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START-UP DYNAMICS IN JAPAN: COMPARATIVE EVIDENCE FROM THE DYNEMP V.2 DATABASE

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The present paper describes the patterns of entry and post-entry growth in the Japanese manufacturing sector over the 2001–2007 period, pointing to similarities and differences with other countries. The paper also presents a detailed characterization of start-up dynamics at a more detailed (two-digit) sectoral level within the manufacturing sector. The analysis shows that in Japan the entry and growth of start-ups contribute relatively little to net job creation, as compared to other countries. The main reasons are a particularly low start-up rate and a growth rate of surviving new businesses that is among the lowest in the sample of countries analysed.
JEL Classification Numbers: L11, L26, D22.

1. Introduction

In the aftermath of the financial crisis, employment creation and productivity growth are at the top of the policy agenda in most, if not all, OECD countries. They are even more important in those countries like Japan that have suffered from sluggish or negative productivity growth and rising unemployment since the early 1990s, well before the "Great Recession". Recently, the economic literature has emphasized the important role that entrepreneurship and young firm dynamics play in creating employment and increasing aggregate productivity; therefore, policy-makers are becoming increasingly aware of the importance of fostering a fertile business environment for start-ups and for entrepreneurship.

Young firms are, indeed, the engine of job creation. This has been confirmed by a number of country-specific studies (e.g. Haltiwanger *et al.* (2013) for the USA; Lawless (2014) for Ireland; Eslava and Haltiwanger (2012) for Colombia), as well as by the analysis of a cross-country database collected by the OECD (Criscuolo *et al.*, 2014). Across a large sample of OECD and emerging countries, young (and often small) firms are net job creators, even during the Great Recession. Young firms show significantly larger rates of average net employment growth relative to more mature incumbents. While this is true across countries and sectors, evidence from the DynEmp project discussed in Criscuolo *et al.* (2014) points to substantial differences across countries in the extent to which new firms can grow if they prove to be successful: eventually increasing the overall productivity of the economy.

There is some evidence, however, that the contribution of young firms to job creation in Japan is smaller than in other countries and that the creation of new firms declined sharply over the 1980s and the 1990s. For instance, Kawai and Urata (2002) find that the entry rate of small and medium enterprises (SMEs) declined from around 7% in the late 1960s to less than 3% in the early 1990s. The SMEs' exit rate also declined over the same period, but to a smaller extent: after peaking at just over 4% in the early

1970s, it decreased to below 3% at the beginning of the 1990s. This implies that the net entry rate basically went down to zero in the early 1990s. Furthermore, worker flows in Japan are generally smaller than those in the USA and European countries (Lin and Miyamoto, 2012) and innovative businesses struggle to attract resources to grow (Andrews *et al.*, 2014). The lack of dynamism of young, innovative businesses and start-ups might be one of the factors which could be associated with the disappointing growth and productivity performance of Japan over the past two decades.

In this paper we use the methodology developed in Calvino *et al.* (2015) to describe the phenomenon of entry and post-entry growth in the Japanese manufacturing sector over the 2001–2007 period, pointing to similarities and differences with other countries. We also provide a detailed characterization of start-up dynamics at a more detailed (two-digit) sectoral level within the manufacturing sector. The analysis shows that in Japan the entry and growth of start-ups contribute relatively little to net job creation, as compared to other countries. The main reasons are a particularly low start-up rate and a growth rate of surviving new businesses that is among the lowest in the sample of countries analysed. We suggest that further work should investigate the causes, as well as the consequences, of this lack of dynamism of the Japanese economy.

The paper is structured as follows: the next section describes the data set used; the third section discusses the analytical tools employed for the analysis; and the fourth section discusses the results, followed by the conclusions in Section 5.

2. Data: The DynEmp v.2 database

The DynEmp project is based on a distributed data collection exercise aimed at creating a harmonized cross-country micro-aggregated database on employment dynamics from confidential micro-level data where the primary sources of firm and establishment data are national business registers. The project is supported by a network of national experts who run common Stata routines developed centrally by the OECD DynEmp team on the confidential micro data to which they have access (see also Criscuolo *et al.*, 2015). The experts also implement country-specific disclosure procedures in order to ensure that confidentiality is respected.

The main building blocks of the data produced by the DynEmp v.2 routine can be summarized as follows: (i) "flow data sets"; (ii) "transition matrices"; and (iii) "distributed regressions" estimates. At the time of writing, 18 countries have been successfully included in the DynEmp v.2 database (i.e. Austria, Belgium, Brazil, Costa Rica, Denmark, Finland, Hungary, Italy, Japan, Luxembourg, the Netherlands, Norway, New Zealand, Portugal, Spain, Sweden, Turkey and the UK). More details on the DynEmp v.2 database can be found in Calvino *et al.* (2015) and in Criscuolo *et al.* (2014).

