



Contents lists available at ScienceDirect

J. Finan. Intermediation

journal homepage: www.elsevier.com/locate/jfi

Stock markets, credit markets, and technology-led growth[☆]

James R. Brown^a, Gustav Martinsson^b, Bruce C. Petersen^{c,*}

^a Iowa State University, College of Business, Department of Finance, 3331 Gerding Business Building, Ames, IA 50011-1350, United States

^b Royal Institute of Technology (KTH) and Swedish House of Finance (SHoF), Lindstedtsvägen 30, SE-100 44 Stockholm, Sweden

^c Washington University in St. Louis, Department of Economics, Campus Box 1208, One Brookings Dr., St. Louis, MO 63130-4899, United States

ARTICLE INFO

Article history:

Received 4 December 2015

Revised 8 June 2016

Accepted 10 July 2016

Available online xxx

JEL classifications:

G10

O16

O40

Keywords:

Finance and growth

Innovation

Technological progress

Stock market development

Financial system architecture

ABSTRACT

The high-tech sector accounts for the majority of corporate innovation in modern economies. In a sample of 38 countries, we document a strong positive relation between the initial size of the country's high-tech sector and subsequent rates of GDP and total factor productivity growth. We also find a strong positive connection between a country's equity (but not credit) market development and the size of its high-tech sector. Our main difference-in-differences estimates show that better developed stock markets support faster growth of innovative-intensive, high-tech industries. The main channels for this effect are higher rates of productivity and faster growth in the number of new high-tech firms. Credit market development fosters growth in industries that rely on external finance for physical capital accumulation but is unimportant for growth in innovation-intensive industries. These findings show that stock markets and credit markets play important but distinct roles in supporting economic growth. Stock markets are uniquely suited for financing technology-led growth, a particularly important concern for advanced economies.

© 2016 Elsevier Inc. All rights reserved.

1. Introduction

A strong case can be made that the high-tech sector is the single most important driver of long-run economic growth in advanced economies. The main reason is that the high-tech sector accounts for the vast majority of corporate R&D investment.¹ For example, in the last 15 years, four two-digit SIC high-tech industries account for nearly 80% of U.S. corporate R&D. During the same period, the high-tech sector's share of worldwide patents

registered at the United States Patent and Trademark Office (USPTO) is over 60%.²

Another distinguishing characteristic of the high-tech sector is that there is arguably no other sector more prone to under-investment due to financing frictions (e.g., Hall, 2002). Briefly, these frictions include: (i) large asymmetric information problems arising from the difficulties educating potential investors when projects involve cutting-edge science, (ii) limited collateral value stemming from the intangible nature of high-tech R&D, and (iii) pronounced costs of financial distress given the large fraction of high-tech market values accounted for by future growth options (e.g., Brealey and Myers, 2000). These frictions imply that both the extent and the nature of a country's financial market development can influence the performance of its high-tech sector and rate of technological progress.

In this study, we explore the role equity and credit markets play in the process of technology-led growth. Equity financing arguably has several advantages over debt (e.g., Brown et al., 2009) when it comes to funding high-tech investment, including: (i) the nature of the equity contract is better suited for funding investments with a high chance of failure but some chance of spectacular success, (ii)

[☆] We appreciate the many useful suggestions we received from conference and seminar participants at the Institute for Financial Research (SIFR), Research Institute of Industrial Economics, Lund University, University of Gothenburg, and the CEPR Conference on Finance and the Real Economy in St. Gallen, Switzerland. We also thank Thorsten Beck, Mike Burkart, Ross Levine, Johan Hombert, and Alminas Zaldokas for comments on early versions of the manuscript. We are particularly grateful to Charles Calomiris (the editor) and an anonymous referee for suggestions that greatly improved the paper. The paper was originally circulated under the title "Access to External Finance and Technology-Led Growth: Does the Type of Finance Matter?".

* Corresponding author.

E-mail addresses: jrbrown@iastate.edu (J.R. Brown), gustav.martinsson@indek.kth.se (G. Martinsson), petersen@wustl.edu (B.C. Petersen).

¹ See Romer (1990) and Aghion and Howitt (1992) for seminal theoretical studies on the role of R&D and innovation for economic growth.

² We plot these developments in Figs. 1 and 3. The high-tech industries correspond to two-digit SICs 28, 35, 36, and 38. Also see the evidence on high-tech's share of patenting and patent citations in Hall et al. (2005).

collateral is not pledged to secure external equity finance, and (iii) equity finance does not accentuate problems of financial distress. The relative importance of stock markets and credit markets for promoting growth in high-tech remains, however, an open question, particularly given that a number of recent studies report that access to debt finance promotes innovation, particularly patenting.

Our analysis is based on a sample of 38 countries over the period 1980–2005. We begin by documenting the broad, cross-country connections between financial development, the size of the high-tech sector, and economic growth. First, we document a positive and economically significant relation between the initial share of economic activity located in high-tech industries and subsequent rates of GDP and total factor productivity growth. Next, we find a strong positive connection between a country's equity market development and the size of its high-tech sector, but no relation between credit market development and high-tech production. While only suggestive, these broad connections are consistent with the idea that equity markets are particularly important for technology-led growth.

