Financial Development and Genetic Diversity

Abstract

A growing body of literature suggests that a country's level of financial development plays an important and inextricable role in the economic growth process. There is substantial variation in the level of financial development across countries that research has been trying to explain. In this paper, we investigate how a deep-rooted characteristic – a country's degree of genetic diversity – impacts the level of financial development. Building on the recent work by Ashraf and Galor (2013 AER), we hypothesize that a country's degree of genetic diversity can impact its level of financial development through two channels: (i) indirectly through its effect on productivity and the subsequent demand for financial development, and (ii) directly through its effect on innovation in the financial sector. Paralleling the argument put forth by Ashraf and Galor, we predict a hump-shaped relationship between a country's degree of genetic diversity and its level of financial development. Using data from almost 150 countries, our cross-sectional analysis reveals results that are consistent with our prediction; namely, we observe a significant hump-shaped relation between a country's degree of genetic diversity and its level of financial development. This result is robust to several different proxy measures of financial development, and various controls that have previously been shown to impact financial development.

1 Introduction

There exists a rather mature and wide-ranging body of literature suggesting, both theoretically and empirically, that a country's level of development in the financial sector plays an important role in fostering economic growth (e.g., Greenwood and Jovanovic, 1990; Roubini and Sala-i-Martin, 1992; King and Levine, 1993; Atje and Jovanovic, 1993; Pagano, 1993; De Gregorio and Guidotti, 1995; Jayaratne and Strahan, 1996; Rajan and Zingales, 1998; Demirgüç-Kunt and Maksimovic, 1998; Beck et al., 2000; Beck and Levine, 2002; Carlin and Mayer, 2003; Aghion et al., 2005; and Hsu et al., 2014).[1] Levine (1997), who provides a discussion of the importance of financial development to economic growth and surveys the literature, notes: "a growing body of work would push even most skeptics toward the belief that the development of financial markets and institutions is a critical and inextricable part of the growth process" (p. 689). In particular, a well-developed financial sector can serve many integral functions including: the reduction of transaction and information costs, pooling and management of risk, allocation of resources, mobilization of savings, entrepreneurial screening, and the facilitation of trade.

While the potential advantages of financial development have been identified and empirically documented, it is also the case that there exists substantial heterogeneity in the level of financial development across countries (Rajan and Zingales, 2003). This has spurred substantial research attention aimed at identifying the possible factors that can affect financial development. The result is a growing body of literature identifying many contributing factors to a country's level of financial development. These factors include: (i) a country's level of economic development and

[1] The idea that financial development spurs economic growth is consistent with the supply side arguments suggested by Schumpeter (1912) and Hicks (1969), where increases in the supply of financial development lead to increases in economic growth.

the subsequent demand for financial development[2] (Rajan and Zingales, 2003; Ang and McKibbin, 2007), (ii) a country's level of trade and/or capital openness (Rajan and Zingales, 2003; Chinn and Ito, 2006), (iii) a country's legal system origin, which is typically classified as common law or civil law (La Porta et al., 1997, 1998; Beck et al., 2003), (iv) a country's culture and predominant religion(s) (Stulz and Williamson, 2003), and (v) a country's endowment, which is typically characterized by the geographical landscape and/or the disease environment (Acemoglu et al., 2001; Beck et al., 2003). This extant literature is suggestive of the notion that multiple structural sources can play an important role in a country's level of financial development.

In this paper, we investigate a more deep-rooted factor that might play a role in explaining the heterogeneity in financial development across countries – a country's level of genetic diversity. Using cross sectional data from almost 150 countries, we explore if, and to what extent, a country's degree of genetic diversity is associated with its level of financial development, after controlling for other structural differences mentioned above. Following Rajan and Zingales (2003) and Beck et al. (2003), we consider several different proxies for a country's level of financial development in the analysis including: (i) market capitalization, (ii) value of stocks traded, (iii) security issues, and (iv) amount of private credit.

Our study builds on recent work by Ashraf and Galor (2013) (A&G henceforth) who examine the link between a country's degree of genetic diversity and its level of economic development. In doing so, the authors construct a country level measure of (predicted) genetic

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[2] This demand side story for increased financial development is in line with Robinson's (1952) argument that "where enterprise leads, finance follows."

diversity that is based on *migratory* distance of the country from East Africa.[3] The basic idea behind this measure, as noted by A&G, is that "migratory distance from the cradle of humankind in East Africa had an adverse effect on the degree of genetic diversity within ancient indigenous settlements across the globe" (p. 2). As postulated by the serial-founder effect, as subgroups of the population migrated over the earth, they only carried with them a subset of the overall genetic diversity of the parent colony; hence, the further the migratory distance (out of East Africa), the less genetically diverse this sub-group. We provide a more thorough discussion of genetic diversity, how it is measured, and the details of how A&G construct the predicted measure of genetic diversity when the data is described in Section 3. A&G then develop a stylized model where genetic diversity has a concave or "hump-shaped" effect on economic development. Specifically, as the genetic diversity of a country increases, there is a beneficial effect of development from expansion in the production possibilities frontier through complementarities in a wider spectrum of traits that allows for the development and implementation of new technologies. However, *too high of degree* of genetic diversity can have a disadvantageous effect on development as it can lead to coordination problems and mistrust, which lowers cooperation amongst the population and the ability to produce at the production possibilities frontier. Using cross-sectional country level data, the authors find empirical support for the predictions of their model. Namely, at both years 1500 CE and 2000 CE, the authors find a hump-shaped effect of a country's degree of genetic diversity on the level of economic development.

[3] The authors also collect data on the actual observed genetic diversity for a subset of 21 countries, which are spanned by the 53 ethnic groups from the Human Genome Diversity Cell Line Panel (will discuss this further in Section 3). The authors find similar results when observed diversity is used for this subsample compared to when predicted diversity is used for the larger sample of countries.

Building on the arguments posited by A&G, we hypothesize that a country's degree of genetic diversity can impact its level of financial development. Specifically, we posit that there are two ways through which genetic diversity can influence financial development. The first is through its effect on economic development. A&G document a hump-shaped relation between genetic diversity and economic development. As a result, this will lead to corresponding change in the demand for and, subsequently, the level of financial development in a country. The second way is through the direct effect on innovation in the financial sector. In particular, there will be a hump-shaped relation between a country's level of genetic diversity and innovation in the financial sector, which in turn will impact the level of financial development. Hence, we predict that the degree of genetic diversity in a country can impact its level of financial development through two possible channels: (i) directly through its effect on financial innovation, and (ii) indirectly through its effect on the demand for financial development (working through the effect on economic development). Moreover, the effect of genetic diversity on financial development is hump-shaped through both channels and, hence, we predict an overall hump-shaped relation between genetic diversity and financial development.

To empirically investigate our prediction, we gather data for around 150 countries on their level of financial development from the World Bank, a measure of their degree of genetic diversity developed by A&G, as well as other controls. As predicted, our cross-sectional regressions for year 2000 CE yield a significant hump-shaped relation between a country's degree of genetic diversity and each of the proxy measures for financial development we consider. This result is generally robust even after controlling for other possible factors that may affect a country's level of financial development including: a country's openness, legal origin, religious composition, and endowment. To attempt to separate out the effect of genetic diversity of financial development that is coming through financial innovation, rather than through the demand for financial development, we include a proxy for the demand of financial development (per capital GDP) as independent variables. Even after controlling for the demand for financial development, we continue to document a significant hump-shaped relation between genetic diversity and financial development. This is consistent with our prediction that genetic diversity has a hump-shaped effect on financial innovation, which then impacts the level of financial development. Again, these results are robust even after controlling for factors that can impact financial development.

