

# **Access to Finance and Job Growth:**

## **Firm-Level Evidence across Developing Countries \***

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### **Abstract:**

This paper investigates the effect of access to finance on job growth in 50,000 firms across 70 developing countries. Using the introduction of credit bureaus as an exogenous shock to the supply of credit, the paper finds that increased access to finance results in higher employment growth, especially among micro, small, and medium enterprises. The results are robust to using firm fixed effects, industry measures of external finance dependence, and propensity score matching in a complementary panel data set of over one million firms in 29 developing countries. The findings have implications for policy interventions targeted to produce job growth.

JEL: G21, D22, J21

Keywords: access to finance, job growth

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## I. Introduction

The recent global financial crisis has highlighted the impact of credit markets on the real economy, in particular on employment. While an extensive literature exists on how finance can affect corporate investment and overall economic growth,<sup>1</sup> comparatively little is known about the effect of finance on labor market outcomes. Arguably, the relationship between finance and job growth is more subtle, since it is not clear that increasing access to finance should readily lead to the hiring of more workers. Firms may grow by increasing investment, and thus output from greater access to finance without ever increasing labor, a case of “jobless growth”. Or conversely, financial constraints should not affect labor directly, since unlike capital, labor does not require financing. On the other hand, the theoretical literature on capital-labor market linkages<sup>2</sup> suggests that labor has a fixed cost component that requires financing to bridge upfront costs associated with training and hiring and so we should expect to see credit markets affect firm employment decisions.

Ultimately, the impact of access to finance on employment growth is an empirical question, and an important one given the concerns on jobless recovery and rising unemployment following the 2007-09 Great Recession.<sup>3</sup> The recent empirical evidence on the link between access to credit and employment is largely focused on the U.S. experience and we have little evidence of the impact of credit markets on employment in developing countries where financial institutions are less developed. This is also an especially relevant question for micro, small and

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<sup>1</sup> See Levine (2005) for an overview of the literature on finance and growth and Beck (2009) for a detailed discussion of the different techniques used to analyze how finance affects aggregate, industry, or firm level growth.

<sup>2</sup> See Oi (1962, 1983), Hamermesh (1989), and Benmelech, Bergman, and Seru (2011).

<sup>3</sup> For example, see International Labor Organization’s (ILO) Global Employment Trends reports (2009-2014).

medium enterprises (MSMEs), since small firms have been shown to be the most vital job creators in developing countries,<sup>4</sup> as well as the most likely to be credit constrained.<sup>5</sup>

In this paper, we use comprehensive firm-level data across a large set of developing countries to analyze the impact of access to finance on job growth and the heterogeneity in this relationship across firm size. In particular, we study the differential impact of access to finance on MSMEs' ability to create jobs relative to that of larger firms.

Establishing a causal effect from access to finance to employment growth is complicated, since the variables measuring a firm's access to finance may also reflect its demand for labor. Moreover, there are potentially many factors that could drive both firm employment growth and access to finance. We alleviate these identification concerns using a number of empirical strategies. First, we consider an exogenous shock to the supply of credit in the form of the introduction of a credit bureau.<sup>6</sup> We use a difference-in-difference approach in estimating the impact of the introduction of credit bureaus on employment growth, by comparing countries which introduced credit bureaus and countries which did not, and years pre- and post-credit bureau introduction. Second, we use propensity score matching (PSM) to more closely match the treatment and control group of countries and re-estimate the difference-in-difference specification. Finally, following Rajan and Zingales (1998), we identify credit supply effects using industry measures of external finance dependence interacted with the credit bureau reform variable. If increased access to finance from the introduction of credit bureaus affects job growth,

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<sup>4</sup> Ayyagari, Demirguc-Kunt, and Maksimovic (2011) show SMEs to be important job creators. Haltiwanger, Jarmin and Miranda (2013) also find a strong role for SMEs in job creation in the US.

<sup>5</sup> See Love and Mylenko (2003), Beck et al. (2008), and Galindo and Micco (2005).

<sup>6</sup> A credit bureau is defined in the World Bank Doing Business database as a private firm or nonprofit organization that maintains a database on the creditworthiness of borrowers (individuals or firms) in the financial system and facilitates the exchange of credit information among creditors. Credit investigative bureaus that do not directly facilitate information exchange among banks and other financial institutions are not considered.

then we should expect to see larger effects for firms in industries that are more dependent on external finance.

We use two complementary sources of firm level data: cross-country World Bank Enterprise Surveys that include information on 52,231 firms operating in 70 developing countries; and Bureau Van Dijk's Orbis database on over 1 million firms operating across 29 developing countries. Both databases include large and small, and listed and unlisted firms. While the Enterprise Surveys provide data across a larger number of countries, the panel dimension in the Orbis database allows us to control for unobserved heterogeneity at the firm level, using firm fixed effects.

We find a strong positive relationship between access to finance and job growth. Overall, firms with access to a loan exhibit employment growth between 1 to 3 percentage points larger than firms with no access to finance across the two databases. These results are robust to controlling for firm fixed effects. When identifying the relationship using the introduction of credit bureaus (CB) as an exogenous shock to the supply of credit, we find that the introduction of CBs increases employment growth by over 5 percentage points compared to countries where CBs do not exist, a result that holds when estimated with the matched sample using Orbis data. This effect is particularly large for firms in industries that are more dependent on external finance.

We also find the association between finance and job growth to be stronger among MSMEs than among large firms. MSME firms with access to a loan have between a 1 to 4 percentage point larger employment growth than MSMEs without a loan across the two databases. This difference in job growth among MSMEs with and without access to finance is at

least three times larger than the differential among large firms with and without a loan.<sup>7</sup> In our largest database, the introduction of CBs elicits a job growth response among MSMEs that is over six times larger than that among large firms. Finally, MSMEs in industries with high dependence on external finance respond to the introduction of CBs with job growth rates that are almost two times larger than those of large firms in similar industries.

Our paper contributes to the growing literature on finance and labor. Several papers have used the 2007-09 Great Recession in the US as a shock to external finance to identify the causal link between finance and employment. Duygan-Bump, Levkov, and Montoriol-Gariga (2015) find that workers in small firms in the US were more likely to become unemployed during the 2007-09 financial crisis if they worked in industries with high external financing needs. Benmelech, Bergman, and Seru (2011) show that local unemployment rates in the U.S. are affected by the provision of bank credit. Chodorow-Reich (2014) finds that borrowers of banks affected by disruptions in the syndicated loan market following the collapse of Lehman Brothers in 2008 faced restrictions in credit supply, which translated into greater cuts in employment at these firms. Greenstone, Mas, and Nguyen (2012) also show that the 2007-09 lending shocks accounted for significant but modest declines in overall county-level employment.

However, it is not clear how these finance and labor market linkages in the US<sup>8</sup> translate to firms in poorer economies with completely different financial infrastructures and institutional

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<sup>7</sup> We find similar results in robustness tests using alternative measures of access to finance such as growth of financing and debt ratio. A one standard deviation increase in the growth of financing among MSME's is associated with employment growth rates that are over 0.89 percentage points higher. Similarly, a 1 standard deviation increase in the debt ratio of MSME firms is associated with an almost 0.4 percentage point higher employment growth. These are large movements in response to changes in financing when compared to the median annual employment growth rate of just under 1.5 percent.

<sup>8</sup> A few studies have used data from other developed countries. Bentolila, Jansen, Jimenez, and Ruano (2013) use matched bank-firm data from the Spanish Credit Register and show that during the Great Recession, firms with credit relationships with weak banks had substantially lower employment levels than firms borrowing from non-affected banks. Popov and Rocholl (2015) use German banks' heterogeneous exposure to the US subprime mortgage market to show that firms with credit relationships with affected banks experienced significantly larger declines in

environments. Thus, the external validity of these results in the context of developing economies where access to finance is rapidly evolving is limited. There are few papers that have relied on cross-country data, either at the firm level (Aterido, Hallward-Driemeier, and Pages (2011); Cull and Xu (2011)) or at the industry level (Pagano and Pica (2012)). But, with the exception of Aterido et al. (2011), these papers have looked at the impact of the aggregate level of financial development as opposed to analyzing the impact of individual firms' access to finance on employment as we do in our paper. This distinction is important because access to finance is not the same as financial development. Financial systems can be considered developed because the volume of credit to GDP is high but access to finance might still be low if credit is allocated only among few firms.

Our paper also contributes to the understanding of the differential impact of firm size in the finance and employment growth relationship. Our finding of a consistently stronger impact of financing on employment growth for SMEs and MSMEs sheds new light on the heterogeneous impact by firm size. These results have important policy implications for tailoring interventions intended to produce job growth in MSMEs through increased availability of financing. Our paper also advances the literature finding a positive link between reforms in the information sharing systems and increased access to finance (Galindo and Miller (2001), Love and Mylenko (2003), Brown, Jappelli, and Pagano (2009), Martinez Peria and Singh (2014)). In contrast to these papers, we show a direct link between the introduction of these credit information sharing systems and job growth. In that sense, our paper is aligned with work by Campello and Larrain (2014) who show that increasing access to credit through expansion in the scope of collateral law

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employment and labor compensation relative to firms whose credit relationships were with healthy banks. Boeri, Garibaldi, and Moen (2012) use data from 11 OECD countries and find that highly leveraged sectors are characterized by higher job destruction rates than low-leveraged sectors during banking crises.

to include movable assets results in employment growth for firms in the country. The relationship between reforms that increase access to credit and job growth has important implications, since it highlights a policy lever through which policy makers can focus on increasing employment in developing countries.

