FINANCE AND INEQUALITY:
THEORY AND EVIDENCE

Asli Demirguc-Kunt
Ross Levine

Finance and Inequality: Theory and Evidence
Asli Demirguc-Kunt and Ross Levine
NBER Working Paper No. 15275
August 2009
JEL No. G0,O15,O16,O43

## **ABSTRACT**

This paper critically reviews the literature on finance and inequality, highlighting substantive gaps in the literature. Finance plays a crucial role in most theories of persistent inequality. Unsurprisingly, therefore, economic theory provides a rich set of predictions concerning both the impact of finance on inequality and about the relevant mechanisms. Although subject to ample qualifications, the bulk of empirical research suggests that improvements in financial contracts, markets, and intermediaries expand economic opportunities and reduce inequality. Yet, there is a shortage of theoretical and empirical research on the potentially enormous impact of formal financial sector policies, such as bank regulations and securities law, on persistent inequality. Furthermore, there is no conceptual framework for considering the joint and endogenous evolution of finance, inequality, and economic growth.

Asli Demirguc-Kunt
World Bank
1818 H Street
Washington, DC  20433
ademirguckunt@worldbank.org

Ross Levine
Department of Economics
Brown University
64 Waterman Street
Providence, RI 02912
and NBER
ross_levine@brown.edu

# 1. INTRODUCTION

Financial development may affect the degree to which a person's economic opportunities are determined by individual skill and initiative, or whether parental wealth, social status, and political connections largely shape economic horizons. The financial system influences who can start a business and who cannot, who can pay for education and who cannot, who can attempt to realize one's economic aspirations and who cannot. Thus, finance can shape the gap between the rich and the poor and the degree to which that gap persists across generations. Furthermore, by affecting the allocation of capital, finance can alter both the rate of economic growth and the demand for labor, with potentially profound implications on poverty and income distribution.

In this paper, we critically review the literature on finance and inequality. By finance, we mean the ability of financial contracts, markets, and intermediaries to facilitate the screening of investment opportunities; the monitoring of investments after providing funding; and the pooling, trading, and management of risk. By inequality, we follow the literature and consider three related, though clearly distinct and potentially contradictory, concepts. Many researchers stress equality of opportunity. Others emphasize the intergenerational persistence of cross-dynasty relative income differences. Still others concentrate on income distribution both to proxy for equality of opportunity and because income distribution is an independently worthwhile focus of inquiry, as relative income directly affects welfare.

Economic theory provides conflicting predictions about the nature of the relationship between finance and inequality. For instance, financial development might operate on the extensive margin, increasing the availability and use of financial services by individuals who had not been employing those services because of price or other impediments. Thus, financial

[1]

development might expand the economic opportunities of disadvantaged groups and reduce the intergenerational persistence of relative incomes (Becker & Tomes 1979, 1986; Greenwood & Jovanovic 1990). Finance can also operate on the intensive margin, enhancing the financial services of those already accessing the financial system, which are frequently high-income individuals and well-established firms. Thus, the direct effect from improving the quality of financial services could fall disproportionately on the rich, widening inequality and perpetuating cross-dynasty differences in economic opportunity (Greenwood & Jovanovic 1990). Theory also indicates that finance can affect inequality through indirect mechanisms. Changes in the financial system can influence both aggregate production and the allocation of credit, each of which may alter the demand for low- and high-skilled workers with concomitant ramifications on the distribution of income (Townsend & Ueda 2006). For example, improvements in finance that boost the demand for low-skilled workers will tend to tighten the distribution of income, expanding and equalizing economic opportunities. Thus, theory illuminates an assortment of direct and indirect mechanisms through which changes in the operation of the financial system can intensify or reduce the inequality of economic opportunity.

The emerging bulk of empirical research points tentatively toward the conclusion that improvements in financial contracts, markets, and intermediaries expand economic opportunities, reduce persistent inequality, and tighten the distribution of income. For example, access to credit markets increases parental investment in the education of their children and reduces the substitution of children out of schooling and into labor markets when adverse shocks reduce family income. Moreover, a growing body of evidence suggests that better functioning financial systems stimulate new firm formation and help small, promising firms expand as a wider array of firms gain access to the financial system. Besides the direct benefits of enhanced access to

[2]

financial services, research also indicates that finance reduces inequality through indirect, labor market mechanisms. Specifically, cross-country studies, individual-level analyses, and firm-level investigations show that financial development accelerates economic growth, intensifies competition, and boosts the demand for labor, disproportionately benefitting those at the lower end of the income distribution.

In our critique, we argue that economists underappreciate the potentially enormous impact of financial sector policies on inequality. For example, while a growing body of theoretical and empirical research suggests that finance exerts a first-order impact on inequality, the three volumes of the *Handbook of Income Distribution* do not mention possible connections between inequality and formal financial sector policies, such as bank regulations and securities law. While finance plays a crucial role in the preponderance of theories of persistent inequality, researchers generally take financial market imperfections as given and unalterable (e.g., Becker & Tomes 1979, 1986; Galor & Zeira 1993; Mookherjee & Ray 2003). In some theories, credit constraints are taken as exogenous. In others, static information and transaction costs endogenously produce adverse selection and moral hazard that impede financial contracting. In either case, researchers treat finance as unchanging and proceed to dissect how schooling, savings, and fertility decisions shape inequality. Yet, these analyses, and the resultant policy recommendations, are based on the erroneous treatment of finance as fixed. Finance is not immutable. Financial sector policies, economic development, and financial innovation all shape the functioning of the financial system. Consequently, we stress that formal financial sector policies deserve a much more prominent position in the study of inequality.

At a broader level, we emphasize that the literature uses potentially conflicting conceptions of inequality and lacks a satisfactory theoretical framework for considering the joint

[3]

and endogenous evolution of finance, growth, and inequality. Specifically, the three notions of inequality are distinct and potentially contradictory. For example, financial innovations that equalize opportunities could widen the distribution of income as the economy rewards those with the most skills and initiative. Similarly, the intergenerational persistence of inequality could fall as opportunities expand from greater financial development, while the distribution of income could simultaneously widen for every generation. Thus, changes in the financial system could have conflicting effects on the different conceptions of inequality. In terms of an overarching theoretical structure, promising research suggests that growth and inequality interact during the process of economic development (Galor & Moav 2004). Different work indicates that finance and economic growth are inextricably linked (Greenwood & Jovanovic 1990, King & Levine 1993b). Yet, we do not have a framework for assessing the dynamic, endogenous relationships among finance, growth, and inequality.

Moreover, to draw sharper inferences about finance and inequality, future research needs to reduce the gaps between theory and evidence. Theory naturally specifies how particular information and transactions costs shape financial arrangements and the degree of inequality. Yet, we do not have precise measures of the degree to which financial contracts, markets, and intermediaries ameliorate these market frictions. Furthermore, while theory highlights changes in the direct use of financial services by individuals and families, we lack systematic cross-country data on the use of financial services, which limits the degree to which empirical researchers can directly examine the theoretically advertised channels linking finance and inequality. Similarly, while theory examines the distribution of income, intergenerational income dynamics, and the degree to which individuals from different families enjoy the same economic opportunities, there are severe measurement problems. Researchers have compiled measures of income inequality for

many countries over many years, but the problems with their accuracy and comparability are well documented (Deininger & Squire 1996). Moreover, there are no systematic measures of the intergenerational persistence of cross-dynasty relative income differences or equality of opportunity. Constructing more precise measures of financial development, access to financial services, and inequality would make exceptionally valuable contributions.

In light of the gaps between theory and evidence, we first review theories of finance and inequality and then turn to empirical assessments. By discussing the theory in one section, it is easier to develop a coherent conceptual framework and discuss limitations with this framework. By organizing the empirical discussion around distinct econometric methodologies, we can better highlight directions for future research. Throughout, we stress the desirability of improving our understanding of how financial sector laws and regulations affect inequality.

Our examination has noteworthy limitations. First, we examine the connection between finance and inequality. We do not seek to update the *Handbook of Income Distribution*'s sweeping collection of surveys on income distribution. Rather, we examine how the emergence of financial contracts, markets, and institutions under specific laws, regulations, and policies affect inequality. Second, we do not examine the impact of inequality on finance as in Haber (2007), Haber & Perotti (2008), and Perotti & von Thadden (2006). In reviewing the econometric work on finance and inequality, we naturally critique the exhaustive efforts of researchers to identify the causal effects of finance on inequality. Nonetheless, there are good reasons for believing that income distribution shapes public policies, including financial sector policies. Thus, understanding the channels through which the distribution of income shapes the operation of financial systems and the formation of financial sector policies are extraordinarily valuable lines of research. Third, we focus on theories and empirical evidence that abstract from

[5]

the importation of financial services from other economies. Since financial globalization is substantively changing where firms and households access capital and financial services, future research on inequality will benefit from focusing on international finance.

We organize the remainder of the paper as follows. Section 2 reviews theoretical models that highlight potential interactions between the financial system and inequality. In Section 3, we turn to empirical tests of the predictions emerging from these theories, explicitly linking the results back to the theories discussed in Section 2. We offer some concluding thoughts in Section 4.

## 2. FINANCE IN THEORIES OF PERSISTENT INEQUALITY

### 2.1 Framework

Finance plays a central role in theories of persistent inequality. In this section, we describe how different assumptions regarding preferences, technologies, and financial market frictions shape the dynastic transmission of wealth, human capital, and investment opportunities, which in turn determine the persistence of inequality. By financial market frictions, we mean information and transaction costs that impede the ability of financial contracts, markets, and intermediaries to screen investments, monitor investments after they are financed, and facilitate risk trading. Theories of inequality are frequently interwoven with theories of economic growth, and our presentation reflects these linkages.

We organize the discussion around a simple equation of total income. Dynasty $i$'s total income in generation $t$, $y(i,t)$, is divided into income from wages and income from claims on physical capital:

$$y(i,t) = h(i,t)w(i,t) + a(i,t)r(i,t), \text{ (1)}$$

where $h(i,t)$ is the level of human capital in dynasty $i$ in generation $t$, $w(i,t)$ is the wage rate per unit of human capital, which might be dynasty specific as discussed below, $a(i,t)$ is dynastic wealth in dynasty $i$ in generation $t$, and $r(i,t)$ is the return on assets, which may also vary by dynasty. We describe theories concerning the behavior of each of the components of Equation 1, how this behavior affects the evolution of the distribution of income, and the roles of financial market imperfections in shaping the dynamics of inequality across generations.

## 2.2 Human Capital, Persistence, and Finance

### 2.2.1 Human capital investment

We begin with wage earnings, which account for approximately 70% of the persistence of total earnings across generations in the United States and elsewhere. We first emphasize the role of finance in shaping the persistence of inequality through human capital accumulation. Then, we discuss recent work on how financial market imperfections affect cross-dynasty wage differences even among individuals with the same human capital.

Building on Becker & Tomes (1979, 1986), researchers examine the decision by parents to invest in the human capital of their children and how this determines the persistence of relative incomes across generations. Let $h(i,t) = h[e(i,t), s(i,t)]$, where $e(i,t)$ is the dynastic endowment of ability and $s(i,t)$ is investment in human capital accumulation (schooling). Further assume that ability endowments and schooling are complementary inputs into human capital production, so that $\partial^2 h/\partial e\partial s > 0$. Thus, it is socially efficient for kids with high ability endowments to receive the most schooling. If one assumes that ability endowments across dynasties are mean reverting, then ability can be specified as $e(i,t) = \rho e(i,t - 1) + \varepsilon(i,t)$, where $0 \leq \rho < 1$, and $\varepsilon(i,t)$ is the random component of individual ability. The children of high-ability parents tend to have greater abilities

than children of low-ability parents, but the relative difference in ability tends to shrink from generation to generation.

