

# Does Informality Hinder Financial Development Convergence?

Can Sever \*

International Monetary Fund

Emekcan Yücel<sup>†</sup>

Boğaziçi University

August 28, 2021<sup>‡</sup>

Most recent version is [here](#).

## Abstract

This paper sheds light on the role of informal economy in financial development convergence. The evidence shows that credit levels tend to converge across countries over time, particularly when informality is lower. As the size of informal economy becomes larger, however, financial development convergence weakens, and eventually can turn out to be divergence. This finding suggests that policies that address informality can help countries with lower levels of financial development catch up with the countries with more developed financial systems. It also has implications for the evolution of cross-country income gaps, considering the role of financial development in economic performance. In the last part of the paper, we find evidence consistent with this. Result shows that higher informality is also associated with weaker income convergence across countries over time.

**JEL-Codes:** E26, F37, G10, G20, H26, N20, O16, O17, O47

**Keywords:** Financial development, informality, shadow economy, convergence, banking, credit, international finance

---

\*International Monetary Fund, 700 19th Street, N.W. Washington, D.C. 20431, United States. Email: [csever@imf.org](mailto:csever@imf.org)

<sup>†</sup>Boğaziçi University, Department of Economics, Natuk Birkan Building, Bebek, İstanbul 34342, Turkey. Email: [emekcan.yucel@boun.edu.tr](mailto:emekcan.yucel@boun.edu.tr)

<sup>‡</sup>The views expressed here are those of the authors and do not necessarily represent the views of the IMF, its Executive Board, or IMF management. All errors are our own.

# 1 Introduction

Whether income gaps across countries narrow down, persist, or widen over time has been a central question of the literature on economic growth.<sup>1</sup> On the other side, there is abundant evidence in the literature that financial development plays a crucial role in both economic growth,<sup>2</sup> and also, in income convergence across countries (Aghion et al. 2005). Therefore, bridging cross-country gaps in financial development can promote cross-country income convergence, and in turn, help poorer countries achieve the living standards in the richer ones. On the other side, if differences in financial development across countries persist, or even widen, over years, this may exacerbate existing income gaps across the globe. These raise the question of whether financial development tends to converge across countries over time, and relatedly, which country-specific factors help us understand the strength of that convergence better. In this paper, we specifically focus on the role of informality in financial development convergence, and find that higher informality is associated with weaker financial development convergence.

One might expect cross-country convergence in financial development, as financial institutions likely have a higher potential to reach new customers, expand new areas of service, and introduce new products in countries where the starting level of financial development is lower. Combined with the strong wave of financial liberalization around the world in the recent decades, these opportunities attract both domestic and international financial institutions to invest in such countries. Such investments by international financial institutions also help spread international know-how in finance, thereby reducing knowledge gaps in the financial sector in countries with initially lower level of financial development (Bahadir and Valev, 2015). These in turn can generate an underlying process of convergence by spurring financial development in countries that have less developed financial markets to begin with.

---

<sup>1</sup>See, among many others, Solow (1956), Barro and Sala-i-Martin (1992), Islam (1995).

<sup>2</sup>The vast literature on the effect of financial development on productivity and economic growth dates back to Schumpeter (1911), and includes, among many others, King and Levine (1993a, 1993b), Rajan and Zingales (1998), Beck et al. (2000a).

However, in order for the aforementioned channels to work, the ability and capacity to operationalize such opportunities should also be higher in countries with initially lower financial development. This is where informality can matter. Informal, or shadow, economy is broadly defined as all economic activities that are hidden from official authorities for various reasons (Medina and Schneider, 2018). The extent of such activities can weaken those channels for several reasons. On the firm side, banks would not be willing to extend credit to firms who lack proper documentation that shows financial soundness. Moreover, hidden assets of firms operating in the informal sector cannot be used as collateral for bank credit (World Bank, 2007). On the worker side, informal sector workers whose hidden labor income cannot be verified would not have access to credit from banks. Hence, strong presence of informality can limit the ability and capacity of financial markets to take advantage of available opportunities, thereby preventing them from reaching their true potential. This, in turn, can hinder the process where countries with less developed financial systems catch up with the developed ones. Whether this is the case or not, though, is an empirical question which has not been answered yet.

In this paper, we answer this empirical question by shedding light on the role of informal economy in financial development convergence. Using data from 156 economies over the period of 1991-2017, we find that lower informality is associated with stronger financial development convergence. In particular, the evidence shows that credit levels (as share of GDP) exhibit convergence across countries over time, particularly when informality is lower. As the size of the informal sector becomes larger, however, financial development convergence becomes negligible, and eventually can turn out to be divergence. The estimates imply that financial development convergence is pronounced in cases where the size of informality is low, i.e. below 26% of GDP. In the range of informality from 26% to 50% of GDP, convergence becomes negligible. Once the size of informality exceeds 50% of GDP,

there exists financial development divergence. This finding remains similar when financial development convergence is tested conditional on other factors, and cannot be explained by cross-country differences in institutional quality. We conclude that informality is an important determinant of the evolution of cross-country gaps in financial development.

This implies that as countries with lower levels of financial development take actions to downsize the extent of informal activities, their financial systems can catch up with the countries with more developed financial systems. On the other side, higher informality can create leaders and laggards in terms of financial development. Our results show that cross-country gaps in financial development can persist, or even widen, over years in the presence of high informality.

The role of informality in the evolution of cross-country differences in financial development can have implications for income gaps across countries as well, since financial development is crucial for economic growth and also found to be important for income convergence (Aghion et al. 2005). In the second part of the paper, we show evidence on this phenomenon. We find that lower informality is also associated with weaker income convergence across countries over time. This suggests that policies to curb the problem of informality can ultimately help developing countries reach the living standards in the developed countries, thereby narrowing down income inequality across countries.

We contribute to the long literature on the determinants of financial development by providing new evidence that helps us understand the evolution of cross-country differences. The literature identified many factors as drivers of financial development,<sup>3</sup> including informality.<sup>4</sup> This paper focuses on a related, but different question: Instead of the role of informality in explaining the size of cross-country differences in financial development (as

---

<sup>3</sup>See La Porta et al. (1997, 1998), Beck et al. (2003), Acemoglu and Johnson (2005), Djankov et al. (2007).

<sup>4</sup>See Roubini and Sala-i-Martin (1992, 1995), Dabla-Norris and Koeda (2008), Elgin and Uras (2013).

documented by the existing studies), we focus on the extent to which informality affects how those differences change over time. There is a significant difference between the two. The goal of the former is to understand whether financial services that are available for firms and households increase, if the size of informal economy decreases. The latter, however, aims to explain whether some countries lead or lag in the process of financial development, depending on the level of informality. Hence, beyond the role of informality in explaining current gaps in financial development across countries, the question we investigate sheds light on whether informality is a barrier to bridging existing cross-country gaps in financial development in the long-term.

On the other side, the limited literature that investigates whether financial development converges across countries finds mixed results in general.<sup>5</sup> The closest to our paper is Bahadir and Valev (2015), who show that the level of credit (as share of GDP) converges across countries. However, to the best of our knowledge, there is no previous study that have looked at how the level of informality affects this convergence process. Hence, ours is the first paper that investigates the role of informality in the process whereby financial development levels converge across countries, and to show that it indeed plays a crucial role.

Finally, we contribute to the literature on income convergence across countries. Given the significant effect of financial development on economic growth and cross-country income gaps (as found in the literature and cited earlier), our results on the effect of informality on financial development convergence already, but indirectly, imply that informality can also weaken income convergence. In the second part of the paper, we also directly test whether this is the case, and find that higher informality is indeed associated with weaker income convergence across countries. Therefore, our results also add to the literature on cross-country income convergence by showing that informality weakens convergence of income, and by providing a specific channel (i.e. effect of informality on financial development convergence) through which this effect works.

