



## Tech Retrospective

### Tech scale-ups: Leading the pack?

National discussions on scale-ups and policies supporting scale-ups and firm growth inevitably involve a focus on the technology (“tech”) sector. For example, in 2019, the federal minister for Small Business, Export Promotion, and International Trade announced \$20 million in funding to support Canadian firms to grow, \$7 million of which was devoted to scale healthcare and biotechnology companies (ISED, 2020). Similarly, Innovation, Science and Economic Development Canada has committed \$950 million in funding five tech-focused superclusters, covering areas such as artificial intelligence, advanced manufacturing, and agricultural technology.<sup>21</sup> In 2021, the Ontario Minister of Economic Development, Job Creation and Trade announced \$100 million (\$60 million committed under the previous government, \$40 million in new funding) to focus on supporting tech-companies in Ontario to scale (Simpson, 2021).

There is a strong case that supporting Canada’s tech sector is an indisputable matter of national (and, arguably, environmental) importance to facilitate the transition from extractive industries

towards tech and other frontier industries crucial for promoting long-term national prosperity.

But do the findings presented in this report justify such an outsized focus on the tech industry? Are tech scale-ups more desirable compared to scale-ups in other industries? Throughout this report, tech scale-ups (and even some non-scale-ups) measure exceptionally well across several indicators, but not all of them. Our findings warrant a careful consideration of how we think about tech scale-up measurement and performance.

In this “tech retrospective,” we explore how tech scale-ups stack up against the rest by evaluating their performance in key policy areas. In doing so, we also consider how we conceptualize and measure scale-ups in the first place.

### *Employment objectives*

A commonly cited reason to support scale-ups, in the tech and other industries, is their expected employment impact. We find the employment contribution of tech firms is not straightforward. First, we observe that tech firms do not perform

well when it comes to early growth, as evidenced by their relatively low share of employment scale-ups as per the Kauffman Foundation's criteria. However, among companies with proven business models (those with at least 10 employees, as per the OECD Employment definition), the share of scale-ups in tech is the greatest.

What do these diverging findings indicate? In our interpretation, they point to the relative difficulty (compared to other industries) tech firms face in achieving growth in the early years of operation. But once initial growth hurdles are overcome, the data indicate that it becomes easier for tech firms to sustain scale. Expanding more broadly on these findings, the evidence seems to reflect positively on start-up dynamism and the business environment for tech companies. When combined with the insights we explore below on innovation and productivity measurements, it suggests that the dynamics and conditions are such that poor-performing firms (i.e., those with little value-add, low innovation capacity, or products or services with poor market fit) are pushed out of the market.

Another dimension we consider is quality of employment, as measured through pay. Here we find that average pay at tech scale-ups exceeds that in almost all other industries across economic regions of Canada. Notably, the average pay at both tech scale-ups and non-scale-ups is significantly higher than the average pay for all scale-ups in Canada. There are some differences between tech firms by scale-up status (Kauffman employment scale-ups pay more, OECD employment scale-ups pay less), but with pay rates ranging from \$80,500 to \$89,000 annually, Canadian workers make better money at tech firms than they do just about anywhere else in the country. This does not mean, however, that scale-up and non-scale-up firms otherwise perform similarly.

### ***Productivity and innovation objectives***

While the employment impact of tech scale-ups is somewhat mixed, when it comes to productivity and innovation activities, these firms are clear winners. The average productivity growth (APG)

for tech scale-ups across all definitions shows that they are considerably more productive than non-scale-up tech firms and scale-ups in other industries. We can confidently conclude that tech firms contribute significantly greater economic value than other firms by making better use of their inputs.

However, there is an important point to be considered given the lower levels of employment contribution observed for early growth tech firms. The evidence suggests that as tech firms scale in the earlier years of the firm life-cycle, they focus on making investments in productivity-enhancing measures that are capital deepening and labour saving (this is probably the reason why revenue scale-ups in tech are, by far, the most productive among the three types considered). In other words, younger tech scale-ups do not have as notable an employment impact as other industry sectors, because they are focused on making more effective use of other inputs to the production and sales processes without adding to payroll. Not until the firm is market validated do we see more notable performance gains (identified in this case by the OECD Employment definition).

Tech scale-ups are also R&D leaders, as defined by the share of firms spending on R&D. Given the importance of R&D to tech, this is not surprising, but it is nevertheless notable. Canada, like all advanced industrial economies, is increasingly moving towards an ideas-based, intangible economy (Lamb and Munro, 2020).

Interestingly, the gap between tech scale-ups and non-tech scale-ups for R&D spending is considerably smaller when it comes to those defined under the OECD Employment definition. As discussed, the sub-population of firms we consider for this definition involves those that have reached a baseline level of size that demonstrates a viable and sustainable business model.

One concerning trend we show is the gradual decline in the share of tech scale-ups that recorded R&D expenditures between 2011 and 2016. This finding lends further weight to what

has been described as Canada’s “low innovation equilibrium” (Nicholson, 2016), or where the country becomes a consumer of new technologies as opposed to a creator. This declining trend is observed despite government attempts to stimulate spending and investment.