With perfect credit markets, high-ability people get schooling irrespective of parental wealth. Human capital, $h(i,t)$, is a function of ability only, $e(i,t)$, and the economy attains the socially efficient allocation of schooling, $s(i,t)$. That is, an individual's economic opportunities are determined solely by her abilities, not by parental wealth. Since ability regresses to the mean and individuals can borrow to finance education, initial dynastic wealth differences tend not to persist.

Imperfect credit markets increase the persistence of cross-dynasty differences in human capital, with corresponding implications for the persistence of cross-dynastic differences in income and wealth. Even if ability tends to regress toward the mean, there will be a slower reduction in cross-dynasty human capital differences if access to schooling is constrained by parental wealth so that $s(i,t)$ is a function of $a(i,t - 1)$ and $h(i,t) = h[e(i,t), a(i,t - 1)]$. Children from rich parents with comparatively low abilities receive more schooling than comparatively high-ability children from poor families. Extensions of this model demonstrate that when families can neither insure against adverse shocks nor borrow to smooth consumption when those shocks hit, some poor families will take their kids out of school and employ them in low-wage jobs even though this hinders high-return human capital accumulation (Jacoby & Skoufias (1997) and Baland & Robinson (1998)). Thus, financial market imperfections can exert a profound impact on economic welfare by hindering the ability of poor families to develop the human capital of their children, which (*a*) increases the cross-dynasty persistence of relative incomes, (*b*) reduces the economic opportunities of individuals born into poor dynasties, and (*c*) lowers the socially efficient allocation of schooling resources.

[8]

There are good conceptual reasons for believing that financial markets are imperfect and will forever remain imperfect, especially when contemplating human capital investments. As Loury (1981, pp. 851-52) argues, "Legally, poor parents will not be able to constrain their children to honor debts incurred on their behalf. Nor will the newly matured children of wealthy families be able to attach the (human) assets of their less well-off counterparts, should the latter decide for whatever reasons to not repay their loans… Moreover, the ability to make use of human capital is unknown even to the borrower." From this perspective, financial market imperfections will impede efficient human capital accumulation with deleterious effects on economic opportunity.

Yet, simply because financial market imperfections are unlikely to be eliminated does not obviate the value of studying how the degree of financial imperfections influences the degree of intergenerational persistence of inequality of opportunity. Financial market imperfections differ markedly across countries, and these imperfections change substantively over time as reviewed by Levine (2005). Thus, financial sector policy reforms and innovations could profoundly alter cross-dynasty investments in human capital.

### 2.2.2 Human capital nonconvexities

Financial market imperfections can also influence the persistence of cross-dynasty relative income differences even when innate abilities are identical across dynasties. Unlike Becker & Tomes (1986), Galor & Zeira (1993) assumed that individuals have identical innate abilities and instead considered a nonconvex technology for creating human capital in conjunction with financial market frictions. With imperfect credit markets and a fixed cost associated with schooling, self-financed investment in human capital is feasible only for rich dynasties, so that

[9]

financial market imperfections disproportionately impede the accumulation of human capital by the poor.

In this setting, financial market imperfections produce cross-dynastic relative income differences that do not converge even in the long run and also shape the aggregate growth rate of the economy.[1] The initial distribution of wealth interacts with financial market imperfections to determine aggregate levels of human capital accumulation and growth. If the distribution of initial wealth is highly skewed, then few people accumulate human capital, which reduces aggregate efficiency, slows growth, and calcifies cross-dynasty inequality. In the presence of financial market frictions, the initial distribution of wealth is crucial for both long-run growth and the persistence of inequality. As the financial system improves, the poor can borrow to invest in human capital, accelerating aggregate growth and reducing income inequality.

Yet, theory still does not treat financial market frictions as integral, endogenously changing features of the economy. Financial market frictions are taken simply as immutable constants. While this facilitates comparative static exercises, it treats finance in an unrealistically inert manner. The informational asymmetries between producers and investors may change endogenously as technology advances. Laeven et al (2009) modeled the joint evolution of financial and technological innovation. Indeed, they showed that economic growth and technological innovation are associated with financial innovation, not simply the level of financial development. Nevertheless, they did not incorporate inequality into their analyses. The connections among finance, growth, and inequality represent a prime area for future research.

### 2.2.3 Human and physical capital accumulation

Human capital is intrinsically different from physical capital, suggesting that there are conceptual advantages to assessing the simultaneous accumulation of these factors in a dynamic

[10]

model of growth and inequality. Specifically, human capital is embodied in individuals, and investment in human capital is likely to be characterized by diminishing marginal returns at the individual level. If individuals have the same innate abilities, therefore, the economy-wide return to investment in human capital is maximized by spreading this investment equally across all individuals. In contrast, diminishing returns to physical capital do not materialize at the level of individual ownership of capital because physical capital is not embodied in individuals.[2] Thus, economy-wide returns to investment in physical capital are not necessarily maximized by spreading capital ownership across many individuals.

Considering both physical and human capital accumulation, Galor & Moav (2004) illustrated that the relationships among finance, inequality, and growth change during development. They made two key assumptions: (*a*) the marginal propensity to save increases with income and (*b*) the rate of return to physical capital accumulation is greater than the return to human capital during the early stages of economic development, reversing in later stages of development. During the early stages of development, therefore, inequality promotes growth by channeling resources toward individuals with higher marginal propensities to save. In this early stage, financial development that boosts growth will also tend to intensify inequality. In later stages of economic development, dispersed human capital is essential for growth. Although the poor would like to borrow to invest in human capital accumulation, credit market imperfections inhibit their economic opportunities. At this later stage, inequality hurts growth because, for the same average income per capita in the economy, greater inequality implies that fewer people can afford education, thereby slowing growth. Financial imperfections exert a particularly pernicious effect on inequality at higher levels of development as human capital becomes increasingly important.

[11]

**2.2.4 Human capital, public good, and politics**

In assessing inequality dynamics, some researchers focus on the political economy of providing public goods. For example, people with different wealth levels will disagree about the provision of public goods if these goods are financed with a proportional tax on capital. The tax burden falls primarily on the wealthy. The benefits are shared more equality. In the case of education, low-income individuals will prefer greater redistribution through a higher tax rate and better public education, especially if poor dynasties cannot borrow to finance their children's education. The rich will prefer lower tax rates and faster capital accumulation, especially when the rich can either self-finance or borrow to finance their children's education. Building on this structure, some theories predict that greater income inequality will increase the proportion of the population favoring greater redistribution and higher taxes, whereas economies with a more equal distribution of income will favor lower taxes and less redistribution, as suggested by Alesina & Rodrik (1994), Bertola (1992), Perotti (1993), and Persson & Tabellini (1994).

Benabou (2000), however, posited a U-shaped relationship, instead of monotonic link, between inequality and redistribution. He suggested that, when inequality is very small, there is very strong support for redistribution because it does not cost much and it boosts aggregate growth. As inequality rises, more people are hurt by redistribution, which enhances the political constituency against redistribution. A lower redistribution rate further increases inequality because the poor cannot borrow to finance schooling, while the rich can either borrow or self-finance schooling. At very high levels of inequality, the large proportion of the population below the mean level of wealth vote for redistribution.

Finance remains a lynchpin of persistent inequality in these political economy models. For example, Galor & Moav (2006) argued that the natural process of economic growth

[12]

influences different groups' views about the use of tax revenues to finance growth-enhancing public education that raises wages and reduces inequality. In a model with financial market imperfections that prohibit poor workers from financing their own education to optimal levels, they showed that the long-run accumulation of physical capital increases the returns to human capital accumulation and induces the capitalists to support the provision of public education for the poor. While capitalists benefit from the aggregate accumulation of human capital in society, landowners lose, assuming that human capital complementarities are lower for landowners. Because individuals face diminishing returns to human capital accumulation, the aggregate stock of human capital is larger if its accumulation is widely spread. Without public education, investment in human capital is socially suboptimal owing to borrowing constraints. The acquisition of human capital skills increases wages relative to the return on capital. Thus, inequality will persist, and the economy will stagnate in this model, unless the industrialists and labor can exert sufficient political power to finance public education, or financial markets can be developed sufficiently to facilitate more investment in human capital accumulation by poor families.

Finance is also a crucial component of local-externality explanations of persistent inequality (Benabou 1993, 1996; Fernandez & Rogerson 1996, Durlauf 1996). Specifically, if the marginal private benefits of having more educated neighbors are higher for more educated people, then market forces push toward self-segregation. Highly educated people are ready to pay a marginally higher rent (or taxes or other inconveniences) to live next to highly educated people. Local externalities, therefore, can make market equilibria Pareto inefficient by impeding the human capital accumulation of comparatively poor dynasties, perpetuating cross-dynasty inequality. In these models, however, the rich become segregated only if the poor cannot borrow

[13]

sufficiently to build a home in high-education neighborhoods. Since financial market implications are unlikely to be eliminated, this suggests that local externalities exert a continuing influence on inequality.

**2.2.5 Wages, discrimination, persistence, and finance**
Next, consider the wage rate per se, rather than human capital accumulation. It is common to think of the wage rate per unit of human capital as invariable across individuals. As Gary Becker (1957) articulated, however, employers might discriminate by particular characteristics, such as race. For example, blacks with exactly the same skills as whites might receive lower wage rates because employers have a preference for hiring white workers, i.e., employers are willing to forgo some profits to satisfy their "taste" for hiring white workers. At a broader level, employers might discriminate by sex, religion, ethnicity, chaste, or any other characteristic. Discrimination could contribute to the intergenerational persistence of inequality.

Becker (1957) argued that discrimination is cheaper when there is little competition. When an owner is earning large rents, the marginal cost of hiring a more expensive worker from a "preferred" group rather than an equally productive and less expensive worker from a "discriminated" group is not a very large share of the profits. With more intense competition, when new employers with less of a taste for discrimination can enter the market, the cost of discrimination increases. As with any efficiency, discrimination will be competed away if the barriers to new firm entry are sufficiently low.

Finance fits comfortably within Becker's theory of discrimination, as emphasized by Levine, Levkov, and Rubinstein (2009). Financial sector reforms that spur banks to fund the best firms rather than simply financing established firms will intensify competition among firms. For example, if a bank has a monopoly, it may lend comfortably to those with whom it has a long,

multidimensional relationship. There may be other existing or potential firms with better

projects, but the bank earns comfortable profits by lending to cronies. Regulatory reforms that

expose this bank to more competition, however, might induce the bank to search more rigorously

for projects with the highest risk-adjusted rates of return. In turn, firms will increasingly need to

demonstrate their superiority in product markets to attract bank capital. Thus, intensified

competition in banking can reduce the barriers to the entry of new nonfinancial sector firms,

boosting competition throughout the economy. According to Becker (1957), therefore, financial

sector reforms that intensify competition will reduce discrimination and expand the economic

opportunities of disadvantaged groups.

## 2.3 Investment Opportunities, Savings, Persistence, and Finance

### 2.3.1 Investment opportunities

Finance can also affect cross-dynasty returns to investment. With lower levels of financial

development, a potential producer's wealth has bigger effects on the adverse selection and moral

hazard problems that constrain the producer's opportunities. Thus, financial market

imperfections increase the degree to which the level of assets $a(i,t)$ influences the returns that are

available to dynasty $i$ in generation $t$. Investment opportunities become a function of dynastic

assets, $r[a(i,t),t]$.

When an individual's investment opportunities are constrained by parental wealth, this

can create another convexity that fosters persistent inequality. For example, minimum

investment requirements or fixed costs associated with high-return investments, including high-

return entrepreneurial activities, imply higher returns to wealthier individuals, $\partial r(a(i,t),t)/\partial a(i,t)$

$> 0$, that can perpetuate inequality. Indeed, empirical evidence suggests that liquidity constraints

impede the business opportunities of the poor (Evans & Jovanovic 1989, Evans & Leighton

1989, Holtz-Eakin et al. 1994, Black & Lynch 1996, Blanchflower & Oswald 1998, McKenzie & Woodruff 2006).

