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The Turnaround of Swedish Industry: Reforms, Firm Diversity and Job and Productivity Dynamics

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Abstract: This paper examines the Swedish industrial reorganization process that took place from 1990-2009. We argue that the early adoption of information and communication technology (ICT) in Swedish industry was a crucial element in the success of the industrial restructuring process. We also argue that several reforms in the 1990s mitigated the insider-outsider problem in the labour market and incentive problems in the Swedish business sector: the deregulation of the wage negotiation system, the deregulation of product markets, and the deregulation of the market for corporate ownership. The main prediction that results from our institutional examination is that technological change and economic reforms benefitted more productive firms and factors while punishing less effective firms and factors. We find support for our thesis by using detailed matched plant-firm-worker data.

JEL: D22, E23, J21, J23, K23, L11, L16, L51
Keywords: regulations, allocative efficiency, productivity, job dynamics, matched employer-employee data, industrial structure and structural change

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1. INTRODUCTION

Europe is experiencing one of its biggest economic challenges ever. In the wake of the financial crisis, many countries need to downsize employment in the government sector, restructure the industrial sector, and create jobs in the private sector. Sweden is one of the few countries in Europe that has shown both high productivity and job growth in its industry in the last few decades. In the early 1990s, however, Sweden experienced similar problems to those of many countries in Europe today and faced its most severe economic crisis in the post-war period; Swedish companies lost their competitiveness in the world market at the same time that the Swedish state became very highly leveraged. The period 1991-1994 was characterized by a large decrease in gross domestic product (GDP) and increasing unemployment.

The purpose of this study is to examine the Swedish industrial reorganization process that took place from 1990-2009 and to provide knowledge about the economic forces behind this successful transformation of Swedish industry. We will argue that one important explanation for the Swedish economy's recovery from the crisis was that during the 1980s—and in particular, during the 1990s—Sweden implemented several important economic reforms that improved dynamic efficiency in the business sector. These reforms included labour market deregulations, product market deregulations, efficiency-enhancing tax reforms, and the removal of barriers to foreign direct investments (FDIs). This implementation of reforms focusing on dynamic efficiency continued during the next decades. Moreover, Sweden was one of the first countries in the world to implement full-scale information and communication technology (ICT) in industry which, together with a strongly efficiency-oriented business culture, ensured that Sweden has not only recovered from its bad performance in the 1980s and the early 1990s but also actually outperformed most comparable countries during the last decade.

During the last two decades, productivity growth in the Swedish business sector has been extraordinary compared to comparable countries. With the exception of Ireland, Sweden and the US experienced the highest labour productivity growth in the OECD during the period 1995–2011 (OECD, 2013). Sweden's high level of labour-productivity growth has primarily been driven by factors that increased the effectiveness of its business sector. Simultaneously, following the Swedish crisis of the early 1990s, we have seen a strong recovery in private-sector employment as a share of the total labour force

To understand the restructuring processes that took place in Swedish industry in the 1990s and 2000s, we first survey the industrial restructuring literature to locate mechanisms that have been shown to be important in explaining firm, employment, and productivity dynamics. We show how firm productivity can be explained using both "firm-specific factors" and "external factors". "Firm-specific factors" are factors that firms themselves can choose and influence. "External factors" are factors over which firms have no influence but that can (both directly and indirectly) affect firm productivity and employment. In our empirical study of firms in the Swedish business sector, we will focus on such external factors that were changed in a large reform package in Sweden in the early 1990s: including reforms of the labour marker, the product market and the market for corporate ownership. We survey these reforms and situate them in relation to their role in the Swedish industrial and job-restructuring processes. Our main finding from this institutional and theoretical examination is that a crucial ingredient for the success of these economic reforms was that they not only removed barriers to the entry and growth of new and productive firms in the Swedish industry but also increased the rewards for investment in human capital and effort in the workplace. This action, we argue, led to a remarkable growth of productivity and employment in the Swedish business sector in the two decades that followed.

Our empirical analysis is based on broad predictions from the theoretical and institutional analysis, centred on stylized examples that discuss important features of the Swedish restructuring process. The focus is on firm-level employment and productivity dynamics during Sweden's reformation and recovery period (1990-2009). The analysis uses data from an extensive and detailed database maintained by Statistics Sweden (SCB). The data consist of matched plant-firm-worker data for 1990-2009. The use of detailed information on firms, plants, and individuals working in the firms makes it possible to analyse issues related to firm employment and productivity dynamics in more detail than has been possible in most other international studies.

Although it is difficult to find causal evidence for our general theoretical and institutional predictions in a single-country study, we do find indicative support for them in the empirical analysis. In particular, we find that the relationship between productivity and wages in firms increases over the study period, suggesting that productive firms and productive employees have become more rewarded in Swedish industry. Moreover, we find that firm dynamics are systematically related to product market competition. Stronger competition affects the composition both of new firms that survive in the market and of those that exit. We also present evidence of systematic differences between firms of different sizes in terms of their overall contribution to employment and productivity in the Swedish business sector. The results indicate that most of the net jobs were created in small firms, whereas most of the productivity gains were created in large incumbent firms, thus suggesting a division of labour between the two. Finally, we show that to a large extent, foreign firms contributed to productivity and employment growth in the business sector during the study period.

In our final section of the paper, we use our theoretical and empirical findings to discuss policy implications. We end with a discussion of how our study of Sweden can contribute to a discussion of how Europe can improve competitiveness and employment levels in its business sector.

2. THEORETICAL FRAMEWORK: INDUSTRIAL RESTRUCTURING

To understand the restructuring processes that took place in Swedish industry in the 1990s and 2000s, we start with a brief overview of the basic economic mechanisms that have been shown to be important in explaining firm, employment, and productivity dynamics in general.[1] Armed with this general knowledge, we then proceed to stylized examples that discuss important features of the Swedish restructuring process. We end this section with a discussion of a number of empirical predictions that follow from the analysis, which we explore in the next section.

Figure 1 shows a schematic picture of how firm- and business-sector employment and productivity can be understood. The figure categorizes "firm-specific factors", which the firms themselves can choose and influence. The figure also includes "external factors". These are factors over which firms have no influence but that both directly and indirectly can affect firm productivity and employment through the limitations that they set on firm-specific choices. In our study of Swedish firms, we will focus on external factors that were the subject of a large reform package in Sweden in the early 1990s, including reforms of the labour market, the product market and the corporate-ownership market.

Firm-specific and external factors affect firm performance in terms of measurable productivity and employment dynamics. Various methods can later be used to aggregate these dynamics at the business-sector level, as shown at the bottom of Figure 1.

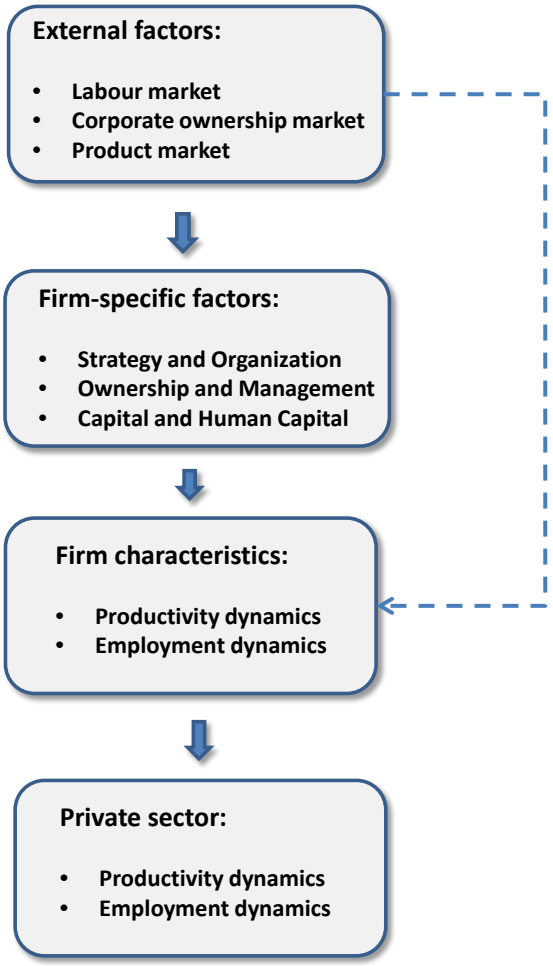

Figure 1: Explanatory factors underlying productivity and employment trends in the business sector.

2.1. Firm-specific Factors

To compete in the marketplace, firms need to undertake efficient decisions in several dimensions. Short-term decisions are decisions such as optimal pricing and efficient marketing. Medium-term decisions involve aspects such as proper activity locations and hiring productive staff. Finally, long-term decisions involve decisions about updated research and development (R&D) and optimal organizational forms.[2] We discuss some of the more important firm-specific factors below.

2.1.1. Business Strategy and Organization

Productivity and employment dynamics in firms essentially depend on the changes that firms – and their rivals – make to their business strategies and organizations. Firms that have good business ideas need to decide not only how to grow but also what should be produced internally versus what should be bought on the market. On the one hand, economies of scale and scope imply that increasing firm size reduces costs and increases profits. On the other hand, larger firms are confronted by problems related to free riding, lacking control over their activities, and lost motivation among staff, all of which limit the optimal firm size.[3]

The optimal firm size also differs among individual firms and industries and depends on factors such as technology (i.e., ICT), market conditions (demand levels), and presiding institutions and laws (corporate tax system). Start-ups and expansions are also associated with high degrees of uncertainty and problems related to

asymmetric information. This means that many businesses will fail and, thus, that the observed number of highly successful and expanding ventures will be low.

Overall, these results indicate that firms with strong business ideas typically increase their productivity levels but might not necessarily grow in employment levels because of either labour saving or outsourcing of non-core business activities.[4]

2.1.2. Ownership and Management

Expanding productive firms are typically associated with having active owners and up-to-date and incentive-based management practises. Thus, economically efficient decisions are made at the right time. Moreover, efficient ownership and management typically create a well-functioning business culture, leading to a motivated work force.[5]

Why, then, do inefficient firms not implement more efficient management? One explanation is that some firms are family owned and have managers that are not easily replaced. Another explanation is that firms possibly face problems of corporate control in which managers use their superior information to either shirk their responsibilities or hide their incompetence. Various incentive and monitoring systems have been developed to mitigate these problems (see, e.g., Tirole 2006).

2.1.3. Capital and Human Capital

Another important explanation for why some firms are able to expand and maintain high productivity is that they not only educate and hire productive employees but also invest in high-quality capital. Efficient human-resource management enables firms to acquire talent and further develop their skills so that they might facilitate the generation of high profits and firm expansion.[6] [7] The implementation of ICT is a prominent example of how the adoption of new technology was able to spur firm growth and productivity.[8] Acquisitions of small, growing firms are another important explanation for growth in employment and productivity in expanding firms.[9]

2.2. External Factors and the Swedish Creative Destruction Process

Why did the Swedish industry recover so quickly after the crisis in the early 1990s? What were the crucial elements in the restructuring that occurred? What policies helped this development?

2.2.1 The ICT change in the Swedish industry

As a first step towards an answer, we make use of the firm-specific factors discussed above to illustrate how successful technological upgrading can explain the productivity and employment dynamics in the Swedish business sector. After the crisis in the 1990s, the Swedish industry was early to adopt new ICT-based technologies, not least through Ericsson, which became a world leader in wireless telecommunication, and a large set of small entrepreneurial firms in the ICT sector. This, in turn, implied that a large share of the firms in the Swedish business sector were early to adopt ICT. This change was accomplished through the use of efficient business strategies and organization, along with an efficient management and labour force, enabling firms to be successful in the international technology race. Sweden was also an early adopter of comprehensive broadband penetration and was early to have a large number of advanced users. This infrastructure was a good steppingstone towards the

implementation of ICT in the business sector.[10] Moreover, the new technology favoured more outsourcing, implying reduced employment in large incumbent firms and more low-skilled employment among subcontractors and customers.

