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# Banking System Concentration and Unemployment in Developing Countries

**Horst Feldmann , University of Bath**

**Abstract.** This paper studies the effect of banking system concentration on unemployment in developing countries. Using data on 42 developing countries, it finds that more concentration increased unemployment over the period 1987 to 2007. The magnitude of the effect is substantial. The result is robust to both endogeneity of the bank concentration variable and numerous variations in specification. It is important because many developing countries are characterized by high levels of both banking system concentration and unemployment.

**JEL classification:** E24, G21, J64, L16

**Keywords:** banking system concentration, labor market performance, unemployment

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## 1. Introduction

There is ample empirical evidence suggesting that banking system concentration affects both the efficiency of financial intermediation and the performance of nonfinancial industries. In a recent paper, we report that it impacts on labor market performance too (Feldmann 2013). The latter paper is the first to study the impact of banking system concentration on the labor market. It uses a sample of industrial countries. By contrast, this paper studies the impact on unemployment in developing rather than industrial countries.[1] The topic is important because many developing countries have been experiencing high levels of both bank concentration and unemployment for many years.

The following section reviews previous research, indicating how the effects of bank concentration on financial intermediation and the performance of nonfinancial industries might lead to knock-on effects on unemployment. Section 3 explains our variable of interest and our control variables. Section 4 describes the dependent variable, sample and methodology. Section 5 presents and discusses our regression results. Section 6 concludes.

## 2. Previous research and possible transmission channels

From a theoretical perspective, higher banking system concentration can have either adverse or favorable effects on financial intermediation and unemployment. According to the structure-conduct-performance hypothesis, a higher level of concentration leads to higher loan rates, higher

[1] Our two papers differ from each other in more respects than country sample. Specifically, the present paper also provides a much more comprehensive survey of the previous literature. Furthermore, in its empirical part it reports the results from more robustness checks. Finally, it more thoroughly examines possible channels through which bank concentration might affect labor market performance.



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interest margins and a restricted supply of loans because of lessened competition and lower costs of collusion (e.g., Smith 1998, Guzman 2000). This could reduce investment, economic growth and job creation, which is likely to increase unemployment, particularly if wages are sticky downwards.

By contrast, according to the efficient structure hypothesis, a more concentrated banking industry can be the result of more efficient banks gaining larger market shares (e.g., Demsetz 1973, Peltzman 1977). According to this hypothesis, the higher efficiency of financial intermediation has favorable knock-on effects on loan rates and firms' access to finance. In a similar vein, Petersen and Rajan (1995) argue that, if credit markets are concentrated, banks have more incentives to forge and maintain long-term relationships with younger firms. Since they can obtain future surpluses from these firms, they initially charge modest loan rates, enabling more firms to be started and financed. This in turn can foster job creation, investment and economic growth. Consequently, a more concentrated banking industry may result in lower rather than higher unemployment.

Let us now look at previous empirical papers on the effects of bank concentration, starting with those studying the effects on the cost of financial intermediation (interest rate margins, bank profitability, etc.).[2] While most of these papers cover industrial countries, several more recent ones cover developing countries. Industrial countries first. Using data from the 1980s on about 4,800 US banks, Berger (1995) empirically tests two versions each of the structure-conduct-performance and the efficient structure hypotheses. He finds that, while the data lend limited support to one version of each hypothesis, none of the four versions are of great importance in explaining bank profits. Using US state-level data for the period 1976 to 2000, Jeon and Miller (2005) find that increased bank concentration leads (causes) increased bank profitability, supporting the structure-conduct-performance, rather than the efficient structure, hypothesis. Another study on the US, using

[2] Our overview of empirical research focusses on more recent studies. For surveys of the older literature, see Berger et al. (2004) and OECD (2008).

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quarterly bank-level data on 644 banks from 1994 to 2005, also finds a positive and highly significant relationship between concentration and profitability (Tregenna 2009). Using UK data over 1996 to 2002, Hanley et al. (2006) find that lenders with the largest market share in SME finance charged significantly higher interest premia, suggesting market power effects. Using a large sample of small Norwegian firms from 2000-01, Kim et al. (2012) find a positive and significant effect of banking concentration on the mark-ups for older, but not for younger, firms. Corvoisier and Gropp (2002) use country-level data on ten EU countries over 1991-99, finding that increased concentration may have led to collusion and higher interest margins of banks for both loans and demand deposits, which again supports the structure-conduct-performance hypothesis. Using data on 183 banks from the EU-15 countries for 1997 to 2004, De Jonghe and Vennet (2008) find that banks with a large market share in a concentrated market were able to generate non-competitive rents.

Most studies on developing countries also suggest that higher bank concentration increases the cost of financial intermediation. For example, using bank-level data Sufian (2011) finds that concentration significantly raised banks' profitability in South Korea over the period 1992 to 2003.[3] Using quarterly data over 2001 to 2006, Aboagye et al. (2008) find that increases in bank concentration substantially increased net interest margins in Ghana. Using monthly data for the Columbian banking system from 1997 to 2006, Tovar et al. (2011) find that high market concentration increased interest rates' mark-ups when the system was under stress. Based on quarterly bank-level data from five Latin American countries over 1995 to 2001, Martinez Peria and Mody (2004) find that bank concentration raised both spreads and administrative costs. Whereas these three studies support the structure-conduct-performance hypothesis, the following two tend to support the efficient structure hypothesis. First, using data on 186 banks from ten central and eastern European countries over the period 1998 to 2003, Koutsomanoli-Filippaki et al. (2009) find

[3] According to World Bank classification, South Korea was as a developing country up to 2000 (except for 1995-97).



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that banks in more concentrated markets were more efficient provided the degree of competition was sufficiently high. Second, using bank-level data from ten Middle East and North African countries, Ben Naceur and Omran (2011) find higher bank concentration to have reduced both net interest margins and return on assets over the period 1989 to 2005.

Two other studies cover both industrial and developing countries. The first of these, which uses bank-level data for 80 countries in the years 1988-95, finds that bank concentration increased bank profitability (Demirgüç-Kunt and Huizinga 1999). The second, which uses data on over 1,400 banks across 72 countries from the 1995-99 period, finds that while concentration is positively associated with net interest margins, this relationship breaks down when controlling for inflation and regulatory impediments to competition (Demirgüç-Kunt et al. 2004).

Thus, while the results are somewhat mixed, most studies suggest that bank concentration raises the cost of financial intermediation. As noted previously, this effect could lead to increased unemployment by reducing investment and job creation.

The results of empirical papers studying the effect of bank concentration on credit availability are more mixed. Interestingly, most papers on industrial countries find a favorable rather than an adverse effect. For example, using a large sample of small US firms over 1988-89, Petersen and Rajan (1995) find firms in more concentrated credit markets to have somewhat easier access to bank credit. Similarly, according to Saeed and Esposito (2012) bank concentration relaxed financial constraints on firm-level investment in the UK over 2001-09. Using data on 14 European countries between 1992 and 2005, Ratti et al. (2008) find that with a highly concentrated banking sector firms were less financially constrained.