Greenwood & Jovanovic (1990) examined growth and inequality dynamics in a model where finance affects dynastic access to higher expected-return projects. It is costly to assess the quality of projects. Whereas financial intermediaries enjoy economies of scale in screening projects, there is a fixed cost of joining financial intermediaries. Joining the financial intermediary also improves the efficiency of social resource allocation, spurring aggregate growth. Growth means that more individuals can afford to join financial intermediaries, which gives more individuals access to higher rates of return.

Under these conditions, the relation between growth and income distribution depends on financial development. At low levels of economic development, few people join intermediaries because of the high fixed costs relative to income, so growth is slow and the distribution of income is equal. Over time, some people join the financial intermediary and enjoy greater returns. Both growth and income inequality increase. Eventually, many people can afford to join the intermediary, which maximizes growth and reduces inequality. In a valuable extension, Townsend & Ueda (2006) showed that slight alterations in assumptions concerning technologies and preferences complicate the transitional dynamics. The overall evolution of inequality is not necessarily monotonic on the growth path. Nonetheless, the efficiency of the financial system in identifying high-return investments is critical for both economic growth and changes in inequality.

Greater financial development speeds the convergence of the economy to a state with no persistent cross-dynasty income differences. The inverse of the cost of joining the financial intermediary represents the level of financial development. As financial development improves,

[16]

more people join the intermediary and receive higher returns. This expedites the transition from (*a*) a low level of economic development with little income inequality and slow growth to (*b*) a high level of economic development with little income inequality and fast growth. In the Greenwood & Jovanovic (1990) model, the transition period during which there are substantial cross-dynasty income indifferences shrinks as the level of financial development increases.

Other theories focus on the role of financial frictions in affecting the ability of individuals to become entrepreneurs or select other occupations, with material implications for inequality (Mookherjee & Ray 2003, Jeong & Townsend 2007, 2008). These theories stress that returns to physical capital investment can become dynasty specific when there are fixed costs associated with becoming an entrepreneur. With financial market frictions, the initial distribution of wealth influences which dynasties can obtain external finance and acquire the business acumen to initiate projects. Both moral hazard and adverse selection can generate credit constraints, as discussed by Aghion & Bolton (1997), Piketty (1997), and Bardhan (2000). Thus, the initial distribution of wealth can influence total output and the future distribution of income. In particular, with financial market imperfections and nonconvexities to becoming an entrepreneur, poverty traps and persistent income inequality may arise (Kanbur 2000 p. 799). Low wealth [$a(i,t)$] prohibits entrepreneurship. Thus, low $a(i,t)$ implies low $r(i,t)$, thus perpetuating the dynasty's relatively low income level. In addition, by impeding talented, but poor, individuals from becoming entrepreneurs, credit constraints lower the overall level of economic efficiency (Piketty 2000, p. 455). Banerjee & Newman (1993) showed that (*a*) if everyone is very poor, there is only subsistence self-employment because nobody can afford to be an entrepreneur, so that there is a low level of inequality and slow growth and (*b*) with some initial inequality, the rich become entrepreneurs, hire workers, and obtain high returns, so that growth is accompanied

by widening income differences. Well-functioning financial markets, however, diminish the link between investment in a project and the wealth of the project owner.

### 2.3.2 Risk and opportunity

The degree to which financial contracts, markets, and institutions facilitate risk diversification, pooling, and trading can also affect cross-dynasty investment opportunities (Stiglitz 1974, Newbery 1977, Atkinson & Stiglitz 1980, Townsend 1982, Eswaran & Kotwal 1985, Bardhan et al. 2000). As with other dimensions of financial development, changes in the financial system that improve the provision of risk-diversification services can affect investment opportunities on both the extensive and intensive margins. For example, a drop in the fixed cost of ameliorating risk will disproportionately affect poor dynasties. Of course, reductions in the marginal cost of diversifying, pooling, and trading risk might also work on the intensive margin and therefore disproportionately help those who are already using these services. Thus, policies affecting the risk services offered by the financial system could substantively impact the intergenerational persistence of relative incomes.

### 2.3.3 Savings behavior

We conclude by reviewing theories of how savings behavior affects intergenerational income dynamics. At one level, this is the most obvious vehicle through which richer dynasties remain comparatively rich; richer parents give more assets to their children than do poorer ones. Under standard assumptions, the intergenerational correlation of income will be positive if inheritance (savings) is a positive function of parental income $[\partial a(i,t)/\partial y(i,t-1)] > 0$, i.e., $a' > 0$. Rich parents bequeath more money than do poor parents, which perpetuates relative income differences. The positive correlation between parental and child wealth, however, does not necessarily imply that cross-dynasty relative income differences persistent in the long run.

Holding labor income constant, if the inheritance (savings) function is a concave function of parental income, $a' > 0$ $a'' < 0$, then average savings rates $a/y$ decline as income $y$ rises. Consequently, relative income differences between dynasties decline across generations (Stiglitz 1969).

In this setting, inequality persists in the long run when rich parents bequeath (save) a higher percentage of their incomes to their children than do poor parents. With a convex bequest (savings) function, $a' > 0$ and $a'' > 0$, average savings rates $a/y$ rise with income, putting upward pressure on wealth inequality (Bourguignon 1981).[3] With no financial market frictions and no cross-dynasty differences in labor income, convex bequest preferences can produce long-run persistence in cross-dynasty relative income differences.[4]

Finance has not played a central part in theories linking savings behavior with the dynamics of income inequality, perhaps because research indicates that changes in financial development do not alter aggregate savings rates (King & Levine 1993a, 1993b) , Levine & Zervos 1998,  Levine 2005). Yet, future work could investigate whether finance affects savings behavior of poor families differently from rich households. Financial development might operate both on the intensive margin by improving the financial services employed by those already accessing the financial system. Finance might also influence the extensive margin by allowing poorer families to reduce liquidity constraints, expand investment opportunities, and manage risk. By differentially affecting the rich and poor, financial development might affect the distribution of savings and hence the dynamics of cross-dynasty relative income levels without affecting the aggregate savings rate. This warrants more serious investigation.

**2.4 Discussion and Predictions**

As shown, finance plays a central---if sometimes understated---role in theories of inequality.

Many theories predict that reductions in financial market frictions will reduce the promulgation

of dynastic income differences through time. This is not a uniform prediction, however.

Financial developments that reduce information and transaction costs can have complex,

countervailing effects on the distribution of economic opportunities, the distribution of income,

and the evolution of cross-dynasty relative income differences. In this section, we summarize the

major predictions from theory.

Much of the literature on finance and inequality focuses on the extensive margin: the

direct use of financial services by individuals who had not been using those services. For

example, many models emphasize information and transactions costs associated with financing

education (e.g., Becker & Tomes 1979, 1986; Galor & Zeira 1993), so that poor families cannot

borrow to pay for education, thereby strengthening the connection between parental wealth and

human capital accumulation. Inequality falls in these models when poor families borrow to pay

for more education. Thus, it is the direct use of finance by families that did not have access to

those financial services that affects economic opportunities. Other models emphasize the

connection between education and the smoothing of adverse income shocks (e.g., Jacoby &

Skoufias 1997, Baland & Robinson 1998). With underdeveloped financial markets, shocks to

family income might force parents to remove their kids from school and employ them in income-

earning activities. Thus, financial underdevelopment disproportionately inhibits human capital

accumulation in poor families. In these models, inequality falls when the poor use financial

markets to smooth income shocks. As a final example, consider entrepreneurship. Influential

models predict that poor dynasties will tend to remain poor in the presence of financial markets

that lend to those with sufficient collateral, rather than to those with the best business ideas

(Aghion & Bolton 1997, Bardhan 2000). Again, when a very promising, though poor, entrepreneur is able to borrow because of improvements in the financial system, this will weaken the connection between familial wealth and economic opportunity. These direct, extensive margin effects, however, are not the only mechanisms linking finance and inequality.

Financial development can also operate on the intensive margin. Improvements in the quality and range of financial services might primarily benefit households and firms that are already using financial services. In particular, improvements in the financial systems that do not lower the fixed costs of accessing financial services will not tend to broaden access to financial services, but they will instead improve the quality of financial services enjoyed by those already purchasing financial services (Greenwood & Jovanovic 1990). The direct benefits of these intensive margin effects accrue primarily to the rich, widening both the distribution of income and disparities in economic opportunity. This direct intensive margin effect, however, does not obviate potential indirect, general equilibrium effects from financial development.

Even if the initial effect of financial development operates on the intensive margin and widens inequality, financial development may have dynamic, general equilibrium effects that mitigate this effect. For example, financial development may improve the efficiency of resource allocation, accelerate economic growth, and boost wage rates. Under these condition, the fixed cost of accessing financial services falls relative to wage rates, potentially permitting a greater proportion of the population to access financial services. Thus, although the initial effects of financial development might intensify inequality by operating on the intensive margin, the broader effects of financial development may ultimately work to expand economic opportunities.

Financial development could also affect the economic opportunities and outcomes of many families without directly altering their use of financial services (Beck et. 2009), Gine &

[21]

Townsend 2004, Townsend & Ueda 2006). For example, financial development that enhances economic activity could boost the demand for labor. If this increased demand for labor falls primarily on low-skilled workers, then this indirect effect of financial development will reduce inequality. Thus, even if financial development does not increase the direct use of financial services by the poor, it might tighten the distribution of income by augmenting the demand for labor services provided by the poor. This effect, however, depends critically on whether financial development primarily boosts the demand for low- or high-wage earners (Jerzmanowski & Nabar 2007).[5] If financial development exerts a disproportionately positive impact on the demand for skilled workers, for example, then the indirect effect of financial development on inequality through the labor market would tend to boost inequality.

Finally, theory distinguishes between the distribution of income and the distribution of opportunity. Financial development could widen the distribution of income by increasing the returns to skills or the returns to entrepreneurial ability. When the talented entrepreneur successfully uses a bank loan to create or expand a business, the result is an increase in income that neighbors do not necessarily experience. At the same time, the distribution of economic opportunities could become more equal. With expanded access to financial services, more individuals have the chance to obtain a loan to initiate or enlarge a business, which would weaken the link between parental wealth and economic opportunity. Under these conditions, financial development could reduce the intergenerational persistence of relative income differences, but widen the distribution of actual outcomes in each generation.

In sum, theory provides ambiguous predictions about the impact of finance on the distribution of economic opportunities and the distribution of actual outcomes. Thus, it is the goal of empirical research to sift through the complex and potentially countervailing effects of

[22]

financial development to assess different hypotheses and provide greater insight into the potentially rich relationship between the operation of the financial system and the intergenerational persistence of relative incomes.

## 3. EVIDENCE

The empirical evidence on finance and inequality is highly varied, including the use of computable general equilibrium models, regressions based on natural experiments, microeconomic analyses using firm- and household-level surveys, as well as cross-country regressions. Researchers focus both on the microeconomic mechanisms linking finance and economic opportunity and on the macroeconomic assessments of an economy's distribution of income. For example, while some studies investigate the impact of finance on savings behavior, schooling, and investment returns, others take a more reduced-form approach and assess the association between finance and the Gini coefficient of income inequality. Studies also differ in the methodologies employed, the extent to which they identify causal relationships, and the empirical proxies they use to capture inequality and access to finance.

Three tentative conclusions emerge from the evidence. First, there are indirect effects of finance on economic opportunity matters. Although the bulk of theoretical and empirical research emphasizes the direct use of financial services by the poor, this is not the only channel linking finance and opportunity. Second, each methodological approach has weaknesses. Thus, results that emerge from many different econometric strategies with imperfectly correlated statistical and data problems should be greeted with greater confidence than findings based on only one approach. Finally, although theory provides ambiguous predictions about the finance-inequality relationship, the evidence suggests that better functioning financial systems disproportionately help the poor.