---

<sup>5</sup>See Bianco et al. (1997), Antzoulatos et al. (2011), Veysov and Stolbov (2011), Bruno et al. (2012).

The findings in this paper are even more relevant in the post-COVID-19 world. The pandemic has led to a large and wide-spread economic downturn across the globe (IMF, 2021), and seems to exacerbate existing cross-country income gaps (Filippini and Yeyati, 2021). There is plenty of evidence that informal economy can serve as a buffer during the periods of adverse economic shocks by absorbing some portion of the fall in output (e.g. Schneider and Buehn 2012, Colombo et al. 2016). Informality is likely to expand during the pandemic-driven economic downturn as well, since people turn to informal activities for their livelihood (ILO 2020a, 2020b). Our findings imply that such an increase in informality can hamper financial development convergence across countries in the post-pandemic world, and in turn, add to the negative effect of the pandemic on cross-country income differences. On the positive side, the role of informality in convergence as we find points to an opportunity for many developing economies to promote economic recovery from the COVID-19 shock, and catch up with the developed economies, if right policies that aim to mitigate informality are implemented.

The rest of this paper is organized as follows. Section 2 explains the data and variables. Section 3 illustrates the stylized fact. Section 4 introduces the empirical methodology. Section 5 documents and discusses the results. Finally, Section 6 concludes.

## 2 Data

This section explains the data and variables. For brief descriptions, see Appendix (Table A1).

### 2.1 Financial variables

Financial variables are obtained from the Financial Development and Structure Dataset (FDSD) compiled by Beck et al. (2000b, 2009). We adopt the most recent update by the authors in 2019 which has data until 2017. The database collects information from a wide range

of sources, and provides variables on financial systems for a broad set of countries. We obtain two widely-used proxies for financial development, namely, private credit by deposit money banks (bank credit), and private credit by deposit money banks and other financial institutions (total credit), as shares of GDP (expressed in percent).<sup>6</sup> We test our results using both variables, since non-bank credit can be an important source of funding for some countries.

When we test convergence conditional on other factors, we adopt two proxies for the efficiency of the banking system from the same dataset. Those are return on assets (ROA), defined as the average return as share of total assets; and overhead costs, defined as costs share of total assets in the banking system.

## 2.2 Informal economy

We obtain the data on the size of informal economy from Medina and Schneider (2018, 2020). The authors use multiple indicator-multiple cause (MIMIC) model to estimate the extent of informal activities (as share of GDP), and provide one of the most comprehensive and widely-used database that covers a large set of countries across the globe over the period of 1991-2017.

Informal economy, by definition, is difficult to measure, as individuals and firms that take part in those activities aims to remain undetected. Given its economic relevance, though, the literature has proposed various methodologies to estimate the extent of informal activities. These can broadly be classified as direct and indirect approaches. Direct approaches are mainly based on surveys with voluntary replies or tax auditing to measure the size of informal economy. The results are sensitive the design of questionnaire, and therefore, are not likely to capture a high fraction of informal activities. Moreover, it is not likely to ob-

---

<sup>6</sup>These are well-accepted proxies for financial development by the literature, e.g. King and Levine (1993a, 1993b), Levine et al. (2000), Rioja and Valev (2004), Beck et al. (2007), Djankov et al. (2007).

tain consistent and comparable results for a broad set of countries over a long period of time using this approach. Hence, cross-country studies focusing on a longer time period need to depend on data from indirect approaches. Indirect (or indicator-based) approaches employ indirect information, such as the residual between official and actual labor force, discrepancy between income and expenditure, electricity approach or currency demand, to estimate the extent of informal economy. Relatively recently, the literature has moved to MIMIC model.<sup>7</sup>

MIMIC model overcomes two main limitations of the majority of the rest of the indirect methodologies. First, previous methodologies mostly use one indicator, such as electricity, labor, or currency demand, to capture all informal economic activity in an economy. However, it is likely that informality can affect various indicators to some extent, and hence focusing on just one indicator may lead to higher measurement errors. Second, the models often do not account for potential causes of informal economic activity. In case of some exceptions, such as the currency demand approach, they consider only one cause. MIMIC model accounts for multiple indicators together with multiple causes, and hence provides a more complete picture of the extent of informality, as discussed by the literature (e.g. Alderslade et al. 2006). These are the main reasons why we prefer the database by Medina and Schneider (2018, 2020).

In particular, the MIMIC model uses structural equation modeling that is widely used in social science research since 1970s. It is mainly a theory-based approach to confirm the impact of a set of exogenous causal factors on the latent variable (i.e. informal economy), and the effect of the informal economy on macroeconomic indicators. Since 1980s, it has been widely applied to the realm of informal economy by highly influential papers in this area, e.g. Frey and Weck-Hanneman (1984), Schneider and Enste (2000, 2013), Gerxhani (2004),

---

<sup>7</sup>See Schneider and Enste (2000), Schneider (2005) and Medina and Schneider (2018) for comprehensive reviews of the literature and detailed discussions on advantages and disadvantages of various methodologies.

Buehn et al. (2009), Feld and Schneider (2010), Schneider et al. (2010), Mai and Schneider (2016) and Schneider and Buehn (2017). It estimates the size of informal economy in two steps, where the first one includes determining the causes and indicators of informal economy, and given the findings in the former, the second one is a structural equation model which treats informal economy as an unobserved phenomenon (i.e. latent variable). To estimate informality, the MIMIC model incorporates information on various causes (e.g. taxation variables, regulatory burden, institutional quality) and indicators (e.g. employment, or change of local currency). We refer the reader to Medina and Schneider (2018) for a detailed explanation of the methodology and the underlying consideration.

We acknowledge that, regardless of the methodology, it is not very likely to measure the “true” size of informality. In other words, there is no methodology that can precisely capture the size of informality. However, although being far from perfect, e.g. sometimes criticized for overestimating the size of shadow economy (Schneider and Williams, 2013), compared with other methodologies, MIMIC model (1) provides measures that are comparable across countries and years, and (2) captures a more complete picture of informality by accounting for multiple indicators, as discussed above. We also employ robustness checks to mitigate concerns about the exact estimates from the database (see Section 5.4).

As an alternative estimate for the size of informal economy, we use the data on informal employment from the ILOSTAT database in a robustness check. The database relies on household and labor force surveys and provides estimates of informal employment as percentage of total employment. However, the sample shrinks in this test. Another drawback of using those estimates is that they are only available for later years in the sample and only for few years in each country. We adopt the earliest year available for each country in the sample, ranging from 2010 to 2019. We note here, as we will show later (see Section 5.4), that our main result is robust to using this alternative measure of informality.

## 2.3 Other variables

We control for two macroeconomic factors to explore if the role of informality in financial development convergence stays similar conditional on those. Macroeconomic variables include GDP per capita (constant in 2010 USD and used in logarithm) and a proxy for financial openness. The former is from the World Bank World Development Indicators (WDI) database. When we run a weighted regression, we adopt real GDP (constant in 2010 USD and used in logarithm) from the same database. A de jure measure of capital account openness, the well-known index by Chinn and Ito (2006), is added in a separate test. It is a proxy for financial openness from a regulatory perspective, ranging from -2 to 2, higher values meaning economies with more open financial systems.

