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Marco Pagano * **and Giovanni Pica** **

Abstract

How does finance affect employment and inter-industry job reallocation? We present a model that predicts that financial development (i) increases employment and/or labor productivity and wages, with a smaller impact at high levels of the equilibrium wage and financial development; (ii) may induce either more or less reallocation of jobs depending on whether shocks to profit opportunities or to cash flow predominate; (iii) amplifies the output and employment losses in crises, firms that rely most on banks for liquidity being hit the hardest. Testing these predictions on international industry-level data for 1970-2003, we find that standard measures of financial development are indeed associated with greater employment growth, although only in non-OECD countries, and are not correlated with labor productivity or real wage growth. Moreover, they correlate negatively with inter-industry dispersion of employment growth. Finally, there is some evidence of a "dark side" of financial development, in that during banking crises employment grows less in the industries that are more dependent on external finance and those located in the more financially developed countries.

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1. Introduction

The financial crisis of 2007-09 and the subsequent recession have caused such massive job destruction that recovering pre-crisis levels of employment will take over 20 million new jobs worldwide (ILO, 2010).[1] In the United States, "the deterioration of labor market conditions during this recession is the worst on record since the late 1940s" (Elsby, Hobijn and Şahin, 2010, p. 2). The displacement of so many workers – together with the huge burden placed on taxpayers – has prompted a good deal of public anger at financial markets and bankers. Many people now consider the financial markets as unproductive at best if not socially harmful. Even a business-friendly magazine such as *The Economist* acknowledges: "Financial markets promised prosperity; instead they have brought hardship" (Carr, 2009, p. 3).

While these indictments are particularly harsh in the wake of the recent crisis, they are not new. In April 2005, during the national election campaign in Germany Franz Müntefering, the head of the German Social Democratic Party, likened private equity firms and hedge funds to "swarms of locusts that fall on companies, stripping them bare before moving on" and charged that "some financial investors don't waste any thoughts on the people whose jobs they destroy". With an equally colorful metaphor, in March 2007 John Evans, secretary of the Trade Union Advisory Committee referred to private equity as "a cancer eating away at the job-creation system" (Arnold, 2007).

These damning accusations stand in sharp contrast to a vast body of work in academic journals over the last twenty years: many papers have documented that financial development tends to be associated with faster output growth and that the correlation can be interpreted as causal, in the sense that more highly developed financial markets contribute to economic growth. The divergence of opinion calls for further research on the economic effects of financial development. The present paper bears on three distinct aspects of the question.

First, in principle financial development could produce "jobless growth": easing financing constraints may allow firms to invest in more capital-intensive technologies and thereby expand output but not employment, only increasing productivity. This means that the empirical evidence of a relationship between finance and growth need not translate mechanically into a link between finance and employment.

Second, even if financial development does cause employment gains, it may not do so across the board: the more efficient financial markets and intermediaries become, the more selective they

[1] This estimate refers to the countries that had not yet attained pre-crisis employment levels by the first quarter of 2010.

should become in allocating resources between "winners" and "losers", with more funding to more profitable firms and industries, and less to the weaker, which may even be forced to shut down altogether. Financial development, that is to say, may increase the magnitude and frequency of job reallocation across industries. But this is not a forgone conclusion, since more highly developed financial intermediaries may also be able to provide more funding to firms hit by liquidity shocks and so help stabilize employment and output. Thus, in principle better-developed financial markets could be associated with either more or less severe job reallocation.

Third, despite the textbook description of the financial system as an efficient machine for resource allocation, its actual operation is far from smooth and flawless. The recent events have administered a sharp reminder that the financial markets may themselves be a source of risk, rather than a mechanism to price and share it; and financial sophistication may itself be a source of instability, if it encourages excess risk-taking. The question then becomes whether more developed financial markets may not aggravate the crisis-induced losses of employment and output. It stands to reason that economies that depend more heavily on the smooth functioning of financial markets may be more severely damaged by their collapse. So, while in normal times financial development may foster output and employment growth, in a crisis it may exacerbate their contraction.

To guide empirical analysis on these three issues, in Section 2 we lay out a simple one-sector model in which the degree of financial development is gauged by the ability of financial intermediaries to verify their borrowers' cash flows, and financial development itself produces greater availability of external finance to firms. When firms are identical, financial development allows all of them to invest and produce more. However, the extent to which they will also hire more workers depends on the labor supply response: if labor supply is elastic, the effect will be mostly on employment; if it is rigid, on productivity and wages, with a correspondingly large increase in capital intensity. And if firms differ in efficient capital stock, the effect of financial development on economic activity is non-linear: it gradually decreases and eventually vanishes, because as the financial markets develop, fewer and fewer firms remain finance-constrained.

To analyze the second issue – the effect of finance on the reallocation of labor – we then extend the model, positing two industries of differing expected profitability. In this case, financial development allows the more profitable firms to attract more labor by bidding up wages, inducing labor reallocation from the weaker to the stronger industries. By the same token, it amplifies the inter-industry differences in the employment response to profitability shocks, implying that the cross-sectional variance in profitability should result in greater cross-sectional variance in employment. At the same time, though, financial development also decreases the sensitivity of

employment to cash-flow shocks by increasing the fraction of unconstrained firms, which are immune. So whether financial development actually results in more or less cross-sectional employment variability should depend on which type of shock prevails – to future profitability or current cash flow.

To adapt the model to deal with crises, we suppose that firms can deal with liquidity shocks in either of two ways: self-insurance (hoarding liquidity) and borrowing (relying on banks to provide funds when needed, thus hoarding less and investing more). In this modified model, credit-rationed firms cannot count on bank funds to overcome liquidity shocks, so they must either hoard liquidity or, equivalently, preserve some unused debt capacity in order to borrow in case of shock. By contrast, the unconstrained firms can and do count on banks. Thus, insofar as banks themselves can actually perform this insurance function, financial development allows the economy to hoard less liquidity and so frees resources for investment. But if banks should undergo a crisis that prevents them from supplying the pledged liquidity, an economy in which most firms rely on banks' liquidity services will be affected more severely than one with a less developed financial system, in which firms can count on their own hoarded cash. In short, the eventuality of a banking crisis reveals a possible "dark side" to financial development.

The rest of the paper brings empirical evidence to bear on these three questions, using UNIDO data for the period 1970-2003. Section 3 extends the empirical approach of Rajan and Zingales (1998) to the relationship between financial development and employment and wage growth. We find that financial development is associated with employment growth but not with productivity or real wage growth. We also find, in keeping with theory, that the effect of finance on output and employment is non-linear: it is positive and statistically significant in developing countries, but not in developed ones; moreover, in the sample as a whole, it is positive and significant only in the 1970s and 1980s, not afterwards, when the financial system had already become quite developed in most countries.

In Section 4 we show that measures of labor reallocation are correlated inversely with financial development: this suggests that the stabilizing effect of developed financial markets due to firms' lesser sensitivity to cash-flow shocks outweighs the increased cross-sectional job reallocations that they produce through profitability shocks.

Finally, in Section 5, we explore whether the correlation between growth and financial development may be weakened or even inverted during banking crises. We find some evidence for this "dark side" to financial development, even though the 2007-09 crisis period cannot be included in our sample for non-availability of data.

2. A simple model

Financial development stems from various sources and takes several forms. Liberalization may allow the entry of new intermediaries, resulting in cheaper and more abundant finance. Legal reform to strengthen creditor or shareholder protection may reduce moral hazard in lending or in the provision of equity capital, thus easing firms' financial constraints. Banks' investment in better screening or monitoring can produce the same result. In all these cases, financial development tends to increase the external funding available to firms, facilitating business start-ups and expansion. Financial development can also assist growth by allocating capital more efficiently, channeling more resources to the more promising projects and thus boosting aggregate productivity.

We offer a simple model to explore the ways in which financial development can be expected to affect employment, productivity and wages. An advance in financial development is modeled as a reduction in credit rationing, thanks either to enhanced investor protection or banks' greater ability to mitigate moral hazard in lending/borrowing. Of course, there are other possible gauges for financial development: sharper competition between banks or the elimination of unfavorable tax and regulatory provisions. These alternatives, however, all share one essential feature with our own choice: they result in more abundant supply of funding to firms, especially the most promising, allowing them to demand more labor.[2] So while the analysis will inevitably differ depending on how financial development is modeled, some of the basic results should be invariant.

2.1. Effects of financial development on labor market equilibrium

At first we posit an economy with one industry and a continuum of homogeneous firms, deferring the case of heterogeneous firms to the next section. Firms behave competitively in both product and labor markets; they produce using capital K and labor L with a Cobb-Douglas technology.[3] So the typical firm's revenue is

$$Y = \theta K^{1-\alpha} L^{\alpha}, \tag{1}$$

[2] Financial development may also take the form of better risk-sharing, say by increasing the opportunities for portfolio diversification for both firms and employees. This may induce firms to undertake not only additional investments, as in our model, but also riskier ones, as in the models of Saint-Paul (2003) and Thesmar and Thoenig (2004). This is an additional channel through which financial development may lead not only to increased employment but also to greater employment risk – a result that may arise also in our setting.

[3] The results would be qualitatively unchanged if capital and labor were assumed to be perfect complements in production. The issue that obviously cannot be analyzed under that assumption is the effect on labor productivity, which in that case is constant and completely determined by technology.

where θ is a parameter capturing total factor productivity and $\alpha \in (0,1)$.[4] Given that the technology has constant returns to scale, in the absence of financing constraints there is no optimal firm size. Section 2.1.2 explores how the predictions change when the production function features an efficient scale. The price of a unit of capital is standardized to 1, and the wage is denoted by *w*. The representative entrepreneur purchases capital out of his initial wealth *A* plus any funds he can borrow from a set of perfectly competitive banks, at an interest rate that for simplicity is standardized to zero.

The ability to borrow from banks is limited by the problem of moral hazard: entrepreneurs can extract private benefits *B* from the firm by appropriating no more than a fraction $1-\lambda$ of its operating profits $Y - wL$ before repaying the loan. Private benefits can be extracted at the expense of the bank but not of employees, who we assume to be better positioned to verify the firm's revenues and enforce their claims (thanks either to industrial action or to seniority over other creditors). The fraction λ of operating profits that banks recover depends on their screening and monitoring ability, as well as on their legal protection. So λ measures the financial development of the economy, which depends both on the efficiency of intermediaries and on the quality of legal institutions.

The time line features three stages, indexed by $t = 1, 2, 3$:

1. "financing": entrepreneurs borrow external funds *F* and use them together with their initial wealth *A* to purchase capital *K*;
2. "labor hiring": entrepreneurs hire *L* workers;
3. "production": the firm generates revenue *Y*, workers receive wages wL, entrepreneurs extract private benefits *B*, and banks receive the rest.

At $t = 3$, it is optimal for each entrepreneur to extract the maximum amount of private benefits by choosing $B = (1-\lambda)(Y - wL)$, since the firm's input choices – and therefore its revenue – have already been determined in the previous two stages.

At $t = 2$, the entrepreneur chooses *L* so as to maximize his private benefits of control *B*, since the capital stock *K* is predetermined at the financing stage by the amount of investable resources $A + F$. The resulting level of private benefits must exceed the entrepreneur's initial wealth *A*, in order for him to be willing to invest it in the firm. Therefore, the hiring problem can be written as

$$\max_{L} \; B = (1-\lambda)(Y - wL), \tag{2}$$

[4] As *Y* is the firm's revenue, changes in θ can also capture changes in the price of its output.

subject to the entrepreneur's participation constraint $B \geq A$. Substituting Y from (1), the maximization yields the firm's choice of labor as a function of its capital stock and of the wage:

$$\hat{L} = \left(\frac{\alpha\theta}{w} \right)^{\frac{1}{1-\alpha}} K, \tag{3}$$

and the entrepreneur's corresponding level of private benefits

$$\hat{B} = (1-\lambda) \left[(1-\alpha) \left(\frac{\alpha}{w} \right)^{\frac{\alpha}{1-\alpha}} \theta^{\frac{1}{1-\alpha}} \right] K = (1-\lambda)\phi(w)K. \tag{4}$$

In the second step of (4), the expression in square brackets – profits per euro invested – is denoted by $\phi(w)$, which is a decreasing function of the wage: $\phi'(w) < 0$. Using (4), the participation constraint $\hat{B} \geq A$ can be rewritten as

$$(1-\lambda)\phi(w)K \geq A. \tag{5}$$

The maximum funding F that banks can provide at $t = 1$ without losing money is the firm's "pledgeable income" $\lambda(\hat{Y} - w\hat{L})$, which is computed assuming that the firm's optimal hiring decision at $t = 2$ will be given by (3) and that accordingly its revenue will be $\hat{Y} = \theta \hat{L}^{\alpha} K^{1-\alpha}$. Being competitive, banks set their lending F precisely at the break-even level:

$$F = \lambda(\hat{Y} - w\hat{L}) = \lambda\phi(w)K, \tag{6}$$

where the optimal labor input $\hat{L}$ has been substituted in from (3). Since $\phi'(w) < 0$, the firm's pledgeable income and external funding F are decreasing in the wage w. Recalling that the entrepreneur can also fund investment out of his wealth A, the total resources available for investment are $F + A$:

$$K \leq A + F = A + \lambda\phi(w)K. \tag{7}$$

This constraint means that the firm can pledge to repay $€\lambda\phi(w)$ for each extra €1 of funding. So two cases can arise:

(i) If $\lambda\phi(w) \geq 1$, banks will to lend any amount to the firm: constraint (7) is not binding, i.e. the firm is not finance-constrained. In this case, the firm's capital, employment and output do not depend on the entrepreneur's wealth A and on the degree of financial development λ.

(ii) If instead $\lambda\phi(w) < 1$, €1 of investment generates less than €1 of pledgeable income, so the finance constraint (7) is binding; that is, it determines the capital stock of the firm:

$$\hat{K}(w) = \frac{A}{1-\lambda\phi(w)}, \quad \text{for } \phi(w) < \frac{1}{\lambda}, \tag{8}$$

which is decreasing in *w*: a higher wage reduces the profitability of investment $\phi(w)$, tightening the firm's rationing constraint. Indeed the condition that generates rationing, $\phi(w) < 1/\lambda$, sets a lower bound $\underline{w}$ on the wage *w*: a firm is rationed if the wage exceeds

$$\underline{w} = \phi^{-1}(1/\lambda) = \alpha\left[\lambda(1-\alpha)\right]^{\frac{1-\alpha}{\alpha}} \theta^{\frac{1}{\alpha}}. \tag{9}$$

If it fell below this level, firms would be so profitable that banks would no longer ration credit. But when $w > \underline{w}$, the finance constraint is binding.