We view the current study as contributing broadly in two main areas of research. The first is in the area aimed at exploring possible factors that can affect financial development. While much of the previous literature (cited earlier) has focused primarily on the role of structural, institutional, cultural, or political factors in shaping financial development, we take a complementary approach by investigating a more deep rooted characteristic of a country – its degree of genetic diversity. We document a robust link between a country's degree of genetic diversity and its level of financial development; this is persistent even after controlling for other observable factors that have received attention in the literature. Paralleling the argument put for by Rajan and Zinagales (2003), we are by no means implying that theories of financial development based on these other factors are wrong, but rather incomplete. Given the important and inextricable role that financial development plays in economics growth, it is important to understand the factors that affect financial develop; the insights gleaned from this study contribute to this understanding.

Second we view our study as contributing more broadly to the burgeoning field of research that lies at the intersection of genetics and economics.[4] The general aim of research in this area is to identify if, and to what extent, genetic variation can account for differences in preferences, economic decision making, and outcomes (see Beauchamp et al., 2011 and Benjamin et al., 2012 for thorough discussions). This field is typically divided into two sub-groups – (i) behavioral genetics and (ii) molecular genetics or genoeconomics (Benjamin et al., 2007). The former involves making assumptions about the extent to which different types of siblings (e.g., identical/monozygotic vs. fraternal/dizygotic twins) share the same genetic makeup, and then estimating the amount of variance in the dependent variable of interest is attributed to genetic variation, which is referred to as heritability. Examples of such "twins" studies that document heritability include: Taubman (1976) and Benjamin et al. (2012) with income; Wallace et al. (2007) and Cesarini et al. (2008) with cooperative tendencies; Cesarini et al. (2012) with decision biases; Cesarini et al. (2009), Zyphur et al. (2009) with risk preferences; Barnea at al. (2010) and Cesarini et al. (2010) with portfolio allocation decisions; and Cronqvist and Siegel (2014) with investment biases. With regard to Genoeconomics research, the idea is to directly measure an individual's genotype and then correlating variations in a gene(s) with the outcome of interest. Genetic makeup determines not only physical traits like hair, eye color, etc., but can also influence economic decision making like risk-taking and trust-related behaviors (Israel et al., 2009; Kuhnen & Chiao, 2009; Dreber at al., 2009). Because the existing Genoeconmics literature is more extensive, we refer readers to Ebstein et al. (2010) and Beauchamp et al. (2011) for comprehensive reviews. While much of the previous literature exploring the effect of genetic

[4] The study of genetics has been transformed following the sequencing of the human genome in 2001 (International Human Genome Sequencing Consortium 2001a, 2001b, 2004). Not only has it led to a revolution in the medical field, but also an increasing number of social scientists—including economists—have begun to measure genetic variation and study how it relates to individual behaviors and outcomes.

variation is at the individual level (cf. A&G), we explore the possible influence of genetic variations at the country level; importantly, this allows us to shed light on how genetic variations within a country can affect an important aggregate outcome – the country's level of financial development. In doing so, our study directly complements that of A&G, as well as contributes, more broadly, to our understanding of how genetic variation can play a role in shaping important economic outcomes.

The remainder of the paper is organized as follows. Section 2 develops the main hypothesis of the paper regarding the effect of genetic diversity on financial development. Section 3 explains the design of our empirical tests, the data, and the construction of the variables we use in the analysis. Section 4 presents the results, and Section 5 concludes.

2 Hypothesis Development

We proceed by motivating the main hypothesis of our study; namely, a country's degree of genetic diversity plays a role in shaping its level of financial development. We predict that this effect of genetic diversity will come through two channels: (i) indirectly, by impacting the level of economic development and the subsequent demand for financial development, (ii) directly, by impacting the degree of financial innovation and the subsequent supply of financial development. Our jumping off point is the predictions and empirical findings documented in A&G.

In particular, A&G explore the effect of a country's degree of genetic diversity on its level of economic growth. In doing so, they posit a model where an increase in genetic diversity has both a beneficial and detrimental effect on economic productivity. With regard to the beneficial effect, they argue that an increase in genetic diversity widens the spectrum of traits across the population. This will enable higher levels of productivity through specialization of the labor force, complementarities across these different specialized tasks, and a larger concentration of higher cognitive ability individuals. As stated by A&G, "higher diversity therefore enhances society's capability to integrate advanced and more efficient production methods, expanding the economy's production possibility frontier and conferring the benefits of improved productivity" (p. 3). However, there is a possible detrimental impact on economic development resulting high levels of genetic diversity that arises through decreases in trust and cooperation; consequently, this decreases the production efficiency of a country, relative to its production possibilities frontier. Combined, A&G argue that the interplay between the beneficial and detrimental effects of genetic diversity results in a hump-shaped relation of genetic diversity and a country's level of economic development.

There also exists substantial research highlighting the important link between economic development and financial development. The idea being that as a country becomes more productive, the accompanying increased economic development increases the *demand* for more developed and well-functioning financial markets/institutions; this increase in demand then fosters financial development. The demand driven justification for financial development has been proposed conceptually (Robinson, 1952), documented empirically (Luintel and Khan, 1999; Rajan and Zingales, 2003; Ang and McKibbin, 2007), and even suggested anecdotally, e.g., ‘‘the US has also regained its primacy as the world's leading stock market . . . Underlying these gains is a powerful upsurge in productivity."[5] Combining the link between economic development and financial development (based on increased demand) with the findings of A&G yields the

[5] Business Week, October 9, 1995, "Riding high," by Christopher Farrell, Michael J. Mandel and Joseph Weber.

following hypothesis: the degree of genetic diversity impacts a country's level of productivity and economic development, which, in turn, will impact the demand for financial development. As a result, the first channel through which genetic diversity is predicted to impact a country's level of financial development is indirectly through its effect on economic development and the demand for financial development.

The second distinct channel through which genetic diversity can impact financial development is through financial innovation and the subsequent *supply* of financial development. We consider financial innovation in a broad sense to represent any new technologies, advancements, and/or improvements in all of the possible functions of the financial sector. As discussed in Frame and White (2004), this includes but is not limited to: new products, new services, new processes, and new organizational forms; each of which facilitate and/or improve the functioning of the financial sector. Both the prevalence and significance of financial innovation, especially during the 20th century, have been extensively recognized (Miller, 1986; Merton, 1992; Allen and Gale, 1994; Tufano, 2003; Frame and White, 2004; Lerner, 2006). Moreover, Lerner (2006) points to the importance of financial innovation within the financial sector, as well industries outside the financial sector; similarly, Frame and White (2004) note the direct and indirect benefits of financial innovation.

Laeven et al. (2013) explicitly model financial innovation as an important factor that affects economic growth. In their model, financial innovation results from the outcome of profit maximizing financiers. The authors assert that financial innovation, via advancements and improvements in entrepreneurial screening technologies, plays and important role as it increases the likelihood of investing in the most promising technologies. Furthermore, the authors note that there must be financial innovation, concurrent with technological innovation, to avoid stagnation.

Relatedly, Tufano (1989) hypothesizes that there is a first-mover advantage with regard to financial innovation and documents empirical evidence consistent with this hypothesis. Hence, there is a benefit conferred to financial innovators, which serves as a motivation to innovate that is distinct from the above mentioned demand channel.

We contend that the same argument put forth by A&G regarding the effect of genetic diversity on productivity, applies more specifically to innovation in the financial sector; namely, the effect of genetic diversity on financial innovation will be hump-shaped. An increase in genetic diversity will have a beneficial effect on financial innovation through the complementarities of more specialized traits and higher concentrations of more innovative thinkers. At the same time, this will be offset by the detrimental effects on financial innovation resulting from mistrust and lower levels of cooperation at high enough levels of genetic diversity. Assuming the benefits of increased genetic diversity are diminishing (as is assumed in A&G), then a hump-shaped pattern will emerge. As a result, the second channel through which genetic diversity is predicted to impact financial development is through its direct effect on financial innovation and the subsequent supply of financial development.

To summarize, our main predictions regarding the relation between a country's degree of genetic diversity and its level of financial development are as follows:

- Genetic diversity impacts financial development through two separate channels: (i) directly through its effect on financial innovation, and (ii) indirectly through its effect on the demand for financial development.
- Genetic diversity has a hump-shaped effect on the level of financial development; namely, *low* and *high* levels of genetic diversity will be associated with relatively lower levels of

financial development, while *intermediate* levels of genetic diversity will be associated with relatively higher levels of financial development.