This paper is based on the transition matrices, which summarize the growth trajectories of cohorts of units from year t to year $t + j$, where t takes by default the values 2001, 2004 and 2007, and j is equal to 3, 5 or 7 (therefore, if data are available, transition matrices are calculated for the periods: 2001–2004, 2001–2006, 2001–2008; 2004–2007, 2004–2009, 2004–2011; 2007–2010, 2007–2012, 2007–2014). The matrices contain a number of statistics (number of units in the cell, median employment at t and at $t + j$, total employment at t and at $t + j$, and mean growth rate) for different combinations of age and size classes at time t and $t + j$, and also statistics focusing on the dynamics of high-growth units.

The Japanese data present some peculiarities as compared to other countries. Information on the full economy is not available on a yearly basis, but only every 2–3 years. Yearly data covering the universe of firms are, however, available for the manufacturing sector. Therefore and differently to Calvino *et al.* (2015), in which most statistics are averaged across the whole non-financial business sector (manufacturing, non-financial services and construction), this paper presents and discusses new evidence focused on the manufacturing sector only for all countries.

3. Methods: The decomposition of start-up net job contribution

Calvino *et al.* (2015) set up a comprehensive analytical framework to analyse start-up dynamics across countries. Namely, they propose a new decomposition in which the contribution of new firms in terms of new job additions to the existing workforce is expressed as a combination of four different elements: start-up ratio, average size at entry, survival rate and average post-entry growth.[1] These four components tend to show rather different patterns across countries, even when looking within a group of economies with similar aggregate start-up job contributions. Therefore, their analysis offers an interesting comparative insight of start-up dynamics across countries (Fig. 1).

4. Findings: Start-up dynamics in Japan

In this section we discuss the results from the decomposition of the start-up job contribution limited to the manufacturing sector and to the period 2001–2004 and 2004–2007. As mentioned above, this selection provides novel evidence that also matches the data availability for Japan in the DynEmp v.2 database, sourced from the Japanese Census of Manufacturers. The reader should also note that, differently from other countries, in the Japanese Census of Manufacturers only plants with at least 4 employees are included; therefore, the firms' employment is calculated only on the employment of plants above this threshold. This may lead to: (i) an underestimate of the start-up rate, as very small new firms with fewer than 4 employees are not accounted for; (ii) a slight underestimate of the survival rate, as firms with employee numbers falling below four and never reappearing again are considered as exiting; and (iii) an overestimate of the average size at entry. However, the differences with the other countries are sizeable enough to still be informative and meaningful despite the important methodological caveat.

In the sample, Japan is among the countries with the lowest net job contribution by start-ups: out of 100 jobs existing in year t, new start-ups born in the same year will create only 1 additional job (Fig. 2). Only Luxembourg and the Netherlands show a lower contribution, with countries at the top of the ranking (e.g. Brazil) having up to 5.5 new jobs created over 5 years for every 100 employees in the manufacturing sector at the beginning of the period.

When looking at the four components of the decomposition, it appears that the relatively low job contribution by start-ups in Japan is mainly explained by the low start-up rate, partially counter-balanced by a very high average size at entry. Post-entry growth is also the

[1] This is measured as the ratio of the net job creation by surviving entrants at time $t + 3$ over the country total employment at time t.

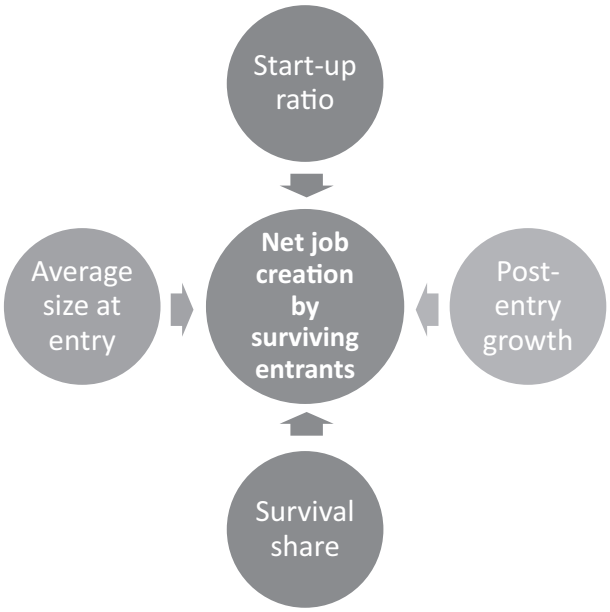

FIGURE 1. The decomposition of start-up job contribution
Source: Calvino *et al.* (2015).

