UNIVERSITAT DE BARCELONA

Three Empirical Essays on Informality

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PhD in Economics

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Con especial cariño a mi madre

En memoria de mi padre

Y a mis hermanas

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Chapter 1: Introduction

1.1. Background and motivation

For most people, the word "informality", when applied to labour, has negative associations. It is associated with low-skilled employment or selling poor quality products. Furthermore, as governments do not regulate informal commercial activity, it has been argued that informality impacts the economy by lowering tax revenue. Furthermore, informality is seen to have a significant social impact in that those who work in this sector are very likely to be working under precarious labour conditions, lacking protection in the face of economic shocks, while formal workers are better protected against economic fluctuations (Perry et al. 2007; Freije 2002; Bacchetta et al., 2009).

Informality is a very complex subject, with the informal workers we see on the streets as only the surface of larger and more complicated issues. It is necessary to identify the economic agents that make up this sector. Informality does not solely imply street-sellers, but also firms of any size, such as large firms that do not comply with tax law. Furthermore, labour informality is not only present in the informal sector. It can also be found in the formal sector, in that a formal firm may fail to comply with the labour rights of one of its workers to be considered to have some degree of informality, this situation implies some degree of precarious labour conditions in most developing countries.

1.1.1. What is informality?

In an attempt to deconstruct the complexities of informality, scholars have put forward a number of definitions and propose different ways to measure it. The term “informality” may mean different issues in economic terms and depending on the point of view of the person, piece of research, or institution. On one hand, informality can be perceived negatively as a phenomenon associated with a lack of labour protections, street-selling, low productivity, and tax evasion, among others (La Porta and Schleifer, 2014). On the other hand, informality can often be related to entrepreneurship,

which is linked to innovation (Ardagna and Lusardi, 2008). Although, most of the time, informality definitions refer to the market-based legal production of goods and services that are deliberately concealed from public authorities (Buehn and Schneider, 2012).

There are four schools of thought on informality: the dualist school, the structuralist school, the legalistic school, and the voluntarist school. Informality has different meanings according to each school of thought (Alter, 2012). The dualist school sees the informal sector as comprising marginal activities that provide income and safety to poor people (Hart, 1973), while the structuralist school understands the informal economy as a way to help reduce inputs and labour costs (Castell and Portes, 1989). The legalistic school views matters from a regulatory standpoint, casting those involved in the informal economy as micro-entrepreneurs who choose this sector as a way to avoid costs (De Soto, 1989). The voluntarist school argues that informality is borne of attempts to avoid regulation (Maloney, 2004). While it is difficult to define informality, finding a simple method of doing so can help to create a proxy and thus measure it; for example, it has been proposed that formal economic activities are those that are recognized and regulated by states, and informal economic activities are those that are not (Weeks, 1975).

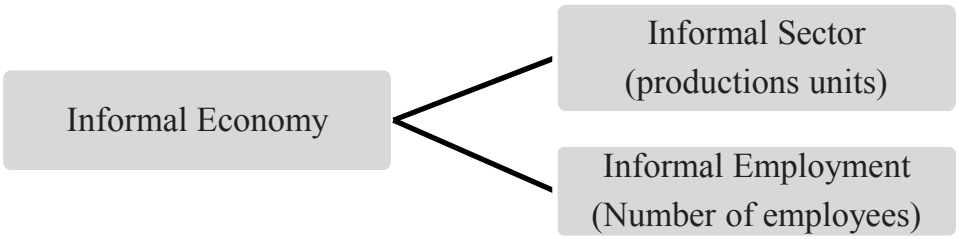
Other ways to define and identify informality that can be found in the literature come from productivity and legalistic standpoints. The former is identified using characteristics from the area of employment, such as non-professional workers, low skilled jobs, family workers, self-employment, and workers in small firms. The latter is represented by non-compliance with the laws of the state in terms of labour and social security legislation (Khamis, 2012), where, for instance, self-employed workers or those without access to the social security system are included in this definition of informality.

International organizations have also tried to conceptualize informality. In its 2003 *Guidelines concerning a statistical definition of informal employment*, the International Labour Organization (ILO) recognises the importance of consistency and coherence in the concepts used to define informal employment, such as the approach that focuses on the enterprise itself and the approach that is based on jobs (see Figure 1.1). From this

perspective, the informal economy includes the informal sector and informal employment, with the difference being that the enterprise approach is based on production units and the latter depends on the number of employees in the sector.

Informality can include earning activities at the level of the firm that fall outside the purview and regulatory environment of the state (Portes and Schauffler, 1993; Pisani and Pagán, 2004). However, it is difficult to define it as comprising "activities at the margin of government control and regulation" inasmuch as it would cover a broad range of activities, from illegal activities to those that are either legal or dependent on existing taxation and labour laws (Portes and Schauffler, 1993).

Figure 1.1. Informal economy



Source: Own elaboration.

Whether or not the different definitions and concepts of informality are taken into account in informality literature, it is possible to understand that there is no single kind of informality; therefore, it is plausible that there are different types and degrees of informality.

1.1.2. Causes of informality

There are many points of view about the causes of informality. Pisani and Pagán (2004) argue that one can distinguish four clear standpoints: the structuralist view, which sees informality as an area of absorption for excess labour; the neo-marxist view, which focuses on production processes, employment relationships, and the link between national and global economies; the legalistic approach, which argues that governmental institutions and regulation have forced entrepreneurs into the informal sector; and the microenterprise approach, which tries to encourage

competitive ability as a means of escaping poverty. The structuralist view shares similarities with the dualist school, which says that informal actors are excluded from opportunities due to the disparity between population and employment growth (Alter, 2012).

Another explanation for informality comes from exit theory, which states that agents make an implicit cost-benefit analysis between the formal and informal sectors. For instance, micro-firms can decide to avoid regulations and taxation, because they have no intention to grow or no potential to do so. This theory is in line with the voluntarist school (Alter, 2012). In contrast, the exclusion argument states that informality is a result of stringent and costly regulations as well as a lack of opportunities due to low productivity, an absence of labour benefits, irregular work conditions, high turnover, and lower rates of remuneration (Oviedo, 2009). The exclusion argument is in line with legalistic approach, which states that institutions and regulation are the main factors that explain informality.

In the case of the informal labour market, the discussion has focused on whether this market is segmented, integrated, or a combination of both (Khamis, 2012; Pages and Stampini, 2009). Workers decide to enter into the informal sector for many reasons. Freije (2002) mentions some of them, such as informal mechanisms of social protection, credit restrictions, and management risk. On the other hand, as labour protection laws can result in an implicit tax on workers or inflexible wages, informality can offer greater flexibility for workers (Maloney, 1999)—as a result, a cost-benefit analysis is carried out, this reason is similar to the voluntarist school.

On the other hand, there are some mid-term macroeconomic factors and long-term structural changes that can affect the formal sector—such as the global economic reforms of the 1980s and 1990s, including privatization, trade liberalization, and the modernization of the financial sector—that may have had an effect on labour markets by encouraging substitutions of capital for labour (Freije, 2002). Another example is the changes in Latin American countries such as Brazil and Colombia, which were driven by modifications in labour market regulation and social security taxes in the early 1990s, when adjustments were carried out in macroeconomic politics such as the change from a fixed to a floating exchange rate (Perry et al., 2007).

Empirical literature indicates that macroeconomic behaviour and the excessive number of standards and regulations are among the main factors behind informality (Freije, 2002). In other words, excessively high barriers to companies may cause firms to choose not to register and not to hire. Even though it is seen as a backwards step, liquidity restrictions may lead poor people to consider investing, for instance, in a microenterprise (Perry et al., 2007), although this would also indicate a lack of intent or potential for growth.

The role of government is another important factor influencing the size of the informal economy due to its capacity to change regulation through legislation. Studies have confirmed that informality is negatively associated with business regulation, law and order, and the capacity of government to enforce regulation (Loayza et al., 2009; Masatlioglu and Rigolini 2008). Among the regulations that are often mentioned in the literature is taxation, because it is linked to higher informality, inasmuch as it represents a barrier to formality, and the transaction costs are higher (Freije, 2002). Additionally, the strength and efficiency of regulation are positively associated with the reduction of informality (Loayza et al., 2009).

The variable of corruption is often used as an indicator of the level of governmental weakness (Loayza et al., 2009). Corruption can reduce the willingness of firms and workers to pay taxes, because "everybody is involved in corrupt practice"; thus, the provision of public good is always sub-optimal (Oviedo, 2009). The willingness to pay has been represented by means of the so-called "tax morale," or the disposition of society toward tax compliance, with empirical studies finding a positive relationship with informality (Torgler, 2005; Buehn and Schneider, 2012).

In the case of firm informality, its extent has been linked to size: the bigger the firm in terms of production and employment, the lesser the informality. As firms grow, they demand more formal services and institutions, so their exposure to the authorities is greater (Perry et al., 2007). According to the literature, most firm informality is considered to occur in the smallest firms, such as family businesses or microenterprises, where labour is used intensively and there is no government regulation (Pisani and Pagán, 2004).

In summary, there is no unified explanation for the causes of informality. Its causes are not solely economic in nature, and informality is linked to an excessively regulated economy that restricts improved performance during economic shocks, potentially damaging growth[1] (Loayza et al., 2009). Informality is not only linked to excessive regulation, but also to insufficient enforcement of government regulations (Freije, 2002).

1.1.3. Consequences

Informality is important, not only because it represents a significant part of many economies in developing countries, but also because it has economic and social consequences. Informality entails undesirable effects, such as leaving families unprotected and without formal mechanisms to mitigate economic shocks (Perry et al., 2007; Freije, 2002); lags in economic growth and lower levels of productivity due to a greater concentration of workers in small firms (Perry et al., 2007, Freije, 2002; Loayza et al., 2009; La Porta and Schleifer, 2014) which are typically inefficient and run by poor entrepreneurs (La Porta and Shleifer, 2014); lower fiscal capacities that may erode economic growth (Buehn and Schneider, 2012); and deterioration of the rule of law and the credibility of institutions (Perry et al., 2007). Informality can be an indicator of poor regulation and other governmental failures, and it can also affect the ability of formal firms to innovate and to adopt other technologies (Perry et al., 2007).

The proportion of micro firms in an economy, in terms of employees, has been considered to be a good proxy of informality. The workforce is concentrated in this kind of firm, which can lead to efficiency losses, because these firms cannot exploit the economies of scale that large firms can. The presence of informal firms can slow the process of creative destruction, i.e., the replacement of inefficient firms (Perry et al., 2007). Not only are informal firms less efficient and less productive, but they are also at a disadvantage due to a lack of access to the credit and legal protection infrastructure that formal firms can access (De Paula and Scheinkman, 2009).

[1] Loayza et al. (2009) explain that informality is a distorted response, because it entails the misallocation of resources and the loss, at least partially, of the advantages of legality, such as police and judicial protection, access to formal credit institutions, and participation in international markets.

1.1.4. How to measure the informality?

As mentioned above, there are different ways to approach and thus measure informality. As this thesis is focused mainly on the productive unit, this research explores different approaches to studying it. In the case of business, many studies have considered a firm to be informal if it, for instance, does not report sales, or if it exists on the margins of registered compliance with labour or tax laws (Maloney, 1999).

There are various degrees of informality. For example, a firm may not be registered at all and, thus, does not comply with any legal requirements. On the other hand, a firm may be registered, but may not comply with labour laws, such as failing to register its workers with the social security system or failing to pay taxes due by underreporting sales. In other cases, some firms avoid paying their legally required contributions by hiring self-employed workers instead of salaried workers (Brandt, 2011; Perry et al., 2007).

While the level of a firm's informality can be measured based on its registration with the government, this implies a wider definition inasmuch as it would include firms that are not commercially registered, have formal accountancy processes, make social security or tax contributions, or make payments for licenses or mercantile registers. However, measuring informality without the use of mercantile registers is the most representative method (Cardenas and Rozo, 2009). Cunningham and Maloney (1999) agree with this definition, because participation in the formal market and legal institutions ranges from being unregistered with tax authorities to being registered locally or being registered with federal tax authorities. Di Giannatale et al. (2013) consider a micro-firm to be informal if it is not registered with the treasury ministry. Other studies have used other methods to proxy firm informality. One method is similar to those that use labour informality, with a focus in terms of protection, such as those owners or workers who are not protected by the social security system. While another measure used is the size of firms, this measure varies depending on the study, where informality is measured at, for example, fewer than 16 employees or fewer than six workers (Maloney, 1999), or, in other cases, at ten employees or fewer, or even at fewer than four workers (Mondragón-Vélez et al., 2010; La Porta and Shleifer, 2014). Therefore, it can be seen

that there is not a unified measure, and measuring informality in this way can vary according to data availability from one study to another.

A literature review on informality reveals blind spots, the explanation of which is one of the main objectives of this thesis. For instance, one of the clearest gaps in the body of research in this area relates to the relationship between labour informality and the attraction of investment. This thesis seeks to explain whether informality, which is associated with poor labour conditions, can influence foreign direct investment (FDI) flows.

Another blind spot in the literature on micro-firm informality is that these businesses have been classified as informal due to their small size. In contrast, this thesis highlights the necessity of studying them in more depth so as to show that not all micro-firms are equal and that it is necessary to divide micro-firms into categories for improved analysis. The research shows that formal and informal micro-firms behave differently, at least in terms of efficiency.

1.2. Objectives and contribution to the literature

General Objectives

Studying informality from different perspectives is one of the most important objectives of this study. The thesis focuses its analysis on informal labour (Chapter 2) and economic units, placing the informality of firms at the centre of the study in two chapters (3 and 4). In this way, two main aspects of informality are studied here: labour informality and business informality. Labour informality is analysed as a determinant of FDI. Firm informality is analysed from a micro-firm perspective, which has been largely ignored in the literature, with the measurement of micro-firm informality on a per-state basis within a developing country, Mexico, as another objective. A further objective is to ascertain whether there are differences in efficiency between formal and informal micro-firms.

Another important contribution of this study to the literature on informality is the attempt to explain the degree of micro-firm informality by region in a developing country, Mexico. The study of the micro-firm and its legal status has also been ignored in most studies. Although there are many studies analysing the level of informality, the study of micro-firm

informality by state is uncommon in the literature and is not explained in a regional level.

To validate the results obtained in this thesis, different methods for the measurement of informality are taken into account. It is important to mention this aspect, as few studies of informality are validated under different measurements.

Another important contribution to the literature on informality is the level of disaggregation of data, in that the analysis conducted in this thesis ranges from the macro- to the microeconomic level.

This thesis proposes the differentiation of formal and informal micro-firms to better analyse the characteristics of each group. The differences between groups are then explained. The analysis is mainly focused on the efficiency differences between the groups.

This thesis is focused on developing countries, which are the most affected by informality levels. According to the ILO (2002), the informal economy accounts for one-half to three-quarters of all non-agricultural employment in developing countries. Mexico is the country chosen as the object of study in two chapters of this thesis. Mexico is considered a good benchmark to study informality due to its high levels of informality, its economic size, and its status as an emerging economy.

During the 1980s, Mexico, as with most Latin-American countries, moved from an economy controlled by the state and oriented to the domestic market an open economy, starting with the General Agreement on Tariffs and Trade (GATT) in 1985. The economic openness deepened with the entry into force of the North American Free Trade Agreement (NAFTA) in 1994. This stage has been characterised by the privatisation of state-owned companies, the deregulation of financial markets, and FDI. However, Mexico's economic openness has to be contextualised by two economic crises: the external debt crisis in 1982 and the financial crisis in 1994.

One of the main objectives of economic openness was economic growth and increased employment rate. Nevertheless, the average GDP has not exceeded 2.5% in the last three decades. On the other hand, the average unemployment rate has not exceeded 5.0% in the same period, and this has

largely been achieved because of the growing informal economy. The informal economy currently employs roughly 60% of employees in Mexico, with the states of Oaxaca and Guerrero states reaching informality levels higher than 80%, while Baja California Sur and Nuevo Leon with levels of approximately 40%. These informality levels are higher than average among Latin-American countries[2] and are the highest among Organisation for Economic Cooperation and Development (OECD) countries.

Informality is a very important issue to resolve in developing countries by its economic and social consequences, and it is most relevant in countries with greater economic weight. This is the case for Mexico, which is the second biggest economy and the country with the second largest population in Latin America; Mexico's economy is expected to be among the ten largest economies in 2050[3].

Specific Objectives

Although the determinants of FDI have been studied before, there is no agreement on the effect of each variable on attracting investments. However, in general, it is possible to undertake a separation of variables; on one hand, there is more unanimity about the effects of some variables on investments, referred to in this thesis as "basic." Variables with unclear effects on investments are referred to as "enhancers".

Enhancer variables include institutional variables, which are split between formal and informal institutions. Formal institutions constitute the legal framework in each country, such as labour or tax laws. Informal variables refer to unwritten arrangements or belief systems, such as corruption, trust, or informal labour market rules (e.g., firms with low salary workers or outsourced workers).

Research conducted on micro-firms in developing countries is less notable. With the analysis focused on labour informality, business informality has been bypassed and, in particular, micro-firm informality is absent from

[2] According to Instituto Nacional de Geografía y Estadística (INEGI, or the National Institute for Statistics), informal workers constitute 57.46% of the labour force in Mexico and 51.3% in the Latin American region in 2015.

[3] According to the PriceWaterhouseCoopers report "World in 2050", the Mexican economy will be larger than those of the United Kingdom and France.

most studies. While micro-firms are often considered informal due to their small size, this analysis presents a differentiation between formal and informal micro-firms. In this way, another objective of this study is to contribute to the literature on determinants of informality; unlike other studies, this one is focused on economic units in each state. Mexico is selected as a case study due to both its high level of micro-firm informality and the heterogeneity among its states. Furthermore, studies focusing on developing countries are scarce in the literature.

The economic role of micro-firms remains the subject of much discussion and debate. There is no agreement as to the implications for a country's development of the presence of a large proportion of micro-firms. While these firms can be seen as potential growth drivers, as they are usually related to entrepreneurship, a relatively high share of micro-firms can also be a sign of an underdeveloped productive system, which applies especially to developing countries where micro-firms represent the majority of business activities.

In developing countries, micro-firms have been mainly associated with undesirable characteristics, such as low productivity. Unlike other studies, this thesis separates formal and informal micro-firms in order to test whether there are differences between groups. It shows that the division between the two categories of micro-firms is necessary to better understand the behaviour of this kind of business.

1.3. Thesis structure

The three types of analysis carried out in this thesis are discussed in chapters 2, 3, and 4. Each chapter presents the context in which the analysis on the role of informality is carried out, the methodologies used, and the results obtained. The conclusions of the thesis are presented in Chapter 5. The following summarises the three empirical analyses undertaken on informality.

Chapter 2 examines how informal labour markets affect FDI flows and whether the effects are similar in developed and developing countries. The data used in the analysis is taken from different sources, such as the World Bank (WB) and the United Nations Conference on Trade and Development

(UNCTAD). The sample is taken from 65 countries, and panel econometric models are used for the period of study (1996 to 2009). In addition, this chapter uses a dynamic model as an extension of the analysis to establish whether such an effect exists and what its indicators and significance may be. This methodology provides opportunities to improve the analysis. After controlling for basic variables in the analysis, the results show that informal labour markets are relevant and positively affect the flow of FDI, with these effects felt up to a certain level of informality after which they become negative. The results are similar for developed and developing countries and robust to several checks. While the results may indicate that adverse labour conditions can attract investments by means of lower labour cost, there is a point at which this aspect becomes harmful.

Chapter 3 analyses the determinants of micro-firm informality in each state of the Republic of Mexico using public sources, such as the *Encuesta Nacional de Micronegocios* (ENAMIN, or the National Micro-Firm Survey), the *Instituto Nacional de Estadisica* (INEGI), and the *Secretaría de Economía* (SE). Econometric panel data models are estimated for a sample of 32 states over the 2008 to 2012 period. This chapter uses different definitions of informality to check the robustness of the results. The ENAMIN covers only those businesses in the trade, service, and construction sectors that employ up to six people and those that employ up to sixteen people in the manufacturing sector. Furthermore, the surveys are also able to identify micro-firms with employees or those micro-firms in which the owner is the only worker. The empirical evidence obtained allows us to conclude that although economic factors are the main causes of informality, variables such as corruption and education have an important role to play.

Chapter 4 tests whether there are efficiency differences between formal and informal micro-firms and explains these differences. One of the novelties of the study is the use of the Oaxaca-Blinder decomposition method, which enables an analysis of the differences between both groups of firms after controlling for their different allocation of factors. Micro-firms in Mexico are taken as a case study, with the ENAMIN for 2008, 2010, and 2011 used as the basis of the analysis. The empirical evidence suggests that output differences can be explained by endowment characteristics, while efficiency differences are explained by endowment returns. The main variables to

explain the gap between the groups are the owner's level of education, the firm's age, the owner's motivations, and financing.

Finally, chapter 5 summarizes the main conclusions of the thesis and considers policy implications. For instance, from the chapters of this thesis emerges the importance of both the study of informality and the differentiation between types of informal businesses in order to better understand this economic sector. This is more notably the case when the analysis is focused on micro-firms. Besides, it is important to recognize the heterogeneity of this sector. This thesis shows that formal and informal micro firms exhibit different economic behaviour, with education and corruption variables as very important to explaining the degree of informality, and labour informality as a variable that explains FDI flow, especially in developing countries.

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Chapter 2: A Panel data analysis of FDI and informal labour markets*

2.1. Introduction

Inflows of Foreign Direct Investment (FDI) have often been associated with immediate positive economic effects, such as investment in infrastructure, employment generation, and better pay for workers. Moreover, other medium and long term benefits, such as technological spillovers and revenues from new investments and imitation, skills acquisition, competence, and exports are the classic channels are recognised as the transmitters of these benefits (Görg et al., 2005). However, there are also possible negative effects of FDI, such as an increase in wage inequality (Hanousek et al., 2011). Nevertheless, the proven benefits of FDI are the reason that governments often compete and strive to provide the best conditions to investors (Lipsey, 2004).

Although there is abundant literature on FDI determinants examining the process by which investments are made in a particular country, there is no conclusive empirical evidence as to which determinants are most significance or their effects on foreign investments (Agiomirgianakis et al., 2004; Blonigen, 2005). There is greater consensus about some determinants, such as the significance of some variables and their possible effects such as market size, economic growth, and macroeconomic stability. Even so, unanimity does not exist when it is disaggregated or other factors are added, as determinants affect each country, region, and time period in a different way. Among those determinants that have begun to take prominence, the role of institutions in each country is relevant, although there is little consensus as to which institutions are significant and why (Bevan et al., 2004).

* This chapter has been presented in "Interdisciplinary Insights on Fraud and Corruption. Multiple perspectives of the shadow economy". Porto, Portugal. / It has been presented on seminars at Universitat de Barcelona. / It is published as AQR Working Paper 2015/09.

