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Does infrastructure development help decrease informality?

A study in developing countries

Author: Gauthier de Patoul
Supervisor: Bertrand Candelon
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Introduction

According to Oxfam, in 2023 nearly 700 million people lived with $64 a month or $2,15 a day. This is considered as extreme poverty. However, while in 1990, 36% of the world's population lived under this line, today it is 9%. Furthermore, 47% of humanity has to live with no more than $6,85 a day. Most of this poverty is present in the sub-Saharan African regions.

To survive, people are forced to do odd jobs. These jobs are often unregulated and part of what is known as the informal economy. This situation enables many people to survive, but not to develop or benefit from food, financial or even physical security. They are then part of a vicious circle where they are obliged to work to survive, but this work also prevents them from improving their quality of life.

This thesis aims to address the subject of informality across the developing countries. We will first summarize the existent scientific literature on informality to understand the concept behind this word. We will also try to discover the causes and consequences of informality according to the specialists. This will lead us to the second part of this work on informality.

In the second part of this thesis, we will make an empirical study about a possible cause of informality that was not tackled by scientists. We will try to understand the linkages between the phenomenon of informal economy and the development of the infrastructures. After having gathered the data on the informality rates and the amounts spent per capita in infrastructure development from the World Bank and made the necessary calculations on a possible correlation between these two factors, we will provide an analysis on the results. We will then mention the limits of this analysis and give our conclusions and possible recommendations for policymakers.

Literature Review

I. What is the informal economy

In this part, we are going to define what the informal economy is. The subject has been raised in multiple scientific research. Hence, we will try to summarize the main ideas that exist in the current literature in a first part. In a second part, we are going to define it through the neoclassical and macro economical approach.

A. Understanding the informal economy

The subject of informal economy has been tackled in various scientific literature until now. However, scientists and economists still argue on a main definition. Indeed, it is difficult for researchers to find an agreement on what should be included under the term informal economy. For some researchers it is also referred as underground economy, informal sector, shadow economy, and so on. Yet, economists and observers discovered that this part of the economy plays an important role globally. Indeed, according to a study by Khuong et al. (2020), 50% of the Pakistani GDP was coming from the informal sector. The International Labour Organization (2023) estimated that on average 60% of the world's workers and 80% of the enterprises were informal or not under any jurisdiction. The scientific literature also proposes different study approaches of the informal economy. Some researchers focus on the economic aspect, while others highlight the more social and environmental character of this practice. In this literature review, we will explore the different aspects of the informal economy and what are the main research and studies about it until this day.

According to R. Dell'Anno (2021), informal economy includes all economic activities that are not regulated by the government or are not included in official statistics. This definition is very broad and includes a large range of economic activities, going from the small independent family business to the vast criminal activity of a group of individuals. In another way, J. de Laiglesia from the OECD (2011) defines the informal employment as the jobs or activities that do not fall under any regulation neither are protected by the governments but are still providing some services or producing goods. For the International Monetary Fund (2020), the condition of added value to the GDP and tax revenues if recorded is key to define the informal economy.

This raises the question of how the size of the informal economy varies with national income levels. According to a study made by the IMF (2020), the size of the informal economy depends on geographical and developments factors. Indeed, whereas the size of the informal economy represents on average 36% of the GDP in low-income countries for the period 2010-2017, the size of it in the advanced economies was only about 15% of the GDP for the same period. Countries of the OECD also have less informality in their economies in comparison with the Sub-Saharan Africans economies, according to the same study. Another important information from the IMF study is the decreasing size of the informal economy as income levels rise.