However, the wage must not be so high as to violate the entrepreneur's participation constraint (5) for $K = \hat{K}$, which would discourage investment altogether. That condition is met only if $\phi(w) \geq 1$, that is, only if the wage is low enough that investment is viable. This is quite intuitive: the entrepreneur will not invest unless €1 of investment returns at least €1 of profits; this condition translates into an upper bound $\overline{w}$ on the wage: for the entrepreneur to invest, *w* must not exceed

$$\overline{w} = \phi^{-1}(1) = \alpha(1-\alpha)^{\frac{1-\alpha}{\alpha}} \theta^{\frac{1}{\alpha}}. \tag{10}$$

Hence, the firm's constrained demand for capital is

$$K_c^D = \begin{cases} 0 & \text{if } w > \overline{w}, \\ K \in \left[0, \hat{K}(\overline{w})\right] & \text{if } w = \overline{w}, \\ \hat{K}(w) & \text{if } w \in (\underline{w}, \overline{w}), \end{cases} \tag{11}$$

where $\hat{K}(w)$ is given by expression (8). The firm's constrained demand for labor correspondingly is

$$L_c^D = \begin{cases} 0 & \text{if } w > \overline{w}, \\ L \in \left[0, \left(\frac{\alpha\theta}{\overline{w}}\right)^{\frac{1}{1-\alpha}} \hat{K}(\overline{w})\right] & \text{if } w = \overline{w}, \\ \left(\frac{\alpha\theta}{w}\right)^{\frac{1}{1-\alpha}} \hat{K}(w) & \text{if } w \in (\underline{w}, \overline{w}). \end{cases} \tag{12}$$

That is, the demand for labor is nil if the wage goes above the threshold $\overline{w}$, so that investment is not viable; when the wage is exactly at the threshold $\overline{w}$, demand for labor is positive but undetermined,

and is then decreasing in the wage *w*. Intuitively, the higher the cost of labor, the lower the firm's pledgeable income, hence the tighter the finance constraint and the lower the demand for labor. As *w* approaches the lower bound $\underline{w}$, the demand for labor tends to infinity, so that the function approaches this lower bound asymptotically (Figure 1).

What counts here is that the higher is the degree of financial development λ, the larger is the constrained capital stock $\hat{K}(w)$ and therefore the stronger is the demand for labor at any given wage *w*: as banks are less exposed to opportunistic behavior by their borrowers, they are willing to lend more against each euro of the firms' pledgeable income, so firms can invest more and hire more workers.

2.1.1 Labor market equilibrium

To analyze labor market equilibrium, we assume that labor supply is a non-decreasing function $L^S(w)$.[5] Equating it with the constrained demand for labor L_c^D in equation (12) yields equilibrium employment *L** and wage *w**, as shown in Figure 1:

$$\left(\frac{\alpha\theta}{w^*}\right)^{\frac{1}{1-\alpha}} \frac{A}{1-\lambda\phi(w^*)} = L^S(w^*). \tag{13}$$

If labor supply is increasing in the wage, such an equilibrium point will always exist and be unique, so that all firms are constrained in equilibrium. The same applies if labor supply is perfectly elastic at a wage $w^S > \underline{w}$. The only exception occurs if labor supply is perfectly elastic at a wage $w^S \leq \underline{w}$: in this case no firm is finance-constrained. Put differently, with a perfectly elastic labor supply at the reservation wage w^S, the financial constraint on firms disappears when financial development is above the threshold level $\overline{\lambda} = 1/\phi(w^S) < 1$. (Section 2.1.2 shows that if firms have an efficient scale, they may be unconstrained even outside this special case.)

The dashed curves in Figure 1 show how an increase in the degree of financial development from λ to λ' affects the labor market: it shifts the labor demand curve northeast and extends its flat portion at the threshold wage $\overline{w}$. Therefore, financial development raises equilibrium employment, output and wages. In the limit, if λ rises to 1 (perfect capital markets), labor demand becomes a horizontal line at the zero-profit wage $\overline{w}$, which then coincides with the no-rationing wage $\underline{w}$: the

[5] A positive-sloped labor supply curve may result from workers placing a different reservation value on their leisure.

interval between these two thresholds vanishes, meaning that in the absence of moral hazard, external finance is not rationed even when firms make zero profits.

Interestingly, by raising the equilibrium wage financial development induces firms to substitute capital for labor (capital intensity being $(w^*/\alpha\theta)^{1/(1-\alpha)}$) and thus to increase marginal labor productivity (w^*) and average labor productivity (w^*/α). That is, according to the model financial development should generate not only employment growth but also increased labor productivity. The decomposition of the effect between employment and productivity depends on the elasticity of labor supply. The flatter the labor supply curve, the larger the effect on employment; the steeper the curve, the greater the impact on wages and productivity. Formally, the response of employment to λ is increasing in the wage elasticity of labor supply ε^S:[6]

$$\frac{dL^*}{d\lambda}\frac{\lambda}{L^*} = \frac{\lambda\phi(w^*)}{1-\lambda\phi(w^*)+\dfrac{1-(1-\alpha)\lambda\phi(w^*)}{(1-\alpha)\varepsilon^S}}, \tag{14}$$

which is highest in the limiting case of an infinitely elastic labor supply, where the equilibrium wage is fixed at its reservation level w^S:

$$\frac{dL^*}{d\lambda}\frac{\lambda}{L^*} = \frac{\lambda\phi(w^S)}{1-\lambda\phi(w^S)}. \tag{14'}$$

The opposite applies to the response of equilibrium wages and productivity to financial development λ, which is smaller the larger the elasticity of labor supply ε^S:

$$\frac{dw^*}{d\lambda}\frac{\lambda}{w^*} = \frac{\lambda\phi(w^*)}{\left[1-\lambda\phi(w^*)\right]\varepsilon^S+\dfrac{1-(1-\alpha)\lambda\phi(w^*)}{1-\alpha}}. \tag{15}$$

The model can also be used to investigate how financial development affects the employment response to improved firm-level investment opportunities, modeled as an increase in the parameter θ_i for firm *i*. The response of equilibrium employment to a rise in profitability is

$$\frac{dL^*}{d\theta_i}\frac{\theta_i}{L^*} = \frac{1}{1-\alpha}\frac{1}{1-\lambda\phi(w^*)}, \tag{16}$$

[6] In computing the elasticities in expressions (14) and (15), we use the fact that $\phi'(w) = -[\alpha/(1-\alpha)]\phi(w)/w$.

which is increasing in the degree of financial development λ. This is intuitive: a more developed financial system enables the firm to better exploit its improved investment opportunities, and thus to expand employment and output.[7]

2.1.2 Allowing for unconstrained firms

So far, firms have been assumed to have no maximum size, due to the constant-returns technology (1). As a result, in equilibrium firms are invariably finance-constrained (at least if labor supply is increasing in the wage), because the equilibrium wage will be above the lower bound $\underline{w}$. However, if there is an efficient scale for firms beyond which further investment is wasted, this is no longer the case. In our terms, suppose that each firm i (for $i = 1, 2, ..., N$) has an efficient capital stock $\bar{K}_i$, above which investment yields no further increase in revenue:

$$Y_i = \theta\left[\min(K_i, \bar{K}_i)\right]^{1-\alpha} L_i^{\alpha}. \tag{17}$$

The rationale for this condition is that in addition to labor and capital, production also requires a third input that is in short supply: say, the entrepreneur's "attention span," limiting the size of the plant he can manage.

Unlike the firms analyzed so far, those whose technology is described by equation (17) may be either unconstrained or constrained, depending on whether or not the credit F available to them matches the amount $\bar{K}_i - A$ required to achieve the optimal capital stock. Since from (6) each firm can raise external funds $F = \lambda\phi(w^*)K$, firm i will be constrained if $\lambda\phi(w^*) < (\bar{K}_i - A)/\bar{K}_i$. If constrained, it behaves as in the previous section: its demand for capital $K_{c,i}^D$ and labor $L_{c,i}^D$ are given by equations (11) and (12). An unconstrained firm $j \neq i$, for which $\lambda\phi(w^*) \geq (\bar{K}_j - A)/\bar{K}_j$, will choose instead the profit-maximizing employment level:

$$L_{u,j}^D = \left(\frac{\alpha\theta}{w}\right)^{\frac{1}{1-\alpha}} \bar{K}_j, \tag{18}$$

[7] Notice that since each firm is small relative to the economy, in computing this response the equilibrium wage w^* is taken as given. This would not apply if the increase in θ were economy-wide rather than firm-specific, unless labor supply is infinitely elastic: for if labor supply elasticity is finite, then an economy-wide increase in productivity also raises the wage w^*, which reduces the response of equilibrium employment compared to (16):

$$\frac{dL^*}{d\theta}\frac{\theta}{L^*} = \frac{1}{\frac{1-\lambda(1-\alpha)\phi(w^*)}{\varepsilon^S} + (1-\alpha)\left[1-\lambda\phi(w^*)\right]}.$$

which is increasing in the productivity parameter θ and decreasing in the wage w like the employment $L_{c,i}^D$ of constrained firms in (12), but – unlike $L_{c,i}^D$ – is insensitive to the entrepreneur's wealth A and to the degree of financial development λ.

Which firms are constrained and which are not depends both on their efficient scale and on the degree of financial development. For concreteness, suppose there are two types of firm: those with high efficient capital $\bar{K}_H$ and those with low efficient capital $\bar{K}_L$. The former's greater financial needs make them more dependent on external finance. Hence, the economy can be in one of three "regions" depending on the degree of financial development:

	Degree of financial development	**Financing regime**
Region A: low λ	$\lambda\phi(w^*) < \frac{\bar{K}_L - A}{\bar{K}_L}$	all firms are constrained
Region B: medium λ	$\lambda\phi(w^*) \in \left[\frac{\bar{K}_L - A}{\bar{K}_L}, \frac{\bar{K}_H - A}{\bar{K}_H}\right)$	firms with high financial dependence are constrained, firms with low financial dependence are unconstrained.
Region C: low λ	$\lambda\phi(w^*) \geq \frac{\bar{K}_H - A}{\bar{K}_H}$	all firms are unconstrained

As the degree of financial development λ increases, the economy moves from region A to region C,[8] so that the number of unconstrained firms rises, and employment and output become less sensitive to shocks to entrepreneurs' cash position. But an increase in productivity θ affects employment and output in constrained as well as in unconstrained firms. Thus while the impact of cash flow shocks tapers off as financial development advances, that of productivity shocks does not. Moreover, once the economy moves into region C, further increases in λ no longer affect output and employment, suggesting that at later stages of financial development their effects should weaken.

[8] This statement is a less self-evident than it may seem, because an increase in λ raises the equilibrium wage w^* and thereby reduces the profitability of investment $\phi(w^*)$. Thus, it has a *direct positive* effect and an *indirect negative* effect on $\lambda\phi(w^*)$, the pledgeable funds generated by €1 of investment. But the direct effect can be shown to dominate:

$$\frac{d[\lambda\phi(w^*)]}{d\lambda} = \phi(w^*)\left[1 - \frac{\lambda\alpha}{(1-\alpha)\left[1-\lambda\phi(w^*)\right]\varepsilon^S + \left[1-(1-\alpha)\lambda\phi(w^*)\right]}\right] > 0.$$

This can be shown by noticing that this expression is decreasing in ε^S, but that even when $\varepsilon^S = 0$ its value is positive.

2.1.3 Empirical predictions in the case of a single industry

To summarize, in the single-industry model set out above, financial development should raise employment and labor productivity, thus expanding output via both channels.[9] The model also offers three further predictions: (i) the higher the wage elasticity of labor supply, the greater the effect of finance on employment and the smaller the effect on productivity and wages; (ii) the response of employment should be less pronounced as financial development proceeds; (iii) financial development should mitigate the impact of cash shocks on output and employment but not necessarily that of investment profitability shocks, which it could even amplify. When the model is extended to heterogeneous industries, it also affords insights into the extent of job reallocation, as shown in the next section.

2.2. Effects of financial development on the reallocation of labor

Suppose now that the economy consists of two industries, *H* and *L*, each with the same number of identical firms with the Cobb-Douglas technology of equation (1), except that in industry *H* firms are more profitable than in industry *L*: $\theta_H > \theta_L$. (The analysis can be easily extended to multiple industries.) We assume that labor is perfectly mobile across industries and therefore commands a single wage (we comment below on the effects of relaxing this assumption). The two industries have different products, which may sell for different prices. To keep the notation simple, we consider θ_i (for $i = H, L$) as the total factor productivity of industry i multiplied by the price of its product, as Y_H and Y_L denote the revenue of industry i's representative firm. We take the prices of products *H* and *L* as given, on the hypothesis that industries *H* and *L* compete in the labor market but not the product market. Still it is worth bearing in mind that the greater profitability of industry *H* may stem from better productivity, higher product price, or both.

