
Recycling	1.2	1.6	1.1	0.3	1.4	0.8

Appendix table 1b: Total employees of firms (thousands, continued)

SOEs	2005	2006	2007	2008	2009	2010
Manufacturing	520.3	441.3	334.7	225.4	395.4	292.7
Manufacturing, sample industries						
Labour-intensive industries	215.9	185.6	123.0	90.0	130.8	95.0
Textiles	52.8	44.4	33.3	24.3	35.3	21.7
Apparel	86.7	70.4	53.8	34.0	47.3	44.8
Leather and footwear	38.9	30.4	13.5	11.4	17.4	8.8
Wood and wood products	14.2	12.2	8.6	2.5	7.7	7.9
Non-electric machinery	12.0	16.2	5.7	9.5	14.4	7.5
Precision machinery	0.3	0.3	0.3	1.1	1.1	0.2
Furniture, micellaneous manufacturing	10.9	11.6	7.8	7.3	7.6	4.2
Intermediate intensity	221.9	175.3	137.7	86.0	164.1	130.1
Food and beverage	94.5	73.8	47.0	27.8	43.8	41.1
Paper and paper products	13.8	7.5	8.8	1.7	8.5	6.8
Chemicals	31.4	31.2	26.6	19.7	29.2	22.8
Non-metallic mineral products	64.0	46.8	42.4	21.1	58.4	44.1
Fabricated metal products	18.1	16.1	12.9	15.7	24.1	15.4
Capital intensive industries	82.5	80.4	74.0	49.4	100.5	67.5
Rubber and plastics products	11.1	9.8	11.3	9.0	12.8	11.8
Basic metals	20.7	18.6	11.5	4.0	17.5	15.7
Office and computing machinery	0.0	0.0	0.0	0.0	0.0	0.0
Electrical machinery	12.3	9.8	8.1	6.6	8.7	6.7
Communication machinery	4.3	3.9	3.8	3.5	3.2	2.0
Motor vehicles	7.3	8.7	5.6	5.1	15.0	4.6
Other transport machinery	26.9	29.7	33.6	21.3	43.3	26.7
Excluded industries	35.1	32.8	27.3	25.1	33.0	29.5
Tobacco products	13.9	13.6	9.6	7.5	12.6	12.6
Publishing and printing products	21.2	19.1	17.6	17.6	19.2	14.9
Coke, refined petroleum products	0.0	0.1	0.1	0.0	1.2	1.7
Recycling		0.0	0.0	0.0	0.0	0.3

Appendix table 1b: Total employees of firms (thousands, continued)

WO	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	961.4	1164.9	1155.9	607.2	1581.7	1780.1
Labour-intensive industries	705.8	834.9	829.8	418.4	1085.2	1211.9
Textiles	48.3	55.7	51.8	19.4	65.8	68.0
Apparel	193.2	259.3	245.7	177.7	395.2	416.9
Leather and footwear	318.8	339.2	351.5	162.1	407.1	494.4
Wood and wood products	11.7	10.8	12.9	2.4	13.0	12.3
Non-electric machinery	9.7	8.4	12.5	7.1	16.7	21.6
Precision machinery	7.2	9.3	11.6	5.7	12.5	15.2
Furniture, micellaneous manufacturing	116.8	152.3	143.8	44.1	174.9	183.5
Intermediate intensity	107.3	131.0	125.9	66.0	176.9	196.6
Food and beverage	43.3	49.8	48.1	23.1	62.0	66.6
Paper and paper products	9.7	13.4	13.0	6.5	18.2	19.3
Chemicals	11.9	15.9	16.0	6.1	23.5	26.0
Non-metallic mineral products	13.1	14.1	12.5	7.4	16.3	15.2
Fabricated metal products	29.2	37.8	36.2	22.9	56.9	69.5
Capital intensive industries	148.4	198.9	200.3	122.8	319.6	371.6
Rubber and plastics products	35.0	51.2	48.3	30.1	73.1	83.0
Basic metals	3.0	3.6	3.9	1.7	7.5	7.0
Office and computing machinery	10.7	15.7	16.0	20.1	34.2	37.5
Electrical machinery	49.4	65.4	68.0	27.4	77.5	76.6
Communication machinery	20.1	24.4	29.1	27.2	73.7	107.9
Motor vehicles	13.5	19.8	16.9	6.5	23.4	27.2
Other transport machinery	16.7	18.8	18.0	9.7	30.2	32.6
Excluded industries	2.3	5.7	3.0	2.8	7.0	7.0
Tobacco products	0.0	0.0	0.0	0.0	0.0	0.0
Publishing and printing products	2.3	3.0	2.9	2.7	6.8	6.7
Coke, refined petroleum products	0.0	2.6	0.0	0.0	0.1	0.2
Recycling	0.0	0.1	0.0	0.0	0.0	0.1