In a separate section where we examine if informality is indeed a proxy for the strength of institutions, we adopt proxies for institutional quality. We obtain three widely-used proxies from the Center for Systemic Peace Polity V dataset, namely the index on institutionalized democracy, polity score (the difference between the index on institutionalized democracy and the index on institutionalized autocracy scores), and the degree of political competition. Those indexes range from -10 to 10, higher values indicating stronger institutions. We also obtain the degree of political rights from the Freedom House database as an alternative proxy. The index ranges from 1 to 7, higher values pointing to lower institutional quality. Finally, we use the rule of law index from the World Bank's Worldwide Governance Indicators (WGI) database. It compiles information from various sources and captures the extent to which agents have confidence in and abide by the rules, and especially contract enforcement, property rights, police and courts. It is an index ranging from -2.5 to 2.5, higher values meaning a stronger rule of law.<sup>8</sup>

---

<sup>8</sup>There are two major drawbacks of using the WGI index though, namely, (1) the number of sources that are used for the index changes across countries and within countries (making both within- and cross-country comparison less reliable), and (2) there exist large standard errors which make the majority of country-year observations indistinguishable from each other. Moreover, the index is not available for all years. Whenever it is missing, we use the value from the closest available year. In any case, we use this index as the fifth alternative proxy for institutional quality.

## 2.4 Sample

The sample covers 156 countries, including advanced, emerging market and developing economies across the globe. The period of the analysis is from 1991 to 2017. The annual data is transformed into nine non-overlapping 3-year periods, i.e. 1992-1994, 1995-1997,..., 2013-2015 and 2016-2017, where the last period consists of two years. Average changes of credit as share of GDP are calculated within each 3-year period (in percentage points). All country-period observations are included in the sample, whenever the annual change is available for multiple years during a given 3-year period. Results are shown when the data is used at the annual frequency or non-overlapping 5-year periods as well (see Section 5.1). We also represent results in relevant subsamples (see Section 5.4).

## 3 Stylized Fact

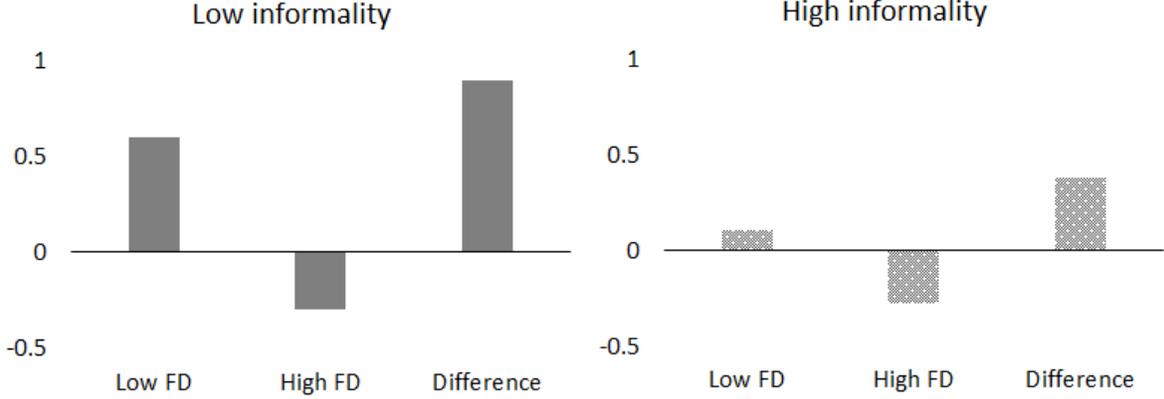
Before introducing the empirical methodology, this section explores whether there seems to be a systematic relationship between informality and financial development convergence. Figure 1 illustrates the findings. We aim to observe the extent of convergence in cases where informality is low and high at the first place. To make sure that few countries/periods do not affect our result, we first regress the changes in bank credit (as share of GDP) on country and time fixed effects, and obtain residual changes. Next, we divide the sample into two subsamples with low versus high informality based on the median value within the sample. In each subsample, we identify the country-period observations with initially low versus high levels of credit (based on the median value). Finally, we report the average annual growth rate of credit in each case.

The chart on the left reports the values from the subsample where the beginning-of-period value of informality is low. The first solid bar is the average annual change (during the subsequent 3-year period) of credit in cases where beginning-of-period level of credit is low. It is 0.6 pp. The second bar is the average annual change of credit in cases where initial

level of credit is high. It is -0.3 pp. These mean that credit (as share of GDP) grows more whenever it is initially low, pointing to the convergence across countries over time. The third solid bar is the difference between the first two bars (0.9 pp), providing a measure of the strength of financial development convergence in this subsample with low informality.

The chart on the right replicates the same exercise in the subsample with high informality. The first bar shows that the credit growth is 0.1 pp in case of low initial credit in this subsample. The second bar illustrates that the credit growth is around -0.3 pp when initial credit is high. The difference in the growth rates of credit in cases with low versus high initial credit is 0.4 pp in this case. Therefore, comparing the third bars in the left (0.9 pp) and in the right (0.4 pp) charts, financial development convergence appears to be stronger under low informality (left chart). Looking at the numbers, the driving force of this gap comes from the difference across two subsamples in case of low initial credit (i.e. comparing the first solid bar and the first dotted bar). In the subsample with high informality (the right chart), when initial credit is low, credit growth is lower (the first dotted bar, 0.1 pp), relative to the growth in the subsample with low informality (the first solid bar in the left chart, 0.6 pp). It seems to be the case that high informality poses a barrier to credit growth whenever the rate of growth must be higher to achieve convergence (i.e. in case of low financial development). Motivated by this fact, we next introduce our empirical methodology to shed light on this phenomenon more formally.

Figure 1: *Financial development convergence and informality*



Notes: We use non-overlapping 3-year periods. Sample is divided into two subsamples based on the median value of beginning-of-period informality. In each subsample the mean values of the residual growth rate of financial development (annual, and in percentage points) are reported when financial development is low and high. Low and high values of financial development is defined using the median values in each subsample. Financial development is defined as bank credit to GDP. Residual growth rates are obtained by regressing the changes in credit on country and time fixed effects.

## 4 Methodology

Our goal is to examine the role of informality in financial development convergence across countries over time. The annual data is transformed into non-overlapping 3-year periods as with the standard practice in the literature.<sup>9</sup> This approach helps us keep the within-country variation and smooth out annual variations at the same time. It also captures medium-run dynamics in financial development. The specification is as follows:

$$\Delta FD_{c,t} = \beta_1 FD_{c,t} + \beta_2 FD_{c,t} \times Informality_{c,t} + \beta_3 Informality_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t} \quad (1)$$

where  $c$  and  $t$  stand for country and period, respectively.  $FD$  represents financial development, defined as the level of credit as share of GDP. The dependent variable  $\Delta FD_{c,t}$  is the average annual change of credit as share of GDP (in percentage points) over each period, while  $FD_{c,t}$  is the beginning-of-period value.  $Informality_{c,t}$  is the size of informal

<sup>9</sup>Several strands of the literature on income convergence or financial development adopted similar approaches, e.g. Barro (1997, 2003), Beck et al. (2000a), Levine et al. (2000) and Demirguc-Kunt et al. (2013). Bahadir and Valev (2015), focusing on credit convergence, also employed this kind of transformation. As noted before, we represent the results when the data is used at the annual frequency, or transformed into 5-year periods (with 5 periods in total), as well.

economy, as share of GDP, obtained from the beginning of each period. Adopting the informality from the beginning of each period mitigates concerns about reverse causality, since the change in financial development in coming years is not likely to affect informality in the past. Country ( $\alpha_c$ ) and time ( $\alpha_t$ ) fixed effects account for time-invariant country-specific features and period shocks that are common across countries. Standard errors are clustered at the country-level. Results are also shown when country fixed effects are excluded, or country-specific period trends are included (see Section 5.4).