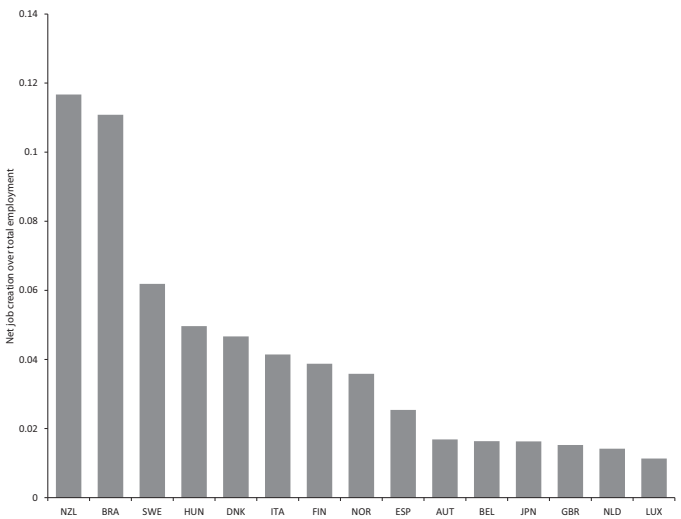

FIGURE 2. The decomposition of start-up job contribution
Notes: The graph illustrates the ratio between employment at time $t + 3$ of surviving entrants and overall country employment at time t in the manufacturing sector. Figures report the average for different time periods $t = 2001$ and 2004, conditional on their availability. Owing to methodological differences, figures may deviate from officially published national statistics. Figures for Costa Rica, Portugal and Turkey are not available due to limited time coverage. See Calvino *et al.* (2015) for further details.
Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

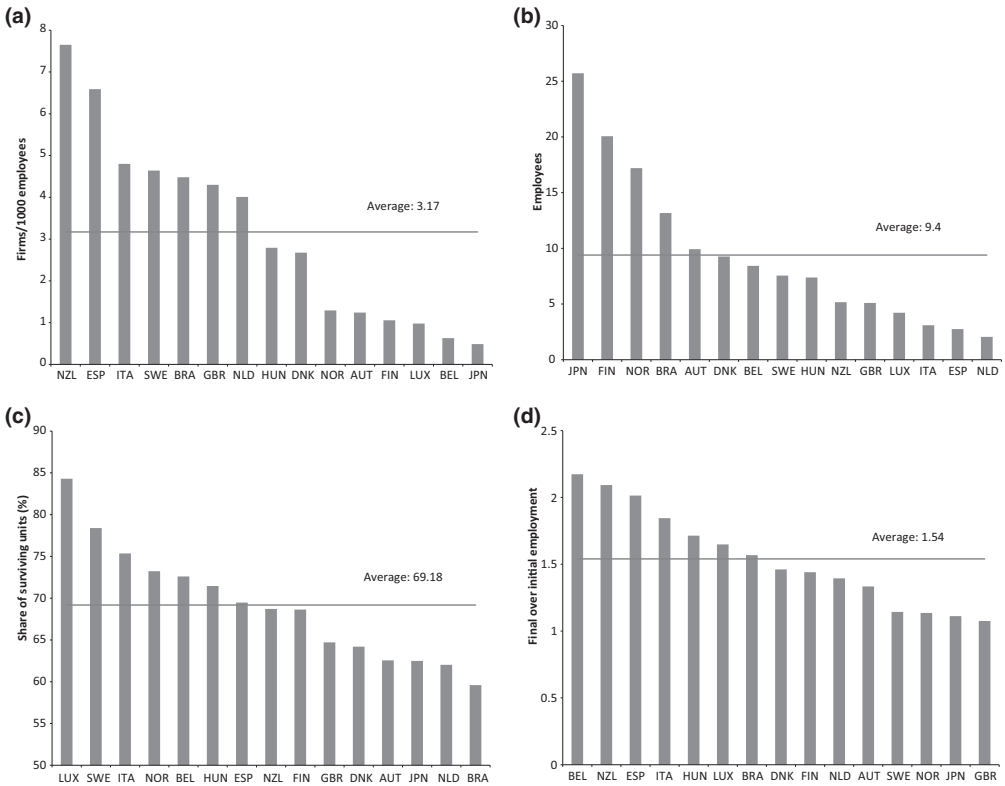

FIGURE 3. Net job creation by surviving entrants relative to total employment: (a) start-up rage, (b) average size at entry, (c) survival share and (d) post-entry growth