3 Data and Methodology

In this section, we first describe the overall empirical methodology, followed by the data and the various measures we construct, and conclude with summary statistics.

3.1 Methodology

Our main hypothesis is that a country's degree of genetic diversity impacts its level of financial development. To investigate this hypothesis, we employ a country-level, cross-sectional regression analysis of financial development.

To establish an overall relation between a country's level of genetic diversity and its financial development (without attempting to separate out the effect coming though each of the two proposed channels), we first regress a country's level of financial development on its degree of genetic diversity using the following specification:

$$FD_i = a_0 + a_1 \cdot gd_i + a_2 \cdot gd_i^2 + \boldsymbol{\beta X}_i + \varepsilon_i \quad (1)$$

where FD_i is a measures of the level of financial development for country i, gd_i is the country's genetic diversity measure, gd_i^2 is the square of its genetic diversity measure, and X_i is a vector of control variables. We include the gd_i^2 term to allow and test for the possibility of a non-linear effect of genetic diversity on financial development. If it is the case that a country's genetic diversity and its level of financial development has hump-shaped relation, as hypothesized, then we would expect $a_1 > 0$ and $a_2 < 0$, both significant.

Next, we attempt to examine the effect of the country's genetic diversity on financial development that is operating directly through financial innovation, as opposed to the indirect effect that is operating through the demand for financial development. To do so, we include as an independent control variable a measure of a country's level of demand for financial development. Specifically, we consider the following regression specification:

$$FD_i = a_0 + a_1 \cdot gd_i + a_2 \cdot {gd_i}^2 + a_3 \cdot d_i + \boldsymbol{\beta X}_i + \varepsilon_i, \quad (2)$$

where FD_i, gd_i, ${gd_i}^2$, and X_i are defined as they were in specification (1), and d_i is a measure of of country *i's* level of demand for financial development, which will be proxied for with a measure of economic development. If it is the case that there is a direct relation between genetic diversity and financial development coming through financial innovation, and the relationship is hump-shaped, then we would expect to continue to see $a_1 > 0$ and $a_2 < 0$ and both significant.

3.2 Data

We proceed by first explain what we mean by a country's level of financial development and then describing the measures we use to proxy for financial development. We then describe the main independent variables we use in the regression analysis, which include: our measure for a country's degree of genetic diversity (which is adopted from A&G), our proxy for a country's level of demand for financial development, as well as other control variables that have been shown in previous studies to explain cross-sectional differences in financial development across countries. In total, we collect the requisite data for a cross-section of almost 150 countries. The data on financial and economic development are collected from World Bank Open Data and World Bank Global Financial Development Database. Data on genetic diversity, legal origins, religions, and endowment are provided by A&G.

Financial Development (FD)

The level of financial development in a country is multifaceted and quite complex, which makes it extremely hard to measure in practice (Rajan and Zingales, 2003). Financial development includes financial assets and instruments, the breadth of markets that trade these assets and instruments, and the financial institutions and intermediaries that connect the suppliers and demanders of capital. The World Bank's Global Financial Development Database identifies four sets of proxy variables characterizing a well-functioning financial system: financial depth, access, efficiency, and stability. These four dimensions are then broken down into two major components in the financial sector: financial institutions and financial markets.

By financial development we mean the "depth" of the financial markets and institutions as defined by the World Bank; in other words, the size of financial market and institutions.[6] To robustly capture a country's level of financial development, we consider four different measures. The first is stock market capitalization relative to GDP (*Market Cap/GDP*), where stock market capitalization is the total market value of all outstanding shares. The second measure is total stocks traded relative to GDP (*Stocks Traded/GDP*), where stocks traded is the total value of shares traded during a year relative to a country's GDP in that same year. The third measure is total security issues relative to GDP (*Security Issues/GDP*), where total security issues is the sum of equity and bond issues by domestic firms. These three measures are intended to proxy for the depth of financial markets. Our fourth measure, which is intended to proxy for the depth of financial institutions, is private credit relative to GDP (*Private Credit/GDP*), where private credit equals total financial intermediary credits to the private sector.

[6] http://data.worldbank.org/data-catalog/global-financial-development

Because our proxy for a country's degree of genetic diversity is for year 2000 CE (the details of the construction of this variable are explained below), we collect data on these four financial development proxies for each of the countries in our sample for each year from 1998 to 2002, i.e., a five year window around the year in which a country's degree of genetic diversity is measured. We then take the average over these five years to generate a single value of financial development for each country for each of the four measures.

We acknowledge that none of the proxy measures for financial development are perfect. However, by considering four different measures and taking the average of each measure across a five year window, we hope to establish a more robustness conclusion regarding the effect of genetic diversity on financial development. Furthermore, these measures of financial development are standard in the extant literature (e.g., King and Levine, 1993; Wurgler, 2000; Rajan and Zingales, 2003; Beck et al., 2003; Rioja and Valev, 2004).

Genetic Diversity (gd)

For the degree of a country's genetic diversity, we adopt the measure developed and used by A&G. In what follows, we provide a sketch of what is meant by genetic diversity, how it is generally measured, and the method that A&G use in creating their measure of predicted genetic diversity at the country level. We refer interested readers to A&G for an unabridged and more thorough discussion of these topics.

Population geneticists typically measure the degree of genetic diversity across individuals within a given population using an index called expected heterozygosity. This index can be interpreted as the probability that two randomly selected individuals from the relevant population are genetically different from one another; the higher this index, the more genetically diverse the population. To construct this index of expected heterozygosity, geneticists collect sample data on allelic frequencies (i.e., the frequency of a specific gene variant or allele) within the given sample population. Given the allelic frequencies, it is possible to construct a gene specific measure of heterozygosity. Then, to construct an overall measure of expected heterozygosity, you simply average this gene specific heterozygosity measure over multiple genes for which there is data.[7] The most reliable data for genetic diversity consists of 53 ethnic groups from the Human Genome Diversity Cell Line Panel, compiled by the Human Genome Diversity Project-Centre d'Etudes du Polymorphisme Humain (HGDP-CEPH) (Cann et al., 2002 and Cavalli-Sforza, 2005).[8] Anthropologists maintain that these 53 ethnic groups are not only native to their current locations, but also have been essentially isolated from genetic flows from other ethnic groups. These 53 ethnic groups span a total of 21 countries, and based on the data from HGDP-CEPH, it is possible to construct a measure of *observed* genetic diversity for these 21 countries based on expected heterozygosity.

However, as noted by A&G, there are two main limitations with using this measure of observed genetic diversity. First, given that this data is only available for 21 countries, the sample would be restricted to a much smaller subset of countries than that for which we have data on economic and financial development. Second, and more important, there may be

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[7] More formally, suppose there is a single gene, denoted as *l*, with a total of *k* observed variants or alleles in the given sample population. Then, the expected heterozygosity for that gene, denoted as H_{exp}^{l}, is given by:

$$H_{exp}^{l} = 1 - \sum_{i=1}^{k} p_i^2$$

Where p_i denotes the probability of the i^{th} allele. If there are *m* different genes, then the overall expected heterozygosity, denoted as H_{exp}, averaged over these *m* genes can be expressed as follows:

$$H_{exp} = 1 - \frac{1}{m}\sum_{l=1}^{m}\sum_{i=1}^{k_l} p_i^2$$

[8] For a list of these 53 ethnic groups and the countries in which they reside see A&G Appendix E.

endogeneity between a countries level of observed genetic diversity and its level of financial development. Specifically, genetic diversity within a country may be determined, in part, by migration patterns, which could have been influenced by a country's level of economic and/or financial development. Furthermore, as argued by A&G, the direction of this possible endogeneity bias is ambiguous; on the one hand it could have been the case that more developed countries were more attractive to migrants (increasing genetic diversity), while on the other hand, more developed countries could have had more developed infrastructure to limit the inflow of migrants (decreasing genetic diversity).