In the absence of the interaction term ( $FD_{c,t} \times Informality_{c,t}$ ), financial development convergence would be captured by  $\beta_1$ . If there is convergence,  $\beta_1$  must be negative, suggesting that credit tends to grow faster in countries/periods where it is lower in the first place. On the other side,  $\beta_1 \approx 0$  means that differences in financial development do not narrow down across countries over time, and  $\beta_1 > 0$  indicates divergence.

However, in our setup, there is a country-specific convergence parameter  $\lambda_{c,t}$  that potentially depends on the size of informality:

$$\lambda_{c,t} = \beta_1 + \beta_2 Informality_{c,t}$$

In this setup, financial development exhibits convergence across countries over time, if and only if  $\lambda_{c,t}$  is negative. Therefore, if  $\beta_2$  turns out to be negative, there exists convergence for all levels of informality, and the pace of convergence increases as the size of informality increases. In other words, informality promotes financial development convergence in that case. If  $\beta_2$  is around zero, this indicates that financial development convergence is not much affected by the size of informality. Finally, whenever  $\beta_2$  is found to be positive, both the presence and the pace of financial development convergence depends on the size of informality. In this case, depending on the relative size of coefficient estimates for  $\beta_1$  and  $\beta_2$ , financial development convergence can still be present at lower levels of informality (i.e.  $\lambda_{c,t} < 0$ ). As the size of informality becomes larger, convergence can become negligible (i.e.

$\lambda_{c,t} \approx 0$ ); and eventually turn out to be that financial development tends to diverge (i.e.  $\lambda_{c,t} > 0$ ), indicating widening gaps across countries over time. We expect  $\beta_1$  to be negative based on the previous evidence in the literature on financial development convergence; and  $\beta_2$  to be positive to the extent that informality is associated with weaker convergence.

The direct effect of informality on credit levels is captured by  $\beta_3$ . Although this is not our focus in this study, we expect  $\beta_3$  to be negative, considering the earlier evidence in the literature on the negative effect of informality on financial development. As mentioned before,  $\beta_3$  helps us explain the size of differences in financial development across countries. However, the convergence parameter  $\lambda_{c,t}$ , our main interest in this study, explains how those cross-country gaps in financial development evolve over time, depending on the size of informality. We note that, since this specification accounts for the direct effect separately, it is able to disentangle the effect of informality on financial development convergence, above and beyond its direct effect.

There are two extensions to this setup. First, the specification in equation 1 represents unconditional (absolute- $\beta$ ) convergence. Although it controls for time-invariant country characteristics ( $\alpha_c$ ) and informality, it does not account for other potentially important variables that can impact convergence. To examine convergence conditional on those factors (conditional- $\beta$  convergence), the beginning-of-period values of macroeconomic variables and measures of banking efficiency are included. Those results are shown in Section 5.2.

Second, we aim to rule out the possibility that informality may actually be a proxy for institutional quality. For this purpose, we extend the specification in equation 1 by including various proxies for institutional quality, as well as the interaction between those proxies and financial development. Those tests are illustrated in Section 5.3.

## 5 Results

### 5.1 Main results

Table 1 documents the main results on the role of informality in financial development convergence. First two columns use non-overlapping 3-year periods to test this phenomenon. Column 1 and 2 adopt bank credit and total credit as shares of GDP, respectively, to proxy for financial development. Columns 3 and 4 examine whether the result is similar when the analysis is done at the annual frequency, whereas the last two column implement the analysis using 5-year periods.

To begin with, the coefficient estimate of financial development ( $FD$ ), being negative and statistically significant at the 1% level, points to convergence across countries, i.e. whenever the initial level of credit is lower, credit grows faster in the subsequent 3-year period. The size of the coefficient estimate in the first column suggests that convergence is economically meaningful as well: When informality is at zero, a 10 percentage points (pp) lower credit to GDP is associated with a 1.3 pp higher annual change in the following 3-year period. This is large, considering that the mean annual change in financial development in the sample is 1.1 pp.

Table 1: *Main results*

Variable	3-year periods		Annual frequency		5-year periods	
	Bank credit	Total credit	Bank credit	Total credit	Bank credit	Total credit
<i>FD</i>	-0.127*** (0.026)	-0.137*** (0.027)	-0.071*** (0.019)	-0.076*** (0.020)	-0.151*** (0.030)	-0.172*** (0.028)
<i>FD</i> × <i>Informality</i>	0.004*** (0.001)	0.004*** (0.001)	0.002*** (0.001)	0.003*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
<i>Informality</i>	-0.203** (0.080)	-0.220*** (0.081)	-0.306*** (0.077)	-0.330*** (0.078)	-0.113 (0.080)	-0.115 (0.081)
Country F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes
$R^2$	0.33	0.32	0.21	0.20	0.49	0.47
Countries	156	156	156	156	156	156
Observations	1303	1308	3827	3837	733	736

Notes: The results are based on equation 1. Columns 1, 3 and 5 adopt bank credit as share of GDP, whereas columns 2, 4 and 6 use total credit as share of GDP, to proxy for financial development. Columns 1 and 2 use non-overlapping 3-year periods. Columns 3 and 4 use data at the annual frequency. Columns 5 and 6 use non-overlapping 5-year periods. Country and time fixed effects are included in all regressions. Standard errors in parentheses are clustered at the country-level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Next, we switch to our main focus in this paper, i.e. the extent to which informality can impact this convergence. The coefficient estimate of the interaction term ( $FD \times Informality$ ) turns out to be positive and statistically significant at the 1% level. This suggests that larger size of informality is associated with weaker financial development convergence. To evaluate the economic significance of the role of informality in convergence, we focus on the two thresholds of informality that (1) make convergence negligible, and (2) turn it into divergence. For this purpose, we first assess the joint effect (i.e. the convergence parameter  $\lambda_{c,t} = \beta_1 + \beta_2 Informality_{c,t}$ ) based on the coefficient estimates as shown by the first column in Table 1.

The coefficient estimate  $\beta_2$  being positive implies that credit tends to converge at low levels of informality until a specific threshold is hit. The size of the coefficient estimates implies that, for a given initial level of credit, financial development convergence becomes statistically insignificant when informality reaches 25.8% of GDP. Moreover, if informality exceeds 50.1% of GDP, it turns out to be financial development divergence. These two thresholds

correspond to the 34th and 92nd percentiles of the distribution of informality in the sample.<sup>10</sup>

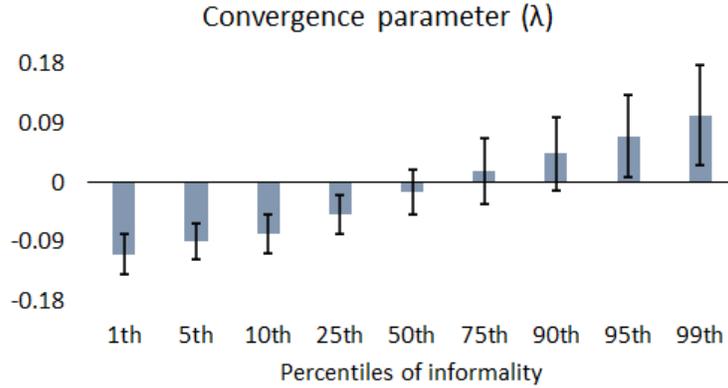
To observe what these thresholds imply for convergence within our sample in more detail, we report the convergence parameter ( $\lambda$ ) at different percentiles of informality. Figure 2 illustrates the findings. It shows that convergence is statistically significant at lower percentiles of informality within the sample. However, it becomes negligible (i.e. statistically insignificant) when we reach the median informality. Importantly, financial development divergence becomes statistically significant above the 95th percentile of informality within the sample.

