



# Financial development and barriers to the cross-border diffusion of financial innovation



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## ABSTRACT

This paper explores the determinants of financial development by focusing on the role played by barriers to the diffusion of financial technology. These barriers are measured using human genetic distance from the technology frontier. The results based on cross-sectional data for 123 countries suggest that genetic distance to the global frontier has an economically and statistically significant effect on financial development, in that countries that are genetically far from the technology leader tend to have lower levels of financial development. Genetic distance is found to have the largest effect, even after controlling for other determinants of financial development established in the literature. These findings indicate that cultural barriers to the diffusion of financial technology across borders impact financial development by influencing the follower countries' ability to adopt and adapt innovations from the frontier.

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## 1. Introduction

There is now a widespread consensus in the literature recognizing the important role of financial development as a source of economic growth (see, e.g., King and Levine, 1993; Demetriades and Hussein, 1996; Levine, 1997; Rajan and Zingales, 1998; Beck et al., 2000; Demetriades and Andrianova, 2004; Ang and McKibbin, 2007; Ang, 2011; Andrianova et al., 2012; Madsen and Ang, 2013). The preponderance of evidence suggesting the beneficial role of financial development has shifted the focus of research towards answering the question of why some countries have well-functioning financial systems whereas others do not.

Several explanations have been proposed. The prominent law and finance theory of La Porta et al. (1997, 1998) stresses the importance of the legal tradition of a country in shaping the subsequent development of its financial system. Other influential works offer alternative perspectives, underlining the importance of endowments (Acemoglu et al., 2001; Beck et al., 2003), financial

and trade openness (Rajan and Zingales, 1998; Baltagi et al., 2009) or culture (Stulz and Williamson, 2003). However, despite the above contributions, one potential factor underlying differences in the level of financial development across nations – barriers to the diffusion of financial innovation – has thus far not been considered in the literature.

Major innovations in the financial sector often take place in technologically sophisticated countries such as the United States. These inventions, such as cash dispensing automatic teller machines (ATMs), electronic payment mechanisms, on-line trading of securities, internet banking, and electronic record-keeping of credit scores, have significantly improved the functioning of financial systems in the frontier countries. A pertinent question is why these innovations do not flow easily to financially backward countries. One plausible source of this impediment is the existence of significant cultural barriers between the frontier and the followers. These development barriers, which can be captured by the genetic distance between countries according to Spolaore and Wacziarg (2009), prevent the free flow of financial innovations through imposing costs on imitation and adaptation.

Against this backdrop the purpose of this paper is to shed some light on how barriers to the diffusion of financial technology affect financial system deepening. We argue that genealogical distance works as a barrier to the diffusion of financial innovations across populations and countries. The underlying premise of this proposition is that populations that are genetically more distant tend to

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differ more in a variety of characteristics that are transmitted inter-generationally, such as language, appearance, norms, values, customs, beliefs, and habits. Differences in these traits between populations hinder the exchange of ideas and reduce opportunities for learning, imitating and adopting, thereby serving as barriers to the diffusion of innovations in financial products and services from the frontiers to the laggard countries.

Conversely, a country with a population genealogically similar to the financial technology leader is able to facilitate the diffusions more effectively since they share similar traits and characteristics, which enables the transfer of financial technology and the diffusion of financial knowledge to take place easily. Such a country is also more likely to act in similar ways in its formulation of financial sector policies and the introduction of financial reforms, and hence is less likely to experience financial backwardness.

We use human genetic distance data compiled by [Spolaore and Wacziarg \(2009\)](#), who provide a summary measure of the degree of genealogical relatedness between populations over time, to investigate how development barriers due to genetic distance relative to the frontier influences variations in the levels of financial development across the globe. Although human genetic distance is not commonly studied in the social sciences, several recent papers have pointed out its important role in predicting economic outcomes.

In particular, the seminal work of [Spolaore and Wacziarg \(2009\)](#) shows that genetic distance between populations is strongly correlated with differences in per capita income across countries. They argue that genetic distance between populations captures the divergence in a wide range of traits and characteristics transmitted across them, and interpret the effects of this distance as barriers to the diffusion of economic development from the world technological frontier, since differences in these traits hinder the flow of ideas, goods, and technologies across populations, which curbs development.