The implementation of ICT in Swedish industry, driven by international competition, triggered a creative destruction process. Large incumbent firms switched to skilled biased technologies, employing skilled labour themselves and outsourcing non-core labour-intensive activities to small, new supplier and customer firms employing low skilled labour. This should have implied reduced—although more skill-intensive—employment in large firms, and increasing—but less skill-intensive—employment in smaller firms. Productivity gains from this restructuring process should have predominantly taken place in large firms.

2.2.2. The Swedish Economic Reforms of the 1990s

Let us now examine the impact on firms' performance of the changes in external factors caused by the package of economic reforms undertaken in Sweden in the 1990s. We will first describe some basics of the Swedish business sector's institutional setting and crucial reforms that were undertaken in the 1990s. To proceed, we will rely on detailed descriptions of the Swedish business sector and the policy reforms that affected firms in Sweden, as described in Heyman, Norbäck and Persson (2015), which is based on Bergh and Erlingsson (2006), Calmfors (2012), Edquist and Henrekson (2013), Henrekson and Jakobsson (2005) and Lindbeck (1997), and the references therein.

During the 1970s and 1980s, Sweden was lagging behind in productivity growth while experiencing high inflation and large budget deficits. During the 1980s, discussions of how to reform the Swedish welfare state became increasingly intensive. The centre-right government that came into power in 1991 was seemingly quick to implement an economic policy based on extensive deregulation in response to the 1990 crisis that hit Sweden. Many of these reforms (such as the deregulation of the air traffic system, the electricity market, and the postal service), however, had already been thoroughly investigated and policies had already been outlined in a government proposition by the Social Democratic government in the late 1980s and early 1990s. Moreover, in 1993 (SOU 1993:16) the so-called Lindbeck commission launched a large number of proposals to improve the efficiency of the Swedish economy. Some of those proposals concerned the business sector.[11]

Several reforms implemented in the 1990s aimed to improve the efficiency and functioning of the business sector. Notable reforms included decentralization of the wage negotiation system, deregulation of the product markets, opening for inward FDIs, and tax reform (Bergh, 2014; Calmfors, 2012; Edquist and Henrekson, 2013 and Lindbeck, 1997).

The Labour Market Reforms

Labour market regulations significantly affect both firm employment and productivity development. On the one hand, labour market institutions increase hiring and productivity by reducing matching and search problems on the labour market. On the other hand, rigid labour markets may offer too much protection for insiders, thereby hampering creative destruction processes. Various types of labour turnover costs give insiders their market power and have implications for talent allocation, work incentives, and employment and unemployment patterns, which might distort the incentives for firm development, education and effort in the workplace (see Lindbeck and Snower, 2002 for an overview). We refer to this problem as the *insider-outsider problem* of the labour market.

Broadly speaking, there are two types of policies that can create a more level playing field between insiders and outsiders in the labour market: (i) "power-reducing policies" (policies that mitigate the market power of insiders), and (ii) "enfranchising policies" (policies that give outsiders a stronger voice in the wage-negotiation process).[12]

Let us now use this background to discuss the implications of a crucial labour market reform in Sweden in the 1990s—the decentralization of the wage negotiation system—on the efficiency of the restructuring of the Swedish business sector. Until the 1990s, wages were negotiated at the central level between unions and employers' organizations. As documented in many studies—see, e.g., Edin and Topel (1997) and Davis and Henrekson (2000)—the outcome of this wage negotiation system was compressed wage distribution.

In 1990, the employers' organization attempted to abolish its centralized wage setting to encourage a more decentralized system. However, this attempt failed; instead, a fully centralized wage stabilization deal was negotiated for 1991-1992. In 1994, state-owned firms joined the employers' organization, thus weakening political influence on wage setting (Nycander, 2008). The agreement included a system that continued industry-level bargaining but with strong *informal coordination* based on pattern bargaining with the manufacturing sector to conclude initial wage agreements in a bargaining round. This system established a norm for wage increases for others to follow. The reformed wage bargaining system turned out to be consistent with lower nominal wage increases than in the past. Moreover, it allowed for greater individual wage flexibility (Calmfors, 2012). Sweden thus progressed from a more coordinated wage negotiation system than other EU countries in the 1980s to a moderately coordinated wage negotiation system in the 1990s. The changes in how wages were set increased the opportunities for firms to better invest and reward human capital. We argue that this insider-outsider problem in the labour market was mitigated by these reforms.

Product Market Reforms

The absence of artificial barriers to entry and expansion is crucial for employment and productivity growth. Incumbent firms also have incentives to exploit their market power to not only protect their market shares but also prevent rivals from expanding and new firms from entering their market. Incumbent firms can, for instance, adopt different forms of predatory behaviour such as exclusive dealing contracts, input cartels, lobbying for special restrictions on entry, and entry-deterring acquisitions. Because of the existence of excessive entry barriers, even if incumbents are ineffective, they may not be replaced by more productive entrepreneurs.

We refer to these product market problems as the *problem of weak creative destruction.* A well-functioning competition policy and legislation can mitigate such entry-deterring and predatory problems (see Motta, 2004 and Tirole, 2006). Moreover, a well-functioning competition policy must ensure that innovative firms can reap benefits from temporary market power, and suppress the profits of firms that are lagging behind (Aghion et al., 2005, Norbäck and Persson, 2012, and Vives, 2008).

We now use this background to discuss the implications of the reforms in the Swedish product markets. Throughout most of the twentieth century, many of Sweden's product markets were public monopolies. Thus, new firms had either no or very few opportunities to enter these markets, and consumer influence was also limited (SOU 2005:4). In the early 1990s, many public monopolies were deregulated, including taxis, electricity, telecommunications, railways, and domestic air travel services. The overall purpose of these reforms was to increase the degree of competition, notably by opening up markets to more entrants (Lundgren et al., 2007; Nicoletti and Scarpetta, 2003). Moreover, a new Competition Act was implemented in 1993 based on three

cornerstones: the prohibition of restrictive agreements, the prohibition of the abuse of dominance, and the prohibition of the control of concentrations (mergers).

A crucial feature of these product market reforms was that they not only made it easier for new firms to enter into the industries but also made it more difficult for inefficient firms to remain in the product market. Thus, these reforms mitigated the problem of *weak creative destruction* in the Swedish business sector.

Reforms of the Market for Corporate Ownership

Business regulation affects the actions that firms can take and the balance of power that exists among various firm stakeholders. Politicians may benefit from protecting owners from competition and then sharing the rents that arise out of such protection (Olson, 1965, Stigler, 1971 and Perotti and Volpin, 2007). Moreover, in more open economies, lobbying for international protection might arise (Spencer and Brander, 1983 and Grossman and Helpman, 1994). Politicians might also have an incentive to favour domestic owners in the international market for corporate control (Horn and Persson, 2001).

Thus, the regulation of the market for corporate ownership runs the risk of distorting the efficiency of the market by favouring some types of ownership over others, such as domestic over foreign or established over start-ups. We refer to the problem as the *discrimination problem in the market for corporate ownership*.

Let us now use this background to discuss the implications of the Swedish reforms of the market for corporate ownership and predict how this might have affected performance in the Swedish business sector. Foreign exchange controls were introduced shortly after the onset of World War II. In practice, this legislation ruled out any substantial foreign ownership of Swedish industry. The purpose of this legislation was openly protectionist, i.e., to ascertain that "Swedish firms remain controlled by Swedish interests" (SOU 1986:23, p. 143). As expected, legal barriers ensured that foreign ownership remained low, with foreign ownership of listed stock never exceeding 8 percent throughout the 1980s and less than 5 percent of private-sector employees working in foreign-owned companies (Henrekson and Jakobsson, 2005).

Between 1989 and 1993, the government undertook measures that suddenly opened the market, leading to a rapidly increasing share of foreign ownership. At a mere 7 percent in 1989, this share had skyrocketed to 40 percent only ten years later (Henrekson and Jakobsson, 2005). This also led to large growth in the share of employees working in foreign-owned firms, increasing from approximately 5 percent at the end of the 1980s to 23 percent in 2011 (Tillväxtanalys, 2012). Thus, we would argue that the reforms severely mitigated the problem with *foreign discrimination* in the market for corporate ownership.

Corporate taxation substantially increased in Sweden during the 1970s and 1980s leading to very high taxes on industry, from an international perspective. However, taxes were reduced from 52 percent to 30 percent when deductions were reduced in the 1990-1991 tax reform; in 1994, taxes were further reduced to 28 percent.

The marginal tax rate on long-term capital gains was zero until 1965. The tax changes implemented in 1976 sharply increased the top marginal tax rate to more than 30 percent and reached a peak in 1979 at almost 35 percent. Thereafter, it decreased to approximately 25 percent prior to the 1990-1991 tax reform (Stenkula et al., 2014). The tax reform of 1990-1991 made all capital gains fully taxable independent of the holding period. However, capital gains were no longer taxed jointly with labour income; instead, they were subject to a separate capital income tax at a flat rate of 30 percent. In 1992-1993, this separate capital income tax rate was temporarily reduced to 25 percent, and in 1994, it was temporarily reduced to 12.5 percent. Until 1991, the Swedish tax system disfavoured new, small, and less capital-intensive firms, while favouring large firms and institutional ownership (pension funds, insurance companies etc.). The 1991 tax reform and some subsequent minor reforms considerably

levelled the playing field for different combinations of owners and sources of finance (Edquist and Henrekson, 2013). The reforms in the 1990s generated a tax system that was far more favourable to individuals wanting to start, develop, and be controlling owners of firms compared to the situation in the 1970s and 1980s. These reforms created opportunities for firm development, particularly for small firms. We would argue that the problem of *outsider discrimination* in the market for corporate ownership was largely solved by these reforms.

With this road map, we now turn to the empirical investigation of the successful industrial change in Sweden from 1990-2009.

3. EMPIRICAL ANALYSIS

The previous section documented that following a period of interventionist policies in the 1970s and 1980s, Sweden deregulated its product and labour markets, reformed the corporate tax system and opened itself up to FDI. We have argued that these reforms should have reduced incumbents' and insiders' advantages and benefitted the growth of new, efficient firms. Moreover, Swedish industry's implementation of ICT, driven by international competition, triggered a creative destruction process in which large incumbent firms switched to skilled biased technology employing skilled labour and outsourced non-core labour intensive activities to new small suppliers and customer firms using low-skilled labour. As a first examination of this proposition, we explore how allocative efficiency in Sweden's business sector developed during this period, i.e., how prone the market is to allocate market share to the most efficient firms in the market. We also examine the importance of firms' entries and exits to productivity growth in the Swedish business sector. Finally, we examine how the market rewards productive labour and firms by investigating how the relationship between productivity and wages has changed over time. This approach provides us with an overall picture of the change in the efficiency of the Swedish business sector.

We then examine the job creation-job destruction process, focusing on the different roles played by small and large firms and noting that the reforms in the labour and product market and the changes in the tax system should have benefitted smaller firms. We also consider the ICT revolution and skill-biased technology changes, which should have affected the matching process in the labour market, by examining how the employment of unskilled and skilled labour has evolved.

We are able to undertake a more detailed empirical investigation in two of our reform areas: how the intensity of product market competition affects firm productivity patterns and in particular, how FDI and foreign ownership have impacted productivity.

Data

The empirical analysis requires us to be able to follow firms and individuals over time, which necessitates access to extremely detailed data. Therefore, we base our analysis on detailed employer-employee data from Statistics Sweden (SCB) for 1990-2009.[13] The data originate from several register-based data sets from Statistics Sweden and cover all private-sector firms. First, the financial statistics contain detailed firm-level information on all Swedish private-sector firms from 1996-2009. Examples of variables are value added, capital stock (book value), number of employees, total wages, ownership status, profits, sales, and industry affiliation. Second, the Regional Labour Market Statistics (RAMS) include data on all plants for 1990-2009. The RAMS adds information on the composition of the labour force with respect to educational level and demographics at the plant level, which we aggregate to the firm level. Individual-, plant- and firm-level data can be linked using unique tracking numbers.