The rest of the paper is organized as follows. Section II describes the data we use. Section III explains the empirical methodology. Section IV presents the empirical results. Section V concludes.

## **II. Data and summary statistics**

### ***A. Firm-level data***

We use two firm-level data sets to analyze the link between access to finance and employment. First, we use World Bank Enterprise Survey (ES) data to analyze how firms' access to finance affects firm level employment growth. The ES uses a common questionnaire and a uniform sampling methodology to produce survey data on manufacturing and service sector firms that is comparable across countries.<sup>9</sup> Stratification of the sample is on three criteria – sector, firm size (employees), and geographic location. The stratified random sampling methodology is used to generate a sample large enough to be representative of the non-agricultural formal private economy,<sup>10</sup> as well as key sectors and firm size classifications. The ES data set provides firm-level information on employment levels, employment growth rate, access to a loan by banks, as well as other firm characteristics. We restrict our analysis to

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<sup>9</sup> Most firms in the Enterprise Surveys are single establishment firms (79%). All our results hold if we restrict our analysis to single establishment firms.

<sup>10</sup> The Enterprise Surveys do not include firms with 100% state ownership. We control for government ownership in all our regressions.

countries with two or more surveys over the course of the period 2002-2014, so that we can control for country fixed effects. We further exclude firms with fewer than five permanent employees to align the data set with the survey's stated intent of sampling firms with five or more employees. The final data set contains information on 52,231 firms operating in 70 countries.

Second, we use data from Orbis, a commercial database distributed by Bureau van Dijk over the period 2004-2011. We focus on those firms that report data on employment. We restrict our analysis to developing countries that had a minimum of 25 non-financial firms over the sample period and had at least 5 firms each year.<sup>11</sup> Furthermore, to be consistent with the ES sample, we limited the Orbis sample to firms that had a median of five or more employees over the period 2004-2011. Overall, the data we use from Orbis includes information for over one million unique firms operating across 29 developing countries. One advantage of using Orbis is that it includes large, small, listed and unlisted firms. Since most firms are followed through time, the data set also introduces a panel dimension to our analysis.

The use of these two data sets in our estimations aids with the analysis because of their complementary nature. With the ES we get a more comprehensive coverage of developing countries, and the random survey sample is nationally representative. However, the total number of firms included in the analysis is just over 50,000. In contrast, the Orbis data set does not cover as many countries, but provides widespread coverage of both listed and unlisted firms in countries where data are collected. In all, estimations using the Orbis data set include over 4.3 million observations. In addition, as most firms are followed through time in Orbis, we are also

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<sup>11</sup> After cleaning the data for errors (i.e., dropping firms with zero or a negative number of employees or of total assets), we also dropped observations for firms that were involved in a merger and/or acquisition after the date of the event. Note, since we impose the minimum number of firms filter before dropping firms with median number employees less than five over our sample period, two countries Nicaragua and Gabon have less than 25 firms.

able to construct a panel data set with one million unique firms. The ES does include a panel component, but one that is too small for a meaningful cross-country exploration in the context we wish to analyze. As a survey, the ES does offer more insight into firm characteristics which allow the use of more control variables in our regressions analysis.

Using the data sets discussed above, we construct a number of variables. The dependent variable, ***Employment growth***, is calculated as the annual change in the number of permanent employees divided by the average value over the two periods.<sup>12</sup> In Orbis, we calculate growth rates year over year, while in the ES sample, employment growth rates are annual changes over a two year period. To nullify undue effects from outliers, we truncate the top and bottom 5 percentile observations from the employment growth distribution in Orbis. As the distribution of employment growth is much tighter in the ES sample, we only remove the top and bottom 1 percentile of observations.

In the ES, firms were asked whether they have access to a loan or line of credit from a financial institution. We use the responses to this survey question to construct a dummy variable, ***Access to a loan***, which takes the value 1 for firms with access to a loan or line of credit and 0 for firms without access. We measure financial access in Orbis using the amount of short-term and long-term financial debt. If any of these amounts are positive, we code the ***Access to a loan*** dummy as 1, and 0 if both are 0 or if either the short-term or long-term debt is 0 and the other is missing. Thus, the financial access measure in Orbis captures access to both short-term and long-term financing. As alternative measures, we calculate the ***Growth of finance*** in Orbis as the

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<sup>12</sup> Employment growth rates calculated using the base year or the average value over the periods as the denominator can yield substantially different growth rates, especially for micro and small firms. We are using the latter method because, like log growth rates, it naturally bounds the employment growth rates so that the regression analysis is not skewed by big jumps from micro and small firms. For more discussion on implications of the two definitions, see Haltiwanger et. al. (2013).

annual growth rate<sup>13</sup> of the sum of the short- and long-term financial debt, and ***Debt ratio*** as the ratio of this sum to the total assets. We again truncate the top and bottom 5 percentile of the distribution of these two variables so as to diminish the influence of outliers.

We proxy for the size of the firm by the natural log of the number of permanent employees. In the ES, we are also able to construct a number of variables on firm characteristics that are described in Table 1. We defer to size classifications provided by the International Finance Corporation and the European Union to identify MSMEs as those firms that have less than 250 permanent employees. MSMEs are further divided into micro firms as those with less than 10 employees and the rest as SMEs.

In Table 2, we present summary statistics. In the ES sample, 24% of firms report having access to a loan. The average number of permanent employees in the sample of firms is 114, and the average annual growth rate is 6.5%. 53% of firms in the ES sample are in the manufacturing sector, 6% are government-owned, 10% have foreign ownership, and 23% are exporters. Furthermore, firms on average have been in business for about 17 years. Of the surveyed firms, 21% report being part of a larger ownership structure. In the Orbis sample of over 4.3 million observations comprising over 1 million firms in 29 countries, a relatively larger percentage of firms (37%) report receiving short- or long-term financing. Firms on average employ just under 100 permanent employees. Firms in the sample grow employment at an average annual rate of close to 7%.

## ***B. Introduction of credit bureaus***

Institutions facilitating the sharing of credit information (such as private credit bureaus and public credit registries) have been shown to be critical for the development of credit markets

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<sup>13</sup> We calculate the growth rate as the difference divided by the average value over the two years.

across countries (La Porta et. al. (1998), Jappelli and Pagano (2002), Detragiache, Gupta, and Tressel (2005), and Djankov, McLiesh, and Shleifer (2007)). Martinez-Peria and Singh (2014) in particular show that the introduction of private credit bureaus has a stronger effect on firm financing than the introduction of public credit registries. To identify the introduction of credit bureaus (CBs) across countries, we rely on the World Bank Doing Business database. Specifically, we identify the countries and the year in which they introduced credit bureaus, as well as the level of coverage in each year following introduction.

In the ES sample, 20 countries have a survey both before and after the introduction of a CB. An additional 30 countries that have at least two surveys, but no CBs, are part of the control group. Fifteen countries in the Orbis data sample introduced CBs during the sample period, while data from an additional 14 countries that do not have a CB serve as the control group.<sup>14</sup> Empirically, we capture ***CB reform*** with a dummy variable that takes the value 1 for countries that introduce CBs in the years after the reform. In the years prior to the introduction of CB for the reform countries, and for the control group of countries with no CB, the dummy variable is coded 0. Thus, the CB reform dummy variable can be thought of as the interaction of a dummy variable that identifies the treatment-control sample with a dummy variable that identifies the pre-post reform years.<sup>15</sup> For countries that introduce a CB, the World Bank Doing Business database also tracks the number of firms and individuals covered by the CB as a proportion of the total population. We refer to this variable as ***CB coverage***.

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<sup>14</sup> Appendix tables A1 and A2 provide the full list of countries in the Orbis and ES datasets, as well as when they are used as treatment or control in the regression using credit bureau reforms.

<sup>15</sup> Unlike a standard difference-in-difference specification, the pre and post periods are not defined for the control group in our analysis. The interaction term we refer to as “CB reform”, however, is well-defined throughout, and is the variable of interest.

### **C. External finance dependence**

We also construct an industry-level measure of the dependence on external finance, *EFD Index*, following the methodology proposed by Rajan and Zingales (1998). The index is based on the assumption that the well-developed US financial markets have fewer market imperfections, allowing US firms to achieve their desired financial structure. Thus, assuming that there are technological reasons why some industries depend more on external finance than others, the index offers an exogenous way to identify the extent of external dependence of an industry anywhere in the world.

To construct the index, we use data on US firms in the Compustat data set over the period 2000-2006. We exclude the years coinciding with the financial crisis where the assumption of unconstrained markets is unlikely to hold. For each firm, we sum the capital expenditure and cash flow from operations over the 7 year time period and take the ratio of this difference to the sum of capital expenditures over this period as a measure of a firm's dependence on external finance. We then take the industry median for each ISIC 2-digit industry to obtain the industry dependence on external finance.