Industry i's demand for labor (for $i = H, L$) is similar to that obtained for L_c^D in the one-industry model of Section 2.1.1 (see equations (12) and (8)):

[9] Although in the model these predictions refer to the levels of these variables, they can be extended to their respective growth rates if total factor productivity is assumed to grow over time.

$$L_{c,i}^{D} = \begin{cases} 0 & \text{if } w > \overline{w}, \\ L \in \left[0, \left(\dfrac{\alpha\theta_i}{\overline{w}} \right)^{\frac{1}{1-\alpha}} \dfrac{A}{1-\lambda\phi_i(\overline{w})} \right] & \text{if } w = \overline{w}, \\ \left(\dfrac{\alpha\theta_i}{w} \right)^{\frac{1}{1-\alpha}} \dfrac{A}{1-\lambda\phi_i(w)} & \text{if } w \in (\underline{w}, \overline{w}), \end{cases} \tag{19}$$

where $\phi_i(w) \equiv (1-\alpha)\left(\alpha / w\right)^{\frac{\alpha}{1-\alpha}} \theta_i^{\frac{1}{1-\alpha}}$ is the profitability of investment in industry *i*, analogous to $\phi(w)$ in Section 1.2.1. Expression (19) shows that industry *i* hires no labor (that is, it shuts down) if the wage goes above the threshold

$$\overline{w}_i = \phi^{-1}(1) = \alpha(1-\alpha)^{\frac{1-\alpha}{\alpha}} \theta_i^{\frac{1}{\alpha}}. \tag{20}$$

Conversely, when the wage approaches the lower bound it tends to absorb any amount of labor

$$\underline{w}_i = \phi_i^{-1}(1/\lambda) = \alpha\left[\lambda(1-\alpha)\right]^{\frac{1-\alpha}{\alpha}} \theta_i^{\frac{1}{\alpha}}. \tag{21}$$

Since both of these expressions are increasing in θ_i, both thresholds are higher for industry *H* than for industry *L*: $\overline{w}_H > \overline{w}_L$ implies that industry *H* will be active at wages at which industry *L* cannot operate, and $\underline{w}_H > \underline{w}_L$ that industry *H*'s demand for labor will be put a floor $\underline{w}_H$ under the economy-wide wage, so that industry *L* cannot hope to pay its workers less. Naturally, there is the possibility that this "floor" wage is higher than firms in industry *L* can afford to pay, i.e. $\underline{w}_H > \overline{w}_L$. From (20) and (21), this is seen to occur if

$$\lambda^{1-\alpha}\theta_H > \theta_L, \tag{22}$$

a condition that will surely hold for a large enough value of λ: to see this, simply notice that it will certainly hold if capital markets are perfect ($\lambda = 1$), since by assumption $\theta_H > \theta_L$. So when financial markets are sufficiently developed, the stronger industry will "choke off" the weaker, outcompeting it via the labor market. Intuitively, as λ increases banks lend comparatively more to firms in the stronger industry, enabling them to bid aggressively for workers and push the wage up to the point where firms in the weaker industry are driven out of business.

But the same logic applies even if financial markets are backward enough that the wage is in the interval $(\underline{w}_H, \overline{w}_L)$ where both industries are active, i.e. if λ is low enough to meet condition (22). In this region, an increase in financial development channels proportionately more resources to the stronger industry and may actually compel the weaker one to contract, though not shutting it off altogether. Specifically, suppose that λ is low enough that the equilibrium wage w^* is below $\overline{w}_L$, so that firms in industry *L* make positive profits and are on the decreasing stretch of their labor demand curve. In this region, labor market equilibrium is obtained by equating labor supply with the aggregate labor demand $L^D_{c,H} + L^D_{c,L}$, given by the bottom line in (19):

$$\left(\frac{\alpha\theta_H}{w^*}\right)^{\frac{1}{1-\alpha}} \frac{A}{1-\lambda\phi_H(w^*)} + \left(\frac{\alpha\theta_L}{w^*}\right)^{\frac{1}{1-\alpha}} \frac{A}{1-\lambda\phi_L(w^*)} = L^S(w^*), \tag{23}$$

as illustrated in Figure 2.

Equation (23) shows that, as in the one-industry model, advancing the degree of financial development from λ to λ' increases the demand for labor. Now it does so both in industry *L* and in industry *H*, so that aggregate labor demand shifts as in Figure 2. But financial development benefits the strong industry more than the weak. Intuitively, with more abundant finance the stronger industry can more easily outbid the weaker one in the labor market. This can be shown by using condition (23) to compute the way in which equilibrium employment in industry *i* (for $i = H, L$) responds to a change in λ:

$$\frac{dL_i^*}{d\lambda}\frac{\lambda}{L_i^*} = \frac{\lambda\phi_i(w^*)}{1-\lambda\phi_i(w^*)}\left[1 - \frac{\alpha}{1-\alpha}\frac{dw^*}{d\lambda}\frac{\lambda}{w^*}\right] - \frac{1}{1-\alpha}\frac{dw^*}{d\lambda}\frac{\lambda}{w^*}, \tag{24}$$

so that the difference between the percentage response of employment in the two industries is

$$\frac{dL_H^*}{d\lambda}\frac{\lambda}{L_H^*} - \frac{dL_L^*}{d\lambda}\frac{\lambda}{L_L^*} = \left[\frac{\lambda\phi_H(w^*)}{1-\lambda\phi_H(w^*)} - \frac{\lambda\phi_L(w^*)}{1-\lambda\phi_L(w^*)}\right]\left[1 - \frac{\alpha}{1-\alpha}\frac{dw^*}{d\lambda}\frac{\lambda}{w^*}\right]. \tag{25}$$

This expression is positive, since both expressions in square brackets are positive: the first, because $\lambda\phi_i(w^*)/[1-\lambda\phi_i(w^*)]$ is increasing in $\phi_i(w^*)$, which in turn is increasing in θ_i; the second because otherwise expression (24) would be negative for both industries, which would contradict the result that the increase in λ raises aggregate employment. Hence, an increase in financial development prompts greater employment growth in the strong industry and can even cause a contraction in the weak industry (i.e. expression (24) may be negative for $i = L$), if the wage response captured by the negative terms is powerful enough. Recall that as λ increases the equilibrium wage response

eventually becomes so great that the weak industry disappears (its employment falls to zero, which is shown to occur in Figure 2 when λ rises to the level λ"). But even if the increase in λ reduces employment in industry *L*, it raises it more sharply in industry *H*, so that in equilibrium total employment increases. Thus financial development leads to job reallocation across industries, not just to greater aggregate employment, labor productivity and wages. These effects of financial development parallel those triggered by trade liberalization in Melitz (2003) and Pica and Rodríguez Mora (2011), where exposure to trade induces reallocation of resources towards the more productive firms and forces the least productive ones to exit, through firms' competition for labor.

In addition to directly prompting job reallocation, financial development amplifies the reallocation induced by changes in firms' profitability caused by productivity and price shocks. Suppose for instance that the profitability parameter θ_i rises in a single firm within either industry. The proportional response of employment is given by expression (16), except that in the denominator the term $\phi_i(w^*)$ will be indexed by i:[10]

$$\frac{dL_i^*}{d\theta_i}\frac{\theta_i}{L_i^*} = \frac{1}{1-\alpha}\frac{1}{1-\lambda\phi_i(w^*)}. \tag{26}$$

Since $\phi_H(w^*) > \phi_L(w^*)$, equation (26) shows not only that the employment response to a firm-specific increase in profitability is greater in industry *H* than in industry *L*, but that this differential response is increasing in λ: financial development widens the difference between firms' responses to profitability shocks in the two industries, and in this way as well amplifies job reallocation.

2.2.1 Allowing for unconstrained firms in the two-industry model

The conclusion that financial development triggers cross-industry job reallocation or amplifies that induced by profitability shocks does not carry over to cash-flow shocks. In this instance, indeed, financial development has precisely the opposite effect, exerting a stabilizing influence.[11] This can be seen by again extending the model to allow for financially unconstrained firms as in Section 2.1.2, i.e. positing that there is an efficient size for firms. In the present two-industry setting, even if firms have the *same* efficient size $\bar{K}$, their financing regime can differ because of their different profitability: as λ increases, firms in the strong industry move into the unconstrained regime before

[10] As in Section 2.1.1, in computing this response the equilibrium wage *w** is taken as given, because each firm is small relative to the economy.

[11] A similar result arises in the search-theoretic general equilibrium model by Wasmer and Weil (2004), who show that credit frictions amplify the volatility of employment through a financial accelerator mechanism.

those in the weak industry. As in Section 2.1.2, we can distinguish three regimes, although the boundaries between the corresponding regions are now different:

	Degree of financial development	**Financing regime**
Region A	$\lambda < \frac{\bar{K} - A}{\bar{K}} \frac{1}{\phi_H(w^*)}$	all firms are constrained
Region B	$\lambda \in \left[\frac{\bar{K} - A}{\bar{K}} \frac{1}{\phi_H(w^*)}, \frac{\bar{K} - A}{\bar{K}} \frac{1}{\phi_L(w^*)} \right)$	industry-L firms are constrained, industry-H are unconstrained.
Region C	$\lambda \geq \frac{\bar{K} - A}{\bar{K}} \frac{1}{\phi_L(w^*)}$	all firms are unconstrained

Since only constrained firms respond to cash shocks, in region A all firms respond, in region B only firms in industry *L*, and in region C none. Hence, cross-industry reallocation induced by cash-flow shock drops to zero as λ crosses from B into C . While this is an extreme example, it serves to demonstrate that the effect of financial development on employment reallocation is not necessarily increasing, since by reducing the fraction of finance-constrained firms it eventually isolates them from cash-flow shocks.

Throughout this section, labor has been assumed to be homogeneous and perfectly mobile between sectors, and therefore able to reallocate itself in the event of a financial liberalization or other economic shock; by the same token, a single wage clears the labor market. If, instead, workers cannot move freely between sectors – say because employability requires industry-specific and irreversible investments in human capital – then wage differentials between industries can emerge in equilibrium and may widen in response to a shock. The same might occur if job protection measures introduced frictions in the reallocation of workers across firms. Maintaining the logic followed so far, in this modified framework one should expect that with a more highly developed financial system shocks to expected profitability will be associated with a greater increase in inter-industry wage dispersion. In practice, the most realistic scenario may be an intermediate one, in which labor is neither completely mobile nor completely immobile: some (especially younger) workers may be able to retrain and switch industries in response to shifts in demand, so that shocks may result in both job reallocation and greater wage differentials.

2.2.2 Empirical predictions in a two-industry model

Extending the model to two industries generates new predictions about the effects of financial development on the comparative performance of the two industries. (i) Financial development produces a reallocation of employment and output to the more profitable and away from the weaker industry, eventually "shutting down" the latter altogether. (ii) by the same token, it amplifies the differential response of employment to shocks to profitability (if labor supply is perfectly elastic). And (iii) it mitigates the cross-industry reallocation due to cash-flow shocks by insulating production and hiring decisions from firms' cash position.

2.3. Does financial development benefit workers?

The primary purpose of the simple model presented so far is to generate positive predictions concerning the effects of financial development on labor market outcomes, not to inquire into its normative implications. Deriving implications for workers' welfare may appear arduous, considering that we have not specified the utility function underlying workers' labor supply decision. But since financial development is predicted to raise the equilibrium level of wages and/or employment, it should also increase workers' welfare, according to revealed preference.

In our setting, even the effect of financial development on labor reallocation across industries cannot be argued to hurt workers. As highlighted in Section 2.2, a more developed financial system amplifies employment reallocation from less to more profitably industries. But in our setting of complete labor mobility, this reallocation is beneficial for workers: they move across industries in response to the higher wages that more profitable industries can offer them, and insofar as financial development heightens such competition for their labor services, they should be better off. Even if workers had to pay a cost to retrain or relocate themselves when moving across industries, they would move only if the increase in wage were to exceed this frictional cost, and therefore labor reallocation *per se* would occur only if it were to yield a net benefit to employees.

Indeed, for financial development to hurt workers via an increase in labor income risk, the model of Section 2.2 should be amended precisely by assuming that not all workers are free to move across industries. For example, take the extreme case where all workers acquire industry-specific skills that cannot be redeployed elsewhere, and they make this investment before learning the profitability of the two industries. Then, once the profitability of the two industries becomes known, firms in each industry will compete for employees in its own pool of workers, and in

equilibrium the strong industry will offer higher wages than the weak industry. Hence, from an *ex-ante* perspective, workers face the risk of training for what turns out to be the less profitable industry, and earning a correspondingly lower salary. Equipped with the previous analysis above, we know that financial development reinforces the demand for labor in both industries, and therefore tends to raise equilibrium wages (and employment, if labor supply is wage-elastic) in both of them. However, it will tend to benefit more the stronger industry, and therefore raise the income of its employees by more. Hence, from the standpoint of a worker at the training stage, financial development will raise both expected labor income *and* its variance. Thus, if workers are sufficiently risk averse, financial development may reduce their expected utility: the implied increase in their labor income risk could outweigh the benefit from a larger expected income.[12]

This argument illustrates that there may be situations in which financial development imposes some costs on workers. The question remains as to whether and when these costs more than offset the benefits of higher employment and/or wages, so that society may want to "throw sand in the wheels of capitalism", as in Bersem, Perotti and von Thadden (2010). The answer also depends on whether one can devise systems by which the gains of the "winners" can be partly redistributed to the "losers", rather than simply forgoing the efficiency gains of financial development.

In any case, this entire discussion relies on a rather optimistic view of financial markets and intermediaries, since they are assumed never to fail in allocating funds efficiently. The effective risk of such failure, as in banking crises, underscores that financial development may impose other costs on workers or for that matter on broader social strata. To this question we now turn.

2.4. Banking crises and the dark side of financial development

As we noted in the introduction, the 2007-09 financial crisis constitutes a sharp reminder that financial markets do sometimes create and amplify rather than merely reallocate risk. And the consequences may be borne by employees no less than investors or taxpayers. For instance, given financial bubbles, indicators taken as gauges of "financial development" (a broader stock market, more abundant credit) may actually be pathological (overvalued shares, reckless and predatory lending) and foreshadow crisis, hence a drop in output and employment. So employment risk may reflect not only efficient reallocation to "winning" industries and firms but dysfunctional financial markets.

[12] Incidentally, if some workers are mobile across industries this increase in labor income risk should be mitigated: labor mobility will tend to reduce the divergence between industry wages in response to differences in profitability, and thus reduce human capital risk.

The tendency to create asset price bubbles is one reason why developed financial markets may harbor such dangers. Another is that in such markets innovation is more frequent and pervasive, and the speed with which new, complex instruments are introduced can outstrip investors' ability to understand and price them. A third is that when financial markets and intermediaries are highly developed, people tend to count on them to hedge liquidity risk and so are more severely damaged when markets and intermediaries are crippled and fail to deliver the promised liquidity.

We now show how this line of reasoning can be captured in our two-industry model. To do so, we add a stage to the time line, between the creation of the firm and the start of production, when the firm is hit by an idiosyncratic liquidity shock with probability p. That is, once the firm has already ordered capital equipment and hired employees, it may suffer a "cost overrun" of size cK, i.e. proportional to its capital stock (c is a positive constant). If the firm cannot meet this extra cost, production cannot proceed and revenue is zero. Imagine, say, that an essential and very expensive piece of machinery turns out to be defective and must be replaced. Further assume that this cost is unobservable to outside investors, who cannot verify the truthfulness of the firm's claim that a defective piece of equipment needs replacement.

