When It Comes to Entrepreneurs, Youth Isn’t Everything

Star innovators such as Bill Gates, who was 19 when he started Microsoft, Steve Jobs, 21 when he started Apple, and Mark Zuckerberg, 19 when he launched Facebook, have reinforced the long-standing impression that young people are the wellspring of entrepreneurship. Systematic data on firm founders, however, suggest that this impression is false.

In *Age and High-Growth Entrepreneurship* (NBER Working Paper No. 24489), Pierre Azoulay, Benjamin Jones, J. Daniel Kim, and Javier Miranda provide evidence that, on average, successful entrepreneurs are middle-aged. They analyzed administrative data from the U.S. Census Bureau on more than 2.7 million business founders whose companies subsequently hired at least one employee. The mean age of founders was 42. When looking at the highest-growth startups in the economy, the mean age at founding rose still higher — to 45.

The study explores not just the age of founders, but the factors that are correlated with firm success. Founders with prior work experience closer to the specific industry of the start-up, and founders with longer experience in that industry, have substantially greater success rates. “For the 1 in 1,000 highest-growth firms, founders with three or more years of experience in the 2-digit industry see upper tail success at twice the rate” of founders with no experience in the 2-digit industry, the researchers report.

While it is a widely held belief that youth and entrepreneurship go hand in hand, research finds that more successful entrepreneurs launch their enterprises in their 40s than in their 20s.

The first considers technology orientation, which can suggest the potential for high growth. The second considers the actual outcome for the firm, based on the three-, five-, or seven-year time window after founding.

Using third-party venture capital databases, the researchers determine whether a given company has received venture capital financing. They argue that such funding is suggestive of substantial growth potential. They also use employment growth and sales growth as defining characteristics of a high-growth new venture.

“... [C]omputing-oriented ventures as
Automation Can Be a Response to an Aging Workforce

Some worry that rapid technological progress, specifically in automation and robotics, may lead to workers being replaced by machines in many industries, and that this will generate societal disruptions not seen since the onset of the Industrial Revolution. The authors of Demographics and Automation (NBER Working Paper No. 24421) offer a different narrative. Daron Acemoglu and Pascual Restrepo show that changing demographics are one factor that relates to the adoption of new technologies. An aging workforce leads to automation, particularly through robotics, as employers react to a scarcity of middle-aged workers. New automation and robotic technologies. The number of industrial robots per thousand workers in the U.S. manufacturing sector, for instance, stood at 9.1 in 2014; the numbers were significantly higher in Japan (14.2) and Germany (17.0), both of which have older populations.

Using data from a variety of sources, including the International Federation of Robotics, the researchers zero in on the age distribution of the working population as a potential driver of robotic innovation. They define middle-aged workers as those between the ages of 26 and 55, and older workers as those over the age of 55. They find that countries that are undergoing more rapid aging, meaning that they are experiencing a greater proportional decrease in the number of middle-aged workers relative to older workers, invest significantly more in robotics. They are more likely to develop new technologies and manufacture robots, and to deploy these robots in production.

Population aging can explain almost 40 percent of the country-to-country variation in the adoption of industrial robots. The researchers estimate that a 10 percentage point increase in the ratio of the number of middle-aged to older workers is associated with 0.9 more robots per thousand workers. In their

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**Table: Workforce Aging and the Increase in Industrial Automation**

<table>
<thead>
<tr>
<th>Country</th>
<th>Annualized percentage increase in industrial robots per thousand workers, 1993–2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Korea</td>
<td>80</td>
</tr>
<tr>
<td>Germany</td>
<td>40</td>
</tr>
<tr>
<td>Sweden</td>
<td>20</td>
</tr>
<tr>
<td>Denmark</td>
<td>10</td>
</tr>
<tr>
<td>Belgium</td>
<td>-10</td>
</tr>
<tr>
<td>Singapore</td>
<td>-20</td>
</tr>
<tr>
<td>Chile</td>
<td>-40</td>
</tr>
<tr>
<td>Egypt</td>
<td>-60</td>
</tr>
</tbody>
</table>

*Source: Researchers’ calculations using data from the United Nations and the International Federation of Robotics*
High-Speed Rail Expansion and German Worker Mobility

Starting in the late 1990s, Germany expanded its high-speed rail network (HSR), connecting outlying locales to large urban areas. In The Effect of Infrastructure on Worker Mobility: Evidence from High-Speed Rail Expansion in Germany (NBER Working Paper No. 24507), Daniel F. Heuermann and Johannes F. Schmieder study how this large-scale infrastructure investment affected commuter behavior. They find that the expansion reduced travel times and increased commuting, as workers moved to jobs in smaller cities while keeping their places of residence in larger urban areas.