Notes: The graph illustrates the four components of the growth decomposition. Start-up ratio is expressed as total number of entering units over total employment (in thousands). Survival share of entrants is expressed as number of entering units surviving over total number of entrants per cent. Average size of surviving entrants is expressed as total employment of surviving entrants over number of surviving entrants. Post-entry growth is calculated as the ratio between total employment at $t + 3$ over total employment of surviving entrants. Figures report the average for different time periods $t = 2001$ and 2004, conditional on their availability. Owing to methodological differences, figures may deviate from officially published national statistics. Figures for Costa Rica, Portugal and Turkey are not available due to limited time coverage. See Calvino *et al.* (2015) for further details.

Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

lowest in the sample, and the survival share is around 60%, a value below the cross-country average but substantially in line with other countries (Fig. 3). The entrepreneurial ecosystem in Japan is, therefore, characterized by a small number of very large new firms; four out of ten start-ups do not reach the 5th year of activity, and those who do survive tend to exhibit slower growth performance than similar firms in other countries.

As mentioned above, however, these figures may be somehow biased by the fact that, contrary to other countries, firms with fewer than 4 employees are not covered, due to the sample design of the Japanese Census of Manufacturers. Another caveat is the prolonged period of crisis faced by Japan over the 1990s and the 2000s, which makes it difficult to assess whether the low dynamism is specific to young firms or is rather a more general problem of the whole economy. In order to address both concerns, Figure 4 shows the average yearly growth rate of manufacturing firms in the 10–49 size

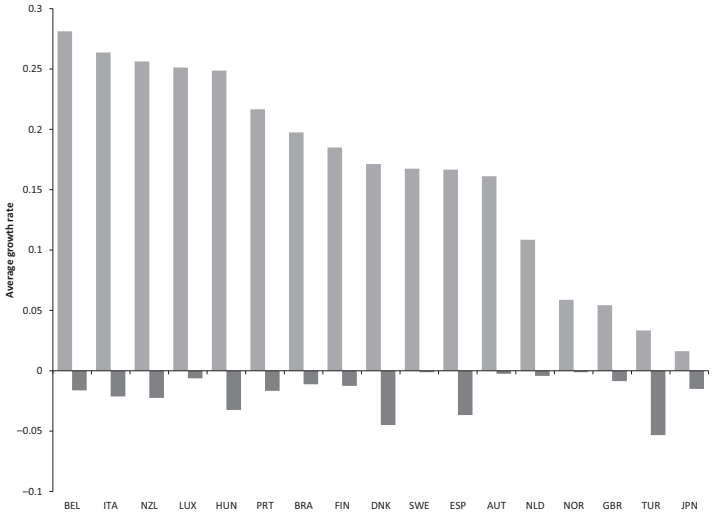

FIGURE 4. Average yearly growth rate, size class 10–49, period 2001–2009. (■) Age 0–2; (■) age 6+
Notes: The growth rate is calculated as the difference between employment at time t and at time $t - 1$, over the average employment in t and $t - 1$. Owing to methodological differences, figures may deviate from officially published national statistics.
Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