[23]

### 3.1 Impact on Households

**3.1.1 General equilibrium models**

General equilibrium models represent a natural bridge between theory and evidence. Notably, Robert Townsend, with various coauthors, develops, estimates, and calibrates general equilibrium models to analyze the impact of financial development on growth, income inequality, and household welfare, typically drawing on surveys of Thai households, stretching from 1976 to 1996. Gine & Townsend (2004) built a model using information about wealth, wage rates, financial transactions, and occupational choices. They estimated some of the model's parameters and calibrated others to help the model fit the evolution of Thai growth and savings rates. Then the authors used this model to simulate how increases in the share of households with access to credit affects entrepreneurship, employment, wages, growth, and income distribution. They showed that financial liberalization and the accompanying increase in access to credit can explain the fast GDP per capita growth in Thailand over the sample period. Underlying these developments are the occupational shifts from subsistence sector into the intermediated sector, which increase employment and wages.

Although increased access to financial services accelerates economic growth and boosts demand for labor, there are both comparative winners and losers and the distributional consequences evolve and change. Initially, gains are concentrated disproportionately on a small group of talented but low-wealth individuals, who without credit could not become entrepreneurs, as in the model of Banerjee & Newman (1993).[6] But, eventually, a much wider class of workers also benefits from increases in employment and wages, as the new entrepreneurs are able to build and expand their businesses with greater access to credit. Savers also benefit in the form of higher interest rates on their savings. Those who lose from improved

[24]

access to finance are the former entrepreneurs who now have to pay much higher wage rates and face greater competition.

The general equilibrium model of Gine & Townsend (2004) suggests that the greatest quantitative impact of improved access on income inequality comes through indirect labor market effects of higher employment and wages. Reductions in inequality do not arise primarily from individuals at the lower end of the income distribution intensifying their use of financial services or from poor individuals accessing the financial system for the first time. Rather, depending on the model calibration, finance reduces inequality by increasing the demand for labor in the long term, which off-sets the short-term increases in inequality as a result of gains that accrue to new entrepreneurs.[7]

Research also seeks to identify the underlying financial market imperfections that limit entry into entrepreneurship. The literature stresses two main financial constraints limiting entrepreneurship. In Evans & Jovanovic (1989), the financial constraint is due to limited liability, where wealth facilitates the pledging of collateral that limits default. With limited liability, borrowing does not automatically imply entrepreneurs do not have the wealth to self-finance a project. Agents can supplement their personal stake in entrepreneurial activity by borrowing to diversify risk. Hence, borrowing can increase with wealth. Another source of financial constraints can be moral hazard, as in the model of occupational choice featured in Aghion & Bolton (1997). In this case, entrepreneurial effort is unobserved and repayment is possible only if a project succeeds. Hence, with moral hazard, poor borrowers who have little to lose if a project fails, also have little incentive to be diligent, thus increasing the likelihood of project failure and default. This requires lenders to charge higher interest rates to low-wealth borrowers. In contrast to the limited-liability case, when there is moral hazard and wealth increases, constrained

entrepreneurs will increasingly self-finance and borrowing diminishes. In a moral hazard environment, all entrepreneurs who borrow are constrained. Paulson, et al. (2006) estimated a general equilibrium model using Thai survey data to see if they can distinguish limited liability from moral hazard. Their results indicate that the dominant source of the financing constraints preventing new entry is moral hazard and that limited liability alone cannot explain differences in entrepreneurship across Thailand.

General equilibrium models illustrate important aspects of the relationship between improved access to finance and the development process. Within the context of a controlled laboratory, one can carefully scrutinize the mechanisms linking finance and inequality. As suggested by Jeong & Townsend (2007), however, general equilibrium models do not capture the full complexity of even the simplest economies.

**3.1.2 Natural policy experiments**

Natural policy experiments represent an additional way of assessing the impact of financial development on economic opportunity. Instead of building a general equilibrium model and examining the impact of parameter changes within the model, natural policy experiments evaluate the impact of an actual policy change on different outcomes. A crucial element in using policy experiments is identifying an exogenous change in policy.

One such experiment involved the Indian government's policy on bank branching, imposed between 1977 and 1990. In 1977, the Reserve Bank of India mandated that a commercial bank could open a new branch in a location that already had bank branches only if it opened four others in locations with no branches. The policy led to the opening of 30,000 new rural branches as well as an increase in deposit and credit volume in states with initially low levels of financial development.

Burgess & Pande (2005) found that India's bank-branching policy led to faster poverty declines in states that started the period with a lower level of financial development during the program period. Furthermore, wages of agricultural workers grew faster over this period, while the wages of urban factory workers did not show such a time pattern. This seems to suggest the branch regulation---and the improved access to finance that resulted from it---led to faster reductions in poverty.

Another natural experiment arises from the deregulation of geographic restrictions on banking across the individual states of the United States. For most of the twentieth century, each state imposed various restrictions on the ability of banks to branch within state borders (intrastate regulations) and the ability of banks from one state to operate in other states (interstate regulations). From the mid-1970s to 1994, however, technological innovations made it easier to provide banking services from a distance, which diminished the economic and political power of banks benefiting from geographic restrictions. These technological innovations interacted with preexisting state-specific differences concerning the power of local banks to shape the timing of regulation across the states of the United States. Considerable research indicates that the timing of bank deregulation was largely exogenous to preexisting differences and trends in labor market conditions and income inequality (Kroszner & Strahan 1999, Black & Strahan 2002, and Beck et al. 2009, Levine et al. 2009, Levine & Rubinstein 2009). Moreover, bank deregulation improved the functioning of state banking systems. For example, Jayaratne & Strahan (1996) found that a state's rate of economic growth accelerated after removing intrastate branching restrictions.

Beck et al. (2009) exploited this quasi-natural experiment associated with bank deregulation to examine both the impact of finance on inequality and the mechanisms driving the finance-inequality relationship. They found that after a state deregulates geographical

[27]

restrictions, the Gini coefficient of income inequality decreases relative to other states and relative to the state's own level of inequality before deregulation. This effect is large, explaining 60% of the variation of inequality relative to state and year averages. Importantly, deregulation reduced inequality by disproportionately helping the poor, not by hurting the rich.

These results also highlight the indirect effects of financial development on inequality. Deregulation does not reduce income inequality primarily by directly increasing the business income of poor individuals relative to rich individuals. Rather, deregulation exerts a disproportionately positive increase in the demand for lower-skilled workers, which increases the annual earnings of lower-income workers relative to higher-income individuals. Approximately three-quarters of the reduction in income inequality due to deregulation is explained by a tightening in the distribution of wage earnings, whereas less than 10% is accounted for by a tightening of the distribution of income among entrepreneurs. Financial development primarily expanded the economic opportunities through this indirect, labor market channel.

Moreover, bank deregulation that reduced credit market constraints enhanced the rate of human capital accumulation of poor individuals in the United States, as suggested in theories by Becker & Tomes (1979, 1986), Galor & Zeira (1993), and others. More specifically, Levine & Rubinstein (2008) also used bank deregulation across the states of the United States to identify an exogenous intensification of bank competition and a corresponding reduction in lending rates. They showed that bank reduction eased credit market constraints and lowered high-school dropout rates. As expected, this effect holds only among poor households.[8] Thus, financial sector reforms that reduced the cost of borrowing increased the rate of human capital accumulation among lower-income families.

Another study used bank deregulation to provide further evidence on the impact of financial development on economic opportunity. As we have stressed, the distribution of economic opportunity is different from the distribution of realized income. Financial development could affect the return to skills and hence alter the distribution of realized incomes without necessarily affecting the opportunities for obtaining those skills. Thus, finance could affect income inequality without affecting economic opportunity. Similarly, financial development could expand economic opportunities, without necessarily tightening the distribution of income. For example, finance could make it easier for the most talented to excel regardless of parental wealth. This would expand opportunity, but not necessarily tighten the distribution of realized income for any generation. Levine et al. (2009), however, examined racial discrimination, which is directly linked with opportunity. Discrimination curtails the economic opportunities of a particular disadvantaged group. Financial development can expand economic opportunities, therefore, by ameliorating the pernicious effects of discrimination.

More specifically, Levine et al. (2009) used bank deregulation to identify an exogenous intensification of competition in the nonfinancial sector and then assessed the impact of competition on racial discrimination in labor markets. The study is motivated by Becker's (1957) argument that an employer's taste for discrimination becomes more expensive to satisfy with more intense competition. For example, whereas a monopolist might be willing to forgo profits to hire a less-qualified white worker, a firm facing stiff competition will find it comparatively more expensive to hire less-cost-efficient workers. Because past work shows that bank deregulation eased entry barriers in the nonfinancial sector and thereby intensified competition, Levine et al. (2009) examined whether racial discrimination fell after states deregulated. They examined the difference between the wage rates of white males and black males after controlling

[29]

for a wide array of personal characteristics. The estimated race gap is the difference between white and black wage rates that is unaccounted for observable characteristics. As in other studies, they found a positive race gap: White wage rates are above black wage rates when holding other traits constant.

They found that the race gap falls after bank deregulation. Specifically, the race gap drops by approximately 20% after a state removes restrictions on interstate banking. The researchers showed that the reduction in the race gap is not due to the impact of deregulation on the wages of the poor; deregulation exerts an independent and positive impact on the wages of black workers relative to those of white workers with the same characteristics. Financial development broadened the economic opportunities of a group that has been discriminated against for many generations.

Although these natural policy experiments help in drawing causal interpretations, they have limitations. Major, exogenous policy changes are infrequent and difficult to measure. Furthermore, it is difficult to generalize from one policy action to broad policy strategies and from the experiences in one country to other economies. In turn, researchers use many other approaches to assess the relationship between finance and the persistence of intergenerational relative incomes.

### 3.1.3 Evaluation of specific schemes and experiments

A large body of research examines specific policy interventions that improve access to finance for some households or firms, but not others. These evaluations frequently do not consider the potential indirect effects of financial development on inequality. Rather, these studies focus on the direct impact of a particular policy intervention on households or firms.

[30]

Identification issues are a consuming concern in empirical assessments of access to finance. For example, households or enterprises that receive a loan may simply have greater prospects. They may have flourished even in the absence of the loan. Indeed, they may have received the loan because of their greater prospects. Alternatively, a household or enterprise may excel for reasons having nothing to do with using financial services. For example, some third factor might drive both the receipt of the loan and the firm's success, making it inappropriate to conclude that the loan caused the firm to succeed.

The debate surrounding the impact of microfinance loans from Bangladesh's Grameen Ban---the most famous microfinance institution---illustrates the difficulty of identifying the effect of credit on performance. Pitt & Khandker (1998) studied the impact of access to credit on the clients of Grameen Bank and two other microfinance institutions in Bangladesh. For identification, they exploited an exogenous eligibility criterion: To borrow from these institutions, households could not own more than one-half acre of land. Using a regression-discontinuity approach, they attributed differences in the fortunes of the households with land ownership just under and just above this half-acre threshold to finance. Pitt and Khandker found small but significant effects of the use of credit on household expenditures, household assets, labor supply, and the likelihood that children attend schools.

Others, however, challenge the finding that the Grameen Bank's microcredit programs boosted economic outcomes. Many doubt that the half-acre rule was systematically and rigorously applied, leading to concerns that selection bias still plagued the analysis. Using the same data, but a difference-in-differences approach and comparing microfinance recipients with a control group of households in areas not served by any microfinance program, Morduch (1998) failed to find any significant impact of microcredit on borrowers' income, consumption, or

[31]

likelihood of sending children to school, although he did find an effect on consumption

smoothing, i.e., a substantially lower variation in consumption and labor supply across seasons.

Furthermore, Pitt & Khandker (1998) could include only fixed effects at the village level and

could not deal with the endogeneity of household participation because they did not have a

household panel. In an extension, Khandker (2003) used a panel of household surveys to control

for unobserved, time-invariant borrower characteristics. The resulting estimates suggest a much

smaller impact of credit on household welfare than the original findings with Mark Pitt.