Until the late 1990s, the HSR system connected the largest cities of Germany. The connected cities were located in just three of the 16 German states. Areas between the large cities, through which the tracks ran, campaigned for stations, and in a second wave of expansion, the government added stops in many of these cities.

The researchers analyze the effects of this infrastructure improvement by comparing cities granted stops in the second wave of expansion with other small German cities that were not added to the rail network. They note that new rail stops were not placed due to economic conditions, such as connectedness to urban centers, but because of political factors. Moreover, unlike infrastructure investments in roads and highways, the HSR system exclusively carries passengers. It does not transport goods, so it affects labor but not product markets.

While the implications of population aging for a nation’s productivity are ambiguous, and depend on how technology responds to demographic change, the implications for the relative productivities of specific industries are clear: “[B]ecause of the induced increase in automation, industries with the greatest opportunities for automation should increase their value added per worker relative to other industries.” — Jay Fitzgerald

Expansion of the network between larger and smaller cities reduced travel times by 13 minutes on average, and increased the number of commuters working in smaller cities while retaining homes in larger ones.
enjoy living in large urban areas and are not there solely for employment.

The study concludes that the gains from the investment in infrastructure accrued mainly to smaller cities. Commuters are twice as likely as non-commuters to be college graduates, which suggests that building HSR networks may be one way to engage relatively high-skilled workers in the economies of peripheral regions.

— Morgan Foy

Exploring Wide Productivity Variances among EU Firms

European companies vary widely in output per unit of capital and labor, which means that the European Union (EU) does not produce as much as it could if resources were allocated more efficiently, according to Resource Misallocation in European Firms: The Role of Constraints, Firm Characteristics and Managerial Decisions (NBER Working Paper No. 24444).

The cross-firm spread in labor and capital productivity in EU countries is about twice as large as that in the United States, Yuriy Gorodnichenko, Debora Revoltella, Jan Svejnar, and Christoph T. Weiss calculate. Reducing the EU dispersion to US levels—a change that would likely require many significant policy reforms—could increase the EU’s GDP by more than 30 percent.

The researchers measure firm productivity by studying the marginal revenue product of an extra unit of capital and an extra unit of labor. They find that the cross-firm dispersion of the estimated marginal revenue product of capital (MRPK) has been increasing steadily since the 1990s. The dispersion of the marginal revenue product of labor (MRPL) has also risen, but not as much as the dispersion of MRPK.

To understand why firm productivity varies so widely, the researchers survey a random sample of firms in each of the EU’s 28 nations and match the survey answers to an administrative database with firm-level information. This makes it possible to assess how well firm characteristics, as well as industry-level and country-level variables, can explain firm-level productivity. The variables that help to explain the variation in firm productivity include firm demographics, measures of input quality, capacity utilization, and indicators of the dynamic adjustment of inputs. For example, an older firm with a dated capital stock may be less efficient than a newer firm with state-of-the-art technology and recently acquired capital. Higher capacity utilization is also associated with higher productivity.

The researchers find that when they constrain the effects of these variables to be the same in all EU countries, firm-level characteristics can explain 11.2 percent of the variation in MRPK, and 27.1 percent of the variation in MRPL. When they allow the effect of firm-level variables to differ across countries, so that the effect of a rise in capacity utilization influences the predicted productivity of a German firm differently than an Italian firm, they can explain most of the variation in productivity. The researchers show that, in terms of labor allocation, firms are more segmented across countries than across industries, as seen in the fact that differences in the levels of MRPL are higher across countries than across industries. The opposite is true for capital. This suggests that national regulations and language barriers could play an important part in the efficiency of resource allocation within the EU.

They also find that measures of each country’s business, institutional, and policy environment contribute to explaining the dispersion of firm productivity.