While institutions are becoming increasingly relevant to economic analysis, the extent of their influence on investors' decisions is unclear, and even more uncertain when considering the informal institutions of a society. The informality of the labour market, in any of the definitions given in the bulk of published studies, has a negative connotation, although, a few studies find an opposite effect on economic activity and investment (Misati, 2010). Arguments about the adverse effects of informality tend to be concentrated on the economic growth of countries that occurs due to lower tax revenues, less infrastructure, and a lower level of well-being as result of the inclusion-exclusion policies governments vis-à-vis the economic units and individuals that formal institutions do not manage to capture. However, what informality represents in a society is little studied—that is, the relationship of informality and investment and how informality can influence investor decisions, company location, or FDI (Misati, 2010). In this study, informality is taken from the point of view of the labour market and the workforce of each country, in that it focuses on the vulnerability of workers and the level to which labour institutions are developed. In this way, this study asserts that the informal market has an effect on investments.

This chapter has the following specific objectives: to contribute to the literature on FDI determinants by analysing factors not considered by previous research; to contribute to the literature by analysing the influence of informal labour markets and their potential role as a determinant of FDI flows; to produce evidence taken from a bigger set of countries and over a longer time period than those considered by previous studies, which is also of great relevance to the literature.

Based on the foregoing, various statistical and econometric techniques are applied to achieve these aims. As both time series and cross-section information are available for various countries, panel data analysis forms the basis of this work. An advantage of the panel data modelling approach is the superior analysis it permits by controlling both individual and time effects, and, if necessary, the consideration of past effects and their impact on the analysis.

The next section provides a review of the literature about FDI determinants followed by a description of the methodology used for the analysis, a description of the database, and a summary of the results.

2.2. Literature overview

The increasing mobility of capital observed in the last few decades (see Figure 2.1), seen in both goods and capital flows for both developed and developing countries, has been the subject of economic studies seeking to examine its origin, and to identify the consequences it has on others economic agents. Understanding the factors behind these flows would enable the examination of the behaviour of companies and an understanding of why some companies decide to be located in outside their home country.

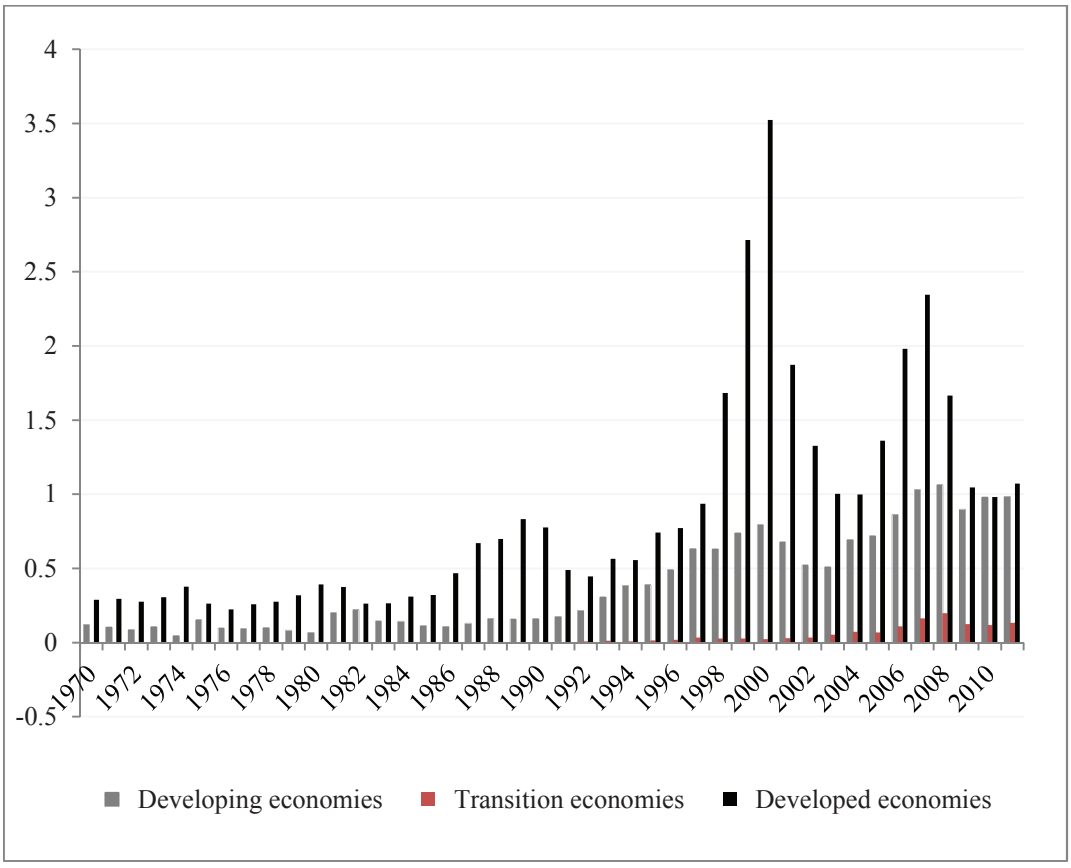
Regarding the possible economic consequences of capital mobility, many studies have been limited to the analysis of its immediate effects, such as the impact of investment on infrastructure, the employment directly generated in the country destination for the investment, and the impact of relocation on the company's home country. Others have also considered the possible side effects on other participants of these "contagions" (*spillovers*), such as innovation in production and organizational processes, distribution networks, technology, and salaries on local companies and competition. While there is no consensus about existence and direction of the effect, it is a topic that remains the subject of investigation (Hanousek et al., 2011; Clark et al., 2011).

The determinants that may capture more investment for a country are varied and depend largely on the group of countries that are considered in the sample, time period, and methodology. Even so, inferences can be made from the trends identifiable in the results obtained for each of the variables involved in the studies. This section provides a brief review of the most important FDI determinants, as described in the relevant empirical studies and literature, in order to analyse in more detail those variables that have generated discussion in the literature. (In)formal institutions are studied more deeply.

Based on the literature review and the classifications made by various authors (Parcon, 2008; Whyman and Baimbridge, 2006; UNCTAD, 1998; World Economic Forum, 2012), the determinants are split into two large blocks referred to as *basic* and *enhancers* (See Figure 2.2). The former refers to the group of determinants about which there is a growing consensus in the literature as to their effect on FDI and that have or have

had a significant statistical weight on both developed and developing countries. The latter embodies determinants may be more susceptible to development and may be a catalyst in attracting FDI. Annex 2.A shows the effect of each variable on FDI.

Figure 2.1. FDI flows as a percentage of world GDP (1970-2011)

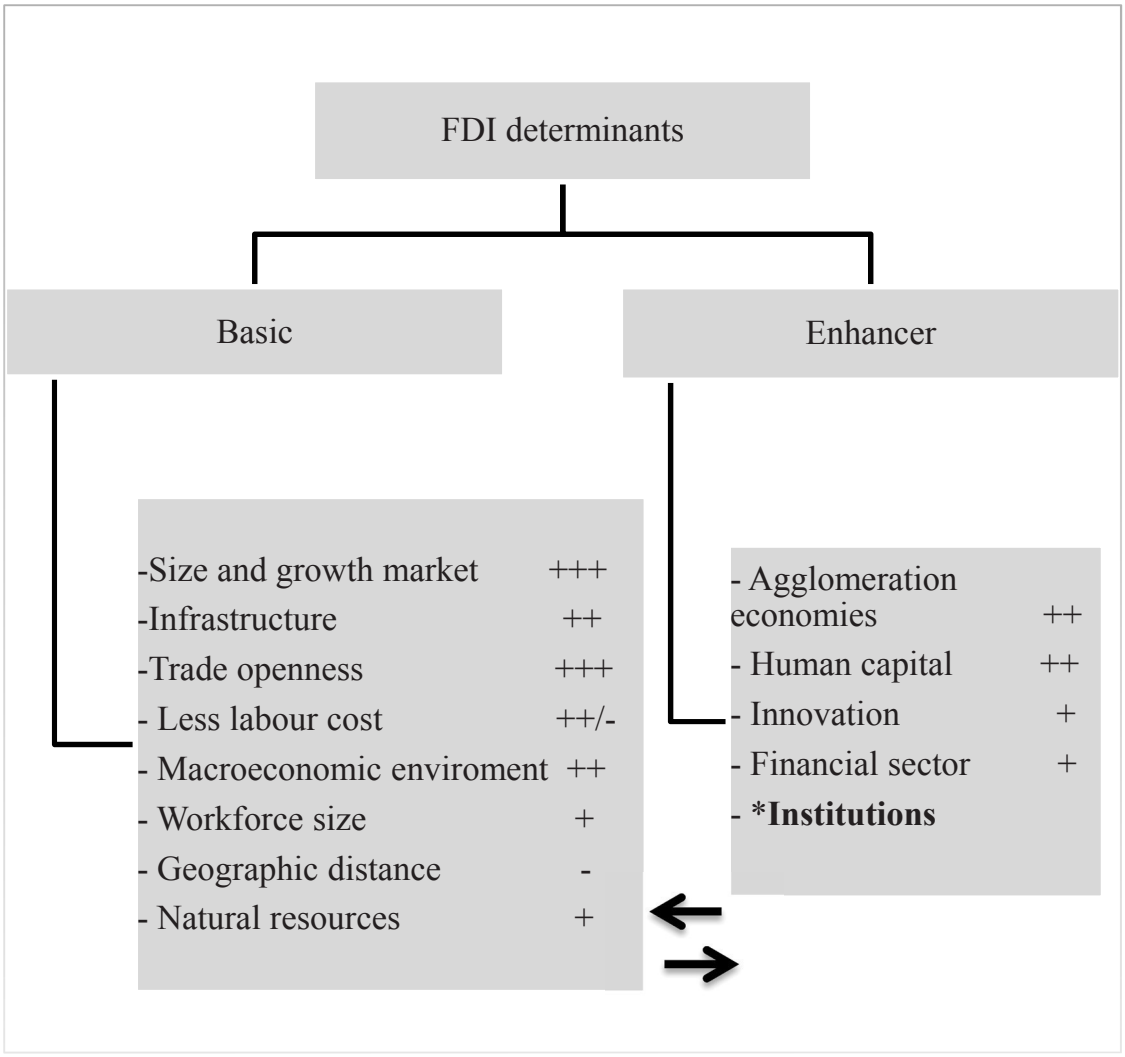


Source: Own elaboration with data from United Nations Conference on Trade and Development (UNCTAD).

2.2.1. Basic determinants

According to the literature, there is increasing evidence and consensus about the significance of these *basic* variables. They are grouped and described below in the following order: market size and growth, trade openness, infrastructure, labour costs, and macroeconomic environment.

Figure 2.2. FDI determinants



Source: Own elaboration.

Market size and growth

Market size and growth are the variables that are most highlighted in the literature or that have more statistical weight or significance. Their importance lies in the better use of scale economies, enabling lower costs and greater benefits for investors, and, moreover, greater potential demand. The significance is often confirmed in developed and developing countries (Agiomirgianakis et al., 2004; Ismail and Yussof, 2003; Bevan et al., 2004).

While the approaches to the measurement of these variables may vary, they are taken as proxies mainly by means of Gross Domestic Product (GDP). Another common method used in their measurement has been the population size of each country, which tends to lend weight and statistical significance to investors' decisions (Caetano and Galego, 2009; Ismail and Yussof, 2003).

Growth prospects, or market potential, have been commonly found to exert a positive influence on FDI flows and a statistically significant relationship. Growth prospects express the purchasing power of the population and, thus, the demand. It is usually measured by means of GDP per capita (Agiomirgianakis et al., 2004; Ranjan and Agrawal, 2011). However, it is also possible to find an adverse effect, likely because growth prospects capture rising costs (Walsh and Yu, 2010).

Trade openness

This variable enables the measurement of the openness of an economy to global trade. Trade openness refers to the size of barriers to import and export across countries, with lower barriers involving a reduction in costs to investors. The bulk of the empirical work has found a statistically significant and positive relationship between attracting FDI and trade openness (Agiomirgianakis et al., 2004; Bevan et al., 2004). The effect is often tested for developing countries (Caetano and Galego, 2009; Ranjan and Agrawal, 2011; Bengoa and Sanchez-Robles, 2003).

Infrastructure

This variable is seen as key point in the operation of any economic activity, as infrastructure reduces the distances involved in trade and integrates the various regions of the country with foreign markets, reducing costs for investors. Also, infrastructure is seen as a way to get closer to the prosperity of a country and/or movement facilities. The sense of the infrastructure effect over FDI on the empirical work has changed largely by the way to get to this relationship and the degree of development of the country analysed. Although infrastructure can also find a positive effect (Agiomirgianakis et al., 2004; Asiedu, 2006; Bengoa and Sanchez-Robles, 2003), this effect may vary as information is disaggregated as there are often differences on effects by economic sector (Walsh and Yu, 2010), or

maybe infrastructure can become less important respect to qualitative variables (Fung et al., 2005). Infrastructure is usually approximated based on the number of kilometres of railways, roads, or number of phone lines.

Labour costs

The relationship between labour costs and investments is relatively clearer than other determinants, because they express, directly or indirectly, the burdens that investors have by law or agreements with respect to the workers; that is, the benefits are affected directly. In the literature, the balance has leaned toward negative effects of labour cost on investments (Agiomirgianakis et al., 2004; Bevan et al., 2004). Other studies have found a positive and statistically significant effect, arguing that labour cost may express the purchasing power of the population (Javorcik and Spatareanu, 2005). The wages of each country or sector of the economy usually serve as a proxy for this variable.

Most of the discrepancies in the analysis of the effects of this variable depend on which group of countries is being analysed. For example, the investment flows to transitioning or developing countries have been explained largely by the advantage represented by having lower wages and salaries, which would be translated into in lower labour costs compared to developed countries (Leibrecht and Scharler, 2009; Ranjan and Agrawal, 2011).

Macroeconomic environment

An adverse macroeconomic environment can express uncertainty to investors through, for example, a high level of debt (Bengoa and Sanchez-Robles, 2003), uncertainty that the government can provide services efficiently or pay creditors, or a high exchange rate volatility (Treviño and Mixon, 2004). These factors, along with high inflation (Asiedu, 2006; Amal et al., 2010; Bengoa and Sanchez-Robles, 2003) and interest rates (Agiomirgianakis et al., 2004; Ismail and Yussof, 2003; Walsh and Yun 2010) may be a reflection of economic instability and uncertainty. If a high level of taxation is also in place (De Mooij and Ederveen, 2003; Feld and Heckemeyer, 2011), these factors can be translated into costs that companies can expect.

2.2.2. Enhancer determinants

This group of variables may explain the size of the gap between developed and developing countries. Enhancer determinants are considered a catalyst in attracting FDI. The determinants are analysed in the following order: agglomeration economies, human capital, and institutions. The institutions analysis is split into two sub-categories: formal institutions, which include the role of the government, intellectual property, and labour regulations (labour flexibility and trade unions), and informal institutions, such as corruption and confidence-reputation.

Agglomeration economies

This variable is closely related to the size and potential of an economy. This happens, for example, when a company already established in a particular location or country can attract more investment through ties that exist between this and other foreign companies, groups, or individuals. As the location or country is known to other investors because there are some kinds of background, i.e. companies are already familiar with the business enviroment, the country or region can be considered a much more appropriate place in which to invest, with a better business environment and scale economies and spillovers to be exploited. Moreover, agglomeration economies can be considered as the capacity of absorption of each country. Although this variable is not usually considered due to the limitations of databases, the coefficient is often a statistically significant and positive factor in attracting FDI (Walsh and Yu, 2010).

Human capital

Numerous studies have recognised the importance of human capital in attracting FDI, as the presence of highly skilled workers suggests a more productive society and a more desirable destination for investment. In addition, workers with better and higher education are able to carry out more complex tasks and adapt to the fluctuations that take place in economies. The significance and direction of the coefficient depends on the sample. For example, marginal increases for developed countries do not produce the same impact as on developing countries. Some results show that human capital adversely affects investment (Ismail and Yussof, 2003),

while others do not find that the coefficient associated to this variable is statistically significant (Agiomirgianakis et al., 2004; Walsh and Yu, 2010).

Institutions

The role of institutions and their interaction with other economic variables is increasingly recognised. Institutions represent the rules of the game and imply higher or lower transaction costs.

The approach and the interaction of institutions with FDI have not been made clear in the literature, from definition to quantitative approach (Ali et al., 2010). This study differentiates formal and informal institutions. The former refers mainly to the rule of law, which can be influenced by the state directly, while the latter refers to socially shared rules fulfilled by convention (Grogan and Moers, 2001). The empirical literature about the effects of formal institutions on FDI shows that flows are directed to countries with higher institutional quality (Buchanan et al., 2012).

2.2.3. What kinds of institutions are relevant for foreign investors?

The role of government has already been discussed, because it can intervene either directly or by means of regulations. Government can have an important impact through the enactment or amendment of laws, for example, and may affect investment flows. Investment in infrastructure is associated with positive effects in some studies (Caetano and Galego, 2009) but these effects are seen ambiguous in others (Agiomirgianakis et al., 2004). Another form of government intervention is the use of political control or political stability (Grogan and Moers, 2001; Asiedu, 2006; Naudé and Krugell, 2007), as well as the fulfilment of the rule of law and a functional financial system (Buchanan et al., 2012; Gani, 2007). The literature has also focused largely on the way governments give legal protection or legal certainty to investors, often using intellectual property rights, which has been found to have a strong positive effect on the attraction of FDI (Du et al., 2008).

The role of labour legislation is inconclusive, and research has focused on the role of more flexible laws, i.e., flexibility in hiring and firing. These results show labour legislation having a positive effect on the ability to attract investment (Dewit et al., 2009; Gross and Ryan, 2008; Walsh and Yu, 2010; Javorcik and Spatareanu, 2005; Ham and Kleiner, 2007). However, other studies have found evidence of a limited or diminished importance or significance of labour legislation (Leibrecht and Scharler, 2009), or a role related to the degree of flexibility of labour legislation (Parcon, 2008; Kucera, 2002) or the extent to which the economic sector is developed in each country (Walsh and Yu, 2010). No less controversial is the effect of unions, although the balance leans towards a negative effect on FDI (Dewit et al., 2009; Ham and Kleiner, 2007).

Although the literature reveals little with regard to informal institutions and their effects on the localization and flow of FDI, these effects have been studied from different angles, with corruption as one of the most recurrent perspectives used to study it. An inverse relationship has been found in the literature between corruption and the attraction of FDI, as it implies higher transaction costs (Bénassy-Quéré et al., 2007; Asiedu, 2006; Du et al., 2008; Gani, 2007). However, there are studies where this variable is not important (the coefficient is not statistically significant, as in Caetano and Galego, 2009). Another perspective from which informal institutions have been considered is through the analysis of trust and reputation. While there are only a few studies that have examined this issue, the evidence shows that trust and reputation have a positive impact on FDI (Seyoum, 2011; Grogan and Moers, 2001). It is worth mentioning that up to now the activities of the informal labour market have rarely been linked to investment. In contrast, trust and reputation have been found to affect FDI in a positive way in certain countries (Misati, 2010), and in others are at least seen as an alternative to the rigidity of formal activities (Munro, 2011).

It is notable that previous studies have not dealt with the effect of the informal labour market on investment, as this variable can be used as an approximate measure of the degree to which the labour market is restrictive. If this sector is a part of the workforce that is excluded from formality and protection, it is exposed to uncertainty and market shocks. In other words, the informal labour market can probably be considered a good indicator of

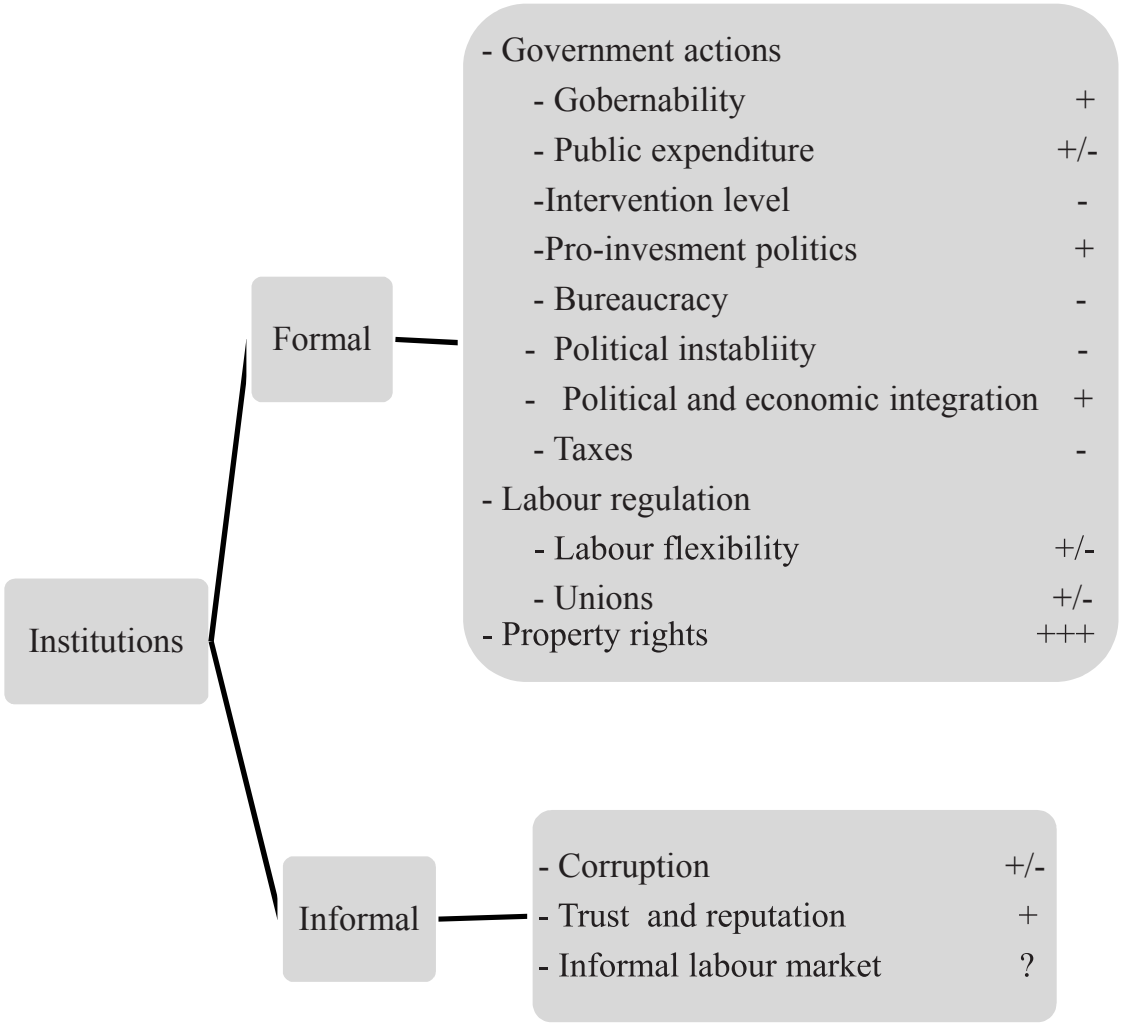
the state of the labour market and can be used to examine how the workforce is protected in each country, since it is, in general, characterised by small-scale, self-employment activities with low levels of organisation and technology (Misati, 2010). As the informal sector does not generate revenues for governments, the growth of this sector would have a substantial impact on infrastructure investment and foster vulnerabilities (Munro, 2011). Furthermore, informal activities take place outside of the law and with little regulation (Loayza, 1996). However, some studies find a positive effect on investment, as the informal sector may provide an environment in which innovation can flourish, thus encouraging investment (Schneider and Klinglmair, 2004).

