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THE INFORMAL ECONOMY AND BUSINESS CYCLES

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A vast literature has focused on what causes businesses to move into informality and what is the impact of an enlarging informal sector on growth. This paper shows that the size of the informal economy also affects business cycle volatility. Informal businesses are usually small in size, which not only prevents them from achieving economies of scale and from operating with the right capital/labor mix, but also restricts their access to credit markets. Because firms operating informally lack access to credit markets to neutralize the cash flow squeeze arising during recessions, they are more exposed to fluctuations in economic activity and more likely to fail. Using a Generalized Method of Moments methodology, this paper shows that countries with larger informal economies tend to undergo increased volatility in output, investment and consumption over the business cycle.

JEL classification codes: E26, E32

Key words: business cycles, informal sector, legal institutions

I. Introduction

The informal economy has become a significant share of the economic activity of many countries. When measuring the scope of the informal sector, the first obstacle to overcome is obtaining a clear definition of what is being considered as informal activities. Due to the measurement method used in obtaining proxies for the informal sector, the definition used here is that of Schneider & Enste (2000): it encompasses “legal value-added creating activities which are not taxed or registered [by government entities] and where the largest part can be classified as ‘black’ or clandestine labor.” (p. 79) Thus, the informal economy includes market activities that are unaccounted for by the government, and, in this manner, are able to circumvent tax payments. Household production not for trade, voluntary services and criminal activities are not included.

Traditionally, labor market rigidities have been blamed for the growth of the

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informal sector. As the formal economy becomes unable to cope with the high costs associated with labor legislation, the informal economy absorbs the displaced workers. More recently, the informal sector has also been identified as a smallscale entrepreneurial sector arising from workers' decision to become self-employed to avoid not only high labor costs, but also official taxation and the costs associated with bureaucracy and corruption.

The informal economy encompasses in large part small business with restricted access to credit and unable to rely on the legal system for the protection of property rights and contract enforcement. A vast literature has shown that countries with a large informal sector face lower growth rates: the need of informal firms to remain small in order to avoid detection implies that achieving economies of scale, operating with the right capital/labor mix, and, therefore, being productive is an unfeasible endeavor (see, among others, Loayza 1997, Johnson, Kaufmann and Zoido-Lobaton 1999, and Schneider and Enste 2000.)

This paper reveals that countries with sizeable informal economies also have a tendency to experience more pronounced fluctuations in economic activity. The second section of this paper briefly establishes the theoretical link between the size of the informal economy and the fluctuations in economic activity. The third section describes the data used in the empirical tests and the estimation methodology. The fourth section addresses the estimation results and its robustness, and the fifth section concludes.

II. Some theoretical considerations

The literature on the credit channel has discussed extensively the importance of credit markets imperfections for the fluctuations in economic activity, and empirical works supporting this view's theoretical implications abound (see, among others, Gertler and Gilchrist 1994, Bernanke and Gertler 1995, Hubbard 1997, and Bernanke, Gertler and Gilchrist 1998.) In the presence of information asymmetries, the equilibrium in the market for credit is characterized by credit rationing, as some borrowers are shut off from having access to credit. As a consequence, these credit-constrained borrowers are more exposed to fluctuations in economic activity, since they are unable to smooth the fluctuations in cash flows.

For example, consider the impact of a contractionary monetary policy shock. The consequent increase in interest rates affects firms by raising interest expenses on existing debt, which decreases firms' cash flows, and by depressing asset prices, which reduces borrowers' collateral. In addition, the rise in interest rates

also slows down aggregate demand, reducing firms' revenues and increasing the financing gap.¹ The corporate cash squeeze and the drop in net worth increase firms' external finance premium, which is the cost of raising external funds such as debt and equity in excess of the opportunity cost of internal funds. The increase in the external finance premium occurs because the lower the borrower's financial contribution in the implementation of a project is, the greater the potential conflict of interest between the borrower and the external financiers. Thus, as the external finance premium increases and the availability of credit falls, the enhanced swings in production, investment and spending magnifies the initial contractionary monetary policy shock.

This financial accelerator has been formally modeled by Bernanke, Gertler and Gilchrist (1996, 1998). These authors have shown that a positive shock to entrepreneurs' wealth in the presence of credit-market frictions not only has a significant impact on output, but also has relevant propagation effects. In other words, changes in the wealth of entrepreneurs can significantly add to cyclical fluctuations. The authors also point out the presence of an "excess sensitivity" of credit-constrained firms to monetary policy shocks: these firms experience greater volatility in investment in response to these shocks than firms with better access to credit.

Gertler and Gilchrist (1994), for instance, have shown that in response to a cash flow squeeze, small firms reduce inventories, production, employment and prices. Large firms, on the other hand, respond to drops in cash flows by increasing shortterm borrowing and inventories and by maintaining production and employment levels, at least temporarily. This difference in behavior arises because large firms have access to commercial paper markets and other sources of credit unavailable to small firms. Thus, the workings of the financial accelerator imply that markets dominated by small firms are more likely to experience greater fluctuations in economic activity.

In this context, establishing a connection between the size of the informal economy and business cycle volatility is straightforward. Informal businesses, which are usually small in size, face greater credit limitations than small formal enterprises. In developing countries, for example, when informal businesses have access to external financing, they normally do so from illegal moneylenders that advance small amounts at relatively high interest rates (see Loayza 1997, Dabla-

¹ The difference between the uses and sources of funds widens because costs tend to adjust slowly in the short run.

Norris and Feltenstein 2003, and Farrell 2004). As a result, informal businesses not only tend to be subscale and unproductive, but they are also more likely to fail due to their incapacity to smooth fluctuations in cash flows.

While in developing countries firms operating exclusively underground are common, in industrialized countries, informal and formal activities are normally undertaken within the scope of a single enterprise (see Gërkhani 2004). Nonetheless, the need to avoid detection implies that this firm is likely to encounter tougher credit conditions than a firm of the same size that operates exclusively in the formal sector. When resorting to legal credit markets, for instance, the income and scope of the informal activities must be omitted, harming the firm's credit perspectives.

Therefore, in a cross-country data set, countries with larger informal economies are expected to face greater business cycle volatility, although this link may be weakened in places where the separation between formal and informal activities is not clear-cut. As a result, it is important to consider the isolated performance of high-income countries.

In addition, the motivations for firms to go underground in high-income countries differ from those of firms operating informally in developing countries. The costs of corruption, bureaucracy and poor law enforcement constitute the main reasons for firms to operate informally in developing countries, while in highincome countries firms undertake informal activities mostly to avoid the burden of taxation and the rigidity in the labor market (see Gërkhani 2004). Particularly, if the decision to undertake informal activities is due to high labor costs, then the link between the size of the informal economy and the volatility of the business cycle may not be as straight forward.