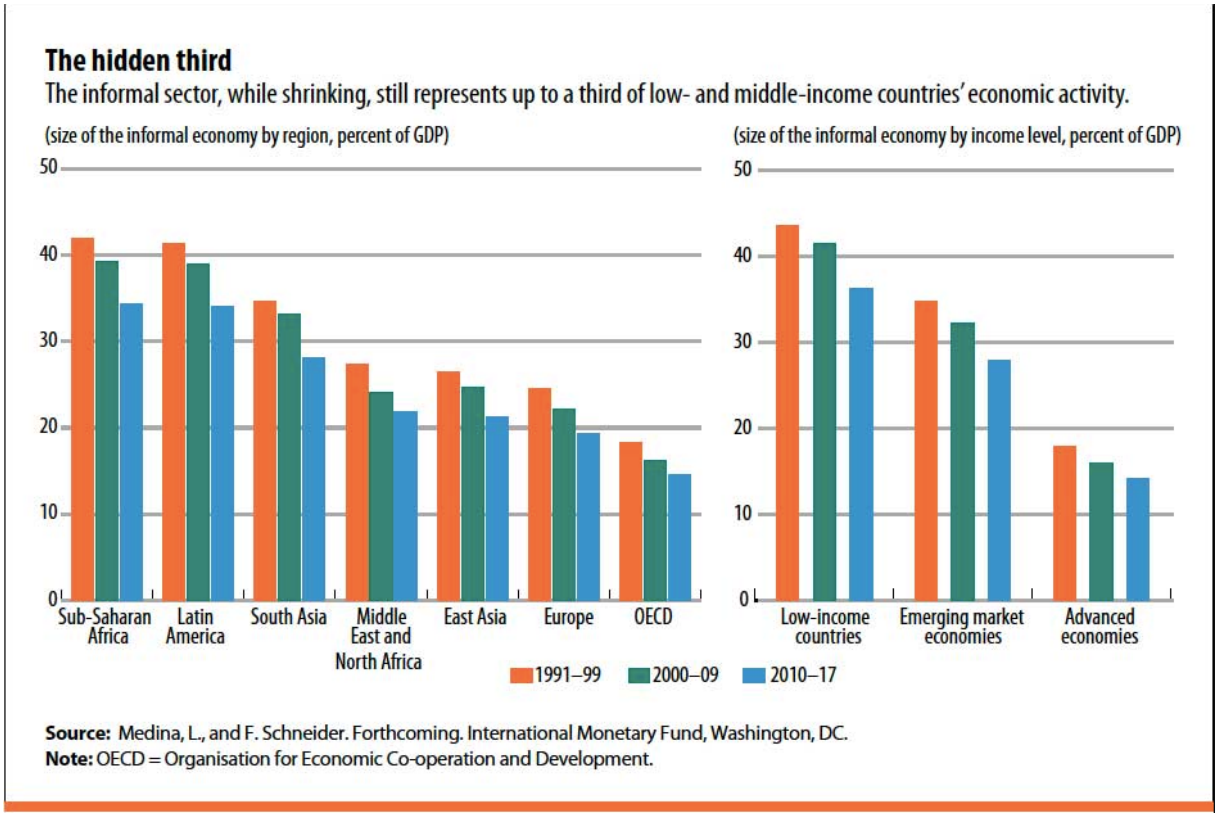


Illustration 1: The evolution of informality around the world (Deléchat & Medina, 2020)

This study concludes by stating that informality affects the economic growth and development of countries and should be tackled by steady reforms around education and structural policies that would address the people in the most efficient way. This because billions of workers still rely on the informal economy as source of income, still, according to the study of the IMF (2020).

These results must be taken carefully, though. Indeed, according to S. Pellet (2014), the amount of informality can largely vary in a same region. The author emphasized the difference between the percentage in 2007 for Switzerland and Italy, both countries are member of the OECD yet

with an informality rate of respectively 8,1% and 26,8% of the countries' GDP. Hence, the distinction in informality between the region is still notable and relevant, but there are also differences in a same region. S. Pellet (2014) emphasized the role of weighting the rate of informality for each country. However, Yelwa and Adam (2017) found out in their study about the impact of the informal sector in Nigeria, that this part of the economy had a positive impact on the GDP of the country. The authors qualified their finding since it was not possible to find a straight relationship between the amount of informality and the economic growth. Furthermore, for Yelwa and Adam (2017), the economic growth of Nigeria was mostly due to endogenous factors described in his growth model and monetary approaches for the country. The question of the influence of the informal economy on growth was also tackled by other researchers. Indeed, Elgin and Birinci (2016) discovered that in an economy with a high growth rate the size of the informal sector tended to be medium whereas in economies with a low growth rate the size of the informal sector was either small or huge. Hence, Elgin and Birinci (2016) discovered an inverted-U relationship between the growth of the GDP per capita and the size of the informal economy. These results need to be contrasted with the study of the Pakistani economy by Khuong et al. (2020) in which they discovered that the informal economy had a negative impact on the formal sector of the country. The authors also recommended some policies that the government could put in place to try to reduce this phenomenon, such as taxation, actions against illegal businesses and non-documentation.

In his article *Theories and definitions of the informal economy: A survey*, R. Dell'Anno (2021) listed three main confusions about the informal sector in the economical and statistical scientific literature. We will now quickly list these three main confusions and discuss it to qualify the previous definitions of the informal economy.