Finally, we obtain country level macro data such as the inflation rate and the GDP growth rate from the World Development Indicators, and data on regulatory quality from the World Governance Indicators.

## **III. Empirical methodology**

We adopt a two-pronged approach in our empirical strategy. First, we use the ES sample to present evidence on the access to finance and employment growth relation across a large number of developing countries, addressing causality issues using country fixed-effects

estimations and a difference-in-difference setup using the introduction of credit bureaus as an exogenous shock to the supply of credit. Next, we use the Orbis sample that covers fewer countries but offers several million firm-level observations and allows us to take an even closer look at addressing causality concerns using firm-level panel data, propensity score matching, and the Rajan and Zingales (1998) methodology.

#### **A. Enterprise Survey sample**

We begin our analysis by running firm-level regressions of employment growth on access to finance across 70 countries in the ES as specified in equation (1) below:

$$Employment\ Growth_{i,j,k,t} = \alpha Access\ to\ Finance_{i,j,k,t-1} + \beta X_{i,j,k,t} + \gamma Z_{j,t-1} + C_j + Y_t + \eta_{i,j,k,t} \quad (1)$$

Where  $i$  identifies firms,  $j$  countries,  $k$  sectors/industries and  $t$  years. *Employment Growth* refers to the annual employment growth. *Access to Finance* is an indicator variable equal to 1 for firms that have an outstanding loan or line of credit.  $X$  is a matrix of firm level characteristics such as firm size, ownership (foreign or government owned), exporter status, and age.  $Z$  captures country level variables that can affect employment growth such as inflation and GDP growth.  $C_j$  and  $Y_t$  are a vector of country and year fixed effects, respectively. With the repeated cross-sections in ES, we obtain within-country estimates that control for non-time-varying country controls in the empirical specification. The regressions are estimated using ordinary least squares with standard errors clustered at the survey level.

We first estimate equation (1) for all firms to understand the overall correlation between financial access and employment growth. We follow this up with separate estimations over sub-

samples of MSMEs, SMEs and large firms, and test for differences in the impact of financing for these groups.

While equation (1) highlights the correlation between access to finance and job growth it does not provide a definite causal relationship. Clearly, employment growth could be driving firms' access to finance (i.e., financial institutions might be more likely to lend to growing firms and similarly growing firms are likely to demand more financing to sustain their operations) or there could be other variables that drive both employment growth and access to finance. In other words, both reverse causality and omitted variable bias are potential concerns in identifying the causal effect of finance on employment growth.

To address these concerns, we proceed as follows. First, to partially alleviate the problem of endogeneity arising from omitted variable bias at the country level, in lieu of separate country and year fixed effects, we introduce survey (i.e. country-year specific) fixed effects. The coefficient  $\alpha$  in equation (1) now measures the within survey impact of firm financing on job growth and by design controls for all time-varying country level variables relating to, for example, policy, institutions, regulatory quality and aggregate growth. We drop country level controls, inflation and GDP growth in this specification.

Second, to identify a causal link from access to finance to employment growth, instead of directly analyzing the impact of finance on employment growth, we examine what happens to employment growth for firms in countries that undertake financial infrastructure reforms that are intended to increase the supply of credit. In particular, we look at firms in countries that introduced credit bureaus relative to firms that are in countries that do not introduce such a reform. There is an extensive literature that studies the link between reforms in the information sharing systems and increased access to finance and finds a strong positive link. The empirical

analyses have been done both at the country level (Jappelli and Pagano (2002); Detragiache, Gupta, and Tressel (2005), Djankov, McLiesh, and Shleifer (2007)), and more contextually relevant in our case, at the firm level (Galindo and Miller (2001), Love and Mylenko (2003), Brown, Jappelli, and Pagano (2009), Martinez Peria and Singh (2014)). The approach we take of identifying the impact of access to finance through institutional reform that shocks the supply of credit is also tangentially related to work done by Bertrand et al. (2007). While they look at deregulation in the banking industry within a single country (France), we use a reform that is identifiable and comparable across countries, since ours is a cross-country analysis.

Specifically, we estimate the following equation:

$$Employment\ Growth_{i,j,k,t} = \alpha CB\ Reform_{j,t-2} + \beta X_{i,j,k,t} + \gamma Z_{j,t-2} + C_j + Y_t + \eta_{i,j,k,t} \quad (2)$$

where *CB Reform* is a dummy variable which equals one for countries that introduced a credit bureau following the year of introduction. All other variables have been defined above. CB reform can be thought of as the interaction of a dummy for the set of countries that introduced a reform during the sample period with a country-specific dummy which identifies the years after reform. Thus, this empirical methodology is akin to a difference-in-difference approach, comparing countries which underwent reforms and countries without reform, and years pre- and post-reform. By replacing a direct measure of access to finance that is endogenous with an external country-wide shock to the supply of credit that is exogenous to the firm, we are better able to extract a causal relationship between financing and employment growth. As the link between the increases in credit supply due to credit bureau reform and subsequent job growth

works through an intermediate increase in firm access to finance, to allow the effect to be realized we lag the CB variable in the equation by a further year.

The identifying assumption in equation (2) is that credit bureau reforms are exogenous shocks to the supply of credit.<sup>16</sup> The primary role of credit bureaus is to facilitate exchange of information among banks and financial institutions and, thus, it is reasonable to assume that the effect of CB reform on job growth as estimated in the specification above is exogenous and operates only through the effect of CB reform on credit markets. This approach takes advantage of cross-country variation in the supply of credit due to some countries introducing credit bureaus while others did not. With country fixed effects in the difference-in-difference setting, we are measuring the within country effect of CB reform. As such, this controls for any omitted variable bias from time-invariant country level variables. Introducing year fixed effects controls for macro variations across time periods.

### ***B. Orbis sample***

Even with the use of a difference-in-difference estimation strategy for the impact of CB reform, arguably our analysis may not fully account for the endogeneity in the decision by countries to introduce CBs. For example, firm-level factors may drive countries to introduce CBs and also impact job growth. In such a scenario, our specification may suffer from selection bias due to omitted variables as the effects on job growth from these unobserved factors are attributed to CB reform. To address these concerns we use panel data from Orbis that allows us to include firm fixed effects to control for any firm-level unobserved heterogeneity. We also use two distinct methods to address causality issues that may result from country-level omitted factors or firm demand for finance. First, we empirically match the treatment and control countries to

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<sup>16</sup> We relax the assumption of exogeneity in the following section.

produce a more aligned sample of countries. In the specification (2) above, any country without a CB is placed in the control group. To provide a better counterfactual and to mitigate the selection bias, we match control countries to treatment countries on the following factors –average GDP per capita over the period 2002-2004, average real GDP growth over the period 2002-2004, and propensity to reform. We measure propensity to reform using the 3 year *change* in the World Governance Indicator (WGI) Regulatory Quality Index over the same period.<sup>17</sup> This Index captures perceptions of the ability of the government to formulate and implement policies and regulations that promote private sector development. By matching on changes in regulatory quality, we are matching countries that show similar trends in propensity to reform.<sup>18</sup> In addition, we seek to keep the treatment and control countries similar on the level and rate of overall development by also matching on GDP per capita and real GDP growth.

We calculate propensity scores for each country using pre-reform values on these variables, and use nearest neighbor one-to-one propensity score matching (with replacement).<sup>19</sup> With a newly matched treatment and control countries, we subsequently estimate the difference-in-difference specification of equation 2, taking into account the number of times a control country matches multiple treatment countries with frequency weights.

Second, we introduce within-country variation in dependence on external sources of finance across industries. This approach compares the impact of CB reform on employment growth across industries that are more versus less dependent on external sources of finance. Firms in different industries rely on external financing to a different extent, and we use the

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<sup>17</sup> A three year timeframe provides a more stable regulatory direction of a countries policies that is more likely to smooth out annual jumps.

<sup>18</sup> Using another measure of regulatory quality, the ICRG Legislative Strength, index produces similar matching results.

<sup>19</sup> We verified that the choice of matching method is not crucial to the overall results. Using Kernel density based matching, for example, produces similar matching and qualitatively similar regression results.

varying response of these industries to credit bureau reform as part of the empirical strategy. It stands to reason that if firms in industries that are more dependent on external financing are able to secure such financing, they will be able to grow at a faster rate.

This follows the strategy proposed by Rajan and Zingales (1998). However, while they have used this strategy to assess how country level financial depth affects industry output growth, in this case we use it to study how the supply shock to credit from introductions of CBs affects firm employment growth. Essentially, this involves estimating equation (3) below:

$$\begin{aligned} Employment\ Growth_{i,j,k,t} = & \alpha CB\ reform_{j,t-2} + \theta CB\ reform_{j,t-2} * EFD\ Index_k + \beta X_{i,j,k,t} + \gamma Z_{j,t-2} \\ & + F_i + Y_t + \eta_{i,j,k,t} \end{aligned} \quad (3)$$

Where *EFD Index* is the Rajan and Zingales (1998) external finance dependence index and the remaining variables have been described above. The identifying assumption in (3) is that external dependence represents a true technological measure of demand for external financing independent of supply. As discussed in the previous section, we follow Rajan and Zingales (1998) in constructing the index, using data from US firms assuming that capital markets in this country are relatively frictionless and thus an industry reliance on external finance in that country is a reliable indication of true technological demand for financing.