Appendix table 1b: Total employees of firms (thousands, continued)

MNE Joint Ventures	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	75.6	79.0	72.6	48.6	96.6	95.1
Labour-intensive industries	60.8	70.7	62.3	32.6	62.4	65.0
Textiles	5.8	7.5	6.9	3.5	3.5	4.6
Apparel	19.9	17.3	13.7	16.0	23.3	26.2
Leather and footwear	23.1	32.8	32.4	8.0	25.5	25.4
Wood and wood products	3.6	2.6	1.8	0.6	2.1	2.0
Non-electric machinery	1.2	1.1	0.4	0.4	0.9	1.1
Precision machinery	0.9	0.6	0.7	0.6	0.7	0.8
Furniture, micellaneous manufacturing	6.4	8.9	6.4	3.4	6.2	5.0
Intermediate intensity	40.4	39.7	40.5	24.8	49.0	47.2
Food and beverage	19.8	19.3	20.4	10.1	27.4	27.2
Paper and paper products	0.4	0.5	0.5	0.4	0.4	0.4
Chemicals	6.1	5.8	4.1	2.6	4.0	3.8
Non-metallic mineral products	9.7	9.4	10.0	7.7	11.6	11.2
Fabricated metal products	4.5	4.7	5.6	4.0	5.6	4.6
Capital intensive industries	34.5	38.4	31.5	23.1	46.8	47.4
Rubber and plastics products	4.2	4.6	3.7	3.2	3.8	4.6
Basic metals	1.6	1.5	1.4	1.1	2.0	2.7
Office and computing machinery	0.0	0.0	0.0	0.0	0.0	0.0
Electrical machinery	3.3	3.8	4.1	4.1	5.8	5.2
Communication machinery	5.3	5.1	5.8	3.1	4.0	4.2
Motor vehicles	4.4	4.0	3.2	2.4	5.5	5.1
Other transport machinery	15.7	19.4	13.2	9.2	25.8	25.6
Excluded industries	0.7	0.9	0.6	0.7	0.7	0.5
Tobacco products	0.4	0.4	0.4	0.1	0.8	0.8
Publishing and printing products	0.3	0.5	0.3	0.4	0.4	0.1
Coke, refined petroleum products	0.4	0.4	0.4	0.3	0.4	0.4
Recycling	0.0	0.0	0.0	0.0	0.0	0.1

Appendix Table 2 Mean value added per worker of firms (million 1994 dong).

Private firms	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	18.1	28.3	46.0	44.4	119.8	120.7
Labour-intensive industries	10.3	11.6	22.0	23.5	76.2	82.5
Textiles	15.9	14.3	30.7	34.5	65.0	74.0
Apparel	6.1	7.7	11.3	13.7	41.5	46.7
Leather and footwear	6.6	10.3	14.6	15.5	73.6	48.5
Wood and wood products	9.9	11.8	29.3	23.3	154.7	176.4
Non-electric machinery	17.8	22.3	31.4	42.3	54.0	81.1
Precision machinery	17.6	18.0	25.1	31.5	30.5	15.8
Furniture, miscellaneous manufacturing	8.7	9.2	20.2	22.1	58.8	54.5
Intermediate intensity	20.9	22.2	58.3	55.3	147.8	145.1
Food and beverage	22.0	24.9	84.4	67.2	154.1	153.3
Paper and paper products	20.7	23.7	44.7	45.7	65.8	89.7
Chemicals	24.9	25.7	56.7	48.9	91.2	76.5
Non-metallic mineral products	20.3	18.9	37.9	37.7	220.3	205.8
Fabricated metal products	18.6	19.3	45.8	62.4	120.4	121.0
Capital intensive industries	49.6	51.4	139.7	98.8	59.3	69.9
Rubber and plastics products	32.4	31.9	57.6	58.2	74.6	119.2
Basic metals	35.0	43.6	107.4	119.0	123.0	118.0
Office and computing machinery	22.4	33.1	15.8	35.9	27.9	13.5
Electrical machinery	25.9	34.6	77.9	88.7	133.9	134.7
Communication machinery	17.1	13.3	32.0	17.2	20.9	100.8
Motor vehicles	16.2	26.3	50.8	67.2	330.9	207.1
Other transport machinery	14.5	18.6	29.2	56.4	500.9	250.0
Excluded industry						
Printing and publishing	16.5	16.2	20.7	25.8	38.1	64.7
Tobacco products	199.8	329.5	243.1	374.3	282.6	317.8
Oil and coal products	73.4	45.3	136.0	12.3	47.8	111.1
Recycling	8.1	7.0	37.3	24.2	143.8	120.2