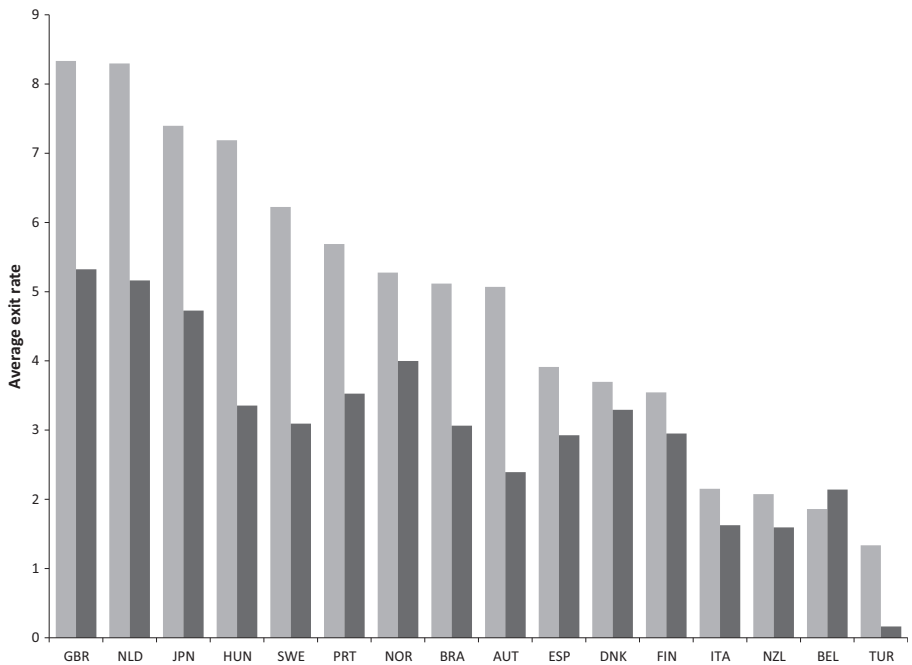

FIGURE 5. Average exit rate, manufacturing, size class 10–49, period 2001–2009. (■) Age 0–2; (■) age 6+
Notes: The exit rate is calculated as the number of exiting firms over the total number of active firms. Owing to methodological differences, figures may deviate from officially published national statistics. Luxembourg is excluded due to the limited number of firms included in this statistics.
Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

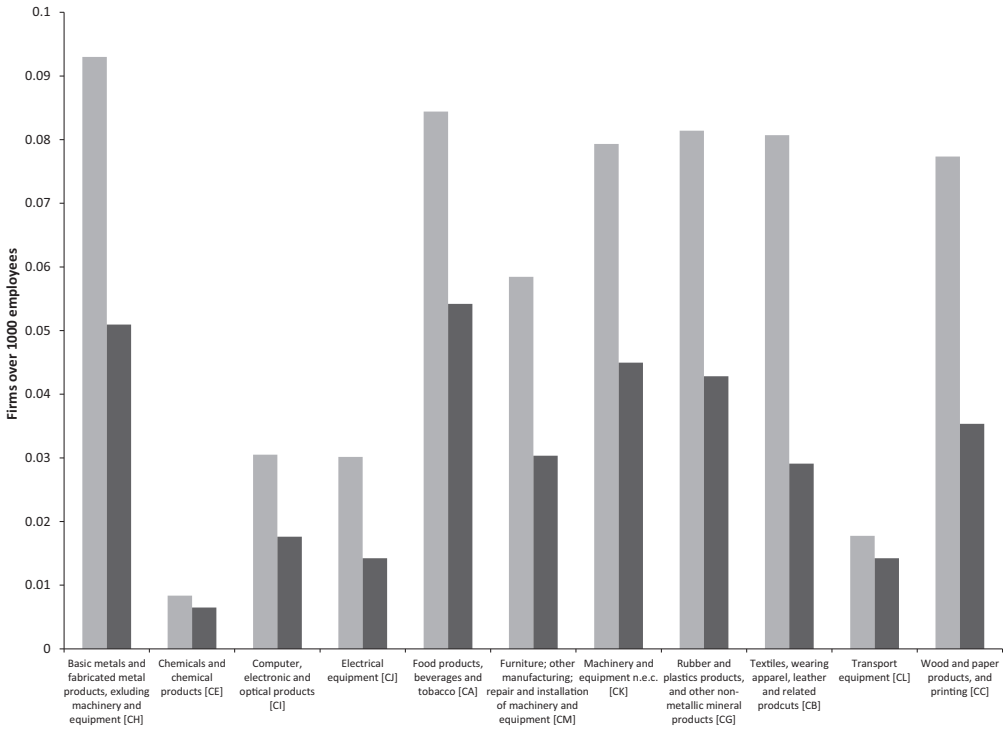

FIGURE 6. Start-up rate, two-digit sectors, Japan. (■) 2001; (■) 2004
Notes: The graph illustrates the four components of the growth decomposition. Start-up ratio is expressed as total number of entering units over total employment (in thousands). Survival share of entrants is expressed as number of entering units surviving over total number of entrants per cent. Average size of surviving entrants is expressed as total employment of surviving entrants over number of surviving entrants. Post-entry growth is calculated as the ratio between total employment at $t + 3$ over total employment of surviving entrants. Figures report the average for different time periods $t = 2001$ and 2004, conditional on their availability. Owing to methodological differences, figures may deviate from officially published national statistics. Figures for Costa Rica, Portugal and Turkey are not available due to limited time coverage. See Calvino *et al.* (2015) for further details.
Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

class and in the 0–2 age class over the period 2001–2009.[2] The graph shows that the disappointing performance of young firms is confirmed also when restricting the attention to young firms of size 10–49, suggesting that the 4 employee threshold is not providing a misleading picture of start-up dynamics in Japan. Furthermore, the graph also shows that the growth rate in Japan is particularly low for young firms, while the same measure for older firms is more in line with that of other countries. A similar conclusion applies to Figure 5, which shows average exit rates (for young and older firms) in the 10–49 size class. Again, the main results from the previous graphs are confirmed, with Japan showing a relatively high exit rate.