As a result of the limitations associated with using actual observed genetic diversity, A&G proposes a measure of *predicted* genetic diversity for each country in year 2000 CE that is based on the ethnic composition of that country, as well as migratory distance from East Africa. In particular, the authors build on the work from Ramachandran et al. (2005) who document that migratory distance from East Africa has a significant negative linear effect on observed genetic diversity and a significant positive linear genetic distance within the 53 ethnic groups in the HGDP-CEPH data; they find the variation in migratory distance explains 78 percent of the variation in genetic distance across the 1,378 ethnic group pairs, and 86 percent of the cross-group variation in within-group diversity. Given the results of Ramachandran et al., A&G construct a measure of predicted genetic diversity for each country as follows: First, they identify the ethnic composition of each country, based on the *World Migration Matrix, 1500-2000* of Putterman and Weil (2010); this data complies for each country the fraction of the 2000 CE population that is descended from the population of every other country in 1500 CE. Given this data on ancestral source countries, AG construct a measure of predicted heterozygosity for each country that accounts for *within* group genetic diversity and *between* group genetic diversity.

For within group genetic diversity, A&G calculate the predicted level of genetic diversity based on the migratory distance of the ancestral source country from Addis Ababa, Ethiopia. Specifically, they apply the coefficient of the effect of migratory distance on observed genetic diversity obtained by Ramachandran et al. (from the 53 ethnic groups and 21 countries in the HGDP-CEPH data).[9] However, this alone does not account for the between group genetic diversity of the ethnic composition of each country that results from post 1500 CE population flows. For the between group component of genetic diversity, A&G incorporate a measure of genetic diversity between two populations that is referred to by population geneticists as *genetic distance.* Again, A&G appeal to the results from Ramachandran et al. who also show there is a strong positive correlation between pairwise genetic distances and pairwise migratory distances from East Africa. Using the coefficient estimate from Ramachandran et al., A&G calculate the predicted level of between group genetic diversity across all pairs of ethnic groups within a country. Given the estimates of within and between group genetic diversity, which are both predicted from migratory distance, A&G construct an overall measure of genetic diversity which is essentially a weighted average given the ethnic composition of each country in 2000 CE. A&G refer to this measure as the *ancestry adjusted* measure of predicted genetic diversity. This predicted measure of genetic diversity minimizes endogeneity concerns based on the assumption that prehistoric migratory paths out of Africa had no direct effect on Common Era development. It is this predicted measure of genetic diversity for each country in year 2000 CE, denoted as *pdiv_aa*, which we adopt as our measure of genetic diversity in our analysis.

[9] The reported OLS coefficient of migratory distance in Ramachandran et al. (2005) is highly negatively significant (t-stat = -9.770; p-value < .0001), and migratory distance explains almost 86% of the cross-group variation in genetic diversity within the sample.

Economic Development and the Demand for Financial Development (d)

One key factor that could influence a country's level of financial development is its level of economic development and the subsequent demand for financial development (Rajan and Zingales, 2003). Furthermore, we hypothesized that one of the ways in which genetic diversity can impact financial development is through its effect on the demand for financial development (vis a vis its effect on economic development as documented in A&G). We proxy for a country's level of demand for financial development with the country's per capita GDP (denoted as *d* in our empirical specification*)*. This variable is used by Rajan and Zingales (2003) and also corresponds with the proxy of contemporary economic development used in A&G. As with the construction of our financial development measures, we average the yearly measure of per capita GDP across the five year window of 1998 through 2002.

Other Possible Factors Affecting Financial Development

In the existing literature, several factors have been shown to influence a country's level of financial development. The factors include: the type of legal origins (La Porta et al., 1998; Beck et al., 2003); the trade and capital openness of a country (Rajan & Zingales, 2003); the country's endowment (Acemoglu et al., 2001; Beck et al., 2003); and cultural factors (Stulz & Williamson, 2003). Below we describe the variables that we use to attempt to control for the effect of these other possible factors on financial development.

With regard to legal origin, the idea, as argued by La Porta et al. (1999), is that the type of legal origin can influence financial development through two possible channels. The first is in regard to the priority that is placed on protecting property rights, and the second is in the protection of private contracting rights. The two main types of legal origins are the British

Common Law system, which evolved to protect private property rights, and the French Civil Law system, which was designed to reinforce the power of the State. As a result, British Common Law systems are regarded as being more conducive for financial development (Beck et al. 2003). To control for the effect of legal origins we use the data from La Porta et al. (1998) and A&G on the type of legal origin for each country. In particular, in our regressions we construct the following dummy variables for legal origin of a country: *Legal Origin UK* (British Common law), *Legal Origin FR* (French Civil law), *Legal Origin Other* (all other forms of legal origin).[10] *Legal Origin Other* is omitted in the regressions.

With regard to openness, Rajan and Zingales (2003) argue that when the country's borders are open to trade and capital flows, financial development is improved. Following Rajan and Zingales (2003), we use the sum of exports and imports of goods divided by GDP as a proxy for a country's level of trade openness. We collect data for each year for the periods of 1998 through 2002 and take the average over these five years. The resulting country level proxy is denoted as *openness* in our regression analyses.

The endowment theory emphasizes the roles of a country's geography and its disease environment in shaping migration and subsequent institutional development and growth (Acemoglu et al., 2001). Beck et al. (2003) provide evidence that a country's endowment, as proxied for by settler mortality rate in the early nineteenth century, does impact a country's level of financial development.[11] To control for possible different environmental endowment levels across countries, we use the percentage of the population (in 1994) that was at risk of contracting

[10] These other forms of legal origin include: German Law, Socialist or Communist Law, and Scandinavian Law. The regression results reported later are robust to including dummy variable for each legal origin.

[11] Their study provides evidence for both the law and endowment theories. However, their results show that initial endowments explain more of the cross-country variation in financial intermediary and stock market development across countries.

malaria, denoted as *Malaria_frac;* this measure was obtained from A&G and originally constructed by Gallup and Sachs (2001).[12]

Lastly, it has been shown that cultural differences across countries can play a role in shaping differences in financial development (Stulz & Williamson, 2003; and Beck et al. 2003). In order to further test the robustness of our prediction that a country's genetic diversity has an effect on its financial development we also include controls for the religious composition of the country (Beck et al., 2003). Our variables are: *P_protest*, *P_catholic*, and *P_muslim*, and *P_other*, which measure the percentages of a country's population belonging to Protestant, Roman Catholic, Muslim, and other, respectively; *P_other* is the omitted group in the regressions.

3.3 Summary Statistics and Correlations

Table 1 reports summary statistics of all variables used in our analysis. We conduct a cross-sectional regression analysis at the country level for each of the four proxies of financial development we consider: *Market Cap/GDP*, *Stocks Traded/GDP*, *Security Issues/GDP*, and *Private Credit/GDP*. Depending on the measure of financial development that is used, the number of observation in each corresponding regression specification is different based on availability of the data. As a result, the summary statistics in Table 1 are broken down based on the corresponding measure of financial development: Panel A for *Market Cap/GDP*, Panel B for *Stocks Traded/GDP*, Panel C for *Security Issues/GDP*, and Panel D for *Private Credit/GDP*.

With regard to the financial development measures, Panel A shows that the mean of *Market Cap/GDP* is 0.4339. Panel B reveals that the mean of *Stocks Traded/GDP* is 0.2456, which means that the total value of shares traded account for roughly 24.5% of a country's GDP. Panel

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[12] Our results are robust to the settler mortality rate as well. Once we merged the mortality rate variable with our data we have enough observations (60 observations) only for our Private Credit/GDP variable.

C reveals that mean *Security Issues/GDP* is 0.5255. Lastly, Panel D reveals that the mean *Private Credit/GDP* is 0.4190. It is important to point out here that for all for measures of financial development, the mean is substantially higher than the median. This indicates, as we would expect, the presence of positive skewness and outliers at the upper end of the distribution of financial development. In order to mitigate the possibility that are results may be driven by such outliers on the right tale of the distribution, we take log transformations of the each of the financial development measures in our analyses that follow.