From an international perspective, the data are relatively unique in terms of both magnitude and level of detail. A description of the included variables is presented in Table A1 in the Appendix.

One potential problem in analysing employment dynamics is the difficulty of following firms over time. The use of organization numbers as a method of identifying continuing, entering and exiting firms can be problematic because for various reasons, these numbers can change. To more reliably follow firms over time, we use additional data from Statistics Sweden (FAD data). These data make it possible to identify new firm entries and exits, which means that we can analyse employment changes in (i) completely new units, (ii) continuing units and (iii) exiting units.[14]

To measure productivity, we use labour productivity, which is defined as value added per employee. Value added per employee is a commonly used measure of productivity and is easily comparable across countries. Value added is calculated as the output value minus the costs of purchased goods and services, excluding wages and other personnel costs (calculated by SCB according to the international definition).[15]

Productivity Dynamics in the Swedish Business Sector

Figure 2 depicts the evolution of employment-weighted and unweighted labour productivity in Sweden in firms with at least 10 employees for 1996-2009.[16] The weighted measure is defined as

$$P_t = \sum_{f \in I} s_{f,t} p_{f,t} \qquad (1)$$

where P_t is employment-weighted labour productivity in year t, $s_{f,t}$ is firm f's employment share at year t and $p_{f,t}$ is labour productivity per employee in firm f at time t. We see that labour productivity steadily increased during the period, with slumps in the aftermath of the IT crash in 2001 and during the outbreak of the financial crisis in 2008. Note that because employment-weighted labour productivity is higher than the unweighted measure, productivity has increased more in larger firms than in smaller firms. We will return to this observation in the next section.

Figure 2: Labour productivity 1996-2009

Allocative Efficiency

Figure 2 illustrates the strong recovery of the Swedish economy after the crisis at the beginning of the 1990s. Here, we begin to develop evidence about the effects of the reforms and industrial reorganization on the efficiency of the economy. We begin by using a productivity decomposition proposed by Olley and Pakes (1996) to analyse productivity and reallocation. The Olley and Pakes method decomposes aggregate productivity into two terms, thus implying that the weighted productivity in the business sector can be written as the sum of the simple (un-weighted) average productivity and the covariance between productivity and market share.[17] That is,

$$P_t = \mathrm{E}[p_t] + \mathrm{cov}(p_{f,t}, s_{f,t}) \,. \qquad (2)$$

The second term has a natural efficiency interpretation term and can be interpreted as the extent to which market share is allocated to high-productivity firms. If the covariance between firms' productivity and their share of labour is strictly positive, then more productive firms tend to attract a larger share of workers, which is what we would expect in a well-functioning market economy.

To examine whether such allocative efficiency has changed over time in Sweden, we compute the Olley and Pakes covariance term at the two-digit industry level for each year from 1996-2009. Figure 3 presents the result, measured as yearly figures on the mean of the covariance term. As seen in Figure 3, we find an increasing allocative efficiency in Sweden, which demonstrates that the reforms should have improved the market allocation of resources. We observe much higher estimates of the allocative efficiency term in the final years of our sample compared to the first years. There is clearly a sharp increase in 2004. We have not identified any major reform during that year, but we judge that this increase reflects that the package of reforms had long-term effects on industry performance and that to a larger extent, the effects became visible in 2004 and after. Additionally, note that the allocative efficiency term falls during the financial crisis.

One drawback of this calculation is that we cannot compare developments in Sweden with those of other countries. However, Andrews and Cingano (2014) use firm-level data from a commercial data source covering 21 OECD countries for 2005 to analyse how structural policies affect resource allocation efficiency. According to the Olley and Pakes covariance, Sweden has the largest allocative efficiency index across countries in the manufacturing sector. In comparison, the figure for Sweden is nearly 400 percent higher than for Italy and approximately 40 percent higher than for the US. The index is negative in Greece, implying that productive firms in Greece have fewer resources than if resources had been randomly allocated across firms.

The result for Sweden is consistent with the substantial changes in Sweden that we have accounted for in the previous section and the increase in allocative efficiency that we depict in Figure 3. Interestingly, Andrews and Cingano (2014) also examine the source of the variation in the allocative efficiency term. They report that regulations related to employment protection, product market competition and FDI are negatively related to productivity through a worsening of allocative efficiency, which indicates a reduced ability to allocate resources to more productive firms.

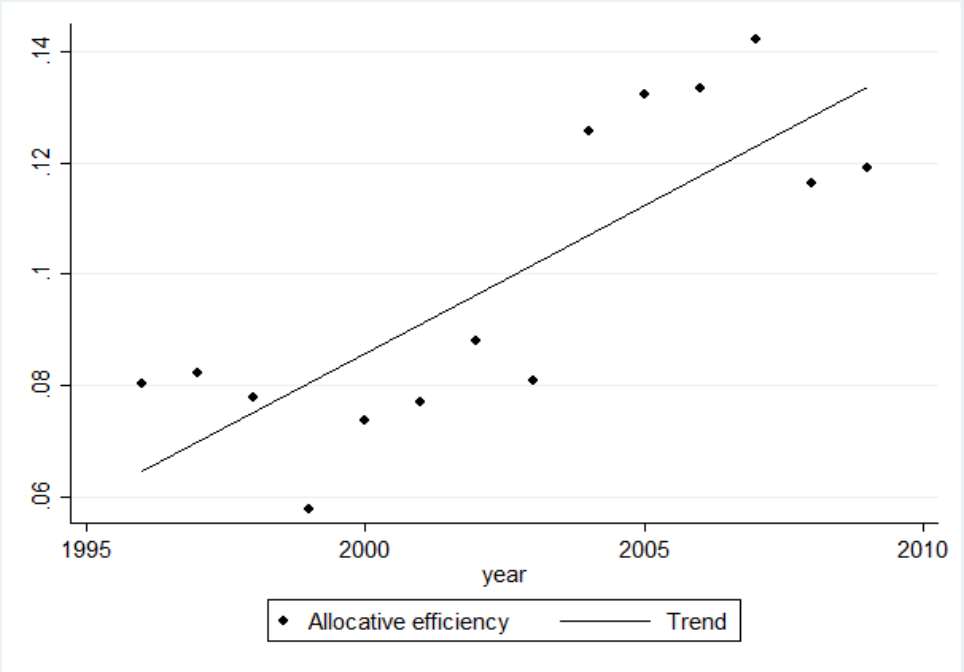

Figure 3: The development of the Olley and Pakes covariance term, 1996-2009; means across two-digit industries

Entry and Exit of Firms

In Section 2, we suggested that labour market and—in particular—product market reforms combined with tax reforms may have reduced barriers to entry, and these actions might have played an important role in the turnaround of the Swedish business sector by improving the creative destruction process.

To distinguish the effect of the entry of new firms and exits of incumbents from the expansion and contraction of existing firms, we now use a decomposition method to analyse the drivers of overall productivity in greater detail (see Foster et al., 2001, for a discussion of different decomposition methods). The decomposition allows us to distinguish aggregate productivity changes at the intensive margin from those at the extensive margin.[18]

$$\Delta P_t = \underbrace{\sum_{f \in F} s_{f,t-1}\Delta p_{f,t}}_{\text{1.Within firm effect}} + \underbrace{\sum_{f \in F}\left(p_{f,t} - P_{t-1}\right)\Delta s_{f,t}}_{\text{2.Between firm effect}} + \underbrace{\sum_{f \in F}\Delta p_{f,t}\Delta s_{f,t}}_{\text{3.Cross effect}} + \underbrace{\sum_{f \in N} s_{f,t}\left(p_{f,t} - P_{t-1}\right)}_{\text{4.Entry effect}} + \underbrace{\sum_{f \in U} s_{f,t-1}\left(p_{f,t} - P_{t-1}\right)}_{\text{5.Exit effect}} \quad (3)$$

The use of firm-level data allows us to disentangle overall productivity growth into different components, which can indicate whether Swedish productivity growth originated from within-industry dynamics (firm-level productivity growth), a reallocation of market share between existing firms (incumbents) or the entry and exit of firms. Even if the productivity of individual firms does not change, productivity can substantially change due to changes in the market shares of firms with different productivity levels. These insights are difficult to obtain with more aggregated data.

The first component in Equation 3 reflects the extent to which productivity growth resulted from changes in firm-level productivity growth ($\Delta p_{f,t}$) for given market shares ($s_{f,t-1}$). The second component shows the extent to

which changes in firms' market shares explain productivity growth at a given productivity level. This effect is positive if, for instance, employment shares ($\Delta s_{f,t}$) are increasing for firms that are more productive than average productivity in the previous year ($p_{f,t} - P_{t-1}$). The third component interacts changes in firm-level productivity with changes in employment shares. This term is positive if firms with positive productivity growth increase their market shares. It is also positive if firms with negative productivity growth decrease their market shares. Analogously, it is negative if firms with positive (negative) productivity growth decrease (increase) their market shares. The final two components indicate the effects on productivity growth of firms that enter or exit markets. The entry effect will increase average productivity if new firms have higher-than-average productivity. Similarly, firms' exit will have a positive effect on overall productivity growth if the exiting firms have lower-than-average productivity.

As discussed in Section 2, a new firm with good business ideas and products and innovative production processes will have the opportunity to rapidly increase its productivity if the product market is competitive. If the firm enters the market with a superior technology or product, the increased competition may cause the exit of less efficient rivals, and the firm will take an increasing share of the market. However, if a new firm finds that its technology or product is not good enough to compete in the market, it will have to exit.

Both of these effects are clearly visible in Figure 4, which presents the results from our productivity decomposition for 1996-2009. Here, we see that more than half of the overall increase in the business sector's productivity originated from new firms. New firms that survive will gradually become more efficient than average and therefore will make a positive contribution to long-term productivity growth. As seen in Figure 4, entering firms' contribution to productivity growth exceeded that of incumbents (in firms that are active from 1996-2009). Hence, over the period studied, it is clear that new firms' entry is the main factor driving increased productivity in the Swedish business sector. This result is consistent with Sweden's lower entry barriers enhancing the creative destruction process. Increased entry also emerged as a result of Sweden's corporate tax reforms, which levied the playing field between entrants and incumbents by promoting new firm start-ups and, as we will see below, opening the economy to FDI.

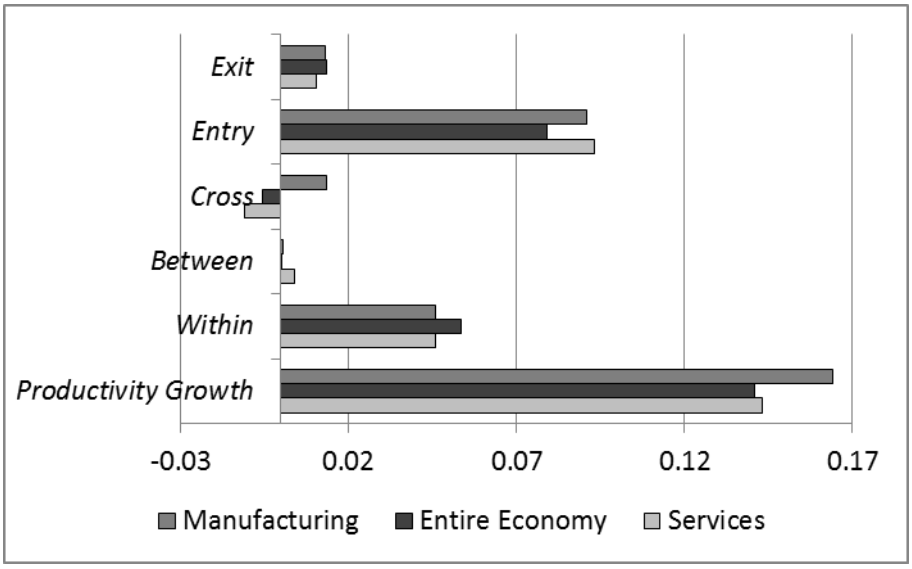

Figure 4: Labour productivity growth decomposition, 1996-2009

Figure 4 shows similar results for firms in the manufacturing and service sectors. The overall change in productivity between 1996 and 2009 appears to have been somewhat larger in the manufacturing sector than in the service sector. We also observe a positive cross-effect in the manufacturing sector. This result indicates that the established manufacturing firms that expanded increased their productivity (or that established manufacturing firms that reduced their productivity also experienced decreasing employment shares). Interestingly, this cross-effect is negative in the services sector. This result is consistent with the fast-growing nature of the service sector, where many expanding firms experience declining productivity during their growth phase.