Taking into account the definition of informal labour given by the ILO, by means of the labour vulnerability, then this indicator is associated with the quality of employment, the frequency of informal agreements, and precarious work. It can, therefore, be taken as a better indicator than unemployment figures (Perry et al., 2007). Do all of these labour market characteristics influence investment? What is the effect of the informal labour market on foreign investment? It is worth remembering that any formal or informal institutions represent costs in any interaction among economic actors (See Figure 2.3).

2.3. Data

The database used in this study is taken from the combination of statistical sources compiled by institutions such as UNCTAD, the ILO, the World Bank (WB), the Fraser Institute, and the Heritage Foundation. The databases used are described in Table 2.1. Due to the availability of information, the period of study is from 1996 to 2009, and the data obtained are reported annually. Table 2.2 shows the countries considered in the analysis, a list that varies according to the model used. The maximum number of countries considered is 65, but in some models this number is reduced to 30 due to data availability problems.

Figure 2.3. Informal and formal institutions



Source: Own elaboration.

Table 2.1. Description of variables

Abbreviation	Variable	Source
FDI	Foreign Direct Investment (stock as % of GDP)	UNCTAD
GDP	Gross Domestic Product (constant prices 2005)	UNCTAD
GDPpc	GDP per capita (constant prices 2005). Market exchange rate.	UNCTAD
GDPg	Growth rate of GDP	UNCTAD
Openness	Openness to trade (Import + Export as % GDP)	UNCTAD
Inflation	Inflation rate	UNCTAD
L. Cost	Labour costs (costs of compensation for hours of employees in the manufacturing industry)	ILO
Informality	Workforce informality (vulnerable employment as a % of total employment)	World Bank
Corruption	Corruption (Freedom from corruption. From 0 to 10 scale; a lower score indicates more corruption and vice versa)	Heritage Foundation
L. Flex	Labour Flexibility. From 0 to 10 (Hiring and firing regulations- A lower score indicates lower flexibility)	Fraser Institute

Table 2.2. Countries in the study

Argentina	Cyprus	Germany	Japan	Netherlands	Portugal	Thailand
Australia	Czech Rep.	Greece	Korea	New Zealand	Romania	Turkey
Austria	Denmark	Honduras	Latvia	Nicaragua	Russian Fed.	U. K.
Belgium	Ecuador	Hungary	Lithuania	Norway	Singapore	Uruguay
Bolivia	Egypt	Iceland	Macedonia	Pakistan	Slovak Rep.	Venezuela
Brazil	El Salvador	Indonesia	Malaysia	Panama	Slovenia	
Chile	Estonia	Ireland	Malta	Paraguay	Spain	
Colombia	Finland	Israel	Mexico	Peru	Sri Lanka	
Costa Rica	France	Italy	Moldova	Philippines	Sweden	
Croatia	Georgia	Jamaica	Morocco	Poland	Switzerland	

Note: The highlighted countries correspond to the sample of thirty countries due to data availability.

The variable of interest in the research, labour informality and its effect on investment, is an area seldom discussed in the literature, and one that has been approached from different perspectives. The method used to measure it is very different across studies (Bénassy-Quéré et al., 2007; Asiedu, 2006; Du et al., 2008; Gani, 2007; Seyoum, 2011; Grogan and Moers, 2001). In accordance with the different classifications or approaches taken into account by the ILO (Perry et al., 2007), informal labour is taken as *vulnerable employment*, a variable taken from the WB. This definition has the advantage that it can incorporate into the analysis more countries and wider time periods than those typically collected in the literature on informal institutions and FDI determinants. Moreover, most studies tend to be cross sectional. This variable definition is considered the best option available due to the difficulty represented by approximation or measurement and the benefit offered in terms of comparison and the number of years taken into account.

2.4. Methodology

Panel data analysis is used in this study, taking into account the transversal information and the time period of 14 years, in order to determine whether the variable of interest, labour informality, has an effect on FDI. This methodology has the advantage of being able to take into account the individual characteristics of each country. The basic model of the determinants of FDI, which is our dependent variable, is the following:

$$FDI_{it} = \alpha \quad + \beta_1 X_{it} + \beta_2 Informality_{it} + U_{it} \tag{2.1}$$

Where:

FDI_{it}= Foreign Direct Investment made in country "i" in time period "t"

X_{it} = Is the vector of control variables such as GDP, GDP per capita, openness, inflation, labour costs, corruption, and labour flexibility.

$Informality_{it}$ = Vulnerable employment, proxy of the informality of workforce

U_{it} = Term of random disturbance

This model has a balanced panel data, in that it enables the observation of all individual units in all periods of time (Ti = T for all i), and it is considered short. The error term is undertaken as independent. The individual effects are incorporated into the general model in order to capture the characteristics of each country, which are assumed as fixed on the time:

$$FDI_{it} = \alpha_i + \beta X_{it} + \beta Informality_{it} + \varepsilon_{it} \quad (2.2)$$

Where α_i = country specific fixed effects

At this stage of the analysis, the model is subjected to the Hausman test (Wooldridge, 2003) to determine the most appropriate method out of the fixed or random effect. This test takes as a null hypothesis that if the individual effects are random the estimators should be similar, because they are consistent. On the other hand, the estimators differ in the alternative hypothesis.

Another way to extend the model is to allow that the intercept may change across individuals and time. This is carried out in order to incorporate possible events, such as economic shocks, that may affect the set of countries in the period of study, which results in:

$$FDI_{it} = \alpha_i + \gamma_t + \beta X_{it} + \beta Informality_{it} + \varepsilon_{it} \quad (2.3)$$

As previously mentioned, investment may attract more investment in the future. Agglomeration economies are, therefore, taken into account, with the dependent variable being lagged one year on the right side of the equation, as follows:

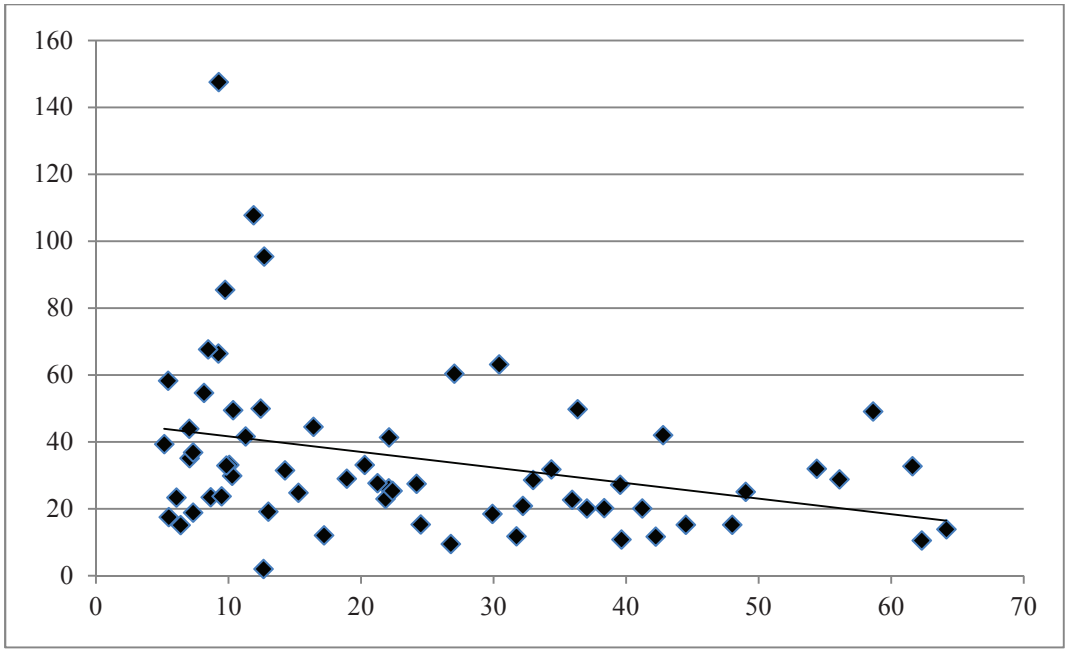
$$IFDI_{it} = \alpha_i + \gamma_t + \beta FDI_{i,t-1} + \beta X_{it} + \beta Informality_{it} + \varepsilon_{it} \quad (2.4)$$

As seen in the above equation, which is a dynamic model, it is necessary to be careful when estimations are carried out, because the lagged dependent variable and the correlated errors lead to inconsistent estimates of parameters when estimated by Ordinary Least Squares (OLS). Therefore, the above equation is estimated by means of the best-known method, that used by Arellano and Bond (1991). Initially, the control variables are treated as exogenous.

2.5. Results

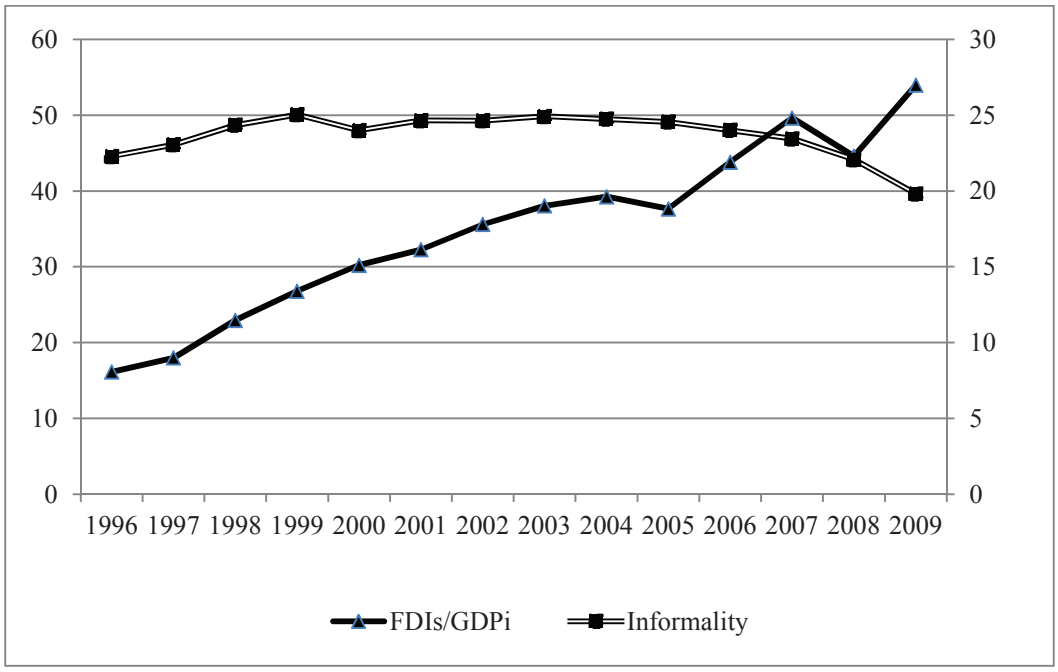
Before moving on to the results of the panel data analysis for the determinants of FDI, this chapter considers some descriptive evidence. Figure 2.4 presents the dispersion of informality (X axis) and FDI (Y axis) for the average period 1996 to 2009 for all countries analysed. At first appearance, there is a negative relationship, but it is only a general overview inasmuch as other variables can influence the dependent variable, and these are not taken into account. Figure 2.5 shows the evolution of both variables mentioned through the period 1996 to 2009. As can be seen, the FDI has been raised while informality is decreasing, but the figure must be analysed carefully, as it includes developed and developing countries; the latter are analysed separately.

Figure 2.4. Informality (x) and FDI (y) - Country average of period 96-09



Source: Own elaboration with data from UNCTAD and WB.

Figure 2.5. FDI and informality - Average of all countries (65)



Source: Own elaboration with data from UNCTAD and WB.

The descriptive statistics for the rest of the variables considered in this study can be seen in Tables 2.3 and 2.4. In the case of Table 2.4, note the heterogeneity of the value of variables taken into account among countries, as expressed in the differences between minimum and maximum. As shown in Table 2.3, the different control variables and the variable of interest have different degrees of association. The Variance Inflation Factor (VIF) is used to test multicollinearity among the independent variables and it is not found among the variables. The test values of the VIF are below 4.63, which is below the accepted limit. The variable of interest and the different institutional variables considered in the study were subjected to the exogeneity test proposed by Mackinnon (Wooldridge, 2003), meaning that it was not necessary to include instrumental variables in the panel data analysis[4].

[4] The results have not been included but are available upon request to the author.

Table 2.3. Correlation matrix

	GDPpc	GDPg	Openness	Inflation	Corruption
GDPg	-0.1288	1			
	(0.0001)				
Openness	0.1278	0.1228	1		
	(0.0001)	(0.0002)			
Inflation	-0.2839	-0.0582	-0.1362	1	
	(0.0000)	(0.0795)	(0.0000)		
Corruption	0.8103	-0.0612	0.164	-0.3049	1
	(0.0000)	(0.1036)	(0.0000)	(0.0000)	
Informality	-0.7796	0.1068	-0.2435	0.2376	-0.6485
	(0.0000)	(0.0018)	(0.0000)	(0.0000)	(0.0000)

Numbers in parentheses indicate the p-value

Table 2.4. Descriptive statistics

	Media	Median	Minimum	Maximum	St. Dev.
GDPpc	15408.25	7271.36	498.74	67467.50	15816.97
GDPg	3.26	3.65	-17.73	18.29	3.68
Openness	87.96	75.85	1412	446.98	53.82
Inflation	6.90	3.60	Y -1.71	154.76	1150
Informality	23.77	1940	2.20	66.10	16.64

Table 2.5 presents the results of the econometric analysis carried out on the database. In order to give a better picture of the effect of the informal labour market on investments, we start with Model 1, which is the general model for the group of 65 countries; according to the Hausman test, the appropriate method is fixed effects. The coefficient associated with the variable of interest (informality) has a positive sign and is statistically significant at five per cent. It is important to emphasise the meaning of effect as contrary to what might be expected: the informal labour market, expressed by the variable of employment vulnerability, may represent adverse conditions in labour markets for workers, but have a positive effect on the attraction of investments by means of profits[5]. The effect is cleaned in the following models.

[5] Although, in the case of multinational companies that do not hire informal sector workers, national suppliers of these workers can hire them. In this way, the informal labour market can have an indirect influence on FDI.

Table 2.5. FDI determinants - 65 Countries (1996-2009)

VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
FDI (Lag)		0.750 ***	0.755 ***	0.722 ***	0.806 ***
		(0.00165)	(0.00333)	(0.00272)	(0.0107)
GDPpc (log)	56.66 ***	15.95 ***	1642 ***	-3.568	5.390
	(5.427)	(0.541)	(0.727)	(2.300)	(3.743)
GDPg	-1.160 ***	-0.602 ***	-0.601 ***	-0.444 ***	-0.493 ***
	(0.172)	(0.00821)	(0.00860)	(0.0144)	(0.0313)
Openness	0.417 ***	0.0393 ***	0.0410 ***	0.0180 ***	0.0281 **
	(0.0563)	(0.00339)	(0.00520)	(0.00414)	(0.0117)
Inflation	0.00423	-0.043 ***	-0.0393 ***	-0.00827	0.00855
	(0.0701)	(0.00347)	(0.00815)	(0.00537)	(0.00785)
Informality	0.489 **	0.242 ***	1.014 ***	0.780 ***	1.556 ***
	(0.239)	(0.0320)	(0.0633)	(0.0927)	(0.322)
Informality^2			-0.0114 ***	-0.00854 ***	-0.0171 ***
			(0.000801)	(0.00128)	(0.00450)
Corruption					-0.00146
					(0.0287)
L. Flex.					-0.145
					(0.180)
Fixed Effects	Yes	-	-	-	-
Time Trend	No	No	No	Yes	Yes
Constant	-520.9 ***	-140.7 ***	-154.7 ***	26.52	-66.65 *
	(48.94)	(5.095)	(6.956)	(20.77)	(34.68)
Observations	847	721	721	721	473
Number of countries	65	65	65	65	41

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1 . In Model 5 due to missing data, the sample corresponds to 41 countries, it includes institutional variables: informality, corruption and work flexibility. Dynamic panel data was estimated by Generalized Method of Moments (GMM).

On the other hand, the control variables taken into account by this study have the expected effect. The level of income or purchasing power as expressed by GDP per capita (GDPpc) of the citizens of each country has a positive effect and its coefficient is, as expected, statistically significant to the usual levels. The coefficient associated with trade openness, expressed by the variable *openness* in the different models, is statistically significant at one percent with a positive impact. Inflation, which represents macroeconomic stability, has a negative effect, and the coefficient associated with it is statistically significant to the usual levels, as can be seen across the models and as described by the various authors cited in the literature review. However, the coefficient associated with GDP growth (GDPg), and which expresses potential demand, has a negative sign and is statistically significant at one percent. While it is not the sign predicted by the bulk of the literature, it is not an irregular finding, as the results for this variable suggest that greater growth may deter investments and FDI on the grounds of the cost of doing business in a country. In terms of material and labour capital, the higher the standard of living the greater the cost of investment (Buchanan et al., 2012).

In Table 2.5, Model 2 incorporates the effect of agglomeration economies on the analysis. This variable is considered important, because investments made today may have an effect on the attraction of investment in the future. For this reason, the dependent variable is lagged by one period. As mentioned above, the Generalized Method of Moments (GMM) developed by Arellano and Bond (1991) is used to work this specification. The variable added has a positive effect and its coefficient is statistically significant at the level of one per cent, with the expected result agreeing with the literature review. The variable of interest retains its positive effect on investment and the statistical significance becomes stronger, rising to a level of significance of one per cent.

Table 2.5 shows the results of estimating Model 3, namely adding to the previous model the quadratic term of the variable of interest in order to ascertain whether the effect captured occurs only up to a certain level (non-linear relationship). In fact, when incorporated, neither the variable of interest, the coefficient, nor the sign sense lose statistical significance at the usual rate. Moreover, the squared term has a negative sign and the

coefficient is significant at one per cent. One of the first conclusions about the relationship between informal labour markets and investment is that it is positive only up to a certain level, as we can see in the model, where in the first instance the informal labour market has a positive effect that later becomes negative[6].

Model 4 in Table 2.5 is the same model as above, but incorporates the time trend effect with the aim of taking into account the different events that are common to that set of countries at that time, thus being able to clear the effect of the independent variables[7]. As we can see, the effect of the variable of interest on FDI does not change. In the same way, the statistical significance of the quadratic term does not change.

In Model 5, in order to incorporate more institutional and labour market variables, corruption and labour flexibility variables are added. In this way, it is possible to better capture the effect of the informal labour market on investment. As can be seen, even when we incorporate these variables, neither the effect of variable of interest nor the quadratic term change, and the statistical significance of the coefficient is held at the usual levels. As this model also incorporates a time trend, it tries to clean the effect of the variable studied even more. It is worth stating that in this model the sample includes only 40 countries because of the lack of available information for some of the variables added.

In Table 2.6, the analysis used previously is developed, splitting the developed from the developing countries and enabling the identification of differences between the groups in terms of the effect of the variable of interest on FDI. In Model 2, in the results for developed countries, the informality of labour markets maintains its positive effect and has a statistical significance of ten percent; furthermore, the control variables demonstrate the same behaviour as that predicted in the literature. When the quadratic term is incorporated into the analysis, the preliminary findings

[6] In fact, the threshold in any model used in Table 2.6, the quadratic term, is about 45%, indicating that the informality has a positive impact on FDI, but when this level is achieved a negative impact results. Accordingly, the countries that are very close to this threshold are Colombia, Ecuador, El Salvador, Honduras, Jamaica, Morocco, Nicaragua, Paraguay, Peru, Philippines, Romania, Sri Lanka, and Turkey.
[7] Time fixed effects are used as well with very similar conclusions.

remain valid—i.e., informal labour markets positively affect FDI flows up to a certain level and then act as a deterrent to FDI. Trying to "clean" the effect of the independent variables, we incorporate the trend time effect of Model 4 in Table 2.6 and the same results are obtained.

The results for developing countries are generally the same in effect and direction. While in Model 2 of Table 2.6 the variable of interest does not have a significant coefficient, it has the same impact on investment. Furthermore, it is significant when the quadratic term is included, even when the trend time effect is added in Models 3 and 4. In this way, the results are similar between developing and developed countries, although, in Model 4 the coefficients of developing countries are stronger.

Table 2.7 shows the analysis for the sample group of 30 countries where the variable of labour costs is added and is considered important, as investors tend to choose countries where the cost of the workforce is cheaper. Moreover, this variable improves accuracy with respect to the effect of the variable of interest, as it is then possible to carry out a robustness test. When the labour costs variable is included in Model 2 it is statistically significant, and the negative effect is as expected. On the other hand, the informal labour market variable maintains the significant coefficient and the sense of the sign.

The control variables included in the study maintain the results detailed above. In Model 3, the squared term coefficient is equally significant with the negative sign already explained. In Model 4, and in the successive models, the time trend effect is used with the variable of informality maintaining its statistical significance at ten percent. In Model 5, despite the application of the robustness test, in adding corruption and labour flexibility variables the informality variable maintains both its statistical significance and its effect on investment. While the informality variable does not appear significant after the quadratic term is added to Model 6, its importance is clear after the foregoing analysis.

