CHINA’S DECLINING BUSINESS DYNAMISM

After impressive growth in the 2000s, China’s productivity has more recently stagnated. We use firm-level data to analyze productivity and firm dynamism trends from 2003 to 2018. We construct a bottom-up estimate of manufacturing productivity from our data and confirm the productivity growth slowdown. We then document five facts coming out of the microdata that show a decline in China’s business dynamism. We show that the share of young firms in the economy has declined, that life-cycle growth of young firms has become weaker relative to older incumbents, that younger and smaller firms are more capital constrained than their older and larger counterparts, that the economy’s ability to allocate capital has worsened over time, and that there are large and persistent productivity gaps between SOEs and private firms. In the cross-section of provinces, we find that where SOEs account for a larger share of assets, business dynamism tends to be weaker. The findings underscore the need for China to undertake pro-market reforms to boost productivity growth. In particular, SOE reform could boost productivity growth both directly through resource reallocation and indirectly by stimulating business dynamism.

A. Overview of Trends in Productivity Growth and SOE Intensity.

1. After impressive growth in the 2000s, largely driven by the rapid growth of young private firms, China’s productivity has more recently stagnated. While this slowdown in aggregate total factor productivity (TFP) has also occurred in other countries, that China’s productivity deceleration in the post-GFC period has been particularly dramatic, with TFP rising by around 22 percent between 2003 and 2011 and a mere 5 percent between 2011 and 2019 (see figure). Given looming demographic headwinds and diminishing returns to state-led investment, China’s medium and long-term growth prospects are set to become increasingly dependent on its ability to reignite productivity growth. An extensive literature has documented how various large-scale reforms in the early 2000s spurred China’s productivity growth, including entry into the WTO and reductions in external trade barriers (Brandt and others, 2017), reductions in internal trade and migration barriers (Tombe and Zhu, 2019), and SOE reform (Brandt, Van Biesebroek and Zhang, 2012). Studies using rich firm-level data have also documented the importance of the private sector (Hsieh and Song, 2015), with the entry and rapid growth of young private firms the primary driver of aggregate productivity growth (Brandt, Van Biesebroek and Zhang, 2012). However, this dynamism may be losing steam, with evidence that firm productivity growth and entry started dramatically slowing down from 2008-2013 (Brandt et al, 2020, Brandt and Lim, 2021).

1 Prepared by Diego Cerdeiro (APD) and Cian Ruane (RES).
2. Following a large decline in the wake of dramatic reforms in the 2000s, the share of state-owned enterprises (SOEs) in the economy has more recently remained flat. New opportunities for private firm growth in both external and internal markets were created in the 2000s thanks to China’s WTO entry as well as domestic product market reforms. This growth of the private sector was in part enabled by large-scale SOE reform (involving the closure, privatization or merger of more than 80 percent of SOEs between 1998 and 2007 (Hsieh and Song, 2015)) which allowed for productivity-enhancing resource reallocation (Hsieh and Klenow, 2009). The left panel figure shows a reduction in the pace at which the state-owned sector has been shrinking, with SOEs still accounting for 27 percent of industry revenues and 39 percent of assets in 2019. Given that SOEs also have lower capital productivity than private firms within the same sector (see right panel figure), this suggests potentially large direct gains from capital reallocation between SOEs and private firms (see Jurzyk and Ruane (2021) for a quantification of these gains among listed firms). However, SOE intensity can also have indirect effects on productivity if it reduces private sector dynamism. A large SOE presence could therefore both impede productive capital reallocation between private firms and disincentivize young entrepreneurs from investing in growing their firms and innovating. We explore these issues in this paper using a large new dataset of Chinese firms from 2003 to 2018 (for more details see Cerdeiro and Ruane, 2021).

