

# **Does Finance Benefit Society? Financial Sector Size and Labour Market Performance**

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# **Does Finance Benefit Society? Financial Sector Size and Labour Market Performance**

We examine a large sample of some 100 economies worldwide to study the impact of financial sector size expansion on labour market performance. Estimating dynamic panel data models inspired by the well-developed finance-growth literature, we find that a larger financial sector is beneficial for the labour market as it reduces unemployment rates. However, estimating country- and period-specific target levels of financial sector size, we find evidence that the relative contribution of finance vanishes with excessive levels of finance and excessive levels of credit may actually be detrimental to employment. These non-linearities in the finance-unemployment nexus are more pronounced within developed economies. Overall, our study sheds new light on the ongoing controversy over the impact of the financial sector on societal well-being and highlights the importance of monitoring the expansion of the financial sector, in particular when it comes to credit markets.

Keywords: finance; financial development; labour markets; unemployment; non-linearities

Subject classification codes: E22; E24; E44

## **Introduction**

Does an economy's financial sector, and in particular its expansion, contribute to the well-being of its citizens? Frequently, economists have approached this important question by studying the finance-growth nexus, i.e. the way the financial sector expansion contributes to GDP (Demirgüç-Kunt, Feyen, and Levine 2013). However, there is an increasing awareness that GDP is an imperfect measure in regard of the aforementioned question (Stiglitz, Sen, and Fitoussi 2009). Indeed, when it comes to understanding individuals' happiness or well-being, probably the single most important external factor is (un)employment (Layard, Clark, and Senik 2012).

So, does financial sector expansion contribute to employment? Some argue that better access to finance will increase employment (e.g. Acemoglu 2001). For instance, limited or reduced access to finance might represent an obstacle for businesses, and thus for job creation (e.g. Belke and Fehn 2001; Wasmer and Weil 2004), or cause job cuts (Jermann and Quadrini 2012). Some argue that this depends on the financial structure within an economy, as improved availability of credit is generally assumed to foster job creation by strengthening the bargaining position of entrepreneurs and enabling them to employ more workers (Monacelli, Quadrini, and Trigari 2011). Others adhere to Keynes (1936) and argue that the financial sector may produce speculative activity that impedes economic development (e.g. Singh 1997). With arguments for both sides, it remains an empirical question, but – with the notable exception of Gatti, Rault, and Vaubourg (2012) – country-level studies of the finance-unemployment nexus remain rare, probably due to previously limited data availability.

However, recently, data availability has improved giving access to more extensive time-series data for a broader sample of countries.. Starting from the June 2017 version of the World Bank's Global Financial Development (GFD) Database and various other data sources, we compile a novel data set covering some 100 economies starting as early as 1986 to empirically examine the contribution of finance to (un)employment. Inspired by the well-developed finance-growth literature, we estimate dynamic panel data models using the system generalized method of moments (GMM) and examine how measures of financial sector size affect labour market performance, operationalized by the unemployment rate. Thereby, we explicitly allow for non-linearities and take a closer look at developed economies.

In the empirical analysis, we find that a larger financial sector is beneficial for the labour market as it reduces unemployment rates. However, when we allow for non-linearities, we find evidence that the relative contribution of finance vanishes once the financial sector becomes *excessive*, i.e. larger than predicted by a regression taking into account global macro-economic fluctuations as well as cross-country heterogeneity in economic and institutional development. In particular, excessive levels of credit (to the private sector) may actually be detrimental to employment. These non-linearities in the finance-unemployment nexus are even more pronounced within developed economies and robust to alternative calibrations of our dynamic model.

As such, our study adds to the literature and the debate about the contribution of the financial sector to societal well-being in several ways. First, we complement the finance-growth literature by examining the impact of financial sector expansion on labour market performance based on an extensive worldwide sample and provide evidence of a positive effect of finance on employment. Second, inspired by the ‘too much finance’ literature – recently prominently advocated by Law and Singh (2014) and Arcand, Berkes, and Panizza (2015) in the context of economic growth and Gächter and Gkrintzalis (2017) in the context of trade openness – we explicitly allow for non-linearities in the relationship of interest and find decreasing returns to finance. Third, differentiating between finance provided by the stock market and finance in form of private credit, the evidence suggests that while the former is beneficial over wide ranges of the distribution, more caution is warranted with increasing private credit volume, in particular in developed economies.

## **Background and related literature**

The recent global financial crises has sparked a broad public debate about the merits of the

financial sector for society. For instance, in 2009, Benjamin Friedman, professor at Harvard, titled a Financial Times Opinion Column with the catchy headline “*Overmighty finance levies a tithe on growth*” (Friedman 2009). In a related article, the Economist asked “*What good is finance?*” in its headline (*Economist*, August 27, 2009) and in his 2015 American Finance Association Presidential Address, Luigi Zingales, a professor from the University of Chicago, asked “*Does finance benefit society?*”.

Traditionally economists have approached these kind of questions by studying the finance-growth nexus, i.e. the relationship between finance and economic growth. This work has been inspired by the pioneering contribution of Schumpeter (1911), Goldsmith (1969), McKinnon (1973), Shaw (1973) and many others, and still finds its interest, as many recent contributions demonstrate.<sup>1</sup> Yet, over the years, scepticism about using GDP as a measure for economic development and societal well-being emerged and interest in taking a broader, multidimensional view in assessing economic performance and social progress arose. For instance, in a report commissioned by the French government, Stiglitz, Sen, and Fitoussi (2009, 7) warn that “[w]hat we measure affects what we do” and emphasize the importance of considering alternative measures taking into account aspects measuring the *quality of life*.

Unfortunately, such approaches face the challenge to define (quantitative) measures for ‘quality of life’. Stiglitz, Sen, and Fitoussi (2009) suggest that one way to address this

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<sup>1</sup> See, for instance, Arcand, Berkes, and Panizza (2015), Demirgüç-Kunt, Feyen, and Levine (2013), Gambacorta, Yang, and Tsatsaronis (2014), Langfield and Pagano (2016), Law and Singh (2014), Rapp and Udoieva (2017) to name but a few. Ang (2008) and Valickova, Havranek, and Horvath (2015) provide recent surveys on the finance-growth related research.

problem is to borrow from philosophical research and its tradition to hypothesize that individuals are the best judges of their own conditions. Following this approach, one is faced with the fact that when it comes to understanding individuals' happiness or well-being, probably the single most important external factor is (un)employment (Layard, Clark, and Senik 2012). Indeed, the costs imposed by job losses on the people's quality of life entail not only the economic costs associated with a reduced income but also non-pecuniary costs of losing social status, self-esteem, workplace social life, and identity (Layard, Clark, and Senik 2012). Consequently, unemployment perceived as sharp as 'bereavement or separation' (Layard, Clark, and Senik 2012, 66) is strongly associated with lower life satisfaction evaluations, higher prevalence of negative and lower levels of positive effects, and a reduced probability of a high overall happiness (Di Tella, MacCulloch and Oswald 2003, Krueger and Mueller 2012). Besides, the societal costs of unemployment extend beyond the losses of unemployed themselves due to spillover effects on their families and colleagues who feel less safe in the workplace (Green 2011).