While in principle we could undertake propensity matching in the ES sample, we do not show these as the main results since the one-to-one nearest neighbor matching with replacement results in a much larger reduction in the number of control countries in the ES data. We are unable to apply the Rajan and Zingales (1998) methodology to the ES sample since its industry classification of firms does not correspond to standardized classifications such as ISIC, SIC or

NAICS. Our attempt to match industries by name relies on far too many simplifying assumptions. By contrast, firms in the Orbis data provide 2 digit standardized SIC codes. We are thus able to match RZ external finance dependence measure calculated from the Compustat data precisely with firm-level Orbis data.

## IV. Results

### A. Access to finance and employment growth

We find a strong positive correlation between firm access to finance and the rate of employment growth. Table 3 presents estimates of the association between the firm's access to a loan and subsequent employment growth (equation 1) for all the firms in the sample, as well as over the MSME, SME, and large firm subsamples. The first four columns show estimations using country and year fixed effects along with time varying country-level controls, while the next four columns replace the time varying country-level variables with survey (country-year) fixed effects.

Column 1 shows that firms with access to a loan have an annual employment growth that is 3.29 percentage points larger than for firms with no access. Columns. (2) to (4) show the association between access to finance and employment growth to be strongest in the case of MSMEs and SMEs<sup>20</sup> (3.59% and 3.06% respectively) compared to large firms (1.18%) with point estimates more than three times larger than for large firms. To statistically test how the estimates for SMEs and MSMEs differ from those of large firms, we estimate the two subsamples as Seemingly Unrelated Regressions (SUR) and conduct a t-test for whether the coefficients are equal. We reject the null hypothesis of their equality resoundingly at the 1%

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<sup>20</sup> We follow the IFC and EU size categorization and classify MSME as firms with less than 250 employees. We also ran the regressions using different categorization of MSME's as firms with less than 100 employees suggested by others and find that the results are very similar.

level of statistical significance.<sup>21</sup> In columns (5) to (8), we present an alternative specification that controls for survey fixed effects (which are country-year specific) rather than country and year fixed effects. These within survey estimates in essence remove country level omitted variable bias from both time-varying and time-invariant covariates. The qualitative results in columns (1) to (4), in terms of sign as well as relative magnitude between MSMEs, SMEs and large firms, carry through in these specifications.

As robustness, in appendix A3 we estimate columns (1) to (4) from Table 3 over the Orbis sample and obtain qualitatively identical results.<sup>22</sup> In all regressions in this table, we use OLS regressions with firm and year fixed effects with standard errors clustered at the firm-level. Overall, firms with access to a loan have an average annual employment growth rate that is 1 percentage point larger than that for firms that lack such financing in the Orbis sample. As before, we find the association to be strongest in the case of MSMEs with a point estimates more than four times higher than that of large firms. We confirm with a t-test that it is statistically higher at the 99% confidence level.

In columns (5) to (12), as robustness, we present results using two additional measures for the volume of financing – growth of finance and debt ratio. In columns (5) to (8), we find that a 1 standard deviation increase in the growth of finance correlates to an overall increase in employment growth by 0.81 percentage points. This relationship appears entirely driven by the high correlation among MSME firms. A 1 standard deviation increase in the growth of finance is associated an increase in employment growth by 0.89 percentage points among MSMEs and only

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ults hold. Micro firms with access to a loan increase employment growth at a rate of almost 5 percentage points larger than that of micro firms without a loan, by far the sub-sample with the highest correlation.

<sup>22</sup> All analysis using ORBIS data is done using the full sample of firms available even when data for a particular firm is not available for all years. As robustness check, we repeated all our analysis over a balanced panel that drops firms not available over the entire 2004-2011 timeframe. Although the number of countries and the sample size drops substantially, all results carry through. The regression tables are available on request.

0.07 percentage point increase among large firms. Thus, the increase in employment growth from increase in the growth of finance is 13 times higher for MSME firms. T-tests confirm that the null hypothesis for the equality of the estimates for MSMEs and SMEs against large firms can be rejected strongly at the 1 percent significance level.

Columns (9) to (12) show that the overall effect, as well as for MSMEs and SMEs of an increase in the debt ratio results in a positive impact on job growth. Overall, a 1 percentage point increase in the debt ratio results in approximately a 0.03 percentage point increase in employment growth. A similar point estimate is observed within the MSME and SME subsamples. Here again we find the relation between access to finance and job growth to be strongest (both economically and statistically) in the case of MSMEs and SMEs compared to large firms.

Overall, the results from Table 3 and Appendix A3 provide initial suggestive evidence that access to finance leads to higher employment growth. Further, as MSMEs are more likely to be credit constrained, we consistently see that they are more inclined to increase employment given financial access. As discussed above though, econometrically, endogeneity of the finance variables is a concern that does not allow for a causal interpretation of the effect of financing on employment growth. We try to address this in the following sections.

### ***B. Credit bureau reform, access to finance, and employment growth***

In this section, we try to address the endogeneity of the financing variables by using the introduction of credit bureaus as an exogenous shock to the supply of credit in an economy. We first establish the association between introduction of CBs and access to finance and then examine the impact of CB on employment growth.

In Table 4 we first regress *Access to loan* on *CB reform* and find that the introduction of a CB is associated with an increase in access to finance. These regressions are estimated using a linear probability model (LPM) and standard errors are clustered at the survey level. Specifically, controlling for country and year fixed effects,<sup>23</sup> in the years after which a CB is introduced in the country, there is a 6 percentage point increase in the average firm's access to a loan in the overall sample. We find similar point estimates in the MSME and SME sample. The association between CB reform and access to finance is not statistically significant in the large firm sample as seen in column 4 of Table 4. While we expect MSMEs and SMEs, which are potentially the most financially constrained firms in an economy, to benefit the most from reforms that improve the credit information environment in the country, we are not able to reject the null hypothesis for the equality of the estimates for MSMEs and SMEs against large firms.

Having established the effect of CB reform on access to finance, we next re-estimate equation (2) but replace *Access to loan* with the more exogenous *CB reform*. Using the Enterprise Survey data, Table 5 shows that the introduction of CBs leads to 1.28 percentage point increase in employment growth for the overall sample. MSMEs and SMEs again respond more to the supply shock (1.34% and 1.79% increase in employment growth respectively), while the larger firms have a lower increase in employment growth (1.11%) that is not statistically significant. Statistically, we confirm using t-tests that the estimates for MSMEs and SMEs are higher than those for large firms at the 99% confidence level.

In Table 6, we confirm the impact of CB reform on employment growth using the ORBIS sample but the magnitudes we find are larger. Introduction of CBs leads to an over 5 percentage point increase in employment growth both for the overall sample (5.29%) and for MSMEs

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<sup>23</sup> We are unable to use survey (country-year variation) fixed effects as in Table 3, because CB reform is a country-year variable.

(5.54%) and is only slightly smaller in the case of SMEs (4.85%). By contrast, the increase in employment growth is just under 1 percentage point for larger firms. Thus, introduction of CBs results in an increase in employment growth that is over 6 times larger among MSMEs than large firms. Statistically, we confirm using t-tests that the estimates for MSMEs and SMEs are higher than those for large firm at the 99% confidence level.

In addition to the year of introduction of CB's, the World Bank Doing Business reports<sup>24</sup> also gather information on the coverage of the CBs as a percentage of total population. The estimation of equation (2) using CB reform above switches from 0 to 1 with their introduction, thus treating all CBs in the same manner. It is reasonable to assume that if CBs are introduced with varying degrees of coverage, the subsequent shock to credit supply will be proportionally varying. As a robustness check, we introduce this information into equation 2 by replacing CB reform variable with the interaction of CB reform and CB coverage.<sup>25</sup> Results provided in the Appendix Table A4 show that increases in coverage do appear to have varying degrees of impact on job creation due to a differential effect on credit supply. Countries that introduce CB reform with a 1 percentage point higher coverage, on average, grow employment at a 0.05 percentage point higher rate in the Enterprise Survey sample and a 0.16 percentage point higher rate in the Orbis sample. To put these estimates in context, consider a change in coverage from the 25th percentile to the 75th percentile of countries, which corresponds to 37.4 percent increase in coverage. Such an increase in coverage, according to the estimates in Table A4, would lead to an additional 2 percentage point increase in the growth of employment in the ES sample and 6 percentage point increase in job growth in the Orbis sample. The gulf in employment growth between MSMEs and large firms is still evident in these regressions and t-tests confirm that

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<sup>24</sup> <http://www.doingbusiness.org/data/exploretopics/getting-credit>

<sup>25</sup> We do not introduce CB reform and CB coverage individually due to issues of multi-collinearity.

differences between MSMEs and large firm are statistically significant at the 1 percent significance level.