B. Bottom-up Productivity Estimates from Manufacturing Firm-level Data

3. We use firm-level data from Bureau Van Dijk’s Orbis database to analyze productivity and firm dynamism trends from 2003 to 2018. There are two main benefits from these data; the coverage of firms and the time horizon. The Orbis database has a broad coverage of manufacturing firms across the size distribution. Because there is a minimum annual revenue threshold up to 2012, we impose a RMB 5mn revenue threshold across our whole sample.2 The database contains on average 240 thousand firms per year for which we can observe revenues and total assets, with around 2,600 SOEs every year on average in manufacturing and mining sectors, and (for the

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2 The minimum threshold is of RMB 5mn in annual revenues from 2003 to 2010, and RMB 20mn in 2011-2012. These are the same thresholds in the commonly-used Chinese Industrial Survey.
subperiod 2013–2018) 6,400 SOEs every year on average in services sectors. We identify SOEs in our database by combining information from Orbis’ own ownership database and linking firm identifiers to Wind ownership data for listed firms. (see Cerdeiro and Ruane (2021) for more details on the data). Most importantly, the Orbis database has information on firms through 2018, allowing us to study firm dynamics in the more-recent past, compared to most other comprehensive studies that rely on samples ending in 2013. While sampling changes lead to changes in coverage over time relative to official values, aggregate manufacturing revenues from our data are 72 percent of official aggregates on average for above-scale manufacturing.

4. **Our bottom-up measure of manufacturing TFP indicates a slowdown in productivity growth post-GFC.** We construct an aggregate TFP series from our firm-level data as a gross-output weighted average of industry-level TFP, based on an industry production of the type: \( Q = A(K^\alpha L^{1-\alpha})^\gamma X^{1-\gamma} \), where \( Q \) is output, \( K \) is capital, \( L \) is labor, \( X \) is intermediate inputs, and \( A \) is total factor augmenting productivity. We use revenues as our measure of output, tangible fixed assets as our measure of capital, and use industry shares to identify labor and intermediate inputs from the sum of cost of goods sold plus non-operating costs. We deflate all variables using 2-digit industry deflators for revenues and intermediate inputs. We construct our TFP measures at the same-level as our industry-specific deflators, thereby avoiding the possibility of conflating true productivity growth with changes in markups. Sampling changes post-2013 increase the volatility of TFP series, however it is clear that TFP growth slowed down considerable post-GFC relative to the previous decade. Understanding whether declining firm dynamism is in part responsible for this decline is a critical input for the design of policies to reverse it and achieve sustainably high long-run growth.

C. **Five Facts about China’s Declining Business Dynamism**

5. **An extensive literature documents how business dynamism matters for aggregate productivity.** Business dynamism reflects the forces that drive growth at the firm-level in an economy, such as entry and exit, resource reallocation among incumbent firms, innovation and

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3 Excluding firms for which either fixed assets or costs need to be imputed from either the firm’s previous data or sectoral averages, these numbers are of 2,400 for manufacturing sectors and 2,900 thousand for services sectors. For our firm-level regressions, we exclude all firms for which fixed assets or costs had to be imputed.

4 Data for firms in services sectors are available for 2013-2018. In the absence of proper deflators for 2-digit services sectors, the subset of manufacturing-sector results that we extend to below for services firms are those that do not require deflation.

5 Note that our TFP series is not directly comparable to that from the PWT, both because we focus only on manufacturing, and because our production function is in terms of gross output rather than value-added.
knowledge diffusion. These are important drivers of economic growth. For example, Garcia-Macia, Hsieh and Klenow (2019) find that entry of new firms accounts for around a quarter of U.S. productivity growth between 1983 and 2013. Decker and others (2020) provide evidence that firm responsiveness to shocks has been declining in the U.S. and that this has contributed to slow productivity growth. Akcigit and Ates (2019a, b) highlight that declining U.S. business dynamism reflects lower knowledge diffusion between firms. Akcigit and others examine the role that market power and M&As play in driving business dynamism in a larger set of countries.

6. We document five facts from the data that show a decline in China’s business dynamism. We show that the share of young firms in the economy has declined, the life-cycle growth of young firms relative to older incumbents that enter has become more feeble, younger and smaller firms are more capital constrained than their older and larger counterparts, the economy’s ability to allocate capital has worsened over time, and there are large and persistent productivity gaps between SOEs and private firms.