Despite the aforementioned arguments, very few studies address the relationship between finance and labour market performance. To date, what we know about the finance-unemployment nexus is largely derived from theoretical considerations that identify two major channels, through which monetary policy is transmitted to the labour market: the credit channel and the financial structure channel. Central to *the credit channel view* is the concept of financial constraints. Credit market imperfections due to asymmetric information entail high agency costs making external capital costly and, thus, impede capital-constrained entrepreneurs to raise funds to establish new ventures, create new (permanent) jobs or cope with technological and related structural changes (Acemoglu 2001; Bernanke and Gertler 1989; Rendon 2001). Frictions in imperfect credit markets

raise macroeconomic volatility, reduce the number of financiers and, consequently, new entries, leading to the shift in the labour demand curve and increase in unemployment (Wasmer and Weil 2004). Apart from the disturbances to credit availability, sudden shocks to other parts of the financial sector also affect borrowing power of firms, specifically those with rigid financial structures, and generate fluctuations in the labour demand (Jermann and Quadrini 2012).

In contrast to the credit channel view, explaining the link between finance and labour demand by high costs of financing employment, *the financial structure view* considers distribution of bargaining power between workers and employers. Better access to credit, and as a result, higher leverage strengthens the bargaining power of entrepreneurs in the wage determination process, enables them to negotiate lower wages and, consequently, employ more workers (Monacelli, Quadrini, and Trigari 2011).

The theoretical prediction that (access to) finance determines labour market performance is supported by firm-level studies. Sharpe (1994) was among the first to show that financial leverage of a manufacturing-sector firm is significantly associated with the cyclicity of its labour force, i.e. firms with better access to credit are characterized by on average greater employment-to-sales elasticity. Using a dynamic model of labour demand under liquidity constraints, Rendon (2001) provides evidence suggesting that financial constraints hinder the creation of – more productive but also more expensive – permanent jobs. Nickell and Nicolitsas (1999) find that increase in financial pressure – measured by the interest-to-cash-flow ratio – and a consequent increase in bankruptcy risks are negatively associated with employment and pay rises controlling for the effect of actual or expected changes in product demand. Acemoglu (2001) presents descriptive cross-country evidence indicating substantially less employment in the most credit-dependent industries

in Europe. Finally, based on interview surveys, Blanchflower and Oswald (1998) conclude that more capital constraints are associated with a lower probability of self-employment.

However, what can we conclude on the macro level? Will the labour market benefit from an expansion of the financial sector? Empirical evidence based on macro data is relatively scarce. In an early unpublished work, Belke and Fehn (2001) find that overall and early stage venture capital investments improve labour market performance in 20 OECD economies over 1986-1999. Later on, using finance indicators as controls in the empirical models predicting joblessness, Amable, Demmou and Gatti (2011) show that domestic credit volume is negatively associated with unemployment. Gatti, Rault, and Vaubourg (2012) is – to the best of our knowledge – the only published study that explicitly investigates the finance-unemployment nexus. Based on an analysis of 18 developed economies, the authors find that the effect of finance for labour market depends on labour market factors, however, finance is insignificantly related to employment for the average labour market.

With the subsequent empirical analysis we aim to contribute to this literature. Taking advantage of the recently improved data availability, we apply advanced econometric techniques and explicitly allow for non-linearities in the finance-unemployment nexus. The latter accounts for recent insights from the well-developed finance-growth literature, where recent studies have asked the question about ‘Too much finance?’ (Arcand, Berkes, and Panizza 2015; Gächter and Gkrintzalis 2017; Law and Singh 2014) and raised concerns about marginal or even negative returns of finance to macroeconomic activity (e.g. Keynes 1936; Singh 1997; Rousseau and Wachtel 2011).



## Empirical strategy

### *Model specification*

Interested in the relationship between financial sector expansion and labour market performance, we regress unemployment ( $UEmpl$ ) on financial sector depth ( $Finance$ ) (Gatti, Rault, and Vaubourg 2012). Inspired by the finance-growth literature, we (i) study data averaged over non-overlapping 5-year periods to mitigate the effect of cyclical fluctuations, (ii) use the dynamic panel model to account for the persistence in the endogenous variable and (iii) employ GMM estimator to address endogeneity issues (e.g. Beck and Levine 2004).

*In a first step*, we estimate versions of the following dynamic linear model:

$$UEmpl_{it} = \beta_0 + \beta_1 \cdot UEmpl_{it-1} + \gamma \cdot Finance_{it} + \delta \cdot X_{it} + \tau_t + \varepsilon_{it}, \quad (1)$$

where  $UEmpl$  is the natural logarithm of the unemployment rate in percent,  $i$  refers to the economy,  $t$  to time,  $X_{it}$  represents a set of control variables,  $\tau$  is a time-fixed effect, and  $\varepsilon$  is a random disturbance. Inspired by Rousseau and Wachtel (2011), we use a broad-based measure for the right-hand side variable of interest. Financial sector size ( $FSS$ ) aggregates the size of *StockMarket*, i.e. the aggregate market capitalization, and the volume of *Credit* provided to the private sector, both normalized by GDP.<sup>2</sup> In the empirical analysis,

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<sup>2</sup> Both measures are frequently used in the finance-growth literature (e.g. Arcand, Berkes, and Panizza 2015; Rousseau and Wachtel 2011). We also experiment with other measures, e.g. intermediated credit (Beck and Levine 2004) and take into account the private bond market (Demirgüç-Kunt, Feyen, and Levine 2013). Our key results remain unaffected.

we regress  $UEmpl$  on the aggregate measure and also assess whether the two sub-indicators jointly enter the regression significantly.