The first incomprehension about informality, according to R. Dell'Anno (2021), is due to the different meanings and concepts behind the term of informal economy and its synonyms. The author criticizes the definition of the International Labour Organization, it has according to R. Dell'Anno (2021) not a clear distinction between informal employment and informal sector. In his study, the author emphasizes the fact that these two concepts are different. While the informal sector focuses on the main characteristics of the businesses, the informal employment focuses on the job itself. R. Dell'Anno (2021) explained that these two concepts could be entangled and could be as well separated or related. Both concepts could be understood under the term Informal Economy, which can lead into confusion for researchers.

The second incomprehension according to R. Dell'Anno (2021) is based on the differences of calculation methods of the informal economy. The author noticed two main possibilities of calculation. The first, being based on the work produced by people and which is proposed by the International Labour Organization. For R. Dell'Anno (2021) this definition lacks the inclusion of illegal activities. Whereas, the other method that covers the overall economy, based on the national account standards, includes the illegal activities. R. Dell'Anno (2021) emphasized that the distinction between these two methods based on the inclusion of illegal activities should be mentioned and should depend on the type of study that is conducted, and the results wanted.

The third incomprehension focuses on the role of tax evasion in the definition of informal economy. According to R. Dell'Anno (2021) the economic definition of the informality includes activities during which the actors purposely avoid paying taxes and social contributions or following some restrictions and regulations. While broader definitions of the informal economy focus on the fact that some activities are not included in the national production statistics, according to the author. R. Dell'Anno (2021) points out that this difference of whether the tax evasion should be included in the informality definition or not leads to confusion, because it creates a gap between what the author found out to be expected and actual tax amounts. These differences can make it challenging to measure the informal economy accurately, according to R. Dell'Anno (2021).

We have seen that a clear definition of the informal economy accepted by all does not exist yet. However, for Chen and Carré (2020) there is an absolute need to define it clearly for the future research. According to Chen and Carré (2020) the definition should not be dependent of a binary formal-informal perspective but more as various possibilities of overlapping between formal and informal enterprises and workers.

B. The different approaches of the informal economy

Neoclassical approach

Under the neoclassical approach, employment and wages levels are determined by supply and demand in the market. Informality is considered as a result of an absence of equilibrium

between the amount of job demand and the lack of job offer. The neoclassical approach points out strict employment regulation as a cause for this disparity. According to International Labour Organization, the neoclassical approach criticizes the strict employment regulations as it makes hiring in the formal economy more expensive and has in consequence a lower rate of recruitment. These hard conditions tend to push workers out of the formal system which leads them to choose voluntarily for the informal sector as it leads to more benefits for the workers in this scenario in comparison with a strict formal sector still according to the studies made by International Labour Organization.

Macro-economic approach

From the years 1950s several researchers focused on a broader picture of the informal economy. These studies led by Cagan (1958), Gutmann (1977) Gaertner and Wenig (1985) and other authors, are the first macroeconomic approaches on the informal economy. They differentiated their studies by not focusing on the number of people involved in informality, but rather by finding out the hidden economic value of the phenomenon. The objective of the research at the time was to quantify the part of the economy that was not included in official statistics. Hence, these studies aimed to measure the importance of the underground production. The approach researchers used was rather new at the time and focused on labor, development, and tax evasion to analyze the informal economy.

For the past 25 years, the scientific literature on the informal economy has boomed, according to R. Dell'Anno (2021). According to the author, this is due to the greater availability of reliable estimates on the proportions of the informal economy, which has allowed researchers to dig deeper into the subject of informality and explore the causes and consequences of it. In his study on the theories of the informal economy, R. Dell'Anno (2021) regroups the causes of informality into five groups. These categories include the *taxation system* (about the taxation burden and complexity, etc.), the *regulatory system* (including employment protection laws, etc.), the *labor force* (the amount of illegal immigrants and unskilled workers or the employment rates, etc.), the *implementation of the laws* (repression, likelihood of getting caught, etc.), and the *tax morale and institutions* (corruption, quality of institutions, trust in the government, etc.).

A challenged faced by the macroeconomic literature on informal economy is the issue of reverse causality, i.e., whether informality causes changes in other economic factors, or if it is

the other way around. Multiple studies have mentioned a causality link or a consequence link between the economic factors and informality. However, it is important to mention that R. Dell'Anno (2021), expresses some doubts on the empirical results of these studies because of both the reliability of the estimates of the informal economy and the issue of endogeneity.