Appendix Table 2 Mean value added per worker of firms (million 1994 dong, continued)

SOEs	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	34.4	38.0	63.9	55.2	117.7	134.6
Labour intensive industries	19.0	19.3	27.3	31.2	90.3	86.8
Textiles	18.7	22.2	34.7	49.8	293.5	45.5
Apparel	7.3	7.5	12.7	14.1	30.6	45.3
Leather and footwear	5.4	7.0	9.5	10.9	9.7	10.4
Wood and wood products	28.4	22.7	36.1	64.9	83.6	328.1
Non-electric machinery	17.3	27.7	31.0	33.4	133.3	119.9
Precision machinery	24.8	22.8	23.7	40.9	26.3	55.9
Furniture, miscellaneous manufacturing	18.3	17.0	38.8	28.9	106.0	100.0
Intermediate intensity	38.2	39.5	85.1	74.9	131.2	147.7
Food and beverage	31.2	35.0	93.4	86.2	165.9	191.4
Paper and paper products	22.2	24.5	59.9	29.6	75.2	73.4
Chemicals	58.6	55.2	92.3	70.7	98.8	111.5
Non-metallic mineral products	46.7	44.4	93.5	76.1	120.7	124.6
Fabricated metal products	23.6	32.6	36.4	59.5	105.3	137.2
Capital intensive industries	59.8	79.8	90.5	63.8	135.6	195.8
Rubber and plastics products	34.6	31.3	48.2	36.1	64.4	200.6
Basic metals	27.9	36.3	179.4	16.7	85.8	94.1
Electrical machinery	37.6	48.2	79.3	76.5	165.0	141.1
Communication machinery	52.1	46.0	71.2	38.1	485.7	552.8
Motor vehicles	26.6	31.9	52.8	48.3	210.5	65.4
Other transport machinery	53.0	101.9	55.9	61.7	66.0	252.7
Excluded industries						
Printing and publishing	26.0	23.3	30.2	29.8	48.9	67.2
Tobacco products	226.6	237.0	276.3	239.4	228.8	265.2
Oil and coal products	42.2	19.6	33.0	34.8	105.0	7.1
Recycling						0.0

Appendix Table 2 Mean value added per worker of firms (million 1994 dong, continued)

Wholly foreign MNEs	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	30.5	32.5	78.7	62.2	40.4	48.4
Labour-intensive industries	15.4	15.9	31.5	23.5	25.3	43.5
Textiles	22.0	24.0	47.4	37.6	74.6	33.0
Apparel	9.8	8.4	12.6	13.1	11.3	12.1
Leather and footwear	14.2	16.9	28.2	16.5	14.6	17.6
Wood and wood products	16.0	17.0	55.0	35.7	22.1	25.9
Non-electric machinery	46.3	51.9	69.4	51.6	34.4	68.8
Precision machinery	24.0	25.7	36.6	65.2	34.5	24.9
Furniture, miscellaneous manufacturing	12.2	11.5	29.2	23.7	16.7	68.6
Intermediate intensity	28.5	32.3	66.1	71.0	171.2	142.6
Food and beverage	53.7	61.8	194.1	146.1	89.4	107.2
Paper and paper products	31.7	31.9	81.5	109.6	37.8	51.5
Chemicals	78.0	77.4	218.8	140.5	71.9	82.9
Non-metallic mineral products	68.7	52.3	94.7	86.5	75.4	79.5
Fabricated metal products	26.5	31.0	71.8	57.0	36.1	43.6
Capital intensive industries	34.7	37.9	82.9	81.7	41.5	49.0
Basic metals	65.3	78.7	341.8	510.9	95.2	93.6
Office and computing machinery	41.9	35.2	62.2	62.0	20.3	19.0
Electrical machinery	45.3	40.2	80.9	115.9	48.6	81.7
Communication machinery	26.6	40.2	44.1	46.5	32.5	39.9
Motor vehicles	40.0	47.8	54.2	62.9	51.6	45.7
Other transport machinery	23.6	24.4	46.4	60.9	35.7	35.6
Excluded industries						
Printing and publishing	15.3	17.1	40.9	29.1	24.3	302.4
Oil and coal products					40.2	0.1
Rubber and plastics products	31.9	34.3	87.5	51.8	35.4	42.1
Recycling		15.4	13.5	58.7	22.7	9.3

Appendix Table 2 Mean value added per worker of firms (million 1994 dong, continued).