In a second step, we allow for non-linearities in the relation of interest. Therefore, we calculate country-specific measures of  $ExcessFinance$  and extend model (1) to

$$UEmpl_{it} = \beta_0 + \beta_1 \cdot UEmpl_{it-1} + \gamma_1 \cdot Finance_{it} + \gamma_2 \cdot ExcessFinance_{it}^2 + \delta \cdot X_{it} + \tau_t + \varepsilon_{it} . \quad (2)$$

While the ‘too much finance’ literature often considers a simple quadratic specification and thus implicitly assumes a common threshold, we argue that country-level heterogeneity might be important here. Thus, we adopt a two-step approach, where in a first step we estimate a target finance regression, i.e. an OLS-regression of  $Finance$  on  $GPD$  (in constant 2010 US\$), GDP growth ( $\Delta GPD$ ), the rule of law indicator ( $RoL$ ), indicators for the legal origin ( $Legal$ ), and period-fixed effects. Effectively, for each of our measures of finance, we apply the OLS-method and estimate the following target finance regression:

$$Finance_{it} = \beta_0 + \beta_1 \cdot GDP_{it} + \beta_2 \cdot \Delta GDP_{it} + \beta_3 \cdot RoL_{it} + \beta_{4,1} \cdot French_i + \beta_{4,2} \cdot German_i + \beta_{4,3} \cdot Scandinavian_i + \tau_t + \varepsilon_{it} , \quad (3)$$

and interpret predicted values from these regressions as our target levels of financial sector depth. We then consider positive deviations, i.e. positive residuals, to represent an excessive financial sector.<sup>3</sup> Thus,  $ExcessFinance$  refers to positive residuals of our target

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<sup>3</sup> Results of the first step regression, together with further analyses, are provided in the empirical analysis section. The approach to estimate country-specific target levels of finance essentially borrows from the corporate finance literature, which frequently estimates a firm-specific target capital structure (e.g. Hovakimian, Opler, and Titman 2001).

finance regressions from model (3) and – in the style of the commonly adopted quadratic specification – we allow them to enter the regression in quadratic form.<sup>4</sup>

### ***Data and sample***

We start from the June 2017 version of the World Bank’s GFD Database, from which we draw the financial indicators, and complement it by the harmonized unemployment rates and GDP per worker data from the ILOSTAT Database and the OECD Labour Force Statistics. To estimate a target finance regression according to model (3), we collect and add GDP and GDP growth data from the World Bank’s World Development Indicators (WDI) Database, the rule of law indicator from the World Bank’s World Governance Indicators (WGI) Database, and indicators for the legal origin from La Porta, Lopez-de-Silanes, and Shleifer (1997). For additional analyses, we draw tax wedge data from OECD Tax Statistics, unemployment benefit replacement rates from OECD Database on Benefits and Wages, trade union density from OECD and J. Visser, ICTWSS Database 3.0, product market regulation and employment protection indicators from OECD Indicators of Product Market Regulation and Employment Protection, respectively. We end up with data from 1991 (OECD 1986) to 2015. Finally, we restrict the sample to economies with initial GDP per capita of no less than 250 US\$ to ensure a minimum level of development. All variables discussed above are listed with definitions and sources in Table 1.

[Table 1 near here]

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<sup>4</sup> We also experiment with linear specifications, but frequently find the quadratic specification to better fit the data (in terms of lower SSR).

### *Descriptive statistics*

Table 2 provides first insights into the data and reports descriptive statistics. Over the sample period, the labour market of the average economy in our sample is characterized by an unemployment rate of 8.86 percent (with a standard deviation of 5.75 percent) and GDP per worker of 48,076 in PPP terms (constant 2011 PPP\$) (with a standard deviation of 37,809 constant 2011 PPP\$). From 1991 till 2015, an average unemployment rate decreased from 8.29 to 7.40 percent. The highest unemployment is observed in year 1993 (9.70 percent) and the lowest unemployment is documented in 2015 (7.40 percent). Unemployment in OECD economies is on average by 1.78 percentage points lower and by 2.28 percentage points less volatile than in non-OECD economies. As illustrated in Figure 1, countries with the lowest average unemployment are Qatar (0.70 percent), Bahrain (1.32 percent), and Kuwait (1.46 percent), whereas highest average unemployment is documented in South Africa (23.98 percent), Bosnia and Herzegovina (26.25 percent), and Macedonia (33.87 percent). Taking a dynamic perspective, Qatar and Thailand are countries with the largest relative intertemporal decrease in unemployment (92.08 and 75.33 percent, respectively), while Kuwait and Luxembourg are countries with the largest relative increase in unemployment over time (344 and 350 percent, respectively).

[Table 2 near here]

[Figure 1 near here]

Similarly, distribution and development of financial indicators in the last few decades give a heterogeneous picture. Over 1991-2015, average economy in our sample has a financial sector of 114 percent of GDP (with a standard deviation of 115 percent of GDP) and a bank-based financial sector structure (private credit volume of 63 percent of GDP and stock market size of 52 percent of GDP). Over time, financial sector expanded

significantly: from on average 87 percent in 1991 to 177 percent in 2015. Hereby, average domestic credit size rose by 36 percentage points and stock market capitalization increased by 54 percentage points. In a cross-section, OECD countries have on average more developed financial sector, with relatively more heterogeneous private credit markets and less heterogeneous stock markets. When considering target levels of financial development, we observe that the financial sector is on average by 25% of GDP larger than its estimated target level. In the subsample of OECD economies, countries with the most overdeveloped financial sector are Switzerland, in which excessive stock market capitalization equals 108 percent of GDP, and Iceland and Japan, in which excessive private credit sector equals 68 and 83 percent of GDP, respectively. In the subsample of non-OECD economies, countries with the most overdeveloped financial sector are Hong Kong and South Africa, due to overdeveloped stock markets of 453 and 111 percent of GDP, respectively.

To gain some preliminary insights into the finance-unemployment nexus, we proceed in two steps. *First*, we study full sample correlations. The results support the conjecture that finance is negatively associated with unemployment: the coefficients of correlation are -0.24 for *FSS*, -0.20 for *SMS*, and -0.23 for *PCV*. The correlation is stronger in the subsample of OECD economies: -0.32 for *FSS*, -0.26 for *SMS*, and -0.30 for *PCV* compared to -0.21, - 0.18, and -0.21, respectively, in the subsample of non-OECD economies.