In conclusion, the informal economy is a complex and multifaceted phenomenon that lacks a universally accepted definition. It could be mainly resumed by economic activities that are not regulated by the government or included in official statistics. The size and significance of the informal economy vary across countries and regions, with estimates ranging from 15% to 80% of workers and enterprises being informal. The informal economy can have both positive and negative impacts on economic growth and development. It provides a source of income for billions of workers but can also hinder formal businesses' growth and contribute to tax evasion and corruption. The neoclassical approach attributes informality to an imbalance between job demand and supply, while the macroeconomic approach focuses on the hidden economic value of informal activities. There are ongoing debates and challenges in accurately measuring and understanding the informal economy, including the inclusion of illegal activities, the distinction between informal employment and the informal sector, and the role of tax evasion.

II. Factors contributing to the informal economy

Now that we defined the informal economy, we could focus on what factors are responsible for informality. Many studies have been conducted throughout the years on what could be possible causes, and these are generally consensual amongst the different scientists.

We can cite the approaches of the ILO or Gabriel Ulyssea. For the International Labour Organization (2023), informality occurs in a context with high unemployment rates, underemployment, gender inequalities, precarious work, and poverty. According to G. Ulyssea (2020), higher costs of labor are increasing the costs of formality and are pushing smaller firms to go informal. But the main causes that pushes people to go informal are well resumed in A. Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009)'s article. These authors explained that the informal economic activity can be caused by various factors and have different outcomes. However, A. Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009) listed strict regulations, high taxes, complex administrative procedures, corruption, low education levels, weak rule of

law, poor public services, lack of trust of the populations regarding their leaders, limited access to financial resources, and weak law enforcement. The authors also stated that an individual could also prefer to work independently and informally rather than to work formally for personal reasons. This constitute a first approach on what could be the causes of informality. However, further research has been conducted on what could be fueling the informal economy.

In a study conducted in Lithuania written by Gasparėnienė, L., Remeikienė, R., Williams, C.C. in 2022, another point of view on the subject is presented by the authors. In this article, the causes of informality are examined in different regions, treating regions as state administrative units. The study compares the causes of informality in rural and urban municipalities, considering their distinct economic features. Rural areas are defined as having a small population, low density, and specific socio-cultural ties, while urban informality refers to activities outside state regulation in the entire urban population. The causes of informality include general determinants applicable to both rural and urban areas, as well as specific features and historical traditions. These determinants can be categorized into economic, regulation, market, public sector, social, and financial market factors (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022). We will now dig deeper into these different determinants as they provide a good insight on what is responsible for informality.

- *Economics determinants:* According to the authors, informality in both rural and urban areas is heavily influenced by economic factors. The state of the economy, including things like income levels and unemployment rates, plays a big role in how much informal work exists. When a country's economy is doing well, with higher GDP and income, there tends to be less informal work. But during tough times like economic crises or when unemployment is high, informal work becomes more attractive to earn money (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022). In rural regions, the informality is influenced by both local and global economic factors. These includes market dynamics such as price fluctuations and the demand for agricultural goods. To illustrate the authors gave this example; when international markets offer higher prices for crops compared to local markets, farmers may opt for informal trade channels to capitalize on these more favorable prices. In urban settings, various elements such as economic expansion, income inequalities between urban and rural regions, and shifts in industries additionally contribute to the prevalence of informality. Gaining insight into these economic aspects holds significance for policymakers aiming to tackle informality

and fuel sustainable economic growth (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022). Through a comprehensive analysis of the economic environment and its influence on unofficial labor, policymakers possess the ability to devise effective approaches that mitigate informality and enhance the broader economic landscape (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022).

- *Regulation determinants:* According to research, the complexity of formal business regulations, such as taxes, can contribute to informality. Poorly formed tax systems with vague laws, gaps, and high rates negatively impact the informal economy. Labor regulations and complicated business formalization procedures also play a role. Strict labor market regulations and minimum wage requirements can increase informal employment. Social security systems and unemployment benefits may reduce motivation to work, leading to informality. In rural areas, economic agents assess regulations based on personal needs. Tolerance of informality by governments can result in higher rural unemployment rates (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022). In urban areas, reducing restrictions on the informal sector can absorb the growing labor force, but it may face opposition from the formal sector. Land use and building standards regulations also affect informality, still according to the authors. Finding a balance between formal and informal sectors is crucial. Simplifying regulations and addressing labor market issues are important steps to reduce informality (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022).