In terms of genetic diversity in the sample of countries, we see from Table 1 that the predicted degree of genetic diversity within a country ranges from about 0.63 to 0.77, with a standard deviation of .027. In our sample, the least genetically diverse country is Bolivia, while the most genetically diverse country is Uganda. By comparison, the USA ranks 42nd with a predicted genetic diversity of 0.72.

Table 2 reports the pairwise correlations among the four measures of financial development we consider. From Table 2, we can see that the correlations range from .68 - .96. That fact that they are all strongly positively correlated with each other ($p < .001$ for each pairwise correlation) is suggestive that each of the four measures is a reasonable proxy for level of financial development. At the same time, the fact that the correlation are all not very near to one suggests that there is some variation in what components of development in the financial sector each these measures is capturing. Hence, considering all four different measure in our upcoming analysis will provide a robust picture of how genetic diversity impacts financial development.

4 Results

This section reports the results of our empirical investigation of the relation between genetic diversity and financial development at the county level. The dependent variable is one of the four measures of financial development (described in Section 3.2). For each specification, we report the results for all four measures of financial development.

4.1 Relation of Genetic Diversity and Financial Development

We first look at the overall relation of genetic diversity and financial development. Table 3 reports the results from the cross-sectional regressions of each of the four financial development measure on genetic diversity (*pdiv_aa*) and genetic diversity squared (*pdiv_aa_sqr*). From Table 3 we see that the linear term of predicted genetic diversity is positive and highly significant for all four measures of financial development. In addition, the quadratic term of predicted genetic diversity is negative and significant in for all four measures. This provides initial evidence consistent with our main hypothesis of the overall hump-shaped association between genetic diversity and financial development. Based on our coefficient estimates, was can calculate the estimated degree of genetic diversity where financial development is maximized. The last row of Table 3 reveals that the predicted optimal degree of genetic diversity ranges from 0.692 to 0.707 (depending on the measure of financial development). Given the range of 0.63 to 0.77 of genetic diversities in our sample, this confirms the idea that intermediate levels of genetic diversity are associated with the highest levels of financial development.

To explore the robustness of the hump-shaped effect of genetic diversity on financial development, we add in a full set of country level control variables that have previously been shown to impact a country's level of financial development (these are described in detail in Section 3.2), as well as continent dummies. Table 4 reports the relevant results. From Table 4, we see that for all four measure of financial development, the linear term on genetic diversity remains positive and significant. Moreover, the quadratic term also remains negative and significant. As a result, the overall hump-shaped relation between genetic diversity and financial development remains even after controlling for other factors that can possibly effect financial development. The R^2 increases from a range between 0.06 to 0.19 in Table 3 to a range between 0.49 to 0.55 in Table 4 when we add control variable that are known to explain the country's level of financial development. The magnitude of the effect of a change in the country's genetic diversity on its level of financial development remains statistically and economically significant. The last row of Table 4 reveals the predicted level of genetic diversity, estimated from the regression coefficients, where financial development is maximized; from Table 4 we see that this ranges from .681 to .684 (depending on the measure of financial development). Similar to the result from Table 3, this is consistent with the notion that intermediate degrees of genetic diversity are associated with higher levels of financial development.

4.2 Relation of Genetic Diversity and Financial Development through Financial Innovation

We hypothesized that there are two possible channels through which genetic diversity can impact financial development. The first is indirectly through its effect on economic development and the subsequent demand for financial development, and the second is through its effect on financial innovation and the supply of financial development. To try and separate these two effects, we control for a country's demand for financial development. Table 5 displays the results of the effect of genetic diversity on financial development with the inclusion of *Per Capita GDP*, which is our proxy for a country's level of economic productivity and subsequent demand for financial development. As predicted we still observe that the coefficient associated with *pdiv_aa* is positive and significant and the coefficient associated with *pdiv_aa_sqr* is negative and significant. Thus, as expected, even after controlling for the level of demand for financial development as proxied by *Per Capita GDP* we still observe a hump-shaped relation between country's financial development and its genetic diversity. This result is consistent with the idea that genetic diversity can impact financial development through two channels: (i) indirectly through its effect on productivity and the subsequent demand for financial development, and (ii) directly through its effect on innovation in the financial sector.

4.3 Robustness of the Effect of Genetic Diversity on Financial Development

In the extreme case it is possible that our results so far are due only to the effect of a country's genetic diversity on the level of GDP, which appears in the denominator of our measures of financial development. That is, we want to ensure that the association between genetic diversity and financial development we have observed is not solely a result of the influence of genetic diversity on economic productivity, as previously shown in A&G. To do so, we reevaluate the effect of genetic diversity on financial development, using our four measures for financial development that are unscaled by GDP: log(*Market Cap)*; log(*Stocks Traded); log(Private Credit).*[13] Table 6 reports the results of the regression of genetic diversity on the unscaled measures or financial development. We still observe the hump-shaped relationship between the country's genetic diversity and financial development. In columns (1) and (2) in Table 6 the coefficients associated with *pdiv_aa* are positive and significant and the coefficients associated with *pdiv_aa_sqr* are negative and significant. In column (3) the coefficients associated with the country's genetic diversity are insignificant but the still in line with our predictions – the coefficient associated with *pdiv_aa* is positive and the coefficient with *pdiv_aa_sqr* is negative.

[13] For our fourth measure of a country's financial development *Securities Issues/GDP* we were not able to obtain only the numerator from the World Bank. *Security Issues/GDP* is the sum of equity issues/GDP and bond issues/GDP. The numerator of the latter is average of two year's bond issues weighted by the corresponding cpi so it can't be derived given the available data.

4.4 Possible Endogeneity of Predicted Genetic Diversity

Next, we address the possibility that the predicted measure of genetic diversity that we use in the analysis is endogenous to financial development. Recall, that the genetic diversity measure for each country is comprised of two sources: (i) the within ethnic group genetic diversity, and (ii) the between group genetic diversity between each pairwise ethnic group comparison. A predicted measure of each of these sources was then calculated based on pre historic migratory distance from East Africa; thus the predicted measure of each component or genetic diversity is likely exogenous to current levels of financial development. That said, the overall measure of predicted genetic diversity (*pdiv_aa*) is determined, in part, by the number of different ethnic groups within a country and the concentration of each ethnic group. Thus, there is a possibility for this measure of predicted genetic diversity to be endogenous to financial development to the extent that financial development may have impacted the post 1500 CE population flows and the current ethnic composition of each country. Said differently, it is possible for there to have been post 1500 CE migration away from less financial developed countries and toward more financial developed counties, which would then increase the between group source of genetic diversity in these countries.[14]

We address this possible endogeneity issue in the following way. We consider an alternative measure of genetic diversity. In particular, instead of using the *pdiv_aa* (ancestry adjusted) measure of genetic diversity, we use a measure that is based strictly on migratory distance, which is borrowed from A&G. The construction of this measure, denoted as *pdiv*, is solely based on the migratory distance from East Africa of each country, and does not take into account the ethnic

[14] A&G discuss this same possibility of endogeneity of this measure of genetic diversity to the level of economic development.

composition of the country.[15] Thus, there is no scope for post 1500 CE migration flows to impact the genetic diversity measure. As a result, we contend that this measure, predicted solely on prehistoric migratory distance, is exogenous to contemporary levels of financial development. Furthermore, the *pdiv* measure is strongly correlated with the *pdiv_aa* measure (correlation coefficient of .75 and p-value < .0001). Table 7 presents the results with *pdiv* serving as the independent variable for genetic diversity. From Table 7, we can see that this predicted measure of genetic diversity has a significant hump-shaped relation to the level of financial development, even after including the full set of control variables. Hence, our main results regarding the relation of genetic diversity and financial development are robust to this exogenous, albeit more crude, measure of a country's genetic diversity.