[2] Differently from the other graph, the underlying data are sourced from the yearly flow database, rather than from the transition matrices.

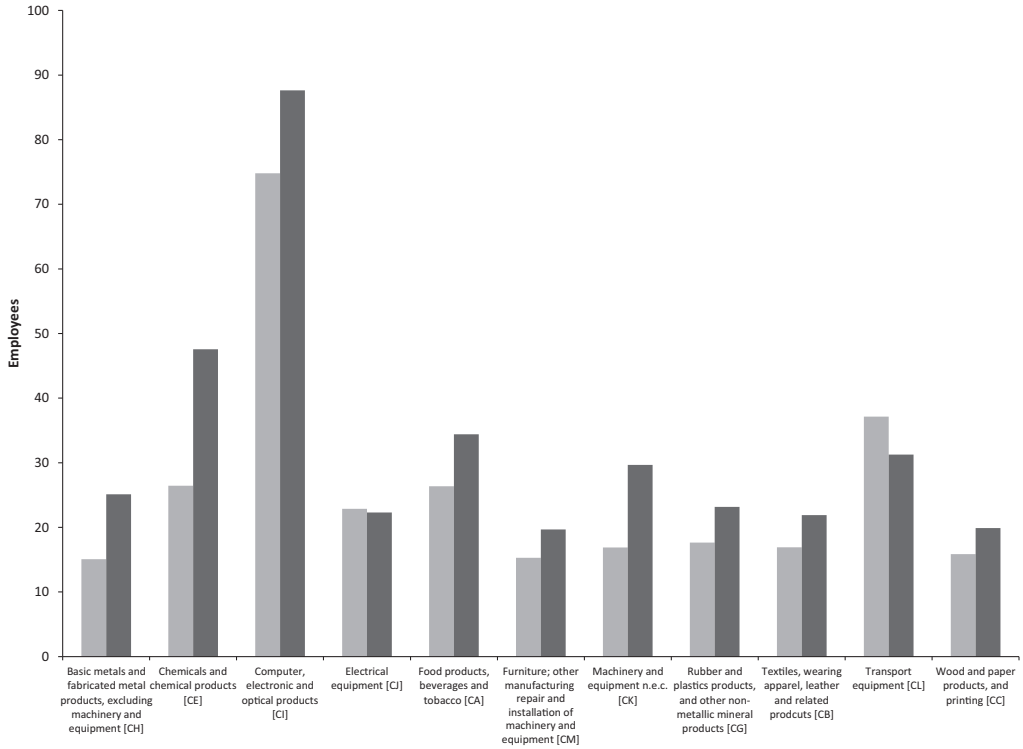

FIGURE 7. Average size at entry, two-digit sectors, Japan. (■) 2001; (■) 2004
Notes: The graph illustrates the four components of the growth decomposition. Start-up ratio is expressed as total number of entering units over total employment (in thousands). Survival share of entrants is expressed as number of entering units surviving over total number of entrants per cent. Average size of surviving entrants is expressed as total employment of surviving entrants over number of surviving entrants. Post-entry growth is calculated as the ratio between total employment at $t + 3$ over total employment of surviving entrants. Figures report the average for different time periods $t = 2001$ and 2004, conditional on their availability. Owing to methodological differences, figures may deviate from officially published national statistics. Figures for Costa Rica, Portugal and Turkey are not available due to limited time coverage. See Calvino *et al.* (2015) for further details.
Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

4.1 Analysis at two-digit sector level

Figures 6–9 illustrate the four components of the decompositions for Japan disaggregating across the two cohorts of 2001 and 2004 over the 3-year periods (2001–2004 and 2004–2007) and the two-digit sectors of manufacturing.[3] The graphs show some interesting patterns in the temporal and sectoral diversification of start-up dynamics, both across sectors and time periods.

First of all, the start-up rate (measured as the number of entrants over total employment in manufacturing) is much higher in 2001 than in 2004 in all the two-digit sectors under scrutiny, with the decrease in the second period being particularly striking in the textile

[3] The pharmaceutical sector and coke and refined petroleum products sectors have been excluded from the graphs due to the relatively low number of underlying observations and to data confidentiality restrictions.