Overall, the CB results reported so far suggest that the relationship between access to finance and job growth is causal rather than merely correlated. Furthermore, CB introductions, especially with higher coverage, and the subsequent increase in access to finance appear to be better utilized by MSMEs who grow employment at a much faster rate than larger firms.

As an interesting aside, we delve deeper into the effects of CB introductions on corporate decision making. If firms have greater access to finance from the introduction of CBs, it is not hard to envision that this should manifest in the growth of the firm in other dimensions besides employment. An obvious effect would be on investment as firms finance lump-sum increases in capital. In Appendix Table A5, we present results replacing employment growth with total asset growth and tangible fixed assets growth, respectively, as the dependent variable in the specification of equation (2). These variables are only available for the Orbis sample and for a smaller sample of countries. We find that CB reform leads to increases in the growth rate of total assets and tangible fixed assets. In the disaggregated size categories, we get estimates that are in line with the pattern of results thus far – an effect among MSMEs and SMEs from financing (CB reform) that is much higher than for large firms. These results suggest an obvious avenue for growth in employment among firms. It is conceivable that the increase in job growth from financing is working through an intermediate increase in capital. As firms finance capital accumulation, labor is hired to “work the machines” and maintain optimal capital-labor ratios.

### C. Additional robustness tests

In this section, we present results from two additional strategies aimed at countering concerns of endogeneity from the selection of treatment and control countries that undertake CB reform – propensity score matching and the RZ methodology.

First, in columns (1) to (4) of Table 7, we present results from estimating the same specification as before (equation 2), but modifying the sample of control countries as a result of matching. The one-to-one nearest neighbor matching with replacement reduces the number of control countries used from 14 to 8 in the Orbis data. The regressions make use of frequency weights to produce an overall sample that is analogous to having an equal number of treatment and control countries. A test of the balancing property shows that the balancing property of the estimated propensity score is satisfied, i.e., countries with the same propensity score have the same distribution of observable (and unobservable) characteristics independently of whether or not they undertake CB reform.<sup>26</sup> In estimating the propensity score, we impose the Common Support condition, which ensures that matching is only conducted over the overlapping region of the distributions of propensity score in the treated and untreated groups, thus ensuring that conditional on observed characteristics, the probability of undertaking a CB reform or not is non-zero.

The regressions results with matching are qualitatively identical to the unmatched results in Table 6 above. Columns (1) to (4) of Table 7 show that the point estimates for the overall effect of the introduction of CB on job growth are slighter lower than earlier, as are the effects among SMEs and MSMEs. Increased access to finance resulting from the introduction of CBs

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<sup>26</sup> Rosenbaum and Rubin (1983) show that to ensure a bias reduction the propensity score should satisfy two important properties: *Balancing Property* which ensures that given the propensity score, the treatment and observables are independent and the *Unconfoundedness Property* which ensures that given the propensity score the treatment and the potential outcomes are independent. We use the Stata routine psmatch2 to estimate the propensity score and test the balancing property. Note that the unconfoundedness property cannot be tested.

leads to a growth in employment of approximately 5 percentage points in the overall sample, as well as for SMEs and MSMEs. We test that this is statistically higher at the 1% confidence interval than the estimate for subsample of large firms.

Overall, the results from the matched sample provide more substantive evidence for the positive effect of CB reform on employment growth. More closely aligning the treatment and control countries in their propensity to undertake regulatory reform and the overall level and growth of income produces a smaller grouping of control countries. However, the estimates for the overall sample as well as the relative size of the impact for the subsamples continue to hold.

Our second strategy to strengthen the causal impact from firm financing to employment growth relies on supplementing the credit bureau reform analysis presented above with exogenous cross-industry variation in dependence on external financing. As set out in equation (3), following Rajan and Zingales (1998), this involves estimating the effect of the interaction between the CB reform dummy and the industry level index of external finance dependence. This variable varies at the country level depending on if and when CBs were set up in a country, and further breaks down firms in reform countries by the level of external finance dependence in the sector the firm operates.

Since the external finance dependence index is only calculated for firms in the manufacturing sector, we first repeat the estimation in equation (2) (Table 6) over this sub-sample to confirm that the underlying effect still exists (Appendix Table A6).

In columns (5) to (8) of Table 7, we regress *Employment growth* on *CB Reform x EFD* and find strong evidence that the effect of CB reform does appear to vary by industry. The interaction between CB reform and the external finance dependence variable is positive and significant for the overall sample as well as for all three sub-samples. That the effect of CB

reform on employment growth varies by an exogenously constructed technological measure for the industry's demand for external financing provides further evidence that a causal link between financing and subsequent economic growth exists. The relative magnitude of the effect appears much larger among MSMEs and SMEs than the large firms. A t-test for the null hypothesis that the interaction term for the MSME/SME subgroup is equal to the large subgroup is rejected at the 1 percent significance level.

## **V. Conclusion**

There is an extensive literature in corporate finance establishing the link between finance and growth at the macro level (country economic growth and industry growth) and micro level (firm sales growth). However little is known about the link between finance and labor markets. Firms may grow by increasing investment, productivity, and thus output from greater access to finance without ever increasing labor, a case of “jobless growth” that is of particular concern after the global financial crisis of 2008.

Our paper is the first to establish that increased access to finance results in increased job growth in developing countries. We use two complementary data sets – a cross-sectional micro-level data set covering over 50,000 firms across 70 developing countries and a panel micro-level data set covering fewer developing countries but over 4.3 million observations – that allow us to conduct an array of tests to address endogeneity concerns. We find that the link between access to finance and employment growth is robust to using firm fixed effects to control for unobservable firm-level heterogeneity, using the introduction of credit bureaus as an external exogenous shock to the supply of credit in the country, and using propensity score matching to better match the countries that undertake credit bureau reform and those that do not. The effect

of access to finance on employment growth is also shown to be particularly large for firms in industries that are more dependent on external finance. These effects are all economically large as well as statistically significant.

We also find the association between finance and job growth to be stronger among micro, small, and medium firms (MSMEs) than among large firms. In particular, we find that MSMEs and SMEs, which are potentially more financially constrained than large firms given their limited information environment, exhibit higher employment growth with the introduction of credit bureaus than large firms.

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**Table 1: Variable description**

The following table summarizes the definition of each of the variables used in the regression analysis. Refer to Section II.A for more detail.

Variable	Description
<i>Firm-Level Variables</i>	
Employment growth	Annual growth in employment calculated as the increase in employment divided by the average employment over the period. For the Enterprise Survey (ES), this is over a 2 year period. For Orbis, this is a one year period.
Access to loan	Dummy variable. In ES, 1 if the firm reports having access to a loan or line of credit from a financial institution and 0 otherwise. In Orbis, 1 if either the amount of short-term or long-term financial debt is positive and 0 if both short-term and long-term debt are 0.
Growth of finance	Annual growth in short- and long-term debt calculated as the increase divided by the average over the period. Orbis only.
Debt ratio	Ratio of short- plus long-term debt to total assets. Orbis only.
Total asset growth	Annual real growth in total assets calculated as the increase divided by the average over the periods. Orbis only.
Tangible fixed asset growth	Annual real growth in the tangible fixed assets calculated as the increase divided by the average over the period. Orbis only.
Firm size (employees)	Number of permanent full time employees of the firm.
Single establishment	Dummy variable. 1 if a single establishment that is not part of larger firm. ES only.
Manufacturing	Dummy variable. 1 if the firms is in the manufacturing sector.
Exporter	Dummy variable. 1 if 10% or more of sales are exported directly or indirectly by the firm. ES only.
Foreign owned	Dummy variable. 1 if 50% or more of the firm is owned by foreign organizations. ES only.
Government owned	Dummy variable. 1 if 50% or more of the firm is owned by the government. ES only.
Firm age	Number of years since firm began operation. ES only.
<i>Other Variables</i>	
Inflation rate	Inflation, GDP deflator (annual). Source: WDI.
GDP Growth rate	Real GDP Growth rate (annual) Source: WDI.
GDP/capita	GDP per capita (constant 2005 US\$). Source: WDI.
EFD Index	The Rajan and Zingales (1998) external finance dependence index calculated using Compustat data.
Credit bureau reform	Dummy variable. 1 for countries in the years after introduction of CB. 0 for years prior to introduction of CB for the reform countries and for the control group that had no credit bureaus introduced. Source: World Bank Doing Business database.
CB coverage	Number of individual and firms covered by the CB as a percentage of the country's adult population. Source: World Bank Doing Business database.
Regulatory quality	Index that captures perceptions of the ability of the government to formulate and implement sound policies and regulations. Source: World Governance Indicators.

**Table 2: Summary statistics**

The following table provides summary statistics for variables used in the regression analysis. Refer to section II.A for discussion.