7. Fact 1: The revenue and asset share of young Chinese firms has declined over time. It is well established that entry of young firms is an important contributor to aggregate productivity growth (see e.g. Alon, Berger, Dent and Pugsley, 2018). A critical moment to quantify their importance is their share of outputs and inputs (Garcia-Macia, Hsieh and Klenow, 2019). We show that the revenue share of young firms has declined dramatically over time: the share of firms under 10 years old fell from around 70 percent in 2003-04 to around 30 percent in 2017-18. This low share of young firms in recent years is not driven by sampling, as it is similar when we include firms below the RMB 5mn revenue threshold in 2017/2018, which expands the sample from around 200,000 firms to 700,000 firms. We also find a similarly small revenue share for young firms using Orbis’ data on service sector firms, indicating that this is a common pattern across the whole economy. While it is natural that the share of young firms was particularly high in the wake of China’s WTO entry and large-scale market reforms in the early 2000s, the dramatic decline since then also suggests that market dynamism may have declined markedly.

8. Fact 2: Life-cycle growth of young Chinese firms has declined over time. Recent evidence suggests that growth over a typical firm’s life-cycle tends to be much higher in the U.S. than in developing economies (Hsieh and Klenow, 2014), with the U.S. in particular exhibiting strong up-or-out dynamics which spur aggregate productivity growth (Haltiwanger, Jarmin and Miranda, 2013; Eslava, Pinzon and Haltiwanger, 2019). Our data allow us to track firms over their life-cycle and evaluate how medium-run growth dynamics have changed over time. We report average 3-year firm revenue growth by age group relative to older firms (16 years +) in the same sector and year, splitting our sample into two periods: 2003-2010 and 2011-2018. As has been previously
documented in the literature, we find that average firm growth decreases with age. However, more strikingly, we find that the growth rate of firms under the age of 10 (relative to older firms) is substantially smaller from 2011-2018 than from 2003-2010.\(^6\) Such flatter life-cycle growth could be due to a) increasing distortions which prevent firms from growing, or b) firms investing less in R&D, process efficiency, quality improvements, or other intangible inputs.\(^7\) We don’t find evidence of worsening distortions with age driving this trend, but rather in we show that productivity growth of young firms relative to older firms is much weaker – young firms are investing relatively less in process efficiency and quality improvements than they had in the previous decade. While this might not be a problem if it was compensated by innovation and rapid growth of older firms, this is clearly not the case given the very weak TFP growth from 2011-2018 shown in Figure 3. These findings indicate a concerning decrease in the dynamism of young firms in China, which could be contributing to the aggregate productivity growth slowdown.

9. **Fact 3: Younger and smaller firms appear to be more capital-constrained than larger and older firms.** Younger and smaller firms tend to have much higher capital productivity (revenue per unit of capital) than older and larger firms in 2017-18 (see figures).\(^8\) Such differences in capital productivity likely reflect (at least in part) differences in the marginal products of capital across firms, suggesting that there are large potential gains from capital reallocation across firms. Financial frictions are likely to be playing an important role for explaining this pattern, and while the literature has focused on the importance of such friction in the 2000s (see Bai, Lu, Tian, 2018 for a quantitative evaluation of financial frictions for Chinese firms), these patterns suggest that such frictions are an equally important barrier to firm growth today.

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\(^6\) This finding is not driven by any sampling issues, as we get even stronger results when we control for initial firm size (as smaller firms tend to have higher growth rates), and is also robust to excluding SOEs. We also note that controlling for initial firm size also makes the growth rates for startups (firms age 1-2) in 2011-2018 significantly lower than in 2003-2010.

\(^7\) Increasing distortions would show up as higher average revenue products (TFPR), while lower efficiency would show up as lower physical productivity (TFPQ). This widely adopted TFPR vs. TFPQ notation goes back to Foster, Haltiwanger and Syverson (2008).