It is possible that the *pdiv_aa* measure of genetic diversity we consider in our analysis is endogenous to a country's current level of financial development, as a result of post 1500 CE migratory flows. That said, it is not clear or obvious whether this possible endogeneity would lead to a positive or negative bias regarding the effect of genetic diversity on financial development. Furthermore, our results are robust if we exclude from the sample those countries that may be more desirable to migrate away from because of lower levels of financial development, as well as those countries that may be more desirable to migrate to because of higher levels of financial development. In addition, our results are robust if we use a distance only measure of predicted genetic diversity that is likely to be exogenous to contemporary levels of financial development. Taken together, these results suggest that the hump-shaped relation of genetic diversity on financial development we document in our analysis is not strictly an artifact

[15] A&G use this *pdiv* distance only based measure to investigate the effect of genetic diversity on economic development in 1500 CE when, presumably, there was little migratory flows and insufficient data on ethnic composition within a country.

of migration flows for more financial developed countries, which then increases genetic diversity in those countries.

5 Conclusion

It is well established in the literature that development in a country's financial sector is an important component of its growth process. At the same time, there is ample empirical evidence documenting considerable heterogeneity in financial development across countries. This has spurred much research aimed at identifying possible factors that can influence financial development and, thus, account for differences across countries. Subsequently, many structural, institutional, cultural, and political factors have been shown to influence financial development.

In this paper, we take a complementary approach by investigating if, and to what extent, a country's level of genetic diversity impacts its level of financial development. Building on the recent work from Ashraf and Galor (2013), we hypothesize that a country's level of financial development is determined based on two components: (i) the country's demand for financial development, which is proportional to its level of economic growth, and (ii) the country's level of financial innovation. We assert that a country's degree of genetic diversity can impact the total level of financial development through each of these two channels. Furthermore, paralleling the argument put forth by Ashraf and Galor, we hypothesize that genetic diversity will have a hump-shaped effect on financial development; namely, when genetic diversity is low, an increase in genetic diversity will increase financial development, while at high enough levels of genetic diversity, an increase in genetic diversity will have a detrimental effect of financial development. We then test this hypothesis empirically using a cross section of almost 150 countries. In doing so, we gather data on a country's level financial development, its degree of genetic diversity, its demand for financial development, as well as other controls that have received attention in the literature. The measure of genetic diversity we use is adopted from Ashraf and Galor, and is determined based on the ethnic composition of a country combined with prehistoric migratory distances of these ethnic groups out of East Africa.

As predicted, our results indicate that there is a significant non-monotonic (hump-shaped) relation between a country’s degree of genetic diversity and its level of financial development. These results are robust across four different proxy measures of financial development that we consider. Furthermore, the results are robust after controlling for a country’s demand for financial development, which is consistent with our hypothesis that genetic diversity impacts financial development through its effect on financial innovation. Our results remain robust even after controlling for other factors that have been shown in the extant literature to impact financial development, which include including the country’s type of legal origin, its degree of trade openness, its initial endowment, and its cultural composition.

Given the close link between the functioning of a country’s financial sector and its economic development and growth, it is important to understand factors that can shape financial development. Similar to the view of Rajan and Zingales (2003), we assert that the existing theories regarding factors that can influence financial development are not wrong, rather they are incomplete. Our results suggest that some of the various in financial development across country’s may be the result of a more deep rooted factor – the degree of genetic diversity within its population, as determined by prehistoric migratory distance out of East Africa.

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Table 1 – Summary Statistics

This table reports summary statistics. Panel A reports the summary statistics for the subsample used when *Market Cap/GDP* is the measure of financial development. *Market Cap/GDP* is the average of the stock market capitalization divided by GDP across 1998 - 2002. Panel B reports the summary statistics for the subsample used when *Stocks Traded/GDP* is the measure of financial development. *Stocks Traded/GDP* is the average of the total value of shares traded divided by GDP across 1998 - 2002. Panel C reports the summary statistics for the subsample used when *Security Issues/GDP* is the measure of financial development. *Security Issues/GDP* is the average of sum of equity and bond issues by domestic companies divided by GDP across 1998 - 2002. Panel D reports the summary statistics for the subsample used when *Private Credit/GDP* is the measure of financial development. *Private Credit/GDP* is the average of private credit by deposit money banks and other financial institutions divided by GDP across 1998 – 2002. *pdiv_aa* is the ancestry adjusted predicted genetic diversity in 2000 CE from Ashraf and Galor (2013). *Per Capita GDP* is the average of per capita GDP in thousand dollars across 1998 - 2002. *Openness* is the sum of import and export divided by GDP averaged over 1998 – 2002. *Legal Origin UK*, *Legal Origin FR*, and *Legal Origin Other* are dummy variables for a country's legal origin of (i) English Common Law, (ii) French Civil Law, (iii) Other origins. *P_protest*, *P_catholic*, and *P_muslim*, and *P_other* are the percentages of a country's population belonging to (i) Protestant, (ii) Roman Catholic, (iii) Muslim, and (iv) Other religions. *Malaria_frac* is the percentage of the population at risk of contracting malaria.

Panel A						
Variable	Mean	Median	Std	Max	Min	N
Market Cap/GDP	0.4339	0.2448	0.5236	3.0220	0.0007	109
pdiv_aa	0.7219	0.7310	0.0282	0.7653	0.6279	106
Per Capita GDP	12.9798	8.3924	12.6598	59.9896	0.6942	106
Openness	0.8633	0.7881	0.5088	3.5028	0.2003	108
Legal Origin UK	0.3486	0	0.4787	1.0000	0	109
Legal Origin FR	0.3578	0	0.4816	1.0000	0	109
Legal Origin Other	0.2936	0	0.4575	1.0000	0	109
P_protest	13.6417	1.9000	23.2979	97.8000	0	108
P_catholic	32.9018	13.1000	37.5073	97.3000	0	109
P_muslim	19.1334	0.9000	33.6737	99.4000	0	109
P_other	34.5820	23.8500	33.3250	100	0.4000	108
Malaria_frac	0.1411	0	0.2866	1.0000	0	104
Panel B						
Variable	Mean	Median	Std	Max	Min	N
Stocks Traded/GDP	0.2456	0.0375	0.4387	2.3017	0.0001	106
pdiv_aa	0.7223	0.7313	0.0281	0.7653	0.6279	103
Per Capita GDP	13.2867	8.7857	12.7131	59.9896	0.6942	103
Openness	0.8624	0.7550	0.5154	3.5028	0.2003	105
Legal Origin UK	0.3491	0	0.4789	1.0000	0	106
Legal Origin FR	0.3585	0	0.4818	1.0000	0	106
Legal Origin Other	0.2925	0	0.4571	1.0000	0	106
P_protest	14.0067	1.9000	23.5280	97.8000	0	105
P_catholic	32.9292	13.7500	37.2651	97.3000	0	106
P_muslim	18.7457	0.8500	33.2909	99.4000	0	106
P_other	34.5882	24.5000	33.0066	100	0.4000	105
Malaria_frac	0.1397	0	0.2888	1.0000	0	101