A vast literature has shown that price and wage rigidities augment fluctuations in economic activity (see, among others, Akerlof and Yellen 1985 and Jeanne 1998). If the move into informality is motivated by the need to avoid restrictive and costly labor legislation, a larger informal economy may actually be associated with smoother business cycles. This result may emerge because informal firms' costs can adjust faster to shocks to economic activity than the costs of firms operating in the formal sector (see Renooy 1990).

III. The data and estimation methodology

Unless otherwise indicated, the data was obtained from several editions of the International Monetary Fund's International Financial Statistics Yearbook (IFS).

Where data inconsistency was found among different editions, the series was spliced retaining the values of the most recent edition (2003).²

The econometric tests were run on four samples of cross-country data. The choice of countries included in each sample was determined by the availability of data.³ Two samples included countries with all levels of income, one with data for the 1961 – 2002 period and another with data for the 1985 – 2002 period. The other two samples included data for twenty-four high-income countries, with the same breakdown of time periods. The reasoning for running the tests on these four different samples is discussed below in the methodology section.

A. The size of the informal economy

The data used in the current study was obtained from the World Bank's Doing Business Database (2003), which, to my knowledge, is the only dataset that provides information on the informal economy for a broad sample of developing and developed countries. Here, a word of caution is warranted. Data availability constraints led to the use of different methods to calculate the estimates of the size of the informal economy of each country, implying that cross-country comparisons may not be fully precise. Yet, the data used in calculating the estimates all refer to the 1999/2000 period, which may minimize this shortcoming.

Measuring the size of the informal economy is a difficult task, and all methods developed so far provide only rough approximations. The variety of methods available has been discussed extensively in Schneider and Enste (2000), who indicate the advantages and weaknesses of each approach. Three different methods were used to obtain the estimates of the size of the informal economy (*INFORMAL*) in terms of value added that are available from the Doing Business Database (2003). For developing countries, depending on data availability, either the physical input (electricity) method, the currency demand or the model (DYMIMIC) approach was undertaken. For developed countries, either the currency demand or the model (DYMIMIC) approach was used.⁴

² Table A1 in the Appendix displays a list of all variables included in the tests.

³ Table A2 in the Appendix lists the countries included in each sample, the data and summary statistics on informal sector size and business cycle volatility.

⁴ Note that the database does not allow the sorting of countries by the method used in the calculation of informal sector size, which could improve the robustness of the results. For details, see Schneider (2002).

The input method is developed under the assumption that electricity consumption is the single best physical indicator of economic activity. If this is the case, the growth rate in total electricity consumption is a proxy for the growth in the overall economic activity, including both the informal and formal sectors. Then, the growth rate of the official GDP can be subtracted from this proxy in order to isolate the growth in the informal economy.

The currency demand approach, in turn, assumes that informal activities are undertaken with the use of cash so as to avoid detection by the government. Thus, a regression is estimated to isolate the excess demand for cash from an increase in such activities. A weighted average tax rate is used to proxy for changes in the size of the informal economy, while per capita income, interest rates and payment habits are included in the regressions to control for other factors determining the changes in currency demand.

Each of the methods above considers only one indicator capturing all effects of the informal economy. Yet, the informal economy has simultaneous impacts on the production, labor and money markets. The model (DYMIMIC) approach estimates a set of structural equations, assuming that a few indicators affect the size of the informal economy. These indicators are: a proxy for the volume of monetary transactions, the labor participation in the official economy (as the informal economy grows, labor is shifted away from the formal economy, in the form of a lower number of workers or shorter working hours in the official economy) and a flow of inputs (particularly, labor) out of the official economy.

Besides the methodology problem in calculating the size of the informal economy, another possible shortcoming of the data is that the size of the informal economy is expressed as a fraction of a country's Gross National Product (GNP). The use of a Gross Domestic Product (GDP) based measure may be considered more appropriate, because most activities included in the Gross National Product - but not in the GDP - are likely to be part of the formal economy. Moreover, the informal activities whose performance matters for business cycle volatility are those that take place within a country's borders. Note, however, that, for most countries, the distinction between GDP and GNP is not significant, and the choice of a GNP based measure used here is, again, due to data availability.

B. Instrumental variables

Empirical evidence has shown that countries with greater growth rates tend to have smoother fluctuations in economic activity (see Ramey and Ramey 1994) and

a smaller informal sector (Loayza 1997, Johnson, Kaufmann and Zoido-Lobaton 1999, and Schneider and Enste 2000.) The tests conducted here used different instruments to control for the possibility that business cycle volatility and informal sector size are endogenous variables.

Empirical works on the determinants of the informal sector have highlighted a number of variables that seem to influence the size of the informal economy (see Johnson, Kaufmann and Zoido-Lobaton 1998 and 1999, Schneider and Enste 2000, Friedman et al. 2000 and Farrell 2004). Overall, three factors have been found to contribute to informality: limited enforcement of legal obligations, high costs of operating formally and social norms.

Poor enforcement of legal obligations reduces the costs of operating informally by diminishing the likelihood of detection and prosecution. In addition, high tax burden, labor market restrictions, onerous bureaucracy and a high level of corruption enhance the incentives for firms to go underground, and leads to a vicious cycle: the high costs of operating formally increases the size of the informal sector, which reduce government tax revenues, the quality of government services, and, consequently, the incentives of firms to operate formally. Finally, in many countries, avoiding taxes and regulations is considered a legitimate right of small firms competing against large businesses.

The present study has used the following indicators as instrumental variables:⁵

- Rule of Law (*RULELAW*): this variable measures each country's tradition for law and order, the degree to which individuals have confidence in and abide by the regulations. The indicator ranges from -2.5 to 2.5, with the lower scores reflecting reduced law enforcement (base year: 2000).

- Corruption (*CORRUPTION*): this variable proxies for the degree in which government agents use their political power for private gain. The corruption indicator aims at capturing the fact that, while firms may be willing to pay taxes at a reasonable rate, they may go underground to avoid extortionate and arbitrary demands of public officials. The index ranges from -2.5 to 2.5, with the low scores indicating higher level of corruption (base year: 2000).

- Employment Laws Index (*EMPINDEX*): this indicator encompasses information about three different aspects of employment laws, namely, firm's flexibility in hiring workers, flexibility in firing workers and the conditions of employment. The

⁵ When available, the instrumental variables were obtained for the year 1997, two years prior to the data available for the informal sector size. The reason for such choice is that the institutional characteristics of a country that determine the size of the informal economy should do so with a lag.

employment law index constitute a measure of protection of employed workers, with higher scores indicating greater incremental cost for firms to deviate from a hypothetical rigid contract in which job conditions are specified and workers cannot be fired (base year: 1997).⁶

- Top Tax (*TOPTAX*): this index varies from one to ten, with a lower score indicating a higher top marginal income tax rate for a corresponding income threshold, and, thus, a greater burden from taxation (base year: 1997).