In another influential study, Coleman (1999) found that microcredit did not materially

help borrowers in northeast Thailand. To deal with selection issues, he exploited the facts that six

communities had been identified as future locations for village banks and that there was a list of

self-selected villagers who wanted to apply for loans once the banks were established. Instead of

simply surveying a random group in the not-yet-served villages, Coleman (1999) compared

actual borrowers with borrowers in waiting, in a technique known as pipe matching. He found no

significant impact of microcredit on physical assets, savings, production sales, productive

expenses, labor, or expenditures on health care or education.

A cleaner way of dealing with selection bias is to construct a genuine experiment in

which the subjects and the control group are chosen randomly. One such experiment was

conducted by Karlan & Zinman (2007), who convinced a South African consumer lender to

choose a subset of marginally rejected applicants at random and reverse the loan decision. Two

years later, those granted access were in better shape than a control group that remained without

loans. Borrowers were significantly more likely to retain wage employment, less likely to

experience hunger in their household, and less likely to be impoverished.[9] These findings

contradict predictions of behavioral models that suggest consumers may overborrow because

they underestimate borrowing costs, have present- biased preferences, and are overly optimistic (see Laibson et al. 2007, Ausubel 1991, Stango & Zinman 2006).

Randomized experiments and direct measures of access to finance are critical for assessing the impact of finance on welfare. Nonetheless, such studies tend to focus only on the direct use of financial services, not the spill-over effects from better-functioning financial systems on the economy. General equilibrium models and natural policy experiments suggest that the indirect effects of financial development are relevant for the poor.

### 3.1.4 Other household studies

Other studies have used household data to assess the impact of access to finance on a household's ability to educate, nourish, and care for its children. For example, using household data from Peru, Jacoby (1994) investigated how quickly children with different family backgrounds progress through the primary-school system. He found that children start withdrawing from school earlier in households with lower income and durable-goods holdings, but these factors influence only schooling to the extent households are predicted to be borrowing constrained on the basis of their reported loan activity. The results suggest that lack of access to credit perpetuates poverty because poor households reduce their children's education. In another paper, Jacoby & Skoufias (1997) showed that households from Indian villages without access to credit markets tend to reduce their children's schooling when they receive transitory shocks more than do households with greater access to financial markets. Furthermore, Flug et al. (1998) used cross-country panel regressions over 1970--1992 to show that lack of access to financial markets reduce average secondary-school enrollment rates.

Financial market imperfections also encourage child labor, with adverse implications on human capital accumulation in poor families. Beegle et al. (2006) used a household panel survey

[33]

in Tanzania to show that transitory income shocks (crop shocks) lead to greater increases in child labor in households with fewer assets (which are used both as buffer stocks and collateral for borrowing). Guarcello et al. (2002) used data from Guatemala and showed that child labor increases in response to broadly defined income shocks and self-reported credit rationing. If the household has assets, including pension assets (which they can use either as a buffer or as collateral to borrow), child labor does not increase with the negative income shock (Edmonds 2004). Hence, access to credit is likely to be important. Using cross-country analyses, Dehejia & Gatti (2005) found that financial development in the period 1960--1995 is associated with a reduction in child labor.[10]

Finance can also affect intergenerational persistence of relative income differences through child health. Foster (1995) studied the fluctuations in child growth in rural areas of Bangladesh during and after severe floods in 1988. He showed that growth patterns in children in landless households were influenced by credit market imperfections and concluded that because the high cost of transferring resources between periods appears to be an important contributor to fluctuations in child growth in the poorest households, small-scale credit programs targeting these households may provide significant benefits in terms of reducing these fluctuations.

In another study, Gertler et al. (2003) examined the roles of both large commercial and microfinance institutions in helping families insure consumption against major illness in Indonesia. The authors used measures of individuals' physical abilities to perform activities of daily living to identify serious health problems and found that families cannot insure against the costs of a major illness and see their consumption decline. They also showed that wealthier households reduce consumption considerably less as a result of illness. Finally, they estimated the effect of geographical proximity to financial institutions on consumption smoothing. They

[34]

found households that are closer to financial institutions are better able to insure consumption and that the estimated effects of being close to a commercial bank are similar to that of being close to a BRI branch---the largest microfinance lender in the country. Although it is difficult to interpret the effect of bank branches---because commercial banks are likely to be located in prosperous areas---being close to a BRI branch is less likely to suffer from endogenous location choice because microfinance branching decisions are not made on the basis of profitability. Hence, these results suggest significant welfare effects of being able to access finance.

The degree to which the financial system allows families to manage risk affects their entrepreneurial opportunities. For example, Rosenzweig & Wolpin (1993) and Rosenzweig & Binswanger (1993) found that low-wealth families without access to risk amelioration services choose lower-return, low-risk production process relative to families without these constraints. Hausman (1979) showed that, in the absence of well-developed financial markets that allow poor entrepreneurs to diversify risk, the higher discount rates of the poor will stymie entrepreneurial behavior. This work suggests that financial developments that make it easier for entrepreneurs to diversify, manage, and pool risks might materially expand the economic opportunities faced by many individuals and thereby affect the evolution of dynastic income differences. Clearly, more work is needed on these themes.

Finally, research has focused on the impact of wealth and liquidity constraints on self-employment decisions and entrepreneurial survival. Specifically, researchers have looked into the determinants of the switch into self-employment and its subsequent success (Paulson & Townsend 2004, Demirgüç-Kunt et al. 2008). Their results suggest wealthier households are more likely to start new businesses. Furthermore, the results suggest that chance of survival for new entrepreneurs is higher if there is an existing prior relationship with a financial institution

(Demirgüç-Kunt et al. 2008). Earlier studies using U.S. data similarly emphasize the importance

of wealth and liquidity constraints in starting businesses (see, for example, Evans & Leighton

1989, Evans & Jovanovic 1989, Holtz-Eakin et al. 1994.) [11] Thus, access to financial institutions

expands the economic opportunities of individuals that are unable to tap into the dynastic wealth

of their families to fund their entrepreneurial endeavors.

### 3.1.5 Summary

Overall, empirical research suggests that households benefit significantly from financial

development, though considerable work remains. On the one hand, general equilibrium models

and natural policy experiments that investigate both the direct and indirect effects of finance

frequently find that, although both effects are operational, the indirect effects are more important

in reducing inequality. On the other hand, randomized experiments of specific interventions and

other household studies often focus just on identifying the direct impact of using financial

services on households and do not examine potential indirect effects of improvements in the

financial system. Furthermore, some studies use proxy measures of access to finance, such as

durable assets or land, which can be used as collateral, or distance from a financial institution,

rather than the actual use of financial services. This shortcoming makes it difficult for some

studies to draw sharp inferences about the role of financial frictions since it is difficult to

distinguish between wealth and access to finance.

### 3.2 Impact on Firms and Industries

Although an enormous body of research examines the impact of financial services on firm

performance, we seek to focus only on the subset of this research that provides information on

linkages between finance and the intergenerational persistence of relative income differences.

Toward this end, we first review firm-level and industry-level studies that examine the impact of

financial development on economic growth. As discussed above, economic growth that increases wage rates may indirectly broaden access to financial services by reducing the comparative cost of using those services. Thus, we briefly note empirical research making this aggregate point.

We then turn to research on whether financial development disproportionately helps small firms. This does not provide direct, unambiguous information on intergenerational persistence of relative incomes. Very rich dynasties can own many small firms. Furthermore, financial development that spurs the growth of small firms could primarily increase demand for highly skilled labor, intensifying income inequality. Nonetheless, it is valuable to review research on whether financial development exerts a particularly pronounced effect on the growth opportunities of small, or even start-up, firms because this may shed empirical light on the distributional effects of financial development. Future research should seek to link findings on the impact firms of different sizes to the broader concept of economic opportunity.

### 3.2.1 Cross-country firm- and industry-level studies

Research establishes a robust correlation between improved access to finance and economic performance by exploiting firm- and industry-level heterogeneity. These studies address causality issues by identifying firms or sectors that are more likely to suffer from limited access to finance and then test whether financial development exerts a differential effect on the growth of these firms and industries. This research starts by observing that if financial underdevelopment prevents firms (or industries) from investing in profitable growth opportunities, it will not constrain all firms (or industries) equally. Firms that can finance themselves from retained earnings, or industries that depend less on external finance for technological reasons, will be minimally affected, whereas firms or industries relying on external finance may be severely constrained. By also examining a specific mechanism though which

[37]

finance might affect growth---ability to access external finance---both the cross-firm and cross-industry studies seek to provide evidence on the causal impact of finance on growth.

Whether using a firm- or industry-level approach, research suggests that improvements in the financial system boost economic growth. Specifically, Demirgüç-Kunt & Maksimovic (1998) used firm-level data from 8500 large firms in 30 countries and a financial planning model to predict how fast those firms would have grown if they had no access to external finance. They found that in each country the proportion of firms that grew faster than this rate was higher, the higher the country's financial development and quality of legal enforcement. Rajan & Zingales (1998) instead used industry-level data across 36 sectors and 41 countries and showed that industries that are naturally heavy users of external finance benefit disproportionately more from greater financial development compared with other industries. Natural use of external finance is measured by the finance intensity of U.S. industries because the U.S. financial system is relatively free of frictions, so each industry's use of external finance in the United States is assumed to be a good proxy for its demand.

Besides using cross-country, firm- and industry-level data to assess the causal linkages between finance and growth, researchers use these data to test whether financial development disproportionately benefits small firms because they face more severe credit constraints (Banerjee & Newman 1993). In particular, Beck et al. (2008a) used the industry-level approach to assess this possibility, whereas Beck et al. (2005) exploited the firm-level approach. Both papers indicate that financial development eases the obstacles that firms face to growing faster and that this effect is particularly strong for smaller firms. More recent survey evidence also suggests that access to finance is associated with faster rates of innovation and firm dynamism, consistent with the cross-country finding that finance promotes growth through productivity

increases (Ayyagari et al. 2007). Another approach is to examine start-up firms and trace their subsequent growth rates. Using entry rates for different industries in developed and transition economies, Klapper et al. (2006) showed that financial regulations that facilitate firm access to finance (such as accounting standards and property rights) have a positive effect on entry and subsequent growth rates.

While providing valuable insights, these cross-country firm or industry-level investigations are not without their own identification weaknesses. For example, although the analysis by Rajan & Zingales looks at within-country, between-industry differences and is therefore less subject to criticism due to omitted variables, the main underlying assumption that industry external dependence is determined by technological differences may not be accurate. After all, two firms with the same capital-intensive technology may have very different financing needs because their ability to generate internal cash flow would depend on the market power they have or the demand they face. Moreover, the level of competition faced by the firm may depend on the development of the financial system, thereby introducing additional concerns about endogeneity bias.

### 3.2.2 Country case studies

Researchers also examine the connection between finance and firm performance within a single country. Although focusing on a single country raises questions about the broader applicability of the results, abandoning the cross-country dimension reduces potential biases due to comparability of data and omitted variables. Moreover, focusing on a single country frequently permits researchers to use exceptionally detailed information that is unavailable across countries.

For example, Banerjee & Duflo (2004) studied detailed loan information on 253 small- and medium-sized firms from a bank in India both before and after they become eligible for a

directed credit program. The size definition of the direct credit program was reduced in 1998, enabling a new group of medium-sized firms to obtain loans at subsidized interest rates. When these firms began to borrow under this favored program, they did not simply substitute subsidized credit for more costly financing. They expanded production proportionally with the additional loan resources. Their response strongly suggests that these firms had been severely credit constrained. For our purposes, these findings suggest that underdeveloped financial systems in India are curtailing the economic opportunities of small business with exceptional growth prospects.