Investors' inability to verify the occurrence of the liquidity shock creates additional moral hazard over and above that engendered by the entrepreneur's ability to divert revenue to his pockets. Consider a finance-constrained entrepreneur who used its entire debt capacity: *ex post*, he will always want to claim that there has been a liquidity shock, so that the bank will have to grant an additional loan cK that the firm cannot repay; otherwise, the bank would lose its entire investment. Anticipating this holdup problem, at the financing stage the bank will require the firm to keep liquidity cK on hand, or else retain enough unused debt capacity to borrow cK and face the liquidity shock, without subsequently defaulting on this additional loan.

However, the bank has no such concern if it contracts with an unconstrained firm. If, as assumed in Section 2.2.1, firms feature a common efficient scale $\bar{K}$ and capital markets are sufficiently developed, some firms may be able to borrow more than needed to reach this efficient scale. If these firms have enough slack to cover the additional loan cK, banks will be ready to provide the extra funds, while firms have no incentive to apply for it unless they actually do face a liquidity shock. As banks can expect to be called upon to provide the extra loan cK with probability p, by the law of large numbers they will need to set aside liquidity pcK per unconstrained firm.[13]

[13] Strictly speaking, in our setting unconstrained firms can do just as well by taking an extra loan cK anyway and repaying it at the final stage, since the interest rate is zero. But if firms pay an interest rate r between the financing stage

Consider first a situation with an intermediate degree of financial development, with industry-*H* firms unconstrained and industry-*L* firms constrained. For the latter, the financing constraint is now $K = A + \lambda\phi(w)K - cK$, so that their capital stock and employment level are

$$L_{c,i}^{D} = \begin{cases} 0 & \text{if } w > \overline{w}_L, \\ L \in \left[0, \left(\dfrac{\alpha\theta_i}{\overline{w}}\right)^{\frac{1}{1-\alpha}} \dfrac{A}{1-\lambda\phi_i(\overline{w})+c}\right] & \text{if } w = \overline{w}_L, \\ \left(\dfrac{\alpha\theta_i}{w}\right)^{\frac{1}{1-\alpha}} \dfrac{A}{1-\lambda\phi_i(w)+c} & \text{if } w \in (\underline{w}_L, \overline{w}_L), \end{cases} \tag{27}$$

where the wage's upper bound is $\overline{w}_L = \phi_L^{-1}(1+pc)$ (since the cost of capital now includes the expected cost overrun *pc*) and the lower bound is $\underline{w}_L = \phi_L^{-1}((1+c)/\lambda)$, due to the new form of the rationing constraint. Comparing expression (27) with (19), we see that owing to the non-verifiable nature of their liquidity risk, constrained firms must invest less and hire less, as they must hoard liquidity *c* (or else retain an amount *c* of spare debt capacity) per euro invested. The need to hoard liquidity also expands the region where firms are rationed: now industry-*L* firms are constrained for a larger range of values of λ than in the analysis at the end of Section 2.2, as the condition for being in region C is now

$$\lambda \geq \frac{\overline{K} - A}{\overline{K}} \frac{1}{\phi_L(w)} + \frac{c}{\phi_L(w)}.$$

By contrast, each of the unconstrained firms hires the efficient amount of labor $L_{u,H}^{D}$ (given by (18), upon setting $i = H$ and $\overline{K}_i = \overline{K}$) and sets no liquidity aside, since it can count on banks in case of need. Therefore, in the event of a shock the constrained firms draw on their liquidity hoard cK_C, while the unconstrained apply to banks for liquidity $c\overline{K}$.

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and the potential liquidity-shock stage, they will prefer to borrow the amount cK only when actually hit by the shock: competitive banks will charge the opportunity cost $rpcK$ to provide unconstrained firms with a credit line of size cK, while if firms were to borrow cK they would pay an interest charge rcK. So by taking a credit line on which to draw in the case of a liquidity shock, firms save $(1-p)rcK$: by pooling many idiosyncratic liquidity risks, banks' credit lines offer valuable insurance against liquidity shocks. The reasoning in the text applies to the limiting case as the interest rate *r* tends to zero.

A different situation would prevail if financial markets were so primitive as to make all firms finance-constrained, i.e. if $\lambda < (1+c)/\phi_H(w)$. Then industry-*H* firms too would have to hoard liquidity, invest less and hire less. That is, a further benefit of financial development is the reduction in wasteful liquidity hoarding, which induces more investment, employment and output.

On the other hand, financial development also heightens firms' reliance (in our example, those of industry *H*) on the financial system to provide liquidity. In normal times this is efficient. However, if with a very small probability banks happen to be unable to provide all the liquidity pcK^* per firm that they have pledged, the unconstrained firms that patronize them will be unable to cope with the shock and under our assumptions will go bankrupt. For instance, if banks can provide a fraction β of the pledged liquidity, they can only rescue that fraction of the unconstrained firms, so that the remaining $1-\beta$ unconstrained firms will fail and dismiss their entire workforce.[14]

Paradoxically, such a crisis will be more damaging to output and employment in countries with highly developed financial markets than poorly developed ones (in terms of our model, countries with lower λ, hence more financially constrained firms). Moreover, the crisis will hit stronger rather than weaker firms, as the latter, anticipating that they cannot count on banks, will have set aside enough liquidity.

Does this "dark side" of financial development imply that society may not wish to maximize it, and thus choose the maximum investor protection? This brings us back to the question of efficiency discussed in Section 2.3. The answer depends on the frequency of crisis episodes. If they are frequent, it may well be positive, but if they occur very rarely, it may be *ex-ante* efficient to bear these rare output and employment losses in exchange for the implicit year-in, year-out output and employment gains in normal times. This, in fact, was the view of the nineteenth-century business-cycle theorist Clément Juglar: "The wealth of nations can be measured by the violence of the crises which they experience […]; one should not be frightened by them, considering that their duration is rather short" (Juglar, p. 648).[15] But going deeper into normative analysis is beyond the scope of this paper. The extension basically serves to show that our model can help illuminate the way in which financial development may exacerbate the disruptions caused by banking crisis.

[14] Since the probability of such a banking crisis is assumed to be very small, it will not pay for unconstrained firms to self-insure against its occurrence by hoarding liquidity.

[15] Juglar (1891) goes on to argue that crises are thus a price well worth paying for long-run growth: "However great the disaster, one cannot conclude that it destroys all the benefits of the prosperous years. Crises can occur and renew themselves without ruining countries, as it is sometimes argued; certainly they stop activity and cause business losses, but the growth of wealth still follows its course; which explains how, despite their periodicity, a country exposed to crises may not only not become poorer, but enrich itself much more rapidly than sheltered countries, that is, countries that live in state of business stagnation that, while preserving them from shocks, actually deprive them of all hope of large gains. Avoiding some chance of loss enormously reduces the chances of gain" (p. 648-9, authors' translation).

3. Evidence on finance, employment and wage growth

This section takes the most basic predictions of the model developed in Section 2 to the data: that finance should have a positive effect on employment and wages and that this effect should be stronger in countries with low initial financial development. In the model, finance should affect output, employment and wages only in industries where firms are financially constrained, having a small volume of investable resources relative to their efficient scale. In empirical work, such industries are often referred to as "financially dependent". Indeed, as we shall see, our empirical strategy relies precisely on the differing responses of industries to financial development according to their degree of financial dependence – an approach first proposed by Rajan and Zingales (1998) and used in many subsequent studies.

Before presenting our methodology, data and results, let us place them within the vast empirical literature on finance and growth. It is well known that measures of the size of financial markets are correlated with output growth, but this mere correlation obviously does not establish that "finance causes growth". To test for this causal link, researchers have used econometric techniques and identification strategies to control for possible feedback of growth on financial development. The studies to disentangle the causality issue have used three types of data: country or state-level, industry-level and firm-level.

Using country-level data, King and Levine (1993a, 1993b) relate economic growth rates to measures of lagged financial development in 80 countries. Their main finding is that all the indicators of economic performance are positively associated with the predetermined component of financial development, defined as the size of the financial sector at the beginning of the sample period. However, the use of predetermined variables to measure financial development only partly overcomes endogeneity problems. An omitted common variable could still drive both long-run growth and the initial level of financial development, generating a spurious correlation. To resolve this problem, researchers have sought instruments that are unquestionably exogenous. Some scholars have selected the type of legal system, which La Porta et al. (1998) show to be correlated with the size of a country's financial market. This variable can be considered exogenous because legal systems were created centuries ago and spread mainly through occupation and colonialism. Beck, Levine and Loayza (2000a) accordingly use legal origin as instrument for financial development, and again find that the size of the financial sector has a positive and robust correlation with the rate of growth of per capita GDP and of total factor productivity – a result later

corroborated and extended by other studies including Beck, Levine and Loayza (2000b) and Demirguc-Kunt and Levine (2001).

Other works have exploited state-level data for the U.S., exploiting changes in financial market regulation to inquire into causality. For instance, Jayaratne and Strahan (1996) provide evidence that the relaxation of geographical restrictions on bank expansion has been associated with faster local economic growth (although Haung (2008) questions the economic significance of their results). Dehejia and Lleras-Muney (2007) document the same relationship with earlier data, showing that changes in state-level banking regulation between 1900 and 1940 were also associated with higher growth after controlling for factors that could confound a causal interpretation of the correlation.

Another strand of inquiry relies on industry-level data to address causality, on the hypothesis that, as in our model, financial market development should be more beneficial to the industries that are more dependent on external finance. Rajan and Zingales (1998) construct their test by first identifying each industry's need for external finance from U.S. data (and defining the U.S. financial system as highly developed by assumption) and then interact this industry-level "external dependence" variable with a country-level measure of financial development. They then include this interacted variable in a regression for industry-level growth, where its coefficient should capture the severity of constraints on growth due to degree of financial development, using fixed effects to control for other country and sector characteristics. Applying this approach to industry-level data for a large sample of countries in the 1980s, they find that measures of financial development do indeed affect economic growth disproportionately in externally dependent industries.

Further evidence on the nexus between finance and growth can be drawn from firm-level data. Guiso, Sapienza and Zingales (2004) find that in Italy local financial development, as measured by self-reported information on households' access to credit, increases an individual's probability of starting a business, the ratio of new firms to the population, the growth rate of firms over and above internally financed growth, and per capita GDP. They control for the potential endogeneity of financial development by instrumenting their indicator with bank branch density as determined by regulation in 1936. Guiso, Jappelli, Padula and Pagano (2004) apply the Rajan-Zingales approach to microeconomic data for companies in the EU and in Central and Eastern Europe, producing firm-level estimates consistent with those of studies based on industry-level data and finding that financial development fosters the growth of smaller firms in particular. Firm-level data have also been used to detect the impact of financial development on market entry for small businesses.

Aghion, Fally and Scarpetta (2007), applying the Rajan-Zingales approach to harmonized firm-level data in 16 industrial and emerging economies, find that financial development encourages entry by small firms in the sectors that are most dependent on external finance. And Klapper, Laeven and Rajan (2006) show that in Europe financial development favours entry in the sectors that are relatively dependent on external finance.

Surprisingly, however, there is almost no empirical research on the effect of financial development on labor markets. The only exceptions we are aware of are Bertrand, Schoar and Thesmar (2007), finding that the French banking reforms of 1985 were associated with faster employment growth in the more bank-dependent sectors, and Benmelech, Bergman and Seru (2010), documenting that unemployment in U.S. metropolitan areas is negatively correlated with measures of credit availability in 1993-2009.

3.1. Empirical specification and data

Our basic specification builds on the idea that the impact of financial development on growth should be heterogeneous across industries, depending on their technological need for external finance. Because dependence on external finance is an unobservable variable, we follow Rajan and Zingales (1998) and gauge it by the reliance on external finance of U.S. listed companies in the Compustat database. Unlike Rajan and Zingales, we take as dependent variables the growth not only of value added but also of employment, real wages and labor productivity, by sector and country. Denoting the dependent variable by *Y*, our baseline specification is:

$$Y_{jc} = \delta(FD_c \times ED_j) + \gamma SHARE_{jc}^{1970} + \mu_j + \mu_c + \varepsilon_{jc} \qquad (28)$$

where the subscripts *c* and *j* index countries and sectors, respectively, FD_c is a country index of financial development as measured by the initial ratio of total credit and/or stock market capitalization to GDP, and ED_j is industry *j*'s external finance requirement. The variable $SHARE_{jc}^{1970}$ denotes the industry's share of Y_{cj} in the manufacturing sector in 1970. Fixed sector and country effects are denoted by μ_j and μ_c, respectively, and ε_{jc} is the residual. Fixed effects are included in order to rule out the possible spurious correlation between finance and real variables due to unobserved heterogeneity in country or industry characteristics.

The essential coefficient in equation (28) is δ, which captures the effect of financial development on the dependent variable. The estimate of this coefficient can be interpreted as the differential response to financial development in Y_{cj} by industries with different external finance

requirements. If the dependent variable in equation (28) is employment growth, a positive and significant estimate of δ is consistent with the thesis that financial development facilitates hiring in sectors that are highly dependent on external finance. Since the model predicts that this effect will be stronger in countries with relatively underdeveloped financial markets (coinciding broadly with the less developed countries), we estimate equation (18) separately for OECD and non-OECD members. And since this facilitating effect may be partly offset by national regulations hindering hiring and firing, we also estimate it separately for countries with "strong" and "weak" employment protection.

For reasons of data availability, the sample for the estimation covers three decades but not the years of the financial crisis of 2007-09. We use the UNIDO INDSTAT3 2006 database, which contains annual data for three-digit industries (28 sectors, listed in Appendix A.2) on value added, employment and wage bill for the period 1970-2003.[16] Since indicators of financial development and other institutional variables are not available in many countries, we use at most 63 of the countries in the database (listed in Appendix A.1). Additional observations are lost due to missing data on output, value added, or other variables used in the regressions, which somewhat reduces the final sample. The measures of employment protection legislation are drawn from the *FRDB Database of Structural Reforms: Employment Protection Legislation*, available at www.frdb.org.