Canada has long lagged behind its OECD peers in business expenditures on research and development, with no signs of improvement (Lamb, Munro, and Vu, 2018; Lamb and Munro, 2020), but the unwillingness (or inability) of Canadian firms, especially in the tech sector, to spend on R&D should be seen as a major problem. Considering the high proportion of tech scale-ups that export, having high levels of investment in R&D in the domestic market may mean little if these firms have to compete in international markets. While our measures of scale-ups and our chosen definition of tech firms are not well-suited for international comparisons, the trends are indeed concerning and should be further investigated.

### ***Export objectives***

The export activity findings are also consistent with what we would expect. The proportion of tech scale-ups that export (measured by exchange in goods) is in the range of 40 to 50 percent of all tech firms. Notably, tech firms do not export as much as other firms. Depending on the definition, we observe that a greater proportion of non-tech manufacturing firms, wholesale traders, or firms classified as selling other products export. But given the focus on goods exported, this is not surprising. It is also notable that revenue-based tech scale-ups rank second behind non-tech manufacturing.

As indicated by export behaviour data and what we know about this economic activity, we can say that tech scale-ups (and indeed, all scale-ups) likely meet an organizational requirement and have the type of administrative sophistication needed to make the most of support, funding and otherwise. Exporting is associated with a host of other desirable performance metrics

and is a good indication of a firm’s managerial and administrative sophistication and capacity (Harris, 2015). In short, firms that export can be understood as firms capable of managing complexity and are thus better candidates for government support. This notion is consistent with the “threshold firm” concept explored above.



Returning to the original questions posed in this section, the data and insights covered in this report do indeed support the strong focus on tech as contributors to Canada’s economy. Whether these firms should be targets for government support is, as questions of public policy tend to be, a much harder question to answer. The evidence provided here supports the conclusion that some tech firms for certain reasons are likely worthy recipients of support. If, for instance, the goal is to provide support to market-validated firms who will make most productive use of new inputs, then the answer leans strongly in the affirmative. But there are broader findings and implications to consider.

First, it is often said that Canada has a robust tech start-up ecosystem (Gregson and Saunders, 2020), but it struggles to support the scaling of promising firms. What we observe differs slightly, but importantly, from this view. From the perspective of whether the scale-up environment in Canada is one that grows the right kind of firms, we see evidence for such an environment. In all performance metrics evaluated in the tech industry, we see large gaps between scale-ups and non-scale-ups. This indicates to us that while it can be difficult to attain growth as a young firm (explored through the Kauffman Employment definition), once one achieves initial scale, it becomes easier to maintain that size. These observations do not speak to the issue of whether those who have reached scale are supported adequately. This is a separate matter and one we discuss through the lens of R&D spending.

Overall, the finding of a greater proportion of R&D spenders in tech scale-ups (compared to other industries) is both expected and encouraging, as research consistently shows that the social returns to R&D spending are enormous (Jones and Summers, 2020). Accordingly, it is not surprising Canada's lacklustre performance in R&D spending has been a perennial concern. That we observe a declining trend in the propensity to invest in R&D among scale-ups highlights that these concerns are pervasive and salient even among dynamic tech-based businesses. Unfortunately, what exactly is causing this weak R&D performance, or what an effective solution might be remain unclear. Recent policy changes (not covered in our sample period) have adjusted the innovation policy support mix to include more direct support, e.g., grants and contributions, among other forms of support.

The performance differences between those companies receiving direct support for R&D and those who do not underscores the value of R&D spending and incentivizing and supporting such spending (Howell, 2017; Santoleri, Mina, Di Minin, and Martelli, 2020). Bérubé and Therrien (2016) show, in the Canadian context specifically, that both direct and indirect forms of R&D support yield better firm performance across a host of indicators (although direct support, used in combination with indirect, is associated with significantly better performance). These findings highlight the potential of targeted direct support as a vehicle to aid innovative businesses with the potential to scale. As well, recent research drawing on interviews with Canadian tech scale-ups documents their preferences for a policy mix that is more heavily weighted towards targeted forms of direct support—which suggests the current policy mix is not fully aligned with their needs (Denney, Southin, and Wolfe 2021). Future work could explore how different forms of government support have influenced the growth trajectories of tech scale-ups, which would help inform on whether the current policy mix adequately supports scale-ups.

To conclude, it is important to underscore the time dimension of the findings presented here. Given the limitations of federal data on firm activity, this report's analysis ends in 2016. More recent studies show that, at least in large urban centers like Toronto, domestic tech growth has only just begun to take off (Denney, Southin, and Wolfe, 2020). Given the record-breaking amounts of venture capital deals in the tech sector (especially in software) over the last five to seven years (Silcoff, Kiladze, Lundy, and Willis, 2021), as well as the increase in Initial Public Offering or IPOs (Orland, 2021), it stands to reason, although it is by no means certain, that the number and performance of Canada's tech scale-ups have changed, and possibly improved, over the past five years. Venture capital and private equity deals, given their concentration in a few firms, do not in and of themselves say all that much about the industry's total performance. But as a proxy measure they do signify a great deal of increased activity in the scale-up sector, and that is worthy of further investigation.