Variable	Obs	Mean	Median	SD	Min	Max
<b>ENTERPRISE SURVEY SAMPLE</b>						
<i>Firm-Level Variables</i>						
Employment growth	43790	6.535	2.439	18.346	-50	71.429
Access to loan	52231	0.241	0	0.428	0	1
Firm size (employees)	43790	114.260	25	521.735	5	64000
Single establishment	43790	0.794	1	0.405	0	1
Manufacturing	43790	0.525	1	0.499	0	1
Exporter	43790	0.232	0	0.422	0	1
Foreign owned	43790	0.105	0	0.307	0	1
Government owned	43790	0.067	0	0.251	0	1
Firm age	43790	17.030	12	16.324	1	195
<i>Country-Level Variables</i>						
Inflation rate	43790	0.158	0.093	0.223	-0.238	1.420
GDP growth (annual)	43790	0.053	0.055	0.043	-0.065	0.207
<b>ORBIS SAMPLE</b>						
<i>Firm-Level Variables</i>						
Employment growth	4,376,268	6.997	1.418	28.288	-66.667	93.617
Access to loan	3,491,319	0.374	0	0.484	0	1
Growth of finance	777,010	9.869	4.586	73.915	-200.000	200.000
Debt ratio	3,212,424	6.323	0	12.905	0	61.279
Total asset growth	2,233,959	-0.143	-3.525	34.870	-86.354	112.726
Tangible fixed asset growth	2,233,959	-9.402	-15.226	39.963	-97.459	119.933
Firm size (employees)	4,376,268	98.803	25	853.199	1	330,429
<i>Country-Level Variables</i>						
Inflation rate	4,376,268	12.209	13.593	6.668	-16.705	84.886
GDP growth (annual)	4,376,268	6.148	7.300	6.319	-17.955	33.736

**Table 3: Employment growth and access to loan**

The following regressions estimate equation 1 with robust standard errors clustered at the survey level reported in parentheses. Results in column (1)-(4) are estimates using country and year fixed effects (FE) separately, while (5)-(8) are using survey (country-year variation) FE. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *Access to loan* variable in the respective size categories. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment growth (%)							
Dataset Sample	All firms	MSME firms	SME firms	Large firms	All firms	MSME firms	SME firms	Large firms
Access to loan	3.289*** [0.338]	3.590*** [0.351]	3.060*** [0.356]	1.182** [0.528]	3.227*** [0.316]	3.564*** [0.325]	3.029*** [0.341]	0.926* [0.553]
Log firm size	-2.920*** [0.106]	-3.575*** [0.142]	-1.370*** [0.180]	-0.796*** [0.291]	-2.994*** [0.104]	-3.669*** [0.137]	-1.409*** [0.181]	-0.898*** [0.306]
Single establishment	-3.995*** [0.349]	-4.098*** [0.363]	-3.250*** [0.335]	-2.195*** [0.616]	-3.955*** [0.348]	-4.060*** [0.367]	-3.213*** [0.339]	-2.230*** [0.592]
Manufacturing	0.102 [0.268]	0.413 [0.278]	-0.384 [0.334]	-2.177*** [0.820]	0.085 [0.258]	0.384 [0.260]	-0.428 [0.328]	-1.958** [0.915]
Exporter	2.900*** [0.274]	3.238*** [0.284]	2.503*** [0.294]	-0.221 [0.626]	2.718*** [0.262]	3.061*** [0.266]	2.370*** [0.279]	-0.438 [0.667]
Foreign owned	2.144*** [0.317]	2.243*** [0.337]	2.159*** [0.374]	1.561** [0.638]	2.288*** [0.315]	2.389*** [0.335]	2.316*** [0.376]	1.701** [0.672]
Government owned	0.716 [0.596]	0.379 [0.646]	-1.131* [0.666]	-0.762 [0.610]	0.91 [0.601]	0.568 [0.629]	-1.029 [0.647]	-0.597 [0.656]
Log firm age	-3.235*** [0.188]	-3.336*** [0.199]	-2.917*** [0.226]	-1.795*** [0.357]	-3.168*** [0.190]	-3.272*** [0.202]	-2.835*** [0.229]	-1.588*** [0.366]
Inflation rate	-0.544 [0.853]	-0.319 [0.866]	-0.646 [0.935]	-0.225 [0.653]				
GDP growth rate	18.561*** [7.067]	21.886*** [7.556]	20.594*** [7.649]	-5.283 [7.343]				
Constant	26.752*** [2.676]	28.249*** [2.847]	18.247*** [2.483]	11.224*** [2.582]	33.304*** [0.565]	35.563*** [0.599]	24.294*** [0.896]	9.817*** [2.284]
Observations	52,231	48,254	31,305	3,977	52,231	48,254	31,305	3,977
R-squared	0.114	0.117	0.070	0.080	0.128	0.132	0.086	0.117
Country FE	Yes	Yes	Yes	Yes	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	No	No	No	No
Survey FE	No	No	No	No	Yes	Yes	Yes	Yes
T-Test	MSME = Large 0.000		SME=Large 0.000		MSME = Large 0.000		SME=Large 0.000	
p-value								

**Table 4: Access to loan and credit bureau reform – Enterprise Survey sample**

The following regressions estimate the intermediate effect of CB reform on access to loan using LPM estimation. Robust standard errors clustered at the survey level are reported in parentheses. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *CB reform* variable in the respective size categories. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Dataset Sample	(1) Access to loan			
	Enterprise Survey			
	All firms	MSME firms	SME firms	Large firms
CB reform	0.062** [0.030]	0.061** [0.029]	0.069** [0.034]	0.074 [0.056]
Log firm size	0.050*** [0.004]	0.050*** [0.005]	0.058*** [0.006]	0.037** [0.014]
Single establishment	-0.006 [0.008]	-0.011 [0.009]	-0.011 [0.010]	0.024 [0.023]
Manufacturing	0.012 [0.007]	0.007 [0.007]	0.012 [0.009]	0.076*** [0.022]
Exporter	0.054*** [0.008]	0.053*** [0.008]	0.045*** [0.009]	0.044* [0.024]
Foreign owned	-0.057*** [0.010]	-0.051*** [0.010]	-0.051*** [0.011]	-0.086*** [0.025]
Government owned	-0.100*** [0.017]	-0.094*** [0.018]	-0.094*** [0.019]	-0.121*** [0.023]
Log firm age	-0.003 [0.004]	-0.005 [0.004]	-0.007 [0.005]	-0.006 [0.011]
Inflation rate	-0.118*** [0.037]	-0.125*** [0.038]	-0.136*** [0.040]	-0.050 [0.072]
GDP growth rate	0.110 [0.214]	0.106 [0.236]	0.311 [0.236]	-0.006 [0.345]
Constant	0.256*** [0.030]	0.270*** [0.030]	0.211*** [0.051]	0.194* [0.108]
Observations	33,423	30,668	21,100	2,755
R-squared	0.253	0.244	0.238	0.245
Reform countries	20	20	20	20
Control countries	30	30	30	30
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
T-Test	MSME = Large		SME=Large	
p-value	0.767		0.906	

**Table 5: Employment growth and credit bureau reform – Enterprise Survey sample**

The following regressions estimate equation 2 with robust standard errors clustered at the survey level reported in parentheses. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *CB reform* variable in the respective size categories. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Dataset Sample	All firms	Enterprise Survey			(4)
		(1)	(2)	(3) Employment growth (%)	
CB reform	1.282* [0.711]	1.337* [0.787]	1.791** [0.808]	1.113 [1.005]	
Log firm size	-3.394*** [0.130]	-4.356*** [0.169]	-1.580*** [0.173]	-0.882*** [0.301]	
Single establishment	-3.663*** [0.308]	-3.766*** [0.326]	-3.250*** [0.341]	-2.193*** [0.604]	
Manufacturing	0.241 [0.296]	0.530* [0.290]	0.149 [0.328]	-1.541* [0.833]	
Exporter	2.714*** [0.244]	3.173*** [0.258]	2.601*** [0.271]	-0.776 [0.613]	
Foreign owned	1.953*** [0.340]	2.022*** [0.390]	2.006*** [0.436]	1.939*** [0.662]	
Government owned	-0.291 [0.525]	-0.856 [0.560]	-1.729*** [0.600]	-0.956 [0.682]	
Log firm age	-3.492*** [0.210]	-3.555*** [0.229]	-3.182*** [0.236]	-2.581*** [0.352]	
Inflation rate	-5.161*** [1.671]	-5.212*** [1.908]	-4.712** [1.907]	-3.364** [1.347]	
GDP growth rate	-3.890 [6.033]	-5.045 [6.693]	-9.207 [6.695]	-10.380 [6.723]	
Constant	32.156*** [2.225]	34.823*** [2.372]	21.879*** [2.286]	15.734*** [2.692]	
Observations	43,790	39,801	28,287	3,989	
R-squared	0.137	0.140	0.075	0.094	
Reform countries	20	20	20	20	
Control countries	30	30	30	30	
Country FE	Yes	Yes	Yes	Yes	
Year FE	Yes	Yes	Yes	Yes	
T-Test	MSME = Large			SME=Large	
p-value	0.854			0.588	