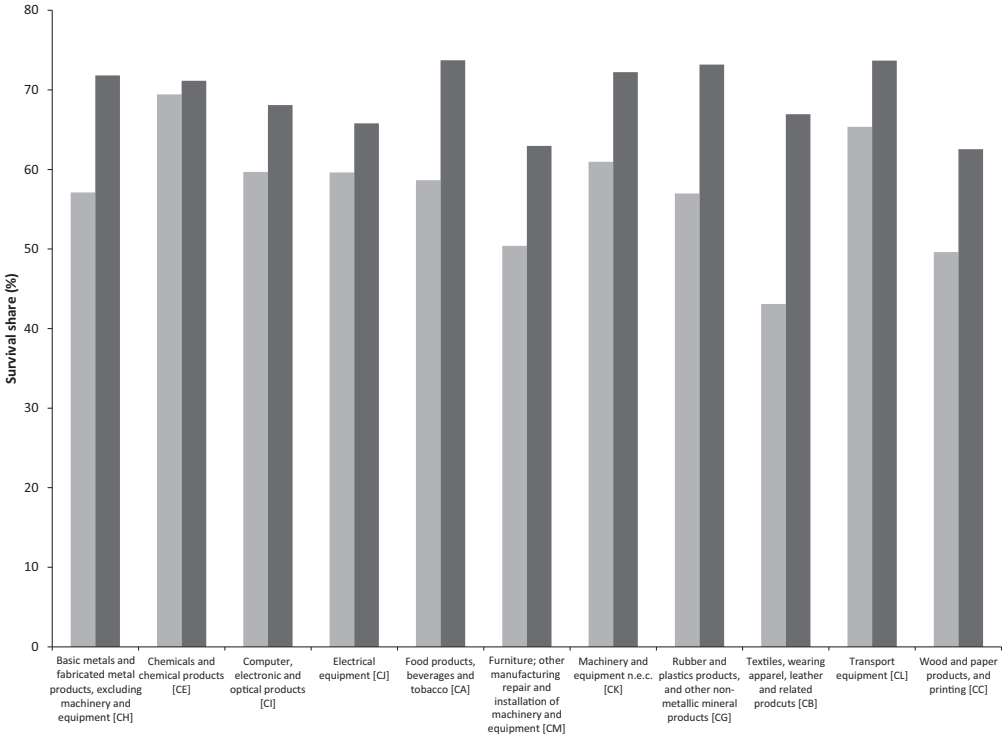

FIGURE 8. Survival share, two-digit sectors, Japan. (▒) 2001–2004; (■) 2004–2007
Notes: The graph illustrates the four components of the growth decomposition. Start-up ratio is expressed as total number of entering units over total employment (in thousands). Survival share of entrants is expressed as number of entering units surviving over total number of entrants per cent. Average size of surviving entrants is expressed as total employment of surviving entrants over number of surviving entrants. Post-entry growth is calculated as the ratio between total employment at $t + 3$ over total employment of surviving entrants. Figures report the average for different time periods $t = 2001$ and 2004, conditional on their availability. Owing to methodological differences, figures may deviate from officially published national statistics. Figures for Costa Rica, Portugal and Turkey are not available due to limited time coverage. See Calvino *et al.* (2015) for further details.
Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

and wood product sector (Fig. 6). Although a longer time series would be necessary to investigate the specificities of this dynamics, this pattern seems consistent with the "secular decline" in business dynamism found in the United States (Haltiwanger *et al.*, 2015) and in other countries. Interestingly, the start-up rate also shows a fair amount of variation across sectors, with basic and fabricated metal products and food processing being the sectors with the highest number of start-ups in both years 2001 and 2004.

Differently from start-up rates, the average size at entry is generally higher in 2004 than in 2001, with the exception of the transport and electric equipment sectors (Fig. 7). The measure is abnormally high in the computer and electronics sector, which we cannot rule out as being linked to some new large firms as a result of restructuring or acquisition or mergers of existing companies ("de alio"), rather than being from the real entry ("de novo") of new business ventures. However, the fact that the measure is very high in both