The main implication of this exercise is that higher informality can have substantial consequences for financial development convergence across countries over time. Higher levels of informality can (1) make cross-country gaps in financial development persist over time, and also (2) generate leaders and laggards in terms of financial development, exacerbating existing cross-country gaps. Considering the role of financial development in economic growth and cross-country income convergence, high informality can also hinder convergence of living standards across countries, as shown in Section 5.5.

---

<sup>10</sup>Figure A1 in Appendix illustrates the distribution of informality within the sample, and where these thresholds exactly stand in the distribution. The first region where convergence is statistically significant (i.e. where informality is lower than 25.8% of GDP) is illustrated by Region I in Figure A1. Region II represents the observations where convergence is negligible (i.e. statistically insignificant). As informality hits the second threshold (i.e. 50.1% of GDP), there exists divergence in the sample (Region III).

Figure 2: *Financial development convergence at different percentiles of informality distribution*



Notes: Results are based on the coefficient estimates from the first column of Table 1. Convergence parameter  $\lambda_{c,t} = \beta_1 + \beta_2 \text{Informality}_{c,t}$  is reported at different percentiles of informality within the sample. 90% confidence intervals are also shown.

Although this is not our main focus in this paper, it is worth to note that the direct effect of informality on financial development is separately captured in this estimation aforementioned. The statistically significant coefficient estimate of *Informality* suggests that informality has a direct and negative impact on the growth rate of credit as well.

Before going into the next section, we note that the result stays similar when total credit is used to proxy for financial development (column 2). The result is similar when the analysis is employed at the annual frequency (columns 3 and 4) or using 5-year periods (columns 5 and 6). Moreover, the critical thresholds of informality implied by the coefficient estimates of those regressions are broadly consistent with each other. Across those tests, the first threshold (making convergence statistically insignificant) ranges from 21-29% of GDP; whereas the second threshold (leading to statistically significant divergence) is between 43-53% of GDP (see Table A2 in Appendix). For the rest of the analysis, we adopt bank credit to GDP, and do the analysis at non-overlapping 3-year periods.

## 5.2 Conditional convergence

This section examines whether the role of informality in financial development convergence remains similar when convergence is tested conditional on several factors. We extend equation 1 by adding the beginning-of-period values of those control variables. Table 2 illustrates the results. In columns 1-4, we control for GDP per capita, Chinn-Ito index of financial openness, and two measures of banking sector efficiency (ROA and overhead cost). In the last column, we control for all those variables. The main result on the role of informality on financial development convergence does not change much across these tests.<sup>11</sup> The only statistically significant coefficient estimate among the control variables is for the per capita GDP, indicating that higher economic development is associated with higher credit growth.

Table 2: *Conditional convergence*

Variable	GDP per capita	Financial openness	ROA	Cost	Controlling for all
<i>FD</i>	-0.128*** (0.027)	-0.125*** (0.027)	-0.189*** (0.031)	-0.194*** (0.031)	-0.167*** (0.031)
<i>FD</i> × <i>Informality</i>	0.003** (0.001)	0.004*** (0.001)	0.005*** (0.001)	0.005*** (0.001)	0.003** (0.001)
<i>Informality</i>	-0.137* (0.073)	-0.224*** (0.085)	-0.236** (0.109)	-0.232** (0.111)	-0.111 (0.113)
<i>GDP per capita</i>	1.356** (0.559)				3.942*** (1.400)
<i>Financial openness</i>		0.190 (0.226)			0.105 (0.410)
<i>ROA</i>			0.130 (0.141)		0.080 (0.111)
<i>Cost</i>				-0.042 (0.080)	-0.023 (0.082)
Country F.E.	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes
$R^2$	0.40	0.33	0.47	0.48	0.52
Countries	155	154	150	151	147
Observations	1284	1262	954	955	935

Notes: The results are based on equation 1. Column 1-4 controls for real GDP per capita, financial openness (Chinn-Ito index), and measures of banking sector efficiency (ROA and overhead cost). The last column adds all control variables. Country and time fixed effects are included in all regressions. Standard errors in parentheses are clustered at the country-level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

<sup>11</sup>The result stays similar if we test convergence conditional on other macroeconomic or banking sector variables, e.g. trade, exports, government expenditure, or net interest margin in the banking system. Those results are available upon request.

### 5.3 An alternative explanation: Institutional quality

This section addresses a potential concern that informality may actually be a proxy for institutional quality, i.e. whether previous results can indeed be explained by the effect of the latter. This test is sensible, since the literature discusses that informality can be a result of weaker institutions.<sup>12</sup> Thus, the size of informality in previous regressions may be serving as a proxy for institutional quality. We attempt to rule out this explanation by testing the role of informality on financial development convergence in a setup where we extend the specification in equation 1. In particular, we add (1) an index on institutional quality to account for its direct effect of financial development, and (2) the interaction term between this index and the beginning-of-period value of financial development.

Table 3 represents the results. In columns 1-3, we adopt three different proxies for institutional quality from Polity V dataset, namely the index on democracy, polity score and the degree of political competition. In the fourth column, we use the index from the Freedom House database as an alternative proxy. In column 5, the index on rule of law is used. Our previous result, the significant role of informality on financial development convergence, remains the same across these tests. Therefore, the concern that institutional quality may be the driving force of our findings is empirically not very relevant. The coefficient estimates of other interaction terms turn out to be statistically insignificant, except the last column. The result in the last column suggests that convergence is dependent on the rule of law, on top of the size of informality.

---

<sup>12</sup>See, among others, Friedman et al. (2000), Chong and Gradstein (2007), Dabla-Norris et al. (2008).

Table 3: *Informality versus institutional quality*

Variable	Democracy index	Polity score	Political competition	Freedom House	Rule of law
<i>FD</i>	-0.087** (0.037)	-0.098*** (0.025)	-0.085** (0.036)	-0.122*** (0.030)	-0.014 (0.057)
<i>FD × Informality</i>	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.004*** (0.002)	0.003*** (0.001)
<i>Informality</i>	-0.136* (0.074)	-0.138* (0.074)	-0.138* (0.075)	-0.217** (0.084)	-0.243*** (0.082)
<i>FD × Institutional quality</i>	-0.003 (0.003)	-0.001 (0.002)	-0.003 (0.003)	-0.010 (0.015)	-0.742** (0.315)
<i>Institutional quality</i>	0.016 (0.075)	0.020 (0.043)	0.057 (0.099)	0.070 (0.239)	7.394 (4.992)
Country F.E.	Yes	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes
$R^2$	0.42	0.42	0.42	0.34	0.35
Countries	148	148	148	154	156
Observations	1200	1200	1200	1286	1303

Notes: The results are based on equation 1. Columns 1-3 adopt the index on democracy, polity score and the degree of political competition as proxies for institutional quality from the Polity V database, respectively. Column 4 uses the index on political rights from the Freedom House database for institutional quality. Column 5 adopts the rule of law index from the WGI database. Country and time fixed effects are included in all regressions. Standard errors in parentheses are clustered at the country-level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## 5.4 Other checks

This section employs several robustness checks. Table 4 illustrates the findings. We start by focusing on the measure of informality. As mentioned before, it is not easy to capture the true size of informality. Therefore, the exact estimates are not likely to be very precise. To mitigate this issue, we compare convergence in countries/periods with high versus low informality. In the first column, we define a dummy variable which takes 1 whenever the size of informality is above the sample median, and 0 otherwise. The coefficient estimates suggest that convergence is significant whenever the size of informality is low (i.e. when the dummy variable is 0), while it becomes negligible (i.e. statistically insignificant) in cases of high informality (i.e. when the dummy variable is 1). This finding is broadly consistent with the stylized fact illustrated in Section 3.