\(^8\) We focus on capital productivity rather than total factor productivity because revenues and assets are the two variables which are most commonly reported.
10. **Fact 4**: The allocation of capital to firms with high marginal products of capital is worsening over time. An important measure of market dynamism is the dispersion of input growth. This captures the speed of reallocation of inputs across firms and tends to be higher when the economy has many high-growth firms (Akcigit and Ates, 2019a,b). We find however that dispersion in total asset growth (which is reported by all firms in our database) has declined over time from 0.126 in 2003-2007 to 0.083 in 2013-2018. More importantly, we evaluate whether capital is moving towards the firms with the highest measured marginal products of capital (as captured by their ratio of revenue to total assets). We report the elasticities of capital growth to the firm’s initial capital productivity. A higher elasticity is suggestive evidence of a more efficient reallocation of capital across firms. We find that this elasticity declined from 0.096 in 2004-2007 to 0.059 in 2016-2018. The decline appears to be particularly marked among the youngest and oldest firms (see figure), a feature that is consistent, for example, with older and less productive firms being better able to access finance at the expense of younger and more productive ones. This decline in responsiveness of input growth to marginal products suggests that the process of capital allocation across firms, particularly from old to young firms, has weakened over time.
11. **Fact 5**: SOEs have persistently lower revenue and capital productivity than POEs in the same sector. Using data for above-scale industrial firms, various papers have documented large productivity gaps between SOEs and private firms through 2013 (Hsieh and Klenow, 2009; Berkowitz, Ma and Nishioka, 2017; Bai, Liu and Tian, 2018). These gaps have also been found for the more recent period (through 2019) for the case of listed firms (Jurzyk and Ruane, 2021). Little is known about whether the earlier findings apply more generally in the recent period, or whether such gaps exist in services as well as manufacturing sectors. Our data allow us to measure these gaps accounting for non-listed firms and covering both manufacturing and services sectors. By controlling for sector-year fixed effects, we ensure that the measured gaps do not reflect, e.g., the fact that SOEs tend to be present in more-established and thus less-productive sectors. Figure 8 (top left) shows that SOEs have consistently had lower revenue productivity than private firms, with an average gap of around 4-5 percent. As found in most of the earlier literature, these gaps are almost exclusively explained by SOEs’ lower capital productivity, as show in the top left panel figure. The gaps for services, estimated for the 2013-2018 period in which services-sector coverage becomes meaningful in Orbis, are somewhat smaller but still statistically and economically significant.
D. Regional Heterogeneity and Business Dynamism

12. To understand the decline in Chinese business dynamism, we explore its connection to SOE presence across provinces. A critical puzzle is why China’s business dynamism has slowed down so dramatically since the 2000s. Many factors are most likely at play, especially given such trends have been observed in other countries such as the U.S., where changing demographics and market power have played a role (Pugsley and Sahin, 2019; Akcigit and Ates, 2019). We focus here on one factor that seems particularly relevant for China – the role played by the state, which we measure as the SOE share—or SOE intensity—of economic activity. Brandt, Kambourov, Storesletten (2020) find that regional state presence may be an important factor in reducing the creation of new firms. Given that China’s growth spurt in the 2000s happened during a period of large-scale SOE reform (the SOE share of industrial assets declined from over 54 percent in 2003 to below 43 percent in 2008), it is natural to investigate whether state presence in China is associated with lower private sector dynamism.

13. Young firms in provinces with higher SOE intensity have weaker life-cycle growth. We use our data on manufacturing firms to explore how the life-cycle growth of private firms varies with both sector-level and province-level SOE intensity. We construct SOE intensity as the asset share of SOEs identified in our Orbis database. We then construct the 3-year average growth rates of young firms (age < 5) relative to old firms (16+) in each sector- and province-year, and regress these against initial SOE intensity. We control for year fixed effects and either sector or province fixed effects, to control for common time trends and time-invariant province or sector characteristics. We find that young firms operating in provinces with higher SOE intensity have weaker revenue growth, capital growth and TFPQ growth relative to older firms. These results are shown in the text table and are both significantly and economically significant. Our results suggest that some of the negative spillover effects of high SOE intensity to private firms may be local rather than sectoral and may reflect political economy problems, as those discussed in Brandt, Kambourov, Storesletten (2020). For example, young firms may invest less in productivity improvements or market expansion because they may face local regulatory barriers, which are put in place out of the concern that business dynamism could threaten the position of local SOEs through product market competition and competition for local factors of production.

### Text Table. Capital Growth vs Capital Productivity and Province-Level SOE Intensity

<table>
<thead>
<tr>
<th>SOE Intensity</th>
<th>Revenue Growth</th>
<th>Capital Growth</th>
<th>TFPQ Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.007**</td>
<td>-0.006**</td>
<td>-0.0035**</td>
</tr>
<tr>
<td></td>
<td>(0.00352)</td>
<td>(0.00302)</td>
<td>(0.00157)</td>
</tr>
<tr>
<td>Observations</td>
<td>394</td>
<td>394</td>
<td>394</td>
</tr>
<tr>
<td>R2</td>
<td>0.237</td>
<td>0.269</td>
<td>0.264</td>
</tr>
</tbody>
</table>