Table 2.6. FDI determinants-Developed and developing countries (1996-2009)

	Developed Countries			Developing Countries		
VARIABLES	Model 2	Model 3	Model 4	Model 2	Model 3	Model 4
FDI (Lag)	0.815 ***	0.817 ***	0.816 ***	0.761 ***	0.736 ***	0.639 ***
	(0.00661)	(0.0120)	(0.0132)	(0.0145)	(0.0175)	(0.0257)
GDPpc (log)	21.03 ***	20.66 ***	14.19 *	2.179	5.795 ***	18.30 ***
	(2.999)	(3.161)	(8.214)	(1.927)	(2.010)	(3.116)
GDPg	-0.575 ***	-0.598 ***	-0.514 ***	-0.478 ***	-0.492 ***	-0.390 ***
	(0.0386)	(0.0438)	(0.0679)	(0.0215)	(0.0252)	(0.0291)
Openness	0.101 ***	0.109 ***	0.0846 ***	0.00407	-0.00578	-0.00434
	(0.00827)	(0.00966)	(0.0101)	(0.0107)	(0.00970)	(0.0109)
Inflation	-0.0885 **	-0.115 ***	-0.0825 *	0.0398 ***	0.0193	0.0330 ***
	(0.0406)	(0.0378)	(0.0422)	(0.00865)	(0.0118)	(0.00532)
Informality	0.619 *	1.841 ***	1.452 **	0.0436	1.448 ***	0.788 ***
	(0.370)	(0.459)	(0.629)	(0.0565)	(0.262)	(0.240)
Informality^2		-0.0283 ***	-0.0212 *		-0.0167 ***	-0.0102 ***
		(0.00855)	(0.0114)		(0.00315)	(0.00267)
Time Trend			Yes			Yes
Constant	-215.6 ***	-221.9 ***	-153.5 *	-9.437	-61.54 ***	140.0 ***
	(33.71)	(34.68)	(85.15)	(15.94)	(16.63)	(26.48)
Observations	377	377	377	344	344	344
Num. countries	32	32	32	33	33	33

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , *p<0.1

Table 2.7. FDI determinants with labour cost variable - 1996-2009

VARIABLES	Model 2	Model 3	Model 4	Model 5	Model 6
FDI (lag)	0.821 ***	0.810 ***	0.721 ***	0.755 ***	0.706 ***
	(0.00989)	(0.0143)	(0.0223)	(0.0123)	(0.0267)
GDPpc	24.89 ***	29.65 ***	-30.66 **	-28.99 ***	-38.78 ***
	(3.753)	(6.483)	(15.02)	(9.167)	(10.07)
GDPg	-0.989 ***	-1.006 ***	-0.258 **	-0.322 ***	-0.236 ***
	(0.0410)	(0.0465)	(0.119)	(0.0875)	(0.0908)
Openness	0.0768 ***	0.0690 ***	0.0143	0.0357 **	0.0470 ***
	(0.0131)	(0.0147)	(0.0137)	(0.0148)	(0.0159)
Inflation	-0.752 ***	-0.719 ***	-0.409 ***	-0.405 ***	-0.306 *
	(0.116)	(0.150)	(0.136)	(0.149)	(0.156)
Labour Cost	-7.320 ***	-7.758 ***	-14.65 ***	-0.527 ***	-0.579 ***
	(0.584)	(1.299)	(0.990)	(0.0852)	(0.0954)
Informality	0.735 ***	1.543 ***	1.519 **	1.268 ***	1.193
	(0.153)	(0.353)	(0.629)	(0.214)	(0.904)
Informality^2		-0.0150 ***	-0.0206		-0.00771
		(0.00576)	(0.0132)		(0.0191)
Corruption				0.0254	0.0123
				(0.0536)	(0.0568)
Labour Flexibility				0.478	0.575
				(0.673)	(0.835)
Time Trend			Yes	Yes	Yes
Constant	-232.1 ***	-284.7 ***	315.7 **	-112.0 **	366.8 ***
	(36.66)	(64.57)	(147.4)	(45.40)	(98.39)
Observations	348	348	348	348	348
Number of countries	30	30	30	30	30

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1

2.6. Conclusions

The analysis of FDI determinants has been studied. However, the more the topic is disaggregated, the more discussion it provokes, as is the case with the effect of institutions on investments, which remains controversial. Any institution may cause the costs assumed by investors to be reduced or increased. The institutions of the labour market, and specifically the informal sector, have been little analysed. In this study, vulnerable employment is taken as a proxy of this sector.

The purpose of this study is to answer the basic question of whether informal labour markets affect investment flows as expressed by FDI. The analysis carried out in this study covered 65 countries for the period of 1996 to 2009. The study's principal findings can be summarized as follows:

This study focused on informal institutions in terms of the informality of the labour market, expressed here using the term vulnerable employment, which seems to have a significant and positive effect on FDI flows. This reaffirms, therefore, that informal institutions have an important role in economic analysis, particularly when considering labour markets. When the robustness test was included in the analysis by means of the inclusion of variables such as corruption or labour flexibility, it became clearer that the conditions of informal labour markets, proxied by vulnerable employment, may be capturing labour precariousness, such as employment quality, informal agreements, institutional development, etc., and are attractive to investors.

This study examines the relationship between informal labour markets and investment, revealing that while the former has a positive impact, this is only true up to a given level, becoming negative after a certain point. The same pattern can be seen in the analysis of developed and developing countries. Moreover, when variables such as labour cost, labour flexibility, and corruption are considered as part of the cleaning of informal labour market effects, the significance and sense of the coefficients do not change between the country subgroups.

2.7. References

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Annex 2.A. FDI determinants -Developed and developing countries (1/2)

Author	Period and Countries	Economic Variables	Effect	Institutional Variables	Effect
Naudé and Krugell (2007)	1970-1990 / 42 countries	Macroeconomic instability Human Capital	- +	Corruption Governance	- +
Dewit et al. (2009)	1986-1995 / 59 countries	Market Size Labour Costs	+ -	Labour Flexibility Union density	- -
Agiomirgianakis et al. (2004)	1975-1997 / 20 Countries-OCDE	Size and growth mark. Workforce Size Human Capital Agglomeration Ec. Labour Costs Infrastructure Trade openness	+ + + + /- - + +	Economic –policy int.	+
Ismail and Yussof (2003)	1985-1999 / 3 countries	Labour costs * Work force size Market size * Human Capital * Innovation * Macroeconomic Sta. * Trade openness *	+ /- + + - - /NS - + /S.		
Kucera (2002)	1993-1999 / 170 countries	Labour Costs Workforce size Trade openness Growth market Human Capital	- + + + +	Labour Flexibility	+ /
Gross and Ryan (2008)	Late 80's and 90's / 15 countries	Workforce size Labour Costs Agglomeration Ec. Human Capital	+ -, NS + + ,S.	Emp. protection legislation Economic -policy int. Trade Unions *	- + + / -, NS
Bénassy-Quéré et al. (2007)	2000 / 52 countries - OCDE.	Market Size Agglomeration Ec. Geographical distance Growth market	+ + - +	Labour Flexibility Corruption Banking Sector Bureaucracy Governance	- - + - +
Caetano (2009)	1995/1997-2003/2005 / 25 countries	Growth market Trade openness Pro-investment politics*	+ + + /-	Government size Property rights * Corruption	- + /S. - ,S.
Bevan et al. (2004)	1994 And 1998 / 14 countries	Market size Geographical distance Labour cost advantages	+ - +	Financial System Trade openness Governance	+ + +
Grogan and Moers (2001)	1990-1998 / 25 countries	Macroeconomic sta. Trade openness	- +	Governance Pro-investment politics Property rights Informal inst.: rules and trust	+ + + +
Treviño and Mixon (2004)	1988-1999 / 7 countries (L.A.)	Macroeconomic sta.	+	Governance	-
Asiedu (2006)	1984-2000 / 22 Afri co.	Macroeconomic Sta. Infrastructure Natural Resources Trade openness Human Capital	+ + + + +	Informal inst.: corruption Governance Political instability	- + -

Annex 2.A. FDI determinants - Developed and developing countries (2/2)

Author	Period and Countries	Economic Variables	Effect	Institutional Variables	Effect
Gani (2007)	1996, 1998, 2000 and 2002 / 17 countries	Growth market Market Size Trade openness	+ - +	Governance Corruption control Political instability	+ + -
Du et al. (2008)	2001 / China	Agglomeration eco. Labour Costs Infrastructure Human Capital	+ - + +	Gov. intervention * Int. property rights Corruption *	- + - /NS
Fung et al. (2005)	1990-2002 / China - (USA, Japan, Hong Kong, Taiwan, Korea)	Market Size Labour costs * Infrastructure Agglomeration eco. Human Capital *	+ + / -, NS + / -, NS + +, NS	Gov. intervention	-
Leibrecht & Scharler (2009)	1995-2004 / 14 countries	Market Size Geographical distance Taxes Labour costs Pro-investment politics	+ - - - +	Labour Flexibility	-
Fathi et al. (2010)	1981-2005 / 69 countries	Growth market Trade openness Taxes Infrastructure Macroeconomic sta.	+ + - NS NS	Int. property rights	+
Parcon (2008)	1990-2005 / 150 countries-165 countries	Labour costs * Growth market Taxes Human Capital Macroeconomic Stability Trade openness	+ /- + -, NS - ,S. + ,NS. ++	Labour flexibility Corruption *	+ /- + /-
Seyoum (2011)	2003-2005 / 107 countries	Market size Growth market Trade openness Workforce size Human Capital Macroeconomic Sta.	+ + /S. + + ,S. + + ,S.	Informal inst.: trust and reputation	+
Amal et al. (2010)	1996 And 2008 / 8 countries (A. L.)	Macroeconomic Stability * Market Size Human Capital	- + +	Trade openness Corruption	+ NS
Bengoa & Sanchez-Robles (2003)	1970-2009 / 18 countries	Market size Macroeconomic Sta. Infrastructure	+ - + ,S.	Trade openness	+
Ranjan & Agrawal (2011)	1975-2009 / 4 countries (BRIC)	Market size Trade openness Labour Costs Infrastructure Macroeconomic sta.	+ + - + -		

Source: Own preparation. * The direction of the effect depends on the group of countries and the sector is analyzed; NS = Not significant. Note: The variables were homogenized for a better comparability.

Chapter 3: Determinants of micro-firm informality in Mexican states 2008-2012*

3.1. Background and motivation

There has been an increasing interest in informality in recent years, taking a more significant position in economic analysis with the growth of this sector in most developing countries. This growth has been attributed largely to the fact that the formal economy cannot absorb all workforces and firms have been unable to adapt to new market conditions. Even so, the informal sector has been considered a means of reducing pressure on economies, although informal sector conditions are usually precarious in both labour and economic terms (Perry et al., 2007).

Although many studies have been conducted on informality, most have centred on labour issues focussing on the worker's point of view. However, economic units have been largely ignored, with researchers choosing not to target firms or productive units. Furthermore, defining the informality of a firm has been a problem for every study—a crucial step that results in the differences among studies on this subject. There is agreement on general definitions, such as informality occurring when a worker or firm falls outside the legal framework set by government. In the case of firms, most studies have opted for a definition of informality that relates to registration as a result of data limitations to adopt more precise definition. Given the lack of consistency in defining informality, measurement is challenging; for instance, when informality is analysed under different definitions, results vary depending on the way informality is conceptualised.

There are different theoretical arguments to explain why a firm can be found in the informal sector. La Porta and Schleifer (2014) summarise the predominant reasons, such as the firm being representative of an untapped

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reservoir of entrepreneurial energy, or that the informal entrepreneur enjoys the advantages of avoiding taxation and regulation. More radical still, they cite these firms as parasites competing unfairly or as the product of poverty, with the only way to reduce their number as the development and expansion of economy.

While many researchers have studied informality using national level data, the determinants on a regional level have not been studied enough. Mexico, in particular Mexican states, is an interesting case study of informality as is argued in the Chapter 1. Moreover, to the knowledge of this author there are no studies explaining the different extents of informality for micro-firms among Mexican states, where the informal sector generated 25% of GDP in 2012. In the analysis of informality, the economic unit has been overlooked. This chapter examines and analyses the factors that determine the informality of productive units, by state, in Mexico.

For the case of Mexico, the official institution of statistics of the country analysed and based on the International Conference of Labor Statisticians (ICLS), the INEGI identifies common characteristics of the informal sector from the perspective of the economic unit (See Figure 3.1). These include lack of registration with the government, being a small-scale operation[8], and the absence of formal accountancy processes[9] (INEGI, 2014).

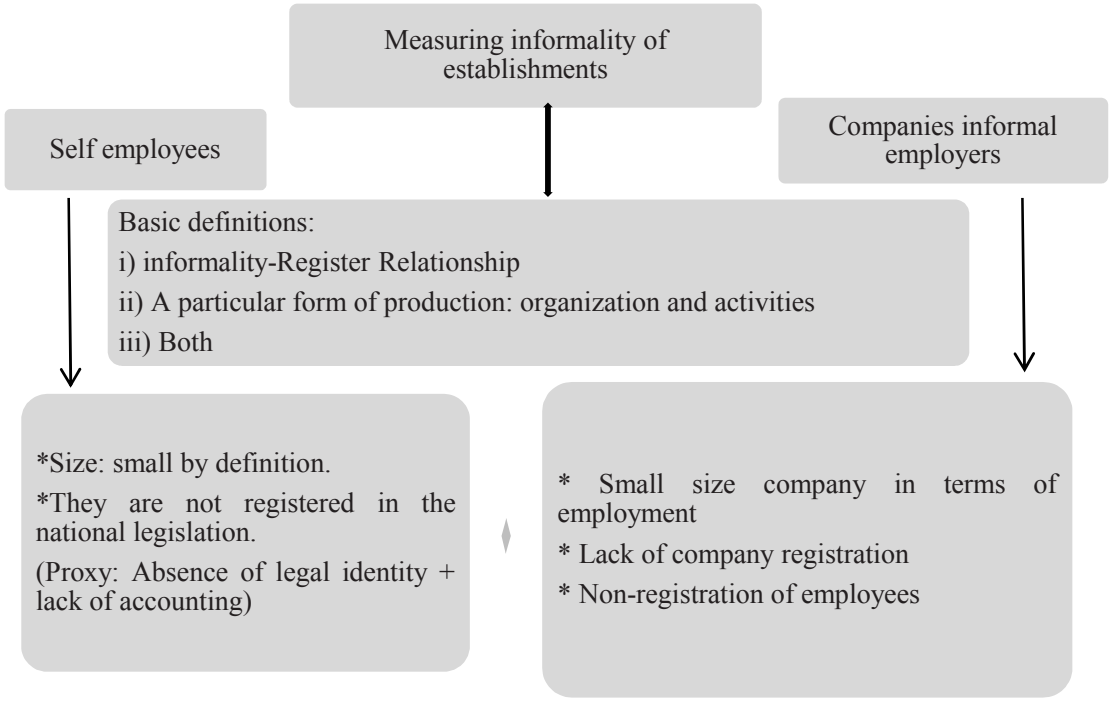
The point of analysis in this study, as mentioned above, is the economic unit. It tests the different levels of firm informality according to informality measures such as self-employment and ownership of micro-firms.[10] The following section describes the database used in this study and the manner in which the different variables were constructed. Section 3.3 describes the methodology employed; section 3.4 outlines the econometric analysis and results discussed; and section 3.5 summarises the conclusions.

[8] Although small operations can be a characteristic of the informal sector, this is not a decisive element, because, for instance, the simplification of bureaucracy in some countries can enable owners to do their own accounting.

[9] The informal sector is defined as when firms are not registered under any specific form of national legislation, such as tax or social security law. While it is important to be clear that the economic unit from the informal sector does not comply with the fundamental registration requirements, in the case of countries such as Mexico there are simple accountancy measures that can be applied to imply a degree of formality.

[10] An independent worker who does not have a boss or supervisor, or somebody who has not been given operation instructions.

Figure 3.1. Measuring informality of establishments



Source: Own elaboration.

3.2. Data

The database used in this research has been taken from different resources compiled by INEGI, the *Encuesta Nacional de Ocupación y Empleo* (ENOE, or the National Survey of Occupations and Work), the World Bank's Doing Business Report, *Consejo Nacional de Población* (CONAPO, or the National Council on Population), the SE, and the *Encuesta Nacional de Micronegocios* (ENAMIN, or the National Micro Firm Survey).[11] The ENAMIN forms much of the basis of this study as it is focused on micro-firms, making research at a deeper level into this sector in Mexico possible. The databases used for every variable are described in Table 3.1. Based on the availability of the databases, the period of study is from 2008 to 2012, with data obtained for every two years. The study takes

[11] The survey is representative at a national level from 2008 to 2012. The sample for each year is about 30,000 micro-firm owners, but does not include agriculture workers

its data from the 32 states in the Republic of Mexico, including the *Distrito Federal* (the metropolitan area of Mexico City).

Taking into account the fact that it is difficult to measure the variable of interest, the informality of firms, and given that there is not a single definition of informality, several approaches have been used. Based on the literature review and data availability, three ways to identify and measure informality are proposed: whether the economic unit is constituted as a legal entity; whether the economic unit has formal accountancy processes; and the sum of the previous two criteria. The three dimensions are considered for owners, the self-employed, and a combination of both.[12]

The first criterion for indicating informality, referring to the question as to whether the firm is constituted as a legal entity, is taken from a question on the ENAMIN survey—"Is your business or activity registered before a notary public?"—to which only "Yes" and "No" answers are possible. The second criterion of informality is taken from the question referring to the formal accountancy processes used: "In your activity or business…". When the respondent answers that only a "notebook or a notepad is used for accountancy," or "no accountancy is carried out," the firm is considered to be informal. The third criterion takes the previous two criteria to form a general indicator.

In the literature review on the determinants of the informality of economic units, specifically for micro-firms, the following variables are used to describe the macroeconomic environment: GDP as a measure of the size of each estate; GDPpc as measure of the wealth of the population; unemployment rate as a cause of informality; inflation; and FDI. As another factor that is mentioned in the literature is the access or channel to financial sources (Gatti and Honorati, 2008; Ayana and Reilly, 2011), bank credit (BC) was calculated as the commercial credit as a percentage of the GDP of each state.

[12] The numbers of each state were subjected to a weighting factor given by ENAMIN-INEGI.

Table 3.1. Definition of variables

Abbreviation	Variable	Source
Inf	Informality	Instituto Nacional de Estadística y Geografía (INEGI)
GDP	Gross Domestic Product (Size)	INEGI
GDPpc	Gross Domestic Product per capita (wealth)	INEGI Consejo Nacional de Población
Unemployment	Unemployment	INEGI
Inflation	Inflation	INEGI
FDI	Foreign Direct Investment	Secretaría de Economía
BC	Bank Credit	Own elaboration with data of Secretaría de Finanzas
SE	Sector Specialization	Own elaboration with data of INEGI
Education	Education (Average scholar years of Economically Active Population)	Encuesta Nacional de Ocupación y Empleo
Taxes	Taxes	Own elaboration with data of INEGI
SB	Cost to start a business	World Bank
Corruption	Corruption	Transparency International
Peace	Social stability	Vision of Humanity

Source: Own elaboration.

To take into account the extent of heterogeneity by sector and state, the index of specialisation in the economy was computed following the same method used by Dussel Peters (2009)[13]. It is also known that the education level in the population is considered a crucial factor in informality (La Porta and Shleifer, 2014), as people with lower education levels run most small informal firms.

As explained above, laws and regulations are an important factor in determining the degree of informality. The cost of starting a business is considered an important factor inasmuch as it can reflect the level of bureaucracy and cost faced by micro-firms, reflecting burdens of regulation and barriers (Dougherty and Escobar, 2013). As taxes are considered a very important variable, the taxes collected by each state[14] are also measured in this study.

Another factor to consider is the corruption of states, as this can represent the biggest cost faced by firms (Oviedo, 2009). This can also be a proxy of the quality of the institutions in each state and used as a variable of social stability. In addition to indicators of social stability, the global peace index produced by the Vision of Humanity organization is also included here.

3.3. Methodology

Taking into account the fact that the information has been obtained every two years for the period of study, 2008 to 2012, this was organized into panel data. The econometric analysis has been conducted to ascertain the determinants of informality for micro-firms for each state in Mexico. The dependent variable is the informality of micro firms in each of the 32 states in Mexico. Therefore, the basic model is:

[13] The index of specialisation (EI) is computed as follows: $EI_{it} = (GDP_{ij} / GP_i) / (GDP_{Nj} / GDP_N)$ where the sector is represented by "i", the state by "j", and country N.

[14] As most taxes in Mexico are collected at a federal level, with some taxes collected at a state level, only the following were considered: taxes (sale of used cars, etc.), rights (civil registry, etc.), products (sale of properties, etc.) and uses (fines or surtaxes) that are collected by states.

$$Inf_{it} = \beta_0 + \beta_1 EE_{it} + \beta_2 Spe_{it} + \beta_3 Reg_{it} + \beta_4 Inst_{it} + U_{it} \qquad (3.1)$$

Where variable Inf_{it} is the share of informal micro firms in state "i" in year "t". The vector EE_{it} represents all independent variables for the economic environment described in the previous section, such as GDP, GDPpc, unemployment rate, inflation, FDI, and bank credit. The vector Spe_{it} includes the sector of specialisation as the main activity for each state, and the level of education is indicated by the average number of school years completed by the Economically Active Population[15] (EAP). The variable "cost to start a business" is considered a significant and reliable proxy of the regulatory environment for business. The variable for corruption is added to the study as a way of representing the level of trust in the quality of institutions, while the global peace index is considered in order to indicate the level of social stability.

The database is considered balanced, as it has complete observations for whole units in the period of time mentioned. In addition, as the data is available in biannual form the panel data is considered short, in that there are data for many individuals and few periods of time.

The model was subjected to the Hausman Test (Wooldridge, 2003) in order to decide whether the fixed method or the random effect method would be best to estimate the model. This test takes as null hypothesis the question as to whether the individual effects are random, as the estimators should be similar because they are consistent. However, when the estimators are different, the other method is deemed better. The Hausman Test results indicated that the random effect method is best, in that this model assumes that the unobservable individual effects are not correlated with the independent variables, or that individual effects are randomly distributed across the states. In contrast, the fixed effect method assumes that the heterogeneity among states can influence the independent variables, but the characteristics are assumed as invariant in time.

[15] The EAP refers to those aged 12 years above who, in the week of reference, were carrying out some kind of economic activity or who are part of the openly unemployed population.

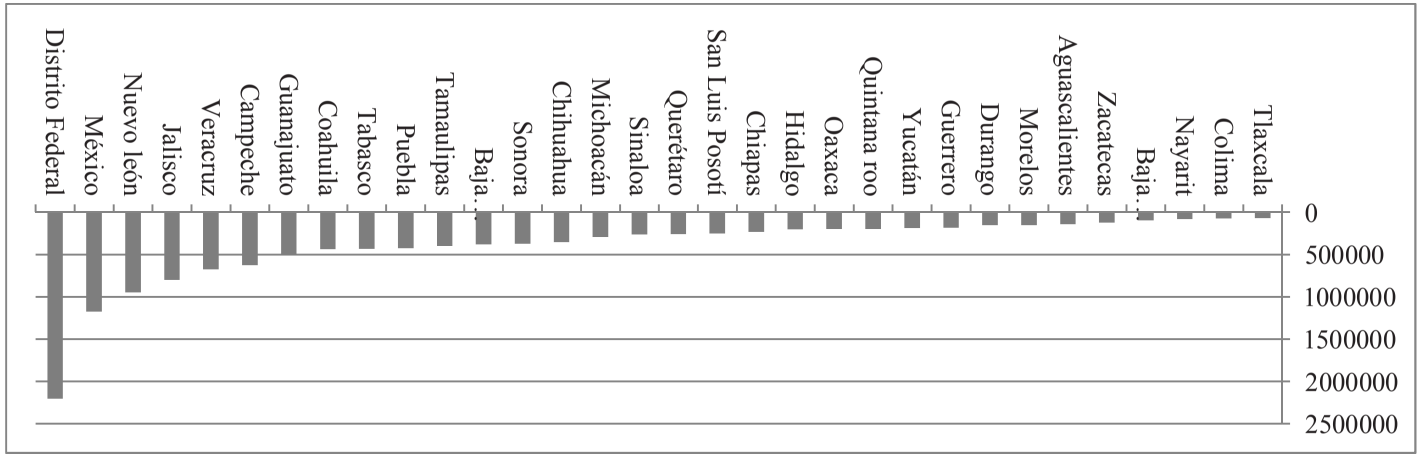
As the econometric literature explains, working with panel data, in fact, measures two effects: a cross section effect and a time series effect. While these effects are not necessarily moving in the same direction, because one effect can be positive and the other negative, random effect estimations compute an average of both effects, i.e., the average of the long and short run specifications (Baltagi and Griffin, 1984). In order to take this into account in the analysis, these effects are computed between the estimator and fixed effect model.