3.2. Results

Table 1 presents the estimates of equation (28) using as dependent variables the growth rate of value added, as in Rajan and Zingales (1998), and the growth rates of employment, real wages and labor productivity. For comparability with the existing literature, we proxy financial development by two measures of financial activity: the ratio of stock market capitalization to GDP (1980–95 average) and the ratio of private credit to GDP (1980–95 average). Using the average of these indicators over the first 15 years of our sample period should allay the concern that our measures may reflect not financial "development" but overlending or stock market bubbles. Anyway, later we also provide separate estimates for "normal" and "crisis" periods.

The estimates for the full sample reported in Panel A of Table 1 show that with a higher degree of financial development both value added (columns 1 and 2) and employment (columns 3 and 4) tend to grow faster in the sectors that are highly dependent on external finance, while there is no

[16] We chose the 2006 release because the subsequent releases have more missing observations, particularly for developing countries.

significant correlation with the growth of real wages (columns 5 and 6) or labor productivity (columns 7 and 8).

To get a sense of the magnitude of the effects, we can compute the percentage differential in the real growth rates between industries at the 75th and at the 25th percentile in terms of external dependence (textiles versus non-metal products), when they are located in countries at the 75th and the 25th percentile in terms of financial development (Ireland vs. Panama in column 1, Spain vs. El Salvador in column 2). The differential ranges between 0.16% and 0.52% for value added and between 0.23% and 0.83% for employment.

Panel B of Table 1 reports results for the subsample of OECD countries. Here financial development appears to have no significant impact on the growth of value added, employment or wages: the coefficient of the interaction between external dependence and measures of financial development is small and not significantly different from zero.[17] In contrast, Panel C indicates that financial development does spur the growth both of value added and of employment in the subsample of non-OECD countries, again with no effect on wage growth.[18] This suggests that, as the model predicts, the results discussed above are driven by the non-OECD countries, since that is where firms are more likely to be finance-constrained. This result is consistent with Aghion, Howitt and Mayer-Foulkes (2005), who plot the average growth rate of GDP per capita against the average degree of financial development in a cross-section of 71 countries over 1960-95, and notice that the positive correlation between financial development and growth vanishes for countries whose degree of financial development is higher than that of Greece.[19]

Table 2 reports results of the estimation of equation (28) separately for countries with strong and weak employment protection. If strong job protection reduces labor mobility and prevents firms from seizing profitable investment opportunities, one should expect financial development to foster growth more in weak-protection low than in strong-protection countries. Panel A in Table 2 suggests that this is hardly the case in our sample: the results on employment and wage growth are mixed, changing with financial development proxy chosen.

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[17] The OLS results in Table 1 from regressions on the OECD subsample suggest that labor productivity grows more slowly in sectors that are highly dependent on external finance when the degree of financial development is higher. But this finding is not robust to the IV specification (see Table A4 in the Appendix), and we accordingly conclude that financial development does not affect labor productivity growth.

[18] Similar results are obtained by re-estimating these regressions on the original data set used by Rajan and Zingales (1998), available at http://faculty.chicagobooth.edu/luigi.zingales/research/topics/fin.dev.html. In those data too the correlation between financial development and growth obtains only for non-OECD countries.

[19] We also consider the measure of an industry's liquidity needs developed by Raddatz (2006): the ratio of inventories to annual sales in the period 1980–1989. This variable captures an industry's need for finance for working capital. Consistently with Kroszner, Laeven and Klingebiel (2006), coefficient of the interaction between our measure of financial development and the Raddatz measure of liquidity is not statistically significant. The same is the case when we interact our measure of financial development, the Raddatz measure of liquidity needs, and a banking crisis dummy.

To address the concern that financial development may be endogenous even after controlling, via country and sector effects, for spurious correlation due to unobserved heterogeneity, Appendix A4 also reports instrumental variable (IV) estimates. Like Rajan and Zingales (1998), we instrument financial development with legal origin dummies and the property rights index. The IV estimates show that our results are substantially unaffected.

Since our data cover more than 30 years, we explore whether the results are stable over time by splitting the period into three decades, so as to take into account that some national financial have changed quite substantially in the interim. The results are reported in Tables A5, A6 and A7 in the Appendix: financial deepening is associated with value added and employment growth in the 1970s and the 1980s but not in the 1990s, consistent with the thesis that financial development matters more at its early stages.

Finally, we can relate our findings to the debate on which financial structures are more conducive to growth: so far we have two distinct measures: stock market capitalization to capture the development of security markets and domestic private credit to capture that of banks. To link up with the debate on financial structure, we run an additional specification including both variables, so as to appraise which is more strongly associated with employment growth. The results in Table A8 of the Appendix show that the driver of employment growth is private credit, whose estimated coefficient remains positive and significant, while stock market capitalization becomes insignificant. This suggests that a strong banking sector is more important for growth than the stock market. Since in financially integrated economies firms may gain access to finance not only domestically but also from abroad, we also add a measure of financial openness (total foreign assets + total foreign liabilities / GDP) to our explanatory variables; in this case, private credit is still positive and significant, but financial openness is now significantly associated with employment growth.

4. Evidence on finance and labor reallocation

The version of the model with heterogeneous firms developed in Section 2.2 predicts that well-functioning financial markets affect the rate of job reallocation in ways that depend on the nature of any shocks to the economy. Financial development may increase job reallocation by facilitating the transfer of resources from low-growth to high-growth sectors, but on the other hand it allows more firms to weather cash flow shocks, thereby helping to stabilize employment. Again, we first review the empirical results of previous studies and then present our own methodology and data (Section 4.1) and results (Section 4.2).

The studies to date have used only firm-level data referring to specific countries, not cross-country, industry-level data, to determine whether the size and breadth of financial markets fosters the reallocation of employment or output between industries. Nickell and Nicolitsas (1999) show that for British firms financing constraints (assumed to be inversely related to a flow measure of leverage) deter hiring. Bertrand, Schoar and Thesmar (2007) show that the French banking reforms of 1985 were associated with greater corporate restructuring and job reallocation in the more bank-dependent sectors. After deregulation, banks were less inclined to bail out poorly performing borrowers, while firms in the more bank-dependent sectors became more likely to restructure, inducing more inter-industry employment reallocation.

Other studies have analyzed the employment impact of corporate restructuring carried out by private equity firms, but the findings that differ considerably from country to country. Davis, Haltiwanger, Jarmin, Lerner and Miranda (2008), in a study of 5,000 private equity interventions in U.S. firms between 1980 and 2005, find that employment shrinks 7% more in private equity targets than in a control sample, but that in the two subsequent years these firms have 6% greater greenfield job creation than the control firms, and more acquisition and divesture activity as well. They conclude that private equity firms act as "catalyst for creative destruction". Arness and Wright (2007) and Cressy, Munari and Malipiero (2007) find that in the U.K. private equity interventions are associated with short-term employment declines but an increase after 5 years. Instead, Boucly, Sraer and Thesmar (2009) document that in France companies restructured by private equity firms have 14% greater employment and wages than the control group.

These studies suggest that financial development – whether in the form of more intensive bank monitoring or of private equity intervention – leads to more reallocation of employment. However, there is also some evidence that financial development lowers the sensitivity of employment to shocks. Sharpe (1994) shows that employment in more highly leveraged U.S. firms responds more to fluctuations in aggregate output, and Caggese and Cuñat (2006) document that finance-constrained Italian SMEs have more volatile employment and more temporary workers. This contrast in results may reflect the fact that, as in the model of Section 2.2, the sign of the effect of financial development on labor reallocation may depend on whether shocks are to profit opportunities or to cash flow.

4.1. Empirical specification and data

We test the relationship between degree of development of financial markets and rate of job reallocation using the UNIDO industry data. We regress a measure of inter-industry reallocation on measures of financial development, according to the following specification:

$$sd(Y_{jct}) = \delta FD_{ct} + \mu_c + \mu_t + \varepsilon_{jct}, \tag{29}$$

where the dependent variable $sd(Y_{jct})$ is the cross-sectoral standard deviation of Y_{jct} (industry *j*'s value added, employment or wage bill) in country *c* and year *t*, FD_{ct} is a time-variant country index of financial development (measured alternatively by the ratio of total credit to GDP, stock market capitalization to GDP or total stock market trading to GDP), μ_c are country fixed effects, μ_t are calendar-year effects, and ε_{jct} is the residual. The inclusion of country fixed effects implies that identification comes from the time variation of the indices of financial development, while calendar-year effects control for the possible time-series correlation between financial development and the intensity of inter-industry reallocation of employment or output, as reflected for instance in fluctuations in credit or in stock market valuations. Since the extent of reallocation may also be affected by national regulations on hiring and firing, we also estimate equation (29) separately for countries with strong and weak employment protection.

Recalling that the model predicts that financial development will increase the inter-industry dispersion of employment in response to shocks to profit opportunities but not necessarily to cash flow, we construct a measure of the dispersion of profit opportunities by computing the cross-sectional standard deviation of stock returns for each country and year, $sd(DRI_{jct})$. We draw sectoral stock returns from Datastream, matching them as closely as possible with our UNIDO industries.[20] To minimize the endogeneity problems arising from the possibility that the reaction of the stock market may be affected by the country's level of financial development, we use the return indices at continent level. For example, for Italy we use the changes in the return index at the European level.

We then estimate the following specification, where financial development is also interacted with this measure of dispersion of profit opportunities:

$$sd(Y_{jct}) = \delta FD_{ct} + \gamma\, sd(DRI_{jct}) \times FD_{ct} + \mu_c + \mu_t + \varepsilon_{jct}. \tag{30}$$

Based on the predictions of the two-sector model in Section 2.2, we expect the coefficient γ to be positive, since financial development should increases employment reallocation in response to

[20] The index of returns in Datastream is the theoretical growth in value of a notional stock holding, inclusive of gross dividends.

profit shocks. Insofar as the interaction with $sd(DRI_{jct})$ captures the effect of the changing variability in shocks to firm profitability, adding it to the set of explanatory variables should reduce the estimated value of the coefficient δ, which should then mainly capture the effect of cash flow shocks on job reallocation. Thus specification (30) permits a tighter test of the predictions of the model than specification (29).

4.2. Results

Table 3 reports the estimates of specification (29) in Panel A and specification (20) in Panel B. For robustness, we also use the value of stock market trading scaled by GDP as an additional measure of financial development. Panel A indicates that financial development is associated with significant reductions in the inter-industry dispersion of value added growth (columns 1, 2 and 3) and of employment (columns 4, 5 and 6).

There is also evidence that it is associated with a reduction in the inter-industry dispersion in wage growth (columns 7, 8 and 9). Recall that the model provides no guidance on this issue, as it assumes perfect labor mobility, hence no wage differentials. However, insofar as financial development affects the dispersion of employment growth, given frictions to inter-industry mobility its effect may extend to wage dispersion as well. The last two columns of the upper panel of Table 3 indicate that financial development is also associated with a reduction in the dispersion of real wage growth rates, although the estimate of the coefficient is not statistically significant when the measure of financial development selected is the ratio of stock market capitalization to GDP.

So Panel A of Table 3 suggests that financial development, rather than heightening employment risk, exerts a stabilizing influence on inter-industry output and job reallocation, as well as on wage growth dispersion. However, the estimates shown in Panel B paint a subtler and more intriguing picture. Precisely as the model predicts, the coefficient γ of the interaction $sd(DRI_{jct}) \times FD_{ct}$ is positive in all specifications, and in most cases significantly different from zero, while the estimates of δ stay negative and become considerably smaller than the corresponding values in Panel A, at least for the regressions concerning the cross-sectional dispersion of variations in output and employment. The threshold of profit volatility above which the relationship between financial development and labor market volatility switches sign is 0.29, which is between the 95^{th} and 99^{th} percentile of the volatility's distribution. This means that only in case of very severe profitability shocks does financial development increase the volatility of employment.

Therefore, the estimates are consistent with the model's predictions that financial development should amplify the dispersion of output and employment changes when these reflect high cross-industry dispersion in stock returns, and therefore in profit opportunities but reduce the dispersion of those changes when the cross-industry dispersion in stock returns is low, i.e. when cash-flow shocks prevail.

Finally, Table 4 reports results from the estimation of equation (29) separately for countries with strong and weak employment protection legislation. In principle, one would expect such legislation to hinder job reallocation and thus attenuate the impact of financial development on job reallocation. But the empirical results lend no support to this argument: in this case too, the coefficients of the financial development proxies tend to be fairly similar for countries above and below the median of the country-year distribution of employment protection.

5. Evidence on finance, employment and wages in banking crises

This section considers the possibility of a "dark side" to financial development – the thesis that although it may foster growth in normal times, a developed financial market exacerbates the repercussions of financial crises on value added, employment and wages. The argument – illustrated by the model in Section 2.3 – is that in an economy with sophisticated financial markets firms rely more heavily on external finance and so are more severely hurt when a crisis cripples financial intermediaries than in an economy where firms ordinarily rely mainly on own resources for investment and growth.

Some studies have investigated whether financial development strengthens the resilience of the economy to shocks (say, by enabling firms to withstand temporary cash-flow shocks), and whether this effect differs between normal and crisis periods when the financial sector is itself crippled and so unable to provide liquidity to the real economy. Braun and Larrain (2005) find that the more financially dependent industries are hit harder in recessions but that this effect is less severe in countries with high accounting standards and in industries with more tangible assets, which suggests that financial development does improve the resilience of firms. In a banking crisis, however, this no longer applies. Using the Rajan-Zingales approach, Kroszner, Laeven and Klingebiel (2007) distinguish between normal times and banking crises in the period 1980-2000, and find that sectors that are heavily dependent on external finance suffer a much sharper contraction of value added in countries with a higher degree of financial development. They do not seek to determine whether these adverse effects extend to employment and wages.

There is also substantial microeconomic evidence that firms are affected by the failure or distress of the banks with which they have a lending relationship, especially in a financial crisis, along the lines of the model presented in Section 2.3. Slovin, Sushka and Polonchek (1993) document that 29 firms borrowing from Continental Illinois suffered a loss in stock market value averaging 4.2% when the bank almost failed, followed by a gain when it was eventually bailed out. Likewise, Bae, Kang and Lim (2000) find that credit downgrades of Korean banks during the Asian crisis of 1997-98 led to average abnormal returns of minus 4.4% for their client firms; and Djankov, Jindra, and Klapper (2005) show that bank closures in Indonesia, Korea, and Thailand were associated with borrowers' negative abnormal returns (–3.9%). Chava and Purnanandam (2009) find that during the 1998 Russian crisis firms that borrowed from the banks involved had significantly larger valuation losses and cut their investment significantly more sharply. Finally, Carvalho, Ferreira and Matos (2010) find, for a sample of publicly traded firms with syndicated loans in 34 countries, that stock prices fell more in 2007-08 for those whose syndicate leader was in distress at the time of the collapse of Lehman Brothers and Bear Stearns and of the introduction of the Treasury–FDIC bailout plan, as well as at dates for which losses (write-downs) are reported for these banks.