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In contrast to the industrial countries papers, most papers on developing countries find an adverse effect on credit availability. For example, de Castro Almeida and Jayme (2008) report that the process of consolidation in the Brazilian banking sector in the period 1995-2004 adversely affected lending, mainly in the less developed regions of the country. Similarly, using data on 302 Indian manufacturing firms for the period 2000-09, Saeed and Vincent (2012) find that bank concentration tightened firms' financial constraints on investment, the effect being more pronounced for small firms and firms dependent on short-term debt.

Three papers use data from both industrial and developing countries. One of them, Olivero et al. (2011), which uses bank-level data from 18 Asian and Latin American economies (except for two Asian countries all being developing countries), reports that, between 1996 and 2006, the bank lending channel of monetary policy was weakened as concentration in banking increased. Another one, González and González (2008), uses firm-level data from 39 mostly industrial countries and finds that bank market concentration expanded firms' access to long-term debt in the 1995 to 2004 period. The third, Beck et al. (2004), uses firm-level data from 74 countries from the late 1990s and finds that bank concentration increased financial obstacles, with the effect being the largest for small firms. Additionally, it finds that the relationship holds for low-income countries only.

Thus, as far as credit availability is concerned, whereas most studies on industrial countries corroborate the efficient structure hypothesis, most studies on developing countries, and most of those covering both types of countries, corroborate the structure-conduct-performance hypothesis. Stronger (weaker) credit constraints are likely to increase (reduce) unemployment because they adversely (favorably) affect investment, probably lowering job creation and labor demand.

There is also empirical research on the effects of bank concentration on business formation and growth. This research, too, yields mixed results. Take the following three studies on the US. Using

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data from the 1969-76 period, Jackson and Thomas (1995) find that, in general, local bank concentration had a positive effect on firm creation. They also find that, whereas bank concentration had a positive effect on job growth in new firms, it was negatively associated with job growth in mature firms. By contrast, using US state-level data from 1976-94, Black and Strahan (2002) report that states with more concentrated local banking markets had lower rates of business incorporation and that the introduction of interstate banking increased the rate of incorporations. Similarly, using data on nine US regions and 20 manufacturing sectors from 1977-88, Cetorelli (2003) finds that more bank concentration implied less entry and lower rates of job creation of younger firms, as well as higher job creation rates and delayed exit of older firms.

In a paper covering 28 OECD countries, Cetorelli (2004) reports results similar to his US study. Specifically, using data on 27 manufacturing sectors from the 1980s and 1990s, he finds that sectors where incumbent firms were more dependent on external finance had a disproportionately larger average size if they were in countries with a more concentrated banking industry – evidence that seems to imply that bank concentration may represent a barrier to entry in non-financial industries. Also studying a cross section of OECD countries (with data from 27 industries and the period 1970-95), Carlin and Mayer (2003) find that higher bank concentration was associated with lower growth of equity-financed and skill-intensive industries.

While, in this area, there are no papers yet on developing countries, several papers use data from both industrial and developing countries. Using industry-level data for 41 countries and the 1980s and 1990s, Cetorelli and Gambera (2001) show that, while the overall effect on industry growth was negative, bank concentration promoted the growth of industries that relied heavily on external finance by facilitating credit access to younger firms. By contrast, also using data on 41 industrial and developing countries from the 1980s and 1990s, Claessens and Laeven (2005) find no evidence that banking system concentration explains industrial sector growth. More in line with Cetorelli and

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Gambera (2001), Fernández et al. (2010), who use data on 84 countries over 1980-2004, report that bank concentration generally had a negative effect on economic growth.

All in all, the papers studying the effects on start-up activity and growth neither favor the structure-conduct-performance hypothesis over the efficient structure hypothesis (or vice versa) nor do they lead one to unequivocally expect that higher bank concentration adversely (or favorably) affects unemployment through this channel.

Finally, researchers have studied the effects of bank concentration on bank failure and systemic banking crises. For example, using a cross-sectional sample of about 2,500 US banks in 2003 and a panel dataset of about 2,600 banks in 134 developing countries for 1993-2004, Boyd et al. (2006) find that banks' probability of failure is positively related to concentration. Using bank-level data on 133 developing countries over the same period, De Nicolò and Loukoianova (2007) find that this positive relationship is strongest when state-owned banks have sizeable market shares. By contrast, using data on 69 industrial and developing countries from 1980 to 1997, Beck et al. (2006, 2007) find that systemic banking crises are less likely in economies with more concentrated banking systems. Using data on 79 countries and 50 episodes of banking crises over the same period, Evrensel (2008) also finds that bank concentration tends to reduce the risk of bank failure and banking crises. However, she also notes that developing countries have both higher concentration and higher risks of bank failure and banking crises. Taken together, the results from this line of research are inconclusive. While one can expect more bank failures and banking crises to increase unemployment, previous research does not unambiguously suggest that higher concentration is likely to either increase or decrease unemployment through this channel. In fact, the results from previous research are inconclusive with regards not only to this channel but to all other channels as well. For each of these channels it is unclear what to expect from higher concentration – an adverse

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or a favorable effect on unemployment. Thus the issue of how bank concentration affects unemployment needs to be resolved empirically.

In our paper studying the effects on labor market performance in industrial countries, we use data on 21 countries from the period 1987 to 2009 (Feldmann 2013). We find that a more concentrated banking sector both increased the unemployment rate and reduced the employment rate over the sample period, with the magnitude of both effects being moderate.

## 3. Variable of interest and control variables

In line with many previous papers, our 'bank concentration' variable equals the share of assets of the three largest banks in total banking system assets, excluding the central bank (for definitions, descriptive statistics and sources of all variables, see Table 1). There is substantial variation in our measure, with concentration levels ranging from 0.20 to 1.00, with a sample mean of 0.57 and a standard deviation of 0.17.

We use five control variables measuring various characteristics of the financial system. For example, we control for the impact of banking system activity using the 'bank credit' variable. It measures one of the main activities of banks: providing loans. In two of our supplementary regressions, we use a measure of the banking sector's size rather than of its activity: 'bank deposits'. As bank lending is more likely than banking sector size to matter for unemployment and as there is a marked degree of correlation between both variables, we prefer 'bank credit' to 'bank deposits'. In one of our robustness checks, we add the 'stock market activity' variable. The purpose of including these three controls is to ensure that our 'bank concentration' variable does not proxy for the activity or size of the banking industry, or for financial sector development more generally.



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For example, countries with a larger banking industry, relative to the size of the economy, may have a lower bank concentration ratio.