**Table 6: Employment growth and credit bureau reform – Orbis sample**

The following regressions estimate equation 2 with robust standard errors clustered at the firm level reported in parentheses. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *CB reform* variable in the respective size categories. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Dataset Sample	(1) (2) (3) (4) Employment growth (%)			
	All firms	MSME firms	SME firms	Large firms
CB reform	5.287*** [0.0620]	5.535*** [0.0647]	4.845*** [0.0730]	0.861*** [0.177]
Log firm size	-26.75*** [0.0741]	-26.75*** [0.0740]	-27.75*** [0.0979]	-26.97*** [0.625]
Inflation rate	0.229*** [0.00817]	0.229*** [0.00857]	0.231*** [0.0104]	0.173*** [0.0244]
GDP growth rate	-0.580*** [0.00521]	-0.588*** [0.00541]	-0.658*** [0.00655]	-0.355*** [0.0170]
Constant	102.3*** [0.263]	97.13*** [0.250]	111.8*** [0.355]	172.1*** [3.857]
Observations	4,376,268	4,074,240	3,076,701	302,028
R-squared	0.472	0.472	0.478	0.444
Reform countries	15	15	15	15
Control countries	14	14	14	14
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
T-Test: Null Hypothesis	MSME = Large		SME=Large	
p-value	0.000		0.000	

**Table 7: Employment growth and CB reform – Robustness**

The following regressions estimate equation 2 and 3 with robust standard errors clustered at the firm level reported in parentheses. Columns (1)-(4) show results from estimating equation (2) using a matched sample. The control countries represent a matched sample using nearest neighbor propensity score matching (with replacement) on change in Regulatory quality, GDP/capita, and real GDP growth rate. Columns (5)-(8) show results from estimating equation (3). Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *CB reform* and *CB reform X Ext Fin Dependence* interaction term, respectively. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment growth (%)							
Dataset	ORBIS							
Sample								
CB reform	4.919*** [0.0628]	5.154*** [0.0657]	4.530*** [0.0736]	0.814*** [0.177]	1.998*** [0.133]	2.145*** [0.143]	1.649*** [0.155]	0.0229 [0.289]
CB reform x EFD					0.548*** [0.0562]	0.585*** [0.0616]	0.540*** [0.0636]	0.337** [0.107]
Log firm size	-26.83*** [0.0755]	-26.82*** [0.0756]	-27.91*** [0.0996]	-27.17*** [0.630]	-30.33*** [0.173]	-30.11*** [0.175]	-32.00*** [0.212]	-32.96*** [0.824]
Inflation rate	-0.613*** [0.00559]	-0.624*** [0.00585]	-0.693*** [0.00696]	-0.356*** [0.0173]	-0.529*** [0.0112]	-0.543*** [0.0120]	-0.566*** [0.0136]	-0.329*** [0.0285]
GDP growth rate	0.0528*** [0.00968]	0.0369*** [0.0103]	0.0716*** [0.0121]	0.189*** [0.0264]	0.225*** [0.0175]	0.214*** [0.0197]	0.265*** [0.0222]	0.243*** [0.0361]
Constant	105.0*** [0.282]	99.87*** [0.271]	114.3*** [0.373]	173.1*** [3.892]	132.5*** [0.726]	122.0*** [0.682]	135.1*** [0.853]	209.7*** [5.152]
Observations	4,245,359	3,945,145	3,009,595	300,214	1,496,106	1,292,034	1,145,890	204,072
R-squared	0.473	0.473	0.479	0.444	0.457	0.456	0.464	0.462
Reform countries	14	14	14	14	15	15	15	15
Control countries	8	8	8	8	14	14	14	14
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T-Test: Null Hypothesis	MSME = Large		SME=Large		MSME = Large		SME=Large	
p-value	0.000		0.000		0.000		0.000	

**Appendix Table A1: Enterprise Survey (ES) country list**

The following table provides the full list of countries in the ES sample. The *Access regression* and *CB regression* columns provide indications for when data availability and methodology allowed the country to be included in the respective sample.

Country	Years	Access regression	CB regression	
			Treatment	Control
Albania	2002, 2005, 2007	X		X
Angola	2006, 2010	X		X
Argentina	2006, 2010	X		
Armenia	2002, 2005, 2009	X		X
Azerbaijan	2002, 2005, 2009, 2013	X		X
Belarus	2002, 2005, 2008, 2013	X		X
Benin	2004, 2009	X		X
Bolivia	2006, 2010	X	X	
Bosnia and Herzegovina	2002, 2005, 2009, 2013	X	X	
Botswana	2006, 2010	X		
Brazil	2003, 2009	X		
Bulgaria	2002, 2005, 2007, 2009, 2013	X	X	
Chile	2004, 2006, 2010	X		
Colombia	2006, 2010	X		
Congo DRC	2006, 2010	X		X
Costa Rica	2005, 2010	X		
Croatia	2002, 2005, 2007, 2013	X	X	
Czech Republic	2002, 2005, 2009	X	X	
Dominican Republic	2005, 2010	X		
Ecuador	2003, 2006, 2010	X	X	
El Salvador	2003, 2006, 2010	X		
Estonia	2002, 2005, 2009	X		
Ethiopia	2002, 2011	X		X
Georgia	2002, 2005, 2008, 2013	X	X	
Guatemala	2003, 2006, 2010	X		
Guyana	2004, 2010	X		X
Honduras	2002, 2005, 2009	X	X	
Hungary	2002, 2005, 2009	X		
Jamaica	2005, 2010	X		X
Kazakhstan	2002, 2005, 2009, 2013	X	X	
Kenya	2003, 2007, 2013	X	X	
Kyrgyzstan	2002, 2003, 2005, 2009, 2013	X	X	
Laos	2009, 2012	X		X
Latvia	2002, 2005, 2009	X		X
Lebanon	2006, 2013	X		X
Lesotho	2003, 2009	X		X
Lithuania	2002, 2004, 2005, 2009	X		X
Macedonia (FYROM)	2002, 2005, 2009, 2013	X		X
Madagascar	2005, 2009	X		X
Malawi	2005, 2009	X		X
Mali	2003, 2007, 2010	X		X
Mauritius	2005, 2009	X		X
Mexico	2006, 2010	X		
Moldova	2002, 2003, 2005, 2009, 2013	X		X
Mongolia	2004, 2009	X		X

Country	Years	Access regression	CB regression	
			Treatment	Control
Nepal	2009, 2013	X		
Nicaragua	2003, 2006, 2010	X	X	
Panama	2006, 2010	X		
Paraguay	2006, 2010	X		
Peru	2002, 2006, 2010	X		
Philippines	2003, 2009	X		
Poland	2002, 2003, 2005, 2009	X	X	
Romania	2002, 2005, 2009	X	X	
Russian Federation	2002, 2005, 2009	X		X
Rwanda	2006, 2011	X		X
Senegal	2003, 2007	X		X
Serbia and Montenegro	2002, 2005, 2009, 2013	X	X	
Slovakia	2002, 2005, 2009	X	X	
Slovenia	2002, 2005, 2009, 2013	X	X	
South Africa	2003, 2007	X		
Sri Lanka	2004, 2011	X		
Tajikistan	2002, 2003, 2005, 2008	X		X
Tanzania	2003, 2006, 2013	X		X
Turkey	2002, 2004, 2005, 2008	X	X	
Uganda	2003, 2006, 2013	X	X	
Ukraine	2002, 2005, 2008, 2013	X	X	
Uruguay	2006, 2010	X		
Uzbekistan	2002, 2003, 2005, 2008	X		X
Vietnam	2005, 2009	X		X
Zambia	2002, 2007	X		X

**Appendix Table A2: Orbis country list**

The following table provides the full list of countries in the Orbis sample. The *Access regression* and *CB regression* columns provide indications for when data availability and methodology allowed the country to be included in the respective sample.

Country	Years	Access regression	CB regression	
			Treatment	Control
Algeria	2005-2011			X
Angola	2005-2011			X
Belarus	2005-2011			X
Bolivia	2005-2011	X	X	
Bosnia and Herzegovina	2005-2011	X		
Brazil	2005-2011	X		
Bulgaria	2005-2011	X	X	
China	2005-2011	X		X
Colombia	2005-2011	X		
Ecuador	2005-2011		X	
Egypt	2005-2011		X	
Gabon	2005-2011			X
Ghana	2005-2011			X
India	2005-2011	X	X	
Indonesia	2005-2011	X		X
Jordan	2005-2011	X		X
Kazakhstan	2005-2011	X	X	
Kenya	2005-2011		X	
Latvia	2005-2011	X		X
Lithuania	2005-2011	X	X	
Macedonia (FYROM)	2005-2011			X
Malaysia	2005-2011	X		
Mexico	2005-2011	X		
Montenegro	2005-2011	X		X
Morocco	2005-2011		X	
Nicaragua	2005-2011		X	
Nigeria	2005-2011	X	X	
Pakistan	2005-2011	X		
Philippines	2005-2011	X		
Romania	2005-2011		X	
Russian Federation	2005-2011	X	X	
Serbia	2005-2011	X	X	
South Africa	2005-2011	X		
Sri Lanka	2005-2011	X		
Tunisia	2005-2011			X
Turkey	2005-2011	X		
Ukraine	2005-2011	X		X
Venezuela	2005-2011			X
Vietnam	2005-2011	X		X