In column 2, we aim to alleviate reverse causality concerns about any sort of contemporaneous relationship between the beginning-of-period values of informality and financial development. For this purpose, we use informality from the beginning of the sample period, which is 1991. Therefore, it is a time-invariant variable for each country in this test. Our main result remains similar. We conclude that a potential (contemporaneous) relationship between informality and financial development is not likely to drive our results.

In the third column, our goal is two-fold, namely (1) to make sure that few countries with very large or small size of informality does not drive the result, and (2) mitigate any concerns about the overestimation especially in case of countries with high informality in the database. We exclude countries with average informality below the 5th percentile and above the 95th percentile from the sample. Results stay similar across these tests.

In the next column, we use the estimates for informality from the ILOSTAT database. We note that informality is a time-invariant variable for each country in this test, and dropped, since we adopt the earliest year available for each country due to data limitation, as mentioned before. The main result does not change: Convergence is weaker in cases where informality is higher.

The next two columns illustrate results with different specifications of fixed effects. In column 5, we drop country fixed effects. This is sensible since country fixed effects may be "over-controlling", i.e. absorbing a portion of the direct effect of informality, particularly in countries where informality stays relatively stable. In column 6, we examine if changes in financial development can be explained by underlying country-specific trends over time. Results do not change much.

In columns 7 and 8, we focus on the sample. In column 7, we examine whether smaller economies drive the results. We run a weighted regression, where weights are average real GDP, suppressing the influence of small economies in the sample. Column 8 drops the US. The role of informality on financial development convergence stays similar in these tests.

Finally, in column 9, we estimate an alternative version of equation 1 where we define financial development variables relative to the US, as the US is viewed as the frontier of financial development. Hence, we explore whether financial development grows at a higher pace (relative to the US) in countries that are initially further away from the US in terms of financial development. The result is not much affected.<sup>13</sup>

Table 4: *Other checks*

Variable	Dummy variable	Informality from 1991	Excluding extremes	ILOSTAT estimate	No country F.E.	Country trends	Weighted regression	Excluding the US	Relative to the US
<i>FD</i>	-0.083*** (0.013)	-0.161*** (0.031)	-0.130*** (0.031)	-0.267*** (0.036)	-0.047*** (0.016)	-0.172*** (0.028)	-0.124*** (0.025)	-0.127*** (0.027)	-0.134*** (0.028)
<i>FD</i> × <i>Informality</i>	0.111*** (0.023)	0.005*** (0.001)	0.004*** (0.001)	0.004*** (0.000)	0.003*** (0.001)	0.003** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
<i>Informality</i>	-3.576*** (0.763)		-0.247*** (0.085)		-0.086*** (0.027)	-0.362** (0.141)	-0.204** (0.080)	-0.203** (0.081)	-0.026 (0.075)
Country F.E.	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
$R^2$	0.35	0.33	0.34	0.49	0.15	0.49	0.31	0.33	0.34
Countries	156	156	140	85	156	156	155	155	155
Observations	1303	1303	1168	716	1303	1303	1297	1294	1294

*Notes: The results are based on equation 1. Column 1 uses a dummy variable to define high informality, which takes 1 whenever informality is above the sample median, and 0 otherwise. Column 2 adopts the informality measure from 1991. Column 3 excludes countries which have informality (on average) below 5th and above 95th percentile. Column 4 adopts the size for informality from the ILOSTAT database. Column 5 drops country fixed effects. Column 6 includes country-specific period trends. Column 7 employs a weighted regression where weights are average real GDP. Column 8 drops the US. Column 9 adopts financial development measures relative to the US. Country and time fixed effects are included in all regressions, unless otherwise stated. Standard errors in parentheses are clustered at the country-level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .*

<sup>13</sup>We also note that the results remain similar if (1) The Group of Seven (G7) countries (or China) are excluded from the sample in order to make sure that few largest economies do not drive the relationship, (2) earlier periods (i.e. the 1990s) or the last period (which has two years of data covering 2016 and 2017) are excluded, (3) informality is winsorized at different levels such as the 5-95% levels, (4) the analysis is done using non-overlapping 10-year periods, (5) standard errors are not clustered, (6) a common time trend is included, and (7) time fixed effects are dropped. Those results are available upon request.

## 5.5 Roles of financial development and informality in income convergence

We have discussed that the relationship between informality and financial development convergence is important, since it has implications for the evolution of income gaps across countries over years. Our reasoning is the following. Financial development is crucial for economic growth, and is found to be important for convergence of income across countries (Aghion et al. 2005). Therefore, informality, being associated with weaker financial development convergence as we show, can potentially affect the evolution of cross-country gaps in per capita GDP. This section provides suggestive evidence on this phenomena. We first ask whether there is an association between financial development and convergence of per capita GDP in the data. If so, informality could be expected to be associated with a lower the pace of per capita GDP convergence as well. Whether this is the case is our second question.

Table 5 illustrates the results on the roles of financial development and informality in per capita GDP convergence. In column 1, we explore the role of financial development on convergence. The coefficient estimate of the interaction terms suggests that financial development promotes convergence of income across countries. This is consistent with the finding by Aghion et al. (2005). Therefore, the role of informality in financial development can be expected to have implications for income convergence. In the second column, we test whether this is the case in the data. As could be expected, we find that informality seems to hinder convergence of GDP per capita, consistent with our previous reasoning.

Lastly, although this is not our main focus in this paper, we explore if the impact of informality on income convergence remains significant, even after controlling for the role of financial development separately (column 3). If that turns out to be the case, this may provide suggestive evidence that informality affects income convergence above and beyond its effect of financial development convergence. The result shows that informality hinders income convergence even when we separately account for financial development. This re-

sult points out that there seem to be other channels at play,<sup>14</sup> on top of the role of informality on financial development convergence, through which informality can affect income convergence. We conclude that it is important to address the problem of informality for economically less developed countries to catch up with the more developed ones.

Table 5: *Per capita GDP convergence*

Variable	Financial development	Informality	Both factors
<i>GDP per capita</i>	-6.532*** (1.271)	-11.454*** (1.564)	-9.017*** (1.802)
<i>GDP per capita</i> × <i>FD</i>	-0.010*** (0.002)		-0.007*** (0.002)
<i>FD</i>	0.072*** (0.011)		0.051*** (0.012)
<i>GDP per capita</i> × <i>Informality</i>		0.083*** (0.025)	0.075*** (0.022)
<i>Informality</i>		-0.680*** (0.185)	-0.506*** (0.176)
Country F.E.	Yes	Yes	Yes
Time F.E.	Yes	Yes	Yes
$R^2$	0.45	0.44	0.47
Countries	180	155	155
Observations	1501	1367	1310

Notes: The results are based on equation 1, where the dependent variable is the growth rate of real GDP per capita. Columns 1 and 2 use financial development and informality as explanatory variables, respectively. Column 3 includes both factors. Country and time fixed effects are included in all regressions. Standard errors in parentheses are clustered at the country-level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

## 6 Conclusion

This paper focuses on the role of informality in financial development convergence. The goal is to understand the extent to which informality can explain the evolution of cross-country differences in financial development. The evidence shows that informality hinders financial development convergence. In particular, credit levels exhibit convergence across countries over time, particularly when informality is lower. As the size of informal economy becomes larger, however, financial development convergence weakens; and ultimately can turn out to be divergence.