*Second*, we compute *ceteris paribus* within-country correlations. More precisely, for each country in our sample, we estimate a multivariate dynamic OLS regression as specified by model (1) with GDP per worker as additional control and study the country-specific coefficient estimate  $\gamma$  from model (1). Using the financial sector size (*FSS*) to measure *Finance*, we find a negative *ceteris paribus* finance-unemployment correlation in

67 percent of our sample countries. We illustrate the results of this exercise in Figure 2. We then use the volume of *Credit* provided to the private sector and the size of *StockMarket*, i.e. the aggregate market capitalization, to measure *Finance* separately and illustrate the results in Figure 3 and 4, respectively. In light of a predominantly negative stock-market-unemployment correlation, specifically in Americas, Australia, Europe, and some emerging markets in Africa, Middle East, and Asia, we observe mostly negative credit-unemployment correlations in Africa, Middle East, Asia, South America, and Eastern Europe.

[Figure 2 near here]

[Figure 3 near here]

[Figure 4 near here]

### **Empirical analysis**

In this section, we report our main results from the multivariate regression analysis. We proceed in three steps. First, we report results of our target finance regressions, which allow us to account for country-level heterogeneity in the analysis of non-linearities. Then, we present and discuss our main results relating labour market performance to financial sector expansion. Finally, we discuss further analyses aiming to prove the robustness of our main results.

#### ***Target finance regressions***

To account for country-level heterogeneity in financial sector depth, we borrow from the (corporate) finance literature, and in particular its capital structure stream. Regressing

actual capital structure choices on a set of firm-specific determinants, this literature frequently interprets firm-specific predictions from such regressions as a firm's 'target capital structure' (e.g. Hovakimian, Opler, and Titman 2001). We adopt this approach to predict an economy's target level of finance. Specifically, borrowing from the discussion in La Porta, Lopez-de-Silanes, and Shleifer (1997), we run multivariate regressions of finance on measures of an economy's size and growth, as well as the quality of country-level governance and interpret prediction of these regressions as an economy's target level of finance.

Table 3 provides regression estimates for the worldwide sample and OECD economies (Specification I.1-3 and Specification II.1-3, respectively). Throughout the table, we find that larger economies have on average higher financial development in terms of *FSS*, *SMS*, and *PCV*. Consistent with the earlier findings in the finance-growth literature (e.g. Demirgüç-Kunt, Feyen, and Levine 2013; Gambacorta, Yang, and Tsatsaronis 2014; Langfield and Pagano 2016; Rapp and Udoieva 2017), we document that economic growth is negatively associated with private credit volume (I.2 and II.2) and positively associated with stock market size (I.3 and II.3). Also, in line with the findings of La Porta, Lopez-de-Silanes, and Shleifer (1997), our results document that better quality of law enforcement (I.1-3 and II.1-3) and stronger investor protection (I.1, I.2, and II.1) are consistently associated with a larger financial sector. Yet, in the subsample of OECD economies, quality of law enforcement has relatively more explanatory power for financial development than the legal origin of an economy's commercial laws.

[Table 3 near here]

## ***Main results***

Table 4 reports regression estimates for the worldwide sample (Specification I.1-4) and for OECD countries (Specification II.1-2).<sup>5</sup> Consistent with the view that the labour market benefits from access to finance, I.1 and I.2 suggest a negative effect of financial deepening on unemployment. Differentiating between *StockMarket* and *Credit*, the latter seems particularly valuable for the labour market in the worldwide sample.

Allowing for non-linearities, as specified in model (2), I.3 and I.4 suggest that the returns to finance are diminishing. Hypothesizing that this pattern should be more pronounced in more developed economies, II.1 and II.2 restrict the sample to OECD countries and indeed the *ExcessFinance*-coefficients become larger with (despite the reduced sample size) larger corresponding t-values.

[Table 4 near here]

Figure 5 illustrates the results for OECD economies. According to Panel A, for our broad measure of financial depth, *FSS*, the minimum unemployment is reached with *ExcessFSS* equal to 33% of GDP. This corresponds to some 70% of the standard deviation or 58% of the 90% percentile. Panel B illustrates that for *StockMarket* the minimum unemployment is reached at *ExcessStockMarket* equal to 30% of GDP. This corresponds to some 112% of the standard deviation or 98% of the 90% percentile. Finally, Panel C highlights that there is no evidence that *Credit* adds to labour market performance in

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<sup>5</sup> Due to the small number of observational units and associated overfitting problem in GMM, we use the simple conditioning set of controls. In additional analyses, we gradually add other potential determinants of unemployment: measures of product market regulation, trade union density, and strictness of employment protection legislation. Our results remain robust.



developed economies. Instead, for an OECD country with target volume of private credit, a one standard deviation increase in *Credit* (about 30% of GDP) translates into a 110 basis points increase in unemployment, corresponding to some 51% of the within-country standard deviation of *UEmpl*.

[Figure 5 near here]

### ***Additional analyses***

To validate the consistency of our findings, we perform three types of sensitivity analyses reported in Table 5. *First*, we re-estimate model (1) using the standard harmonized unemployment rate (instead of the log-version) as the right-hand side variable. Specification I.5-6 and II.4-5 estimated based on the worldwide sample and OECD economies, respectively, provide additional support for our baseline findings.

*Second*, following the discussion in Demirgüç-Kunt, Feyen, and Levine (2013), we collect data on the capitalization of private domestic bond markets from the World's Bank GFD Database and additional sources (NASDAQ OMX Baltic, World Federation of Exchanges, Federation of European Securities Exchanges). In the following, we add private credit volume and private bond market capitalization up into a composite measure *DebtMarket*, substitute it for *PCV*, and re-run regression analyses. In line with previous findings, Specification I.7 indicates that both developed stock and private debt markets favour labour market performance by reducing unemployment. Yet, after allowing for non-

linearities, I.8 suggests that the favorable effect of private debt market is smaller in magnitude and diminishes faster.<sup>6</sup>

*Third*, taking advantage of better data availability for OECD economies, we report alternative specifications of model (2), in which we control for the effect of other potential determinants of unemployment such as product market regulation, trade union density, and strictness of employment protection legislation (Amable, Demmou and Gatti 2011; Gatti, Rault, and Vaubourg 2012; Nickell, Nunziata, and Ochel 2005). To deal with an overfitting bias arising from the small number of OECD countries relative to the number of instruments, we follow an approach suggested by Beck and Levine (2004) and stepwise include additional regressors (Specification II.6-II.8). Our results remain robust.

[Table 5 near here]

## **Conclusion**

Aiming to complement the well-developed finance-growth literature, we study the effect of financial deepening on labour market performance. Using advanced dynamic panel analysis estimation techniques, we find that financial sector expansion is beneficial for the labour market, however, the relative contribution of finance vanishes once the economy's financial sector becomes excessively large. Thus, the study highlights the importance of monitoring the expansion of the financial sector. Thereby, particular attention should be drawn to private credit in developed economies.