3.4. Results

In order to show an overview of the results, some descriptive statistics are presented below. In particular, Figure 3.2 shows the heterogeneity across the Mexican states, where there are states with bigger economies as measured by the GDP, such as Distrito Federal, Estado de Mexico (the state adjacent to Mexico city), Nuevo León, Jalisco, Veracruz, and others where the size of economy is much smaller, such as Tlaxcala, Colima, Nayarit, Baja California Sur, and Zacatecas. Furthermore, this heterogeneity is found in terms not only of size but also wealth, as measured by GDPpc (see Figure 3.3). In this respect wealthy states such as Campeche, Distrito Federal, Nuevo Leon, and Tabasco stand out, while states with a remarkably high level of poverty such as Chiapas, Oaxaca, Guerrero, and Tlaxcala can also be found.

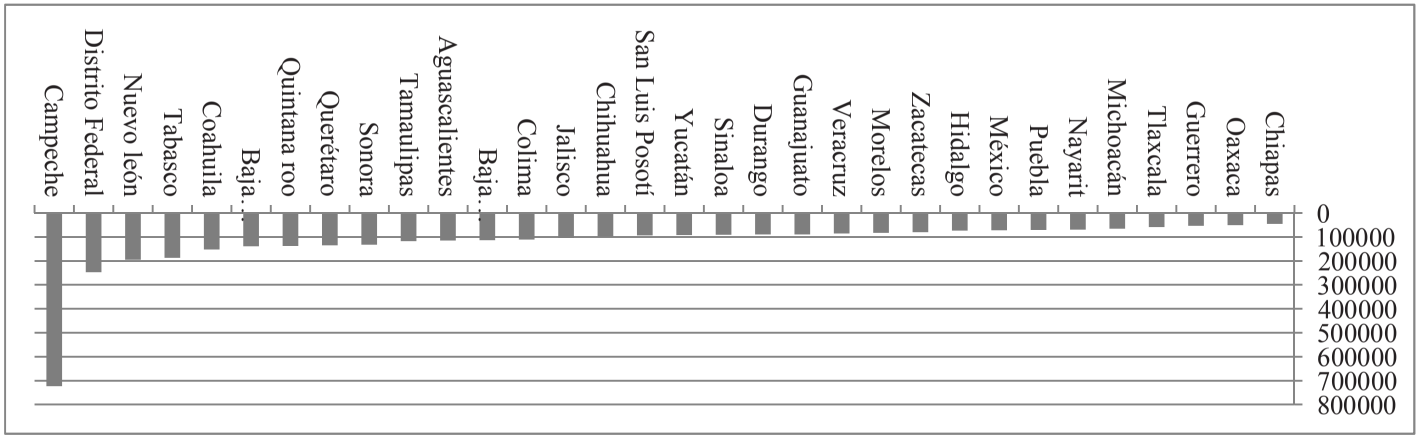
As seen in Figure 3.4, where informality is measured using the three methods proposed above there is an increase in informality from 2008 to 2012. Figure 3.5 shows the heterogeneity of economic units among Mexican states and the different degrees of informality in 2012. For instance, states such as Baja California Sur, Colima, and Queretaro have a lower level of informality, while states such as Campeche, Guerrero, Hidalgo, Oaxaca, and Puebla, are notorious for their high informality levels.

Figure 3.2. GDP by state in 2012



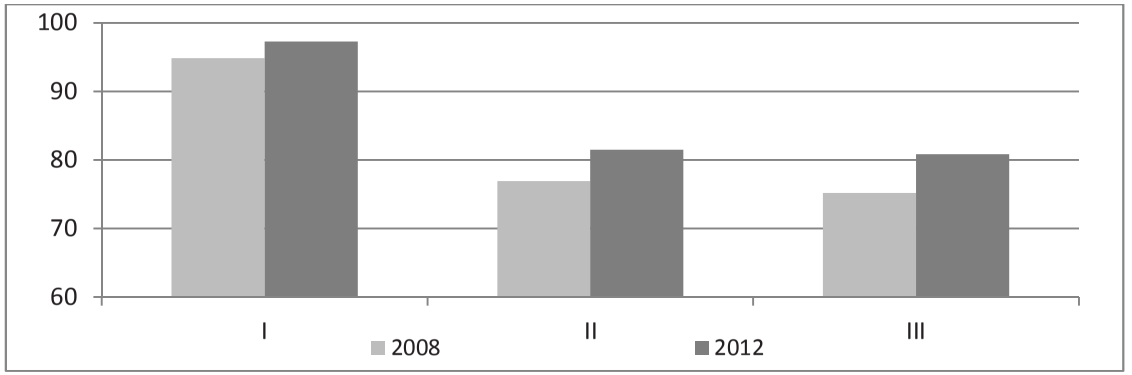
Source: Own elaboration with data from INEGI.

Figure 3.3. GDP per capita by state in 2012



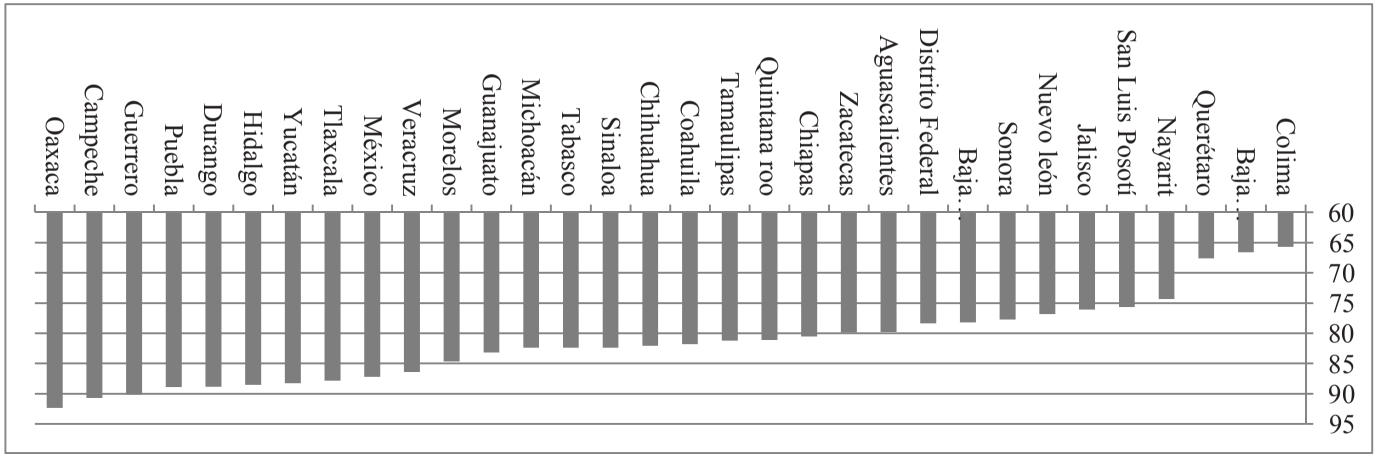
Source: Own elaboration with data from INEGI.

Figure 3.4. Three different ways to measure micro firm informality



Source: Own elaboration.

Figure 3.5. Heterogeneity of micro firms informality by state



Source: Own elaboration.

Table 3.2 shows the results obtained from the econometric analysis of firm informality using the three measures proposed. In the first indicator (*Measure I*), the criterion is whether or not the micro-firm is registered with the government through a notary; the second measure (*Measure II*) is whether or not the firm has formal accountancy processes; the third (*Measure III*) is a combination of the last two measures, i.e., when a firm is not registered and does not apply formal accountancy. An additional advantage of using the ENAMIN survey is that it allows for the differentiation between owners (A) and the self-employed[16] (B), and also the sum of both (A+B), referred to as general, as shown in Table 3.2.

For *Measure I*, among the variables related to economic factors or the *macroeconomic environment*, GDP levels are notable due to the negative and statistically significant effect on informality in general, and for owners and the self-employed as well. This variable is statistically significant at one percent for the owner, at five percent for general informality, and at ten percent for the self-employed. Note that as this variable is representative of the *market size* of each state, it is typical that it affects both kinds of micro-firms, although it does impact owners much more. Furthermore, a negative effect is expected, as the informality of economic units tends to decrease in a larger or growing state economy.

The variable corresponding to *Measure II* is statistically significant at ten percent and has a positive effect, although this is the result for general informality only, while it is not significant for *Measure III*. Table 3.3 shows that the significance and negative relationship are kept even when the temporal effect is included for *Measure I*.

For all measures applied in this study, the coefficient associated with GDPpc is statistically significant for general informality, at a significant level of five percent, and for the self-employed, at ten percent. This impact in line with theory, with informality reducing alongside increases among the population and the growth of micro-firms. *Measure II* is statistically significant for owners and the self-employed, at ten percent, as is the case for the general measure, which, at five percent, has the same negative relationship with informality. Statistical significance is stronger for general

[16] Owners have at least one worker; the self-employed work alone, although they are sometimes helped by relatives

informality under *Measure III*, at one percent, and the self-employed, at five percent, with owner informality maintaining significance at ten percent.

Another variable for considering the macroeconomic environment is *inflation*. Although this variable is statistically significant and has a negative effect on informality in almost all the measures, at ten percent, when the effect of time is considered, the variable becomes positive and significant at five percent for general informality. A proxy of economic instability, informality grows with this variable. This result is consistent with theory, which says that micro-firms are more sensitive to changes in this kind of variable.

The *specialisation sector* in each economy plays an important role, and, as shown in Table 3.2, for *Measure I*, *II*, and *III* all the cases are statistically significant and have a negative effect on the informality of economic units. General informality and self-employed work are statistically significant, at one percent, while owner informality is statistically significant at five percent. These results have the same significance and effect when the effect of time is applied for *Measures II* and *III*. Therefore, informality would be reduced when states or regions specialize in a specific sector, in line with Dougherty and Escobar (2013) who find similar conclusions, albeit having only measured informal employment.

Interestingly, economic variables do not only affect the extent of informality, but also link to variables related to institutional quality such as *corruption*, which is statistically significant and has a positive effect. The more corruption found in the state, the higher the level of informality found there.

Under *Measure I*, corruption is statistically significant at one percent for owners, the self-employed, and the general measure. Under *Measure II*, only owners are affected. Owners and the self-employed are statistically significant under *Measure III* at five percent, while the level for general informality is significant at ten percent. Table 3.3 shows that, even when the effect of time is applied to the model, the corruption variable is significant and has the same positive effect on informality.

Table 3.2. Determinants of micro firms informality

	Measure I			Measure II			Measure III		
VARIABLES	General (A+B)	Owner (A)	Self-Emp. (B)	General (A+B)	Owner (A)	Self-Emp. (B)	General (A+B)	Owner (A)	Self-Empl. (B)
GDP	-0.00880**	-0.0274***	-0.00741*	0.0285*	0.00435	0.0157	0.0206	-0.00629	0.00828
	(0.00417)	(0.00798)	(0.00414)	(0.0170)	(0.0430)	(0.0136)	(0.0169)	(0.0438)	(0.0135)
GDPpc	-0.0240**	-0.0138	-0.0219*	-0.114**	-0.229*	-0.0717*	-0.125***	-0.229*	-0.0846**
	(0.0113)	(0.0216)	(0.0112)	(0.0471)	(0.119)	(0.0379)	(0.0471)	(0.121)	(0.0378)
Unemployment	-0.00506	0.0302	-0.00678	-0.0125	-0.0698	0.00203	-0.0278	-0.0710	-0.0139
	(0.0102)	(0.0196)	(0.0101)	(0.0339)	(0.101)	(0.0286)	(0.0361)	(0.104)	(0.0300)
Inflation	-0.0134	-0.0433***	-0.0142*	-0.0416*	-0.148*	-0.0480**	-0.0556**	-0.117	-0.0668***
	(0.00868)	(0.0166)	(0.00862)	(0.0249)	(0.0807)	(0.0213)	(0.0270)	(0.0831)	(0.0228)
FDI	-0.00392**	-0.00415	-0.00405**	-0.00516	-0.00678	-0.00729	-0.00601	-0.0147	-0.00755
	(0.00179)	(0.00342)	(0.00177)	(0.00545)	(0.0174)	(0.00467)	(0.00594)	(0.0178)	(0.00500)
BC	0.0109*	0.0232*	0.0102	0.0164	0.0456	0.0186	0.0251	0.0697	0.0268
	(0.00637)	(0.0122)	(0.00632)	(0.0214)	(0.0643)	(0.0181)	(0.0229)	(0.0657)	(0.0191)
SE	-0.0465***	-0.0589*	-0.0444***	-0.203***	-0.324**	-0.152***	-0.217***	-0.336**	-0.171***
	(0.0159)	(0.0303)	(0.0157)	(0.0607)	(0.161)	(0.0492)	(0.0615)	(0.165)	(0.0498)
Education	0.0286	-0.269**	0.0547	0.0290	-0.0278	0.00788	0.0905	0.0409	0.0701
	(0.0605)	(0.116)	(0.0600)	(0.225)	(0.622)	(0.186)	(0.233)	(0.634)	(0.191)
Taxes	0.00556	0.00755	0.00605	0.0336	0.0161	0.0248	0.0301	0.00369	0.0224
	(0.00699)	(0.0134)	(0.00694)	(0.0226)	(0.0690)	(0.0191)	(0.0242)	(0.0707)	(0.0202)
SB	-0.00705	-0.0250**	-0.000675	0.00174	-0.0835	0.00634	-0.00165	-0.0964	0.00659
	(0.00653)	(0.0125)	(0.00648)	(0.0256)	(0.0682)	(0.0209)	(0.0262)	(0.0694)	(0.0212)
Corruption	0.0220***	0.0331***	0.0196***	0.0138	0.135**	0.0119	0.0360*	0.152**	0.0330**
	(0.00647)	(0.0124)	(0.00642)	(0.0171)	(0.0594)	(0.0149)	(0.0191)	(0.0613)	(0.0164)
Peace	-0.000410	-0.000385	-0.000270	0.000383	0.000617	0.000407	-0.000152	-0.000610	-6.78e-05
	(0.000292)	(0.000560)	(0.000290)	(0.00109)	(0.00304)	(0.000907)	(0.00114)	(0.00310)	(0.000934)
Constant	4.859***	5.551***	4.762***	5.235***	6.625***	5.003***	5.300***	6.487***	5.083***
	(0.0922)	(0.177)	(0.0915)	(0.392)	(0.980)	(0.314)	(0.390)	(0.994)	(0.312)
Observations	87	87	87	87	87	87	87	87	87
r2_w	0.220	0.342	0.213	0.353	0.136	0.453	0.365	0.0991	0.483
r2_b	0.732	0.708	0.618	0.364	0.452	0.284	0.439	0.485	0.379
r2_o	0.452	0.517	0.376	0.359	0.367	0.328	0.419	0.373	0.410

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1

Table 3.3. Regressions with trend effect

	Measure I			Measure II			Measure III		
VARIABLES	General (A+B)	Owner (A)	Self-Emp. (B)	General (A+B)	Owner (A)	Self-Emp. (B)	General (A+B)	Owner (A)	Self-Empl. (B)
GDP	-0.00633*	-0.0245***	-0.00534	0.0320**	0.0133	0.0191	0.0257	0.00444	0.0129
	(0.00368)	(0.00772)	(0.00382)	(0.0161)	(0.0426)	(0.0128)	(0.0157)	(0.0429)	(0.0125)
GDPpc	-0.00989	0.00306	-0.0100	-0.0613	-0.159	-0.0306	-0.0693	-0.147	-0.0392
	(0.0103)	(0.0216)	(0.0107)	(0.0470)	(0.123)	(0.0377)	(0.0463)	(0.124)	(0.0367)
Unemployment	0.00234	0.0389**	-0.000592	0.000170	-0.0386	0.0142	-0.0106	-0.0334	0.00228
	(0.00905)	(0.0190)	(0.00940)	(0.0319)	(0.101)	(0.0270)	(0.0336)	(0.102)	(0.0278)
Inflation	0.0275**	0.00574	0.0201*	0.0281	0.00987	0.0146	0.0328	0.0742	0.0140
	(0.0113)	(0.0237)	(0.0117)	(0.0310)	(0.116)	(0.0272)	(0.0343)	(0.119)	(0.0294)
FDI	-0.00319**	-0.00324	-0.00343**	-0.00288	-0.00306	-0.00537	-0.00330	-0.0103	-0.00525
	(0.00157)	(0.00329)	(0.00163)	(0.00513)	(0.0172)	(0.00441)	(0.00552)	(0.0175)	(0.00462)
BC	0.00352	0.0144	0.00398	-0.00400	0.0131	0.00180	0.00188	0.0313	0.00716
	(0.00576)	(0.0121)	(0.00599)	(0.0208)	(0.0656)	(0.0177)	(0.0220)	(0.0664)	(0.0182)
SE	-0.0165	-0.0232	-0.0194	-0.107*	-0.184	-0.0752	-0.112*	-0.171	-0.0834
	(0.0151)	(0.0318)	(0.0157)	(0.0639)	(0.176)	(0.0517)	(0.0636)	(0.177)	(0.0510)
Education	-0.0250	-0.333***	0.00984	-0.196	-0.312	-0.167	-0.144	-0.292	-0.120
	(0.0540)	(0.113)	(0.0561)	(0.221)	(0.631)	(0.182)	(0.225)	(0.636)	(0.182)
Taxes	-0.00598	-0.00628	-0.00362	0.00315	-0.0365	-0.000887	-0.00557	-0.0590	-0.00840
	(0.00655)	(0.0138)	(0.00680)	(0.0230)	(0.0735)	(0.0195)	(0.0243)	(0.0745)	(0.0202)
SB	0.00195	-0.0142	0.00686	0.0325	-0.0398	0.0309	0.0320	-0.0449	0.0344*
	(0.00599)	(0.0126)	(0.00622)	(0.0257)	(0.0711)	(0.0210)	(0.0259)	(0.0715)	(0.0208)
Corruption	0.0192***	0.0298**	0.0173***	0.0127	0.129**	0.0107	0.0335*	0.144**	0.0306**
	(0.00568)	(0.0119)	(0.00590)	(0.0159)	(0.0585)	(0.0139)	(0.0175)	(0.0599)	(0.0150)
Peace	-0.000309	-0.000267	-0.000186	0.000402	0.000867	0.000445	-9.45e-05	-0.000292	8.13e-06
	(0.000256)	(0.000539)	(0.000266)	(0.00102)	(0.00299)	(0.000851)	(0.00105)	(0.00302)	(0.000857)
Trend effect	0.0233***	0.0278***	0.0195***	0.0471***	0.0924*	0.0404***	0.0565***	0.111**	0.0500***
	(0.00475)	(0.00997)	(0.00494)	(0.0139)	(0.0496)	(0.0121)	(0.0152)	(0.0507)	(0.0129)
Constant	4.668***	5.324***	4.603***	4.857***	5.866***	4.674***	4.838***	5.574***	4.672***
	(0.0895)	(0.188)	(0.0929)	(0.385)	(1.046)	(0.311)	(0.383)	(1.054)	(0.306)
r2_w	0.408	0.410	0.342	0.448	0.161	0.516	0.472	0.140	0.561
r2_b	0.797	0.732	0.694	0.440	0.501	0.384	0.530	0.542	0.508
r2_o	0.588	0.563	0.486	0.436	0.401	0.419	0.510	0.417	0.520

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1

This variable is very sensitive in a country such as Mexico that, according to Transparency International, ranks 106 out of 177 on the Corruption Perception Index (2013). The OECD classified Mexico's law enforcement efforts in combatting bribery as "little" in 2011.[17]

As mentioned above, while FDI may have an impact on informality, its impact in this analysis is limited. While it is statistically significant at five percent with a negative impact, this result is only obtained under *Measure I* for general informality and self-employed workers, with no impact found for owners. When the effect of time is applied, its statistical significance is maintained along with the limitations mentioned above.

The variables that express the regulatory framework, such as the *cost of starting a business*, are important but only under certain circumstances. In this research, the cost of starting a business is only statistically significant for *Measure I*, and the expected negative effect is confirmed for owners at five percent. This result may be explained by the fact that as the costs rise, they impose restrictions on the entrance of less productive firms into the market and limit entrepreneurship (Dougherty and Escobar, 2013). On the other hand, variables such as *taxes*, which are considered important in the literature, have no visible effect on informality in this model.

As mentioned in the methodology section, the random effect is an average of two effects: the *between* and *time series* effects. In Appendix 1, these are computed in order to ascertain whether or not they have the same effect across the Mexican states. Interestingly, in the *between* effect, variables such as GDP, which represent the size of the market, remain statistically significant at a minimum of ten percent for general informality and the self-employed under any measure, and at five percent for owners. All cases present a negative relationship with the informality of economic units. The coefficient associated with the variable of *bank credit* is statistically significant, for at least *Measure II* and *III*, with the same positive effect for owners and the self-employed. These results agree with the findings of other studies, in which the economic variables remain among the most important factors in the reduction of informality from the perspective of economic units.

[17] http://www.transparency.org/country#MEX

One of the most surprising aspects of the analysis is that the coefficient associated with the variable of corruption is statistically significant for almost all measures, except *Measure I* for owners, having a positive relationship with informality. As mentioned above, this variable is considered of crucial importance in countries such as Mexico, where corrupt practice is extensive and the progress in decreasing it is not encouraging.

On the other hand, the coefficient associated with the variable *education* is statistically significant, with a negative effect on micro-firm informality. This finding further supports the idea that, at least to some extent, a higher education level may be translated into less informality.

In the final analysis of the time series approach, the coefficient associated with the variable *unemployment* is statistically significant and has a positive effect. It is the self-employed who receive a greater impact under *Measure I* and *II*, with a statistically significant level of five percent. While the *owners* are statistically significant at ten percent under *Measure I*, these observations may support the hypothesis that informality is an alternative to unfavourable labour market conditions.

