



Financial development, sectoral reallocation, and volatility: International evidence[☆]



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ARTICLE INFO

Article history:

Received 19 June 2012

Received in revised form 30 March 2015

Accepted 31 March 2015

Available online 11 April 2015

JEL classification:

E32

E44

G11

O16

Keywords:

Financial development

Volatility

Growth

Diversification

Mean-variance efficiency

ABSTRACT

This paper studies how financial development affects the volatility of GDP growth through the channel of sectoral reallocation. For 28 OECD countries over the period 1970–2007, we construct a benchmark industrial portfolio that minimizes the economy's long-term volatility for a given level of long-term labor productivity growth. We find that financial development substantially increases the speed with which the observed industrial composition of output converges toward the benchmark. To overcome endogeneity concerns, we exploit sectoral sensitivities to financial deepening and exogenous liberalization events.

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1. Introduction

A large empirical literature over the past two decades has documented important growth benefits of financial development, but does higher growth come at the cost of increased economic volatility? While frequent financial crises in both developing and developed countries seem to suggest that the answer is “yes,” the literature has identified two channels through which financial development can in fact reduce growth volatility. The first is the stabilization of intrasectoral output. Braun and Larrain (2005) and Raddatz (2006) use sectoral data on value added in large cross-sections of countries, and find that financial development lowers output volatility, more so in financially vulnerable sectors. As long as industrial shares and the correlations of

sectoral output remain constant, these results imply a reduction in overall volatility. Second, financial development can induce an intersectoral reallocation of output away from sectors with a large contribution to aggregate volatility. This argument relies on a portfolio optimization mechanism à la Markowitz (1952) that exploits the correlations in sectoral returns across sectors. Using this approach, Acharya et al. (2011) show that branching deregulation in the United States has reduced state business-cycle volatility through a reallocation of output toward sectors with a large optimal weight implied by mean-variance efficiency.

This paper contributes to the literature by testing the second mechanism in an international context. In theory, diversification of output through the channel of volatility-reducing reallocation may not be a universal outcome of financial development if it depends on the superior institutional features of a particular country (the United States). Our results strongly suggest that this is not the case. Our approach is as follows. We first acquire data on output and employment for nine sectors for 28 OECD countries starting in 1970. We use these data to construct, for each country, a benchmark set of optimal sectoral employment shares, which minimizes long-term aggregate volatility for a given level of long-term growth. In particular, a sector's optimal share is derived from an argument that depends on the sector's own relative labor productivity and labor productivity growth, as well as on the volatility and the correlation with other sectors thereof. We then estimate the effect of financial development (captured in the main

[☆] We thank Luc Laeven for sharing with us a variety of data. For useful comments, we thank Geert Bekaert, Enrica Detragiache, Charles Engel (the editor), Gabriel Fagan, John Fernald, Pierre-Olivier Gourinchas, Philipp Hartmann, Jean Imbs, Urban Jermann, Sebnem Kalemli-Ozcan, Dirk Krueger, Luc Laeven, Ross Levine, Leslie Lipschitz, Florencio Lopez-de-Silanes, Valerie Ramey, Sergio Rebelo, Rafael Repullo, Helene Rey, Peter Tufano, two anonymous referees, seminar participants at the ECB and the IMF, and conference participants at the 2010 Financial Intermediation Research Society Meeting, the National Bank of Poland Conference “Heterogeneous Nations and Globalized Financial Markets,” the 2010 World Congress of the Econometric Society, and the 2011 Federal Reserve Bank of Chicago Annual International Banking Conference. The opinions expressed herein are those of the authors and do not necessarily reflect those of the ECB or the Eurosystem.

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tests by the level of private credit to GDP) over time on the speed with which the economy's actual industrial composition converges to the benchmark. The evidence strongly suggests that financial development has accelerated this convergence. A two-standard-deviation increase in financial development results in a roughly 0.6% higher annual speed of convergence toward the efficient industrial composition. By means of illustration, if in 1970 Italy had as deep credit markets as the United States, then in 2007 its economy would have exhibited a sectoral composition associated with 10% lower volatility than the realized one, for the same level of realized labor productivity level and growth.

We address a number of concerns about the interpretation and robustness of our main findings. First, our results suggest that developed financial markets reduce long-term volatility by exploiting the correlations across sectors in labor productivity level and growth, rather than by simply increasing the weight of low-volatility sectors. An alternative mechanism implied by our results could be the following: finance reallocates resources toward fast-growing sectors, and so they become larger. Because large sectors are more stable, aggregate volatility declines over time. If this is the case, the correlations in sectoral returns would be irrelevant for the evolution of aggregate volatility, and we could simply be capturing a finance-induced reallocation toward (ex-post) low-volatility sectors. However, we show that when in the construction of the optimal industrial portfolio we artificially set the correlations across sectors to zero, the effect of financial development on the speed of convergence disappears. This result sheds new light on how financial development affects the economy. In particular, Wurgler (2000) argues that in financially developed economies booming sectors grow faster by generating higher investment, and Imbs (2007) shows that high-growth sectors tend to have higher volatility. We argue that these results are not incompatible with lower long-term aggregate volatility if at the same time output is reallocated away from sectors with a large contribution to aggregate volatility through the growth correlations mechanism.