Productivity and Wages

Allocative efficiency implies that high-productivity firms are able to attract workers from less productive firms. One obvious question is how the different reforms undertaken in the 1990s, as described above, affected the link between productivity and wages.

First, we examine the evolution of the estimated correlation coefficient between labour productivity and mean wages at the firm level. If the hypothesis that a more flexible labour market contributed to the Swedish recovery is valid, then we should at least see that wages and productivity in firms varied more closely over time. Stronger competition in the product market, an increasing share of foreign ownership and a levelled playing field between incumbent firms and smaller, growing firms should also promote a stronger correlation.

The 1996-2009 results are separately presented in Figure 5 for the manufacturing and service sectors. As seen in the figure, the relationship between productivity and wages is stronger in the service sector. For the manufacturing sector, we essentially observe zero correlation between productivity and wages at the beginning of the period, whereas the correlation is positive in the later period. One reason for the stronger relationship in the service sector is the higher labour share in service firms. Studying the dynamic pattern, it is clear that the correlation increased over the period for both services and manufacturing.

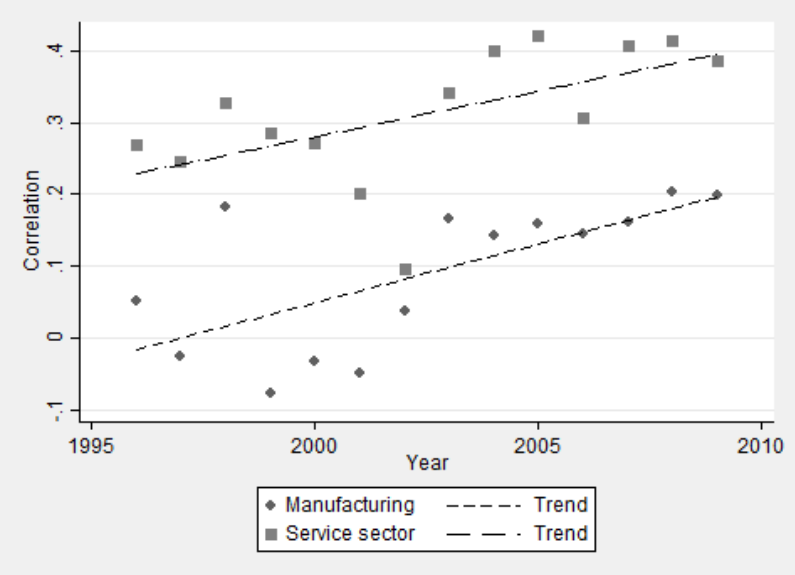

Figure 5: Correlation between productivity and average wages at the firm level, 1996-2009

The aggregate picture depicted in Figure 5 thus appears consistent with the view that the deregulation of the Swedish wage-setting system implied that productive and expanding firms found it easier to hire and reward productive employees. Is this result robust to applying a regression analysis at the firm level? To account for the

impact of firm-level heterogeneity and various other control variables, we have estimated regression models on our panel of firms. Cross-sectional estimations may suffer from biases because of omitted variables that may be correlated with the productivity measure.

To address this potential problem, we therefore estimate the following firm fixed-effect model to examine the relationship between productivity and mean wages from 1996-2009:

$$\left(\frac{Wages_{it}}{L_{it}}\right) = \delta + \varphi \log\left(\frac{Va_{it}}{L_{it}}\right) + X'_{it}\beta + \mu_i + \varphi_t + \varepsilon_{it} \quad (4)$$

The dependent variable is mean wages at firm *i* in period *t* (total wage costs divided by the number of employees). The primary explanatory variable of interest is value added per employee, $\frac{Va_{it}}{L_{it}}$, which is our measure of labour productivity. We also include a vector, *X*, of time-varying firm characteristics that might affect mean wages. These characteristics include capital intensity (the capital-labour ratio), firm age, firm age squared, and the share of high-skilled employees. All of the estimations also include firm fixed-effects, μ_i, to control for unobserved firm heterogeneity and year fixed-effects, φ_t, that control for common macro-level shocks that may affect firm-level wage and employment decisions. Finally, ε_{jt} is the error term. To allow for within-firm correlation over time, standard errors are adjusted for clustering at the firm level.

The results are shown in Table 1. Columns 1-3 show the basic results for the entire economy and for the manufacturing and service sectors separately. As shown in the first three columns, wages are positively and statistically significantly related to labour productivity. Based on within-firm variation, we observe a marginally stronger relationship in manufacturing than in services (columns 2 and 3).

Columns 4-6 in Table 1 show the results when we consider changes over time. *Va/L*Period2003–2009* is an indicator variable that is equal to one for 2003-2009 and zero otherwise. A positive and significant coefficient for this variable indicates a stronger labour productivity-wage relationship over that period, which is what we observe in column 4 for the entire private sector. The positive sign indicates a stronger relationship between wage changes and productivity changes at the firm level. Separating manufacturing and services, we note that this effect primarily originates from firms in the service sector (see columns 5 and 6). For firms in manufacturing, we observe a positive (although not statistically significant) effect. Therefore, it may be that a more flexible labour market is more important for productivity enhancement in more labour-intensive services. Here we note that an important part of the increasing importance of Sweden's service sector is composed of knowledge-based firms in the ICT sector. For these knowledge-based firms, we observe an increase in the relationship between wage changes and productivity changes.

Table 1: Productivity and wages; results from firm fixed-effect regressions for 1996-2009

	(1) All	(2) Manufacturing	(3) Services	(4) All	(5) Manufacturing	(6) Services	(7) Low	(8) High	(9) Low	(10) High
Value added per employee	0.183***	0.202***	0.173***	0.172***	0.198***	0.165***	0.166***	0.250***	0.155***	0.254***
	(0.010)	(0.020)	(0.011)	(0.011)	(0.025)	(0.013)	(0.010)	(0.023)	(0.011)	(0.029)
Va/L*Period2003-2009				0.026***	0.013	0.021***			0.026***	-0.001
				(0.007)	(0.020)	(0.008)			(0.007)	(0.021)
Firm age	0.026***	0.024***	0.027***	0.029***	0.028***	0.029***	0.027***	0.024***	0.031***	0.026***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
(Firm age)^2	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital intensity	-0.006***	0.020***	-0.007***	-0.006***	0.019***	-0.007***	-0.006***	0.017**		
	(0.001)	(0.007)	(0.001)	(0.001)	(0.007)	(0.001)	(0.001)	(0.007)		
Share high skilled	0.105***	0.197***	0.077***	0.099***	0.194***	0.072***	0.087***	0.123***		
	(0.008)	(0.016)	(0.009)	(0.008)	(0.016)	(0.009)	(0.010)	(0.012)		
Observations	398,031	97,914	248,656	398,031	97,914	248,656	240,007	156,760	240,007	156,760
R^2	0.266	0.296	0.247	0.258	0.292	0.238	0.262	0.284	0.253	0.279

Note: The dependent variable is mean wages at the firm level. Firm and year fixed effects are included in all estimations. Capital intensity is the capital-labour ratio. Share skill high is the percentage share of employees with a higher education. Low corresponds to sectors with average competition below the median competition 1996-2009. High corresponds to competition with sectors with average competition levels over the median in 1996-2009. Standard errors are adjusted for clustering at the firm level. ***. **. * show significance at the 1%, 5%, and 10% level, respectively.

Employment, Productivity and Firm Size

We now turn to an examination of how the Swedish restructuring process influenced the combined job and productivity dynamics process. Here, we apply a method for studying job dynamics introduced in seminal papers by Dunne et al. (1989) and Davis and Haltiwanger (1990, 1992). This method allows us to observe which type of gross job flows drive a given change in net employment by decomposing aggregate employment changes into their underlying components. Net employment change is defined as the difference between the jobs created in expanding and new firms and the jobs destroyed in shrinking and closing firms. Using this concept, we obtain measures of job creation, job destruction, and total job reallocation and observe how they are related to net employment changes. Because we are interested in job creation and value creation and how they interact, we also extend this method to productivity dynamics. See Appendix A2 for details on this methodology.

Above, we argued that labour and product market regulations and the structure of the tax system favoured large, incumbent firms over small, new firms. In the aftermath of deregulation, we would therefore expect employment to increase in small firms and decrease in larger firms. Other factors might also contribute to these changes. The introduction and development of ICT meant both that smaller firms could better compete in the market and that they could expand and hire.

We begin by examining job flows and net employment changes across five different firm-size classes: small firms are those with 3-9 employees, medium-sized firms are those with 10-49 or 50-199 employees, and large firms are those with 200-499 or more than 499 employees. Figure 6 depicts a clear negative relationship between firm size and the various job-flow components. Whereas there is a positive employment trend for small and medium-sized firms (net job creation is positive), there is a negative net employment change for the largest firms. Whereas small and medium-sized firms created approximately 300,000 jobs in the business sector from 1990-2009, large firms reduced employment by approximately 120,000 jobs (primarily during the crisis of the 1990s). Hence, from 1990-2009, small firms and especially the smaller medium-sized firms generated increased employment, which is a result in accordance with the discussion in Section 2.

These results also translate into a decreasing share of employment in large firms. The largest firms (with at least 500 employees) had an employment share of 35 percent in 1991. This share was reduced to approximately 30 percent in 2009. Moreover, the results show that smaller medium-sized firms (10-49 employees) increased their share from approximately 21 to 25 percent. This result implies that Sweden's firm-size distribution changed after the reforms, with a larger number of medium-sized firms. Braunerhjelm and Carlsson (1993) show that the number of small firms in the Swedish business sector decreased substantially compared to that of other industrialized countries during the 1970s and 1980s. Henrekson et al. (2012) show that in 2008, Sweden's firm-size distribution had again become more similar to those of other comparable EU countries.

Studying total job reallocation (the sum of job creation and job destruction), we note that the smallest firms (3-9 employees) had a job reallocation rate that exceeded 40 percent. This result can be compared to the 20-percent rate for firms with 11-49 employees and the below-10-percent rate for the largest firms. This result suggests large differences in job dynamics across firms of different sizes.[19]

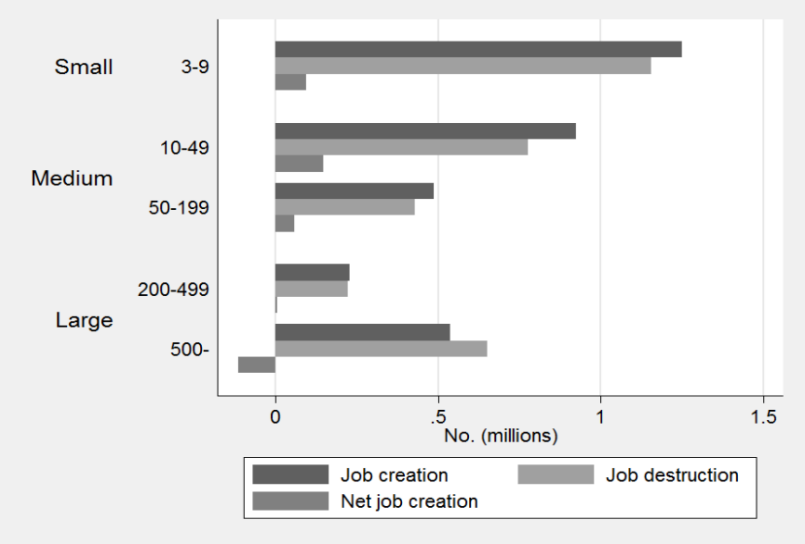

Figure 6: Gross and net job flows, separated by firm size (number of employees) and number of jobs (in millions), 1991-2009

To examine how firm-size differences are related to productivity, Figure 7 depicts the mean contribution of total labour productivity for each firm-size group from 1996-2009 using calculations based on the method developed to study job dynamics that is outlined in Appendix 2.[20]

Panel (i) of Figure 7 shows that the largest firms (with at least 500 employees) accounted for more than half of the total growth in value added per employee for firms with at least 10 employees. We also note that there are considerable differences in productivity growth between large firms and small firms in the manufacturing sector. The corresponding differences across firm size are much smaller in the service sector.