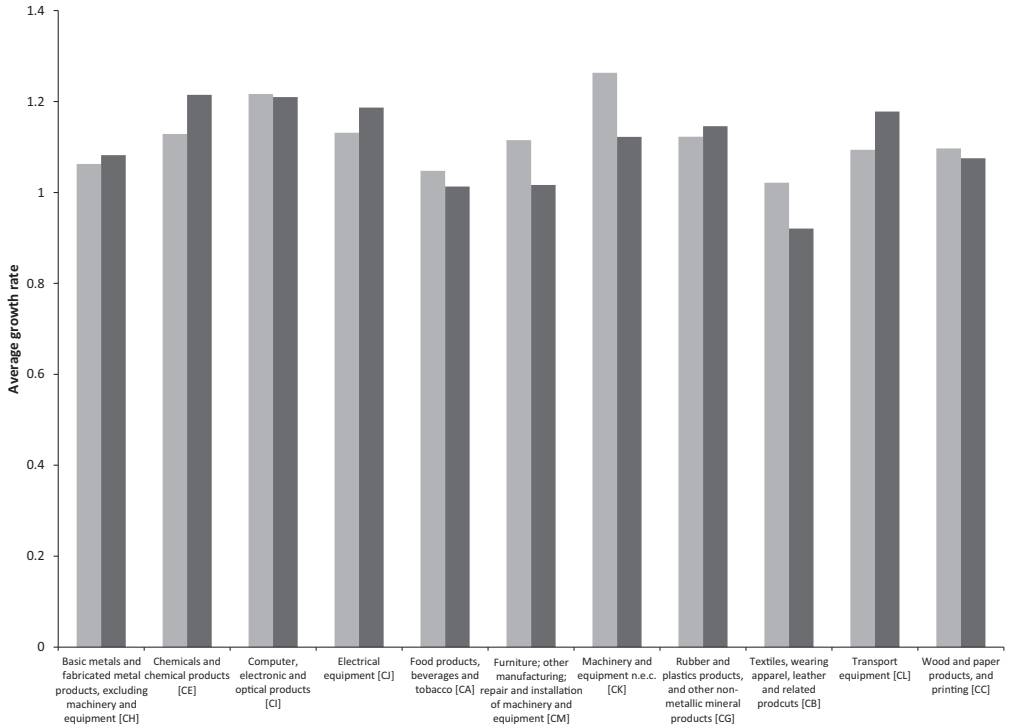

FIGURE 9. Post-entry growth, two-digit sectors, Japan. (■) 2001–2004; (■) 2004–2007
Notes: The graph illustrates the four components of the growth decomposition. Start-up ratio is expressed as total number of entering units over total employment (in thousands). Survival share of entrants is expressed as number of entering units surviving over total number of entrants per cent. Average size of surviving entrants is expressed as total employment of surviving entrants over number of surviving entrants. Post-entry growth is calculated as the ratio between total employment at $t + 3$ over total employment of surviving entrants. Figures report the average for different time periods $t = 2001$ and 2004, conditional on their availability. Owing to methodological differences, figures may deviate from officially published national statistics. Figures for Costa Rica, Portugal and Turkey are not available due to limited time coverage. See Calvino *et al.* (2015) for further details.
Source: OECD DynEmp v.2 database. Data for some countries are still preliminary.

2001 and 2004 would suggest that the value may also uncover a systematic component beyond some noise in the data specific to this sector.

Similarly, the survival share is lower in the period 2001–2004 than in the period 2004–2007 in all sectors (Fig. 8). Interestingly, the measure also presents larger variation in the period 2001–2004, when the share of firms which survive at least until the third year ranges from 43 to 69%. In the period 2004–2007, instead, the survival share is above 60% in all sectors. This may be linked to the higher start-up rate observed in 2001 with respect to 2004, which, in turn, may imply that in the former period there was more experimentation, with more firms entering the market, but also more firms failing if unsuccessful (Fig. 9). The fact that this is true only for post-entry growth, while all other variables show substantial variation across time and sectors, is an interesting feature of business dynamics in Japan that deserves further investigation in future research.

5. Conclusions

In this paper we propose a detailed characterization of start-up dynamics in Japan, building on and expanding the analytical framework developed by Calvino *et al.* (2015). The results show that Japanese start-ups provide a lower contribution to net job creation than those in most other countries in the sample.

The limited job contribution by start-ups at the aggregate level in Japan is mainly linked to a low start-up rate and to a very low growth rate of young businesses. This is only partially compensated by a high average size at entry, as compared to the other countries analysed.

The decomposition of the start-up job contribution at the two-digit sectoral level shows that start-up rates and average sizes at entry are quite heterogeneous across sectors; strikingly, post-entry growth rates are instead extremely similar, both across sectors and across time periods.

Recent OECD work (Calvino *et al.*, 2016) shows that start-ups are significantly more exposed to national policies and framework conditions, especially in volatile sectors and in sectors that exhibit faster growth dispersion. It is, therefore, important for policy-makers to ponder the start-up contribution to job creation and productivity, in order to design policies that can help to fully unleash their potential for economic growth.

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