Besides, a related work by [Guiso et al. \(2009\)](#) demonstrates that genetic distance between European populations lowers bilateral trust, which in turn leads to less economic exchanges, such as trade, portfolio investment and direct investments, between countries. [Giuliano et al. \(2006\)](#), however, show that the effect of genetic distance between European populations on trade volume disappears once geographic factors are properly controlled for. Our work is closely related to the above studies. However, unlike them, we study how genetic distance explains differences in the levels of financial development, rather than income or trade flows, across countries.

Using data for 123 countries, our results indicate that genetic distance to the frontier (i.e., the United States) has an economically large and statistically significant effect on differences in the levels of financial development across countries, supporting the notion that diffusion barriers due to genetic distance reduce financial development. The results are remarkably consistent when we control for the effects of creditor rights, trade openness, financial openness, legal origins, geographic factors, and religions. These findings are also robust to the use of alternative measures of financial development and genetic distance, the choice of technological frontier, and the inclusion of ethnic fractionalization, institutional quality, social capital and continent-fixed effects in the specification. Similarly, excluding the OECD or Neo-Europes does not eliminate the significant effect of genetic distance to the frontier on financial development.

The rest of the paper is organized as follows. Section 2 briefly reviews the related literature. Section 3 discusses the data and sets out the empirical strategies. The estimates are presented and discussed in Section 4. Section 5 provides some robustness checks. Section 6 tests whether the effect of cultural diffusion barriers on

income works through financial development, and the last section concludes.

## 2. Related literature

The growing consensus that financial development promotes growth has spawned an expanding body of research that examines its determinants. The existing literature has highlighted several factors that might account for the differences in the level of financial development across countries.

One influential strand emphasizes legal systems, particularly the legal and regulatory frameworks involving property rights protection, contract enforcement, and creditor rights, as an important determinant of financial development. For example, the Law and Finance view articulated by [La Porta et al. \(1997, 1998\)](#) stresses that the legal origin of a country is a good predictor of how efficient the legal system is in protecting investor rights and enforcing contracts. Focusing on the differences between the most influential legal traditions, they find that countries with the British common law origin emphasize freedom of contract and provide the highest levels of investor protection, hence achieving higher levels of financial development than countries with French, German or Scandinavian civil law origins. [Djankov et al. \(2007\)](#) further demonstrate that legal creditor rights and information-sharing institutions are important determinants of financial development. When lenders can more easily enforce repayment, seize collateral, gain control over firms, and have better access to information about potential borrowers, they will be more willing to extend credit.

Some proponents of the endowment theory stress the important role of geography and the disease environment in shaping institutional development. The underlying premise of this hypothesis is that countries located closer to the equator have a more tropical climate where a high prevalence of pests and disease hinders production. The lack of economies of scale in agriculture prevents specialization, and hence retards innovation and institutional and economic development ([Gallup et al., 1999](#)). [Acemoglu et al. \(2001\)](#) extend this argument by proposing that tropical endowments represented an inhospitable disease environment for European settlers, who therefore focused on extracting resources from colonies and, this led to the development of extractive institutions. Furthermore, [Beck et al. \(2003\)](#) argue that under an extractive environment, colonizers focused on establishing institutions in favor of small elite groups rather than private investors, which dampened property rights protection and contract enforcement, subsequently retarding financial development.

Openness is another important dimension relevant to the shaping of financial development that is often highlighted in the literature. The influential work of [Rajan and Zingales \(2003\)](#) proposes that the incumbent interest groups frequently stand to oppose the policies that would foster financial deepening so as to prevent their rents from being eroded due to greater competition. The strength of the interest groups, however, will be lower the more open the economy is to trade and capital flows. This follows from the fact that new opportunities created by openness may generate enough profits to overcome the loss of rents resulting from increased competition and the loss of incumbency. Hence, their theory suggests that the simultaneous opening of both trade and capital accounts holds the key to successful financial development. [Herger et al. \(2008\)](#) and [Baltagi et al. \(2009\)](#) test this hypothesis and find some supporting evidence.

Differences in the levels of financial development may also be due to cultural diversity, according to [Stulz and Williamson \(2003\)](#). This view proposes that, unlike Protestantism, Catholic and Muslim religions tend to produce relatively centralized hierarchical and authoritative governments with powerful religious

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