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<sup>6</sup> Data limitations restrict this analysis to the worldwide sample, as for the OECD sample the number of observations would decrease below 100.

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Table 1. Variables' definitions and sources.

Variable	Definition	Source
<i>UEmpl</i>	Logarithm of the harmonized unemployment rate (% of total labour force)	ILOSTAT Database, OECD Labour Force Statistics
<i>FSS</i>	Broad measure of financial sector depth, defined as the sum of <i>StockMarket</i> and <i>Credit</i>	GFD Database
<i>StockMarket</i>	Total market capitalization of an economy's domestic listed companies (to GDP)	GFD Database
<i>Credit</i>	Domestic credit to private sector (to GDP)	GFD Database
<i>DebtMarket</i>	Aggregate of <i>Credit</i> and the total amount of outstanding private debt securities issued in domestic markets and placed by nationals on international markets (% of GDP)	GFD Database, NASDAQ OMX Baltic, World Federation of Exchanges, Federation of European Securities Exchanges
<i>GDPperWorker</i>	GDP divided by the economy's total employment (constant PPP\$)	ILOSTAT Database, OECD Productivity Database
<i>Replacement</i>	Initial net unemployment benefit replacement rates for single-earner households without children (to average production worker (APW) wage level)	OECD Database on Benefits and Wages
<i>Wedge</i>	Taxes paid by an average single worker (a single person at 100% of average earnings) without children (to total labour cost)	OECD Tax Statistics
<i>PMR</i>	Indicator of the strictness of product market regulation	OECD Indicators of Product Market Regulation
<i>UnionDensity</i>	Number of wage and salary earners that are trade union members (% total)	OECD and J.Visser, ICTWSS Database 3.0
<i>EPL</i>	Indicator of the strictness of employment protection legislation	OECD Indicators of Employment Protection
<i>GDP</i>	Logarithm of gross domestic product at purchaser's prices (constant 2010 US\$)	World Bank and OECD national accounts data
$\Delta GDP$	Average annual growth rate of per capita gross domestic product (constant local currency)	World Bank and OECD national accounts data
<i>RoL</i>	Estimate of perceptions of the extent to which agents have confidence in and abide by the rules of society	World Governance Indicators
<i>French, German, Scandinavian</i>	Binary variable equal to one if legal origin of an economy's commercial laws is French, German or Scandinavian, respectively, and zero otherwise	La Porta, Lopez-de-Silanes, and Shleifer (1997)

*Notes:* The table provides a list of variables' names, descriptions, and data sources. GFD Database refers to the World Bank's Global Financial Development Database. We use the June 2017 version accessible at [www.worldbank.org/en/publication/gfdr/data/global-financial-development-database](http://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database) (as of September 2017).



Table 2. Descriptive statistics.

<b>Panel A: Worldwide sample</b>									
Variable	<b>Panel A.1: Annual data</b>				<b>Panel A.2: 5-year averages</b>				
	N	Mean	Median	SD	N	Mean	Median	Pooled SD	Time-series within SD
<i>UEmpl<sup>a</sup></i>	2,223	8.86	7.61	5.75	458	8.90	7.54	5.69	1.93
<i>FSS</i>	2,223	1.14	0.83	1.15	458	1.18	0.87	1.12	0.48
<i>StockMarket</i>	2,223	0.52	0.29	0.86	458	0.53	0.31	0.83	0.41
<i>Credit</i>	2,223	0.63	0.49	0.47	458	0.65	0.51	0.46	0.17
<i>ExcessFSS</i>	2,070	0.25	0.00	0.75	433	0.24	0.00	0.76	0.38
<i>ExcessStockMarket</i>	2,070	0.17	0.00	0.66	433	0.16	0.00	0.67	0.37
<i>ExcessCredit</i>	2,070	0.13	0.00	0.25	433	0.13	0.00	0.25	0.11
<i>GDPperWorker<sup>a</sup></i>	2,223	48,076	38,221	37,809	458	48,974	39,400	37,652	6,517

<b>Panel B: OECD sample</b>									
Variable	<b>Panel B.1: Annual data</b>				<b>Panel B.2: 5-year averages</b>				
	N	Mean	Median	SD	N	Mean	Median	Pooled SD	Time-series within SD
<i>UEmpl<sup>a</sup></i>	846	7.53	7.01	3.93	144	7.67	7.21	3.69	2.06
<i>FSS</i>	846	1.47	1.36	0.75	144	1.60	1.54	0.68	0.37
<i>StockMarket</i>	846	0.58	0.47	0.41	144	0.63	0.57	0.38	0.19
<i>Credit</i>	846	0.88	0.82	0.46	144	0.97	0.92	0.43	0.26
<i>ExcessFSS</i>	846	0.19	0.00	0.35	144	0.17	0.00	0.29	0.17
<i>ExcessStockMarket</i>	846	0.11	0.00	0.22	144	0.09	0.00	0.17	0.11
<i>ExcessCredit</i>	846	0.12	0.00	0.23	144	0.12	0.00	0.21	0.13
<i>GDPperWorker<sup>a</sup></i>	842	68,799	67,513	19,933	144	73,801	73,323	18,691	6,994
<i>Replacement</i>	817	0.59	0.60	0.13	144	0.59	0.60	0.13	0.05
<i>Wedge</i>	687	0.37	0.38	0.11	144	0.37	0.38	0.11	0.02

<sup>a</sup> *UEmpl* and *GDPperWorker* are reported without taking the natural logarithm.

*Notes:* The table reports descriptive statistics of variables used in the analyses of the worldwide sample (Panel A) and OECD sample (Panel B). Panel A.1 and Panel B.1 refer to annual data, while Panel A.2 and Panel B.2 consider non-overlapping 5-year averages. SD refers to standard deviation. The time-series within SD refers to the average of all within SD calculated at the country level. A detailed description of all variables can be found in Table 1.

Table 3. Target finance regressions.