For two reasons, we also control for the impact of credit market regulation. First, several theoretical and empirical studies suggest that tighter regulation may increase unemployment (e.g., Acemoglu 2001, Feldmann 2006, 2012a). Second, as the strictness of credit market regulation may affect bank concentration levels we need to ensure that 'bank concentration' does not proxy for the former.

Furthermore, we control for the impact of systemic banking crises. As the recent global financial crises has illustrated, systemic banking crises can substantially raise unemployment. A second reason to include this control variable is that, according to previous research, banking system concentration may affect the likelihood of such crises (section 2). Thus we need to ensure that 'bank concentration' does not proxy for systemic banking crises. However, in our sample there is no evidence that any of our five financial sector control variables is correlated with 'bank concentration'. Rather, the correlation coefficient between this variable, on the one hand, and each of these five controls, on the other, is small in absolute size and statistically insignificant.

We also control for the impact of major labor market institutions. Specifically, we control for centralization of collective bargaining, minimum wage, employment protection legislation, unemployment benefits, and income and payroll taxes.[4] Mainstream labor economics theory

[4] Our tax variable is based on the top marginal income and payroll tax rate and on the income threshold at which the top marginal income tax rate applies. The labor tax wedge would have been a preferable indicator. However, data on this indicator are available for industrial countries only. Our 'income and payroll tax rate' variable can be regarded as a proxy for the labor tax wedge because countries with a large (small) tax wedge usually also have a high (low) top marginal income and payroll tax rate and a low (high) income threshold at which the top marginal income tax rate applies. Indeed, using data from a sample of 21 industrial countries, we find both variables to be highly correlated.



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suggests that more rigid institutions normally increase unemployment. For example, centralized collective bargaining is likely to strengthen trade union power, leading to excessive wage hikes and a compressed wage structure, both of which in turn raise unemployment (McHugh 2002). In a competitive labor market, a higher, binding minimum wage reduces labor demand and increases labor supply, also raising unemployment (Boeri and van Ours 2008). Higher labor taxes increase unemployment because they raise employers' wage cost and lower workers' net wages. More generous unemployment benefits raise unemployment by reducing the job-search intensity of the unemployed and their willingness to accept job offers. By lowering the economic cost of unemployment, they may also put upward pressure on workers' wage claims, further raising unemployment. The effect of stricter employment protection legislation is ambiguous from a theoretical point of view because it leads firms to reduce both hiring and dismissal rates (Bertola 1990). Numerous empirical studies confirm that stricter labor market institutions tend to increase unemployment (e.g., Heckman and Pagés 2004, Nickell et al. 2005, Bassanini and Duval 2006, Feldmann 2009).

Furthermore, we control for the impact of the real interest rate because a rise in the real interest rate reduces investment and labor demand, raising unemployment. Indeed, there is empirical evidence for both industrial and developing countries that a higher real interest rate increases unemployment (e.g., Fitoussi et al. 2000, Feldmann 2012b).

We also control for the impact of inflation. High inflation rates distort price signals and relative prices, hampering an efficient allocation of resources. Furthermore, as profits are mostly taxed on a nominal basis, enterprises' real net return on investment decreases in an inflationary environment so that investment and economic growth are likely to decline in the long term. Both effects may lead to higher unemployment. Alternatively, if nominal wages are downward rigid, inflation may, upon the occurrence of shocks, facilitate the adjustment of real wages, reducing unemployment. Indeed, there



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is evidence for a permanent trade-off between inflation and unemployment at modest inflation rates in the United States (Akerlof et al. 1996, 2000, Groshen and Schweitzer 1999) and other industrial countries (Wyplosz 2001). Similarly, using data on a large sample of industrial and developing countries, Feldmann (2010) finds more inflation to be correlated with less unemployment.

We additionally control for the impact of trade openness. On the one hand, more openness to trade may lead to a more efficient international allocation of labor, lowering unemployment (Grossman and Rossi-Hansberg 2008, Felbermayr et al. 2011). On the other hand, due to more intense import competition, it may increase unemployment, at least during a transition period.

Because unemployment is strongly affected by cyclical conditions, we employ the 'output gap' variable throughout. For two reasons, we also use 'GDP per capita' in all regressions. First, to account for the huge differences in economic development and its potential impact on unemployment. Second, to ensure that 'bank concentration' does not proxy for the level of economic development. The latter may be important because the degree of banking system concentration may be systematically linked to the level of economic development. However, in our sample, the correlation coefficient between both variables is close to nil and statistically insignificant.

We also use a dummy variable for wars because they have a variety of effects on the labor market. For example, interstate wars are likely to decrease unemployment because of military draft and the need to step up the production of military equipment. On the other hand, both interstate and civil wars disrupt non-military production, which could increase unemployment. In one robustness check, we additionally control for the impact of ethnic tensions. In a previous paper, we reported that ethnic fractionalization increased unemployment in a large sample of industrial and developing

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countries, suggesting that this may be because fractionalization reduces labor market efficiency (Feldmann 2012c).

In another check, we additionally control for the impact of product market regulation. Theoretical studies argue that anticompetitive product market regulations (e.g., entry restrictions, price controls) will generally reduce equilibrium output and labor demand, increasing unemployment (e.g., Blanchard and Giavazzi 2003; Pissarides 2003). Indeed, several empirical studies find evidence for such an adverse labor market effect (e.g., Bassanini and Duval 2006, Feldmann 2012d).

In a further robustness check, we additionally control for the impact of legal restrictions on both international trade and international capital movements. Fewer restrictions of international trade can have the same opposing effects as trade openness.[5] On the one hand, they may increase the efficiency of cross-country labor allocation, reducing unemployment. On the other hand, they may trigger job losses due to increased import competition. Fewer restrictions of cross-border financial transactions are likely to improve the efficient allocation of resources and attract FDI inflows, reducing unemployment. However, they may also lead to erratic capital movements such as speculative in- and outflows or sudden stops, increasing unemployment.

In another robustness check, we additionally control for the impact of FDI, both net inflows and net outflows. Whereas net inflows are generally expected to reduce unemployment, net outflows can have either a positive or a negative effect (e.g., Blomström et al. 1997, Lipsey et al. 2010).

In a final robustness check, we additionally use two demography variables, measuring the share of young and old people in the population, respectively. These shares vary widely in our sample. A

[5] Although 'openness' and 'regulation of international trade' are negatively correlated (-0.53), the absolute value of the correlation coefficient is not high, indicating that they capture different aspects of international trade.

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high share of either young or old people may increase unemployment because both groups usually have more difficulties finding a job.

The variables exclusively used in some robustness checks are not included in the baseline specification either because doing so would markedly reduce the number of countries and observations or because they are not normally considered in cross-country unemployment regressions.