Panel C						
Variable	Mean	Median	Std	Max	Min	N
Security Issues/GDP	0.5255	0.2640	0.6435	3.1778	0.0026	102
pdiv_aa	0.7225	0.7313	0.0278	0.7653	0.6279	99
Per Capita GDP	12.4808	8.2961	11.1323	51.4770	0.6942	98
Openness	0.8748	0.7957	0.5234	3.5028	0.2003	100
Legal Origin UK	0.3564	0	0.4813	1.0000	0	101
Legal Origin FR	0.3366	0	0.4749	1.0000	0	101
Legal Origin GE	0.3069	0	0.4635	1.0000	0	101
P_protest	14.3030	2.0000	23.8341	97.8000	0	101
P_catholic	31.9922	11.4500	37.0970	97.3000	0	102
P_muslim	17.4053	0.9500	32.2498	99.4000	0	102
P_other	36.6026	27.1000	34.1076	100	0.4000	101
Malaria_frac	0.1486	0	0.2935	1.0000	0	98
Panel D						
Variable	Mean	Median	Std	Max	Min	N
Private Credit/GDP	0.4190	0.2695	0.4146	2.1284	0.0077	164
pdiv_aa	0.7268	0.7337	0.0271	0.7743	0.6279	143
Per Capita GDP	9.5865	5.0386	10.5383	51.4770	0.3199	157
Openness	0.8653	0.7550	0.4881	3.5028	0.0104	161
Legal Origin UK	0.3313	0	0.4721	1.0000	0	163
Legal Origin FR	0.4294	0	0.4965	1.0000	0	163
Legal Origin Other	0.2393	0	0.4279	1.0000	0	163
P_protest	14.1988	2.7000	21.9101	97.8000	0	163
P_catholic	32.1963	17.9500	35.6277	97.3000	0	164
P_muslim	20.3448	1.0500	33.9128	99.7000	0	164
P_other	33.4286	23.2000	31.7924	100	0.1000	163
Malaria_frac	0.3161	0.0002	0.4242	1.0000	0	143

Table 2 – Pearson Correlation Coefficients of Financial Development Measures

This table reports the correlation matrix of four measures of financial development. *Market Cap/GDP* is the average of the stock market capitalization divided by GDP across 1998 - 2002. *Stocks Traded/GDP* is the average of the total value of shares traded divided by GDP across1998 - 2002. *Security Issues/GDP* is the average of sum of equity and bond issues by domestic companies divided by GDP across 1998 – 2002. *Private Credit/GDP* is the average of private credit by deposit money banks and other financial institutions divided by GDP across 1998 - 2002.

	Market Cap/GDP	*Stocks Traded/GDP*	*Security Issues/GDP*
Stocks Traded/GDP	0.77 (<.0001)		
Security Issues/GDP	0.96 (<.0001)	0.83 (<.0001)	
Private Credit/GDP	0.68 (<.0001)	0.64 (<.0001)	0.74 (<.0001)

Table 3 – Financial Development and Genetic Diversity

Table 3 reports the regression results with four measures of financial development as dependent variables and genetic diversity and genetic diversity squared (ancestry adjusted) as independent variables. *Market Cap/GDP* is the average of the stock market capitalization divided by GDP across 1998 through 2002. *Stocks Traded/GDP* is the average of the total value of shares traded divided by GDP across 1998 through 2002. *Security Issues/GDP* is the average of sum of equity and bond issues by domestic companies divided by GDP across 1998 - 2002. *Private Credit/GDP* is the average of private credit by deposit money banks and other financial institutions divided by GDP across 1998 – 2002. *pdiv_aa* is the ancestry adjusted predicted genetic diversity in 2000 CE from Ashraf and Galor (2013). *pdiv_aa_sqr* is *pdiv_aa* squared. All the regressions include a constant, whose coefficient is not reported. The *p*-values are reported in parentheses. The regression specification is:

$$FD_i = a_0 + a_1 \cdot gd_i + a_2 \cdot gd_i^{\,2} + \varepsilon_i.$$

	(1) Log(*Market Cap/GDP*)	(2) Log(*Stock Traded/GDP*)	(3) Log(*Security Issues/GDP*)	(4) Log(*Private Credit/GDP*)
pdiv_aa	559.576** (0.014)	1542.598*** (0.000)	673.084*** (0.004)	478.298*** (0.003)
pdiv_aa_sqr	-398.737** (0.013)	-1090.490*** (0.000)	-479.355*** (0.003)	-345.832*** (0.002)
R^2	0.06	0.19	0.09	0.17
Observations	106	103	99	143
Maxima is reached at	0.702	0.707	0.702	0.691

Table 4 – Financial Development and Genetic Diversity with Controls

This table reports the regression of financial development on genetic diversity, genetic diversity squared, and controls. *Market Cap/GDP* is the average of the stock market capitalization divided by GDP across 1998 through 2002. *Stocks Traded/GDP* is the average of the total value of shares traded divided by GDP across 1998 through 2002. *Security Issues/GDP* is the average of sum of equity and bond issues by domestic companies divided by GDP across 1998 - 2002. *Private Credit/GDP* is the average of private credit by deposit money banks and other financial institutions divided by GDP across 1998 – 2002. *pdiv_aa* is the ancestry adjusted predicted genetic diversity in 2000 CE from Ashraf and Galor (2013). *pdiv_aa_sqr* is *pdiv_aa* squared. *Openness* is the sum of export and import divided by GDP averaged over 1998 - 2002. *Legal Origin UK*, *Legal Origin FR*, *Legal Origin Other* are dummy variables for a country's legal of (i) English Common Law, (ii) French Civil Law, (iii) Other origins. *P_protest*, *P_catholic*, and *P_muslim*, and *P_other* are the percentages of a country's population belonging to (i) Protestant, (ii) Roman Catholic, (iii) Muslim, and (iv) Other religions. *Malaria_frac* is the percentage of population at risk of contracting malaria. All the regressions include a constant and the continent dummies, whose coefficients are not reported. The *p*-values are in parentheses. The regression specification is:

$$FD_i = a_0 + a_1 \cdot gd_i + a_2 \cdot {gd_i}^2 + X_i\beta + \varepsilon_i.$$

	(1) Log(*Market Cap/GDP*)	(2) Log(*Stock Traded/GDP*)	(3) Log(*Security Issues/GDP*)	(4) Log(*Private Credit/GDP*)
pdiv_aa	370.585*	1096.044***	417.571*	223.060**
	(0.073)	(0.001)	(0.068)	(0.049)
pdiv_aa_sqr	-268.283*	-791.041***	-300.835*	-163.341***
	(0.069)	(0.001)	(0.066)	(0.041)
Openness	0.170	-0.693*	0.099	-0.073
	(0.519)	(0.094)	(0.725)	(0.621)
Legal Origin UK	2.313***	2.831***	1.921***	1.328***
	(0.000)	(0.000)	(0.000)	(0.000)
Legal Origin FR	2.509***	2.373***	1.929***	1.175***
	(0.000)	(0.001)	(0.000)	(0.000)
P_protest	0.026***	0.030***	0.032***	0.012***
	(0.000)	(0.007)	(0.000)	(0.006)
P_catholic	-0.002	-0.003	0.006	0.002
	(0.702)	(0.787)	(0.369)	(0.643)
P_muslim	-0.008	0.000	-0.001	-0.003
	(0.164)	(0.998)	(0.892)	(0.269)
Malaria_frac	-1.311**	-2.346**	-1.718***	-1.299***
	(0.029)	(0.013)	(0.008)	(0.000)
Continent Dummies	Yes	Yes	Yes	Yes
R^2	0.49	0.49	0.45	0.55
Observations	102	99	94	135
Maxima is reached at	0.691	0.693	0.694	0.683

Table 5 – Financial Development and Genetic Diversity with Demand Proxy and Controls

This table reports the regression of financial development on genetic diversity, genetic diversity squared, a country's level of demand for financial development, and controls. *Market Cap/GDP* is the average of the stock market capitalization divided by GDP across 1998 through 2002. *Stocks Traded/GDP* is the average of the total value of shares traded divided by GDP across 1998 through 2002. *Security Issues/GDP* is the average of sum of equity and bond issues by domestic companies divided by GDP across 1998 - 2002. *Private Credit/GDP* is the average of private credit by deposit money banks and other financial institutions divided by GDP across 1998 – 2002. *Per Capita GDP* is GDP per capita in thousand dollars averaged across 1998-2002. *pdiv_aa* is the ancestry adjusted predicted genetic diversity in 2000 CE from Ashraf and Galor (2013). *pdiv_aa_sqr* is *pdiv_aa* squared. *Legal Origin UK*, *Legal Origin FR*, *Legal Origin Other* are dummy variables for a country's legal of (i) English Common Law, (ii) French Civil Law, (iii) Other origins. *P_protest*, *P_catholic*, and *P_muslim*, and *P_other* are the percentages of a country's population belonging to (i) Protestant, (ii) Roman Catholic, (iii) Muslim, and (iv) Other religions. *Malaria_frac* is the percentage of population at risk of contracting malaria. All the regressions include a constant and the continent dummies, whose coefficients are not reported. The *p*-values are in parentheses. The regression specification is:

$$FD_i = a_0 + a_1 \cdot gd_i + a_2 \cdot gd_i^2 + a_3 \cdot d_i + X_i\beta + \varepsilon_i.$$