Dependent variable	FSS	SMS	PCV	FSS	SMS	PCV
Method (SEs)	OLS (clustered at the country level)					
Sample	World			OECD		
	(I.1)	(I.2)	(I.3)	(II.1)	(II.2)	(II.3)
<i>GDP</i>	0.12*** (4.56)	0.06*** (3.97)	0.05*** (3.16)	0.17*** (2.76)	0.07** (2.52)	0.10** (2.48)
$\Delta GDP$	0.00 (0.30)	0.02* (1.85)	-0.01* (-1.78)	0.02 (0.88)	0.04*** (2.85)	-0.02* (-1.87)
<i>RoL</i>	0.56*** (5.73)	0.30*** (3.63)	0.21*** (8.58)	0.78*** (4.43)	0.39*** (3.04)	0.38*** (7.29)
<i>French</i>	-0.40** (-2.22)	-0.29** (-2.08)	-0.06 (-1.10)	0.00 (0.01)	0.07 (0.49)	-0.05 (-0.56)
<i>German</i>	-0.57** (-2.22)	-0.51*** (-2.69)	-0.00 (-0.01)	-0.13 (-0.46)	-0.15 (-0.85)	0.02 (0.15)
<i>Scandinavian</i>	-0.79*** (-2.71)	-0.56** (-2.37)	-0.15* (-1.71)	-0.34* (-1.87)	-0.20 (-1.54)	-0.13 (-1.08)
Observations	592	594	916	214	214	225
Countries	98	98	98	34	34	34
Period-fixed effects	yes	yes	yes	yes	yes	yes
Adjusted R <sup>2</sup>	0.385	0.224	0.507	0.564	0.442	0.538

*Notes:* The table reports OLS-results of target finance regressions according to model (3). Financial sector depth (*FSS*), stock market size (*SMS*), and private credit volume (*PCV*) are regressed on the measures of an economy's size, growth, and country-level governance for the worldwide sample (Specification I.1-3) and OECD economies (Specification II.1-3). Data points are averaged over non-overlapping 5-year periods. A constant and period-fixed effects are included in every regression. Standard errors are clustered at the country level. Values in parentheses are t-statistics, \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively. A detailed description of all variables can be found in Table 1.

Table 4. Regression analysis of the finance-unemployment nexus.

Dependent variable	Unemployment( <i>UEmpl</i> )					
	GMM (Windmeijer-corrected)					
	World				OECD	
Method (SEs)						
Sample						
	(I.1)	(I.2)	(I.3)	(I.4)	(II.1)	(II.2)
<i>FSS</i>	<b>-0.10**</b> (-2.12)		<b>-0.30***</b> (-2.78)		<b>-0.21*</b> (-1.91)	
<i>ExcessFSS</i> <sup>2</sup>			<b>0.03**</b> (2.42)		<b>0.32**</b> (2.38)	
<i>StockMarket</i>		<b>-0.04*</b> (-1.87)		<b>-0.31***</b> (-3.16)		<b>-0.80***</b> (-2.71)
<i>ExcessStockMarket</i> <sup>2</sup>				<b>0.03***</b> (2.65)		<b>1.32***</b> (2.72)
<i>Credit</i>		<b>-0.29**</b> (-2.03)		<b>-0.23</b> (-1.05)		<b>0.16</b> (0.53)
<i>ExcessCredit</i> <sup>2</sup>				<b>0.24*</b> (1.71)		<b>0.77**</b> (2.57)
<i>UEmpl(lag)</i>	0.76*** (4.83)	0.72*** (4.50)	0.71*** (4.89)	0.78*** (7.12)	0.38*** (3.04)	0.65*** (2.90)
<i>GDPperWorker(ln)</i>	0.20** (2.18)	0.21** (2.32)	0.33*** (2.92)	0.26** (2.35)	0.01 (0.02)	0.21 (0.31)
<i>Replacement</i>					-1.25 (-1.44)	-0.97 (-0.73)
<i>Wedge</i>					1.72 (1.37)	3.00* (1.85)
Observations	458	458	433	433	144	144
Countries	109	109	98	98	32	32
Period-fixed effects	yes	yes	yes	yes	yes	yes
Hansen(p-value)	0.475	0.200	0.363	0.312	0.456	0.920
AR(2)(p-value)	0.567	0.380	0.355	0.422	0.928	0.859

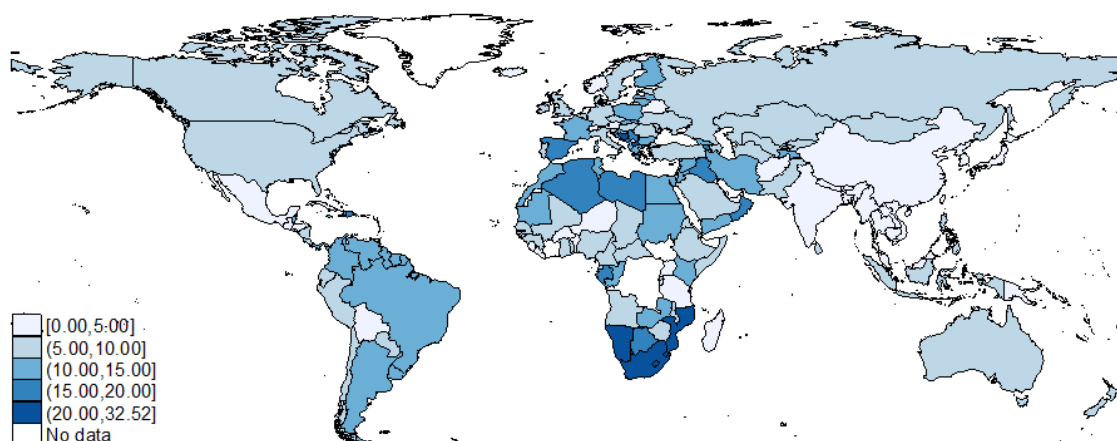
*Notes:* The table reports regression estimates of the relationship between the financial sector expansion and labour market performance in the worldwide sample (Specification I.1-4) and OECD economies (Specification II.1-2) over 1991-2015. Data points are averaged over non-overlapping 5-year periods. Specifications are estimated by the system GMM estimator with Windmeijer-corrected standard errors. A constant and period-fixed effects are included in every regression. Values in parentheses are t-statistics, \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively. A detailed description of all variables can be found in Table 1.

Table 5. Additional analyses.