**Appendix Table A3: Employment growth and firm financing – ORBIS sample**

The following regressions estimate a variation of equation 1 with robust standard errors clustered at the firm level reported in parentheses. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the financing variables in the respective size categories. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Employment growth (%)											
Dataset	ORBIS											
	Sample	All firms	MSME firms	SME firms	Large firms	All firms	MSME firms	SME firms	Large firms	All firms	MSME firms	SME firms
Access to loan	1.040*** [0.0622]	1.122*** [0.0660]	1.181*** [0.0685]	0.258 [0.163]								
Growth of financing					0.011*** [0.0004]	0.012*** [0.0005]	0.012*** [0.0005]	0.001 [0.0008]				
Debt ratio									0.028*** [0.002]	0.031*** [0.003]	0.0340** [0.003]	0.0183** [0.006]
Log firm size	-28.28*** [0.0817]	-28.22*** [0.0814]	-29.78*** [0.104]	-31.7*** [0.825]	-32.0*** [0.245]	-32.65*** [0.250]	-32.9*** [0.291]	-24.7*** [1.225]	-29.19*** [0.0871]	-29.10*** [0.0874]	-30.79*** [0.112]	-33.90*** [0.814]
Inflation rate	-0.579*** [0.00611]	-0.598*** [0.00632]	-0.592*** [0.00702]	-0.29*** [0.0187]	-0.52*** [0.0116]	-0.566*** [0.0124]	-0.56*** [0.0129]	-0.34*** [0.0278]	-0.588*** [0.00638]	-0.607*** [0.00661]	-0.600*** [0.00732]	-0.29*** [0.0196]
GDP growth rate	0.598*** [0.00591]	0.634*** [0.00635]	0.657*** [0.00686]	0.198*** [0.0160]	0.441*** [0.0133]	0.454*** [0.0154]	0.514*** [0.0161]	0.258*** [0.0248]	0.580*** [0.00616]	0.616*** [0.00663]	0.643*** [0.00716]	0.197*** [0.0166]
Constant	110.4*** [0.301]	104.1*** [0.283]	116.8*** [0.378]	201.6*** [5.097]	131.7*** [0.901]	123.1*** [0.824]	131.6*** [1.011]	161.4*** [7.688]	114.1*** [0.321]	107.3*** [0.304]	120.7*** [0.406]	215.3*** [5.041]
Observations	3,491,319	3,209,958	2,631,348	281,361	777,010	678,891	585,717	98,119	3,212,424	2,946,899	2,427,282	265,525
R-squared	0.512	0.512	0.510	0.462	0.533	0.533	0.528	0.477	0.517	0.517	0.516	0.473
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T-Test	MSME = Large		SME=Large		MSME = Large		SME=Large		MSME = Large		SME=Large	
p-value	0.000		0.000		0.000		0.000		0.000		0.000	

**Appendix Table A4: Employment growth and credit bureau coverage**

The following regressions estimate a variation of equation 2 with robust standard errors clustered at the survey level (ES) or the firm level (Orbis) reported in parentheses. Results in column (1)-(4) are estimates from the ES, while (5)-(8) are over the Orbis sample. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *CB reform x CB coverage* interaction term in the respective size categories \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Employment growth (%)							
Dataset Sample	All firms	MSME firms	SME firms	Large firms	ORBIS			
CB reform x CB Coverage	0.053*** [0.018]	0.057*** [0.019]	0.067*** [0.020]	0.009 [0.029]	0.155*** [0.00268]	0.160*** [0.00278]	0.159*** [0.00311]	0.0325*** [0.00823]
Log firm size	-3.319*** [0.130]	-4.273*** [0.175]	-1.525*** [0.178]	-0.783** [0.323]	-26.77*** [0.0740]	-26.77*** [0.0740]	-27.74*** [0.0978]	-26.98*** [0.625]
Single establishment	-3.740*** [0.326]	-3.900*** [0.345]	-3.439*** [0.357]	-1.924*** [0.627]				
Manufacturing	0.141 [0.306]	0.460 [0.303]	0.127 [0.342]	-1.557* [0.881]				
Exporter	2.755*** [0.251]	3.205*** [0.269]	2.611*** [0.286]	-0.884 [0.629]				
Foreign owned	1.740*** [0.348]	1.767*** [0.404]	1.748*** [0.463]	1.928*** [0.699]				
Government owned	-0.316 [0.548]	-0.944 [0.581]	-1.810*** [0.617]	-0.871 [0.725]				
Log firm age	-3.495*** [0.218]	-3.532*** [0.238]	-3.143*** [0.242]	-2.685*** [0.370]				
Inflation rate	-5.013*** [1.753]	-5.115** [1.991]	-4.935** [1.991]	-3.578** [1.420]	-0.559*** [0.00531]	-0.563*** [0.00552]	-0.635*** [0.00664]	-0.356*** [0.0168]
GDP growth rate	-1.500 [6.105]	-2.063 [6.687]	-5.954 [6.459]	-13.032* [7.178]	0.220*** [0.00819]	0.222*** [0.00859]	0.224*** [0.0104]	0.166*** [0.0246]
Constant	31.754*** [2.233]	34.366*** [2.370]	21.577*** [2.242]	15.349*** [2.819]	101.9*** [0.263]	96.65*** [0.250]	111.2*** [0.354]	172.1*** [3.857]
Observations	40,393	36,711	26,270	3,682	4,376,268	4,074,240	3,076,701	302,028
R-squared	0.135	0.138	0.075	0.093	0.471	0.471	0.477	0.444
Reform countries	16	16	16	16	15	15	15	15
Control countries	30	30	30	30	14	14	14	14
Firm FE	No	No	No	No	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T-Test: Null Hypothesis	MSME = Large		SME=Large		MSME = Large		SME=Large	
p-value	0.089		0.082		0.000		0.000	

### Appendix Table A5 – Asset growth and CB reform

The following regressions estimate a variation of equation 2 with robust standard errors clustered at the firm level reported in parentheses. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *CB reform* variable in the respective size categories. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total asset growth (%)				Tangible fixed asset growth (%)			
Dataset	ORBIS				ORBIS			
Sample	All firms	MSME firms	SME firms	Large firms	All firms	MSME firms	SME firms	Large firms
CB reform	15.66*** [0.105]	15.92*** [0.109]	15.32*** [0.127]	11.68*** [0.394]	17.78*** [0.126]	18.07*** [0.130]	16.95*** [0.153]	12.82*** [0.459]
Log firm size	-7.810*** [0.0778]	-7.805*** [0.0789]	-8.383*** [0.0953]	-7.087*** [0.508]	-5.937*** [0.0852]	-5.877*** [0.0866]	-6.363*** [0.105]	-6.816*** [0.529]
GDP growth rate	0.319*** [0.0142]	0.309*** [0.0150]	0.229*** [0.0172]	0.257*** [0.0414]	0.394*** [0.0165]	0.370*** [0.0175]	0.321*** [0.0202]	0.494*** [0.0458]
Inflation rate	0.287*** [0.00816]	0.280*** [0.00849]	0.249*** [0.00993]	0.383*** [0.0288]	0.460*** [0.00982]	0.452*** [0.0102]	0.415*** [0.0120]	0.566*** [0.0327]
Constant	16.08*** [0.322]	14.99*** [0.320]	21.06*** [0.404]	33.30*** [3.223]	-0.0558 [0.364]	-1.141** [0.364]	4.410*** [0.457]	24.92*** [3.375]
Observations	2,233,959	2,112,801	1,568,258	121,158	2,233,959	2,112,801	1,568,258	121,158
R-squared	0.400	0.399	0.402	0.418	0.401	0.400	0.404	0.417
Reform countries	10	10	10	10	10	10	10	10
Control countries	6	6	6	6	6	6	6	6
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T-Test: Null Hypothesis	MSME = Large 0.000				SME=Large 0.000			
p-value					MSME = Large 0.000			
					SME=Large 0.000			

**Appendix Table A6: Employment growth and credit bureau reform – manufacturing firms only**

The following regressions estimate equation 2 with robust standard errors clustered at the firm level reported in parentheses. Refer to Table 1 for variable definitions. The t-test is under the null hypothesis of the equality of the estimate for the *CB reform* variable in the respective size categories \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

	(1)	(2)	(3)	(4)
	Employment growth (%)			
Dataset	ORBIS			
Sample	All firms	MSME firms	SME firms	Large firms
CB reform	1.973*** [0.133]	2.102*** [0.143]	1.622*** [0.155]	0.109 [0.287]
Log firm size	-30.32*** [0.173]	-30.09*** [0.175]	-31.99*** [0.212]	-32.96*** [0.824]
Inflation rate	-0.528*** [0.0112]	-0.542*** [0.0120]	-0.566*** [0.0136]	-0.327*** [0.0285]
GDP growth rate	0.224*** [0.0175]	0.213*** [0.0197]	0.264*** [0.0222]	0.245*** [0.0361]
Constant	132.5*** [0.726]	122.0*** [0.682]	135.1*** [0.853]	209.7*** [5.153]
Observations	1,496,106	1,292,034	1,145,890	204,072
R-squared	0.457	0.456	0.464	0.462
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
T-Test: Null Hypothesis	MSME = Large			SME=Large
p-value	0.000			0.000