In several supplementary regressions, we explore possible channels through which banking system concentration may affect unemployment. In two of these, we additionally include 'net interest margin' and 'bank overhead costs', respectively. As some previous studies indicate that bank concentration affects the cost of financial intermediation, the intention here is to check whether bank concentration affects unemployment through this transmission channel.

## 4. Dependent variable, sample and methodology

Most of our unemployment data are from the ILO's (2009) *Key Indicators of the Labour Market*. They are based on labor force surveys and thus do not refer to registered unemployment. Instead they are based on an international standard that defines the unemployed as all persons above a specific age who, during the reference period, were without work, currently available for work and seeking work. Although national coverage of unemployment can vary with regard to factors such as age limits and criteria for seeking work, the ILO has undertaken great efforts to produce series that are comparable across countries. With regard to age limits, for example, almost all national series presented in this publication refer to the age group 15 years and older. Furthermore, the ILO has 'cleaned' all national time series to eliminate breaks in series. Thus these data are comparable over

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time. Although the ILO's unemployment data are not completely harmonized across countries, they are harmonized to a large extent.

Our sample consists of 42 developing countries (Appendix). Developing countries are defined as low and middle income countries according to World Bank classification. We use annual data from 1987 to 2007. Data for more countries and years are unavailable for some of our variables. For example, data on 'bank concentration' are available only from the late 1980s onwards. In general, with respect to both countries and years the sample size is determined by data availability only.

We run two-stage least squares regressions of the following form:

Second stage:

$$U_{i,t} = \beta_1 B_{i,t} + \beta_2 \boldsymbol{X}_{i,t} + \alpha_i + \lambda_t + \varepsilon_{i,t} \quad (1)$$

First stage:

$$B_{i,t} = \sum_{s=1}^{2} \beta_3 \left(B_{i,t-s} - B_{i,t-s-1}\right) + \beta_4 \boldsymbol{X}_{i,t} + \gamma_i + \kappa_t + \eta_{i,t} \quad (2)$$

$U_{i,t}$ is the unemployment rate of country $i$ at year $t$, $B$ denotes the 'bank concentration' variable and $\boldsymbol{X}$ is a vector of our control variables. Country fixed effects in the second- and first-stage regressions are $\alpha_i$ and $\gamma_i$, respectively. Year fixed effects are $\lambda_t$ and $\kappa_t$, respectively, while the error terms are $\varepsilon_{i,t}$ and $\eta_{i,t}$, respectively. While country fixed effects are included to control for the impact of unobserved country-specific characteristics, year effects are included to control for the impact of shocks that are common across countries.

We instrument our 'bank concentration' variable to extract its exogenous component. The instruments are lagged differences of the instrumented variable covering the previous three years. Lagged differences of the instrumented variable have been shown to be valid instruments, provided



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they pass a test for over-identifying restrictions and are sufficiently strong.[6] To test for over-identifying restrictions, we use Hansen's (1982) *J* test. We also report the first-stage *F* statistic because Staiger and Stock (1997) proposed the rule of thumb that this statistic should take on a value of at least ten; otherwise the instruments are weak. According to the results from Hansen's *J* test and the first-stage *F* statistic, our instruments are both exogenous and relevant, and thus valid (Tables 2 and 3).

To check whether random effects yield similar point estimates, we perform a further robustness check using random rather than fixed country effects. Random effects estimates have the advantage of exploiting both the cross-country and the time-series variation within the sample. By contrast, fixed effects estimates only use the time-series variation. We do not use the random effects estimator in our baseline specification because only "conventional" standard errors are available for this estimator in two-stage least-squares panel data estimation. Thus, in contrast to our fixed effects regressions, the standard errors from our random effects regressions are neither robust nor adjusted for clusters at the country level.

Our two-stage least squares methodology has the crucial advantage of tackling potential endogeneity of our variable of interest. Thus our estimates establish the causal effect of bank concentration on unemployment. Note, however, that this methodology does not enable us to

[6] This insight comes from, inter alia, research into GMM estimation (Arellano and Bover 1995, Blundell and Bond 1998). The latter is not an option in our case because it requires the number of cross sections to be much larger than the number of time periods as otherwise the estimates can be severely biased and imprecise (Roodman 2009a, 2009b). Thus we follow Roodman's (2009b) advice to use a fixed effects estimator instead.



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simultaneously account for potential endogeneity of all explanatory variables, some of which, such as inflation rate, real interest rate and output gap, are clearly endogenous.[7]

## 5. Results

Table 2 presents our main results. While column 1 reports the results from our baseline regression, the other columns report the results from our robustness checks. The coefficient on 'bank concentration' is statistically significant in each regression. According to our estimates, higher banking system concentration increases the unemployment rate. In all robustness checks except one, the size of the coefficient is similar to the estimate from the baseline regression. In regression 5 it is somewhat higher.

Our results suggest that, over our sample period, the effect of banking system concentration on unemployment was substantial. Specifically, a one standard deviation increase in the 'bank concentration' variable is associated with an increase in the unemployment rate of between 1.3 and 1.5 percentage points, ceteris paribus. These figures are based on, respectively, the smallest and the largest coefficient on 'bank concentration' from the regressions presented in Table 2.

Comparing two countries also suggests that differences in banking system concentration might have had a substantial impact on unemployment. For example, over our sample period Pakistan had both a relatively low level of bank concentration and a relatively low unemployment rate whereas in the Philippines both bank concentration and unemployment were much higher. Specifically, the share

[7] A commonly used methodology to simultaneously tackle endogeneity of all explanatory variables is GMM. However, as mentioned in the previous footnote, this methodology is not applicable here because our dataset does not meet the GMM requirement of large *N*, small *T*.



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of the three largest banks averaged 60% in Pakistan and 79% in the Philippines, while the average unemployment rate was 6.4% in the former and 9.7% in the latter country. According to our estimates, if bank concentration in the Philippines had been as low as in Pakistan, the Philippines' unemployment rate might have been between 1.4 and 1.7 percentage points lower, ceteris paribus. These figures, too, are calculated using the smallest and the largest coefficient on 'bank concentration' from the regressions presented in Table 2. Of course, they (as the ones in the previous paragraph) should be taken with a pinch of salt. Still, they illustrate that the magnitude of the effect is likely to have been substantial.

Table 3 presents the results from our supplementary regressions, which are intended to provide evidence on the channels through which banking system concentration may affect unemployment.