5.1. Empirical specification and data

To test the hypothesis that financially dependent sectors experience sharper falls in employment and wages during crisis in countries with more highly developed financial systems, we employ two different but complementary empirical strategies. First, following Kroszner, Laeven and Klingebiel (2007), we re-estimate the basic model of equation (16) in Rajan and Zingales (1998) for three sub-periods (before, during and after a financial crisis), identifying financial crisis with data from Laeven and Valencia (2010) for the universe of systemic banking crises for the period 1970-2009. We then calculate one crisis observation per country, averaging the crisis episodes for countries that experience more than one during our time period. Country and industry indicators are included to control for time-invariant country- and industry-specific factors: with country effects for the crisis period, we control for the general severity of the crisis in each country; and with industry effects we control for the possible inter-industry differences in the severity of the effects at times of crisis.

As a second line of attack, we adopt a panel approach similar to Braun and Larrain (2005), regressing value added, employment and wage growth on the usual measures of financial development and external dependence interacted with a banking crisis dummy. Thus, our empirical specification is as follows:

$$Y_{jct} = \gamma_0 SHARE_{cjt-1} + \delta_1(ED_j \times crisis_{ct}) + \delta_2(FD_c \times ED_j) + \delta_3(FD_c \times ED_j \times crisis_{ct}) + \mu_{ct} + \mu_j + \varepsilon_{jct} \quad (31)$$

In this specification, there would be a "dark side" to financial development if, during banking crises, the estimate of coefficient δ_3 were negative. That is, a banking crisis for industries with heavy external dependence should cause a sharper contraction in the financially more developed countries. Country-year and sector dummies absorb the effects of any covariates that do not vary by country-year or by sector.

5.2. The results

Before turning to the regression results, Figure 3 offers a visual analysis of the unconditional behaviour of employment growth (on the vertical axis) as a function of distance from the crisis (on the horizontal axis), the crisis year being normalized to zero. We divide countries into two groups: those with high (low) financial development are those with a ratio of stock market capitalization to GDP above (below) the median of the country-year distribution. Figure 3 clearly indicates that banking crises coincide with sharp decelerations in employment growth, and are to some extent followed by a rebound. It also suggests, though, that there is no clear-cut differential in the impact on employment growth between countries with high and low financial development. This impression may be driven by the lack of controls for country and/or sector effects, however, so we move to regression analysis, where these and other factors can be controlled for.

Table 5 reports the coefficients obtained by estimating equation (28) separately for crisis and non-crisis periods, for value added, employment and real wage growth in Panels A, B and C respectively. Column 1 reports the results for pre-crisis, column 2 for crisis, and column 3 for post-crisis periods. Consistent with Kroszner, Laeven and Klingebiel (2007), in the pre-crisis or "normal" period, on average in financially dependent industries both value added and employment grow faster in countries with well-developed financial systems. During crisis periods, the opposite holds. That is, the financially dependent sectors grow less in countries with well-developed or deeper financial systems (see column 2, Panels A and B). But these coefficients are estimated imprecisely and fail to pass significance tests at standard confidence levels. In column 3, Panels A and B, we examine the growth of value added and employment in the post-crisis period. Again, the interaction term is positive, as in the pre-crisis growth regressions, and for employment growth it is statistically significant.

In column 4 we estimate how the crisis relation differs from the pre-crisis relation by comparing the real growth in value added and employment in the crisis and the pre-crisis periods. The growth rate declines more for financially dependent firms in countries with well-developed financial systems, and again significantly so in the case of employment growth.

Finally, in columns 5 and 6, we compare the post-crisis growth in value added and employment with growth before and during the crisis. Vis-à-vis pre-crisis growth, the coefficient of the interaction term is negative for value added and for employment, but not statistically significant. Vis-à-vis the crisis, the coefficients on the interaction terms are positive, suggesting that financially dependent sectors grow relatively faster in countries with developed financial systems after than during crisis; and the coefficient of employment growth is statistically significant at conventional levels.

The results on wage growth (Table 5, Panel C) instead show no effect of financial development in any of the sub-periods considered, consistently with Table 1.

Table 6 reports the results for the estimation of equation (31). Also using this panel data approach, on average financial development is positively correlated with value added growth and employment growth: the coefficient of *External dependence* × *Financial Development* in columns 1, 2, 4 and 5 is positive and significant. The coefficient of the triple interaction *External dependence* × *Financial Development* × *Banking crisis* is instead negative but insignificant, except for employment growth when *Financial Development* is proxied by the ratio of private credit to GDP, where it is significantly different from zero at the 10% level.

Table 7 further probes the evidence by focusing only on "severe banking crises", i.e. those associated with severe financial distress, which is defined by a synthetic index of impaired financial intermediation (Balakrishnan, Danninger, Elekdag and Tytell, 2009). Severe banking crises are those during which the financial stress index is above the median of the country-year distribution.

The table again shows that on average financial development has a positive and significant effect on value added growth and employment growth. The coefficient of the triple interaction is again negative, and when *Financial Development* is proxied by the ratio of private credit to GDP it is significant for both value added and employment growth, at the 10 and 5 percent level respectively. Therefore, the evidence is broadly consistent with the thesis that in banking crises negative shocks damage employment growth disproportionately in the financially dependent sectors of the more financially developed countries. That is, a "dark side" of financial development is detectable in the data even before the crisis of 2007-09.

6. Conclusion

How does finance affect employment and the reallocation of jobs between industries? The simple model presented here predicts that financial development: (i) will result in higher employment and/or wages and labor productivity, its impact being smaller at low levels of financial development; (ii) may either increase or decrease job reallocation, depending on whether the economic shock involved is to profit opportunities or to cash flow; (iii) will amplify the output and employment losses during crisis, with the firms that rely more heavily on banks for liquidity being hit the hardest.

Testing these predictions on cross-country, industry-level data for 1970-2003, we find that standard measures of financial development are indeed associated with greater employment growth, but only in the non-OECD countries, consistently with the model. But financial development is not correlated with the growth of labor productivity and real wages. And the inter-industry dispersion of employment growth is correlated negatively with financial development but positively with its interaction with the dispersion in stocks returns across industries, consistent with the model's prediction that financial development should amplify the dispersion of variations in output and employment in response to profit shocks.

Finally, we find some evidence of a "dark side" to financial development. That is, in a banking crisis, employment growth suffers disproportionately more in the financially dependent sectors of the more financially developed countries. This finding is all the more significant in that, owing to problems of data availability, our sample period does not include the crisis of 2007-2009.

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Appendix

A1. List of countries in the UNIDO data set

Australia	Germany	Nigeria
Austria	Greece	Norway
Bangladesh	Honduras	Pakistan
Barbados	Iceland	Panama
Belgium	India	Paraguay
Bolivia	Indonesia	Philippines
Cameroon	Iran (Islamic Republic of)	Portugal
Canada	Ireland	Singapore
Chile	Israel	South Africa
Colombia	Italy	Spain
Costa Rica	Jamaica	Sri Lanka
Cote d'Ivoire	Japan	Swaziland
Cyprus	Jordan	Sweden
Denmark	Kenya	Syrian Arab Republic
Ecuador	Korea	Trinidad and Tobago
Egypt	Malaysia	Tunisia
El Salvador	Malta	Turkey
Fiji	Mauritius	United Kingdom
Finland	Mexico	Uruguay
France	Netherlands	Venezuela
Gabon	New Zealand	Zimbabwe

A2. List of industries in the UNIDO data set

Apparel	Machinery	Printing and
Beverages	Metal products	Professional equipment
Electrical machinery	Non-ferrous metal	Refineries
Food products	Non-metal products	Rubber products
Footwear	Other chemical products	Textiles
Furniture	Other manufacturing	Tobacco
Glass and products	Paper products	Transport equipment
Industrial chemicals	Petroleum and coal	Wood products
Iron and steel	Plastic products	
Leather	Pottery	

A3. Descriptive statistics

The data span from 1970 to 2003. Data on value added, employment and wages are obtained from the UNIDO INDSTAT3 database. The ratio of stock market capitalization to GDP (averaged over the period 1980-1995) and the ratio of claims of banks and other financial institutions to GDP (averaged over the period 1980-1995) is taken from Guiso, Jappelli, Padula and Pagano (2004). External dependence is taken from Rajan and Zingales (1998). Sectoral return indices are drawn from Datastream (details on sectors conversion is available from the authors upon request). The Employment Protection Legislation index is an un-weighted average of the scores for advance notice and severance pay from the *FRDB Database of Structural Reforms: Employment Protection Legislation*, available at www.frdb.org.

	No. of observ.	*Mean*	*Std. Dev.*
Sector-country level variables			
Value added growth	45,929	0.0411	0.3730
Employment growth	44,069	0.0193	0.2393
Wage growth	42,890	0.0190	0.2146
Change in equity return index (continental level)	26,162	0.0998	0.2962
Country level variables			
Stock market capitalization (80-95) to GDP	43,218	0.2508	0.2901
Claims of banks and other financial institutions (80-95) to GDP	45,929	0.5217	0.3206
Employment Protection Legislation	8,645	2.43	1.03
Bank crisis dummy	31,458	0.0956	0.2941
Financial stress	10,052	0.0378	1.0974
Sector level variables			
External dependence	45,929	0.2401	0.3190

A4. Effects of financial development on output, employment and wage growth: IV regressions

Dependent variable:	*Growth of Value Added*		*Employment Growth*		*Wage Growth*		*Labor Productivity*	
	Panel A: Full sample							
Industry's share in 1970	–0.158***	–0.207***	–0.144***	–0.168***	–0.020***	–0.022***	–0.002***	–0.002***
	(0.029)	(0.026)	(0.026)	(0.029)	(0.003)	(0.002)	(0.001)	(0.001)
External dependence × stock market capitalization (80-95)	0.046*		0.070**		0.000		0.011	
	(0.027)		(0.034)		(0.008)		(0.020)	
External dependence × claims of banks and other fin. inst. (80-95)		0.047**		0.063***		0.008		–0.006
		(0.019)		(0.018)		(0.005)		(0.016)
Observations	1533	1637	1447	1526	1293	1370	1428	1505
							0.29	0.30
	Panel B: OECD countries							
Industry's share in 1970	–0.218***	–0.232***	–0.155***	–0.161***	–0.021***	–0.022***	–0.001	–0.001
	(0.053)	(0.056)	(0.043)	(0.045)	(0.004)	(0.004)	(0.001)	(0.001)
External dependence × stock market capitalization (80-95)	–0.001		0.021		–0.042***		–0.026	
	(0.029)		(0.021)		(0.016)		(0.024)	
External dependence × claims of banks and other fin. inst. (80-95)		0.025		0.023*		0.007*		–0.002
		(0.017)		(0.013)		(0.004)		(0.007)
Observations	628	628	624	624	594	594	622	622
	Panel C: NON-OECD countries							
Industry's share in 1970	–0.163***	–0.212***	–0.166***	–0.184***	–0.021***	–0.023***	–0.003***	–0.003***
	(0.032)	(0.029)	(0.032)	(0.036)	(0.003)	(0.003)	(0.001)	(0.001)
External dependence × stock market capitalization (80-95)	0.054		0.083*		0.013		0.025	
	(0.037)		(0.044)		(0.008)		(0.024)	
External dependence × claims of banks and other fin. inst. (80-95)		0.072*		0.110**		0.011		0.010
		(0.043)		(0.044)		(0.011)		(0.030)
Observations	905	1009	823	902	699	776	806	883

Note: All columns are estimated using instrumental variables. Instruments for financial development are legal origin dummies and a property rights index. Estimation period: 1970-2004. Industry's share in 1970 refers to total value added (columns 1-2); employment (columns 3-4); ratio of industry to average wage (columns 5-6); ratio of industry to average labor productivity (columns 7-8). Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

A5. Finance and employment growth: the 1970s

	Growth of Value Added	Growth of Value Added	Employ-ment Growth	Employ-ment Growth	Wage growth	Wage growth
Industry's share in 1970	–0.936***	–0.274***	–0.485***	–0.218***	–0.045***	–0.033***
	(0.310)	(0.065)	(0.169)	(0.040)	(0.012)	(0.005)
External dependence × stock market capitalization (decade average)	-0.268		–0.035		–0.066	
	(0.190)		(0.173)		(0.074)	
External dependence × claims of banks and other financial inst. (decade average)		0.071*		0.078**		-0.002
		(0.038)		(0.032)		(0.008)
Observations	422	1745	392	1595	390	1439
R-squared	0.39	0.27	0.45	0.30	0.63	0.73
			OECD countries			
Initial conditions in 1970	–0.787***	–0.196***	–0.440***	–0.144***	–0.034***	–0.027***
	(0.247)	(0.053)	(0.157)	(0.034)	(0.011)	(0.008)
External dependence × stock market capitalization (decade average)	–0.279		–0.104		–0.014	
	(0.299)		(0.368)		(0.121)	
External dependence × claims of banks and other financial inst. (decade average)		0.006		0.021		0.003
		(0.021)		(0.018)		(0.005)
Observations	128	614	124	610	124	582
R-squared	0.66	0.57	0.50	0.55	0.85	0.85
			NON-OECD countries			
Industry's share in 1970	–0.960***	–0.280***	–0.496**	–0.255***	–0.047***	–0.035***
	(0.336)	(0.079)	(0.196)	(0.056)	(0.015)	(0.005)
External dependence × stock market capitalization (decade average)	–0.309		–0.045		–0.086	
	(0.250)		(0.224)		(0.092)	
External dependence × claims of banks and other financial inst. (decade average)		0.245***		0.208***		–0.005
		(0.092)		(0.076)		(0.019)
Observations	294	1131	268	985	266	857
R-squared	0.39	0.26	0.46	0.24	0.53	0.68