MNE joint ventures	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	84.9	97.6	214.4	105.6	148.4	134.9
Labour-intensive industries	21.1	20.1	41.0	32.4	65.5	40.7
Textiles	29.2	21.3	54.5	42.4	24.4	33.1
Apparel	8.8	7.4	12.9	11.6	39.5	12.5
Leather and footwear	15.7	12.7	23.0	23.3	14.4	14.8
Wood and wood products	34.9	45.7	86.1	57.4	55.5	75.5
Non-electric machinery	39.7	30.8	34.8	41.7	39.1	52.7
Precision machinery	35.6	30.2	45.6	53.6	35.3	28.8
Furniture, miscellaneous manufacturing	11.1	14.0	49.6	39.0	209.2	72.4
Intermediate intensity	102.1	103.1	207.1	145.2	166.7	143.2
Food and beverage	65.2	73.4	165.7	116.6	102.1	141.1
Paper and paper products	48.4	52.3	57.0	66.2	64.1	52.0
Chemicals	160.5	164.7	395.4	127.7	349.8	148.8
Non-metallic mineral products	110.7	107.2	146.0	183.8	185.7	199.8
Fabricated metal products	106.3	99.1	192.9	170.9	105.8	107.0
Capital intensive industries	140.5	188.2	460.9	129.5	224.9	243.5
Rubber and plastics products	66.8	66.7	355.1	46.3	50.5	58.4
Basic metals	150.8	158.4	265.5	157.9	185.8	154.6
Electrical machinery	194.3	294.0	1330.9	137.8	209.2	345.4
Communication machinery	117.7	123.6	289.4	134.3	120.8	162.9
Motor vehicles	253.6	300.4	511.6	360.1	341.9	259.4
Other transport machinery	53.9	67.7	114.7	54.9	112.2	66.8
Excluded industries						
Printing and publishing	19.3	11.9	31.0	36.0	38.5	31.2
Tobacco products	1013.6	2581.8	1972.3	263.0	4408.8	5219.6
Oil and coal products	176.9	111.0	143.7	174.7	106.0	152.5
Recycling			27.6			

Appendix Table 3 Mean value added-fixed asset ratios of firms.

Private firms	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	2.97	3.13	6.19	5.56	14.4	16.5
Labour-intensive industries	3.33	3.27	5.78	5.36	17.1	15.7
Textiles	2.38	3.46	5.96	3.86	14.5	15.8
Apparel	3.99	3.74	4.88	4.77	8.63	16.4
Leather and footwear	3.30	3.13	5.61	5.08	41.0	11.1
Wood and wood products	3.58	2.40	5.45	5.03	32.45	21.4
Non-electric machinery	2.13	4.24	7.06	4.27	6.13	4.30
Precision machinery	3.45	3.92	3.97	9.38	9.21	4.01
Furniture, miscellaneous manufacturing	2.91	2.99	6.88	6.49	8.72	15.9
Intermediate intensity	2.84	2.98	6.91	6.00	13.8	19.3
Food and beverage	3.13	3.27	8.46	7.89	10.0	17.8
Paper and paper products	2.10	2.26	6.37	6.76	8.37	9.34
Chemicals	3.94	4.98	5.03	4.05	8.47	5.09
Non-metallic mineral products	1.64	1.85	2.98	2.59	18.2	14.2
Fabricated metal products	3.79	3.22	9.60	6.05	16.3	34.5
Capital intensive industries	0.92	0.83	1.73	1.48	1.17	1.36
Rubber and plastics products	2.39	3.53	3.79	3.58	5.29	6.63
Basic metals	2.07	3.31	6.82	5.92	5.74	6.19
Office and computing machinery	0.79	0.79	8.83	3.00	27.7	11.9
Electrical machinery	2.92	3.06	3.78	4.09	9.59	12.4
Communication machinery	7.38	5.00	7.94	6.49	9.00	15.6
Motor vehicles	1.46	2.17	3.35	5.99	19.4	10.1
Other transport machinery	2.41	2.24	3.56	5.06	11.6	17.5
Excluded industries						
Printing and publishing	4.14	2.77	3.79	7.10	8.47	7.96
Tobacco products	7.83	14.3	42.4	314.5	9.61	16.9
Oil and coal products	2.20	5.19	4.95	1.28	4.13	5.92
Recycling	0.47	0.75	1.57	6.84	5.66	10.4

Appendix Table 3 Mean value added-fixed asset ratios of firms (continued)