- In the first regression, we exclude 'bank credit' because bank concentration might affect unemployment by affecting credit availability. We include 'bank deposits' instead in order to control for the size of the banking sector. In this regression, the point estimate for the coefficient on 'bank concentration' is marginally higher than in the baseline regression (Table 2). This provides some tentative evidence that higher bank concentration might increase unemployment by reducing the availability of credit.
- In the second supplementary regression, we exclude 'systemic banking crises'. Again, the point estimate for 'bank concentration' is marginally higher than in the baseline regression, tentatively indicating that the adverse effect of banking system concentration on unemployment might partly run through systemic banking crises.
- In the third supplementary regression, we drop both 'bank credit' and 'systemic banking crises'.[8] In this case, the increase in the point estimate for 'bank concentration' is slightly higher than in the previous two regressions. Combined with the results from these regressions, and with the fact that 'bank credit' has a favorable and 'systemic banking crises' an adverse

[8] As in the first supplementary regression, we add 'bank deposits' to control for the size of the banking industry.



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effect when included in the regression analysis (Tables 2 and 3), this indicates that bank concentration might affect unemployment through both channels.

- In the fourth supplementary regression, we add 'net interest margin'. Compared with the baseline specification, the point estimate for 'bank concentration' is now both lower in size and less statistically significant. This suggests that banking system concentration might increase unemployment by raising net interest margins. However, the coefficient on 'net interest margin' is statistically insignificant, which undermines the case for higher interest margins increasing unemployment.
- In our final supplementary regression, we add 'bank overhead costs'. The coefficient on this variable is statistically significant and has a positive algebraic sign. Also, the point estimate for 'bank concentration' is slightly lower than in the baseline specification. This suggests that bank concentration might increase unemployment via higher intermediation costs.

Taken together, our supplementary regressions provide some evidence on the channels through which banking system concentration might increase unemployment. However, the evidence is fragmentary and weak, not least because the changes in the point estimates for the coefficient on 'bank concentration', compared with the baseline regression, are small. The channels through which banking system concentration affects unemployment need to be studied in more detail in future research.

Although the transmission channels through which banking system concentration affects unemployment still need to be more thoroughly explored, we can conclude that our results are in line with previous research according to which bank concentration adversely affects credit availability, banking crises and the cost of financial intermediation (section 2). They also accord with previous empirical research showing that higher concentration hampers start-up activity as well as growth of firms and industries, and increases the chances of bank failures. As explained in

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section 2, each of these effects, too, is likely to have adverse knock-on effects on unemployment. As far as theory is concerned, our results corroborate the structure-conduct-performance hypothesis.

Note that, although the results from previous empirical studies are mixed overall, most of the previous research covering developing countries suggests that, in these countries, banking system concentration has adverse effects at least on the cost of financial intermediation and credit availability. Of course, our paper is also in line with our companion paper studying the labor market effects of bank concentration in industrial countries. Interestingly, the magnitude of the unemployment effect appears to be slightly larger in developing countries. This might be due to the fact that capital markets – particularly, markets for shares, corporate bonds and venture capital – are much less developed in these countries. As most firms there do not have access to these alternative sources of funding, they depend relatively more on bank loans. This in turn is likely to magnify the adverse effect of bank concentration on unemployment. Furthermore, the unemployment effect of bank concentration in developing countries might be larger than in industrial countries because the former have both higher concentration ratios and higher risks of bank failure and banking crises (Evrensel 2008).

Finally, a brief comment on the results for the control variables (Tables 2 and 3). We find that more centralized collective bargaining is associated with lower unemployment. A possible explanation is that very centralized bargaining systems lead to wage moderation if they induce unions to internalize the detrimental effects of excessive wage hikes (Bruno and Sachs 1985). Several studies covering industrial countries also find higher centralization to be correlated with lower unemployment (e.g., Di Tella and MacCulloch 2005, Feldmann 2011). Also in line with the previous literature, we find some, albeit non-robust, evidence that more generous unemployment benefits may raise, and that higher inflation may reduce, unemployment. As usual, we find robust evidence that the business cycle strongly affects unemployment. Furthermore, we find robust

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evidence that higher GDP per capita is associated with lower unemployment, suggesting that richer developing countries may be better able to integrate workers into the job market. Although non-robust, the coefficient on 'openness' suggests that developing countries that are more open to international trade have lower unemployment rates, perhaps because of more job opportunities in export industries. Conversely, higher FDI outflows are associated with more unemployment, probably because they reduce the number of jobs in internationally mobile firms. Finally, stricter regulation of cross-border capital flows is correlated with less unemployment, perhaps because it avoids the disruptive effects erratic capital movements and sudden stops can have on the labor market.

## 6. Conclusion

Our regression results suggest that a more concentrated banking sector is likely to increase unemployment in developing countries. The magnitude of the effect appears to be substantial. Our results are robust to both endogeneity of 'bank concentration' and numerous variations in specification.

Although our results are both robust and in line with many previous papers – particularly, with our companion paper covering industrial countries – more research is clearly warranted, both theoretical and empirical. Most importantly, as noted in the previous section, the transmission channels from banking system concentration to unemployment need to be more closely analyzed. Furthermore, future cross-country studies should use alternative measures of concentration and larger samples of countries. Case studies of individual countries closely tracking the evolution of bank concentration, labor market performance and the links between the two would also be welcome.

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The results reported in this paper have potentially important implications for policy-making – particularly because many developing countries have high levels of both bank concentration and unemployment. The most appropriate policy measures vary from country to country, according to the degree, specific characteristics and historical roots of bank concentration, as well as according to the intensity and other characteristics of competition in the respective national banking industry. The most important policy measures are likely to include lowering entry barriers, especially for foreign banks and domestic non-bank financial intermediaries; imposing stricter limits on mergers that would create or enhance a dominant market position; introducing a sliding scale of capital adequacy ratios that rise with the size of the banks; and privatizing large state-owned banks, which is important because state-owned banks play a dominant role in many developing countries.

## Appendix. List of countries

Argentina, Bolivia, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Czech Republic, Dominican Republic, Egypt, El Salvador, Estonia, Georgia, Greece, Hungary, India, Indonesia, Jordan, Latvia, Lithuania, Malaysia, Mexico, Morocco, Nicaragua, Pakistan, Paraguay, Peru, Philippines, Poland, Portugal, Romania, Russia, South Africa, South Korea, Sri Lanka, Thailand, Ukraine, Uruguay, Venezuela, Vietnam, Zimbabwe.