Our main tests use data on industry-level growth rates and a difference-in-differences approach that is similar in spirit to the tests developed in a seminal study by Rajan and Zingales (RZ, 1998). RZ show that financial development has a positive differential effect on the growth of industries that are more technologically dependent on external finance. By construction, the RZ measure of industry financial dependence captures the amount of *fixed capital* investment that is not financed out of internal operating cash flow. In addition to the RZ measure of financial dependence, we also study a measure of industry R&D dependence. The addition of R&D dependence allows us to test whether the nature of financial development has a different impact on industry growth depending on the innovative-intensity of the industry.

When we include only the RZ measure of financial dependence, we find positive and significant differential effects on growth for both stock market and credit market development, similar to RZ. However, once we include *both* the RZ measure of financial dependence and industry R&D dependence, stock markets are associated with faster growth in industries with higher R&D dependence, while credit markets only have significant effects on growth in industries with high RZ dependence. That is, stock market development matters for the differential growth of high-tech industries, while credit markets have a positive differential effect on growth rates in industries that rely extensively on external finance to fund their fixed capital investments. These results are consistent with the view that stock markets are well-suited for funding risky, intangible activities, while credit finance is more important for activities with substantial collateral value.

We provide a number of tests of robustness and extensions of our main difference-in-differences findings. Notably, we reach identical conclusions if we explore the differential impact of equity markets across industries sorted by patenting activity rather than R&D intensity. We also show that the impact of stock market development on high-tech growth comes principally from higher productivity growth, not fixed capital accumulation. In addition, when we decompose growth into the number of establishments (extensive margin) and the average size of existing establishments (intensive margin), stock market development matters primarily for growth in the number of high-tech firms.

Our study is relevant for several unsettled issues in the influential literature on finance and growth (e.g., King and Levine, 1993; Levine, 1999; Levine et al., 2000; Levine, 2005). First, compared to the large literature on the distinctive role that banks play in the allocation of capital and process of economic growth (e.g., Diamond, 1984; Boot and Thakor, 1997; Stulz, 2000), only a few studies emphasize the uniqueness of stock markets (e.g., Allen and Gale, 1999; Rajan, 2012). In addition, empirical evidence

on the particular importance of equity market development for economic performance is relatively limited. Zingales (2015), for example, notes that “there is remarkably little evidence that the existence or the size of an equity market matters for growth.”³ Our work highlights the comparative advantage of equity markets in financing technology-led growth.

A second outstanding issue concerns the limited evidence that the structure of financial market development matters for economic growth. Levine (2005) concludes from his survey of the finance and growth literature that “countries with better functioning banks and markets grow faster, but the degree to which a country is bank-based or market-based does not matter much”. Our findings are not necessarily at odds with this conclusion, but our results do highlight different mechanisms through which stock markets and credit markets are growth-enhancing: equity markets support technology-led growth, while credit markets matter for the growth of industries that rely on external finance to fund fixed investment. Moreover, though we focus separately on stock market and credit market development, rather than financial structure *per se*, an important implication of our study is that countries with market-based financial systems should be better positioned than their bank-based counterparts to finance technology-driven growth. Given the increasing importance of technological progress for growth in modern economies, our findings suggest that financial system architecture may be a more important determinant of growth going forward than research has found in the past.⁴ In this sense, our findings are useful for understanding why stock markets appear to be more important for growth as an economy's level of financial and economic development increases (e.g., Tadesse, 2002; Demirgüç-Kunt et al., 2013).

Our study builds on and contributes to the literature in two other ways. First, our study is relevant for theoretical and empirical efforts to understand the causal connections between innovative activity, productivity gains, and long-run economic growth (e.g., Romer, 1990; Aghion and Howitt, 1992, 1998; Bayoumi et al., 1999; Griffith et al., 2004). Our findings support the link between innovation and growth emphasized in these literatures, but we also highlight the key role that equity markets play in this process.⁵

Second, our study contributes to an emerging debate on the relation between credit markets and innovation. One segment of this literature explores the impact of U.S. banking deregulation on innovation. Chava et al. (2013) and Amore et al. (2013) report an increase in patenting in some types of firms following interstate banking deregulation, which arguably increased credit supply. Cornaggia et al. (2015), however, find that although interstate branching deregulation led to more patenting by small private firms, the overall effect on state-level patenting was *negative*. In a similar vein, Berger et al. (2015) use a synthetic matching procedure and report a relative *decline* in state-level patenting following intrastate banking deregulations. Overall, these studies provide mixed evidence on the role credit markets may play in the process of innovation-led growth.

³ A few important studies do explore the connection between stock markets and growth using aggregate data, including Levine and Zervos (1998), Rousseau and Wachtel (2000), and Beck and Levine (2004).

⁴ For example, see Beck and Levine (2002) and Levine (2002). Carlin and Mayer (2003) find some evidence that financial structure matters for growth, where structure is measured by proxies for information disclosure and the size and concentration of credit markets. Their study is very different from ours as they do not attempt to distinguish the role of credit versus equity market development and they do not explicitly explore the high-tech sector.

⁵ A related literature examines the consequences of financial innovation for economic performance (e.g., Merton, 1992; Allen and Gale, 1994; Zarukskie, 2013). Notably, the model in Laeven et al. (2015) shows that technological innovation eventually stops unless financiers keep innovating. One implication of our study is that innovations expanding the supply of external equity financing should be particularly pivotal for technology-led growth.

Download English Version:

<https://daneshyari.com/en/article/7362307>

Download Persian Version:

<https://daneshyari.com/article/7362307>

[Daneshyari.com](https://daneshyari.com)