Dependent variable	<i>UEmpl</i>		<i>UEmpl</i> *		<i>UEmpl</i>		<i>UEmpl</i>		<i>UEmpl</i> *		<i>UEmpl</i> *		<i>UEmpl</i>			
Method (SEs)	GMM (Windmeijer-corrected)															
Sample	World								OECD							
	(I.1)	(I.2)	(I.3)	(I.4)	(I.5)	(I.6)	(I.7)	(I.8)	(II.1)	(II.2)	(II.3)	(II.4)	(II.5)	(II.6)	(II.7)	(II.8)
<i>FSS</i>	-0.10**		-0.30***		-1.88***				-0.21*			-1.81*				
	(-2.12)		(-2.78)		(-3.34)				(-1.91)			(-1.91)				
<i>ExcessFSS</i> <sup>2</sup>			0.03**		0.18***				0.32**			2.31**				
			(2.42)		(2.90)				(2.38)			(2.01)				
<i>StockMarket</i>		-0.04*		-0.31***		-2.43***	-0.12*	-0.29**		-0.40**	-0.80***		-5.30***	-0.68***	-0.70***	-0.60***
		(-1.87)		(-3.16)		(-3.06)	(-1.65)	(-2.27)		(-2.30)	(-2.71)		(-2.70)	(-3.42)	(-3.18)	(-2.83)
<i>ExcessStockMarket</i> <sup>2</sup>				0.03***		0.26***		0.03*			1.32***		4.20	1.13**	0.93**	0.63*
				(2.65)		(2.76)		(1.85)			(2.72)		(1.12)	(2.20)	(2.19)	(1.71)
<i>Credit</i>		-0.29**		-0.23		-1.63				0.43	0.16		1.35	0.00	0.08	0.47*
		(-2.03)		(-1.05)		(-1.01)				(1.60)	(0.53)		(0.62)	(0.02)	(0.26)	(1.82)
<i>ExcessCredit</i> <sup>2</sup>				0.24*		2.25**					0.77**		2.88	0.39**	0.48**	0.23
				(1.71)		(2.20)					(2.57)		(1.52)	(2.36)	(2.23)	(1.07)
<i>BondMarket</i>							-0.13*	-0.19*								
							(-1.88)	(-1.91)								
<i>ExcessBondMarket</i> <sup>2</sup>								0.08***								
								(3.67)								
<i>UEmpl(lag)</i>	0.76***	0.72***	0.71***	0.78***	0.62***	0.75***	0.60***	0.49***	0.38***	0.61***	0.65***	0.27**	0.55***	0.42***	0.63***	0.74***
	(4.83)	(4.50)	(4.89)	(7.12)	(3.92)	(5.10)	(4.71)	(4.14)	(3.04)	(3.38)	(2.90)	(2.08)	(2.84)	(4.20)	(3.01)	(6.33)
<i>GDPperWorker(ln)</i>	0.20**	0.21**	0.33***	0.26**	1.88***	1.47**	0.36**	0.37**	0.01	-0.44	0.21	1.73	0.81	1.02***	0.82*	0.12
	(2.18)	(2.32)	(2.92)	(2.35)	(2.78)	(2.10)	(2.26)	(2.24)	(0.02)	(-0.66)	(0.31)	(0.40)	(0.16)	(2.62)	(1.75)	(0.27)
<i>Replacement</i>									-1.25	0.75	-0.97	-14.92**	-3.82	-1.66***	-0.67	0.15
									(-1.44)	(0.62)	(-0.73)	(-2.01)	(-0.48)	(-3.18)	(-0.56)	(0.15)
<i>Wedge</i>									1.72	2.47	3.00*	9.14	21.88**			
									(1.37)	(1.43)	(1.85)	(1.01)	(2.23)			
<i>PMR</i>														0.16		
														(1.21)		
<i>UnionDensity</i>															-0.40	
															(-0.50)	
<i>EPL</i>																0.21
																(1.17)
Observations	458	458	433	433	433	433	228	228	144	144	144	144	144	150	150	150
Countries	109	109	98	98	98	98	51	51	32	32	32	32	32	32	32	32
Period-fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Hansen(p-value)	0.475	0.200	0.363	0.312	0.402	0.400	0.651	0.390	0.456	0.225	0.920	0.639	0.666	0.956	0.727	0.837
AR(2)(p-value)	0.567	0.380	0.355	0.422	0.179	0.209	0.168	0.195	0.928	0.856	0.859	0.334	0.219	0.281	0.770	0.972

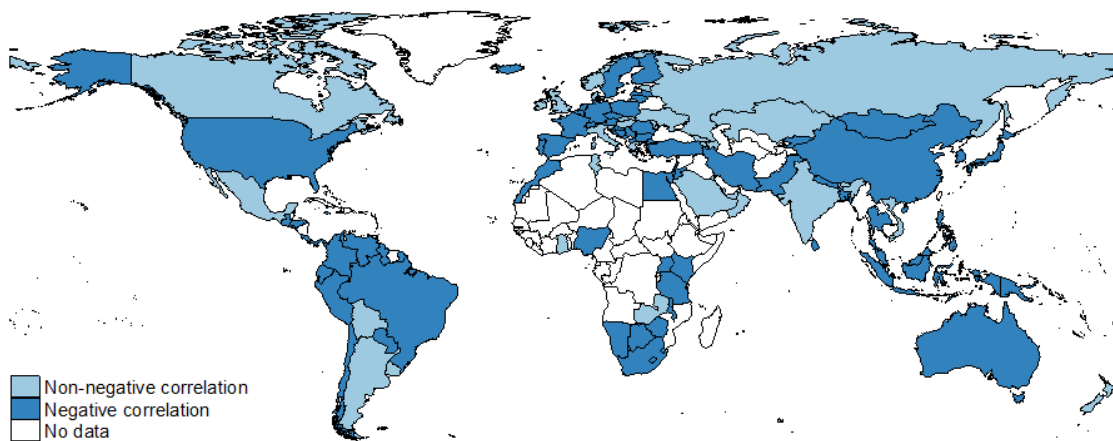
*Notes:* The table reports regression estimates of the relationship between the financial sector expansion and labour market performance in the worldwide sample (Specification I.1-8) and OECD economies (Specification II.1-8) over 1991-2015. Data points are averaged over non-overlapping 5-year periods. *UEmpl\** refers to non-logarithmized harmonized unemployment rate. Specifications are estimated by the system GMM estimator with Windmeijer-corrected standard errors. A constant and period-fixed effects are included in every regression. Values in parentheses are t-statistics, \*, \*\*, \*\*\* indicate significance at the 10%, 5%, and 1% level, respectively. A detailed description of all variables can be found in Table 1.

Figure 1. Average unemployment rates in the worldwide sample, 1991-2015.