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## Table 1. List of variables

| | Definition | Mean | Std. Dev. | Min. | Max. | Source |
|---|---|---|---|---|---|---|
| Bank concentration | The assets of the three largest banks as a decimal fraction of total banking system assets (excluding the central bank). | 0.57 | 0.17 | 0.20 | 1.00 | Beck et al. (2012) |
| Bank credit | The value of deposit money bank credit to the private sector as a decimal fraction of GDP. Deposit money banks comprise all financial institutions (excluding the central bank) that have liabilities in the form of deposits usable in making payments. | 0.40 | 0.31 | 0.00 | 1.66 | Beck et al. (2012) |
| Bank deposits | Demand, time and saving deposits in deposit money banks as a decimal fraction of GDP. Deposit money banks comprise all financial institutions (excluding the central bank) that have liabilities in the form of deposits usable in making payments. | 0.39 | 0.25 | 0.00 | 1.20 | Beck et al. (2012) |
| Bank overhead costs | Accounting value of a bank's overhead costs as a decimal fraction of its total assets. | 0.04 | 0.03 | 0.01 | 0.30 | Beck et al. (2012) |
| Centralized collective bargaining | Subindex 'centralized collective bargaining' of the *Economic Freedom of the World* (EFW) index, scaled to take values between 0 (least centralized) and 1 (most centralized). Because prior to 2000 the EFW index is available on a five year basis only, the author of this paper filled the gaps by linear interpolation. | 0.32 | 0.12 | 0.11 | 0.71 | Gwartney and Lawson (2009), author's calculations |
| Credit market regulation | Chain-linked subindex 'credit market regulations' of the *Economic Freedom of the World* (EFW) index, scaled to take values between 0 (least restrictive) and 1 (most restrictive). The subindex covers the following aspects: percentage of bank deposits held in privately owned banks, percentage of foreign banks' license applications denied, foreign bank assets as a percentage of total banking sector assets, percentage of domestic credit consumed by the private sector, extent of interest rate controls, and prevalence of negative real deposit and lending rates. Because prior to 2000 the EFW index is available on a five year basis only, the author of this paper filled the gaps by linear interpolation. | 0.29 | 0.14 | 0.00 | 0.92 | Gwartney and Lawson (2009), author's calculations |
| Employment protection legislation | Indicator of the stringency of employment protection legislation. Regular contracts of unspecified duration after any trial period for the job. Unweighted average of measures for advance notice period and for severance payment, each of which in turn is based on averages across three lengths of service: after 9 months, after 4 years, and after 20 years. Scores ranging from 0 (least restrictive) to 1 (most restrictive). | 0.41 | 0.15 | 0.00 | 0.75 | Aleksynska and Schindler (2011), author's calculations |

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## Table 1. List of variables (cont.)

| | Definition | Mean | Std. Dev. | Min. | Max. | Source |
|---|---|---|---|---|---|---|
| Ethnic tensions | Component 'ethnic tensions' of the *International Country Risk Guide*, indicating the degree of tension within a country attributable to racial, nationality, or language divisions. The rating scale ranges from 0 to 1. Higher ratings are given to countries where racial and nationality tensions are high because opposing groups are intolerant and unwilling to compromise. Lower ratings are given to countries where tensions are minimal, even though such differences may still exist. | 0.28 | 0.21 | 0.00 | 0.83 | PRS Group (2009), author's calculations |
| FDI net inflows | Foreign direct investment net inflows (new investment inflows less disinvestment) as a decimal fraction of GDP. | 0.04 | 0.03 | -0.02 | 0.31 | World Bank (2010) |
| FDI net outflows | Foreign direct investment net outflows as a decimal fraction of GDP. | 0.01 | 0.01 | -0.03 | 0.17 | World Bank (2010) |
| GDP per capita | Gross domestic product per capita, in tens of thousands of constant 2005 international dollars, converted at purchasing power parity rates. | 0.81 | 0.44 | 0.02 | 2.04 | World Bank (2010) |
| Income & payroll tax rate | Subindex 'top marginal tax rate' of the *Economic Freedom of the World* (EFW) index. It is scaled to take values between 0 and 1, with higher values indicating higher marginal income and payroll tax rates and lower income thresholds at which the top marginal income tax rates apply. Because prior to 2000 the EFW index is available on a five year basis only, the author of this paper filled the gaps by linear interpolation. | 0.41 | 0.18 | 0.00 | 1.00 | Gwartney and Lawson (2009), author's calculations |
| Inflation rate | Annual change in the consumer price index; decimal fraction. | 0.11 | 0.21 | -0.01 | 2.82 | IMF (2010), World Bank (2010) |
| Minimum wage | Statutory minimum wage as a decimal fraction of the mean wage. | 0.38 | 0.19 | 0.00 | 0.87 | Aleksynska and Schindler (2011) |
| Net interest margin | Accounting value of a bank's net interest revenue as a decimal fraction of its interest-bearing (total earning) assets. | 0.04 | 0.03 | -0.09 | 0.23 | Beck et al. (2012) |
| Openness | Ratio of exports and imports of goods and services to GDP. | 0.77 | 0.40 | 0.16 | 2.20 | World Bank (2010) |
| Output gap | The difference between actual and potential GDP as a decimal fraction of potential GDP. Potential GDP is estimated by calculating the trend component of GDP. The latter is obtained by using the Hodrick-Prescott filter ($\lambda = 6.25$). | -0.00 | 0.02 | -0.12 | 0.07 | World Bank (2010), author's calculations |

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## Table 1. List of variables (cont.)

| | Definition | Mean | Std. Dev. | Min. | Max. | Source |
|---|---|---|---|---|---|---|
| Population aged 0-14 | Population between the ages 0 to 14 years as a decimal fraction of the total population. | 0.27 | 0.08 | 0.13 | 0.43 | World Bank (2010) |
| Population aged 65+ | Population aged 65 years and older as a decimal fraction of the total population. | 0.08 | 0.04 | 0.03 | 0.17 | World Bank (2010) |
| Product market regulation | Index of regulatory impediments to product market competition. The index is scaled to take values between 0 and 1, with higher values indicating stricter regulation. It covers the following three equally weighted sectors: agriculture, electricity, and telecommunications. | 0.52 | 0.25 | 0.06 | 1.00 | Ostry et al. (2009), author's calculations |
| Real interest rate | The lending interest rate adjusted for inflation as measured by the GDP deflator; decimal fraction. | 0.09 | 0.18 | -0.35 | 2.52 | World Bank (2010) |
| Regulation of capital account transactions | Index measuring the intensity of legal restrictions on residents' and nonresidents' ability to move capital into and out of a country. The index is scaled to take values between 0 and 1, with higher values indicating tighter restrictions. | 0.32 | 0.24 | 0.00 | 0.88 | Ostry et al. (2009), author's calculations |
| Regulation of international trade | Chain-linked subindex 'freedom to trade internationally' of the *Economic Freedom of the World* (EFW) index, scaled to take values between 0 (least restrictive) and 1 (most restrictive). The subindex covers the following aspects: taxes on international trade, regulatory trade barriers, actual relative to expected size of the trade sector, black-market exchange rates, and international capital market controls. Because prior to 2000 the EFW index is available on a five year basis only, the author of this paper filled the gaps by linear interpolation. | 0.30 | 0.08 | 0.10 | 0.63 | Gwartney and Lawson (2009), author's calculations |
| Stock market activity | The value of shares traded on domestic stock exchanges as a decimal fraction of GDP. | 0.15 | 0.24 | 0.00 | 1.81 | Beck et al. (2012) |
| Systemic banking crises | Dummy variable that takes the value 1 if, in the respective year, the country experienced a systemic banking crisis. A banking crisis is considered to be systemic if two conditions are met: first, significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and bank liquidations); and second, significant banking policy intervention measures in response to significant losses in the banking system. | 0.12 | 0.33 | 0.00 | 1.00 | Laeven and Valencia (2008, 2010) |
| Unemployment benefits replacement rate | Gross unemployment benefits as a decimal fraction of previous gross wage earnings; average for the first two years of unemployment. | 0.10 | 0.11 | 0.00 | 0.57 | Aleksynska and Schindler (2011) |

