

Information and Communications Technology Spending and City Size

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The widespread adoption of new technologies is key for economic growth. Companies that adopt better technology can produce more goods and services with fewer inputs. However, in the United States, the adoption of new technologies has been uneven. Firms in big cities have spent more money per employee and a larger share of their total investment budget on new information and communications technology (ICT) than firms in small cities. Rubinton (2020) examines the relationship between ICT spending and city size and finds that the incentives to adopt new technologies will be stronger in bigger cities with abundant skilled labor and in cities with a comparative advantage in using skilled labor.

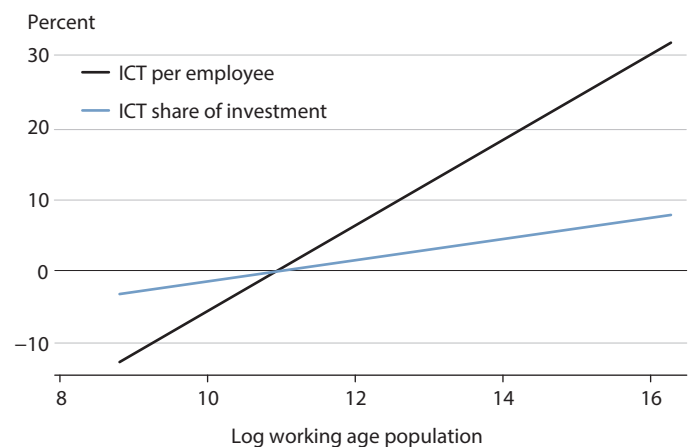
The Relationship Between ICT Spending and City Size

The figure shows the relationship between firm-level ICT spending, conditional on the size of the firm's city, relative to ICT spending in an average city,¹ with controls for firm-specific differences such as industry, age, and number of employees. The black line shows the relationship between ICT expenditures per employee and city population; the blue line shows the relationship between the share of a firm's investment spent on ICT and city population. ICT spending includes spending on purchase, rental, lease, and maintenance payments for software, computer equipment, and other peripheral ICT equipment.

Firms in big cities spend more on ICT-related expenses. Firms in the largest cities, such as New York City and Los Angeles, spend over 30 percent more on ICT-related expenses per employee than firms in average-sized cities. Additionally, they spend about 8 percent more of their total investment budget on ICT-related expenses. The figure also tells us that firms in the smallest cities spend 12 percent less on ICT-related expenses per employee than firms in average-sized cities and about 2 percent less of their total investment budget on ICT-related expenses.

Why do firms in big cities spend more on ICT investment than their counterparts in less-populous areas? One possibility is that industry composition, firm size, and firm age drive the differences in ICT spending across cities. For

Information and Communications Technology Spending Relative to the Mean



NOTE: The figure shows the line of best fit for the relationship between city size and average ICT-expenditures for a firm relative to average ICT expenditures in an average-sized city. Population is measured as the working age population (ages 20-64). This research was performed at a Federal Statistical Research Data Center under FSRDC Project Number 1975. Any views expressed are those of the authors and not those of the U.S. Census Bureau.

SOURCE: Census Bureau: ICT spending is analyzed using the annual ICT supplement from the Annual Capital Expenditures Survey; Disclosure Review Board and Disclosure Avoidance Officers have reviewed this information product for unauthorized disclosure of confidential information and have approved the disclosure avoidance practices applied to this release. Data on employment, payroll, sales, and industries are from the Longitudinal Business Database. Population data are from the intercensal population estimates.

example, New York City hosts a larger share of financial services firms than most other cities and financial-services firms also spend more on ICT than firms in other industries. Large firms also spend more on ICT than small ones. While firm size and industry may determine an individual firm's spending on ICT, neither explains the differences in investment across city size. Both lines in the figure are calculated after first adjusting for the effect of differences in a firm's age, number of employees, number of establishments, and industry.

What Drives Higher Rates of ICT Spending in Big Cities?

Rubinton (2020) identifies three city-level characteristics that drive technology adoption. First, firms in big cities

have larger markets for their products and so can spread a fixed cost for technological innovation across more units of production. Second, if ICT complements skilled labor,² then firms will adopt more ICT in cities where they can easily and cheaply find skilled labor, which is more abundant in large cities. Third, firms will adopt more ICT in cities that already have a productivity advantage in using skilled labor: If firms in a city are already better at using skilled labor, then they will have more incentive to adopt technology that complements skilled workers.

Firms in big cities are spending more on information and communications technology than firms in small cities, a likely cause of the growing economic divide between big and small U.S. cities.

In the United States, big cities tend to have a relatively larger supply of skilled workers and are more productive in using skilled workers. Thus, all three of these channels may be important drivers of greater technology adoption by firms in big cities relative to small cities.

Conclusion

Firms in larger cities spend more on ICT than those in smaller cities, suggesting that the benefits of new skill-biased innovations have accrued more to big cities. The uneven adoption of technology across cities tends to increase the relative wages and relative supply of skilled workers in big cities. Rubinton (2020) analyzes the implications of uneven adoption of new technologies for geographic differences in the skill premium for workers, the supply of skilled workers, and business dynamism. The findings suggest that differences in technology adoption are likely one of the forces behind the growing economic divide between big and small cities in the United States (see also Moretti, 2012). ■

Notes

¹ City size, measured by the working age population in a city, ranges from 6,688 to 11.7 million, with an average of 178,058.

² A large literature has identified ICT as being intimately related to skill-biased technical change (e.g., Katz and Murphy, 1992).

References

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