The second concern is methodological. In the calculations of the mean-variance efficiency frontier, we implicitly assume that there are no structural breaks in the underlying stochastic process generating the unconditional frontier. While this can be true for economies with mature financial markets, many of the countries in our sample underwent financial liberalization during our sample period, possibly inducing a structural break in the sectoral returns. We account for this possibility by repeating our tests on a subsample of countries that liberalized their financial markets prior to the start of the sample period. We also calculate benchmark industrial allocations for more than one period per country (before and after the start of the “Great Moderation”). Our main estimates are qualitatively unaltered by these alternative approaches.

Third, our results might be biased by a demand-driven move over the development cycle toward sectors with lower intrinsic volatility, like health provision, education, and government services (Koren and Tenreyro, 2007). They also could be related to the increase in size of the service sector fueled by a finance-promoted shift toward more capital-intensive technologies (Larrain, 2010). In that regard, the estimated positive effect of finance on convergence toward the benchmark allocation might be biased by a preference-driven or a technology-driven global move away from intrinsically volatile sectors. We address this concern by employing a panel specification with industry-year and country-industry fixed effects. This accounts for convergence-affecting mechanisms that are time-invariant for each sector in each country or that display sector-specific trends. Consequently, we are able to isolate the contribution of the time-varying country-specific component of finance to convergence.

Fourth, our estimates can be contaminated by omitted variables bias and reversed causality. For example, unobserved risk aversion or propensity to save might be driving both output reallocation and financial development. Alternatively, if financial services have a “luxury good” component, richer and better diversified economies would

demand more of them. We address these concerns in a number of ways. First, in the spirit of Rajan and Zingales (1998), we exploit the variation across sectors in natural technological dependence on external finance, and show that convergence is faster for sectors that are naturally sensitive to credit market development. We also replace our continuous measure of financial development with dummy variables proxying for financial liberalization. This *de jure* measure is largely exogenous (Bekaert et al., 2005) and so it should additionally address concerns about the endogeneity of financial development. Finally, we show that convergence is at play in both capital-intensive and labor-intensive sectors, assuaging concerns about our results being driven by the fact that countries that are better diversified and at the same time derive a larger share of economic output from more capital intensive industries can demand larger financial sectors.

Our results inform the literature on the effect of financial development on economic volatility. For example, Hellmann et al. (2000) argue that financial development fuels competition and erodes banks' franchise value, thus incentivizing banks to take on more risk. Since governments cannot commit to not provide bailouts in times of crises, banks have incentives to gamble for resurrection, exacerbating the business cycle. Alternatively, financial development can reduce volatility by alleviating information asymmetries, thus reducing the role of borrower's net worth in the amplification of shocks (Aghion et al., 1999; Caballero and Krishnamurty, 2001).¹ Empirical work using various sample periods and proxies for financial development has presented evidence to both ends. For instance, Easterly et al. (2000) find that financial development reduces output volatility, and Bekaert et al. (2006) find that financial liberalization reduces consumption volatility. At the same time, Kaminsky and Reinhart (1999) link credit growth to crises, and Beck et al. (2006) find no correlation between financial development and long-term volatility. Using sectoral data, Braun and Larrain (2005), Larrain (2006), and Raddatz (2006) present evidence that financial development lowers output volatility in manufacturing industries with high external dependence and liquidity needs. However, Levchenko et al. (2009) show that financial liberalization increases volatility, more so in financially vulnerable sectors. We contribute to this literature by estimating a robust negative association between financial development and aggregate volatility in a large cross-section of countries and by demonstrating the link between the reduction in volatility and the finance-driven evolution of the economy's industrial composition.

We also relate to a vast empirical literature on the finance and growth nexus.² This literature documents a significant, positive, causal effect of finance on economic growth, both at the country level (e.g., Levine and Zervos, 1998; Beck et al., 2000; Bekaert et al., 2005) and at the sector level (e.g., Rajan and Zingales, 1998; Fisman and Love, 2007; Gupta and Yuan, 2009).³ This literature usually abstracts from the effect of finance on volatility. In comparison, we use a mean-variance efficiency approach to study how financial development affects growth and volatility simultaneously.

Finally, our paper is related to a growing body of literature that has focused on the link between economic growth and volatility of growth. From a theoretical point of view, the link is ambiguous. For example, endogenous growth is affected by business-cycle volatility negatively in the presence of diminishing returns to investment, and positively in the presence of precautionary savings, creative destruction, liquidity constraints, or high-return high-risk technologies. The combined evidence implies that growth and volatility tend to relate negatively at

¹ In general, the effect of finance on the variability of output is expected to vary depending on whether monetary or real shocks are at play (Bachetta and Caminal, 2000) and on whether the real shocks are due to shifts in credit demand or in credit supply (Morgan et al., 2004).

² The idea to link finance and growth in a causal way traces back to Schumpeter (1912) and later Goldsmith (1969) and McKinnon (1973), but the modern impetus for studying the nexus is usually attributed to King and Levine (1993a,b).

³ For recent surveys, see Beck et al. (2001); Wachtel (2001) and Levine (2005).

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