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**Table 1. List of variables** (cont.)

| | Definition | Mean | Std. Dev. | Min. | Max. | Source |
|---|---|---|---|---|---|---|
| Unemployment rate | Unemployed as a percentage of the labor force. Labor force survey data. | 9.07 | 4.73 | 0.90 | 28.85 | European Commission (2009), ILO (2009), IMF (2010), OECD (2010) |
| War | Dummy variable that takes the value 1 if, in the respective year, there was a war on the country's territory. The variable takes both wars between two or more states and internal wars (with or without intervention from other states) into account. | 0.05 | 0.21 | 0.00 | 1.00 | Centre for the Study of Civil Wars (2009) |

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## Table 2. Main regressions to explain the unemployment rate[a)]

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Baseline specification | Random effects substituted for fixed effects[b)] | Stock market activity added | Product market regulation added | Regulation of international trade and capital account transactions added | Foreign direct investment added | Ethnic tensions added | Demography added |
| Bank concentration | 7.85** | 7.30*** | 7.66** | 7.58** | 9.09** | 8.14** | 7.46** | 7.65** |
| | (3.60) | (2.54) | (3.66) | (3.58) | (4.19) | (4.14) | (3.61) | (3.71) |
| Bank credit | -3.44** | -4.02*** | -3.28** | -3.36** | -3.11* | -4.14** | -3.40** | -3.93** |
| | (1.54) | (0.94) | (1.53) | (1.39) | (1.82) | (1.74) | (1.44) | (1.79) |
| Credit market regulation | -5.21 | -4.54*** | -6.77** | -4.05 | -5.69* | -5.58 | -4.48 | -4.22 |
| | (3.28) | (1.62) | (3.33) | (2.93) | (3.20) | (3.45) | (3.50) | (3.24) |
| Systemic banking crises | 0.94** | 0.96*** | 0.96** | 1.01** | 1.06** | 0.90 | 0.96** | 0.93** |
| | (0.41) | (0.34) | (0.46) | (0.41) | (0.43) | (0.56) | (0.39) | (0.40) |
| Centralized collective bargaining | -4.21* | -3.33** | -4.80* | -5.58*** | -2.35 | -3.16 | -4.29* | -4.56* |
| | (2.27) | (1.49) | (2.56) | (2.09) | (2.70) | (2.31) | (2.30) | (2.35) |
| Minimum wage | 1.80 | 1.25 | 2.88* | 0.94 | 0.15 | 1.85 | 0.90 | 2.64 |
| | (1.79) | (1.20) | (1.59) | (1.89) | (1.86) | (1.52) | (1.97) | (1.70) |
| Employment protection legislation | 0.18 | 1.22 | 0.67 | -1.08 | -0.32 | 0.88 | 0.16 | 0.50 |
| | (2.55) | (1.65) | (2.52) | (2.23) | (2.29) | (2.94) | (2.48) | (2.90) |
| Unemployment benefits replacement rate | 8.18 | 10.42*** | 8.57 | 10.10* | 5.85 | 9.66 | 7.87 | 6.00 |
| | (5.44) | (3.18) | (5.45) | (5.76) | (4.87) | (6.08) | (5.70) | (5.56) |
| Income & payroll tax rate | -1.43 | -1.07 | -1.44 | -0.71 | -0.55 | -2.43 | -1.22 | -0.86 |
| | (1.62) | (1.13) | (1.69) | (1.57) | (1.65) | (1.83) | (1.56) | (1.69) |
| Real interest rate | 0.45 | 0.69 | 0.33 | 0.26 | 0.66 | 0.27 | 0.68 | 0.58 |
| | (0.90) | (0.87) | (0.91) | (0.88) | (1.08) | (1.32) | (0.90) | (0.94) |
| Inflation rate | -1.24* | -1.31* | -1.05 | -1.40** | -1.17* | -1.16 | -1.47* | -1.04 |
| | (0.73) | (0.72) | (0.74) | (0.69) | (0.66) | (0.82) | (0.76) | (0.74) |

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**Table 2. Main regressions to explain the unemployment rate**[a)] (cont.)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Baseline specification | Random effects substituted for fixed effects[b)] | Stock market activity added | Product market regulation added | Regulation of international trade and capital account transactions added | Foreign direct investment added | Ethnic tensions added | Demography added |
| Openness | -2.68*<br>(1.49) | -2.93***<br>(0.95) | -2.08<br>(1.51) | -2.45*<br>(1.42) | -1.05<br>(1.58) | -2.69*<br>(1.47) | -2.82*<br>(1.52) | -2.73*<br>(1.45) |
| Output gap | -23.44***<br>(4.41) | -27.60***<br>(5.05) | -20.49***<br>(4.30) | -21.97***<br>(4.29) | -22.98***<br>(4.19) | -25.09***<br>(4.34) | -23.81***<br>(4.32) | -22.15***<br>(4.68) |
| GDP per capita | -6.52**<br>(2.55) | -3.51***<br>(1.05) | -7.28***<br>(2.52) | -7.04**<br>(2.92) | -9.98***<br>(2.34) | -6.16**<br>(2.54) | -6.34**<br>(2.57) | -7.34***<br>(2.80) |
| War | -0.19<br>(0.72) | -0.23<br>(0.54) | -0.31<br>(0.69) | -0.38<br>(0.76) | -0.15<br>(0.86) | -0.11<br>(0.74) | -0.17<br>(0.70) | -0.23<br>(0.76) |
| Stock market activity | | | -0.11<br>(0.54) | | | | | |
| Product market regulation | | | | -3.15**<br>(1.52) | | | | |
| Regulation of international trade | | | | | 2.28<br>(3.36) | | | |
| Regulation of capital account transactions | | | | | -3.59***<br>(1.09) | | | |
| FDI net inflows | | | | | | -3.40<br>(7.74) | | |
| FDI net outflows | | | | | | 26.26***<br>(8.03) | | |
| Ethnic tensions | | | | | | | 0.70<br>(1.61) | |