- *Market determinants:* The authors of the study found out that the informal sector of the economy is competitive due to low barriers to entry and operating costs, which can put pressure on formal businesses and reduce their market power. Factors such as growing competition, limited resources, and high operating costs drive informality. Informal operators can serve as suppliers to the formal sector, offering a wider range of products and services (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022). Consumers may choose to buy from informal operators for lower prices or specific product attributes. In rural areas, low agricultural prices push farmers towards informal activities with higher profit margins. Informal trade channels provide advantages such as timely cash settlements, lower transportation costs, and flexibility. For the authors, urban informality is influenced by the need to reduce wage costs and high land and real estate prices. The continuous relationship between formal and informal sectors, especially

during economic crises, distorts value chains and makes it difficult to conduct formal activities alone (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022).

- *Public sector determinants:* The authors found a significant link between the exit reasons of the exclusion-driven informal self-employed and their trust in public authorities. Distrust arises from corruption, weak rule of law, and poor public services. Public infrastructure has a bidirectional impact on informality: well-developed infrastructure might motivate transparent operations, while an oversized public sector leads to a corruption-friendly environment that pushes entrepreneurs into the informal sector. Frequency and quality of public inspections also influence informality. Other determinants of informality include low detection probability and lack of fear of punishment for informal activities, reflecting poor public sector functioning. In rural areas, distrust is highest when residents face income inequalities and limited resource access. Unfair competition and governance styles that tolerate informality contribute to an informal culture. Optimization of public services in rural areas raises costs and reduces autonomy, leading to higher rates of informality. Urban informality is affected by insufficient social housing programs, inadequate urban infrastructure, poor planning, and weak collective organization. Informal settlements lack basic services and state protection, promoting high levels of informal economic activities. In conclusion, distrust in public authorities, poor public services, limited infrastructure, and unequal resource access drive informality in both rural and urban areas (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022).

- *Social determinants:* The authors emphasized the impact informality through social values, awareness levels, property relationships, and cultural norms. In societies with low awareness of the costs and benefits of informality, informal activities are more acceptable. Low public tax morale, indicating a high acceptance of tax evasion, is a significant cause of informality, this point has been agreed previously by other scientists. Rural informality is influenced by economic inequality, low human capital, and social relationships within communities. Poverty, desire for income diversification, and limited investment in education contribute to rural informality. Urban informality is driven by a growing population, rural-to-urban migration, low standards of living, and social interactions. Where the authors diverge from the mainstream idea is on the relationship between migration and informality is debated. Social negotiations,

stigmatization, and interactions between the state and society shape urban informality. In conclusion according to the authors, social determinants such as awareness, tax morale, inequality, human capital, and social relationships significantly influence informality in both rural and urban contexts (Gasparėnienė, L., Remeikienė, R., Williams, C.C., 2022).

- *Financial markets determinants:* For Gasparėnienė, L., Remeikienė, R., Williams, C.C. (2022), the impact of financial market determinants on informality is primarily seen through the availability of financing (loans, credits), which relates to a country's financial system development and the functions of financial institutions. Asymmetric information between lenders and borrowers exists in financing contracts, meaning that people tend to first not disclose all their income to avoid taxation. However, this would result in a lack of collateral to apply for a loan, hence people tend to disclose more. This reduces informality by increasing the net benefit of income declaration. In rural areas, credit availability plays a crucial role in financing formal activities and economic transactions. Limited credit potential increases informality and leads to the emergence of informal rural credit markets. However, research suggests that these markets are insufficient to meet rural credit needs. Lending to the rural sector positively impacts both rural and urban areas, mitigating urban informality growth. Inadequate funding isn't limited to rural areas. Many urban residents in developing countries lack access to affordable long-term financing. Poor financing infrastructure, often due to restrictions on private sector participation, hinders financial expansion. Involving the private sector could mobilize resources, share risks, and provide fiscal incentives.

In conclusion, we can state that the causes of informality have been examined in detail and approximately agreed upon by experts in the field. However, Gasparėnienė, L., Remeikienė, R., Williams, C.C. (2022) differ by introducing a different approach in separating urban and rural areas which has led to different results in their studies. But overall, the factors remain similar and include high rates of unemployment, complex regulations, excessive taxation, corrupt practices, and limited availability of financial resources. It is imperative for policymakers to prioritize the streamlining of regulations, improving labor market conditions, enhancing public services and infrastructure, promoting awareness regarding the pros and cons of informality, and facilitating access to financing options. By addressing these determinants,

policymakers can build an environment that emphasizes formal economic activities while simultaneously reducing the informality rate.