- Tax Policy (*TAXPOLICY*): this indicator measures the fiscal burden of the government in a broader manner, accounting for the level of income tax rates, corporate tax rates and trends in government expenditure as a percentage of GDP. The index ranges from one to five, with a higher score indicating a greater fiscal burden (base year: 1997).

The first two variables listed above were obtained from the Governance Indicators Database (World Bank 2002); the third was obtained from the Doing Business Database (World Bank 2003); the fourth from the Economic Freedom of the World (Fraser Institute 1999); and the fifth from the Index of Economic Freedom (Heritage Foundation 2003). Because these variables are related to the legal origin of a country, they can be considered exogenous, as most countries had their legal system set either through colonization or by direct or subtler imitation (see La Porta et al. 1998 and Botero et al. 2004).

According to the definitions of the instrumental variables listed above, the size of the informal economy is expected to be inversely correlated with *CORRUPTION*, *RULELAW* and *TOPTAX*, and positively correlated with *EMPINDEX* and *TAXPOLICY*.⁷ Table 1 shows the correlation between *INFORMAL* and each of the instrumental variables. As pointed out by Johnson, Kaufmann and Zoido-Lobaton (1998, 1999) and Friedman et al. (2000), poor law enforcement and the burden of corruption constitute the main reasons for firms to move into informality. For highincome countries, the rigidity of labor laws is also relevant for the size of the informal sector.

However, as it was also pointed out by the referred authors, the correlation between the variables capturing the burden of taxation and the scope of the informal economy run in the opposite direction of what is expected: with few exceptions, greater burden of taxation seems to be associated with a smaller informal sector.

⁶ For a complete description of how this index is calculated, see Botero et al. (2004).

⁷ See Friedman et al. (2000) for a simple model formalizing the relationship between the instrumental variables used here and size of the informal economy.

Table 1. The size of the informal economy: Instrumental variables

1961 - 2002	<i>Informal</i>	<i>Empindex</i>	<i>Corruption</i>	<i>Rulelaw</i>	<i>Taxpolicy</i>	<i>Toptax</i>
(a) All 42 Countries						
<i>INFORMAL</i>	1.000					
<i>EMPINDEX</i>	0.441	1.000				
<i>CORRUPTION</i>	-0.731	-0.459	1.000			
<i>RULELAW</i>	-0.769	-0.506	0.971	1.000		
<i>TAXPOLICY</i>	-0.343	-0.169	0.215	0.264	1.000	
<i>TOPTAX</i>	0.517	0.118	-0.578	-0.606	-0.549	1.000
(b) High Income						
<i>INFORMAL</i>	1.000					
<i>EMPINDEX</i>	0.663	1.000				
<i>CORRUPTION</i>	-0.631	-0.454	1.000			
<i>RULELAW</i>	-0.820	-0.598	0.891	1.000		
<i>TAXPOLICY</i>	-0.074	-0.004	-0.271	-0.091	1.000	
<i>TOPTAX</i>	-0.287	-0.247	-0.028	-0.036	-0.400	1.000
1985 - 2002	<i>Informal</i>	<i>Empindex</i>	<i>Corruption</i>	<i>Rulelaw</i>	<i>Taxpolicy</i>	<i>Toptax</i>
(c) All 45 Countries						
<i>INFORMAL</i>	1.000					
<i>EMPINDEX</i>	0.465	1.000				
<i>CORRUPTION</i>	-0.743	-0.517	1.000			
<i>RULELAW</i>	-0.764	-0.540	0.973	1.000		
<i>TAXPOLICY</i>	-0.375	-0.177	0.187	0.233	1.000	
<i>TOPTAX</i>	0.492	0.067	-0.510	-0.544	-0.576	1.000
(d) High Income						
<i>INFORMAL</i>	1.000					
<i>EMPINDEX</i>	0.670	1.000				
<i>CORRUPTION</i>	-0.642	-0.500	1.000			
<i>RULELAW</i>	-0.825	-0.616	0.894	1.000		
<i>TAXPOLICY</i>	-0.008	0.120	-0.339	-0.153	1.000	
<i>TOPTAX</i>	-0.325	-0.359	0.093	0.053	-0.499	1.000

This result is only justified when higher tax rates allow for the provision of a greater amount of public goods by the government and thus generate an incentive for the firms to remain in the formal economy. Note, however, the correlation coefficient between these taxation variables (*TOPTAX* e *TAXPOLICY*) and *INFORMAL* are smaller compared to the other instrumental variables.⁸

⁸ The correlation between the measures of the burden of taxation and *INFORMAL* may be distorted by the fact that the estimates of the informal economy size for some countries were based on the currency demand method, which already accounts for the burden of taxation when estimating the scope of informality. This aspect should not present problems for the results

C. Control variables

Several control variables are included in the tests to account for the importance of other determinants of business cycle volatility. These variables are: two indicators of financial development, the Solow residual, the inflation rate, government expenditures, openness to international trade, and exchange rate volatility. The median of these variables was calculated over the 1961-2002 and 1985-2002 periods, except for the inflation rate and the Solow residual series: for inflation, the average rate was calculated in each period, while for the Solow residual, the standard deviation of the detrended series was obtained for each period.⁹

Recent empirical studies indicate that greater financial development contributes to reducing the volatility of business cycles (see, for example, Ferreira da Silva 2002.) As financial institutions improve the process of screening potential borrowers, the probability that financially unsound projects are externally financed reduces, leading to smoother fluctuations in economic activity. Despite the difficulties to precisely account for the efficiency of financial institutions in screening and monitoring borrowers, two proxies of financial development are used here:¹⁰

- *LLY*: this measure accounts for the size of the formal financial intermediary sector, and it is calculated as the ratio of a country's liquid liabilities to its GDP. The motivation for using this variable is that more efficient, thereby more profitable, financial sectors are more likely to absorb a greater flow of resources.

- *PRIVATE*: this variable represents the share of total domestic credit channeled to the private sector. Financial systems that direct credit to private businesses are likely to do so using more efficient screening and monitoring policies than those that allocate a greater share of resources to state-owned enterprises.

The Real Business Cycle literature has emphasized the importance of technology

presented below because neither *TOPTAX* nor *TAXPOLICY* were included as instruments in the baseline regression analysis (they were only included in the tests for the robustness of the estimations).