3.5. Conclusions

Informality has been the object of several studies, not only because it is a growing phenomenon in most developing countries, but also due to its consequences in the short and long term. However, the difficulties in studying this subject begin with the attempt to define and compute it, as there is no single method with which to identify and measure informality. Most studies have concentrated on the size of labour market informality and, to a lesser extent, on the informality of economic units.

The purpose of the current study is to shed light on the main determinants of economic unit informality by state in Mexico. The key strengths of this study are that it takes micro-firms as the object of the study of informality, differentiating the economic units and proposing ways to measure micro-firm informality. The research is conducted for each state in a developing country for the period of 2008 to 2012. The main contributions of this study are summarised below.

The investigation of micro-firm informality has shown that the economic variables such as market size and wealth are the main causes of informality in each state. Economic stability reduces informality levels. An interesting aspect is that these variables are significant under any of the measures proposed in the research. In contrast, the variable FDI has a limited effect on micro-firm informality, inasmuch as it is only statistically significant under a specific kind of measure.

This study provides additional evidence with respect to the importance of the corruption variable, as it has a statically significant effect as a cause of informality in Mexican states. The variable shows a positive influence under almost every measure considered in the study. Therefore, a key policy priority should be to plan better ways to reduce corruption, as governments would benefit from the increased tax revenue.

Another important finding is that the variable of education has a positive effect on the reduction of informality. It has always been considered a key variable in the development of any country, with governments able to look to this as a tool in efforts to reduce informality.

These findings suggest several courses of action for governments. Specifically, they can fight against corruption and strive to improve and extend education. These are tools that should be considered of great importance for countries such as Mexico.

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Annex 3.A. Robustness check: between estimator

	Measure I			Measure II			Measure III		
VARIABLES	General (A+B)	Owner (A)	Self-Empl. (B)	General (A+B)	Owner (A)	Self-Empl. (B)	General (A+B)	Owner (A)	Self-Empl. (B)
GDP	-0.0108*	-0.0160	-0.0106*	-0.0419	-0.150**	-0.0303	-0.0513*	-0.152**	-0.0403*
	(0.00548)	(0.0124)	(0.00596)	(0.0287)	(0.0687)	(0.0222)	(0.0268)	(0.0681)	(0.0209)
GDPpc	-0.00418	-0.00493	-0.00464	-0.00391	-0.0330	0.00380	0.0108	-0.0299	0.0191
	(0.0122)	(0.0276)	(0.0133)	(0.0637)	(0.153)	(0.0492)	(0.0595)	(0.151)	(0.0465)
Unemploy.	0.00897	0.0338	0.00572	-0.0172	-0.0429	-0.0185	0.000139	-0.0488	0.000320
	(0.0119)	(0.0269)	(0.0129)	(0.0622)	(0.149)	(0.0481)	(0.0581)	(0.148)	(0.0454)
Inflation	0.0105	0.0109	0.00901	-0.0454	-0.103	-0.0415	-0.0493	-0.0539	-0.0480
	(0.0231)	(0.0523)	(0.0251)	(0.121)	(0.289)	(0.0934)	(0.113)	(0.287)	(0.0882)
FDI	-0.00588***	-0.00756	-0.00582**	0.0173	0.0331	0.0129	0.0128	0.0243	0.00873
	(0.00195)	(0.00441)	(0.00212)	(0.0102)	(0.0244)	(0.00788)	(0.00953)	(0.0242)	(0.00745)
BC	0.00843	0.000394	0.0110	0.0745*	0.198*	0.0575*	0.0796*	0.216**	0.0618*
	(0.00798)	(0.0181)	(0.00869)	(0.0417)	(0.100)	(0.0323)	(0.0390)	(0.0992)	(0.0305)
SE	-0.0227	-0.0279	-0.0282	-0.133	-0.331	-0.0927	-0.127	-0.311	-0.0883
	(0.0165)	(0.0374)	(0.0180)	(0.0864)	(0.207)	(0.0668)	(0.0807)	(0.205)	(0.0631)
Education	-0.0512	-0.194	-0.0216	-0.711*	-1.386	-0.506	-0.778**	-1.318	-0.583*
	(0.0745)	(0.169)	(0.0811)	(0.390)	(0.934)	(0.301)	(0.364)	(0.927)	(0.285)
Taxes	-0.00178	0.00346	0.00122	-0.0502	-0.120	-0.0481	-0.0544	-0.159	-0.0502
	(0.00775)	(0.0176)	(0.00844)	(0.0405)	(0.0972)	(0.0313)	(0.0379)	(0.0963)	(0.0296)
SB	0.000433	-0.0266	0.00594	0.0231	-0.0875	0.0337	0.0322	-0.0894	0.0441
	(0.00684)	(0.0155)	(0.00745)	(0.0358)	(0.0858)	(0.0277)	(0.0335)	(0.0850)	(0.0261)
Corruption	0.0259**	0.00772	0.0244*	0.237***	0.582***	0.169***	0.257***	0.582***	0.190***
	(0.0117)	(0.0266)	(0.0128)	(0.0615)	(0.147)	(0.0475)	(0.0575)	(0.146)	(0.0449)
Peace	-0.000492	0.000286	-0.000419	-0.00154	-0.00151	-0.00129	-0.00195	-0.00292	-0.00162
	(0.000329)	(0.000745)	(0.000358)	(0.00172)	(0.00412)	(0.00133)	(0.00161)	(0.00409)	(0.00126)
Constant	4.758***	5.167***	4.693***	5.851***	7.867***	5.388***	5.841***	7.582***	5.399***
	(0.128)	(0.290)	(0.139)	(0.670)	(1.606)	(0.518)	(0.627)	(1.593)	(0.490)
Observations	87	87	87	87	87	87	87	87	87
R-squared	0.803	0.745	0.698	0.742	0.727	0.707	0.784	0.743	0.757
p	0.000182	0.00154	0.00587	0.00168	0.00266	0.00457	0.000398	0.00162	0.00106
r2_w	2.85e-05	0.00670	0.00253	0.0153	0.000627	0.0229	0.00172	0.000512	0.00145
r2_b	0.803	0.745	0.698	0.742	0.727	0.707	0.784	0.743	0.757
r2_o	0.295	0.356	0.232	0.264	0.243	0.187	0.292	0.245	0.227

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1

Annex 3.B. Robustness check: including year fixed effects

	Measure I			Measure II			Measure III		
VARIABLES	General (A+B)	Owner (A)	Self-Emp. (B)	General (A+B)	Owner (A)	Self-Emp. (B)	General (A+B)	Owner (A)	Self-Emp. (B)
GDP	0.0408	-0.131	0.0192	0.375	1.040	0.247	0.275	1.327	0.135
	(0.179)	(0.333)	(0.183)	(0.330)	(1.389)	(0.294)	(0.374)	(1.419)	(0.328)
GDPpc	0.273	0.802*	0.161	0.0783	-1.022	0.201	0.240	-0.648	0.329
	(0.240)	(0.446)	(0.245)	(0.442)	(1.860)	(0.393)	(0.500)	(1.901)	(0.440)
Unemployment	0.0346	0.109*	0.0152	0.0958*	0.0341	0.121**	0.101	0.151	0.115**
	(0.0298)	(0.0554)	(0.0305)	(0.0549)	(0.231)	(0.0489)	(0.0622)	(0.236)	(0.0546)
Inflation	0.00252	-0.0298	-0.00884	0.000495	-0.169	-0.00516	-0.00527	-0.0993	-0.0173
	(0.0169)	(0.0315)	(0.0173)	(0.0312)	(0.131)	(0.0278)	(0.0354)	(0.134)	(0.0311)
FDI	0.000818	0.00569	-0.000384	-0.00249	0.00491	-0.00581	-0.00133	-0.000498	-0.00435
	(0.00328)	(0.00610)	(0.00335)	(0.00604)	(0.0254)	(0.00538)	(0.00684)	(0.0260)	(0.00601)
BC	0.00864	0.0403	0.00453	-0.00329	-0.0438	-0.00458	0.00440	-0.0611	0.00487
	(0.0131)	(0.0244)	(0.0134)	(0.0242)	(0.102)	(0.0215)	(0.0274)	(0.104)	(0.0241)
SE	0.286	0.501	0.135	0.276	-0.455	0.248	0.302	0.101	0.228
	(0.214)	(0.398)	(0.219)	(0.395)	(1.662)	(0.351)	(0.447)	(1.698)	(0.393)
Education	0.161	-0.352	0.163	-0.0253	-0.683	-0.139	0.125	-0.816	0.0353
	(0.212)	(0.395)	(0.217)	(0.391)	(1.648)	(0.348)	(0.443)	(1.684)	(0.390)
Taxes	-0.00983	-0.0194	-0.00552	0.0339	0.131	0.0304	0.0270	0.144	0.0226
	(0.0148)	(0.0275)	(0.0151)	(0.0273)	(0.115)	(0.0243)	(0.0309)	(0.117)	(0.0271)
SB	0.00392	0.000395	0.00723	0.0433	0.125	0.0199	0.0302	0.143	0.00479
	(0.0222)	(0.0412)	(0.0227)	(0.0408)	(0.172)	(0.0363)	(0.0462)	(0.176)	(0.0406)
Corruption	0.00637	0.0170	0.00647	-0.0218	-0.00809	-0.0231	-0.0133	-0.00692	-0.0132
	(0.00955)	(0.0178)	(0.00977)	(0.0176)	(0.0741)	(0.0157)	(0.0199)	(0.0757)	(0.0175)
Peace	-0.000202	-0.00181	0.000223	0.00128	0.00300	0.00124	0.000534	0.00201	0.000550
	(0.000773)	(0.00144)	(0.000791)	(0.00142)	(0.00600)	(0.00127)	(0.00161)	(0.00613)	(0.00142)
Constant	0.468	-2.528	2.060	-1.384	4.147	-0.834	-2.335	-3.727	-1.284
	(1.828)	(3.399)	(1.868)	(3.367)	(14.17)	(2.997)	(3.814)	(14.49)	(3.352)
Observations	87	87	87	87	87	87	87	87	87
R-squared	0.379	0.475	0.308	0.487	0.265	0.572	0.510	0.260	0.605
p	0.0301	0.00224	0.129	0.00150	0.259	6.29e-05	0.000697	0.278	1.47e-05
r2_w	0.379	0.475	0.308	0.487	0.265	0.572	0.510	0.260	0.605
r2_b	0.431	0.324	0.250	0.000851	0.0419	6.99e-05	0.0116	0.00606	0.0213
r2_o	0.165	0.142	0.0706	0.00264	0.0461	0.000393	0.00546	0.00771	0.00883

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1

Chapter 4: Differences in efficiency between formal and informal micro-firms in Mexico*

4.1. Introduction

There is a growing body of literature that recognizes the importance of micro-firms for a country's development inasmuch as these firms represent the majority of business activity and employ more workers than any other kind of firm. This is especially true for developing countries, where micro-firms can be seen as an alternative to the formal wage sector. Low wages and high unemployment levels are common characteristics of developing countries; at the same time, there may also be an expression of the entrepreneurial capacity of the society. In fact, the characteristics of micro-firms are instrumental to understanding their performance.

Micro-firms have been often considered unproductive and as having undesirable characteristics, such as being too small and unlikely to grow sufficiently to be productive, as they are normally run by uneducated people and have a short life expectancy (La Porta and Shleifer, 2014). In fact, in most developing countries, micro-firms are associated with informal activities such as street selling and poor-quality products (Loayza et al., 2009; Masatlioglu and Rigolini, 2008).

Although micro-firm performance has been studied before, most research in this area has not dealt with the differentiation between formal and informal micro-firms, with most studies focusing on bigger firms and labour market issues. The differentiation between formal and informal micro-firms is applied here in order to analyse the characteristics of each group, to test whether they exhibit different performance in terms of output and efficiency, and to explain why.

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The main aims of this study are to characterise formal and informal micro-firms, to visualise the differences between them, and to explain the reasons behind these differences. Another novel aspect of this research is the use of the Oaxaca-Blinder decomposition method (Oaxaca, 1973; Blinder, 1973) to explain the output and efficiency gap between groups. While this method has been used in research on labour issues, it is used in this chapter to shed light on the differences between formal and informal micro-firms.

The rest of the chapter is divided into five sections. Section 4.2 presents the literature review, which provides an overview of the role of the micro-firm, outlining the informality issues linked to this kind of firm and what has been said about the differences between groups. Section 4.3 describes the database used in the research as well as the way the variables were defined. Section 4.4 describes the methodology used to explain the different efficiencies and outputs between groups. Section 4.5 presents the results, and section 4.6 summarises the main conclusions and policy implications.

4.2. Literature review

There has been an increasing interest in the role of micro-firms on countries development, inasmuch as these kinds of firms can be seen to have positive or negative effects on development, depending on the point of view from which they are viewed and the country under study. For instance, in developed countries, owning a business and being your own boss are desirable characteristics, with this kind of firm taken as an alternative to salaried work. In contrast, micro-firms in developing countries are associated with unregulated activities and the self-employed sector. While, most of the time these micro-firms are taken as being involved in informal subsistence activities, they are also recognised as a means of reducing poverty and social inequality (Lagarda and Urquidy, 2007).

It is important to explain the different reasons people decide to explore the informal sector and start a new micro-firm, as it is known that these reasons may influence a firm's economic performance. For instance, it is said that economic performance may respond to voluntary entrance. Where a salaried worker enters the informal sector, this is considered a transitory situation. Similarly, Levy (2010) states that in cases where salaries are too low, as in most developing countries, micro-firms measured as self-

employed may be less desirable. However, the main reason for entering this sector of firms is the non-pecuniary benefits, such as flexibility of hours and being one's own boss (Hurst and Pugsley, 2011). As these benefits have also been found in studies carried out in developed countries, it has been proposed that micro-firms in developing countries should be treated as they are in developed countries, i.e., as a desirable sector that provides, for instance, a source of employment for low-productivity workers (Fajnzylber et al., 2006).

Some argue that micro-firms are less desirable in economic terms for a society, citing their low working capital and low wages and their poor-quality and low-value products (La Porta and Shleifer, 2014). According to Davis et al. (2007), most non-employing micro-firms in the United States are quite small in size and have never employed staff. In this respect, Hurst and Pugsley (2011) state that only a few small businesses have a new idea to market, with most having little interest in growth and innovation. Furthermore, most micro-firms are dismantled when their owners die (Benjamin and Mbaye, 2012). Unlike micro-firms, larger firms have better characteristics, such as higher education levels.

Obstacles may affect the economic performance of micro-firms. For example, regulations play a key role in inhibiting individual activity in order to exploit such opportunities in the market as contract enforcement or labour market regulations (Ardagna and Lusardi, 2008). On the other hand, among the most common obstacles for micro-firms are available capital and credit restrictions (Hernández-Trillo et al., 2005). These factors may make a difference in the performance of a business, as it has been found that micro-firms that support their activities with bank credit instead of loans from family or friends are more efficient (Aguilar et al., 2012). Similarly, Heino (2006) describes the relationship between starting a new micro-firm and the methods of financing it, with, for instance, the constraints of family savings hindering the creation of micro-enterprises in Mexico. However, despite liquidity restrictions, this sector does not appear to be less desirable than alternative business models available in market (Fajnzylber et al., 2006).

Another important argument made against micro-firms is that most of them are informal; in other words, they are breaking law in some way. Whether informality is a problem or not depends on theoretical approach, with the dualist school, for instance, seeing informality as a marginal activity that provides income and security to poor people who, although they would prefer to be employed in the formal sector, are excluded. The structuralist school sees informality as a way to help reduce inputs and labour cost. The legalistic school sees informality as a problem related to regulations, in which economic agents try to avoid costs (Alter, 2012).

In practical terms, the informal sector can be seen as a strategic response to competition from larger firms (Farrell, 2004). Many economic units in this sector encounter capital shortfalls due to a lack of institutional credit and social security, as well as employee job instability. Most informal economic units do not move to the formal sector and remain in the same conditions without any improvement for many years (La Porta and Shleifer, 2014). In addition, governments collect lower tax revenues due to a lack of information on earnings from this sector (Aguilar et al., 2012).

The question as to whether micro-firms choose the informal sector may be explained by government failures, which, for instance, may influence whether or not a society perceives the benefits of paying taxes, such as the quality of public services. Known as *tax morale*, this can affect the decisions of economic agents and promote involvement in the informal sector. In the case of low tax morale, many economic units may see no point in formality (Benjamin and Mbaye, 2012; Jaramillo, 2009).

As mentioned in the previous chapter, the problems with informality begin with attempts to measure it. For instance, the informality of an economic unit has been measured through business size, in terms of the number of employees. A firm with few employees might be considered to be informal. While registration with government agencies has been also used as another measure of informality, the problem with this measurement method is that a business can be registered with one government agency but not others. The firm's accounts are another way of measuring informality, with this measurement considered a good indication, as firms do not usually formally register their activities. Business mobility has been also used as a measure, because this kind of firm does not have a fixed workplace. Most studies

recognise, however, that it is difficult to measure informality regardless of the measurement method, largely due to data availability. Furthermore, it is impossible to talk about unique informality, as there are firms that are breaking all laws and others only breaking some laws (Benjamin and Mbaye, 2012).

Efficiency is a key point to understanding economic development in any society, as it represents a measurement of the efficiency with which a country, firm, or worker produces goods and services. In this regard, economic growth is considered as coming from the creation of highly productive formal, rather than informal, firms, and micro-firms much less so. The problem is that most informal firms are too small to be sufficiently productive; for instance, a sample of poor countries reveals that, on average, an informal firm employs four workers while a formal firm employs 126 workers (La Porta and Shleifer, 2014). The problem of informal firms is that, in general terms, they are less productive and less efficient (La Porta and Shleifer, 2014; La Porta and Shleifer, 2008; Fajnzylber et al., 2011). It has been found that when newly created firms choose to operate in the formal sector, they show better revenue levels, employ more workers, and have more working capital (La Porta and Shleifer, 2014).

The differences in productivity, however, are only found in smaller firms, as bigger informal firms may have productivity levels as high as formal firms while remaining informal (Benjamin and Mbaye, 2012; Castany, 2007). This means that productivity differences are more notable in small firms than in large firms. It is very important to distinguish between large and small firms in order to better explain the productivity differences for each sector and size of firm. The size of a firm has been considered as a criterion for informality, with micro-firms often assumed to be informal without any distinction being made. Nevertheless, there may also be differences in terms of efficiency in this sector of firms. In this regard, Otero et al. (2013) find that informal micro-firms in Mexico are less efficient than formal firms. These efficiency differences may also be expressed in terms of wages and growth rates. La Porta and Shleifer (2014) conclude that the productivity of informal firms is too low for them to compete in the formal sector.

The motivation to begin a new business is another possible variable that can explain efficiency differences between formal and informal firms. The latter sector of firms can be seen as way of sheltering firms from adverse conditions in formal labour market. Put in these terms, micro-firms may simply represent a way of subsisting rather than a form of entrepreneurship, and as such, are unlikely to grow, which may explain some of the differences between groups (Aguilar et al., 2012; Perry et al., 2007).

The human capital variable is another factor used to explain efficiency differences between formal and informal firms. It is said, for instance, that educated people often run formal firms. These business owners find it more profitable to run a bigger formal firm than an informal one. In empirical studies, the human capital variable is statistically significant in explaining productivity levels, although the formation of human capital is more important for managers than workers in this kind of firm (La Porta and Shleifer, 2008; Gennaioli et al., 2013; Akoten et al., 2006; Gelb et al., 2009). It has even been found that entrepreneurs with more educated spouses have higher earnings (McKenzie and Woodruff, 2006). However, the problem of measuring human capital is that most measurements do not take into account labour experience, which is known to play an important role in explaining the performance of any kind of firm (Lagarda and Urquidy, 2007).

Capital endowment may be one of the main differences between formal and informal micro-firms. It is expected that a firm with better endowments will achieve better performance in economic terms. A study carried out on Turkish micro-firms confirms that formal firms are more capital intensive than informal micro-firms, although this was not the case for Egyptian micro-firms (Hendy and Zaki, 2013). Capital differences can be explained by a lack of access to formal credit. Many micro-firms do not comply with the standard requirements of the formal financial system. Empirical studies have found that micro-firms with access to bank loans, moneylenders, or formal credit from clients and suppliers are more efficient than those who depend on credit from family or friends (Hernández-Trillo et al., 2005).

Factors other than credit access or finance issues, such as better market strategies or the characteristics of micro firms and their owners (Fajnzylber et al., 2011; Akoten et al., 2006), may better explain performance differences between formal and informal micro-firms. For instance, a lack of ability or a lack of desire to grow would be reflected in poor performance (De Mel et al., 2010). Besides, variables, such as hours worked, whether or not relatives of the business owner support the micro-firm, or marital status of the business owner can have an important influence on performance (Fajnzylber et al., 2011).

It is important to take into account a broader context where, for instance, the macroeconomic environment can influence micro-firm performance, given the impact of factors such as economic shocks on formal and informal firms.

In the same way, geographical regions have to be taken into account inasmuch as these may influence productivity and efficiency, for instance, firms locates on borders can have a different behaviour by different tax laws .

Furthermore, law enforcement may affect the business environment and thus the performance levels between groups (Gelb et al., 2009). Government plays a very import role in terms of their obligations for law enforcement and the provision of a good business environment. Governmental failures may limit the ability of a micro-firm to reach optimal size and performance. In practical terms, unequal access to public services can generate differences in productivity (Steel and Snodgrass, 2008). In sum, policies that improve the business environment, such as the provision of access to formal credit, facilities to enable formalisation, and management training, can cause differences between the groups (Mano et al., 2012).

4.3. Data and descriptive variables

The database used in this research has been taken from the *Instituto Nacional de Geografía y Estadística* (INEGI, or the National Institute for Statistics), in particular from the *Encuesta Nacional de Micronegocios* (ENAMIN, or the National Micro Firm Survey). ENAMIN is focused on micro-firm owners in Mexico, covering businesses of up to six people in the trade, service, and construction sectors, and up to sixteen people in the case of the manufacturing sector. This survey provides a good perspective on the characteristics, organisation, expenditure, and revenue of this kind of economic unit. The study period includes the years 2008, 2010, and 2012. While the survey conducted interviews with about 30,000 micro-firm owners, after the application of different filters, such as the dropping of missing values and outliers, etc., the sample is reduced to about 12,000 micro-firms each year. Representative to a national level, the survey sample takes data from the 32 states of the Republic of Mexico, including the *Distrito Federal* (the metropolitan area of Mexico City).