<sup>14</sup>For instance, firms operating in the informal sector appear to be less productive, e.g. La Porta and Shleifer (2014); or, higher informality lowers governments' tax revenues which can be invested in public infrastructure projects wherever needed, thereby promoting long-term growth.

This points out that policies that address the problem of informality can help countries with less developed financial systems catch up with the countries with higher levels of financial development. Our findings also have implications for the evolution of cross-country income gaps, given the role of financial development in economic growth and income convergence across countries. The evidence supports this reasoning. We find that lower size of informality is associated with stronger income convergence across countries. These suggest an opportunity during the recovery from the pandemic, especially for less developed countries. Policies to reduce informality can support the economic recovery, and help those countries make progress in achieving the living standard in the developed world going forward.

# Appendix

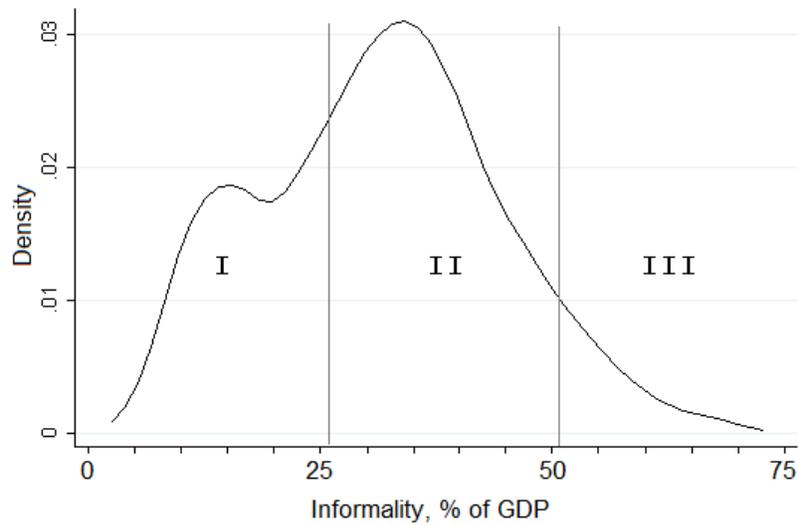
Table A1 provides a brief description of the variables. For more details see Section 2.

Table A1: *Variables*

Variable	Explanation	Source
Bank credit	As share of GDP (%)	FDSB, Beck et al. (2000a, 2009)
Total credit	As share of GDP (%)	FDSB, Beck et al. (2000a, 2009)
Return on assets (ROA)	Income over total assets (%)	FDSB, Beck et al. (2000a, 2009)
Overhead costs	Costs over total assets (%)	FDSB, Beck et al. (2000a, 2009)
Informal economy	As share of GDP (%)	Medina and Schneider (2018, 2020)
Informal economy	As share of employment (%)	ILOSTAT
GDP per capita	Constant in 2010 USD, used in logarithm	World Bank, WDI
GDP	Constant in 2010 USD, used in logarithm	World Bank, WDI
Capital account openness	De jure measure from -2 to 2	Chinn and Ito (2006)
Democracy	Proxy for institutional quality	Polity V
Polity score	Proxy for institutional quality	Polity V
Political competition	Proxy for institutional quality	Polity V
Political rights	Proxy for institutional quality	Freedom House
Rule of law	Proxy for institutional quality	World Bank, WGI

Figure A1 illustrates the distribution of informality within the sample. Vertical lines indicate the critical thresholds of informality as implied by the coefficient estimates in the first column of Table 1. Region I of the distribution is where convergence is statistically significant (i.e. informality being lower than 25.8% of GDP). Region II represents the observations where convergence is negligible (i.e. statistically insignificant). As informality hits the second threshold (i.e. 50.1% of GDP), there exists divergence in the sample (Region III).

Figure A1: *Distribution of informality and financial development convergence*



*Notes: Results are based on the coefficient estimates from the first column of Table 1. The distribution of the beginning-of-period values of informality in the sample is illustrated. The first and second vertical lines represents the thresholds of informality after which (1) convergence becomes insignificant, and (2) it turns out to be divergence, respectively.*

Table A2 reports the thresholds of informality implied by the coefficient estimates from columns 2 to 6 of Table 1. Threshold 1 refers to the implied level of informality after which financial development convergence becomes negligible (i.e. statistically insignificant). In other words, this is the critical level of informality that makes the convergence parameter  $\lambda$  statistically insignificant. Threshold 2 represents the implied level of informality after which financial development divergence becomes statistically significant. That is, this is the critical level of informality that makes the convergence parameter  $\lambda$  positive and statistically significant. To calculate the implied thresholds, column 1 uses the coefficient estimates from the second column of Table 1, column 2 uses the coefficient estimates from the third column of Table 1, and so on.

Table A2: *Critical thresholds of informality*

Values (% of GDP)	(1)	(2)	(3)	(4)	(5)
Threshold 1	26.8	20.6	21.7	27.7	29.1
Threshold 2	52.7	45.4	48.5	42.5	43.3

*Notes: The calculations in columns 1-5 are based on the coefficient estimates from column 2 to 6 of Table 1. Thresholds are in percent of GDP. Threshold 1 refers to the level of informality after which financial development convergence becomes negligible (i.e. statistically insignificant). Threshold 2 refers to the level of informality after which financial development divergence becomes statistically significant.*

## References

Acemoglu, Daron, and Simon Johnson. "Unbundling institutions." *Journal of Political Economy* 113.5 (2005): 949-995.

Aghion, Philippe, Peter Howitt, and David Mayer-Foulkes. "The effect of financial development on convergence: Theory and evidence." *The Quarterly Journal of Economics* 120.1 (2005): 173-222.

Alderslade, Jamie, John Talmadge, and Yusef Freeman. *Measuring the informal economy: One neighborhood at a time*. Washington, DC: Brookings Institution, Metropolitan Policy Program, 2006.

Antzoulatos, Angelos A., Ekaterini Panopoulou, and Chris Tsoumas. "Do financial systems converge?." *Review of International Economics* 19.1 (2011): 122-136.

Bahadir, Berrak, and Neven Valev. "Financial development convergence." *Journal of Banking & Finance* 56 (2015): 61-71.

Barro, Robert J., and Xavier Sala-i-Martin. "Convergence." *Journal of Political Economy* 100.2 (1992): 223-251.

Barro, Robert J. "Determinants of economic growth: A cross-country empirical study." MIT Press, Cambridge, MA (1997).

Barro, Robert J. "Determinants of economic growth in a panel of countries." *Annals of Economics and Finance* 4 (2003): 231-274.

Beck, Thorsten, Ross Levine, and Norman Loayza. "Finance and the sources of growth." *Journal of Financial Economics* 58.1-2 (2000a): 261-300.

Beck, Thorsten, Asli Demirguc-Kunt, Ross Eric Levine, Thortsen Beck, and Asli Demirgüç-Kunt. "A new database on financial development and structure (updated May 2009)." *World Bank Economic Review* 14, no. 3 (2000b): 597-605.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine. "Law, endowments, and finance." *Journal of Financial Economics* 70.2 (2003): 137-181.

Beck, Thorsten, Asli Demirgüç-Kunt, and Ross Levine. "Finance, inequality and the poor." *Journal of Economic Growth* 12.1 (2007): 27-49.