⁹ For the detrending procedure, see the methodology section below.

¹⁰ The indicators of financial development are based on King and Levine (1993). Although the authors propose two other indicators of financial development, the variables used here are considered better proxies for financial development, particularly the variable *PRIVATE*. The regressions were run using these other indicators, and the results are similar to those described below (these outcomes are available upon request.)

shocks in causing fluctuations in economic activity. These shocks are represented by the volatility of the Solow residual (σ_{SOL}), which is calculated as the change in the log of real GDP minus $(1-\alpha)$ times the change in the log of employment, where α is the capital share of output and is set equal to 0.36. Note that, by using this approach to calculate the technological shocks, we ignore the possibility that (i) the residual is capturing more than just technological shocks¹¹; (ii) some countries may not have a Cobb-Douglas production function with constant returns to scale; and (iii) some countries may have different capital shares. Additionally, the calculation does not take into account α times the change in capital stock (Backus et al. 1992 show that excluding this component from the calculations is not a major problem). Yet, the lack of data renders alternative approaches unfeasible for the moment.¹²

Three variables are used to account for the impact of monetary and fiscal policy on business cycle volatility. The average inflation rate (*MPOLICY*) is used to proxy for the stance of monetary policy. A few countries experience significant changes in the average inflation rate over the two periods considered here, but the results outlined below are not sensitive to inflation rate changes. The impact of fiscal policy on the volatility of economic fluctuations, in turn, is represented by the ratio of government consumption expenditure to GDP (*GOV*). For the regressions run on the sample of high-income countries over the 1985-2002 period, the stance of the fiscal policy was also measured by the ratio of the general government structural balance to GDP, with the goal of isolating the cyclical component of the government expenditures (*SGOV*).¹³

International trade and exchange rate policies are often linked to the volatility of business cycles. Openness to international trade affects the fluctuations in economic activity, albeit in an ambiguous manner: economies with fewer barriers to trade are more vulnerable to external shocks, but they are also more capable of

¹¹ Hall and Jones (1998) point out that the Solow residual may also be capturing other determinants of productivity, such as quality of human capital, on-the-job training and vintage effects.

¹² The difficulty in finding data to calculate the Solow residual is the main reason for having a limited number of countries included in the tests. Where data was unavailable from the IFS for certain years, additional data was gathered from governmental agencies and spliced accordingly.

¹³ Data for the structural spending of the government was available only for high-income countries since 1980. Thus, the *SGOV* variable was calculated as the median of the ratio of the government spending to GDP between 1985 and 2002 (International Monetary Fund 2006).

adjusting smoothly to domestic shocks by exporting them. *OPENNESS* is calculated as the ratio of total trade – the sum of exports and imports – to GDP. The impact of exchange rate policies is also uncertain, since fixed or flexible exchange rate regimes will respond differently depending on whether the shock has a monetary or fiscal origin. The degree of flexibility in exchange rate policies is represented by *EXCFLEX*, which equals to the absolute value of the change in the exchange rate (SDRs per unit of national currency).

Finally, Ramey and Ramey (1994) have pointed out that there is a negative and statistically significant link between business cycle volatility and long-term growth. *LTGROW* is estimated as the growth rate in the trend component of the log of real GDP per capita.

Although all these control variables can be considered endogenous, they are treated as exogenous in the tests below. This strategy biases the coefficients of the control variables upward and the coefficient of the size of the informal sector downward. Therefore, treating the control variables as exogenous is a “conservative” approach in the sense that it reduces the likelihood of finding an important role for *INFORMAL* while increasing the odds of finding a substantial role for the control variables (see Acemoglu et al. 2003).

D. Estimation methodology

Each country has one observation for each variable for the 1961 - 2002 period and one observation for each variable for the 1985 - 2002 period. The tests were run on samples that included all countries for each period and samples that included only high-income countries for each period.

Separating the countries by income and running the regressions is important in order to point out differences that may exist in the performance of high-income countries. For example, while the level of corruption is remarkably important for the determination of the size of the informal economy when dealing with the full sample of countries, when considering only high-income countries, the relevance of corruption reduces while the rigidity of labor laws gains more importance (see Table 1). Note, however, that the results of tests including solely high-income countries should be considered with care, because of the reduced number of degrees of freedom.

The tests were also run on two different time periods because the data on the informal sector size for the majority of the countries is available only for the 1999/2000 year. One could argue that an association between the informal sector size

and business cycle volatility for the full time period (1961-2002) would not be appropriate. Yet, to calculate the fluctuations in economic activity, we need time series with a reasonable number of observations. To tackle this problem, the tests were re-run using data referring to a time period (1985-2002) that is small enough to establish the intended relation between informal economy and business cycles, but long enough to allow the calculation of business cycle volatility.

In addition, an alternative data set for the size of the informal economy in highincome countries was used. Schneider (2005) presents information for the size of the informal economy of these countries for five different years in the period between 1989 and 2002. The tests on the sample of high-income countries for the 1985-2002 period were re-run using the average of these observations.

Fluctuations in economic activity, in turn, are proxied by the standard deviation of the business cycle component of real output, real investment and real consumption.¹⁴ Detrending these series and the Solow residual is required before running the regressions. Following recent empirical works on business cycles, a band-pass filter designed by Baxter & King (1999) has been used to isolate the business cycle component of each of these variables (see, among others, Basu and Taylor 1999).

Band-pass filters are moving-averages designed such that the researcher can determine ex-ante the periodicities of the business cycles by eliminating the components of the data with frequencies out of a pre-specified range. This filter has the following advantages over alternative methodologies, such as linear detrending, first differencing or the Hodrik-Prescott filter: it removes unit roots, rendering the time-series stationary; it does not alter the timing relation of the variables; it isolates the business cycle frequencies without re-weighting components; it constitutes an optimal approximation to the ideal band-pass filter; and it generates business cycle components that are independent of the length of the sample period.

The possibility that the size of the informal sector and the fluctuations in economic activity are both being determined by some third factor, such as economic growth levels, indicates the need to use an instrumental variables methodology. The present work relies on a Generalized Method of Moments framework to show the link between the magnitude of the informal economy and business cycle volatility. In the presence of heteroscedasticity, which is common in cross-section

¹⁴ Henceforth, the expressions “the volatility of the business cycle component” and “the volatility” of a series will be used interchangeably.

regressions, this procedure is more efficient than two-stage least squares. In addition, GMM allows testing for the validity of the instruments. The estimated equations have the following format:

$$\sigma_m = \beta_1 + \beta_2 \text{INFORMAL} + \beta_3 X + \varepsilon \quad (1)$$

where σ_m represents the volatility of the business cycle component of the output, investment or consumption series; and X is a matrix of conditioning information that controls for other factors associated with business cycle volatility (it includes one indicator of financial development at a time plus all other control variables).