Evidence from bank deregulation across the individual states of the United States further suggests that financial development is particularly beneficial for facilitating the entry of new firms. As discussed above, the deregulation of restrictions on interstate banking between 1978 and 1994 form a natural experiment for studying the impact of financial development on the economy. Interstate deregulation permitted the country's most innovative banks to purchase banks throughout the country. In particular, interstate deregulation helped spread sophisticated credit-scoring techniques for evaluating small businesses to states that deregulated both directly through cross-state acquisitions and indirectly by creating a more effective takeover market in banking that spurred inefficient banks to adopt better evaluation and monitoring technologies (Hubbard & Palia 1995).

Black & Strahan (2002) and Kerr & Nanda (2007) showed that interstate deregulation boosted the entry rate of new firms and had a disproportionately positive impact on small firms. By stimulating improvements in the acquisition and processing of information about firms, especially new and prospective firms, interstate deregulation enhanced entrepreneurship and opportunity. Similarly, by facilitating risk diversification through geographic expansion,

interstate deregulation reduced the monitoring costs of lending to new, more opaque---and hence riskier---firms. Black & Strahan (2002) found that interstate deregulation helped entrepreneurs start new businesses, with the rate of new incorporations per capita in a state increasing by six percentage points following interstate deregulation. Kerr & Nanda (2007) found that interstate deregulation increased the number of new start-ups by six percentage points and expanded the number of facilities of existing firms by four percentage points, with their findings holding across all sectors in the economy. Furthermore, they found a dramatic increase in both the entry and exit of firms, suggesting that interstate deregulation increased the contestability of markets. These studies suggest that policy shocks that improve the operation of the banking system in an economy enhanced competition in the nonfinancial sector, especially by easing barriers to the entry of new firms.

### 3.2.3 Impact on microenterprises

To draw sharp inferences about finance and firm performance, researchers have also used randomized experiments and other survey-based methods for identifying causal effects. Cotler & Woodruff (2007) assessed the impact of very small firms, i.e., microenterprises, receiving credit. Using the pipe-matching methodology, they evaluated the impact of credit on microenterprises that receive credit and those that were selected to receive it in the future by a microfinance lender in Mexico. They found a positive and significant effect only for the smallest retailers, but a negative effect on larger retailers' sales and profits. [12] Thus, finance can exert a particularly positive impact on very small enterprises.

Randomized experiments provide stronger insights on the connection between finance and firm performance. Specifically, de Mel et al. (2007) and McKenzie & Woodruff (2006, 2008) gave funds to small retail firms in Sri Lanka and Mexico, respectively, providing an

exogenous shock to capital. They showed that this shock generated large increases in profits, indicating returns to capital that are substantially higher than market interest rates.[13] McKenzie & Woodruff (2008) also showed that increases in returns were especially high among the most constrained enterprises in Mexico, indicating that capital constraints are an important source of inefficiency. But rigorous empirical evidence based on credible control-treatment evaluations remains scant, and the same researchers found much weaker effects on returns to capital for female microentrepreneurs in a randomized controlled trial in Sri Lanka. Furthermore, the studies do not incorporate risk considerations. A high return from injecting capital in a firm is not synonymous with making a sound investment because of risk. Hence, more work is required to illustrate that these enterprises would be willing to borrow or able to obtain financing.

### 3.2.4 Summary

Without understating the methodological limitations of each approach, the main messages emerging from firm-level studies, industry-level studies, country case studies, and randomized experiments point to a similar conclusion: Direct access to finance critically and positively affects firm performance. This is in contrast to findings for households, where the impact of direct access is much less clear. More importantly for the purposes of this paper, the empirical research also highlights a distributional effect. Financial development exerts a particularly positive impact on small firms and facilitates the entry of new firms. These results are important because the bulk of the labor force is employed by small- and medium-sized enterprises in developing countries, so any disproportionately positive impact on them would have significant labor market effects for the poor.

**3.3 Impact at the Aggregate Level**

In examining the relationship between finance, income inequality, and poverty at the aggregate

level, it is helpful to recall that (*a*) a large literature finds that financial development---as

measured by measures of depth, such as credit extended to the private sector divided by GDP per

capita---accelerates aggregate economic growth and (*b*) there is an identity linking aggregate

growth, income of the poor, and inequality. Specifically, if $Y_P$ equals the per capita income of the

lowest quintile, $Y$ equals average income per capita, and $L$ is the Lorenz curve, which relates the

share of income received to the share of the population, then $Y_p = Y*L(0.2)/0.2$. Differentiating

with respect to time and letting $g(x)$ represent the growth rate of variable $x$ yields $g(Y_p) = g(Y) +$

$g[L(0.2)]$. The growth of per capita income of the poorest quintile equals the growth of average

per capita income plus the growth of the Lorenz curve, which captures changes in income

distribution. Thus, if financial development does not intensify income inequality (too much),

financial development will reduce poverty by boosting overall economic growth. If, however,

financial development intensifies income inequality, then this income distribution effect could

negate---or even reverse---the poverty-reducing influence of financial development that operates

through overall growth. Or, finance might disproportionately help the poor, in which case

financial development would affect poverty through two channels: overall growth and a

flattening of the distribution of income.

To assess the relationship between the operation of the financial sector and the

distribution of income in an economy, researchers examine the evolution of national Gini

coefficients. Beck et al. (2007a) found that there is a negative relationship between financial

development and the growth rate of the Gini coefficient, which holds when controlling for real

per capita GDP growth, lagged values of the Gini coefficient, and a wide array of other country-

specific factors, and when using panel instrumental variable procedures to control for

[43]

endogeneity and other potential biases. They also found that financial development exerts a disproportionately positive impact on the relatively poor. Financial development boosts the growth rate of the income share of the poorest quintile, thus helping the poor above and beyond the impact on aggregate growth. Specifically, approximately 40% of the impact of financial development on the income growth of the poorest quintile is the result of reductions in income inequality, whereas the remainder of the impact is due to the effect of financial development on aggregate economic growth. These results are robust to conditioning on many country traits and when employing a panel instrumental variable estimator to control for potential endogeneity bias.[14]

The finding of a negative relationship between financial development changes in income inequality are fully consistent with the theory of Galor & Moav (2004), who stressed that the level of financial development will affect the rate of human capital accumulation and hence changes in inequality over time. These results and the relationship between finance and changes in inequality also complement work examining the impact of finance on the level income inequality. Clarke et al.  (2006) and Li et al. (1998) found that financial development is associated with lower levels of income inequality. Thus, the evidence suggests that finance lowers both the level and growth rate of income inequality. Nonetheless, the Gini coefficient measures of inequality measures deviations of perfect income equality regardless of where in the distribution these deviations arise. In particular, the finding that finance reduces inequality does not necessarily imply that finance helps the poor.

Other work finds that financial development is negatively correlated with poverty and the growth rate of poverty. In particular, Beck et al. (2007a) regressed growth of poverty, which is measured as the fraction of the population living on less that $1 per day (or $2 per day) on the

level of financial development, initial poverty, initial income, economic growth, and many other country traits. They found a robust negative relationship and showed that, for the median country in their sample, approximately half of the impact of financial development on the headcount measure of poverty is due to financial development accelerating economic growth and the other half is due to financial development reducing income inequality. However, the sample is small and it is not possible to use panel estimators to control for potential endogeneity, making these results subject to greater qualifications.

Although aggregate cross-country comparisons have their shortcomings, they provide complementary information. Specifically, cross-country regressions suffer from more intractable identification problems than many other methodologies. Also, due to lack of data, aggregate cross-country comparisons frequently rely on broad indicators of financial depth, rather than specific measures of the degree to which households and firms use financial services. On the positive side, for a very broad cross section of countries, these analyses confirm findings emerging from single-country, microeconomic analyses. Furthermore, these results hold when using instrumental variables and dynamic panel estimators to mitigate potential identification and omitted variable problems. Moreover, these aggregate cross-country comparisons capture both the direct and indirect impact of access to finance, which is crucial for fully assessing the finance-inequality relationship.

## 4. CONCLUSION

Theory provides sound reasons for believing that the poor disproportionately benefit from financial development. Financial developments that lower the fixed costs of accessing financial services are especially useful to low-income individuals, helping them to pay for education and health care. Financial development that operates on the extensive margin facilitates

[45]

entrepreneurship by people with promising ideas, but little collateral and income. This both reduces inequality of opportunity and enhances aggregate efficiency. Similarly, financial development provides greater access to risk management and insurance services. Besides directly improving welfare, these services allow families to keep their kids in school even when faced with adverse shocks to family income. Similarly, theory suggests that financial development that boosts economic activity will stimulate the demand for labor, boosting earnings and providing a richer array of economic opportunities.

Theory is not unambiguous, however. In particular, financial development that operates on the intensive margin and improves the financial services available to rich individuals and well-established firms can reduce the equality of opportunity, perpetuate cross-dynasty relative income differences, and widen the distribution of income. While theory provides guidance on the potential mechanisms linking inequality and the operation of the financial system, many of the core questions about the nature of the relationship between inequality and finance are empirical.

Although far from conclusive, an accumulating body of empirical evidence supports this view. The results of cross-country, firm-level, and industry-level studies, policy experiments, as well as general equilibrium model estimations all suggest that there is a strong beneficial effect of financial development on the poor and that poor households and smaller firms benefit more from this development compared with rich individuals and larger firms. Empirical research suggests that an improvement in financial development expands economic opportunities, particularly for those whose opportunities had previously been tightly curtailed.

But how exactly do the poor as well as micro and small firms benefit from financial development? For households, evidence suggests that financial development facilitates consumption smoothing and investment in human capital accumulation. For firms, increased

access to finance is associated with higher returns and better performance, supporting the beneficial impact of direct access to finance. Furthermore, the evidence suggests that the indirect effects of finance on inequality are substantial. General equilibrium estimations, policy experiments, cross-country regressions, and other methods suggest that financial development exerts a disproportionately large effect on the poor by expanding labor market opportunities. For micro and small firms, the indirect benefits of financial development are also significant. Small enterprises benefit not only from increased direct access, but also from the increased growth opportunities generated by financial development.

But there is still too little research examining the particular mechanisms linking finance and inequality. Part of this is a data problem. Although Beck et al. (2007b, 2008b) have recently started to construct systematic cross-country data on the use of financial services, the general lack of data on access to financial services has limited the degree to which researchers can assess the channels through which finance affects inequality. Besides the data problems, more research is needed on finance and inequality. For example, more randomized experiments are likely to shed further light on the direct impact of access to finance on households and microenterprises. But these types of studies cannot capture important economy-wide, indirect effects that seem to be of first-order importance. Rigorous evaluations of natural policy experiments are particularly useful, but there are not enough of them and researchers cannot simply implement more. General equilibrium models help in illustrating potential patterns and examining the impact of different policy changes, but difficulties of capturing all the complexities of real economies in a tractable model reflect the inherent boundaries of this methodology. Using cross-country data, both at the macro and micro level, helps in assessing the combined direct as well as indirect effects of financial development, but these studies are subject to considerable identification problems.

Because different methodologies all suffer from different problems, a complete picture of the finance-inequality relationship can be painted only with a broad brush of complementary methodologies.

We conclude with two observations about financial sector policies. First, there is also startlingly little research on how formal financial sector policies---such as bank regulations or securities markets laws---affect inequality. Given the accumulated body of theoretical and empirical research on the central---though frequently underappreciated---role of finance in explaining economic inequality, this is serious gap. Given the enormous welfare implications at stake, there are potentially high returns to theoretical and empirical research on the impact of financial regulations on economic opportunity, the intergenerational persistence of relative incomes, and the distribution of income.

Second, compare finance and redistributive policies. Many theories motivate redistributive policies as a mechanism for de-linking an individual's opportunities from parental wealth. One problem with redistributive policies, however, is that they create disincentives to work and save, though researchers debate the actual magnitudes of these disincentive effects. These tensions between efficiency and equity, however, vanish when focusing on financial sector reforms. Financial developments that expand individual economic opportunity create positive, not negative, incentive effects, and they avoid the adverse repercussions associated with attempts to equalize outcomes. Financial development boosts both efficiency and the equality of opportunity. This observation further supports our core argument: Economists should devote considerably more resources toward assessing how formal financial sector policies affect economic opportunity and poverty.