Beck, Thorsten, and Asli Demirguc-Kunt. *Financial institutions and markets across countries and over time-data and analysis*. The World Bank, 2009.

Bianco, Magda, Andrea Gerali, and Riccardo Massaro. "Financial systems across "developed economies": Convergence or path dependence?." *Research in Economics* 51.3 (1997): 303-331.

Bruno, Giuseppe, Riccardo De Bonis, and Andrea Silvestrini. "Do financial systems converge? New evidence from financial assets in OECD countries." *Journal of Comparative Economics* 40.1 (2012): 141-155.

Chinn, Menzie D., and Hiro Ito. "What matters for financial development? Capital controls, institutions, and interactions." *Journal of Development Economics* 81.1 (2006): 163-192.

Chong, Alberto, and Mark Gradstein. "Inequality and informality." *Journal of Public Economics* 91.1-2 (2007): 159-179.

Colombo, Emilio, Luisanna Onnis, and Patrizio Tirelli. "Shadow economies at times of banking crises: Empirics and theory." *Journal of Banking & Finance* 62 (2016): 180-190.

Dabla-Norris, Era, and Junko Koeda. "Informality and bank credit: Evidence from firm-level data." *IMF Working Papers* (2008): 1-37.

Dabla-Norris, Era, Mark Gradstein, and Gabriela Inchauste. "What causes firms to hide output? The determinants of informality." *Journal of Development Economics* 85.1-2 (2008): 1-27.

Demirguc-Kunt, Asli, Erik Feyen, and Ross Levine. "The evolving importance of banks and securities markets." *World Bank Economic Review* 27.3 (2013): 476-490.

Djankov, Simeon, Caralee McLiesh, and Andrei Shleifer. "Private credit in 129 countries." *Journal of Financial Economics* 84.2 (2007): 299-329.

Elgin, Ceyhun, and Burak R. Uras. "Is informality a barrier to financial development?." *SERIEs* 4.3 (2013): 309-331.

Filippini, Federico, and Eduardo Levy Yeyati. Pandemic divergence: A short note on COVID-19 and global income inequality. No. 68. (2021).

Feld, Lars P., and Friedrich Schneider. "Survey on the shadow economy and undeclared earnings in OECD countries." *German Economic Review* 11.2 (2010): 109-149.

Freedom House. Freedom in the World. Available at <https://freedomhouse.org/report/freedom-world>

Frey, Bruno S., and Hannelore Weck-Hanneman. "The hidden economy as an 'unobserved' variable." *European Economic Review* 26.1-2 (1984): 33-53.

Friedman, Eric, Simon Johnson, Daniel Kaufmann, and Pablo Zoido-Lobaton. "Dodging the grabbing hand: the determinants of unofficial activity in 69 countries." *Journal of Public Economics* 76.3 (2000): 459-493.

Gerxhani, Klarita. "The informal sector in developed and less developed countries: A literature survey." *Public Choice* 120.3 (2004): 267-300.

IMF. *World Economic Outlook: Managing Divergent Recoveries*. Washington, DC, 2021.

International Labour Organization (ILO). ILOSTAT Database. Available at <https://ilostat.ilo.org/data/>.

International Labour Organisation (ILO). "COVID-19 crisis and the informal economy: immediate responses and policy challenges." *ILO Brief* (2020a).

International Labour Organisation (ILO). "The impact of COVID-19 on the informal economy in Africa and the related policy responses." *ILO Brief* (2020b).

Islam, Nazrul. "Growth empirics: a panel data approach." *The Quarterly Journal of Economics* 110.4 (1995): 1127-1170.

King, Robert G., and Ross Levine. "Finance and growth: Schumpeter might be right." *The Quarterly Journal of Economics* 108.3 (1993a): 717-737.

King, Robert G., and Ross Levine. "Finance, entrepreneurship and growth." *Journal of Monetary Economics* 32.3 (1993b): 513-542.

La Porta, Rafael, Florencio Lopez-De-Silanes, Andrei Schleifer, and Robert W. Vishny. "Legal determinants of external finance." *The Journal of Finance* 52.3 (1997): 1131-1150.

La Porta, Rafael, Florencio Lopez-De-Silanes, Andrei Schleifer, and Robert W. Vishny. "Law and finance." *Journal of Political Economy* 106.6 (1998): 1113-1155.

La Porta, Rafael, and Andrei Shleifer. "Informality and development." *Journal of Economic Perspectives* 28.3 (2014): 109-26.

Levine, Ross, Norman Loayza, and Thorsten Beck. "Financial intermediation and growth: Causality and causes." *Journal of Monetary Economics* 46.1 (2000): 31-77.

Mai, Hassan, and F. Schneider. "Size and development of the shadow economies of 157 worldwide countries: Updated and new measures from 1999 to 2013." *Journal of Global Economics* 4.3 (2016): 1-15.

Medina, Leandro, and Friedrich Schneider. "Shadow Economies Around the World: What Did We Learn Over the Last 20 Years?." *IMF Working Papers* (2018).

Medina, Leandro, and Friedrich Schneider. "Shedding Light on the Shadow Economy." *World Economics* 21.2 (2020): 25-82.

Polity V Database. Center for Systemic Peace. Available at <http://www.systemicpeace.org/inscrdata.html>

Rajan, Raghuram G., and Luigi Zingales. "Financial dependence and growth." *American Economic Review* (1998): 559-586.

Rioja, Felix, and Neven Valev. "Finance and the sources of growth at various stages of economic development." *Economic Inquiry* 42.1 (2004): 127-140.

Roubini, Nouriel, and Xavier Sala-i-Martin. "Financial repression and economic growth." *Journal of Development Economics* 39.1 (1992): 5-30.

Roubini, Nouriel, and Xavier Sala-i-Martin. "A growth model of inflation, tax evasion, and financial repression." *Journal of Monetary Economics* 35.2 (1995): 275-301.

Schneider, Friedrich, and Dominik H. Enste. "Shadow economies: Size, causes, and consequences." *Journal of Economic Literature* 38.1 (2000): 77-114.

Schneider, Friedrich. "Shadow economies around the world: what do we really know?." *European Journal of Political Economy* 21.3 (2005): 598-642.

Schneider, Friedrich, Andreas Buehn, and Claudio E. Montenegro. "New estimates for the shadow economies all over the world." *International Economic Journal* 24.4 (2010): 443-461.

Schneider, Friedrich, and Andreas Buehn. "Shadow economies in highly developed OECD countries: What are the driving forces?." (2012).

Schneider, Friedrich, and Dominik H. Enste. *The shadow economy: An international survey*. Cambridge University Press, 2013.

Schneider, Friedrich, and Colin Williams. "The Shadow Economy. The Institute of Economic Affairs." (2013).

Schneider, F., and A. Buehn. "Estimating a Shadow Economy: Results, Methods, Problems, and Open Questions. *Open Economics*, 1, 1-29." (2017).

Schumpeter, Joseph. *A theory of economic development*." Harvard University Press: Cambridge, MA, 1911.

Solow, Robert M. "A contribution to the theory of economic growth." *The Quarterly Journal of Economics* 70.1 (1956): 65-94.

Veysov, Alexander, and Mikhail Stolbov. "Do financial systems converge? A comprehensive panel data approach and new evidence from a dataset for 102 countries." (2011).

World Bank. *"Informality: Exit and inclusion."* Washington, D.C, (2007).

World Bank. World Development Indicators. Available at <https://databank.worldbank.org/source/world-development-indicators>.

World Bank. Worldwide Governance Indicators. Available at <https://databank.worldbank.org/source/worldwide-governance-indicators>.