SOEs	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	3.65	2.23	2.59	2.42	5.76	5.79
Labour-intensive industries	1.56	1.85	2.50	2.92	5.41	5.70
Textiles	0.65	2.19	1.56	2.26	1.67	0.86
Apparel	1.46	1.40	2.01	3.12	3.52	3.26
Leather and footwear	1.63	2.51	6.68	21.9	35.0	5.50
Wood and wood products	1.82	1.11	2.46	3.65	12.8	21.3
Non-electric machinery	1.36	2.28	1.94	1.50	8.51	3.77
Precision machinery	0.78	0.69	0.89	0.30	0.27	0.43
Furniture, miscellaneous manufacturing	1.69	1.35	2.30	1.82	5.60	3.45
Intermediate intensity	5.70	1.36	2.66	2.11	5.34	6.28
Food and beverage	1.53	1.25	4.06	2.46	6.30	6.39
Paper and paper products	0.59	0.55	2.42	1.16	1.62	2.50
Chemicals	5.36	2.77	3.24	2.93	3.18	6.58
Non-metallic mineral products	1.52	1.22	1.75	2.13	35.7	35.7
Fabricated metal products	45.6	1.54	1.62	1.23	3.89	3.58
Capital intensive industries	2.42	5.83	2.61	1.97	7.47	4.41
Rubber and plastics products	0.85	0.86	1.68	0.77	2.24	3.02
Basic metals	0.88	0.60	1.94	0.36	3.22	4.70
Electrical machinery	2.06	1.92	2.55	2.65	43.3	3.58
Communication machinery	2.91	3.33	5.37	2.21	2.20	6.73
Motor vehicles	2.69	1.31	2.87	2.57	3.15	1.30
Other transport machinery	2.05	13.8	1.56	1.50	1.26	1.84
Excluded industries						
Printing and publishing	2.17	2.61	3.26	2.50	4.11	4.86
Tobacco products	7.20	7.42	6.43	4.13	5.70	7.11
Oil and coal products		0.05	0.09		0.07	0.01

Appendix Table 3 Mean value added-fixed asset ratios of firms (continued)

Wholly-foreign MNEs	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	2.24	1.27	2.50	2.72	2.56	3.14
Labour-intensive industries	3.36	1.55	2.82	3.77	4.06	5.33
Textiles	0.52	0.64	1.09	1.04	0.85	2.09
Apparel	7.11	1.80	3.03	4.84	4.73	4.97
Leather and footwear	1.94	2.17	3.60	5.01	3.19	3.64
Wood and wood products	2.27	1.46	3.49	5.90	8.74	1.47
Non-electric machinery	1.41	1.36	4.10	1.23	1.92	2.36
Precision machinery	1.34	0.68	1.25	1.55	1.65	1.15
Furniture, miscellaneous manufacturing	2.09	1.51	3.07	3.00	3.10	6.38
Intermediate intensity	1.25	1.32	2.89	2.41	1.82	2.90
Food and beverage	1.42	1.69	3.97	4.76	2.86	3.78
Paper and paper products	0.88	0.96	2.65	3.49	1.04	1.23
Chemicals	1.46	1.17	3.10	1.67	1.84	2.53
Non-metallic mineral products	2.74	2.53	5.08	1.23	3.27	2.64
Fabricated metal products	0.57	0.88	1.33	1.41	1.16	2.95
Capital intensive industries	0.38	0.39	0.89	0.66	0.51	0.53
Rubber and plastics products	0.69	0.60	1.86	1.35	1.10	1.24
Basic metals	0.75	0.46	2.45	2.11	0.74	1.92
Office and computing machinery	0.41	0.19	0.79	0.59	0.24	0.29
Electrical machinery	2.04	1.88	2.29	3.04	2.23	2.13
Communication machinery	1.12	1.10	1.95	0.90	1.20	1.21
Motor vehicles	0.85	0.81	1.15	0.95	0.85	0.95
Other transport machinery	0.47	0.42	1.01	0.99	0.78	0.79
Excluded industries						
Printing and publishing	4.41	2.98	1.26	7.75	10.3	37.1
Oil and coal products					2.46	0.01
Recycling		0.51	0.29	1.19	0.65	0.40

Appendix Table 3 Mean value added-fixed asset ratios of firms (continued)