Note that the use of GMM implies that the results should be interpreted as providing evidence for the hypothesis that the exogenous component of the informal economy size affects business cycle volatility. The exogenous component, in turn, is determined by the institutional characteristics of a country, which are reflected on all instrumental variables used.

IV. Estimation results

Overall, the empirical tests indicate that countries with a greater informal sector present more pronounced fluctuations in economic activity. The volatility of the business cycle component of output, investment and consumption increase as the share of the informal economy grows, and this outcome is statistically significant in most regressions. This outcome is in line with that of Bajada (2003), who has shown that contractionary shocks in the legitimate sector of the Australian economy have a more significant effect on the informal economy than positive shocks, which implies that the underground sector deepens economic downturns and augments the volatility of the business cycles.

The results become less robust, however, when the tests are conducted on the samples including only high-income countries. As pointed out before, firms in high-income countries do not normally operate solely in the formal or in the informal sector, but, instead, they undertake activities in both markets. These firms may, therefore, be less restricted in their access to credit in formal markets than firms operating in the informal sector of developing countries. Thus, the reduced significance of the size of the informal economy for the fluctuations in economic activity in high-income countries is justified.

Moreover, while businesses in developing countries face greater difficulties with corruption and law enforcement, firms in high-income countries may be moving

into informality due to the rigidity in the labor legislation. Thus, undertaking informal activities allows greater operational flexibility for these firms, which implies that larger informal economies may actually be associated with reduced business cycle volatility.

Another interesting aspect of the test results is the lack of importance of other factors that are usually considered to be relevant in determining business cycle volatility: most control variables lose importance as we add the informal economy size to the regressions. Recall that the tests results indicate that the exogenous component of the informal economy size, which is determined by the instrumental variables, is relevant in explaining business cycle volatility. Because the instrumental variables reflect the institutional characteristics of a country, the irrelevance of the control variables is a finding that is in tune with the work of

Acemoglu et al. (2003): these authors show that macroeconomic variables appear to have a minor impact on economic volatility once they control for the effect of institutions. Therefore, the informal economy size seems to be one channel through which weak institutions cause business cycle volatility.

This section is divided in three parts. The first two parts analyze the results obtained when using data for both developing and high-income countries. The third part presents the outcomes for the tests run using data solely for high-income countries.

A. Fluctuations in economic activity and the size of the informal economy

The preliminary results depicted in Table 2 indicate that the size of the informal sector is not only statistically significant, but also economically relevant in determining the volatility of output, investment and consumption. Note that *PRIVATE* is the variable proxying for financial development in the results shown on Table 2; for the outcomes obtained when financial development is represented by *LLY*, refer to the discussion about the robustness of the results in Subsection B below.

Countries with a large informal sector experience greater volatility in the business cycle component of output (Table 2, part a). *INFORMAL* is statistically significant at the 1% level in the output regressions, whether the sample used refers to the longer or the shorter time period. As an example of the relevance of *INFORMAL* in explaining fluctuations in output, take the case of India whose output volatility of 0.019 represents the median for the longer time-period sample. If the size of the informal economy in India were to grow by 10% – from 23.1% of the country's GNP to 25.4% –, the volatility of output would increase by 12%.

The size of the informal sector is also statistically significant at the 1% level in the investment regressions (Table 2, part b). In terms of economic relevance, a 10% increase in the size of the informal economy in Finland, the country whose

Table 2. Fluctuations in economic activity

	(a) Output volatility		(b) Investment volatility		(c) Consumption volatility	
	1961-2002	1985-2002	1961-2002	1985-2002	1961-2002	1985-2002
<i>C</i>	-0.046 (-1.432)	-0.022 (-1.616)	-0.117 (-1.607)	-0.041 (-1.221)	-0.039 (-1.086)	-0.024 (-1.292)
<i>INFORMAL</i>	0.001*** (2.540)	0.001*** (2.491)	0.003*** (2.819)	0.003*** (4.240)	0.001 (1.616)	0.001*** (2.736)
<i>PRIVATE</i>	0.017 (1.112)	0.025*** (2.600)	0.116* (1.940)	0.065*** (2.964)	0.032 (0.975)	0.029** (2.299)
σ_{SOL}	0.157** (2.206)	-0.144 (-1.161)	0.154- (1.478)	0.546** (-2.210)	0.109 (0.973)	-0.35* (-1.905)
<i>MPOLICY</i>	-0.00003 (-0.762)	-0.00005*** (-2.881)	-0.0001 (-0.815)	-0.0001 (-1.007)	-0.00016 (-0.980)	0.000002 (0.077)
<i>GOV</i>	0.097 (1.225)	0.005 (0.187)	0.057 (0.523)	-0.001 (-0.013)	0.055 (0.920)	0.005 (0.126)
<i>OPENNESS</i>	0.001 (0.156)	0.001 (0.201)	0.017 (1.140)	0.005 (0.330)	0.020* (1.819)	0.003 (0.452)
<i>EXCFLEX</i>	-0.008 (-0.240)	0.040** (2.223)	0.292 (1.453)	0.032 (0.564)	0.378 (1.407)	0.021 (0.727)
<i>LTGROW</i>	0.226 (0.978)	0.064 (0.720)	-0.070 (-0.123)	-0.283 (-0.925)	-0.223 (-0.557)	-0.119 (-0.564)
<i>n</i>	42	45	42	45	42	45
J-Statistic	0.007	0.044	0.002	0.015	0.031	0.005
n*J-Statistic	0.277	1.995	0.102	0.655	1.302	0.240
$\chi^2_{.05}(1)$	3.841	3.841	3.841	3.841	3.841	3.841

Notes: (1) Numbers reported in parenthesis are the t-statistics; *, ** and *** denote significance levels of 10%, 5% and 1%. (2) Weighting Matrix: the GMM estimates are robust to heteroscedasticity of unknown form. (3) Instruments: conditioning information set plus the rule of law and corruption indices.

investment volatility of 0.063 represents the median for the 1961-2002 sample, would raise the volatility of investment by 8.7%. The impact of the informal economy size on consumption is less significant (Table 2, part c), but *INFORMAL* remains statistically and economically relevant in the short time-period sample: a 10% increase in the size of the informal sector of Honduras, whose volatility in the business cycle component of consumption represents the restricted sample median, would raise consumption volatility by 22.6%.