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**Table 2. Main regressions to explain the unemployment rate**[a)] (cont.)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| | Baseline specification | Random effects substituted for fixed effects[b)] | Stock market activity added | Product market regulation added | Regulation of international trade and capital account transactions added | Foreign direct investment added | Ethnic tensions added | Demography added |
| Population aged 0-14 | | | | | | | | -26.47 (47.83) |
| Population aged 65+ | | | | | | | | 75.69 (95.80) |
| Number of observations | 350 | 351 | 333 | 310 | 325 | 305 | 345 | 350 |
| Number of countries | 41 | 42 | 38 | 38 | 41 | 36 | 40 | 41 |
| $R^2$ within | 0.51 | 0.51 | 0.53 | 0.48 | 0.48 | 0.56 | 0.53 | 0.52 |
| *F* statistic | 510.07*** | | 83.22*** | 957.07*** | 77.98*** | 19,990.19*** | 1,029.07*** | 1,241.63*** |
| Standard error of regression | 1.38 | | 1.37 | 1.35 | 1.35 | 1.37 | 1.37 | 1.37 |
| Hansen *J* statistic (*p* value) | 0.20 | | 0.12 | 0.29 | 0.29 | 0.15 | 0.13 | 0.16 |
| First-stage *F* statistic | 139.68*** | | 740.94*** | 432.38*** | 179.11*** | 3,439.10*** | 126.29*** | 930.35*** |

[a)]Two-stage least squares regressions with country-specific fixed effects, except for regression 2, which uses generalized two-stage least squares with country-specific random effects. 'Bank concentration' is instrumented; the excluded instruments are lagged differences of this variable covering the previous three years. Annual data for 1987 to 2007. All regressions also contain year dummies. Standard errors are reported in parentheses. Except for regression 2, they are robust and adjusted for clusters at the country level. ***(**/*) denotes statistically significant at the 1%(5%/10%) level.

[b)]The $\chi^2$ statistic from the Hausman test is 13.48. The *p* value from the Sargan statistic is 0.37. The Wald $\chi^2$ statistic is 293.11***. The Wald $\chi^2$ statistic from the first-stage regression is 163.93***.

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## Table 3. Supplementary regressions to explain the unemployment rate[a)]

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Bank deposits substituted for bank credit | Systemic banking crises excluded | Bank deposits substituted for bank credit and systemic banking crises excluded | Net interest margin added | Bank overhead costs added |
| Bank concentration | 8.21**<br>(3.88) | 8.06**<br>(3.72) | 8.35**<br>(3.96) | 6.43*<br>(3.33) | 7.07**<br>(3.22) |
| Bank credit | | -2.55*<br>(1.53) | | -3.55**<br>(1.75) | -3.24*<br>(1.95) |
| Credit market regulation | -5.68*<br>(3.15) | -4.83<br>(3.22) | -5.30*<br>(3.04) | -2.47<br>(2.88) | -3.71<br>(3.03) |
| Systemic banking crises | 0.64*<br>(0.38) | | | 1.02**<br>(0.41) | 0.97**<br>(0.46) |
| Centralized collective bargaining | -3.62<br>(2.26) | -4.33*<br>(2.28) | -3.78*<br>(2.25) | -5.42***<br>(1.94) | -5.43***<br>(1.79) |
| Minimum wage | 1.20<br>(1.90) | 1.56<br>(1.88) | 1.13<br>(1.95) | 2.50<br>(1.85) | 2.77<br>(1.89) |
| Employment protection legislation | 0.24<br>(2.72) | 0.26<br>(2.47) | 0.29<br>(2.64) | 0.52<br>(2.34) | 1.25<br>(2.20) |
| Unemployment benefits replacement rate | 10.67**<br>(5.40) | 8.07<br>(5.73) | 10.18*<br>(5.62) | 10.47**<br>(5.27) | 10.46**<br>(5.22) |
| Income & payroll tax rate | -0.94<br>(1.94) | -1.55<br>(1.64) | -1.17<br>(1.93) | -1.35<br>(1.46) | -1.37<br>(1.37) |
| Real interest rate | 0.50<br>(0.98) | -0.05<br>(0.95) | 0.18<br>(1.08) | 0.48<br>(1.10) | -1.95<br>(2.97) |
| Inflation rate | -1.27<br>(0.80) | -1.20<br>(0.79) | -1.21<br>(0.84) | -1.22<br>(0.93) | -3.36<br>(2.04) |
| Openness | -1.64<br>(1.48) | -2.29<br>(1.59) | -1.50<br>(1.48) | -1.94<br>(1.49) | -1.91<br>(1.47) |
| Output gap | -24.09***<br>(4.60) | -26.73***<br>(5.02) | -26.55***<br>(5.04) | -23.85***<br>(4.38) | -24.14***<br>(4.76) |
| GDP per capita | -7.76***<br>(2.33) | -6.78***<br>(2.39) | -7.63***<br>(2.31) | -5.01*<br>(2.59) | -5.18**<br>(2.30) |
| War | -0.30<br>(0.68) | -0.22<br>(0.71) | -0.32<br>(0.67) | -0.41<br>(0.63) | -0.23<br>(0.72) |
| Bank deposits | -3.23<br>(3.17) | | -2.94<br>(3.27) | | |
| Net interest margin | | | | 0.55<br>(5.90) | |
| Bank overhead costs | | | | | 22.88***<br>(7.99) |

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## Table 3. Supplementary regressions to explain the unemployment rate[a)] (cont.)

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Bank deposits substituted for bank credit | Systemic banking crises excluded | Bank deposits substituted for bank credit and systemic banking crises excluded | Net interest margin added | Bank overhead costs added |
| Number of observations | 350 | 350 | 350 | 340 | 337 |
| Number of countries | 41 | 41 | 41 | 41 | 40 |
| $R^2$ within | 0.49 | 0.50 | 0.49 | 0.51 | 0.54 |
| *F* statistic | 189.12*** | 76.99*** | 91.58*** | 360.39*** | 278.94*** |
| Standard error of regression | 1.41 | 1.40 | 1.42 | 1.33 | 1.31 |
| Hansen *J* statistic (*p* value) | 0.15 | 0.15 | 0.13 | 0.24 | 0.23 |
| First-stage *F* statistic | 90.51*** | 126.99*** | 83.15*** | 533.82*** | 205.35*** |

[a)]Two-stage least squares regressions with country-specific fixed effects. 'Bank concentration' is instrumented; the excluded instruments are lagged differences of this variable covering the previous three years. Annual data for 1987 to 2007. All regressions also contain year dummies. Robust standard errors, adjusted for clusters at the country level, are reported in parentheses. ***(**/*) denotes statistically significant at the 1%(5%/10%) level.

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## Research Highlights

- We use data on 42 developing countries and a large number of controls.
- More bank concentration increased unemployment over the period 1987 to 2007.
- The magnitude of the effect is substantial.

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