III. The impacts of the informal economy

So far, we defined the informal economy and the factors that are responsible for its existence. We will now raise the question of the impact of the informal economy on the economy and the society.

For of A. Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009), the informality can hinder the economy and be responsible for significant costs. The authors explained that the primary targets impeded by informality are the small businesses. Their growth and potential are slowed down due to burdensome regulations, weak property rights enforcement, and lack of access to formal credit sources (A. Oviedo, M. Thomas, and K. Karakurum-Özdemir, 2009). Another consequence of informality for these authors is that informality could encourage in a certain way firms to practice tax evasion. Hence, firms are less contributing to their supposedly fair tax shares. As a result, the study showed that this was responsible for congesting public goods and not contributing to their maintenance, according to A. Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009). Which is still according to the authors, not considered as fair since the firms continue to benefit from these existent infrastructures to carry their business, creating a kind of free rider profile problem for companies in these economies. In their work, A. Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009), reviewed studies that showed a strong link between informality, tax evasion, and corruption, highlighting the negative consequences of informal economic activities on governance and societal well-being. The vicious cycle goes on for the authors, because as a result, people lose trust into their institutions and are less willing to participate into a formal system that they could see as corrupted (A. Oviedo, M. Thomas, and K. Karakurum-Özdemir, 2009).

Furthermore, Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009) found out that when people behave informally within formal companies, it affects their performance negatively. They are less productive, earn lower wages, and the overall efficiency of the company suffers. Another problem pointed out by Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009) is that many small informal businesses don't grow to their full potential because they don't reach

an efficient size for production. Some studies have tried to calculate how much these informal sectors cost the economy and how much it could improve if these businesses became formal. However, it's not clear whether informality directly causes inefficiency due to scale. For the authors, there are other factors, like the skills and abilities of the business owners and the local business environment, that might limit growth regardless of formalization. So, low productivity seems to be the main issue driving informality, rather than the lack of formal registration (Oviedo, M. Thomas, and K. Karakurum-Özdemir, 2009).

The last aspect studied by Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009) is the impact on innovation. For the authors, there is limited evidence that can prove an impact of informality on innovation. Some searchers suggested that informal business could increase the costs of growth by operating alongside formal businesses, it would be uncertain for Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009) if those businesses, assuming they would go formal, would reduce these costs. Because the exact productivity gains from reallocating resources from informal to more productive businesses are difficult to determine for the authors. Furthermore, it is important to keep in mind that the debate on informality impedes innovation is not resolved yet. For Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009), there is a lack of reliable empirical evidence.

In conclusion, the informal economy has significant implications for both the economy and society. Studies conducted by A. Oviedo, M. Thomas, and K. Karakurum-Özdemir (2009) highlight the negative impact of informality on small businesses, hindering their growth and potential due to burdensome regulations, weak property rights enforcement, and limited access to formal credit sources. Informality can also lead to tax evasion, resulting in reduced contributions to public goods and infrastructure maintenance. This creates a free-rider profile for companies and erodes trust in institutions. Moreover, informality affects the performance and productivity of individuals within formal companies, leading to lower wages and overall efficiency. The impact of informality on innovation is less clear, with limited empirical evidence available. It remains important to address informality's negative consequences and promote an environment that encourages formal economic participation, trust in institutions, and productivity improvement.

IV. How to tackle the informal economy?

The informal economy poses challenges for countries worldwide. Efforts to reduce informality and its negative impacts on economic growth and development have been explored by researchers. Khuong et al. (2020) examined the growing share of informality in Pakistan and suggested tailored policies to address this issue. Additionally, C. Deléchat and L. Medina (2020) discussed four types of policies, drawn from various countries' experiences, that can effectively reduce informality.

Khuong et al. (2020), in their study about the impact of the informal economy on growth in Pakistan, found out that the share of informality has grown in the recent decades in the country. And that despite various efforts made by local governments and the national government as well, the informal economy was still worth around 56% of the total GDP of the country (Khuong et al., 2020). According to the authors, this situation was counterproductive to the development of the country. Hence, they suggested tailored policies for Pakistan such as taxing the agricultural sector, taking actions against illegal transportation systems, or reducing the non-documented housing schemes. The study makes it clear that informality should be handled by authorities because it could increase the government's revenue. Hence, Khuong et al. (2020), suggested tailor made policies for a specific country. Other researchers suggested more broader methods that could apply to different countries.