— Laurent Belsie
Corporate Money in Politics: A Philanthropic Channel

The channels through which corporations may support elected officials is a subject of long-standing and contentious debate in the United States. Firms’ capacity to spend on behalf of elected officials of whom they approve increased markedly with the Supreme Court’s Citizens United decision in 2010. While a large body of research has studied the determinants of corporate political contributions and has attempted to track their consequences, almost no attention has been paid to another channel through which corporations may interact with elected officials: corporate philanthropy.

Do corporations which support or have business with office holders make sizeable charitable donations either to charities located in those politicians’ districts, or on whose boards the politicians serve? This is the question examined by Marianne Bertrand, Matilde Bombardini, Raymond Fisman, and Francesco Trebbi in Tax-Exempt Lobbying: Corporate Philanthropy as a Tool for Political Influence (NBER Working Paper No. 24451). Using data on corporate charitable giving, lobbying, and congressional committee assignments, the researchers construct a measure that links corporate interests, which are declared in corporate lobbying disclosure forms, to relevant congressional committees, and then to the members of those committees.

Studying corporate foundations associated with Fortune 500 and S&P 500 companies, they find that a foundation’s grants to charitable organizations located in a congressional district are higher when the representative of that district holds a seat on a committee that deals with policy relevant to the firm associated with the foundation. This pattern surrounding corporate charitable giving and committee seats is echoed in corporate political action committee (PAC) spending. When legislators leave Congress, there is a drop in corporate donations into their districts, as seasoned and influential members of Congress are replaced by freshmen, a pattern that also appears for PAC contributions.

Nonprofit organizations with a member of Congress on their board are four times more likely than peer organizations to receive grants from corporate foundations.

The researchers develop a model to assess the fraction of corporate charity that may be politically motivated, and estimate that about 7 percent of the $18 billion in total corporate charitable contributions made in 2014, or about $1.3 billion, was allocated in ways that might have had political motivation. They note that this is 280 percent higher than annual PAC contributions made to candidates in the 2013–14 cycle, and about 40 percent of total annual lobbying expenditures in 2014. The research suggests that campaign donations and lobbying may not be the only channels through which corporations seek to influence elected officials. They see their findings “as highlighting the need to go beyond easily observable channels in order to gain a broader appreciation of the full role of corporate influence in politics.”

— Dwyer Gunn
Postdoctoral Fellowships and Career Choice in Science

What works in supporting the pipeline of scientific talent development? The National Institutes of Health (NIH) has been asking that question for decades, and has funded undergraduate and graduate fellowships, research grants, and other programs designed to train and encourage promising young scientific researchers.

In *The Impact of Postdoctoral Fellowships on a Future Independent Career in Federally Funded Biomedical Research* (NBER Working Paper No. 24508), Misty L. Heggeness, Donna K. Ginther, Maria I. Larenas, and Frances D. Carter-Johnson explore the effects of the NIH’s Ruth L. Kirschstein National Research Service Award (NRSA). This is a training program that supports undergraduate, graduate, and postdoctoral fellowships. The researchers focus on its post-graduate component, and conclude that this program has raised the number of scientists carrying out NIH-funded biomedical research.

In 2008, the NRSA spent about $751 million supporting research for 16,370 researchers, of whom 1,487, or about 9 percent, received so-called “F32” postdoctoral fellowships. Competition for the awards can be fierce.

Over the years, a number of studies have been conducted to measure the impact of the NRSA training programs. A perennial question is whether fellowship programs raise the likelihood of a career in science, or whether they simply keep Ph.D. recipients in the research field for a few years before they pursue other opportunities. The new study focuses specifically on the F32 program and how it affects the careers of fellowship recipients. The researchers consider in particular how fellowship receipt affects the number of NIH research grants that a researcher receives over the course of his or her career.

The study draws on data from the NIH, the National Science Foundation, and other sources. It focuses on 14,276 F32 fellowship applicants over the period from 1996 to 2008, and on NIH grant applications through 2015. The researchers tracked NIH grants to all of the F32 fellowship applicants through their post-fellowship careers. They compared the grant experiences of researchers who received fellowships to those of researchers with very similar characteristics, going by their fellowship applications, but who did not win a fellowship.

The study finds that receiving an NRSA fellowship increases the likelihood that a researcher will continue to be involved in NIH-funded research later in his or her career by between 6.3 and 8.2 percentage points. The probability that a researcher will subsequently receive an NIH-funded “R01” grant award, an indication of an independent research career, rises by between 4.6 and 6.1 percentage points.

— Jay Fitzgerald

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