MNE joint ventures	2005	2006	2007	2008	2009	2010
Manufacturing, sample industries	1.52	1.84	3.82	3.58	6.30	3.45
Labour-intensive industries	2.19	2.06	2.98	5.89	7.03	3.41
Textiles	0.88	1.15	1.28	1.77	0.84	1.21
Apparel	1.90	1.47	2.59	4.03	3.89	3.05
Leather and footwear	2.75	3.02	5.10	5.69	2.56	4.54
Wood and wood products	3.10	1.72	2.62	2.02	2.55	4.45
Non-electric machinery	1.33	3.76	2.66	3.65	2.57	2.23
Precision machinery	0.88	1.14	1.35	1.73	1.63	1.46
Furniture, miscellaneous manufacturing	3.70	2.47	4.95	25.7	44.5	5.73
Intermediate capital intensity	1.12	1.21	2.97	2.82	5.70	2.59
Food and beverage	1.13	1.20	3.04	1.89	2.10	2.10
Paper and paper products	1.18	1.77	2.69	31.1	10.1	1.75
Chemicals	1.52	1.46	3.67	2.99	25.4	2.31
Non-metallic mineral products	1.11	1.11	1.65	2.63	1.60	1.78
Fabricated metal products	0.86	1.18	3.87	2.41	3.23	3.33
Capital-intensive industries	1.76	2.50	6.71	4.81	6.24	5.06
Rubber and plastics products	0.71	0.63	8.93	1.70	1.14	1.91
Basic metals	1.77	2.06	4.29	4.27	3.50	3.25
Electrical machinery	1.00	1.17	2.99	1.53	1.14	1.75
Communication machinery	4.71	10.0	16.50	14.3	6.48	16.5
Motor vehicles	1.36	1.46	4.26	2.61	2.46	2.86
Other transport machinery	1.23	1.31	2.41	1.79	21.1	8.71
Excluded industries						
Printing and publishing	0.27	0.70	0.98	0.35	0.33	0.66
Tobacco products	5.58	5.56	2.80	19.8	5.04	6.18
Oil and coal products	1.20	1.59	2.04	1.14	1.08	1.76
Recycling			0.33			

Appendix Table 4 Random effects estimates of productivity differential in sample manufacturing firms

	2005-2010		2005-2007		2008-2010	
	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)
MNE	0.124		0.234		0.045	
	(8.25)***		(13.3)***		(1.81)*	
WO		0.092		0.191		-0.004
		(5.85)***		(10.2)***		(-0.18)
JV		0.302		0.408		0.339
		(9.96)***		(12.6)***		(6.00)***
SOE	0.105	0.107	0.143	0.144	0.210	0.210
	(6.51)***	(6.61)***	(9.01)***	(9.06)***	(6.93)***	(6.94)***
MNE*TP	0.015		-0.012		0.020	
	(3.24)***		(-2.79)***		(1.40)	
WO*TP		0.019		-0.006		0.030
		(4.05)***		(-1.37)		(2.09)**
JV*TP		-0.003		-0.011		-0.004
		(-0.92)		(-3.77)***		(-0.35)
CR4	0.011	0.011	-0.006	-0.006	0.008	0.008
	(3.45)***	(3.43)***	(-1.76)*	(-1.75)*	(1.56)	(1.54)
TP	-0.049	-0.049	-0.041	-0.042	-0.110	-0.110
	(-11.0)***	(-11.0)***	(-10.7)***	(-10.7)***	(-9.08)***	(-9.09)***
L (lag)	0.297	0.294	0.205	0.200	0.367	0.366
	(11.2)***	(11.1)***	(6.99)***	(6.85)***	(9.44)***	(9.42)***
L^2 (lag)	-0.026	-0.021	0.087	0.090	-0.192	-0.184
	(-0.75)	(-0.61)	(2.20)**	(2.28)**	(-3.49)***	(-3.36)***
K (lag)	0.027	0.030	-0.055	-0.050	0.006	0.010
	(1.27)	(1.39)	(-2.22)**	(-2.02)**	(0.19)	(0.33)
K^2 (lag)	0.189	0.188	0.360	0.351	0.131	0.133
	(7.11)***	(7.07)***	(11.6)***	(11.3)***	(3.16)***	(3.22)***
K×L(lag)	0.069	0.066	0.033	0.037	0.252	0.241
	(1.56)	(1.49)	(0.65)	(0.73)	(3.53)***	(3.38)***
_cons	-0.139	-0.139	-0.100	-0.099	0.080	0.083
	(-18.5)***	(-18.4)***	(-14.0)***	(-13.9)***	(8.65)***	(9.01)***
# of obs.	42588	42588	20169	20169	22419	22419
# of group	18112	18112	9779	9779	14702	14702
R-square	0.51	0.52	0.64	0.64	0.43	0.44
F-statistics	15983.8***	16078.5***	15850.0***	15958.9***	8642.2***	8714.2***
Rho	0.78	0.78	0.85	0.84	0.81	0.81
Breusch&Pagan test	11407.2***	11088.0***	7093.2***	7015.8***	2335.7***	2278.2***
Wald test Ho: WO=JV		45.7***		40.7***		34.1***
Wald test Ho: WO × TP = JV×TP		17.4***		1.16		3.89***

Parentheses show t-statistics; ***,**,* indicate significant at 1%, 5%, and 10%, respectively.