	(1) Log(*Market Cap/GDP*)	(2) Log(*Stock Traded/GDP*)	(3) Log(*Security Issues/GDP*)	(4) Log(*Private Credit/GDP*)
pdiv_aa	370.335*	996.034***	326.145*	101.890
	(0.052)	(0.002)	(0.094)	(0.314)
pdiv_aa_sqr	-272.434**	-718.708***	-241.962*	-78.242
	(0.045)	(0.002)	(0.078)	(0.275)
Per Capita GDP	0.046***	0.033	0.085***	0.050***
	(0.000)	(0.103)	(0.000)	(0.000)
Legal Origin UK	1.731***	2.160***	1.052***	0.883***
	(0.000)	(0.002)	(0.009)	(0.000)
Legal Origin FR	2.056***	2.007***	1.171***	0.737***
	(0.000)	(0.005)	(0.008)	(0.003)
P_protest	0.015**	0.024**	0.013*	0.003
	(0.034)	(0.048)	(0.064)	(0.409)
P_catholic	-0.007	-0.007	-0.002	-0.002
	(0.244)	(0.449)	(0.734)	(0.479)
P_muslim	-0.009*	-0.002	0.002	-0.003
	(0.071)	(0.982)	(0.963)	(0.227)
Malaria_frac	-0.633	-1.610*	-0.604***	-0.885***
	(0.271)	(0.095)	(0.287)	(0.000)
Continents Dummies	Yes	Yes	Yes	Yes
R^2	0.57	0.51	0.62	0.65
Observations	100	97	92	132
Maxima is reached at	0.680	0.693	0.674	0.651

Table 6 – Unscaled Financial Development and Genetic Diversity with Demand Proxy and Controls

This table reports the regression of *unscaled* financial development on genetic diversity, genetic diversity squared, a country's level of demand for financial development, and controls. *Market Cap* is the average of the stock market capitalization divided by GDP across 1998 through 2002. *Stocks Traded* is the average of the total value of shares traded divided by GDP across 1998 through 2002. *Private Credit/GDP* is the average of private credit by deposit money banks and other financial institutions divided by GDP across 1998 – 2002. *Per Capita GDP* is GDP per capita in thousand dollars averaged across 1998-2002. *pdiv_aa* is the ancestry adjusted predicted genetic diversity in 2000 CE from Ashraf and Galor (2013). *pdiv_aa_sqr* is *pdiv_aa* squared. *Legal Origin UK*, *Legal Origin FR*, *Legal Origin Other* are dummy variables for a country's legal of (i) English Common Law, (ii) French Civil Law, (iii) Other origins. *P_protest*, *P_catholic*, and *P_muslim*, and *P_other* are the percentages of a country's population belonging to (i) Protestant, (ii) Roman Catholic, (iii) Muslim, and (iv) Other religions. *Malaria_frac* is the percentage of population at risk of contracting malaria. All the regressions include a constant and the continent dummies, whose coefficients are not reported. The *p*-values are in parentheses. The regression specification is:

$$FD_i = a_0 + a_1 \cdot gd_i + a_2 \cdot {gd_i}^2 + a_3 \cdot d_i + X_i\beta + \varepsilon_i.$$

	(1) Log(*Market Cap*)	(2) Log(*Stock Traded*)	(3) Log(*Private Credit*)
pdiv_aa	1003.056**	1698.454***	291.033
	(0.030)	(0.003)	(0.306)
pdiv_aa_sqr	-727.496*	-1223.600***	-217.200
	(0.017)	(0.003)	(0.279)
Per Capita GDP	0.101***	0.082**	0.088***
	(0.000)	(0.021)	(0.000)
Legal Origin UK	2.237**	2.806**	1.726***
	(0.013)	(0.019)	(0.006)
Legal Origin FR	2.595***	2.617**	1.952***
	(0.005)	(0.033)	(0.004)
P_protest	0.022	0.029	0.015
	(0.182)	(0.167)	(0.190)
P_catholic	-0.003	-0.005	0.001
	(0.804)	(0.786)	(0.905)
P_muslim	-0.008	0.000	-0.008
	(0.513)	(0.977)	(0.290)
Malaria_frac	-0.891	-1.650	-2.480***
	(0.488)	(0.329)	(0.000)
Continents Dummies	Yes	Yes	Yes
R^2	0.47	0.45	0.55
Observations	100	97	135
Maxima is reached at	0.689	0.694	0.670

Table 7 – Financial Development and (Distance Based) Genetic Diversity with Demand Proxy and Controls

This table reports the regression of financial development on genetic diversity, genetic diversity squared, a country's level of demand for financial development, and controls. *Market Cap/GDP* is the average of the stock market capitalization divided by GDP across 1998 through 2002. *Stocks Traded/GDP* is the average of the total value of shares traded divided by GDP across 1998 through 2002. *Security Issues/GDP* is the average of sum of equity and bond issues by domestic companies divided by GDP across 1998 - 2002. *Private Credit/GDP* is the average of private credit by deposit money banks and other financial institutions divided by GDP across 1998 – 2002. *Per Capita GDP* is GDP per capita in thousand dollars averaged across 1998-2002. *pdiv* is the ancestry unadjusted (distance only based) predicted genetic diversity from Ashraf and Galor (2013). *pdiv_sqr* is *pdiv* squared. *Legal Origin UK*, *Legal Origin FR*, *Legal Origin Other* are dummy variables for a country's legal of (i) English Common Law, (ii) French Civil Law, (iii) Other origins. *P_protest*, *P_catholic*, and *P_muslim*, and *P_other* are the percentages of a country's population belonging to (i) Protestant, (ii) Roman Catholic, (iii) Muslim, and (iv) Other religions. *Malaria_frac* is the percentage of population at risk of contracting malaria. All the regressions include a constant and the continent dummies, whose coefficients are not reported. The *p*-values are in parentheses. The regression specification is:

$$FD_i = a_0 + a_1 \cdot gd_i + a_2 \cdot {gd_i}^2 + a_3 \cdot d_i + X_i\beta + \varepsilon_i.$$

	(1) Log(*Market Cap/GDP*)	(2) Log(*Stock Traded/GDP*)	(3) Log(*Security Issues/GDP*)	(4) Log(*Private Credit/GDP*)
pdiv	161.038*	379.691**	184.574**	26.418
	(0.069)	(0.013)	(0.045)	(0.618)
pdiv_sqr	-131.496**	-300.147***	-147.033**	-27.952
	(0.043)	(0.007)	(0.029)	(0.463)
Per Capita GDP	0.044***	0.032*	0.079***	0.042***
	(0.000)	(0.099)	(0.000)	(0.000)
Legal Origin UK	1.732***	2.197***	1.058***	0.867***
	(0.000)	(0.001)	(0.008)	(0.000)
Legal Origin FR	2.086***	2.050***	1.255***	0.746***
	(0.000)	(0.003)	(0.003)	(0.002)
P_protest	0.014**	0.019*	0.013*	0.004
	(0.042)	(0.094)	(0.059)	(0.301)
P_catholic	-0.006	-0.008	-0.001	-0.001
	(0.286)	(0.396)	(0.864)	(0.809)
P_muslim	-0.008	0.002	0.001	-0.002
	(0.111)	(0.833)	(0.913)	(0.483)
Malaria_frac	-0. 731	-1.914**	-0.706***	-0.927***
	(0.191)	(0.043)	(0.200)	(0.000)
Continents Dummies	Yes	Yes	Yes	Yes
R^2	0.59	0.52	0.63	0.63
Observations	101	98	93	136