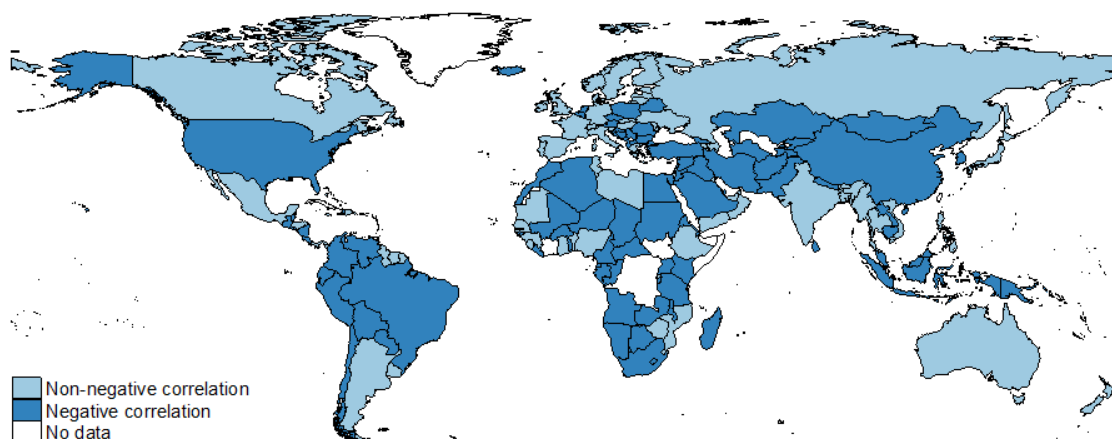
*Notes:* The figure illustrates cross-country levels of an average harmonized unemployment rate (in % of total labour force) for the analysed developed and developing economies over 1991-2015 (data permitting). Data are drawn from the ILOSTAT Database and OECD Labour Force Statistics.

Figure 2. Within-country correlations between financial sector depth and unemployment, 1991-2015.



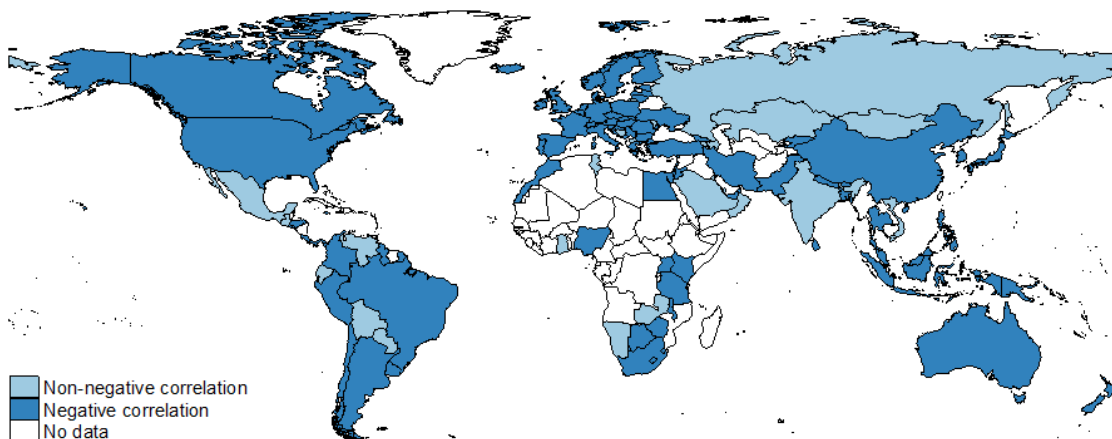
*Notes:* The figure reports the type of the within-country correlations between the aggregate financial sector depth and unemployment for the worldwide sample over 1991-2015 (data permitting). The correlation estimates are obtained by running a multivariate regression analysis according to model (1) country-by-country. A detailed description of variables' definitions and sources is provided in Table 1.

Figure 3. Within-country correlations between private credit volume and unemployment, 1991-2015.



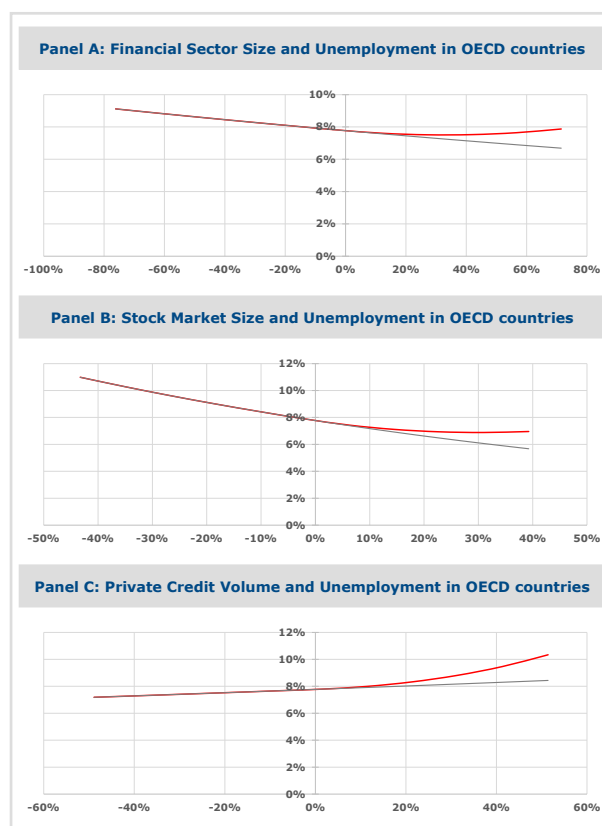
*Notes:* The figure reports the type of the within-country correlations between the volume of domestic credit to private sector and unemployment for the worldwide sample over 1991-2015 (data permitting). The correlation estimates are obtained by running a multivariate regression analysis according to model (1) country-by-country. A detailed description of variables' definitions and sources is provided in Table 1.

Figure 4. Within-country correlations between stock market size and unemployment, 1991-2015.



*Notes:* The figure reports the type of the within-country correlations between stock market capitalization and unemployment for the worldwide sample over 1991-2015 (data permitting). The correlation estimates are obtained by running a multivariate regression analysis according to model (1) country-by-country. A detailed description of variables' definitions and sources is provided in Table 1.

Figure 5. Illustrating regression results for OECD countries.



Notes: The figure illustrates the results of model (2) for developed economies (OECD economies). Specifically, it plots predicted unemployment rates on the y axis against levels of ExcessFinance (Panel A: *ExcessFSS*, Panel B: *ExcessStockMarket*, and Panel C: *ExcessCredit*) on the x axis, where zero *ExcessFinance* refers to the target level of finance as predicted by our target finance regression according to model (3). A detailed description of variables' definitions and sources is provided in Table 1.