According to C. Deléchat and L. Medina (2020), it is challenging to create a policy that can reabsorb informality within an economy for several reasons that can vary from country to country but also within a country itself. The causes and consequences of informality depends on each situation. However, the authors declared that a set of principles studied both in developed and in developing countries could be taken into account by the governments. C. Deléchat and L. Medina (2020) have gathered these principles into four types of policies that have showed effectiveness. Regulators can improve the access to education and improve its quality, design a taxing system that avoids incentivizing people to remain informal, enhance financial inclusion, structural policies to lower the costs of formalization. These proposals can be developed further thanks to other research.

The first policy, improving the access and quality of education, is according to C. Deléchat and L. Medina (2020) particularly important. The objectives of these policies should be aiming to

increase equality in education and making sure that students remain at school at least until the secondary education, as well as offering broader and more technical opportunities. In their article *Informal unemployment and education,* A-S. Kolm and B. Larsen (2016) have conducted a four-sector equilibrium search and developed a matching model. The authors did find that there was a greater proportion of low-educated workers in informal employment, and that this was responsible for a lowering of the incentives to access higher education. However, A-S. Kolm and B. Larsen (2016) argue that this can be lowered by stricter enforcement policies to make low-educated works less attractive. In addition, these types of enforcement in education could create new formal employment. However, it is important according to the authors to emphasize the fact that the amount of new formal jobs would be lower than the lost informal jobs. Hence, the unemployment rate could increase. Policies that focus on improving educational access, quality, and technical opportunities can play a vital role in addressing informality. However, it is crucial for the legislator to remember that the loss of informal jobs will not be totally recovered by the new formal jobs created. Balancing these factors is important when designing policies on education that aim to reduce informality for A-S. Kolm and B. Larsen (2016).

The second policy proposed by C. Deléchat and L. Medina (2020) is implementing a tax system that is not incentivizing individuals or firms to remain informal. According to the authors, simpler tax systems with low exemptions rates and loopholes, as well as lower tax rates, help decrease the informality. However, according to the authors, this applies to value-added and corporate taxes. For C. Deléchat and L. Medina (2020) it is important to have a solid social protection system that can provide help and assistance for those in need. The authors argue that a progressive income tax system can help to achieve this goal. Hence, everyone will have access to adequate support, according to C. Deléchat and L. Medina (2020). *In his paper Tax Justice and the Informal Economy: A Review of the Debates,* M. Rogan (2020) discusses the existing debate on the taxation of the informal sector. The author recognizes a will of the legislator to increase taxation on small firms and own-accounted workers. However, in his empirical research, the author finds out that this could not especially lead to fiscal gains or strengthen the social contract. This is especially true in developing economies, according to M. Rogan (2020). However, the author also claims that the informal sector businesses are ready to contribute to an effective and transparent tax system if they could get the benefits of it. M. Rogan (2020) insists that it is important to consider the political and administrative aspects of informal sector taxation to ensure fairness and maximize local revenues while supporting livelihoods.

The third type of policies that was mentioned by C. Deléchat and L. Medina (2020) are the policies allowing financial inclusion by making the access to formal financial services easier. In their research, the authors found out that many informal business and entrepreneurs face difficulties because they lack access to financial resources. Therefore, their productivity is limited, and growth is difficult to achieve. C. Deléchat and L. Medina (2020) mentioned that in countries where people have access to reliable financial services, the economy tends to grow faster and there is less income inequality. Hence, improving the financial inclusion can help reduce the informality, according to the authors. According to the paper *Financial inclusion and inclusive growth in sub-Saharan Africa* written by B. Sarpong and E. Nketiah-Amponsah (2022), having access to reliable financial services improves the inclusive growth and thus reduces informality. Furthermore, the authors suggest educating people on the availability of financial services and cheaper services as a policy to include the poorest part of the working population. Still, according to B. Sarpong and E. Nketiah-Amponsah (2022) financial institutions should improve the access to credit and develop fintech products for the users. These policies could integrate unbanked people into the formal system and hence, reduce the informality and precariousness of the workers for B. Sarpong and E. Nketiah-Amponsah (2022).

The fourth and last policy suggested by C. Deléchat and L. Medina (2020) is to launch a range of structural policies that can create incentives and lower the cost of formalization. According to the authors, simplifying labor market regulations allowing for more flexibility can help informal workers to transition to formal employment. C. Deléchat and L. Medina (2020) point out the fact that monopolies, excessive regulation, and bureaucracy are counterproductive to formalizing. The authors suggest that digitalization could help the government to reach the citizens. These types of policies were also suggested by the International Labour Organization during their 103rd session in 2014. Indeed, according to the ILO (2014) employment should at the center of the policies to reduce informality. The ILO proposes a large range of policies on employment such as improving the working conditions, improving the employment security, and improving the quality of workers.