Panel (ii) of Figure 7 also depicts the job-flow dynamics for the same sample of firms and during the same period calculated using the same methodology. Similar to the results for 1990-2009 for firms with at least three employees, we see that employment growth was the strongest in small and medium-sized firms. Comparing panels (i) and (ii) in Figure 7, we see that whereas large firms accounted for the largest share of the creation of value added per employee, the largest firms (together with firms with 200-499 employees) were also the group with the fewest new net jobs created during the period. The strong productivity growth in the Swedish business sector contributed to higher incomes that increased the demand for services in the economy. The low capital intensity in the service sector also implies an increasing demand for labour in that sector. Figure 7 illustrates this increasing demand by showing that we primarily observe differences between large and small firms in the manufacturing

sector. Whereas we observe the highest productivity growth in the largest firms, we also see that this group of firms reduced their employment during the study period. Thus, the dichotomy between employment growth in small firms and productivity growth in large firms is the most pronounced in the manufacturing sector.

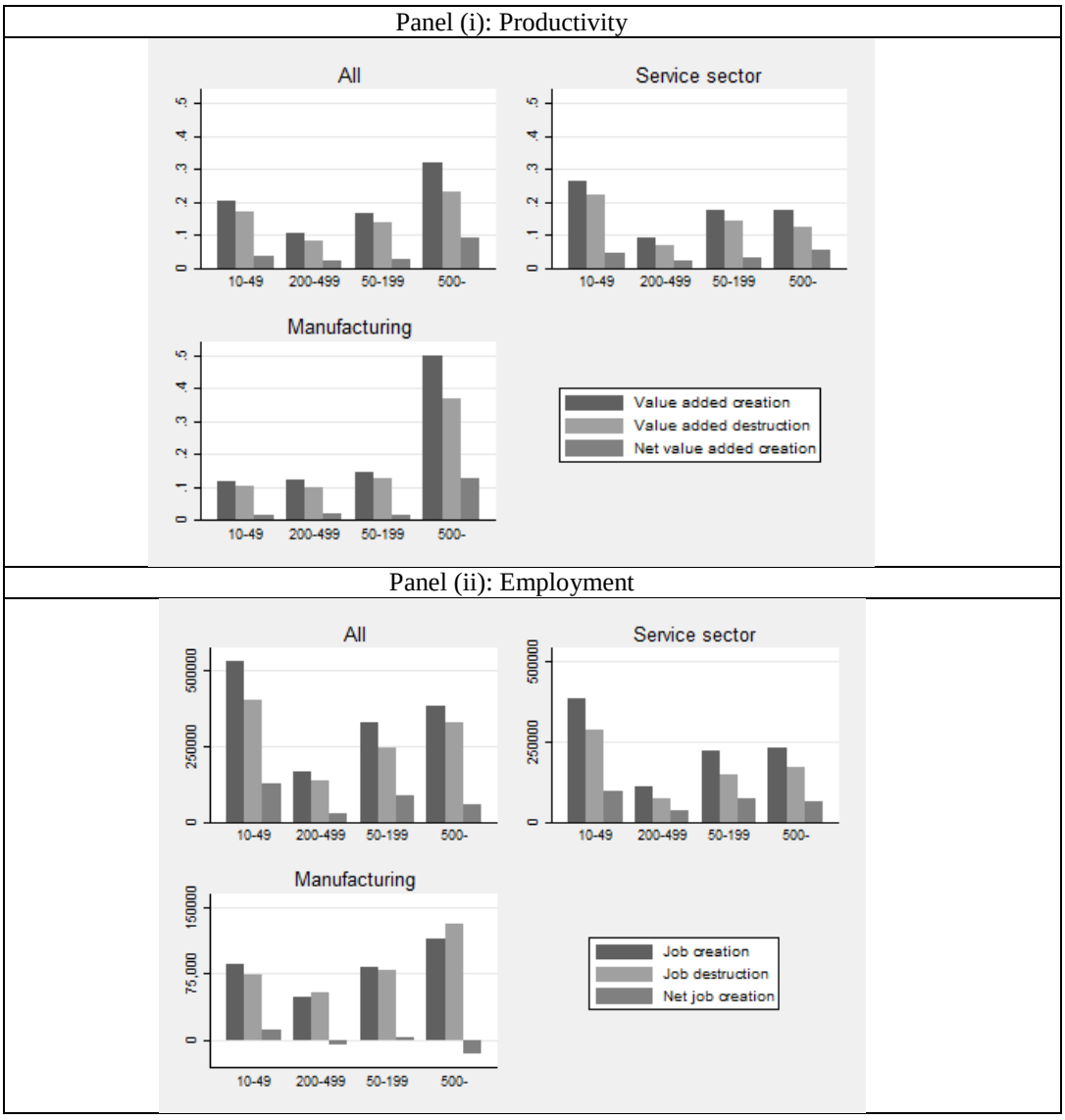

Figure 7: Productivity and job dynamics in the Swedish business sector separated by firm size and sector, 1996-2009; productivity is expressed in millions of SEK

Job Dynamics and Skilled Versus Unskilled Labour

Why do we observe this asymmetry between employment growth in small firms and productivity growth in large firms? We have noted that the reforms facilitated the entry of new, small firms and drove incumbent firms to become more efficient. The emergence of ICT in recent decades has also benefited small firms by making small-

scale businesses more profitable. For larger firms, incentives have emerged to pursue vertical differentiation and thereby to make smaller units more efficient.[21] In a market system without significant state intervention, large firms are able to focus on their core business and outsource parts of their operations to smaller domestic business units and foreign operators with lower costs. It is likely that small and large firms specialized in different activities both during the ICT revolution and in the presence of so-called skill-biased technological change. Large, incumbent firms should have then reduced their employment of less-skilled labour while improving their productivity by upgrading their technology and increasing their employment of skilled labour. Moreover, the increased income from higher productivity and the increased demand for services should promote employment growth in smaller firms, particularly in the service sector, in an economy with low barriers to entry.

To investigate these issues, we group employees into three categories: (1) workers with no more than 9 years of elementary education, (2) workers with 1-2 years of upper secondary education and (3) workers with at least 3 years of post-secondary education. Figure 8 shows the gross job flows separated by educational level and firm size. This separation of job flows across educational attainment is uncommon in the job dynamics literature, where essentially all of the evidence concerns the total number of jobs and does not distinguish between the types of jobs that are created and destroyed. [22] The figure also shows job creation (JC), job destruction (JD), net employment change for employees with different educational levels and how these measures vary with firm size.[23] A number of interesting observations emerge from the figure.

First, we see that essentially half of the total reduction in low-educated employees originated from the largest firms. The bulk of these lost jobs originated from large firms in the manufacturing sector. The corresponding reduction in the smallest firms is considerably lower.

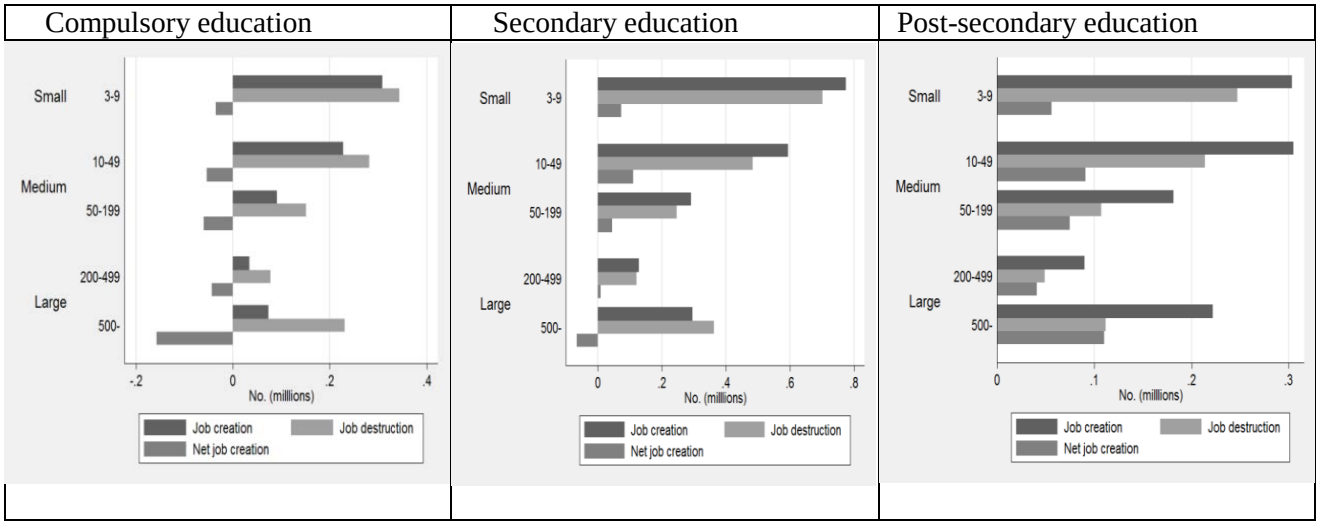

Figure 8: Gross job flows for individuals with only compulsory education, secondary education, and post-secondary education separated by firm size (number of employees); number of jobs (in millions), 1991-2009.

Turning to the medium educated (at most secondary education), we observe an increase in all size classes except for the largest firms. Finally, job flows for the highly educated show an increase for all size groups. However, the strongest growth is observed in the largest firms. Our results indicate that large firms experienced an increasing trend in the overall educational level of their workforce. From 1996-2009, the largest firms hired more highly educated employees while simultaneously reducing the number of workers with only compulsory or secondary educations. Increased opportunities for outsourcing created by the economic reforms described in Section 2 and the use of ICT in combination with skill-biased technological change likely facilitated large firms' efforts to concentrate on their core production activities and to outsource their other activities to small and medium-sized firms.

Overall, these results are consistent with the impact of the economic reforms described in Section 2 and the skill-biased technological change that resulted in differences in job dynamics across firm size, sector, and type of job.

Product Market Competition

The deregulation of the Swedish product markets should have implied that efficient firms expanded and inefficient firms were largely forced out of markets. Thus, the weak creative destruction problem in the Swedish business sector would have been mitigated.

Our next take on productivity and how strengthened competition policies have affected the Swedish creative destruction process is to first relate competition to the relationship between productivity and wages. The deregulation of Sweden's wage-setting system should have strengthened the relationship between productivity and wages. This effect should be stronger in low-competition industries because the creative destruction process should work sufficiently well in industries with intense product market competition.

A measure of product market competition

Competition has usually been measured using industry-level concentration ratios and firm-level measures of market power. However, product market competition is a concept that is not easily captured in a single empirical measure. The measurement issue is even more difficult because different changes in market conditions can have different implications for firm behaviour. Therefore, the appropriate measure of product market competition is context specific. In our case, we want to use a measure of competition that captures how severely the market punishes inefficient firm behaviour. To this end, we use a sophisticated measure of product market competition developed by Boone et al. (2007).