Note: The estimation period is 1970-1979. Industry's share in 1970 refers to total value added (columns 1-2); employment (columns 3-4); ratio of industry to average wage (columns 5-6). Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

A6. Finance and employment growth: the 1980s

	Growth of Value Added	Growth of Value Added	Employ-ment Growth	Employ-ment Growth	Wage growth	Wage growth
Industry's share in 1980	–0.176**	–0.091	–0.108**	–0.136**	–0.007	–0.006
	(0.072)	(0.065)	(0.044)	(0.055)	(0.014)	(0.008)
External dependence × stock market capitalization (decade average)	0.062***		0.056***		–0.005	
	(0.020)		(0.013)		(0.005)	
External dependence × claims of banks and other financial inst. (decade average)		0.050*		0.067***		–0.018
		(0.030)		(0.020)		(0.012)
Observations	1177	1920	1205	1895	1152	1833
R-squared	0.35	0.34	0.38	0.27	0.67	0.70
			OECD countries			
Industry's share in 1980	–0.081	–0.072	–0.106**	–0.110***	–0.026***	–0.004
	(0.065)	(0.055)	(0.045)	(0.039)	(0.006)	(0.012)
External dependence × stock market capitalization (decade average)	0.009		0.026***		–0.004	
	(0.017)		(0.009)		(0.003)	
External dependence × claims of banks and other financial inst. (decade average)		–0.002		0.010		–0.009
		(0.031)		(0.016)		(0.014)
Observations	577	694	577	694	574	691
R-squared	0.40	0.40	0.48	0.41	0.83	0.78
			NON-OECD countries			
Initial conditions in 1980	–0.330**	–0.144*	–0.129*	–0.169**	–0.008	–0.007
	(0.129)	(0.081)	(0.066)	(0.073)	(0.018)	(0.010)
External dependence × stock market capitalization (decade average)	0.132***		0.082***		–0.006	
	(0.036)		(0.025)		(0.011)	
External dependence × claims of banks and other financial inst. (decade average)		0.110**		0.117***		–0.020
		(0.050)		(0.035)		(0.020)
Observations	600	1226	628	1201	578	1142
R-squared	0.36	0.35	0.33	0.25	0.59	0.66

Note: The estimation period is 1980-1989. Industry's share in 1980 refers to total value added (columns 1-2); employment (columns 3-4); ratio of industry to average wage (columns 5-6). Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

A7. Finance and employment growth: the 1990s

	Growth of Value Added	Growth of Value Added	Employ-ment Growth	Employ-ment Growth	Wage growth	Wage growth
Industry's share in 1990	0.023 (0.071)	0.056 (0.068)	–0.038 (0.040)	-0.074 (0.047)	0.105 (0.073)	0.091 (0.066)
External dependence × stock market capitalization (decade average)	0.009 (0.019)		–0.001 (0.013)		0.017 (0.015)	
External dependence × claims of banks and other financial inst. (decade average)		0.019 (0.029)		0.034* (0.019)		–0.012 (0.020)
Observations	1721	1858	1674	1807	1622	1751
R-squared	0.18	0.25	0.22	0.17	0.49	0.54
			OECD countries			
Industry's share in 1990	–0.127 (0.146)	–0.106 (0.150)	–0.092* (0.055)	–0.090 (0.056)	0.283*** (0.034)	0.282*** (0.036)
External dependence × stock market capitalization (decade average)	0.032 (0.037)		0.002 (0.018)		0.040* (0.024)	
External dependence × claims of banks and other financial inst. (decade average)		0.004 (0.021)		0.002 (0.014)		0.033 (0.021)
Observations	693	700	691	698	642	649
R-squared	0.11	0.11	0.19	0.19	0.74	0.73
			NON-OECD countries			
Initial conditions in 1990	0.042 (0.086)	0.083 (0.083)	–0.058 (0.050)	–0.094 (0.060)	–0.018*** (0.007)	–0.009 (0.009)
External dependence × stock market capitalization (decade average)	-0.000 (0.025)		-0.006 (0.015)		0.008 (0.015)	
External dependence × claims of banks and other financial inst. (decade average)		0.027 (0.058)		0.061 (0.039)		–0.005 (0.031)
Observations	1028	1158	983	1109	980	1102
R-squared	0.25	0.30	0.25	0.17	0.57	0.61

Note: The estimation period is 1990-2004. Industry's share in 1990 refers to total value added (columns 1-2); employment (columns 3-4); ratio of industry to average wage (columns 5-6). Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

A8. Labour market effects of financial structure and financial openness

Dependent variable:	*Employment Growth*		*Labour productivity*		*Wage Growth*	
Industry's share in 1970	–0.144***	–0.129***	–0.002***	–0.002***	–0.021***	–0.021***
	(0.027)	(0.027)	(0.001)	(0.001)	(0.003)	(0.003)
External dependence × stock market capitalization (80-95)	–0.002	–0.010	0.010	0.010	–0.001	–0.001
	(0.010)	(0.010)	(0.009)	(0.009)	(0.004)	(0.004)
External dependence × claims of banks and other financial inst. (80-95)	0.060***	0.050***	–0.014	–0.014	0.003	0.003
	(0.015)	(0.014)	(0.014)	(0.014)	(0.004)	(0.004)
External dependence × (foreign assets + foreign liabilities) / GDP (70-03)		0.010***		0.000		–0.000
		(0.003)		(0.002)		(0.001)
Observations	1423	1377	1407	1362	1272	1227
R-squared	0.42	0.44	0.29	0.26	0.72	0.70

Note: Industry's share in 1970 refers to employment (columns 1-2); ratio of value added to employment (columns 3-4); ratio of industry to average wage (columns 5-6). Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

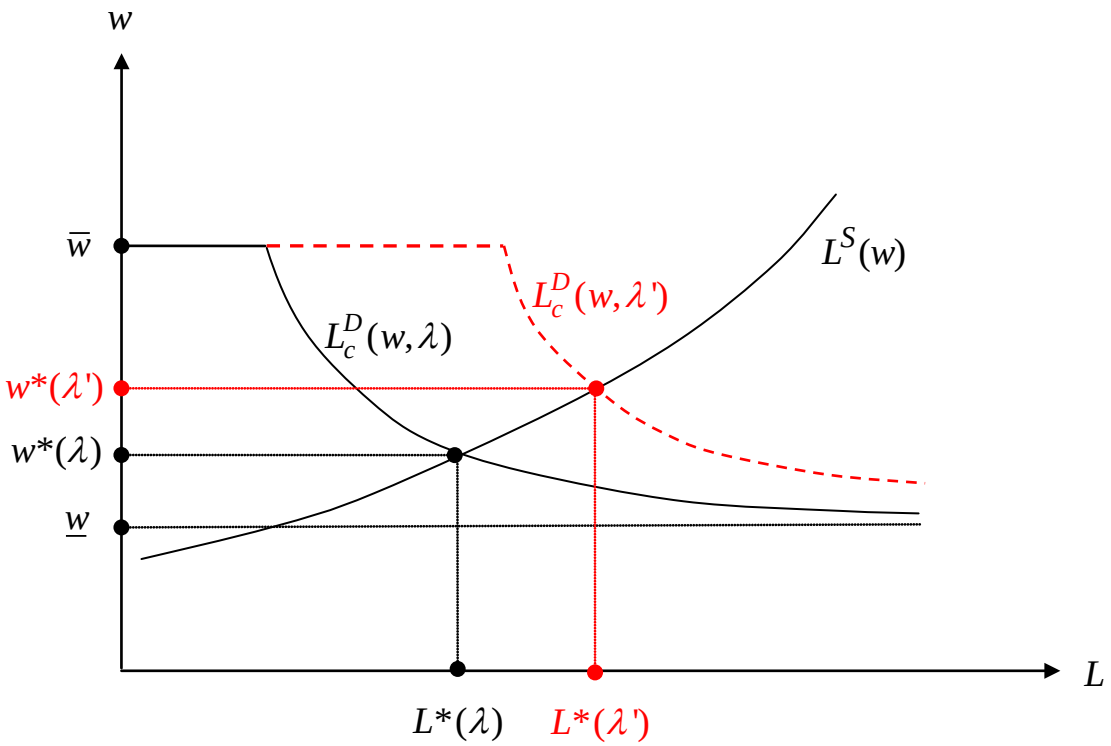


Figure 1. Labor market effects of financial market development: the one-industry case

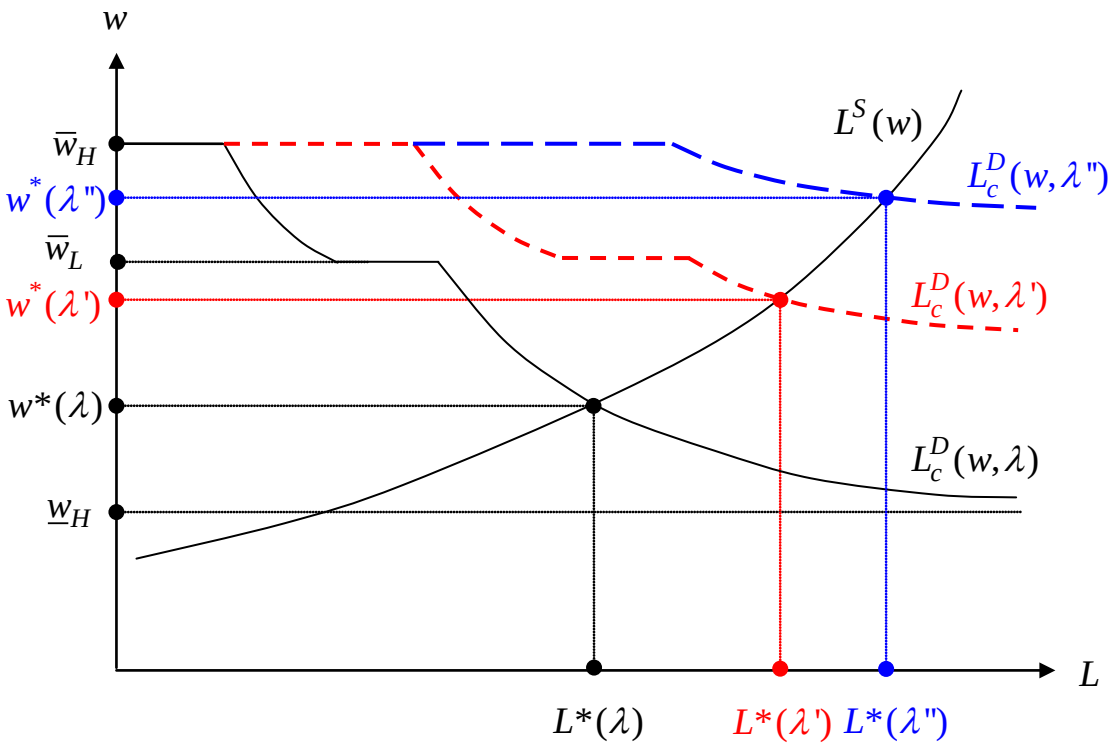
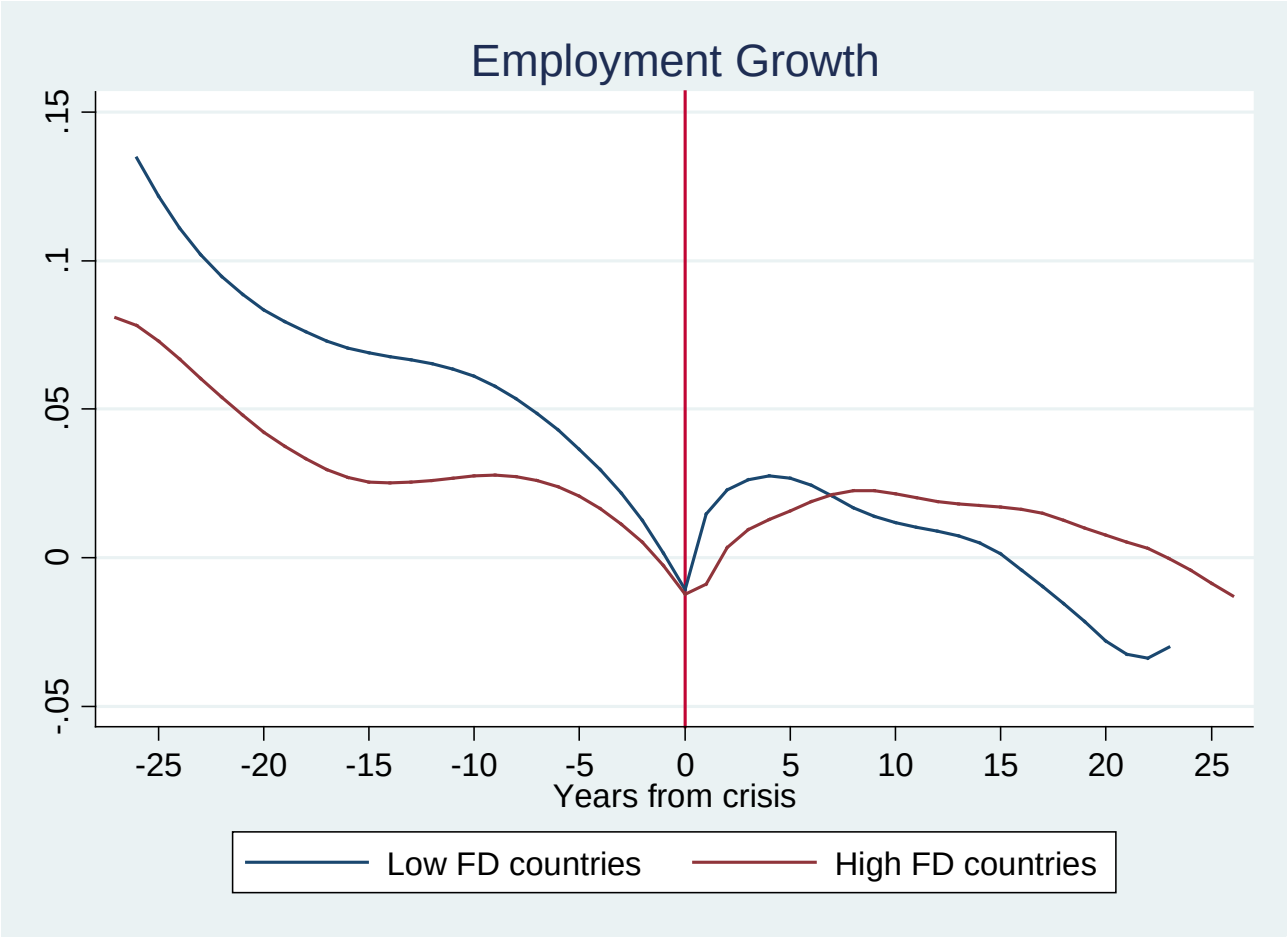


Figure 2. Labor market effects of financial market development: the two-industry case



Note: high (low) financial development countries are those above (below) the median of the country-year distribution of the ratio of stock market capitalization to GDP.