Appendix Table 5 Random effect estimates of productivity differentials in labour-intensive industries

	2005-10		2005-07		2008-10	
	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)
MNE	0.087		0.181		0.047	
	(4.34)***		(8.07)***		(1.27)	
WO		0.065		0.153		0.004
		(3.08)***		(6.34)***		(0.12)
JV		0.202		0.304		0.246
		(4.70)***		(6.79)***		(2.88)***
SOE	0.127	0.127	0.161	0.161	0.261	0.260
	(6.35)***	(6.37)***	(8.29)***	(8.28)***	(6.91)***	(6.89)***
MNE×TP	0.019		-0.003		0.014	
	(3.70)***		(-0.76)		(0.80)	
WO×TP		0.022		0.001		0.022
		(4.23)***		(0.27)		(1.23)
JV×TP		-0.001		-0.008		0.002
		(-0.14)		(-2.61)***		(0.16)
CR4	0.007	0.007	-0.006	-0.006	0.003	0.003
	(1.94)*	(1.94)*	(-1.51)	(-1.49)	(0.47)	(0.46)
TP	-0.045	-0.045	-0.036	-0.036	-0.108	-0.108
	(-9.96)***	(-9.96)***	(-8.97)***	(-8.98)***	(-8.58)***	(-8.60)***
L (lag)	0.241	0.239	0.151	0.149	0.305	0.303
	(7.86)***	(7.79)***	(4.53)***	(4.47)***	(6.52)***	(6.48)***
L^2 (lag)	0.055	0.057	0.168	0.168	-0.081	-0.079
	(1.22)	(1.26)	(3.48)***	(3.49)***	(-1.08)	(-1.06)
K (lag)	0.011	0.011	-0.029	-0.030	0.016	0.012
	(0.40)	(0.39)	(-0.92)	(-0.95)	(0.35)	(0.26)
K^2 (lag)	0.237	0.236	0.348	0.347	0.144	0.148
	(5.27)***	(5.25)***	(7.17)***	(7.15)***	(1.87)*	(1.93)*
K×L(lag)	0.022	0.024	-0.018	-0.015	0.193	0.194
	(0.35)	(0.37)	(-0.27)	(-0.22)	(1.72)*	(1.73)*
_cons	-0.181	-0.181	-0.143	-0.142	0.040	0.044
	(-19.8)***	(-19.8)***	(-16.2)***	(-16.1)***	(3.19)***	(3.46)***
# of obs.	29200	29200	14645	14645	14555	14555
# of group	12400	12400	7235	7235	9522	9522
R-square	0.5	0.5	0.61	0.61	0.41	0.41
F-statistic	10669.2***	10687.5***	9950.0***	9970.8***	5489.6***	5514.9***
rho	0.75	0.75	0.84	0.84	0.79	0.79
Breusch& Pagan test	8520.8***	8406.9***	5031.7***	5001.6***	1692.9***	1674.4***
Wald test Ho: WO=JV		9.18***		0.11		6.84***
Wald test Ho: WO × TP = JV×TP		14.4***		2.35***		0.83

Parentheses show t-statistics; ***,**,* indicate significant at 1%, 5%, and 10%, respectively.

Appendix Table 6 Random effects estimates of productivity differentials in industries with intermediate capital intensity

	2005- 2010		2005-07		2008-10	
	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)
MNE	0.134		0.169		0.093	
	(3.98)***		(4.64)***		(1.75)*	
WO		0.109		0.108		0.028
		(3.12)***		(2.82)***		(0.52)
JV		0.309		0.476		0.548
		(4.46)***		(6.49)***		(4.50)***
SOE	0.072	0.075	0.072	0.074	0.175	0.174
	(2.20)**	(2.29)**	(2.27)**	(2.31)**	(2.86)***	(2.85)***
MNE×TP	0.008		-0.011		-0.013	
	(0.51)		(-0.74)		(-0.34)	
WO×TP		0.011		-0.002		0.012
		(0.73)		(-0.17)		(0.31)
JV×TP		-0.004		-0.015		-0.066
		(-0.30)		(-1.22)		(-1.87)*
CR4	0.015	0.014	-0.021	-0.021	0.024	0.024
	(1.94)*	(1.89)*	(-2.54)**	(-2.56)**	(1.95)*	(1.92)*
TP	-0.042	-0.042	-0.053	-0.054	-0.098	-0.098
	(-2.36)**	(-2.36)**	(-3.38)***	(-3.42)***	(-2.58)**	(-2.57)**
L (lag)	0.616	0.614	0.451	0.445	0.665	0.670
	(8.58)***	(8.55)***	(5.29)***	(5.24)***	(6.40)***	(6.46)***
L^2 (lag)	-0.019	-0.021	0.329	0.334	-0.402	-0.409
	(-0.18)	(-0.19)	(2.67)***	(2.72)***	(-2.07)**	(-2.11)**
K (lag)	-0.258	-0.254	-0.303	-0.300	-0.209	-0.218
	(-3.10)***	(-3.05)***	(-3.28)***	(-3.26)***	(-1.45)	(-1.51)
K^2 (lag)	0.602	0.593	0.808	0.804	0.303	0.313
	(5.10)***	(5.02)***	(6.56)***	(6.54)***	(1.62)	(1.67)*
K×L(lag)	-0.443	-0.434	-0.657	-0.654	0.095	0.097
	(-2.38)**	(-2.32)**	(-3.28)***	(-3.27)***	(0.30)	(0.31)
_cons	0.012	0.012	0.119	0.121	0.197	0.198
	(0.61)	(0.60)	(5.80)***	(5.91)***	(6.90)***	(6.97)***
# of obs	8089	8089	3536	3536	4553	4553
# of group	3308	3308	1630	1630	2962	2962
R-square	0.43	0.43	0.58	0.59	0.37	0.37
F-statistics	2261.1***	2279.6***	2235.6***	2300.9***	1176.9***	1207.0***
rho	0.81	0.81	0.84	0.83	0.84	0.84
Breusch&Pagan test	1984.1***	1854.2***	1318.6***	1270.6***	411.9***	397.7***
Wald test Ho: WO=JV		0.85		23.6***		17.4***
Wald test Ho: WO×TP = JV×TP		0.70		0.52		2.61***