Based on the theoretical work in Boone (2008), Boone et al. (2007) derive an empirical measure of product market competition precisely along these lines. The starting point is that traditional measures of competition are theoretically invalid and that concentration ratios are of especially limited empirical value. The measure of

competition that they derive is based on the within-industry elasticity of profits with respect to marginal costs. The higher the absolute value of this elasticity, the fiercer the competition. In other words, the measure is based on an estimate of how much relative profits are reduced when there is an increase in firms' marginal costs. The measure of competition is generated by estimating the following model for each two-digit industry and year, using OLS:

$$\ln(\pi_{it}) = \beta_t \ln(AC_{it}) + \gamma_i + \theta_t + \varepsilon_{it} \quad (5)$$

Subscript i is a firm-level identifier and t indicates time period. Variable profits, π_{it}, are defined as value added less the total wage bill. Marginal costs are approximated by average variable costs, c, which are defined as the total wage bill plus the costs of variable inputs (sales less value added), divided by sales. Unobservable heterogeneity is taken into account by firm fixed effects, γ_i, and time fixed effects, θ_t. The absolute value of the estimated profit elasticity, β_t, is used as our time-varying industry measure of product market competition.

The resulting ranking of industries based on our measure shows that industries characterized by weak competition are primarily active on the domestic market, whereas industries exposed to tough international competition are active on markets characterized by strong product market competition.

Composition effects

The deregulation of Swedish product markets and the strengthening of competition policies would have led to the expansion of new efficient firms and the exit of inefficient firms from markets. We analyse these effects by investigating transition probability matrices of labour productivity across years and relate these to differences in competition. Does product market competition influence firms' mobility across different parts of the productivity distribution? For each year, we divide the firms into four quartiles based on industry-adjusted productivity. Group 1 includes the 25 percent of firms with the lowest productivity; whereas group 4 includes the 25 percent of firms with the highest productivity. Next, we compute transition probability rates for the productivity distribution among different years.[24] The results are presented in Table 2, showing results for 2003-2009.[25] The table shows the transition patterns separately for firms in industries below and above the median product market competition.

Table 2: Transition matrix for labour productivity 2003-2009, separated by product market competition. 1=Low competition (sectors with average competition below median competition 1996-2009). 2=High competition (sectors with average competition over median competition 1996-2009).

1 Low competition					
	2009				
2003	1	2	3	4	Total
1	605	423	215	123	1366
2	308	906	653	205	2072
3	198	548	1177	688	2611
4	136	191	671	2358	3356
Total	1247	2068	2716	3374	9405

1 Low competition					
	2009				
2003	1	2	3	4	Total
1	**0.44**	0.31	0.16	**0.09**	1
2	0.15	**0.44**	0.32	0.1	1
3	0.08	0.21	**0.45**	0.26	1
4	**0.04**	0.06	0.2	**0.7**	1

2 High competition					
	2009				
2003	1	2	3	4	Total
1	632	417	189	60	1298
2	549	832	449	113	1943
3	306	572	707	276	1861
4	108	173	382	681	1344
Total	1595	1994	1727	1130	6446

2 High competition					
	2009				
2003	1	2	3	4	Total
1	**0.49**	0.32	0.15	**0.05**	1
2	0.28	**0.43**	0.23	0.06	1
3	0.16	0.31	**0.38**	0.15	1
4	**0.08**	0.13	0.28	**0.51**	1

We first note that regardless of the degree of competition, firms tend to remain in the same quartile of the labour-productivity distribution in which they started. For instance, in the low (high) competition group, we see that 44 (49) percent of the firms that began in the lowest productivity quartile remained there six years later. The corresponding figures for firms in the highest productivity quartile are 0.7 and 0.51, respectively.

The latter figures indicate that persistence over time is much smaller for firms in the highest quartile if they are active in a high-competition environment. This is also the case in the second-highest quartile, where the probability of a firm belonging to that group six years later is lower if the firm is active in a high-competition environment. We also see that it is more difficult for a firm to move from the lowest to the highest or second-highest productivity quartile if competition is high. Similarly, high competition also implies a higher risk of moving move from the top to the bottom of the productivity distribution.

We have also analysed how competition is related to the evolution of new firms. Unreported results show that tougher competition is positive for overall productivity because it affects which firms survive and which firms exit. In markets with high productivity, we see that the best firms in terms of relative productivity survive and

grow while firms in the bottom part of the productivity distribution exit. The likelihood of market survival as a low-productivity firm is basically halved if the firm is active in a high-competition industry.

Competition and the relationship between productivity and wages

To determine how product market competition is connected to the relationship between productivity and wages, we re-estimate the models in Table 1 above for different product markets. We divide firms into two groups according to mean competition during the period.

The results from the low- and high-competition groups are presented in columns 7 and 8. Comparing the results for these two groups, we observe a significantly higher productivity-wage relationship in markets with higher competition. If we instead focus on the development over the period studied, then the results indicate interesting catch-up effects. It is only in the low-competition group that we witness a strengthening of the relationship between productivity and wages over time (see columns 9 and 10). These results indicate that although the association is generally higher in markets with relatively high product market competition, the changes in Sweden led to a strengthened relationship between productivity and wages in firms belonging to relatively low-competition industries.

The Liberalization of Foreign Direct Investment

One of Sweden's major reforms was to lift restrictions on foreign ownership. This reform led to remarkably strong employment growth in foreign-owned affiliates in Sweden between 1980 and 2013, when nearly 25 percent of workers were employed by a foreign-controlled firm. In Section 2, we also argued that the increase in foreign ownership represented a much-needed injection to boost productivity in the business sector because a much larger pool of potential owners became available.

A caveat is that foreign acquisitions (and domestic acquisitions) in concentrated markets may occur for market power reasons, particularly for high-quality target firms.[26] If such acquisitions are dominated by foreign takeovers of Swedish firms, their productivity effects could be small or even negative. However, even if inefficient acquisitions occur, the requirement that an acquisition must be profitable limits the possibility of value-destroying takeovers. Moreover, market-power-driven acquisitions should also be subject to scrutiny based on the new competition law, which should make such acquisitions less frequent.

The impact of foreign acquisitions of Swedish firms on productivity in the Swedish business sector is an empirical question. In the next section, we therefore explore productivity effects of foreign ownership and foreign acquisitions. We also attempt to measure the impact of foreign ownership on aggregate productivity to assess the magnitude of the contribution of foreign ownership and increased globalization on productivity growth in Sweden.[27]

Empirical Strategy

The foreign firms that are used to analyse the impact of foreign ownership are subsidiaries established before 1996 either as start-ups or as greenfields during the given time period or through acquisitions of Swedish firms. Differences in labour productivity between foreign-owned firms and Swedish-owned firms might arise because foreign firms acquire ("cherry pick") high-quality Swedish firms. To account for the problem of foreign-owned firms cherry picking productive Swedish firms as targets for acquisitions and to control for unobservable firm characteristics, we estimate firm fixed-effect regression models. These models estimate the average effect of the change from Swedish to foreign ownership on productivity. Making specific assumptions about firms' technology (i.e., that firms use a so-called Cobb-Douglas production function) and the fact that firms compete in an oligopoly (for example, through Cournot competition), one can derive the following equation:

$$\log\left(\frac{VA_{it}}{L_{it}}\right) = \gamma Acq_{it} + \varphi \log\left(\frac{K_{it}}{L_{it}}\right) + \psi \log(L_{it}) + \vartheta Share\_skilled + \mu_t + \phi_i + \varepsilon_{it}. \qquad (6)$$

The dependent variable in Equation (6) is value added per employee in firm *i* at time *t*. *Acq* is an indicator variable that takes the value of one in the period when an ownership change is recorded and thereafter. In Equation (6), we control for a firm's capital intensity and size in terms of employment using logs. The share of skilled workers, which is defined as the percentage share of employees with higher education, is added as an additional control. Because all of these variables can be endogenous to takeovers, we present specifications both with and without these controls. Finally, $\mu_t + \phi_i$ represents time and firm fixed effects, and ε_{jt} is the error term. To allow for within-firm correlation over time, standard errors are adjusted for clustering at the firm level.

The firm fixed effects control for unobserved heterogeneity. However, firms that change ownership may already be developing differently before a takeover relative to firms that are not acquired.[28] Our approach to this problem is to address the issue of potentially omitted variables that may be related to the likelihood of being a takeover target. For this purpose, we exploit the fact that not all of the acquisitions occurred during the same period. Using the "staggered" nature of the data, we can compare estimates from the full sample of firms to estimates obtained when we remove from the sample all of the firms that were never takeover targets. Because identification in both cases comes from within-firm variation, the difference between the two approaches lies in the choice of the control group.[29] If takeover targets as a group have different observable and unobservable characteristics than other firms, using the target sample would provide a better estimate of the actual takeover effect, provided that the characteristics are not time varying.

Thus, our foreign acquisition specifications are estimated on the sample of Swedish firms that were acquired by a foreign firm at some point between 1996 and 2009.[30] This approach implies that the identification of the effect of foreign ownership stems from the variation within firms over time. In this "difference-in-difference"

approach, the estimated coefficient, $\hat{\gamma}$, indicates *the average difference in the change in labour productivity that occurs in a Swedish firm after a change to foreign ownership*.

In addition, to estimate Equation (6), we conduct an "event analysis". Here, we undertake a before-and-after analysis to assess whether the timing of events is consistent with takeovers as the driving force. We investigate the effect of the takeover after one, two, and three years or more. To this end, we include a dummy for the year of the takeover, *Acquisition t = 0*, and three dummies that capture the periods after the change of ownership. *Acquisition t+1* is a dummy for the period after the takeover, *Acquisition t+2* is a dummy for two periods after the takeover, and *Acquisition>t+2* is a dummy that takes the value of 1 for three periods or more after the takeover. In all of our regressions, we also distinguish between Swedish local firms and Swedish parent multinational enterprises (MNEs).

Results

The unreported results when estimating the effects of foreign ownership without firm fixed effects shows that the average difference in labour productivity between a foreign-owned firm and a Swedish-owned firm is approximately 11 percent. Distinguishing between Swedish local firms and Swedish multinationals, we naturally find a larger difference between foreign-owned firms and Swedish local firms (approximately 13 percent) than between foreign-owned firms and Swedish multinationals (approximately 4 percent). This foreign productivity premium suggests that the surge in foreign direct investment in Sweden during the last two decades had a significant impact on productivity growth.

Turning to the results of Equation (6), we find that, on average, labour productivity increased by approximately 3 percent when a company transfers from Swedish to foreign ownership. We find that this effect is completely driven by local Swedish firms without any foreign operations being taken over by foreign firms. When we examine the effect of foreign acquisition of Swedish multinationals, we find no statistically significant effect. This result seems to be consistent with the theory described in Section 3 because synergies may be more easily generated when a MNE takes over a local firm than when two MNEs merge.

In unreported regressions, we repeated the analysis of foreign ownership and foreign acquisition on other performance measures such as average wage and employment. The results are consistent with those reported in Table 3, which indicates the existence of a significant wage and employment premium when considering both average differences and the average change after an acquisition. Thus, foreign ownership and acquisition also appear to have contributed to higher employment and wages, which is what we would expect if foreign firms provide new knowledge, better management, and better products and production methods.

The results from the "event analysis" are presented in columns 7-9. These regressions show whether the timing of events is consistent with takeovers being the driving force. The results show no instant effect of a takeover but instead show an effect that increases over time.