Figure 3. Employment growth around banking crises, for countries with low ratio and countries with high ratio of stock market capitalization to GDP

Table 1. Effects of financial development on output, employment and wage growth

Dependent variable:	*Growth of Value Added*		*Employment Growth*		*Wage Growth*		*Labor Productivity*	
				Panel A: Full sample				
Industry's share in 1970	-0.156***	–0.204***	–0.141***	–0.167***	–0.020***	–0.022***	–0.002***	–0.002***
	(0.030)	(0.027)	(0.026)	(0.029)	(0.003)	(0.003)	(0.001)	(0.001)
External dependence × stock market capitalization (80-95)	0.026*		0.037***		0.00004		0.002	
	(0.014)		(0.013)		(0.004)		(0.011)	
External dependence × claims of banks and other fin. inst. (80-95)		0.034**		0.055***		0.002		–0.008
		(0.016)		(0.014)		(0.004)		(0.013)
Observations	1533	1637	1447	1526	1293	1370	1428	1505
R-squared	0.32	0.33	0.42	0.39	0.72	0.68	0.29	0.30
				Panel B: OECD countries				
Industry's share in 1970	–0.212***	–0.212***	–0.153***	–0.155***	–0.022***	–0.022***	–0.001	–0.001
	(0.054)	(0.055)	(0.044)	(0.045)	(0.004)	(0.004)	(0.001)	(0.001)
External dependence × stock market capitalization (80-95)	–0.022		0.011		–0.010		–0.021**	
	(0.018)		(0.012)		(0.007)		(0.011)	
External dependence × claims of banks and other fin. inst. (80-95)		–0.011		0.009		–0.002		–0.012*
		(0.011)		(0.008)		(0.004)		(0.007)
Observations	628	628	624	624	594	594	622	622
R-squared	0.48	0.48	0.55	0.55	0.70	0.70	0.34	0.34
				Panel C: NON-OECD countries				
Industry's share in 1970	–0.161***	–0.213***	–0.163***	–0.185***	–0.021***	–0.023***	–0.003***	–0.003***
	(0.032)	(0.030)	(0.033)	(0.037)	(0.003)	(0.003)	(0.001)	(0.001)
External dependence × stock market capitalization (80-95)	0.037**		0.041***		0.003		0.008	
	(0.016)		(0.015)		(0.004)		(0.013)	
External dependence × claims of banks and other fin. inst. (80-95)		0.091**		0.133***		–0.000		–0.000
		(0.036)		(0.033)		(0.010)		(0.030)
Observations	905	1009	823	902	699	776	806	883
R-squared	0.30	0.32	0.31	0.30	0.64	0.62	0.24	0.27

Note: The estimation period is 1970-2004. Industry's share in 1970 refers to total value added (columns 1-2); employment (columns 3-4); ratio of industry to average wage (columns 5-6); ratio of industry to average labor productivity (columns 7-8). Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

Table 2. Effect of financial development on employment and wage growth: sample breakdown by employment protection legislation (EPL)

	Full sample	*High EPL*	*Low EPL*	*Full sample*	*High EPL*	*Low EPL*
	Panel A: Employment Growth					
Industry's share of total employment (columns 1-6) in manufacturing in 1970/ Ratio of industry wage to average wage (columns 7-12) in manufacturing in 1970	–0.113***	–0.112***	–0.135**	–0.148***	–0.164***	–0.154***
	(0.032)	(0.041)	(0.053)	(0.037)	(0.051)	(0.059)
External dependence x stock market capitalization (80-95)	0.042***	0.062**	0.031**			
	(0.014)	(0.027)	(0.014)			
External dependence x claims of banks and other financial inst. (80-95)				0.056***	0.045**	0.077***
				(0.015)	(0.020)	(0.023)
Observations	1200	637	563	1253	690	563
R-squared	0.44	0.42	0.49	0.41	0.36	0.51
	Panel B: Wage growth					
Industry's share of total employment (columns 1-6) in manufacturing in 1970/ Ratio of industry wage to average wage (columns 7-12) in manufacturing in 1970	–0.021***	–0.017***	–0.022***	–0.022***	–0.019***	–0.022***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.004)
External dependence x stock market capitalization (80-95)	0.000	0.015***	–0.005			
	(0.004)	(0.006)	(0.005)			
External dependence x claims of banks and other financial inst. (80-95)				0.002	0.006	0.000
				(0.004)	(0.004)	(0.009)
Observations	1082	579	503	1370	628	503
R-squared	0.72	0.76	0.70	0.68	0.69	0.70

Note: The estimation period is 1970-2004. The EPL measure is an un-weighted average of the scores for advance notice and severance pay (FRDB Database of Structural Reforms: Employment Protection Legislation. Milan, Italy, 2010, available at www.frdb.org). High (low) EPL countries are those above (below) the median of the cross-country EPL distribution. Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

Table 3. Effect of financial development on output, employment and wage cross-industry variability

Dependent variable: standard deviation by year and country of	*Value added growth*	*Value added growth*	*Value added growth*	*Employment growth*	*Employ-ment growth*	*Employ-ment growth*	*Wage growth*	*Wage growth*	*Wage growth*
					Panel A				
Private credit by deposit money banks and other financial institutions to GDP	–0.146** (0.058)			–0.043 (0.038)			–0.069** (0.031)		
Stock market capitalization to GDP		–0.054** (0.026)			–0.037** (0.017)			–0.007 (0.008)	
Stock market total value traded to GDP			–0.041* (0.024)			–0.035* (0.019)			–0.021* (0.011)
Observations	1493	984	1008	1438	962	985	1398	928	955
R-squared	0.02	0.03	0.03	0.01	0.03	0.04	0.04	0.02	0.02
					Panel B				
Private credit by deposit money banks and other financial institutions to GDP	–0.097 (0.064)			–0.013 (0.043)			–0.054* (0.029)		
Stock market capitalization to GDP		–0.072*** (0.025)			–0.053*** (0.017)			–0.011 (0.008)	
Stock market total value traded to GDP			–0.089* (0.045)			–0.069*** (0.024)			–0.029** (0.012)
Standard deviation of continental price shocks × Fin. Dev.	0.152 (0.191)	0.236** (0.118)	0.383 (0.250)	0.069 (0.123)	0.182** (0.074)	0.247** (0.110)	0.153** (0.073)	0.063** (0.032)	0.100* (0.054)
Observations	1281	874	893	1246	857	875	1207	824	846
R-squared	0.02	0.03	0.03	0.02	0.04	0.04	0.03	0.03	0.03

Note: Standard deviations are computed across sectors for each country and year. Due to data availability problems, we use stock price indices from South Africa and Australia to compute measures of continental price shocks for Africa and Oceania, respectively. Estimation period: 1970-2004. Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

Table 4. Effect of financial development on employment and wage variability: sample breakdown by employment protection legislation (EPL)

	Full Sample	*High EPL*	*Low EPL*	*Full Sample*	*High EPL*	*Low EPL*	*Full Sample*	*High EPL*	*Low EPL*
	Panel A: Dependent variable: standard deviation by year and country of Employment Growth								
Private credit by deposit money banks and other financial institutions to GDP	–0.090**	–0.065	–0.070						
	(0.042)	(0.046)	(0.069)						
Stock market capitalization to GDP				–0.064**	–0.073**	–0.050			
				(0.026)	(0.029)	(0.043)			
Stock market total value traded to GDP							–0.050**	–0.046***	–0.049
							(0.019)	(0.014)	(0.049)
Observations	1060	539	521	848	455	393	864	466	398
R-squared	0.04	0.06	0.03	0.04	0.08	0.05	0.04	0.07	0.05
	Panel B: Dependent variable: standard deviation by year and country of Wage Growth								
Private credit by deposit money banks and other financial institutions to GDP	–0.084**	–0.074	–0.075						
	(0.037)	(0.050)	(0.054)						
Stock market capitalization to GDP				–0.012	–0.010	–0.006			
				(0.013)	(0.014)	(0.019)			
Stock market total value traded to GDP							–0.020*	–0.014	–0.020
							(0.010)	(0.010)	(0.021)
Observations	1023	527	496	814	443	371	834	454	380
R-squared	0.07	0.07	0.09	0.03	0.05	0.07	0.04	0.05	0.08

Note: The estimation period is 1970-2004. The EPL measure is an un-weighted average of the scores for advance notice and severance pay (FRDB Database of Structural Reforms: Employment Protection Legislation. Milan, Italy, 2010, available at www.frdb.org). High (low) EPL countries are those above (below) the median of the country-year EPL distribution. Robust standard errors in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

Table 5. Effects of financial development on output, employment and wage growth before, during and after banking crises

	Pre-crisis	*Crisis*	*Post-crisis*	*Crisis vs. pre-crisis*	*Post- vs. pre-crisis*	***Post-crisis vs. crisis***
	Panel A: Value Added Growth					
Industry's share of total value added in manufacturing in 1970	−0.306***	0.053	−0.033	0.333	0.297*	-0.110
	(0.074)	(0.249)	(0.134)	(0.249)	(0.154)	(0.197)
External dependence × claims of banks and other financial inst. (80-95)	0.056**	−0.148	0.055	−0.189	−0.005	0.052
	(0.024)	(0.156)	(0.052)	(0.158)	(0.050)	(0.073)
Observations	826	808	671	809	666	668
R-squared	0.41	0.18	0.19	0.22	0.20	0.26
	Panel B: Employment Growth<					
Industry's share of total value added in manufacturing in 1970	−0.215***	−0.022	−0.027	0.187*	0.215*	0.054
	(0.067)	(0.083)	(0.075)	(0.103)	(0.122)	(0.111)
External dependence × claims of banks and other financial inst. (80-95)	0.060***	-0.006	0.051*	−0.057*	−0.008	0.064*
	(0.017)	(0.028)	(0.031)	(0.031)	(0.034)	(0.039)
Observations	771	729	616	731	612	591
R-squared	0.34	0.18	0.24	0.18	0.22	0.19
	Panel C: Wage Growth					
Industry's share of total value added in manufacturing in 1970	−0.025***	0.034	0.013	0.057**	0.033	0.005
	(0.003)	(0.025)	(0.029)	(0.026)	(0.030)	(0.037)
External dependence × claims of banks and other financial inst. (80-95)	0.004	−0.030	0.061	−0.031	0.058	0.099
	(0.006)	(0.031)	(0.038)	(0.032)	(0.038)	(0.066)
Observations	704	651	550	654	547	525
R-squared	0.79	0.52	0.28	0.55	0.36	0.47

Note: Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively. Banking crises dating is taken from Laeven and Valencia (2010)

Table 6. Effects of financial development on output, employment and wage growth during banking crises: panel regressions

	Value Added growth	*Employment growth*	*Wage growth*	*Value Added growth*	*Employment growth*	*Wage growth*
Lagged industry's share of value added (columns 1-4) / Lagged industry's share of employment (columns 2-5) / Lagged ratio of industry's wage to average wage (columns 3-6)	–0.546***	–0.233***	–0.098***	–0.659***	–0.233***	–0.101***
	(0.084)	(0.053)	(0.011)	(0.089)	(0.048)	(0.011)
External dependence × Banking crisis	0.041	0.010	0.009	0.065	0.032	0.008
	(0.056)	(0.019)	(0.011)	(0.065)	(0.024)	(0.012)
External dependence × Stock market capitalization	0.057***	0.036**	0.003			
	(0.021)	(0.017)	(0.007)			
External dependence × Stock market capitalization × Banking crisis	-0.081	-0.058	-0.010			
	(0.129)	(0.061)	(0.024)			
External dependence × banks and other fin. inst. claims				0.072***	0.050***	0.006
				(0.021)	(0.014)	(0.006)
External dependence × banks and other fin. inst. claims × Banking crisis				–0.082	–0.056*	-0.003
				(0.074)	(0.033)	(0.012)
Observations	44856	43293	42033	47431	45533	44265
R-squared	0.01	0.01	0.05	0.01	0.01	0.05

Note: All specifications include country/year and sector dummies. Robust standard errors are reported in parentheses. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.

Table 7. Effect of financial development on output, employment and wage growth during severe banking crises: panel regressions

	Value Added growth	*Employment growth*	*Wage growth*	*Value Added growth*	*Employment growth*	*Wage growth*
Lagged industry's share of value added (columns 1-4) / Lagged industry's share of employment (columns 2-5) / Lagged ratio of industry's wage to average wage (columns 3-6)	−0.547***	−0.234***	−0.098***	−0.660***	−0.233***	−0.101***
	(0.085)	(0.053)	(0.011)	(0.089)	(0.048)	(0.011)
External dependence × Severe banking crisis	0.026	0.023	-0.001	0.068*	0.049**	-0.014
	(0.027)	(0.015)	(0.012)	(0.036)	(0.023)	(0.016)
External dependence × Stock market capitalization	0.052**	0.033**	0.002			
	(0.021)	(0.016)	(0.007)			
External dependence × Stock market capitalization × Severe banking crisis	0.024	–0.015	0.006			
	(0.069)	(0.030)	(0.021)			
External dependence × banks and other fin. inst. Claims				0.065***	0.046***	0.005
				(0.019)	(0.013)	(0.006)
External dependence × banks and other fin. inst. claims × Severe banking crisis				–0.055*	–0.050**	0.016
				(0.030)	(0.022)	(0.015)
Observations	44856	43293	42033	47431	45533	44265
R-squared	0.01	0.01	0.05	0.01	0.01	0.05

Note: All specifications include country/year and sector dummies. Severe banking crises are defined as crises during which the financial stress index from Balakrishnan, Danninger, Elekdag, Tytell (2009) is above the median of the country-year distribution. One, two and three asterisks denote coefficients significant at 10, 5 and 1 percent, respectively.