Parentheses show t-statistics; ***,**,* indicate significant at 1%, 5%, and 10%, respectively.

Appendix Table 7 Random effect estimates of productivity differentials in capital-intensive industries

	2005-10		2005-07		2008-10	
	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)	(Eq.1)	(Eq.2)
MNE	0.037		0.314		-0.087	
	(0.90)		(5.85)***		(-1.40)	
WO		-0.010		0.277		-0.119
		(-0.25)		(4.78)***		(-1.85)*
JV		0.238		0.383		0.109
		(3.32)***		(4.82)***		(0.90)
SOE	0.012	0.017	0.111	0.117	0.083	0.090
	(0.25)	(0.37)	(2.18)**	(2.28)**	(0.98)	(1.07)
MNE×TP	0.029		-0.036		0.053	
	(1.15)		(-1.42)		(1.00)	
WO×TP		0.028		-0.036		0.036
		(1.13)		(-1.43)		(0.69)
JV×TP		0.015		0.005		0.058
		(0.90)		(0.32)		(1.62)
CR4	0.013	0.013	-0.003	-0.003	-0.006	-0.006
	(1.31)	(1.27)	(-0.31)	(-0.33)	(-0.40)	(-0.43)
TP	-0.037	-0.036	-0.055	-0.055	-0.039	-0.035
	(-1.27)	(-1.26)	(-2.07)**	(-2.08)**	(-0.64)	(-0.58)
L (lag)	0.447	0.448	0.283	0.286	0.536	0.541
	(4.63)***	(4.64)***	(2.28)**	(2.31)**	(3.92)***	(3.97)***
L^2 (lag)	0.294	0.288	0.239	0.236	-0.065	-0.095
	(2.40)**	(2.36)**	(1.52)	(1.50)	(-0.34)	(-0.49)
K (lag)	-0.080	-0.068	-0.305	-0.282	-0.521	-0.485
	(-0.88)	(-0.75)	(-2.76)***	(-2.55)**	(-3.51)***	(-3.27)***
K^2 (lag)	0.415	0.403	0.459	0.439	0.534	0.490
	(3.86)***	(3.75)***	(3.83)***	(3.65)***	(3.11)***	(2.85)***
K×L(lag)	-0.480	-0.476	-0.109	-0.111	-0.032	-0.002
	(-2.79)***	(-2.78)***	(-0.49)	(-0.50)	(-0.11)	(-0.01)
_cons	0.216	0.218	0.265	0.266	0.526	0.526
	(6.21)***	(6.29)***	(6.95)***	(7.01)***	(10.8)***	(10.8)***
# of observations	5299	5299	1988	1988	3311	3311
# of group	2404	2404	914	914	2218	2218
R-square	0.44	0.45	0.60	0.60	0.38	0.39
F-statistics	1526.2***	1562.3***	1321.0***	1341.9***	1042.5***	1077.8***
Rho	0.83	0.83	0.86	0.86	0.86	0.86
Breusch & Pagan test	1130.9***	1062.8***	769.6***	757.2***	274.3***	254.3***
Wald test Ho: WO=JV		12.2***		1.74*		3.64***
Wald test Ho: WO × TP = JV×TP		0.25		2.40***		0.16

Parentheses show t-statistics; ***,**,* indicate significant at 1%, 5%, and 10%, respectively.

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