Table 3: The impact of foreign ownership and foreign acquisitions on Swedish firms, 1996-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All firms	All firms	Vs local firms	Vs local firms	Vs MNEs	Vs MNEs	All firms	Vs local firms	Vs MNEs
Acquisition	0.021**	0.025***	0.022**	0.029***	0.019	0.023			
	(0.009)	(0.009)	(0.010)	(0.010)	(0.021)	(0.020)			
Acquisition *t*=0							-0.002	-0.003	-0.033
							(0.010)	(0.011)	(0.024)
Acquisition *t*+1							0.031***	0.035***	-0.027
							(0.011)	(0.013)	(0.029)
Acquisition *t*+2							0.036***	0.037**	-0.003
							(0.013)	(0.015)	(0.031)
Acquisition >*t*+2							0.067***	0.085***	-0.025
							(0.015)	(0.017)	(0.040)
Log(Capital intensity)		0.073***		0.071***		0.067***	0.103***	0.098***	0.119***
		(0.007)		(0.008)		(0.017)	(0.005)	(0.006)	(0.012)
Log(Firm size)		-0.111***		-0.098***		-0.137***	-0.013***	-0.036***	-0.008
		(0.012)		(0.014)		(0.028)	(0.005)	(0.006)	(0.013)
Share skill high		0.019		0.070		-0.008	0.650***	0.633***	0.856***
		(0.056)		(0.061)		(0.238)	(0.023)	(0.027)	(0.077)
Observations	42,911	41,969	31,552	30,804	6,933	6,891	41,969	30,804	6,891
R-squared	0.030	0.057	0.032	0.057	0.040	0.066	0.131	0.135	0.154

Note: The dependent variable is the logged value added per employee. The reference group consists of Swedish firms; "All", "MNEs" (multinational domestic firms), or "Local" (non-multinational domestic firms) . Acquisition takes the value of 1 in the acquisition period and thereafter, 0 before. Acquisition *t*–2 takes the value of 1 two years prior to the acquisition and 0 otherwise. The other Acquisition *t*+/– variables are defined accordingly Capital intensity is the capital-labour ratio. Share skill high is the percentage share of employees with a higher education. All regressions include firm and year fixed-effects. Standard errors are adjusted for clustering at the firm level. ***, **, and * show significance at the 1%, 5%, and 10% level, respectively.

Aggregate effects

How important have foreign firms been for aggregate productivity growth? We can now use the decomposition method developed by Foster et al. (2001) and extend it to also distinguish between Swedish and foreign firms. Thus, we compare the different components that contribute to productivity growth, but we then decompose each component into a Swedish part and a foreign part. The results are shown in Figure 9. It is clear that foreign-owned firms contributed more to productivity growth than domestic Swedish firms. In fact, both the within-firm increase in productivity and the productivity increase from entry are almost twice as large for foreign-owned firms compared to Swedish-owned firms. The reason that the overall difference in productivity growth is smaller is that the cross effect is negative for foreign-owned firms. However, as explained above, this result may be caused by significant expansions of foreign firms where the productivity in the expansionary phase is below average as the firm is built up.

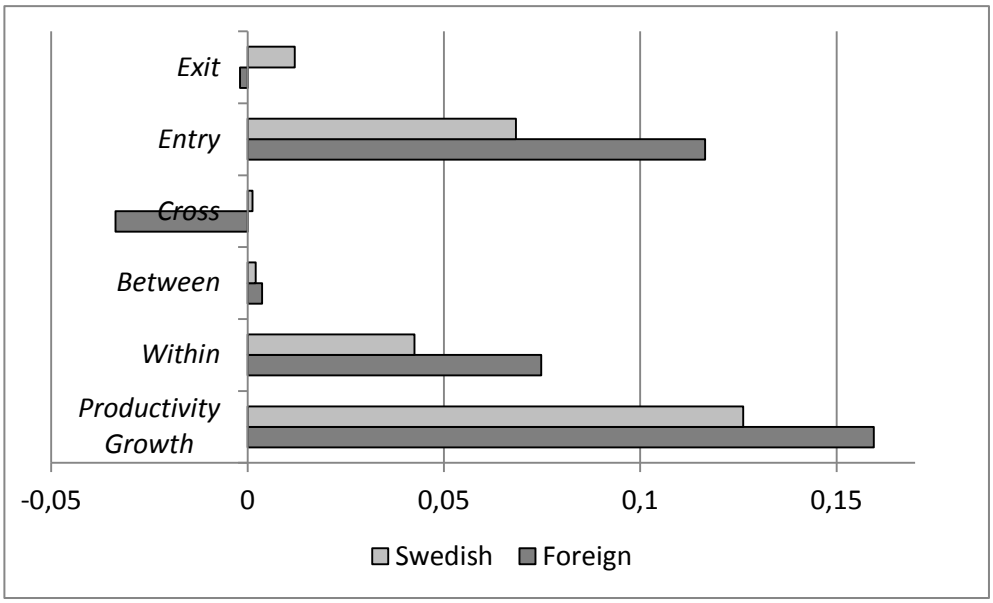

Figure 9: Labour productivity growth decomposition for the entire economy separated by ownership status, 1996-2009

5. CONCLUSION AND POLICY DISCUSSION

As described above, the Swedish industry was lagging behind in the 1970s, 1980s and early 1990s. In the mid-1990s, however, the performance of Swedish industry turned around and productivity and job growth took off to basically continue until 2008 (the beginning of the financial crisis). Building on the described characteristics of the policy reforms in Sweden and the observed patterns of job and productivity dynamics during the period, we have argued that the reason for the turnaround in the performance of the Swedish business sector was that fundamental market and political failures were mitigated through a set of policy reforms that were initiated in the late 1980s but mostly implemented in the 1990s.

The problem with the abuse of dominance by politicians, incumbent firms, and unions was severely mitigated by the tax reforms, the opening up for FDIs and the decentralization of wage bargaining. Thus, Sweden went from having one of the most regulated business sectors in the developed world in the late 1980s to having a below-average level of regulation in 2000 (Edquist and Henrekson, 2013).

Why more than just catching up? The above-described process suggests that deregulating the business sector in one of the most regulated countries in Europe to an average level could explain part of the turnaround in Sweden. However, why has Sweden in the last decade not only caught up with the EU average but also outperformed almost all other countries in terms of productivity growth and employment growth in the business sector?

One possible explanation is that Swedish firms have made more efficient investments in R&D and ICT. Investments in intangibles including software, R&D, mineral exploration, copyright and licensing costs, development in the financial industry, design, brand equity, vocational training, and organizational structure have been important in Sweden. According to Edquist (2011), intangible investments constituted almost 10 percent of GDP and accounted for nearly 30 percent of labour productivity growth in the business sector in Sweden from 1995-2006.

The inflow of FDIs to Sweden has also been extraordinary. This has meant that an increasing number of firms in Sweden are foreign-owned and an increasing number of employees work in foreign-owned firms. There were approximately 13,500 foreign-owned firms with 630,000 employees in 2013, according to the Swedish Agency for Growth Policy Analysis (Tillväxtanalys, 2014). In comparison, in 1980 there were only 150,000 employees in foreign-owned firms. FDIs have not only created employment and increased productivity in the target firms but also had indirect dynamic effects that also seem to have been important. For example, the Wallenberg group held controlling positions in companies accounting for 42 percent of the Stockholm Stock Exchange's market cap in 1998. By November 2010, their control had declined to 17.1 percent of the total market cap. Between 1999 and 2009, Investor almost trebled the share of its portfolio in new growth markets while scaling back on its more traditional investments, through which it controlled a few very large firms. Of these growth investments, 62 percent went to the Nordic region. Thus, the deregulation of FDIs in Sweden seems to have both created synergies in acquired target firms and generated financial capital for entrepreneurial firms in growth markets. Moreover, the possibility of selling successful ventures to large foreign incumbent firms such as Microsoft may have been a driver of the vibrant Swedish start-up market in new service sectors, in computers, and in the Internet and computer games. Prominent examples of such Swedish tech start-ups that have been sold at astronomic sums include SKYPE and World of Warcraft. Network effects in these businesses then create synergies when large foreign incumbents obtain new products from smaller firms. Bidding competition for the target firms creates huge gains for these sellers; those gains are then invested into new projects. This internationalization of industry seems to have been both particularly large and efficient in Sweden compared to in most other European countries.

We would also like to highlight a less researched but probably important reason for why Swedish firms perform better than firms in other countries: the favourable business and within-firm culture, which to a large extent is country-specific. We find that trust levels in Sweden are very high in general and that this high trust is likely to mitigate hold-up problems in firms (Bergh and Bjornskov, 2011).[31] Moreover, the combination of high levels of trust and low power distance in Swedish firms should spur intrapreneurship because employees have the opportunity to exploit entrepreneurial ideas within their firms.[32] This could partly explain the high productivity growth in large Swedish firms during the period studied. Moreover, during periods of rapid technological change, such intrapreneurship might have been of special importance. Indeed, Bosma et al. (2013) find that Sweden has high levels of intrapreneurship in large firms. However, it should also be noted that a lack of incentives might

distort work-ethic norms, as shown by Lindbeck, Nyberg and Weibull (1999). Thus, sufficiently strong incentives for investment and work, combined with an efficiency-oriented business culture, seem to create a stable system for wealth creation.

The reforms that Sweden undertook after the crisis also included other measures. Monetary policy was changed so that price stability began to be targeted by an independent central bank using a floating exchange rate. As interest rates fell and the Krona depreciated in the mid-1990s, demand and exports increased. Causally sorting out which factors were most important—the "micro reforms" that we stress restored incentives and the functioning of markets versus a "macro" story of a depreciating exchange rates resulting in export-led growth—is of course difficult to accomplish. In this respect it is interesting to compare Sweden's development with that of Finland, which was also badly hit in a recession largely caused by the collapse of its trade with the Soviet Union. Until 2007, Finland's economy grew rapidly at about the same rate as Sweden after its 1990s recession. That high growth in both Finland and Sweden compared to other EU-15 countries is consistent with the view that both countries have relatively efficient institutions with regard to their business sectors. Indeed, Finland ranked number 9 (third among the EU-15) and Sweden number 11 (fourth among the EU-15) in the 2015 World Bank Doing Business index ranking. The methods of achieving these ranking positions are, however, different. Finland did not over-regulate its business sector in the 1970s and 1980s to the same extent as Sweden did. Consequently, Finland did not pursue the far-reaching reforms of the business sector that Sweden undertook after the early 1990s. Finland's less reform-oriented path in recent decades may explain why Finland was hit harder than Sweden by the recent financial crisis. A competing explanation is that Sweden—unlike Finland—did not adopt the Euro and that this explains the better performance of the Swedish business sector.

Holmström et al. (2014) show that the hourly compensation of Finnish employees was broadly similar to that of Swedish employees both before and after the financial crisis. However, they also find that changes in the Krona-Euro exchange rate reflected a fall in Swedish Euro-denominated compensation per hour in 2008-2009, as the Krona depreciated against the Euro, and then that it increased faster in Sweden than in Finland as the Krona appreciated. While this suggests that the Swedish export sector was helped by the depreciation during the start of the financial crisis, Holmström et al. (2014) stress that Finland's problem was really the collapse of the value of output (i.e., nominal gross value added), measured per hours worked because of the contraction of the high-margin electronics industry. Moreover, they show that Finland's business sector was less diversified than the Swedish one, primarily relying on two sectors for productivity growth in its heyday: electronics and metals. In Finland, service sector growth has been slow compared to in Sweden. Indeed, Sweden's recovery from the recession was not based on manufacturing, but instead on the strong growth impact of the service sector. This indicates that Sweden's recent business-sector reforms have implied that the Swedish economy has become more dynamically efficient than the Finnish economy.

What, then, can other countries learn from the Swedish example? We believe that our study of the Swedish experience of industrial reorganization in the 1990s can be a valuable case study for crisis response. It can be an

important example of how an economy experiencing a profound crisis can respond and recover by undertaking economically sound industrial reforms. Furthermore, by comparing insights of economic theory to actual restructuring process patterns, we believe that we can provide valuable knowledge about the economic forces behind creative destruction. This can potentially provide solid ground for policy discussions, particularly those related to how Europe can improve its competitiveness and employment levels.

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APPENDIX

A1: Table A1, Variable definitions

Firm variables:	
Capital Intensity	Net property, plant and equipment/employees (in 1995 SEK)
Firm size	Number of employees
Share low skilled	Number of high-skilled workers with no more than 9 years of compulsory schooling /employees
Share median skilled	Number of high-skilled workers with upper secondary school/employees
Share high skilled	Number of high skilled workers with at least 3 years of post-secondary education)/employees
Labour productivity	Value added/employee (in 1995 SEK)
Average wage	Average wage per employee, incl. payroll tax (in 1995 SEK)
Foreign ownership	Dummy=1 if > 50 percent of a firm's votes are foreign owned.