## LITERATURE CITED

Aghion P, Bolton P. 1997. A theory of trickle-down growth and development. *Rev. Econ. Stud.* 64(2):151–72

Alesina A, Rodrik D. 1994. Distributive politics and economic growth. *Q. J. Econ.* 109(2):465–90

Atkinson AB, ed. 1980. *Wealth, Income, and Inequality*. New York: Oxford Univ. Press. 2nd ed.

Atkinson AB, Bourguignon F, eds. 2000. *Handbook of Income Distribution*, Vol. 1. Amsterdam: Elsevier

Atkinson AB, Stiglitz J. 1980. *Lectures on Public Economics*. New York: McGraw-Hill

Ausubel LM. 1991. The failure of competition in the credit card market. *Am. Econ. Rev.* 81(1):50–81

Ayyagari M, Demirgüç-Kunt A, Maksimovic V. 2007. *Firm innovation in emerging markets: the roles of governance and finance.* Policy Res. Work. Pap. 4157, World Bank

Baland J-M, Robinson JA. 1998. *A model of child labor.* Work. Pap. 9803, Dep. Econ., Univ. South. Calif.

Baland J-M, Robinson JA. 2000. Is child labor inefficient*? J. Polit. Econ.* 108(4):663–79

Banerjee AV, Duflo E. 2004. *Do firms want to borrow more? testing credit constraints using a directed lending program.* Discuss. Pap. 4681, CEPR

Banerjee AV, Newman AF. 1993. Occupational choice and the process of development. *J. Polit. Econ.* 101(2):274–98

Bardhan P. 2000. The nature of institutional impediments to economic development. In *A Not-So-Dismal Science: a Broader View of Economies and Societies*, ed. M Olson, S Kähkönen, pp. 245–68. New York: Oxford Univ. Press

Bardhan P, Bowles S, Gintis H. 2000. Wealth inequality, wealth constraints and economic performance. See Atkinson & Bourguignon 2000, pp. 541–603

Barth JR, Caprio G Jr, Levine R. 2006. *Rethinking Bank Regulation: Till Angels Govern*. New York: Cambridge Univ. Press

Beck THL, Demirgüç-Kunt A, Laeven L, Levine R. 2008a. Finance, firm size and growth. *J. Money Credit Bank.* 40:1379--405

Beck THL, Demirgüç-Kunt A, Levine R. 2007a. Finance, inequality, and the poor. *J. Econ. Growth* 12(1):27–49

Beck THL, Demirgüç-Kunt A, Maksimovic V. 2005. Financial and legal constraints to firm growth: Does firm size matter? *J. Finance* 60(1):137–77

Beck THL, Demirgüç-Kunt A, Martinez Peria M. 2007b. Reaching out: Access to and use of banking services across countries. *J. Financ. Econ.* 85(1):234–66**.**

Beck THL, Demirgüç-Kunt A, Martinez Peria M. 2008b. Banking services for everyone? Barriers to bank access and use around the world. *World Bank Econ. Rev.* 22(3):397--430

Beck THL, Levine R, Levkov A. 2009. *Big bad banks? The impact of U.S. branch deregulation on income distribution.* NBER Working Paper, No. 13299.

Becker GS. 1957. *The Economics of Discrimination.* Chicago: Univ. Chicago Press. 2nd ed.

Becker GS, Tomes N. 1979. An equilibrium theory of the distribution of income and intergenerational mobility. *J. Polit. Econ.* 87(6):1153–89

Becker GS, Tomes N. 1986. Human capital and the rise and fall of families. *J. Labor Econ.* 4(3):S1-39

Beegle K, Dehejia R, Gatti R. 2006. Child labor and agricultural shocks. *J. Dev. Econ.* 81(1):80–96

Benabou R. 1993. Workings of a city: Location, education, and production. *Q. J. Econ.* 108(3):619-52

Benabou R. 1996. Equity and efficiency in human capital investment: the local connection. *Rev. Econ. Stud.* 63(2):237–64

Benabou, R. 2000. Unequal societies: income distribution and the social contract," *American Economic Review,* 90: 96-129.

Bertola G. 1992. *Models of economic integration and localized growth.* Discuss. Pap. 651, CEPR

Black SE, Lynch LM. 1996. Human-capital investments and productivity. *Am. Econ. Rev.* 86(2):263–67

Black SE, Strahan P. 2002. Entrepreneurship and bank credit availability. *J. Financ.* 57(6):2807–33

Blanchflower D, Oswald A. 1998. What makes an entrepreneur? *J. Labor Econ.* 16(1):26–60

Blanchflower D, Oswald A. 2007. *What makes a young entrepreneur?* Discuss. Pap. 3139, IZA

Bourguignon F. 1981. Pareto superiority of unegalitarian equilibria in Stiglitz's model of wealth distribution with convex saving function. *Econometrica* 49(6):1469–75

Burgess R, Pande R. 2005. Can rural banks reduce poverty? Evidence from the Indian Social Banking Experiment. *Am. Econ. Rev.* 95(3):780–95

Clarke GRG. 1995. More evidence on income distribution and growth. *J. Dev. Econ.* 47(2):403–27

Clarke GRG, Xu LC, Heng-fu Z. 2006. Finance and income inequality: What do the data tell us? *South. Econ. J.* 72(3):578–96

Coleman BE. 1999. The impact of group lending in Northeast Thailand. *J. Dev. Econ.* 60(1):105–42

Cotler P, Woodruff C. 2007. The impact of short-term credit on microenterprises: evidence from the Bimbo Program in Mexico. *Econ. Dev. Cult. Change* 56:829–49

Dehejia RH, Gatti R. 2005. Child labor: the role of financial development and income variability across countries. *Econ. Dev. Cult. Change* 53(4):913-32

Deininger K, Squire L. 1996. A new data set measuring income inequality. *World Bank Econ. Rev.* 10(3):565–91

de Mel S, McKenzie D, Woodruff CM. 2008. Returns to capital in microenterprises: Evidence from a field experiment." *Q. J. Econ.* 123(4): 1329-1372.

Demirgüç-Kunt A, Klapper L, Panos G. 2008. *The origins of self-employment.* http://siteresources.worldbank.org/INTFR/Resources/BosniaFeb07Klapperetal.pdf

Demirgüç-Kunt A, Maksimovic V. 1998. Law, finance, and firm growth. *J. Financ.* 53(6):2107–37

Djankov S, Miguel E, Qian Y, Roland G, Zhuravskaya E. 2005. Who are Russia's entrepreneurs? *J. Eur. Econ. Assoc.* 3(2-3):587–97

Djankov S, Qian Y, Roland G, Zhuravskaya E. 2006. Who are China's entrepreneurs? *Am. Econ. Rev. Pages Proc.* 96(2):348–52

Dollar D, Kraay A. 2002. Growth is good for the poor. *J. Econ. Growth* 7(3):195–225

Durlauf SN. 1996. A theory of persistent income inequality. *J. Econ. Growth* 1(1):75–93

Easterly W. 2002. *What did structural adjustment adjust? The association of policies and growth with repeated IMF and World Bank adjustment loans.* Work. Pap. 11, Cent. Glob. Dev.

Edmonds E. 2004. *Does illiquidity alter child labor and schooling decisions? Evidence from household responses to anticipated cash transfers in South Africa.* Work. Pap. 10265, NBER

Eswaran M, Kotwal A. 1985. *Risk-bearing, capacity and entrepreneurship as privileges of wealth.* Discuss. Pap. 85-28, Dep. Econ., Univ. B.C.

Evans D, Jovanovic B. 1989. An estimated model of entrepreneurial choice under liquidity constraints. *J. Polit. Econ.* 97(4):808–27

Evans D, Leighton L. 1989. Some empirical aspects of entrepreneurship. *Am. Econ. Rev.* 79(3):519–35

Fernandez R, Rogerson R. 1996. Income distribution, communities and the quality of public education. *Q. J. Econ.* 111(11):135–64

Flug K, Spilimbergo A, Wachtenheim E. 1998. Investment in education: do economic volatility and credit constraints matter? *J. Dev. Econ.* 55(2):465–81

Forbes K. 2000. A reassessment of the relationship between inequality and growth. *Am. Econ. Rev.* 90(4):869–87

Foster A. 1995. Prices, credit markets, and child growth in low-income rural areas. *Econ. J.* 105(430):551–70

Galor O, Moav O. 2004. From physical to human capital accumulation: inequality and the process of development. *Rev. Econ. Stud.* 71(4):1001-26

Galor O, Moav, O. 2006. Das human kapital: a theory of the demise of the class structure. *Review of Economics Studies*, 73(1): 85-117.

Galor O, Tsiddon D. 1997a. Technological progress, mobility, and economic growth. *Am. Econ. Rev.* 87(3):363--82

Galor O, Tsiddon D. 1997b. The distribution of human capital and economic growth. *J. Econ. Growth* 2(1):93–124

[51]

Galor O, Weil DN. 2000. Population, technology, and growth: from Malthusian stagnation to the demographic transition and beyond. *Am. Econ. Rev.* 90(4):806-28

Galor O, Zeira J. 1993. Income distribution and macroeconomics. *Rev. Econ. Stud.* 60(1):35–52

Gertler P, Levine D, Moretti E. 2003. *Do microfinance programs help families insure consumption against illness?* Work. Pap. Ser. 1045, Cent. Int. Dev. Econ. Res., Univ. Calif., Berkeley

Gine X, Townsend R. 2004. Evaluation of financial liberalization: a general equilibrium model with constrained occupation choice. *J. Dev. Econ.* 74(2):269–307

Greenwood J, Jovanovic B. 1990. Financial development, growth, and the distribution of income. *J. Polit. Econ.* 98(5):1076–107

Guarcello L, Mealli F, Rosati F. 2002. *Household vulnerability and child labour: the effects of shocks, credit rationing, and insurance.* Work. Pap. 3, Understanding Children's Work (UCW Proj.)

Haber S. 2007. *Political institutions and financial development: evidence from the political economy of banking regulation in the New World economies.* Mimeogr., Stanford Univ.

Haber S, Perotti E. 2008. *The political economy of finance.* Mimeogr., Stanford Univ.

Haber S, Razo A, Maurer N. 2003. *The Politics of Property Rights: Political Instability, Credible Commitments, and Economic Growth in Mexico, 1876-1929.* Cambridge, MA: Cambridge Univ. Press

Hausman JA. 1979. *The effect of taxes on labor supply.* Work. Pap. 254, Dep. Econ., MIT

Holtz-Eakin D, Joulfaian D, Rosen HS. 1994. Sticking it out: entrepreneurial survival and liquidity constraints. *J. Polit. Econ.* 102(1):53-75

Hubbard RG, Palia D. 1995. Executive pay and performance evidence from the U.S. banking industry. *J. Financ. Econ.* 39(1):105-30

Jacoby HG. 1994. Borrowing constraints and progress through school: evidence from Peru. *Rev. Econ. Stud.* 76(1):151–60

Jacoby HG, Skoufias E. 1997. Risk, financial markets, and human capital in a developing country. *Rev. Econ. Stud.* 64(3):311–35

Jafarey S, Lahiri S. 2002. Will trade sanctions reduce child labour? The role of credit markets. *J. Dev. Econ.* 68(1):137-56

Jayaratne, J., Strahan, P. 1996. The finance-growth nexus: evidence from bank branch deregulation. Q. Journal of Economics 111: 639-670.