None of the control variables are consistently relevant in the regression

analyses, except for *PRIVATE*, which is significant at least at the 10% level in all but two specifications and is positively related to business cycle volatility.¹⁵

B. Robustness of the results

The first test of the reliability of test results obtained with GMM is the J-statistic. In all regressions run, the value of this statistic was multiplied by the number of observations and compared with the table value of the χ^2 distribution with degrees of freedom equal to the number of over-identifying restrictions. In all cases, the instrumental variables chosen are considered informative (statistical significance of at least 5%.)

Different strategies were carried out to verify the robustness of the outcomes outlined in the previous sections. The tests were run using alternative methodologies, alternative instrumental variables, *LLY* as the proxy for financial development and excluding outliers. Overall, the size of the informal economy remains statistically significant regardless of the route undertaken.

Prior to running the regressions using the GMM technique, all regressions were run using two-stage-least-squares (2SLS). In all cases, the greater the size of the informal economy is, the greater the volatility of the business cycle component of output, investment and consumption. The results regarding the relevance of *INFORMAL* obtained under 2SLS are either similar to those obtained with GMM or with greater statistical significance.¹⁶

Besides the rule of law and corruption indices, three other instrumental variables were used: *EMPINDEX*, *TOPTAX* and *TAXPOLICY*. The first refer to the flexibility of labor laws, the second and third refer to the burden of taxation. The outcomes of the regressions with these other instruments should be viewed with care, since all of them have a much lower correlation with *INFORMAL* than *RULELAW* and *CORRUPTION* in the samples including both developing and high-income countries.

When testing with different instruments, two routes were undertaken. First, each of these additional instruments was simply added to the initial regression

¹⁵ This positive relationship between *PRIVATE* and business cycle volatility is at odds with previous research (see Ferreira da Silva 2002.) This outcome indicates that economic agents are more likely to undertake speculative and Ponzi schemes as the economy moves towards a boom, as suggested by Minsky (1986). As long as banks are there to finance these endeavors, this aggressive behavior should bring about increased business cycle volatility.

¹⁶ These test results are available upon request.

setting. Second, the variable *CORRUPTION* was dropped and each of the additional instruments was included. The decision to use only up to three instruments at a time was made because the finite sample bias increases with the number of instruments.

Table 3 displays some of the results obtained with the use of different instrumental variables. The numbers on the table refer to the coefficient of *INFORMAL* and its statistical significance. The size of the informal economy remains positively related to all measures of business cycle volatility, and, with few exceptions, its coefficient is statistically significant at least at the 5% level.

Table 3. Robustness of the results

Alternative instruments and controls	(a) Output volatility		(b) Investment volatility		(c) Consumption volatility	
	1961-2002	1985-2002	1961-2002	1985-2002	1961-2002	1985-2002
Baseline regression	0.001*** (2.540)	0.001*** (2.491)	0.003 *** (2.819)	0.003*** (4.240)	0.001 (1.616)	0.001*** (2.736)
<i>X, RULELAW, CORRUPTION, EMPINDEX</i>	0.0002 (0.704)	0.001*** (2.494)	0.002 ** (2.292)	0.003 *** (4.461)	0.001*** (2.862)	0.001 *** (2.668)
<i>X, RULELAW, CORRUPTION, TOPTAX</i>	0.0005 (1.057)	0.001*** (2.457)	0.004*** (3.484)	0.003*** (4.273)	0.002*** (3.188)	0.001*** (2.749)
<i>X, RULELAW, CORRUPTION, TAXPOLICY</i>	0.001*** (2.661)	0.001*** (2.480)	0.003** (2.253)	0.003*** (4.597)	0.001 (1.518)	0.001*** (2.773)
<i>X, RULELAW, EMPINDEX</i>	0.0003 (2.483)	0.001*** (1.996)	0.002* (4.462)	0.003 *** (2.565)	0.001*** (2.684)	0.001*** (0.754)
<i>X, RULELAW, TOPTAX</i>	0.001** (2.398)	0.001** (2.327)	0.004*** (3.201)	0.003*** (4.274)	0.001*** (2.936)	0.001*** (2.740)
<i>X, RULELAW, TAXPOLICY</i>	0.001*** (2.679)	0.001** (2.373)	0.003** (2.242)	0.003*** (4.635)	0.001* (1.715)	0.001*** (2.769)
Using <i>LLY</i>	0.001*** (2.445)	0.0002 (1.189)	0.002*** (3.433)	0.001* (2.010)	0.001*** (2.665)	0.001* (1.704)
Excluding outliers	0.001** (2.167)	- -	0.002*** (4.457)	0.002*** (4.437)	0.001*** (2.991)	0.001*** (2.612)

Notes: (1) The numbers in parenthesis are the t-statistics; *, ** and *** denote significance levels of 10%, 5% and 1%. (2) There was no visible outlier to be excluded when the dependent variable was the volatility of output.

Also as a test of the robustness of the results described in the previous section, *LLY* was used in place of *PRIVATE* as a measure of financial development. As depicted in Table 3, the results obtained are not as strong, but *INFORMAL* remains statistically significant at least at the 10% level in all but one regression specification.

As a final test of robustness, the regressions were rerun excluding outliers. A sample of these regressions is also shown on Table 3. The results remain unchanged: increases in the size of the informal sector augment the volatility of the business cycle, and this outcome is statistically significant.

C. High-income countries

All the regression analyses conducted above were undertaken using data solely for high-income countries. The goal was to identify any possible differences in the performance of high-income countries. Overall, the results obtained were quite unstable and few conclusions can be drawn from them, due to the reduced number of degrees of freedom.

Consider the results displayed on Table 4. Again, the numbers on the table refer to the coefficient of *INFORMAL* and its statistical significance. The first aspect to notice is that the regression results change dramatically with the financial development indicator used. When financial development is proxied by *PRIVATE* (baseline regression), the coefficient of *INFORMAL* is positive and statistically significant at least at the 5% level in the investment regressions and in the consumption and output regressions for the short time-period sample. However, the coefficient is not statistically significant in the output and consumption regressions for the full sample (negative and positive signs, respectively). When *LLY* represents financial development, the coefficient on *INFORMAL* is negative in all but one regression specification. None of these coefficients is statistically significant, except in the output regressions.

All other control variables do not exhibit a uniform pattern, except for *PRIVATE* (restricted sample) and *EXCFLEX* (full sample period): high-income countries, where a greater amount of credit is channeled to private investors and with greater exchange rate flexibility, exhibit increased investment volatility. These results are available upon request.

The tests were also run using 2SLS, and the inconsistent outcomes described above remained unaltered. The use of different instruments also does not alter significantly the outcomes: a few of the results of the output and investment volatility regressions using the short time-period sample are slightly different (mostly,

the coefficient of *INFORMAL* loses significance), but the results on the consumption volatility regressions are unchanged.