A2: DEFINITIONS OF MEASURES OF JOB AND PRODUCTIVY DYNAMICS

Job flows

In this framework, net employment changes at firm *f* in period *t* can be decomposed into two types of gross job flows: Job Creation (*JC*) and Job Destruction (*JD*):

$$JC_{ft} = Eft - E_{ft-1} = \Delta E_{ft} \ om \ \Delta E_{ft} > 0 \quad \text{(A1)}$$

$$JC_{ft} = E_{ft} - E_{ft-1} = \Delta E_{ft} \ om \ \Delta E_{ft} < 0 \quad \text{(A2)}$$

where E_{ft} is the number of employees in firm *f* at time *t*. *JC* is calculated as the sum of employment gains in new firms or expanding employment in existing firms. Correspondingly, *JD* is calculated as the absolute sum of employment losses in contracting firms or exiting firms. We can now based on (A1) and (A2) calculate the total job creation and job destruction in a specific year *t* as:

$$JC_t \sum \Delta E_{ft} \quad om \ \Delta E_{ft} > 0 \quad \text{(A3)}$$

$$JC_t \sum \Delta E_{ft} \quad om \ \Delta E_{ft} < 0 \quad \text{(A4)}$$

The sum of job creation and job destruction is job reallocation, which measures the total number of jobs reallocated. The difference between job creation and job destruction is equal to the net employment change. To express the job flow measures as rates, we divide by average firm size in periods *t* and *t-1*, defined as $X_{eft} = \frac{E_{ft}+E_{ft-1}}{2}$, implying a total employment, X_t, equal to $X_t = \sum_{ef} X_{ft}$.

We can now define job creation and job destruction rates as job creation (destruction) divided by average employment:[33]

$$JCR_t = \left(\frac{1}{X_t}\right)\left[\sum_e \Delta E_{ft}\right] om \ \Delta E_{ft} > 0 \quad (A5)$$

$$JCR_t = \left(\frac{1}{X_t}\right)\left[\sum_e \Delta E_{ft}\right] om \ \Delta E_{ft} < 0 \quad (A6)$$

implying a job reallocation rate, JRR, equal to $JCR_t + JDR_t$ and a net employment rate, Net_t, equal to $JCR_t - JDR_t$.

Productivity dynamics

Here we describe an alternative approach to analyse productivity dynamics, analogous to the job flows approach described above. Let VA_{ft} be value added of firm *f* at time *t*. Let L_{ft} be the number of employees in firm *f* at time *t* and $\bar{L}_{ft}$ average firm size in period *t* and *t-1*, defined as $\bar{L}_{ft} = \frac{L_{ft}+L_{ft-1}}{2}$. We then define firm *f*:s share of total employment in year *t* as $\bar{s}_{ft} = \frac{\bar{L}_{ft}}{\sum_{f \in I} \bar{L}_{ft}}$, where $\sum_{f \in I} \bar{L}_{ft}$ is the total employment in year *t* calculated from average employment between years *t* and *t-1*. Firm *f*:s value added per employee in year *t* is $p_{ft} = \frac{VA_{ft}}{L_{ft}}$. The change in value added per employed person between *t* and *t-1* is then $\Delta p_{ft} = p_{ft} - p_{ft-1}$. The change in the employment weighted average productivity can with this approach be expressed as

$$\Delta P_t = \sum_{f \in I} \bar{s}_{ft} \, \Delta p_{ft} \qquad \text{(A7)}$$

The change in average productivity in (A7) can now be decomposed into firms that increase their value added per employee and to those that decrease theirs:

$$VC_t = \sum_{f \in I} \bar{s}_{ft} \, \Delta p_{ft} \qquad \text{om } \Delta p_{ft} > 0 \qquad \text{(A8)}$$

$$VD_t = \sum_{f \in I} \bar{s}_{ft} \, \Delta p_{ft} \qquad \text{om } \Delta p_{ft} < 0 \qquad \text{(A9)}$$

$$NV_t = VC_t - VD_t = \sum_{f \in I} \bar{s}_{ft} \, \Delta p_{ft} \qquad \text{(A10)}$$

To examine how, for instance, firm size affects the evolution of productivity, three calculations are made for each firm size category. These are as follows: created average value added per employee (*VC*) from equation (A8), destroyed average value added per employee (*VD*) from equation (A9), and average net change in value added per employee, i.e., average productivity change, from equation (A10).

[1] See Acs and Audretsch (2005), Caves (1998), Santarelli and Vivarelli (2007) and Sutton (1997) for an overview of the literature on market structure and firm dynamics. The literature was initiated by Gibrat (1931), and its point of departure was the fact that firm growth was determined by random growth shocks; the analysis lacked maximizing agents. The 1970s saw growth in the literature introducing dynamic firm growth processes within frames of analysis with maximizing agents. See, e.g., Audretsch (1991), Bartelsman et al. (2005), Ericson and Pakes (1995), Hjalmarsson (1974), Hopenhayn (1992), Klepper (1996), Jovanovic (1982) and Luttmer (2007). See also Nelson and Winter (1982) for an analysis of firm growth processes with bounded rational decision makers.

[2] See Besanko et al. (2003) for an overview.

[3] The free-rider problem implies that actors do not dare invest in development and hard work because they then risk having competitors benefit from the returns to these investments.

[4] The literature that addresses firm formation and size was founded by Coase (1937) and was further developed by Williamson (1979). Grossman and Hart (1986) and Hart and Moore (1990) then developed formal frames of analysis to study these questions; they focus on how the division of ownership affected the different stakeholders' incentives to invest in a firm's development. See Rajan and Zingales (2001) for an application to entrepreneurship and enterprise development. See "Part One: Firm boundaries" in Besanko et al. (2003) for an overview.

[5] Bloom and Van Reenen (2007) find that firms with higher management quality are more productive; they argue that the lower aggregate productivity in the UK and France compared to the US can be explained by a lower level of competition in the UK and France where, in the absence of competitive pressure, inefficient firms are not forced out of the market. Bertrand and Schoar (2003) follow individuals that have been CEOs at different companies and show that CEO quality has an effect on these firms' profitability. Other studies that show the connection between competent leadership and high productivity are Lazear (2000) and Bandiera et al. (2007 and 2009).

[6] See Gibbons and Roberts (2013) and Murphy and Topel (1990) for an overview.

[7] Ilmakunnas et al. (2004) use Finnish data and show that productivity increases with employees' education level and age. Fox and Smeets (2011) show that there remain large differences in productivity among firms when they control for education levels, gender, work experience, and employment duration. Thus, labour-force quality explains some—but by no means all—differences in productivity among firms.

[8] The findings in Van Ark, O'Mahony and Timmer (2008) suggest that the slower productivity development in the EU compared to the US can partly be explained by lower investments in ICT.

[9] Indeed, Maksimovic and Phillips (2001) show both that a large share of the plants in the US manufacturing industry change owners each year (up to 7 percent in some years) and that these plants experience increased productivity.

[10] The Swedish Agency for Growth Policy Analysis presents new data showing that the contribution of the ICT sector and ICT investments between 1995 and 2005 amounted to 32 percent of the Swedish economy's total productivity growth (Tillväxtanalys (2014). According to Edquist (2011), intangible

investments constituted almost 10 percent of GDP and accounted for nearly 30 percent of labour productivity growth in Sweden's business sector from 1995 to 2006. Using a large panel of Swedish firms for 1992-2000, Oh, Heshmati and Lööf (2012) establish that the Swedish economy's long-run productivity growth improved from among the weakest to one of the strongest in the OECD. It is found that the improved growth rate, which initially began in large exporting manufacturing firms, spilled over to the rest of the economy, both in manufacturing and services.

[11] See Lindbeck et al. (1994).

[12] Labour turnover costs can take a wide variety of forms, including costs arising out of insiders' attempts to resist wage competition from outsiders by either refusing to cooperate with them or harassing them. The theory then shows that these costs are, at least in part, borne by the employers; thus, these costs give incumbent workers power in the labour market.

[13] See, e.g., Davidson et al. (2014) and Hakkala et al. (2014) for recent articles based on the data.

[14] See Andersson and Arvidsson (2011) for details on the FAD data.

[15] Another measure of productivity is Total Factor Productivity (TFP). Studies that use both labour productivity and TFP typically find similar results regardless of the measure used (see, for instance, Bartelsman and Doms (2000) and Syverson (2011) for discussions of different productivity concepts).

[16] Note that productivity data for all firms are only available for 1996-2009.

[17] See, e.g., Foster el al., 2001, for details. One advantage of their cross-sectional decomposition method is that cross-sectional productivity differences are more persistent and possibly less sensitive to measurement errors and temporary shocks. The Olley and Pakes approach also does not depend on how the entries and exits of firms are measured. Note that the Olley and Pakes covariance term is equal to the difference between the weighted and the unweighted average productivity so that the exact magnitude of the efficiency term depends on how productivity is calculated. In our analysis, productivity is measured in 1995 Swedish kroners (SEK).

[18] The results are qualitatively similar when we use Griliches and Regev's (1995) alternative decomposition method.

[19]In terms of number of jobs, the results show that the smallest firms' share of the total job reallocation was higher than their employment share. The opposite is true for job reallocation in the largest firms.

[20]We first calculate an employment-weighted measure of created value added per employee for each firm-size class stemming from increased productivity from continuing firms or through the entry of new firms. We label this component *VC* ("Value Creation"). Correspondingly, *VD* ("Value Destruction") is equal to the reduced value added per employee in each firm-size class that stems from firms becoming less productive or from destroyed value added per employee through a firm's exit. Next, we calculate an employment-weighted measure of net labour productivity for each firm-size group, *NV*, which is defined as $NV = VC - \text{VD}$. This measure amounts to the difference between the created and destroyed value added. Details on these calculations are presented in the Appendix.

[21] See Anderman and Schmidt (2007).

[22] One exception is Gartell et al. (2010).

[23] The results in Table 18 are shown in terms of number of jobs. They are qualitatively the same when using shares instead of number of jobs.

[24] On a more general level, previous research has documented a high degree of persistence in productivity over time (see, e.g., Baily et al. (1992) and Faggio et al. (2010). These studies do not, however, consider how product market competition affects the composition of firms in terms of the overall productivity distribution.

[25] We have also calculated transition matrices for other periods to take into account differences in business cycle conditions, for instance. The results are not affected by the choice of time periods.

[26] See, e.g., Norbäck and Persson (2008).

[27] In this study, we do not track workers' movements between firms to analyse assortative matching. In a related paper by one of the authors, strong evidence is found that increased globalization and trade liberalization improves matching between workers and firms (Davidson et al., 2014). The analysis is conducted on similar matched worker-firm data from Statistics Sweden. The results described in that article suggest that there may be significant gains from trade liberalization that have not been identified, e.g., increased globalization may improve the efficiency of the matching process in the labour market.

[28] In other words, the concern is that the "parallel trends" assumption is violated or more technically, that acquisitions are correlated with the error term.

[29] See Stevenson and Wolfers (2006) for a detailed discussion of such a "staggered" difference-in-difference approach.

[30] As a comparison, we also estimated foreign acquisition regressions on the sample of all firms (not only on target firms). This estimation provided qualitatively identical results that are available upon request.

[31] Wennemo (2014) argues that people in Sweden early had an incentive to cooperate in public good provisions due to relative late marriages, small families and living in sparsely populated areas. This experience might have been conducive to building up trust.

[32] Power distance is a dimension that deals with the fact that all individuals in societies are not equal. It expresses the attitude of the culture towards these inequalities amongst us. Power distance is defined as the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is unequally distributed. Sweden scores low on this dimension.

[33] The growth rate is symmetric around zero and bounded in the [-2,2] interval, where the boundaries are equal to the growth rate of an entering plant and an existing plant, respectively.