While we are not capturing all manufacturing SOEs in Orbis, we capture the largest and most important ones.
14. **Capital reallocation between private firms is less efficient in provinces with higher SOE intensity.** We also use the richness of our data to explore how the responsiveness of capital to profitable opportunities across private firms varies with local SOE intensity. Again, we construct SOE intensity as the asset share of SOEs identified in our database and divide provinces into terciles of SOE intensity in two separate periods: 2003-2007 and 2013-2018. We regress at the firm-level capital growth on the average product of capital, dummies for terciles of SOE intensity and interaction terms. We estimate separate elasticities for each period to control for the simultaneous aggregate trend decreases in capital responsiveness and SOE intensity. We do not find a significant link from 2003-2007 between local SOE intensity and capital responsiveness (see text table). However, in the 2013-2018 period, we find that provinces with medium and high SOE intensity have significantly lower capital responsiveness. This is concerning as it suggests a worsening allocation of capital to firms with high capital productivity, in particular in provinces with high SOE intensity. A potential explanation for this finding is that the efficiency of the local banking system for capital allocation is worse in regions where most banks can lend (or are incentivized to lend) to SOEs. This is suggestive evidence that high SOE intensity is not only problematic because the assets owned by SOEs could be better allocated, but also because they result in a worse allocation of resources among private firms.

### Text Table. Province-Level Young Firm Life-Cycle Growth vs. SOE Intensity

<table>
<thead>
<tr>
<th></th>
<th>2003-2007</th>
<th>2013-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>In(ARPK)</td>
<td>0.096***</td>
<td>0.070***</td>
</tr>
<tr>
<td></td>
<td>(0.0015)</td>
<td>(0.0020)</td>
</tr>
<tr>
<td>In(ARPK) x Medium SOE Intensity</td>
<td>-0.002</td>
<td>-0.040***</td>
</tr>
<tr>
<td></td>
<td>(0.0019)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>In(ARPK) x High SOE Intensity</td>
<td>0.003</td>
<td>-0.035***</td>
</tr>
<tr>
<td></td>
<td>(0.0019)</td>
<td>(0.0028)</td>
</tr>
<tr>
<td>Observations</td>
<td>628,666</td>
<td>318,616</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.06</td>
<td>0.049</td>
</tr>
</tbody>
</table>

15. **The evidence is suggestive of SOE intensity being potentially an important driver of declining business dynamism.** The evidence presented in this section bears direct links to young firms’ declining life-cycle growth (Fact 2), and the worsening of capital reallocation over time (Fact 4). All else equal, worsening reallocation could help perpetuate productivity gaps between SOEs and private firms (Fact 5). Given that younger and smaller firms have higher capital productivity (Fact 3), the declining reallocation ability of the economy risks amplifying the effects of financial frictions. Altogether, worsened prospects for younger firms will likely lead to a continued decline in their share of economic activity (Fact 1) and contribution to economic growth.
E. Reform Priorities

16. **Pro-market reforms could boost productivity growth.** Structural reforms have been advancing in China even in the wake of the pandemic, for example on opening up the financial sector, on hukou liberalization, and by accelerating financial opening up. Yet the dramatic deceleration in China’s productivity growth, coupled with the looming demographic headwinds, underscore the need for further reforms that can lift the economy’s potential. Removing barriers to entry, e.g. by further opening up non-strategic sectors to new domestic and foreign firms, and removing regional regulatory barriers can promote competition and improve factor allocation. Market power that stifles innovation should be addressed through a transparent and predictable anti-trust framework, treating SOEs and private firms on an equal basis. Corporate restructuring and insolvency frameworks need to be strengthened to facilitate market-based exit of nonviable firms, including SOEs, while ensuring financial stability.

17. **SOE reform could boost productivity growth both directly through resource reallocation and indirectly by stimulating business dynamism.** SOE reforms can help increase productivity directly by shifting resources to firms that are more productive at the margin. As we document in this paper, however, a greater role for markets can also bring about indirect productivity gains by boosting business dynamism. We find, in particular, that a reduction in SOE intensity —such as the one China achieved in the 2000s—could spur young firms’ investments in productivity improvements and market expansion by loosening explicit and implicit barriers that favor SOEs, both in product and factor markets.
References