Regarding informality, I use the criteria taken from the survey to identify formal and informal micro-firms. Each interviewee had to complete the sentence "In your activity or business…". If from among the possible answers the interviewee chose "using a notebook or a notepad to keep accounts" or "accounts are not kept" the micro-firm was classified as informal.[18]

The criterion used in this study to classify micro-firms as either formal or informal is considered the most appropriate, because it is inferred from a hidden question. When the interviewee is explicitly asked whether the micro-firm is registered with the government, it is highly likely that the interviewee will lie to avoid exposure to financial authorities. Furthermore, informal micro-firms' accounts are not usually officially registered, which is one of their most remarkable and representative characteristics (INEGI, 2014; Benjamin and Mbaye, 2012; Cardenas and Rozo, 2009).

[18] While other studies (Otero et al., 2013) have used the criterion of being registered with Mexico's financial authorities to define micro-firms as informal, this explicit question has been modified from ENAMIN for the period of study featured in this research. In this way, the method proposed is considered as better reflecting the concept of informality.

The variables listed below are obtained in order to measure the efficiency of micro-firms. The output variable is computed by obtaining micro-firm income with the question, "What is the amount of income generated by the business in the past month for the following items?" The survey gives the total amount of income. The capital variable is computed using the following question, "If you had to sell the tools, equipment, machinery, furniture, equipment, land, vehicles, and property that have been used in your trade or business, for how much would you sell them?" with the survey providing an estimated amount of capital. The labour variable is computed using the number of employees in the business, including the owner.

According to the literature, the variable of education is considered as playing an important role in explaining efficiency differences, obtained based on educational level, ranging from zero (uneducated) to nine (PhD). The age of the firm is another variable considered in this study, with the expectation that it has a positive effect on firm efficiency. The motivation for starting a business is considered important, as this can influence micro-firm performance and is taken from the following question: "What was the main reason for which you started this business or activity?" To capture an *active* motivation, the following answers are considered: "I had money and found a good opportunity" or "I wanted to do a job according to my trade, career or profession"; on the other hand, a different answer leads to the motivation being considered as *passive*.

Based on the literature, the formal financing of the micro business is considered as playing an important role in its performance, the data for which being taken from the following question: "Where did you get the money to start this business or activity?" Micro-firms are considered as having used a formal credit institution when the financing comes from commercial banking, government programs, supplier credit, small formal financial institutions, etc. Table 4.1 summarises the variables used in this research:

Table 4.1. Definitions of variables

Variable	Definition	Source
Output	Total amount expressed in money	ENAMIN
Capital	Estimated amount of capital expressed in money	ENAMIN
Labour	Number of workers including owner	ENAMIN
Education	Schooling of owner: from cero(no schooling) nine (Ph.D.)	ENAMIN
Firm Age	Age of micro firm	ENAMIN
Motivation	Motivation to begin the business: active (entrepreneurship) passive (necessity)	ENAMIN
Financing	The money to begin the business comes from: formal credit (bank credit, government, etc.) or informal credit (relatives, friends, etc.)	ENAMIN

As an overview of micro-firms in Mexico, Table 4.2 presents descriptive statistics for the years 2008, 2010, and 2012. While the mean output in the sample for the three years is approximately 15,000 Mexican pesos, differences emerge when the sample is split between formal and informal micro-firms. For instance, the mean output of formal micro-firms is 36,196 pesos, while for informal micro-firms it is only 9,129 pesos, with the difference amounting to 27,067 pesos. While the mean capital for the full sample is 64,110 pesos, there is a notable difference between groups inasmuch as formal micro-firms count on 184,062 pesos of capital, with informal micro-firms counting on only 26,037 pesos.

Table 4.2. Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
	Full simple				*Formal Micro firms*				*Informal Micro Firms*			
					2008							
Output	12875	36214.96	10	1000000	27247	61092.89	12	1000000	7768	18766.05	10	700000
Capital	47246.70	195814.20	1.00	6000000.00	123304.50	343061.30	3.00	6000000.00	20221.23	85862.19	1.00	4000000.00
Labour	1.59	1.04	1.00	13.00	2.10	1.38	1.00	13.00	1.41	0.81	1.00	11.00
Education	3.47	1.97	0.00	9.00	4.58	2.12	0.00	9.00	3.07	1.76	0.00	9.00
N	12324				3231				9093			
					2010							
Output	16152	72410.44	11	3300000	37071	119433.30	80	3300000	9224	45435.37	11	2750000
Capital	70503.08	305624.90	1.00	9000000.00	204837.00	573824.50	9.00	9000000.00	26019.20	85870.80	1.00	3000000.00
Labour	1.74	1.24	1.00	16.00	2.39	1.73	1.00	16.00	1.52	0.93	1.00	14.25
Education	3.55	1.96	0.00	9.00	4.64	2.11	0.00	9.00	3.19	1.77	0.00	8.00
N	11553				2874				8679			
					2012							
Output	17924	53514.10	40	1800000	44271	104228.50	80	1800000	10395	17991.99	40	430000
Capital	74581.19	338829.10	5.00	8000000.00	224046.70	620844.40	100.00	8000000.00	31872.17	171157.80	5.00	8000000.00
Labour	1.74	1.23	1.00	16.00	2.45	1.78	1.00	15.00	1.53	0.93	1.00	16.00
Education	3.64	1.97	0.00	9.00	4.85	2.13	0.00	9.00	3.29	1.77	0.00	9.00
N	11978				2662				9316			
					Promedio							
Output	15650.10	54046.50	20.33	2033333.33	36196.42	94918.23	57.33	2033333.33	9129.16	27397.80	20.33	1293333.33
Capital	64110.32	280089.40	2.33	7666666.67	184062.73	512576.73	37.33	7666666.67	26037.53	114296.93	2.33	5000000.00
Labour	1.69	1.17	1.00	15.00	2.31	1.63	1.00	14.67	1.49	0.89	1.00	13.75
Education	3.55	1.97	0.00	9.00	4.69	2.12	0.00	9.00	3.18	1.77	0.00	8.67

While the mean of number of workers, including the owner, is 1.69 for the full sample, this number changes when it is split, with formal micro-firms having a mean of 2.31 workers and informal micro-firms a mean of 1.49 workers. Another important difference is the owner's level of education, with the mean for formal firms at 4.69, indicating that they have at least a high school education, while the average for owners of informal micro-firms is 3.18, indicating a middle school education. Another important variable is the age of the business, where the full sample has a mean of 10 years, but, again, a notable difference appears between the groups, with formal micro-firms having been, on average, in business for 11.8 years, while informal micro-firms have been in business for only 9.49 years.

4.4. Methodology

In light of the fact that, over the years, many theoretical papers have suggested different approaches to measuring efficiency and have obtained different results, there is no single measurement of them. Although it is difficult to measure, three recognised methodologies have been developed and widely applied to compute productivity: the econometric approach, index number, and distance function. The econometric approach consists of the estimation of the production function in order to obtain the contribution of inputs in the production of the output, with the Total Factor Productivity (TFP) then computed as a "residual"[19]. The index number methodology consists of preparing an index that takes into account the quantities and prices of inputs and outputs.[20] Finally, the main idea of the distance functions approach is that there is not an economic agent that can exceed an "ideal" frontier, with the distance between this and the frontier representing the individual (in)efficiencies.[21]

The methodology for measuring productivity depends largely on the availability and makeup of the database. As such, the use of each methodology has advantages and disadvantages. Taking into account the availability and framework of the ENAMIN survey, the distance function

[19] The best-known work conducted in this area is Solow (1957), who developed a macroeconomic level study. At the level of individual firms, see Olley and Pakes (1996).
[20] See Balk (1998) for a better view of the microeconomic foundation for the index number of price and productivity.
[21] See Coelli and Perelman (2000) for a better framework for the stochastic frontier.

approach is considered the best option for estimating efficiency. The most efficient micro-firms have a higher output-input ratio and are situated in the frontier of production, with the distance between any given firm and this frontier interpreted as the technical "(in)efficiency" of a micro-firm.

The advantage of using this methodology is that it separates efficiency into two components: technical efficiency (movement toward the production frontier) and technical change (outward shifts due to innovation or new organisation). The estimation method is conducted by means of the stochastic frontier model approach, consisting of econometric estimations of parametric functions that take into account the random errors that explain measurement errors and other random factors. The efficiency range is from zero to one, where the higher the score, the more efficient the micro-firm.

4.4.1. Stochastic frontier model

According to the data available in the ENAMIN survey, the stochastic frontier model is the best method for measuring the efficiency differences between formal and informal micro-firms in Mexico, as explained below:

$$Y_i = \beta_0 + \beta_1 K_i + \beta_2 L_i + \delta' X_i + \varepsilon_i \quad (4.1)$$

$$\varepsilon_i = \upsilon_i - \mu_i \quad (4.2)$$

Where variable Y_i represents the log of output expressed in Mexican pesos of micro-firm "i", variable K_i is the log of capital that includes tools, equipment, machinery, furniture, etc., and variable L_i is the log of the number of workers, including owners. Variable X_i is a vector of control variables, such as geographical region and sector of the economy.

Equation 4.2 shows the composed error ε_i, which is the sum or difference of a normally distributed disturbance, υ_i, which is the measurement and specification error, and the disturbance, μ_i, which represents the non-negative (in)efficiency and is assumed to be random and to have a half normal, truncated normal, or exponential. The terms υ_i and μ_i are assumed to be independent of each other and i.i.d. across observations.

In order to get a preliminary test of the effect of (in)formality, this variable is incorporated in Equation 4.1 by means of a dummy variable, with the value of one for a formal micro-firm and zero for others.

Once the stochastic frontier model has been estimated, it is possible to obtain an efficiency measure for micro-firms, μ_i, which is renamed as variable E_i in Equation 4.3. It is then possible to run the regression with the vector Z_i, which contains the main available variables that, according to the literature review, affect efficiency—i.e., owner education, age of business, financing, and motivation for starting the business. As with Equation 4.2, the dummy *formality* variable is included in Equation 4.3, in order to get a preliminary test of the effect of (in)formality over micro firm efficiency.

$$E_i = \theta' Z_i + w_i \tag{4.3}$$

4.4.2. Oaxaca-Blinder decomposition method

A novel aspect of the research is the use of Oaxaca-Blinder decomposition method, which enables a better analysis of efficiency differences between groups. Although the Oaxaca-Blinder decomposition method has often been used to study labour market outcomes for different groups (such as sex or race) by decomposing mean differences, it can be used to explain efficiency differences between formal and informal micro-firms.

In this way, two equations of efficiency can be estimated to obtain the returns enabled by the characteristics of both groups of firms. Equation 4.4 is the mean efficiency of formal micro-firms and Equation 4.5 is the mean efficiency of informal micro-firms. Vectors Z_{fo} and Z_{in} represent the micro-firms' characteristics or endowments, β represents the micro-firms' endowment returns, and u_i is the error term. The subscripts "*fo*" and "*in*" refer to formal and informal micro-firms respectively.

$$\bar{E}_{fo,i} = \bar{Z}_{fo,i}\beta_{fo,i} + u_{fo,i} \tag{4.4}$$

$$\bar{E}_{in,i} = \bar{Z}_{in,i}\beta_{in,i} + u_{in,i} \tag{4.5}$$

$$\bar{E}_{fo,i} - \bar{E}_{in.i} = \left(\bar{Z}_{fo,i} - \bar{Z}_{in,i}\right)\beta_{fo,i} + \bar{Z}_{in,i}\left(\beta_{fo,i} - \beta_{in,i}\right) \tag{4.6}$$

Finally, Equation 4.6 decomposes the average efficiency differential between formal and informal micro-firms using two components, with the first referring to the differential in characteristics between formal and informal micro-firms that have the same endowment returns as formal micro-firms. The second part refers to the efficiency differential, which allows for differentiation of endowment returns for formal and informal micro-firms when they have the same endowments. The same analysis is conducted for the *output* variable as the dependent variable in order to obtain a wider overview of micro-firms.

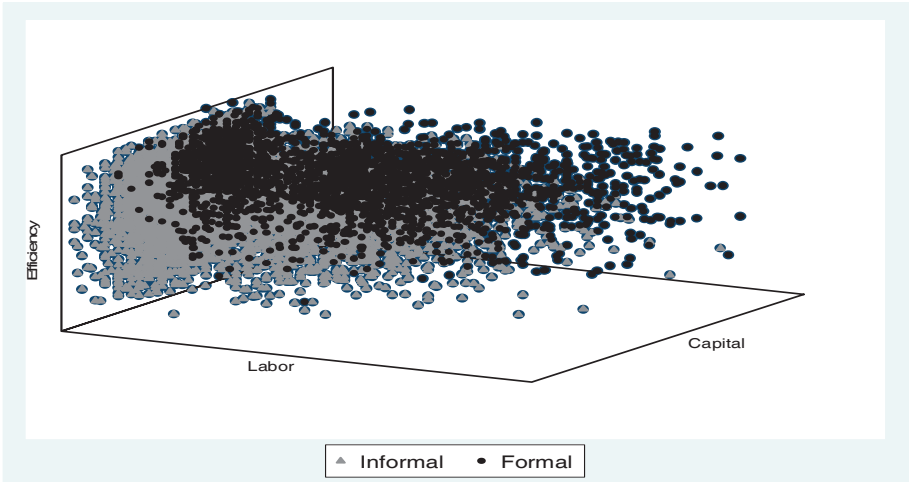
4.5. Results

To compare and highlight the efficiency differences between informal and formal micro-firms, Figures 4.1 and 4.2 show the results of graphing the main variables (capital and labour) with efficiency and output for both formal and informal micro-firms. In the three figures, formal micro-firms (represented by the black dots) are located higher than the informal micro-firms (represented by the grey dots), indicating greater efficiency and production. In addition, Figure 4.3 shows the efficiency differences in terms of the density distribution, which confirm that formal and informal micro-firms exhibit different behaviour in terms of efficiency and output.

4.5.1. Stochastic frontier results

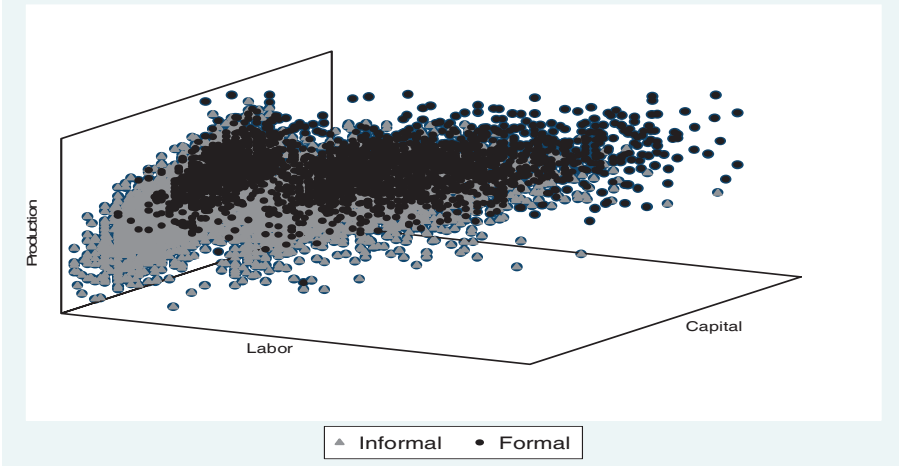
Table 4.3 shows the results obtained from the regressions carried out using the stochastic frontier method to compute micro-firm efficiency. As stated above, the model is computed taking into account the two main production factors—capital and labour—with the geographic area and the economic sector included for the three years, and with *output* as the dependent variable. As shown in Model 1, the independent variables are statistically significant, with coefficients of 0.780 and 0.286 for the labour and capital factors respectively in 2012. Model 2 adds the formal dummy variable, which takes the value of one for a formal micro-firm and the value of zero for an informal micro-firm. With a positive effect of one per cent, the *formal* variable is statistically significant. In other words, a first glance suggests that formal micro-firms perform differently from informal micro-firms.

Figure 4.1. Capital, labour and efficiency - 2012



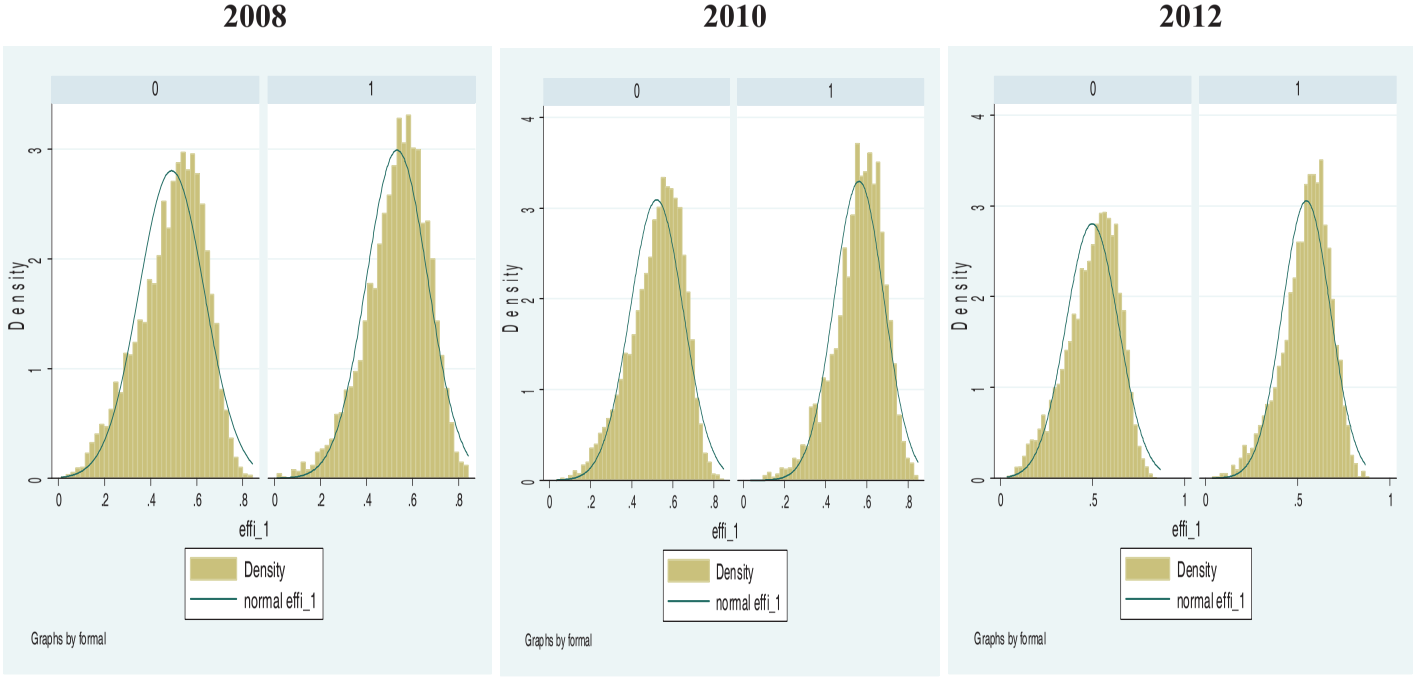
Source: Own elaboration with data from ENAMIN.

Figure 4.2. Capital, labour and output – 2012



Source: Own elaboration with data from ENAMIN.

Figure 4.3. Density distribution of efficiency



Source: Own elaboration with data from ENAMIN.

Once the efficiency level of the micro firms has been computed, with a range between zero and one (the higher the score, the greater the efficiency), the *efficiency* variable is taken as a dependent variable. Table 4.4 shows the results of running the *efficiency* variable with the variables of interest:

In the three years analysed here, the *formal* variable, the main variable of interest, is statistically significant at one percent and has a positive effect on *efficiency*, with, for instance, the highest coefficient of 0.029 in 2012. This result strengthens the conclusions drawn from the results mentioned above, which indicate that formal micro-firms have better efficiency levels than informal micro-firms, and, thus, better performance.

The education variable has the expected positive effect and, at one percent, is statistically significant for the period studied, with a coefficient of 0.0293 in 2012—the second highest impact on efficiency. At one percent, the age of the firm is statistically significant and has a positive effect on efficiency, with a coefficient of 0.003 in 2012. The motivation to start a business has a positive influence on the efficiency level and is statistically significant at one percent with a coefficient of 0.0149. Access to formal financing is statistically significant, with a positive effect on efficiency and a coefficient of 0.0194 in 2012. Although the described results are for 2012, the basic thrust of the analysis is the same for 2008 and 2010.

4.5.2. Oaxaca-Blinder results

Table 4.5 shows the results of the Oaxaca-Blinder decomposition in order to explain the output and efficiency differences between formal and informal micro-firms. This method has the advantage of enabling the separation of the *endowment* and *endowment return* effects. Group 1 is made up of informal micro-firms, with the formal micro-firms found in Group 2. It can be seen from Table 4.5 that the output differences, or output gap, between groups are 1.11, 1.28, and 1.23, in 2008, 2010, and 2012 respectively. Table 4.5 also shows the *efficiency* differences between groups with coefficients 0.035, 0.036, and 0.042 for the period covered in this study. These results confirm the difference between groups and show that formal micro-firms exhibit better performance in terms of production and efficiency than informal micro-firms.

Table 4.3. Stochastic frontiers method. Output as dependent variable

Variables	2008		2010		2012	
Capital	0.285***	0.253***	0.273***	0.238***	0.286***	0.252***
	(0.00482)	(0.00514)	(0.00511)	(0.00547)	(0.00505)	(0.00533)
Labour	0.736***	0.669***	0.748***	0.685***	0.780***	0.710***
	(0.0217)	(0.0217)	(0.0205)	(0.0206)	(0.0200)	(0.0201)
Northeast	0.0452	0.0612	-0.0848*	-0.0645	-0.0481	-0.0343
	(0.0433)	(0.0428)	(0.0443)	(0.0438)	(0.0439)	(0.0433)
Northwest	0.243***	0.252***	0.0315	0.0328	0.174***	0.183***
	(0.0386)	(0.0382)	(0.0380)	(0.0375)	(0.0375)	(0.0370)
West	0.223***	0.216***	0.0506	0.0430	0.193***	0.173***
	(0.0369)	(0.0365)	(0.0375)	(0.0371)	(0.0361)	(0.0356)
East	0.178***	0.189***	-0.156***	-0.141***	0.106***	0.119***
	(0.0400)	(0.0395)	(0.0410)	(0.0405)	(0.0391)	(0.0385)
Northcentral	0.0931**	0.0961**	-0.0518	-0.0380	0.130***	0.128***
	(0.0395)	(0.0391)	(0.0393)	(0.0388)	(0.0390)	(0.0384)
Southcentral	0.0812*	0.0998**	-0.0562	-0.0444	0.120***	0.138***
	(0.0448)	(0.0443)	(0.0456)	(0.0451)	(0.0440)	(0.0434)
Southeast	0.130***	0.137***	-0.0583	-0.0566	0.146***	0.153***
	(0.0389)	(0.0385)	(0.0382)	(0.0377)	(0.0376)	(0.0371)
Manufacturing	-0.182***	-0.171***	-0.194***	-0.175***	-0.145***	-0.121***
	(0.0279)	(0.0276)	(0.0283)	(0.0279)	(0.0279)	(0.0276)
Commerce	0.0487**	0.0317	0.0588***	0.0481**	0.0959***	0.0882***
	(0.0224)	(0.0222)	(0.0227)	(0.0224)	(0.0222)	(0.0220)
Formal =1		0.412***		0.433***		0.462***
		(0.0248)		(0.0258)		(0.0260)
Constant	6.502***	6.697***	6.697***	6.933***	6.623***	6.863***
	(0.0567)	(0.0571)	(0.0624)	(0.0628)	(0.0594)	(0.0598)
lnsig2v	-0.262***	-0.300***	-0.234***	-0.270***	-0.310***	-0.360***
	(0.0345)	(0.0348)	(0.0377)	(0.0374)	(0.0364)	(0.0363)
lnsig2u	0.175***	0.181***	-0.0287	-0.0253	0.130*	0.147**
	(0.0638)	(0.0620)	(0.0855)	(0.0819)	(0.0672)	(0.0634)
N	12324	12324	11553	11553	11978	11978
sigma_u	1.091	1.095	0.986	0.987	1.067	1.076
sigma_v	0.877	0.861	0.890	0.874	0.856	0.835
chi2_c	130.4	139.6	66.56	73.15	109.1	123.6
Cmd	frontier	frontier	frontier	frontier	frontier	frontier
Function	production	production	production	production	production	production
Ll	-18572	-18435	-17145	-17006	-17774	-17617

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1.