Jeong H, Townsend R. 2008. Growth and inequality: Model evaluation based on estimation-calibration strategy. *Macroecon. Dyn. Spec. Issue Inequal.* 12:231--84

Jeong H, Townsend R. 2007. Sources of TFP growth: occupational choice and financial deepening. *Econ. Theory* 32(1):179–221

Jerzmanowski M, Nabar M. 2007. *Financial development and wage inequality: theory and evidence*. MPRA Pap. 9841, Univ. Libr. Munich, Ger.

Kanbur R. 2000. Income distribution and development. See Atkinson & Bourguignon 2000, pp. 791–841

Karlan D, Zinman J. 2006. *Expanding credit access: using randomized credit supply decisions to estimate the impacts.* Discuss. Pap. 6180, CEPR**.**

Kerr W, Nanda R. 2007. *Democratizing entry: banking deregulations, financing constraints, and entrepreneurship.* Work. Pap. 07-33, Cent. Econ. Stud., US Census Bur.

Khandker SR. 2003. *Microfinance and poverty: evidence using panel data from Bangladesh.* Policy Res. Work. Pap. 2945, World Bank

King RG, Levine R. 1993a. Finance and growth: Schumpeter might be right. *Q. J. Econ.* 108(3):717–37**.**

King RG, Levine R. 1993b. Finance, entrepreneurship, and growth: theory and evidence. *J. Monet. Econ.* 32(3):513–42

Klapper L, Laeven L, Rajan R. 2006. Entry regulation as a barrier to entrepreneurship. *J. Financ. Econ.* 82(3):591–629

Kroszner RS, Strahan PE. 1999. What drives deregulation? Economics and politics of the relaxation of bank branching restrictions. *Q. J. Econ.* 114(4):1437–67

Laeven L, Levine R, Michalopoulos S. 2009. "Financial and Technological Innovation: Implications for Growth." Brown University, Department of Economics Working Paper, 2009.

Laibson D, Repetto A, Tobacman J. 2005. *Estimating discount functions with consumption choices over the lifecycle.* Work. Pap. No. 13314, NBER**.**

Lang K, Ruud PA. 1986. Returns to schooling, implicit discount rates and Black-White wage differentials. *Rev. Econ. Stat.* 68(1):41–47

Lazear E. 1980. Family background and optimal schooling decisions. *Rev. Econ. Stat.* 62(1):42-51

Levine R. 2005. Finance and growth: theory and evidence. In *Handbook of Economic Growth*, ed. P Aghion, S Durlauf, 1A:865--934. Amsterdam: North-Holland Elsevier

Levine R, Levkov A, Rubinstein Y. 2009. "Racial Discrimination and Competition." National Bureau of Economic Research Working Paper No. 14273.

Levine R, Rubinstein Y. 2009. "Bank Deregulation, Credit Constraints, and Diplomas." Brown University, Department of Economics Working Paper, 2009.

Levine R, Zervos S. 1998. Stock markets, banks, and economic growth. *Am. Econ. Rev.* 88:537–58

Li H, Squire L, Heng-fu Z. 1998. Explaining international and intertemporal variations in income inequality. *Econ. J.* 108(446):26–43

Loury GC. 1981. Intergenerational transfers and the distribution of earnings. *Econometrica* 49(4):843-67

Lundberg M, Squire L. 2003. The simultaneous evolution of growth and inequality. *Econ. J.* 113(487):326-44

McKenzie D, Woodruff C. 2006. Do entry costs provide an empirical basis for poverty traps? Evidence from Mexican microenterprises. *Econ. Dev. Cult. Change* 55(1):3-42

McKenzie D, Woodruff C. 2008. Experimental evidence on returns to capital and access to finance in Mexico. *World Bank Econ. Rev.*22:457--82

Mookherjee D, Ray D. 2003. Persistent inequality. *Rev. Econ. Stud.* 70(2):369–93

Morduch J. 1998. *Does microfinance really help the poor? New evidence from flagship programs in Bangladesh.* http://www.nyu.edu/projects/morduch/documents/microfinance/Does_Microfinance_Really_Help.pdf

Newbery DMG. 1977. Risk sharing, sharecropping and uncertain labor markets. *Rev. Econ. Stud.* 44(3): 585-94

Parsons DO, Goldin C. 1989. Parental altruism and self-interest: child labor among late nineteenth-century American Families. *Econ. Inq.* 27(4):637–59

Paulson AL, Townsend RM. 2004. Entrepreneurship and financial constraints in Thailand. *J. Corp. Finance* 10(2):229–62

Paulson AL, Townsend RM, Karaivanov A. 2006. Distinguishing limited liability from moral hazard in a model of entrepreneurship. *J. Polit. Econ.* 114(1):100–44

Perotti E. 1993. Political equilibrium, income distribution, and growth. *Rev. Econ. Stud.* 60(4):755–76

Perotti E. 1996. Income distribution and growth. *J. Econ. Growth* 1(2):149–87

Perotti EC, von Thadden E-L. 2006. The political economy of corporate control and labor rents. *J. Polit. Econ.* 114(1):145–74

Persson T, Tabellini G. 1994. Is inequality harmful for growth? *Am. Econ. Rev.* 84(3):600–21

Piketty T. 1997. The dynamics of wealth distribution and the interest rate with credit rationing. *Rev. Econ. Stud.* 64(2):173–89

Piketty T. 2000. Theories of persistent inequality and intergenerational mobility. See Atkinson & Bourguignon 2000, pp. 429–76

Pitt MM, Khandker SR. 1998. The impact of group-based credit programs on poor households in Bangladesh: Does the gender of participants matter? *J. Polit. Econ.* 106(5):958–96

Rajan R, Zingales L. 1998. Financial dependence and growth. *Am. Econ. Rev.* 88(3):559–87

Rosenzweig, MR., Binswanger, HP. 1993. Wealth, weather risk and the profitability of agricultural investment". *Economic Journal*, 103 (1): 56-78.

Rosenzweig, M.R., Wolpin, K.I. 1993. Credit market constraints, consumption smoothing and the accumulation of durable assets in low income countries: Investments in bullocks in India." *J. Polit. Econ.* 101: 223-44.

Stango V,  Zinman J. 2006. *How a cognitive bias shapes competition: evidence from the consumer credit market.* Work. Pap. Ser., Dartmouth College

[54]

Stiglitz JE. 1969. The effects of income, wealth, and capital gains taxation on risk-taking. *Q. J. Econ.* 83(2):263–83

Stiglitz JE. 1974. Incentives and risk sharing in sharecropping. *Rev. Econ. Stud.* 41(2):219–55

Townsend RM. 1982. Optimal multiperiod contracts and the gain from enduring relationships under private information. *J. Polit. Econ.* 90(6):1166-86

Townsend RM, Ueda K. 2006. Financial deepening, inequality and growth: a model-based quantitative evaluation. *Rev. Econ. Stud.* 73(1):251–93

Wydick B. 1999. Credit access, human capital, and class structure dynamics. *J. Dev. Stud.* 35(6):131–52

[1]Within a model of long growth, it is also possible to generate long-run persistence in cross-dynasty human capital differences by modeling human capital as a function of both parental human capital and schooling. Galor & Tsiddon (1997a, 1997b) assumed that all individuals have identical innate ability and model human capital accumulation as follows: $h(t + 1) = \phi\{h(t), s(t)\}$. They assumed positive, but diminishing, returns to dynastic human capital and schooling, so that $\phi_1 > 0$, $\phi_{11} < 0$, $\phi_2 > 0$, and $\phi_{22} < 0$. They also assumed that parental human capital and schooling complement each other, $\phi_{12} > 0$. Galor & Tsiddon (1997b) have both a home environment externality because human capital is positively associated with parental human capital and a global externality because average human capital in the economy accelerates technological progress, which encourages and facilitates schooling. With perfect capital markets, poor dynasties readily respond to these incentives, boosting average human capital, accelerating growth, and reducing inequality. Financial development reduces the probability of experiencing long-run persistence of relative income differences across dynasties.

[2]An implicit assumption underlying this analysis is that the concentration of capital ownership does not distort resource allocation or the policies that influence resource allocation, but see Barth et al. (2006) and Haber et al. (2003).

[3]Endogenous fertility decisions can also motivate the assumption of a convex savings function in per capita terms as shown by Atkinson (1980). If poor dynasties have more kids than rich ones, cross-dynasty per capita wealth inequalities can persist across generations even if all dynasties have the same aggregate savings rate. Galor & Weil (2000) noted, however, fertility does not fall with wealth, rather fertility falls with human capital, which is not perfectly correlated with wealth. This line of inquiry also suggests that financial market policies could affect fertility decisions.

[4]Cross-country empirical observations do not support the assumption of aggregate convex savings behavior. Convex savings behavior implies a positive association between inequality and growth. Consider two economies that are equivalent except economy A has an equal distribution of income, while economy B has a skewed distribution of income. With convex savings, economy B will save more and enjoy a higher average per dynasty income level in the next period. Income inequality, however, is not positively associated with growth (Alesina & Rodrik 1994, Persson & Tabellini 1994, Clarke 1995, Perotti 1996, Forbes 2000, Easterly 2002, Lundberg & Squire 2003). Also, the maintained assumption that labor income is constant across dynasties is not innocuous. The results on long-run persistence with convex savings behavior will not necessarily hold if increases in capital boost demand for human capital, as developed in Galor & Moav (2004).

[5]Although Jerzmanowski & Nabar (2007) analyzed a model in which financial development induces a disproportionate increase in the demand for skilled labor, thereby boosting income inequality, it is unclear how the predictions of this model would change if workers could invest in obtaining skills, especially if financial development facilitates these human capital investments.

[6]Indeed, Paulson & Townsend (2004) showed that financial constraints play an important role in shaping the patterns of entrepreneurship in Thailand. Wealthier households are more likely to start businesses, and these constraints are more binding on entrepreneurship in the poor northeast compared to the richer central region.

[7]In extensions, Townsend & Ueda (2006) endogenized the size of the intermediated sector by introducing fixed transaction costs into the model with similar results. But they concluded that some of the restrictive financial sector policies in Thailand might have slowed the growth of financial intermediation below the endogenous growth rate that would have resulted from increasing per capita income, as predicted by Greenwood & Jovanovic (1990).

[8]Lazear (1980) and Lang & Ruud (1986) also showed that finance affects the persistence of income inequality by disproportionately impeding the poor from accumulating human capital.

[9]It is important to note this design picks up the effect of credit for the marginal borrower. Given heterogeneity across borrowers, the effect might be lower or zero for those borrowers who easily got credit, since they may have close substitutes, but much bigger for those who were denied credit by a bigger margin.

[10]There is also a theoretical literature that models the role of household access to credit in determining the extent of child labor: See Parsons & Goldin (1989), Baland & Robinson (2000), and Jafarey & Lahiri (2002).

[11]There is also an extensive literature that examines the role of other factors, such as institutions, socioeconomic factors, individual characteristics and psychological factors, in identifying the determinants of the decision to start

entrepreneurial activity. See, for example, Blanchflower & Oswald (2007) and Djankov et al. (2005, 2006), among others.

[12]Using survey data for Guatemalan microentrepreneurs, Wydick (1999) also showed a positive association between the use of credit and upward class mobility, but it is difficult to draw causal implications from the analysis.

[13]Note that this work also has important theoretical implications. If returns to capital are very high at very low levels of investment, as in the Sri Lanka and Mexico experiments above, then capital-constrained entrepreneurs should be able to enter and grow to a desired size by reinvesting profits earned in the enterprise. Hence, capital constraints will have short-term costs but fewer long-term effects on outcomes, questioning the validity of models such as those by Banerjee & Newman (1993) where credit constraints lead to permanent poverty traps.

[14]Dollar & Kraay (2002) used a highly unbalanced system panel estimator to examine the relationship between the income of the poor, median income, and policy indicators. They found that average income and income of the poor move equiproportionately. Changes in income and changes in inequality are unrelated. When they examined one measure of financial development, commercial bank/total banking assets, this particular measure of financial development did not enter significantly. But, this is not a very conventional or appealing measure of financial development.