In an attempt to further minimize the problem with the timing of the data for the size of the informal economy, an alternative measure of the size of the informal economy was used: *INFORMALAVG*. Although the coefficient on the variable

Table 4. High-income countries

Alternative instruments and controls	(a) Output volatility		(b) Investment volatility		(c) Consumption volatility	
	1961-2002	1985-2002	1961-2002	1985-2002	1961-2002	1985-2002
Baseline regression	-0.0003 (-1.686)	0.0004*** (3.009)	0.001*** (3.574)	0.002** (2.382)	0.0003 (0.678)	0.001*** (3.109)
<i>X, RULELAW, CORRUPTION, EMPINDEX</i>	-0.0002 (-1.352)	0.0004*** (2.970)	0.001*** (3.533)	0.001 (1.403)	0.0003 (0.663)	0.001*** (3.465)
<i>X, RULELAW, CORRUPTION, TOPTAX</i>	-0.00001 (-0.054)	0.0004*** (3.287)	0.001*** (3.290)	0.001*** (2.915)	0.0005 (1.036)	0.001*** (3.413)
<i>X, RULELAW, CORRUPTION, TAXPOLICY</i>	-0.0003 (-1.698)	0.0003** (2.289)	0.001*** (4.683)	0.002*** (2.573)	0.0003 (0.676)	0.001*** (3.435)
<i>X, RULELAW, EMPINDEX</i>	-0.0002 (-1.341)	0.0002 (0.751)	0.001*** (2.856)	-0.0001 (-0.201)	0.0001 (0.250)	0.001*** (3.084)
<i>X, RULELAW, TOPTAX</i>	-0.001*** (-3.921)	0.0002 (0.809)	0.001*** (3.153)	0.0002 (0.434)	0.001 (1.914)	0.001*** (2.616)
<i>X, RULELAW, TAXPOLICY</i>	-0.0004* (-1.968)	0.0003 (1.673)	0.001*** (4.792)	0.001 (0.711)	0.0002 (0.531)	0.001*** (2.850)
Using <i>LLY</i>	-0.0004* (-2.019)	-0.001*** (-3.058)	-0.0001 (-0.343)	-0.000721 (-0.810)	0.0002 (0.450)	-0.0003 (-0.869)
Using <i>INFORMALAVG</i>	-	0.0001 (0.675)	-	0.001 (1.565)	-	0.001* (2.311)
Using <i>SGOV</i>	-	0.0004** (2.402)	-	0.001** (2.305)	-	0.002* (1.892)
Using <i>INFORMALAVG & SGOV</i>	-	0.0004** (2.448)	-	0.002** (2.268)	-	0.002* (2.002)

Notes: (1) The numbers in parenthesis are the t-statistics; *, ** and *** denote significance levels of 10%, 5% and 1%. (2) There was no visible outlier to be excluded when the dependent variable was the volatility of output.

proxing for the size of the informal sector remains positive, it loses significance. Yet, the inclusion of the variable measuring the structural component of the government spending (*SGOV*) ameliorates this problem: whether *SGOV* is included along with *INFORMAL* or *INFORMALAVG*, the coefficient of the variable proxing for the size of the informal economy is positive and statistically significant, normally at the 5% level, in the output, investment and consumption volatility regressions.

In conclusion, the test results that relied on data solely for high-income countries weakens the case for a relevant link between the size of the informal economy and the volatility of the business cycle, though this outcome should be viewed with care due to the reduced availability of data points. In addition, these results may be just indicating that cross-country variation in the size of the informal economy is relevant to distinguish the economic performance of countries with a broad range of income and development levels, but once countries reach a certain level of industrialization the scope of the informal economy is not as relevant for the volatility in economic activity.

V. Concluding remarks

A growing informal sector has been blamed for contributing to hinder a country's economic growth. This paper has shown that there is an additional cause for concern: countries with a large informal economy tend to experience increased volatility in output, investment and consumption during the business cycle. The small size of informal firms prevents them not only from being productive, but also from having access to credit markets. The lack of credit makes them more vulnerable to fluctuations in economic activity, as they are unable to buffer cash flows squeezes. Because the informal sector is intertwined with formal business, the larger the size of a country's informal economy is, the more volatile the cycles in economic activity.

The empirical tests run on samples including data of developing and highincome countries have shown that the size of the informal sector is positively related to business cycle volatility, and this outcome is not only statistically significant, but also economically relevant. The results indicate that the exogenous component of the informal economy size, which is determined by institutional variables such as the rule of law and corruption, contributes to augment business cycle volatility. Previous research has shown that macroeconomic policies constitute just channels through which institutions affect economics volatility. This paper points out another channel through which institutions matter to fluctuations in economic activity: institutions are key in explaining the size of a country's informal economy, and, as informality grows, so does business cycle volatility.

The inclusion of the informal economy size in the regression analyses conducted here reduces the importance of other variables thought to be relevant in explaining the fluctuations in economic activity. Again, this finding reflects the relevance of institutional characteristics in explaining business cycle volatility. All these outcomes are robust to changes in the econometric methodology and in the instrumental variables included, as well as to the exclusion of outliers.

Nevertheless, when considering solely the performance of high-income countries, the empirical results are less conclusive. The magnitude of the informal sector is positively correlated with business cycle volatility in some regression specifications, and negatively correlated in others. Moreover, its statistical significance is also inconsistent across the several tests described here. Besides the problem associated with the efficiency of the estimation procedure, other factors may lead to this weak result.

First, businesses in high-income countries do not normally operate solely in informality; often, they undertake both formal and informal activities. Thus, firms in high-income countries, when operating in the informal sector, are possibly less financing constrained than firms in developing countries, which normally operate either in the formal or in the informal sector. Thus, the reduced relevance of the impact of the size of the informal economy on the fluctuations in economic activity is expected for the high-income countries sample.

Second, the need to avoid the rigidity of labor legislation is more likely the cause of informality in high-income countries than corruption and law enforcement. If this is the case, the move into informality brings greater operational flexibility to businesses. As a consequence, greater informal economies need not be associated with greater business cycle volatility.

Finally, the weakened results found on the regressions including only high-income country data may be just indicating that once countries reach a certain level of development, the size of the informal economy is not as relevant to explaining the fluctuations in economic activity. In future research, conducting panel-data analysis using data for high-income countries may provide more conclusive evidence on the link between the size of the informal economy and business cycle volatility.