Table 4.4. OLS. Efficiency as dependent variable

Variables	2008	2010	2012
Education	0.0269***	0.0233***	0.0293***
	(0.00314)	(0.00298)	(0.00317)
Firm age	0.00857***	0.00562***	0.00359**
	(0.00142)	(0.00132)	(0.00142)
Formal =1	0.0219***	0.0253***	0.0298***
	(0.00325)	(0.00309)	(0.00343)
Motivation	0.0223***	0.0180***	0.0149***
	(0.00314)	(0.00357)	(0.00348)
Financing	0.0116**	0.00782	0.0194***
	(0.00550)	(0.00555)	(0.00552)
Constant	0.444***	0.482***	0.456***
	(0.00493)	(0.00468)	(0.00509)
Observations	10,479	9,893	10,326
R-squared	0.028	0.027	0.029
N	10479	9893	10326
Cmd	regress	regress	regress

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1 .

Endowment differences can be also seen in Table 4.5, which shows the mean increase (or decrease) for formal micro-firms when formal micro-firms have the same characteristics as informal micro-firms. It can be deduced that the output differences between groups are explained largely due to the *characteristic* or *endowment* differences between micro-firms. For instance, the 1.213 output gap is explained by the differences of 0.890 in micro-firm endowments in 2012, with most of this gap explained by capital and labour factors. In the same way, this result could be observed for the other two years featured in this study. These findings suggest that a large part of the output gap is caused by capital differences between groups, so this difference explains 0.50 points of 0.890 in 2012. In this regard, Hendy and Zaki (2013) have found similar results for micro-firms connected to industry in Turkey, with the group of formal micro-firms more capital intensive than their informal counterparts.

Labour is the second most important variable explaining output differences, contributing 0.26 out of 0.89 endowment differences. Furthermore, these results show that if formal micro-firms had the same labour characteristics as informal micro-firms, their outputs would be lower. Usually, an informal

micro-firm has fewer employees than a formal firm and is less productive (La Porta and Shleifer, 2008).

The results confirm that the *education* variable plays an important role in explaining output differences. In fact, education explains the majority of differences among all variables—excluding capital and labour—with a coefficient of 0.078 in 2012. In this regard, the education variable is in line with most results reported in the literature and has always had a very important role in society. The sense of the analysis is the same for 2008 and 2010.

The *motivation* variable is statistically significant at one percent and explains—excluding capital and labour—0.014 out of 1.141 of the endowment differences recorded in 2012, indicating its importance in explaining output differences. The *age of the firm* variable is third most important in explaining output differences, with a coefficient of 0.009 in 2012, supporting the idea that the age of the firm is significant in explaining performance differences between groups. Finally, although the financing variable has the lowest coefficient it is statistically significant at one percent, thus indicating its importance. The findings are the same for 2008 and 2010.

Interestingly, while the decomposition method applied to explain efficiency differences shows similar results to output difference analysis, this is in terms of variable importance, not in terms of endowments and endowment return analysis. For instance, the *endowment returns* variable explains 0.030 out of 0.429, while the firms' endowments or characteristics explain only 0.012 in 2012. The methods used to exploit endowments explain most of the efficiency differences between groups.

The importance of the *education* variable in explaining efficiency differences between formal and informal micro-firms is strengthened by these results. The variable explains most of the efficiency differences, with a coefficient of 0.012 in 2012. This result is similar to that found by other authors (La Porta and Shleifer, 2008; Gennaioli et al., 2013; Akoten et al., 2006; Gelb et al., 2009), who recorded the same importance and significance of this variable.

Table 4.5. Oaxaca-Blinder decomposition method

Variables	Output			Efficiency		
	2008	2010	2012	2008	2010	2012
Informal	8.262***	8.406***	8.596***	0.495***	0.521***	0.500***
	(0.0146)	(0.0143)	(0.0140)	(0.00166)	(0.00154)	(0.00161)
Formal	9.381***	9.591***	9.833***	0.530***	0.558***	0.542***
	(0.0227)	(0.0236)	(0.0249)	(0.00248)	(0.00237)	(0.00267)
Difference	-1.119***	-1.185***	-1.237***	-0.0356***	-0.0367***	-0.0429***
	(0.0270)	(0.0276)	(0.0285)	(0.00298)	(0.00283)	(0.00312)
Endowments						
Total	-0.831***	-0.840***	-0.890***	-0.0133***	-0.0110***	-0.0122***
	(0.0224)	(0.0234)	(0.0241)	(0.00153)	(0.00144)	(0.00151)
Capital	-0.489***	-0.492***	-0.507***			
	(0.0170)	(0.0177)	(0.0172)			
Labour	-0.205***	-0.232***	-0.262***			
	(0.0122)	(0.0131)	(0.0138)			
Education	-0.0797***	-0.0658***	-0.0781***	-0.00761***	-0.00637***	-0.00859***
	(0.0108)	(0.0102)	(0.0102)	(0.00135)	(0.00121)	(0.00133)
Firm age	-0.0151***	-0.0155***	-0.00977***	-0.00214***	-0.00218***	-0.00147***
	(0.00295)	(0.00385)	(0.00325)	(0.000397)	(0.000481)	(0.000442)
Motivation	-0.0267***	-0.0193***	-0.0140***	-0.00306***	-0.00232***	-0.00183***
	(0.00420)	(0.00454)	(0.00448)	(0.000529)	(0.000558)	(0.000603)
Financing	-0.00502***	-0.00198*	-0.00243*	-0.000471**	-0.000116	-0.000262*
	(0.00191)	(0.00114)	(0.00132)	(0.000235)	(0.000121)	(0.000150)
Region	-0.0104***	-0.0128***	-0.0163***			
	(0.00325)	(0.00317)	(0.00405)			
Returns						
Total	-0.287***	-0.345***	-0.347***	-0.0223***	-0.0258***	-0.0308***
	(0.0288)	(0.0296)	(0.0294)	(0.00331)	(0.00314)	(0.00342)
Capital	0.581***	0.655***	0.775***			
	(0.140)	(0.152)	(0.153)			
Labour	-0.0373	-0.0705**	-0.0787***			
	(0.0267)	(0.0296)	(0.0302)			
Education	-0.169**	-0.222***	-0.224***	-0.0171*	-0.0172*	-0.0190*
	(0.0733)	(0.0759)	(0.0776)	(0.00914)	(0.00892)	(0.00996)
Firm age	0.125**	0.0724	0.120**	0.0209***	0.0172***	0.0210***
	(0.0512)	(0.0549)	(0.0558)	(0.00654)	(0.00657)	(0.00729)
Motivation	0.0314*	0.0180	-0.00222	0.00397*	0.00174	-0.00112
	(0.0176)	(0.0146)	(0.0170)	(0.00225)	(0.00176)	(0.00224)
Financing	0.00369	-0.00123	0.00227	0.000800	-0.000217	0.000383
	(0.00774)	(0.00662)	(0.00692)	(0.000990)	(0.000797)	(0.000909)
Region	-0.0522	-0.0787	0.177**			
	(0.0822)	(0.0875)	(0.0825)			
Constant	-0.770***	-0.718***	-1.116***	-0.0309***	-0.0272**	-0.0320**
	(0.165)	(0.174)	(0.176)	(0.0117)	(0.0113)	(0.0128)
Observations	10,479	9,893	10,326	10,479	9,893	10,326
Informal	7463	7181	7817	7463	7181	7817
Formal	3016	2712	2509	3016	2712	2509

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1 .

Remarkably, the variable age of the firm has a larger coefficient in *endowment return* than *endowment*, with 0.0210 and 0.001 respectively in 2012. This may be an indication that micro-firm owners' business experience affects efficiency differences between formal and informal firms. This result is notable inasmuch as this issue is not often covered by these kinds of studies (Lagarda and Urquidy, 2007). On the other hand, the *motivation* variable is statistically significant at one percent, a result that strengthens the idea that the motivation to start a business is important in explaining efficiency differences. Otero et al. (2013) find similar results for explaining efficiency. The *financing* variable has a positive effect and is statistically significant at ten percent in explaining the efficiency differences between formal and informal micro-firms—a finding in line with Hernández-Trillo et al. (2005). They found that the methods of financing a micro-firm matter in efficiency and output terms, although this variable is only statistically significant at ten percent and has a small coefficient.

4.5.3. Robustness checks

In order to support the results above, the econometric analysis and the Oaxaca-Blinder decomposition method have been applied to different measurements of (in)formality for micro-firms such as: i) registration of micro-firm before a notary (formal 2); ii) registration of micro-firm before a notary and the firm does not have any kind of accounting (formal 3); iii) micro-firm is registered before a governmental institution[22] (formal 4). Annex 4.1 shows the results of the Oaxaca-Blinder decomposition method for 2012. Basically, the results are the same as those shown above for both output and efficiency analysis. The former shows that endowments of micro-firms are more important to explain the differences between formal and informal micro-firms. The latter shows that the return of endowments explains, in a better way, the differences between groups. The importance of independent variables remains the same, with the education variable being the most important when it excludes capital and labour.

[22] It is asked whether micro firm is registered with: i) municipality; ii) Secretariat for Economics; iii) Secretariat of Health; iv) another option; v) no one. In the 2008 survey, it is impossible to know detailed answers to option iv; thus, this measurement was considered unreliable.

4.6. Conclusions

The role of micro-firms has been discussed from different points of view in economic terms, where this kind of firm can be seen as an example of entrepreneurship or as an economic unit that takes advantage of its informal position to compete unfairly. Micro-firms represent the majority of business activity, particularly in developing countries, where informality is seen as an alternative to the traditional employment sector. Nevertheless, most of the time the micro-firm is considered unproductive and informal due to its size.

This study differentiates between two categories of micro firm—formal and informal—and then provides an explanation as to why there are efficiency differences between the groups. A novel aspect of this study is the use of the Oaxaca-Blinder decomposition method to determine why formal micro-firms are more efficient than informal micro-firms. To the knowledge of this author, this methodology has not been used before in this kind of research, which features an economic unit as the main object of study. Furthermore, this study is focused on a developing country, Mexico, in which this kind of firm is common and growing. The sample size is representative to a national level for the years 2008, 2010, and 2012.

Unlike other studies, this research distinguishes between micro-firms, highlighting the importance of categorising them as either formal or informal rather than by size, thereby showing the differences in output and efficiency. The majority of output differences are due to endowment differences between groups, in that the characteristics of formal firms are superior to their informal counterparts. Interestingly, when the efficiency analysis is carried out the endowment return has more weight in the explanation of the gap between groups. Formal micro-firms take more advantage of their endowments.

The detailed analysis shows that the education variable explains the majority of the output and efficiency differences between formal and informal firms. The age of the firm is another variable that helps to explain the differences between groups. Similarly, the motivation variable plays an important role in clarifying the differences. Finally, while the financing

variable has less statistical weight, it is significant in the econometric model.

4.7. References

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Annex 4.A. Robustness checks

	Output			Efficiency		
VARIABLES	Formal 2	Formal 3	Formal 4	Formal 2	Formal 3	Formal 4
Informal	8.856***	8.857***	8.528***	0.509***	0.509***	0.501***
	(0.0132)	(0.0131)	(0.0162)	(0.00142)	(0.00141)	(0.00182)
Formal	10.05***	10.53***	9.453***	0.542***	0.566***	0.523***
	(0.0840)	(0.0964)	(0.0196)	(0.00768)	(0.00900)	(0.00215)
Difference	-1.191***	-1.676***	-0.926***	-0.0336***	-0.0572***	-0.0218***
	(0.0851)	(0.0973)	(0.0255)	(0.00781)	(0.00911)	(0.00282)
Endowments						
Total	-0.956***	-1.273***	-0.762***	-0.0144***	-0.0189***	-0.00826***
	(0.0563)	(0.0637)	(0.0214)	(0.00161)	(0.00194)	(0.00109)
Capital	-0.464***	-0.593***	-0.470***			
	(0.0309)	(0.0355)	(0.0168)			
Labour	-0.361***	-0.501***	-0.213***			
	(0.0322)	(0.0396)	(0.0120)			
Education	-0.103***	-0.140***	-0.0444***	-0.0112***	-0.0152***	-0.00531***
	(0.0118)	(0.0145)	(0.00712)	(0.00138)	(0.00173)	(0.000919)
Firm age	-0.00717***	-0.00830***	-0.00655**	-0.000955***	-0.00111***	-0.00113***
	(0.00273)	(0.00314)	(0.00275)	(0.000363)	(0.000418)	(0.000376)
Motivation	-0.0115***	-0.0154***	-0.00806***	-0.00156***	-0.00208***	-0.00114***
	(0.00396)	(0.00501)	(0.00260)	(0.000532)	(0.000673)	(0.000351)
Financing	-0.00619*	-0.00397	-0.00551***	-0.000711*	-0.000455	-0.000666***
	(0.00348)	(0.00369)	(0.00185)	(0.000410)	(0.000426)	(0.000238)
Region	-0.00347	-0.0122**	-0.0149***			
	(0.00521)	(0.00585)	(0.00335)			
Returns						
Total	-0.235***	-0.403***	-0.163***	-0.0192**	-0.0383***	-0.0135***
	(0.0619)	(0.0755)	(0.0258)	(0.00766)	(0.00897)	(0.00297)
Capital	0.339	0.947**	0.948***			
	(0.346)	(0.458)	(0.126)			
Labour	-0.124	-0.213*	-0.0551**			
	(0.0775)	(0.110)	(0.0248)			
Education	-0.570***	-0.517*	-0.327***	-0.0746***	-0.0621**	-0.0269***
	(0.197)	(0.270)	(0.0640)	(0.0233)	(0.0314)	(0.00827)
Firm age	-0.167	0.0940	-0.00394	-0.0204	0.0109	0.00682
	(0.147)	(0.186)	(0.0458)	(0.0186)	(0.0227)	(0.00611)
Motivation	0.00329	-0.0171	-0.00124	0.00132	-0.00418	0.000290
	(0.0391)	(0.0516)	(0.0128)	(0.00498)	(0.00636)	(0.00172)
Financing	0.0407**	0.0382	0.00815	0.00511**	0.00442	0.00125
	(0.0205)	(0.0236)	(0.00672)	(0.00258)	(0.00286)	(0.000900)
Region	-0.0844	-0.490*	0.187***			
	(0.194)	(0.257)	(0.0695)			
Constant	0.327	-0.245	-0.920***	0.0694**	0.0126	0.00499
	(0.409)	(0.557)	(0.140)	(0.0315)	(0.0407)	(0.0106)
Observations	10,326	10,326	10,326	10,326	10,326	10,326
Informal	9972	10083	6213	9972	10083	6213
Formal	354	243	4113	354	243	4113

Standard Errors in parentheses. *** p<0.01 , ** p<0.05 , * p<0.1.

Chapter 5: Concluding remarks and policy implications

This thesis consists of three essays about informality as studied from two points of view: labour and business. This chapter discusses the main findings of chapters 2, 3, and 4. In addition, the policy implications that emerge from each chapter and the future lines of research are also presented.

The relationship between informality and the business environment has been largely omitted in the literature on informality. For instance, the relationship between labour informality and investment levels has not been studied before, nor has the differentiation between formal and informal businesses, particularly at a micro-firm level. These aspects are especially important in developing countries, where informality plays an important role. This thesis sheds light on a blind spot in the literature on informality. Furthermore, it employs different methods to measure informality in order to verify the conclusions, which are explained below.

Chapter 2 analyses the determinants of FDI for 65 countries over the period of 1996 to 2010. The independent variables are split into *basic* and *enhancers*. The basic variable group is made up variables upon which there is more consensus about their effect on investment and their possible ability to attract FDI. The *enhancer* variable group comprises variables with an effect on investment that is unclear, although many are considered to be able to boost FDI inflows. The second group comprises institutional variables divided in two groups: formal and informal variables. Among the informal variables, the most important involve the study of the effect of labour informality on FDI, a relationship that has not been previously studied in the literature.

The results presented in Chapter 2 indicate that the level of informality has a positive impact on attracting FDI to developed and developing countries. Labour informality affects FDI flows through poor labour conditions, such as disadvantageous labour contracts, outsourcing, low salaries, reduced

social benefits, and the absence of unemployment insurance or health insurance, etc., which are translated into lower costs for multinational firms. Although informality can negatively affect the attraction of FDI flows by causing more social and economic tension, these conflicts are the result of adverse labour conditions associated with informality. The results are tested under different econometric models.

The conclusions presented in this chapter enable me to make some policy recommendations. Many governments seek to attract FDI by means of precarious labour conditions, and although this strategy can work it is only effective at an early stage, as high levels of informality ultimately translate into a negative effect. Government policies should be aimed at improving working conditions. Furthermore, it is very important to eliminate corruption, as these variables can reflect weak institutions and result in low country credibility, factors that translate into higher costs for governments and investors.

Chapter 3 analyses the determinants of micro-firm informality for each state in Mexico for the period of 2008 to 2012. It is noteworthy that micro-firm informality is also an issue at a regional level that has gone largely unnoticed in the literature. Moreover, in order to improve accuracy for the variable of interest, the degree of micro-firm informality is measured in various ways to enable comparison of results. Micro-firms are also divided into three types: those that are employers, those that are not employers (with informality instead providing a means of self-employment), and the total of the two.

The analysis presented in Chapter 4 allows us to conclude that fundamental economic variables such as GDP, GDPpc, and macroeconomic stability (expressed by the inflation variable), are still able to explain the majority of micro-firm informality. These findings are confirmed by all proposed informality measurements. The economic sector in which micro-firms are located confirms the importance of explaining the level of micro-firm informality. The education variable shows the important role that education plays in lowering the level of informality. Finally, the corruption variable affects the level of informality positively—the more corruption, the more micro-firm informality is found per state in Mexico.

The results described above allow us to describe some policy implications. For instance, governments should place more emphasis on the struggle against corruption, which is especially true in developing countries such as Mexico where corruption is pervasive and is showing its adverse effects in various economic and social realms. Moreover, education is another key variable, the importance of which in developing countries is confirmed. When viewed through the detailed state-by-state analysis, it is clear that Mexico is a heterogonous country in terms of how micro-firm informality is distributed. It is clear that if governments want to reduce informality, they have to invest more in increasing the educational level of their populations.

Chapter 5 explains the differences in efficiency between formal and informal micro-firms in Mexico for the years 2008, 2010, and 2012. Unlike Chapter 4, it focuses on the economic unit, i.e., the analysis is carried out at a microeconomic level. Furthermore, informality is measured in various ways to validate the results. The analysis is divided into two phases, with the stochastic frontier model used to compute the efficiency of both groups and the Oaxaca-Blinder decomposition method used to explain the informality differences in terms of endowments and endowment returns for formal and informal micro-firms.

The development of the analysis allows us, on one hand, to confirm the efficiency differences between formal and informal micro-firms, which are not often differentiated, as they are considered informal based on their small size. On the other hand, the analysis enables the identification of some characteristics that make efficiency differences possible. The first part of the analysis shows that the output differences are largely due to *endowments* and, to a lesser extent, *endowment returns*. However, the analysis of efficiency differences shows that *endowment returns* have greater weight. The detailed analysis shows that variables such as the owner's educational level, their motivation for opening the business, financing, and the age of the firm better explain efficiency differences.

The results described in Chapter 5 suggest some policy recommendations. To better understand the micro-firm sector, which employs the majority of the population in developing countries, it is necessary to study the way the sector works in greater depth. For example, it is necessary recognise the heterogeneity of the sector in order to improve economic policies and

encourage entrepreneurship. The variables that better explain efficiency differences are, among others, the micro-firm owner's level of education. As explained in Chapter 4, the education variable plays an important role in explaining informality, and, in this instance, efficiency differences. It is of great importance to increase efforts to improve the educational levels of those working in this sector. In addition, the financing variable is important in explaining efficiency differences between formal and informal micro-firms, and should, therefore, help to create better financing mechanisms to ensure micro-firms' access to economic resources.

This thesis has limitations, both due to the informality issue itself and data availability. As seen in the thesis, informality can cover many aspects of economics making it difficult to define and measure. These problems are faced in macroeconomic and microeconomic areas, but data availability and its interpretation may limit the scope of the analysis. For instance, in Chapter 2, trying to measure labour informality by country may be very risky. Although the analysis of Chapter 2 and Chapter 3 are in different levels of study, the *informality* variable may present some problems of endogeneity. Furthermore, in Chapters 3 and 4 the analysis would be better if the period of study were longer and economic agents could be tracked over time, but this data is not available.

Some possible lines of research have emerged from the analysis of labour and micro-firm informality undertaken in this thesis. In Chapter 2, only one way is used to proxy labour informality. In future research, I would propose other proxies at the country level. Taking into account the fact that most informal micro-firms represent a problem for government due to their undesirable characteristics, the following questions arise: Is it more important to be formal or to be efficient? Is it necessary to redefine informality in terms of, for instance, taxes? Are there benefits to becoming formal for an informal micro-firm? Is it an initial strategy for microenterprises to compete first in the informal market and then go on to operate in the formal market? Can the failure rate of companies be explained by the conditions of informality in developing countries? While these questions have been mentioned in the literature on informality, they are not tested empirically.

In addition, I have also noted the absence of research into the relationship between micro-firm productivity and trade openness in developing countries, leading to the following question: Is there a change in the level of micro-firm productivity before and after trade openness? This question is especially relevant for developing countries, as it has been argued that trade openness improves, among other aspects, economic performance for participating countries. However, few studies have been undertaken to examine this subject in relation to small firms in developing countries.

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