Finding the causes of increased business cycle volatility is relevant because greater fluctuations in economic activity have been associated with lower growth rates in output, in investment (domestic and foreign direct investment) and in employment (see Aisenman 1997, 2003). The overall results presented here point to an important role of the informal economy in contributing to augment the fluctuations in economic activity. Thus, institutional reforms that reduce the costs of operating formally are key to reducing the size of the informal economy and promoting smoother fluctuations in economic activity.

Appendix

Table A1. Variables

Indicators of economic activity	
σ_Y	Standard deviation of the business cycle component of the real GDP series
σ_I	Standard deviation of the business cycle component of the real private investment series
σ_C	Standard deviation of the business cycle component of the real private consumption series
Indicator of the size of the informal economy	
INFORMAL	Value added of the informal economy as a percentage of GNP, 1999/2000
INFORMALAVG	Value added of the informal economy as a percentage of GNP, average value for the 1989 – 2002 period
Instrumental variables	
RULELAW	Tradition for law and order - it ranges from -2.5 to 2.5, with the lower scores reflecting reduced law enforcement
CORRUPTION	Degree to which government agents use their political power for private gain - it ranges from -2.5 to 2.5, with the lower scores reflecting greater corruption
EMPINDEX	Rigidity of employment laws - the higher scores reflect greater the rigidity
TOPTAX	Top marginal income tax rate for a corresponding income threshold - it ranges from 1 to 10, with the lower scores indicating higher tax rates
TAXPOLICY	Fiscal burden of the government - it ranges from 1 to 5, with the lower scores indicating less fiscal burden
Control variables	
LLY	Liquid liabilities as a fraction of GDP*
PRIVATE	Claims to the non-financial private sector as a fraction of the total domestic credit*
σ_{SOL}	Standard deviation of the business cycle component of the Solow residual series
MPOLICY	Average inflation rate
GOV	The ratio of government consumption expenditure to GDP*
SGOV	The ratio of general government structural balance to GDP*
OPENNESS	The ratio of total trade to GDP, where total trade equals the sum of exports and imports*
EXCFLEX	The absolute value of the change in exchange rate, which is defined as SDRs per unit of national currency*
LTGROW	The growth rate of the trend component of the log of real GDP per capita series*

Note: * Median value over the relevant time period.

Table A2. List of countries

Country	1961 – 2002			1985 – 2002			
	INFORMAL	σ_y	σ_f	INFORMAL- AVG	σ_y	σ_f	σ_c
Argentina	25.4	0.036	0.113	25.4	0.040	0.113	0.056
Australia*	15.3	0.016	0.038	15.3	0.012	0.046	0.009
Austria*	10.2	0.013	0.036	10.2	0.008	0.020	0.006
Belgium*	23.2	0.010	0.033	23.2	0.008	0.034	0.009
Bolivia				67.1	0.013	0.086	0.041
Brazil	39.8	0.025	0.153	39.8	0.016	0.087	0.046
Canada*	16.4	0.013	0.040	16.4	0.014	0.041	0.014
Chile	19.8	0.034	0.104	19.8	0.018	0.082	0.028
Colombia	39.1	0.019	0.069	39.1	0.016	0.100	0.020
Denmark*	18.2	0.013	0.048	18.2	0.009	0.039	0.016
Ecuador	34.4	0.032	0.079	34.4	0.025	0.088	0.038
Egypt	35.1	0.025	0.081	35.1	0.011	0.076	0.014
Finland*	18.3	0.019	0.063	18.3	0.022	0.081	0.012
France*	15.3	0.008	0.026	15.3	0.008	0.030	0.007
Germany*	16.3	0.016	0.044	16.3	0.020	0.043	0.026
Greece*	28.6	0.016	0.063	28.6	0.010	0.055	0.010
Honduras				49.6	0.018	0.097	0.022
India	23.1	0.019	0.038	23.1	0.013	0.044	0.013
Indonesia	19.4	0.045	0.224	19.4	0.035	0.077	0.036
Ireland*	15.8	0.014	0.051	15.8	0.014	0.054	0.013
Israel*	21.9	0.056	0.117	21.9	0.014	0.071	0.026
Italy*	27	0.014	0.041	27	0.007	0.027	0.009
Japan*	11.3	0.020	0.041	11.3	0.012	0.032	0.008
Kenya	34.3	0.084	0.107	34.3	0.025	0.072	0.039
Malaysia	31.1	0.027	0.101	31.1	0.030	0.144	0.047
Mexico	30.1	0.020	0.078	30.1	0.021	0.066	0.038

Table A2. List of countries (continued)

Country	1961 – 2002			1985 – 2002			
	INFORMAL	σ_Y	σ_I	INFORMAL- AVG	σ_Y	σ_I	σ_C
Netherlands*	13	0.022	0.030	13	0.008	0.023	0.026
New Zealand*	12.7	0.017	0.059	12.7	0.018	0.064	0.019
Nigeria	57.9	0.052	0.170				
Norway*	19.1	0.010	0.055	19.1	0.011	0.068	0.029
Pakistan	36.8	0.016	0.056	36.8	0.011	0.038	0.024
Peru	59.9	0.050	0.118				
Philippines	43.4	0.020	0.089	43.4	0.025	0.105	0.014
Poland				27.6	0.035	0.075	0.044
Portugal*	22.6	0.019	0.062	22.6	0.013	0.077	0.039
Singapore*				13.1	0.023	0.053	0.029
South Korea*	27.5	0.023	0.080	27.5	0.027	0.068	0.035
Spain*	22.6	0.011	0.042	22.6	0.011	0.049	0.018
Sri Lanka				44.6	0.011	0.036	0.014
Sweden*	19.1	0.015	0.039	19.1	0.017	0.057	0.017
Switzerland*	8.8	0.014	0.049	8.8	0.010	0.035	0.005
Thailand	52.6	0.024	0.083	52.6	0.035	0.126	0.034
Turkey	32.1	0.024	0.068	32.1	0.030	0.073	0.032
United Kingdom*	12.6	0.013	0.041	12.6	0.011	0.050	0.012
United States*	8.8	0.014	0.043	8.8	0.008	0.030	0.008
Uruguay	51.1	0.037	0.336	51.1	0.026	0.081	0.029
Venezuela	33.6	0.025	0.128	33.6	0.035	0.147	0.061
Median	22.9	0.019	0.063	23.1	0.014	0.066	0.022
Average	26.3	0.024	0.079	26.4	0.018	0.066	0.024
Minimum	8.8	0.008	0.026	8.8	0.007	0.020	0.005
Maximum	59.9	0.084	0.336	67.1	0.040	0.147	0.061
Std. deviation	13.168	0.015	0.058	13.228	0.009	0.031	0.014
No. observations	42	42	42	45	45	45	45

Note: * Countries included in the high-income sample.

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