To conclude, the informal economy remains a significant concern for countries that are looking for inclusive and sustainable growth. The scientists emphasized the need for targeted policies to grow government revenue and promote development. Furthermore, we have identified four

policy types proposed by authors which are: improving education, designing more effective tax systems, enhancing financial inclusion, and implementing structural reforms. These policies, supported by empirical evidence and international organizations such as the International Labour Organization, can contribute to reducing informality and encourage economic formalization. It is essential for policymakers to consider these strategies and their potential linkages when developing comprehensive approaches to tackle the informal economy and promote sustainable and inclusive economic systems. Furthermore, exploring the link between infrastructure development and the rate of informality could provide valuable insights.

V. Does the infrastructure development play a role on the informality rate?

The scientific literature tackling directly this question remains limited. We can however point out a case study written by R. Zarate for the World Bank that showed an increase of the formal employment rate after a new subway line was built in Mexico City. In his findings, R. Zarate (2019) explains that most of the gains around 87% can be attributed to direct effects of the construction of the subway line. The remaining 13% is due to a transition of informal workers to formal workers (R. Zarate, 2019). In other words, in this case, the transition of informality to formality contributed to economic gains for Mexico City. This study only partially addresses the issue, but it already provides an initial clue to a broader answer.

However, we can assume that the infrastructure development has a positive impact on overall income. This has been found out by C. Calderón and L. Servén in their paper*: Infrastructure, Growth, and Inequality: An Overview.* Indeed, empirical research show that a positive impact exists of infrastructure development on overall income (C. Calderón and L. Servén, 2014). However, the authors explain that these findings needed to be put into perspective because they could not find a link between the quality of the infrastructure and the effects on total factor productivity or the cost of infrastructure and the distributional implications. Hence, further investigation is needed in that domain (C. Calderón and L. Servén, 2014). Furthermore, the authors found out that the infrastructure development has a positive impact on the access to affordable services for poorer households. But more data is needed to fully understand the impact of development on poverty and inequality reduction for C. Calderón and L. Servén (2014). We can compare these findings with the third policy proposition by C. Deléchat and L. Medina (2020). Indeed, one of the four policies they suggest is to make formal financial services

more accessible (Cf. p16). It is important to notify that in their article, C. Calderón and L. Servén (2014) did specify infrastructure to improve the access to services of all kinds but did not enumerate exhaustively the types of services improved. Hence, we cannot make a comparison between the two articles.

In their paper, C. Calderón and L. Servén (2014) also studied the role of infrastructural development for economic growth. The authors agreed that there is a scientifical consensus that infrastructure development fuels growth. However, they point out a disagreement regarding the specific impact and influencing factors in the existent scientific literature. For C. Calderón and L. Servén, (2014), there is no clear answer on how much of an impact it has and what factors affect it. Early studies showed a strong connection between infrastructure and productivity, but later research found smaller effects. On average, it seems that infrastructure contributes about 10% to economic output (C. Calderón and L. Servén, 2014). Different studies using various measures of infrastructure have shown positive effects on the economy. Some research looks at how infrastructure affects productivity, but the results are mixed. The authors pointed to other studies that examine how infrastructure affects costs and profits, and most find positive results.

Furthermore, different studies explore the long-term effects of infrastructure, but the findings vary depending on the data used. Overall, infrastructure has been shown to have positive effects on economic growth in studies that use physical indicators (C. Calderón and L. Servén, 2014). However, there has been less focus on understanding the costs of building and maintaining infrastructure. Some research suggest that infrastructure is not provided adequately in some countries, while others have excess infrastructure. Surprisingly, the level of infrastructure does not necessarily correspond to a country's wealth. On average, the amount of infrastructure seems appropriate for promoting economic growth, but in low-income countries, there may be a shortage of public infrastructure (C. Calderón and L. Servén, 2014).

In summary, the available scientific literature on the connection between infrastructure advancement and informality reduction is limited but provides valuable insights. A particular study suggests that infrastructure initiatives, like constructing a subway line in a major city, can facilitate the shift from informal to formal sectors, yielding economic benefits. However, additional research is necessary to fully understand the wider outcomes. Other studies indicate that infrastructure development positively influences total income and economic growth, promoting productivity and service accessibility. Nonetheless, further investigation is needed

to know the precise consequences of these advancements and their impact on reducing informality.

To conclude this literature review, we have seen the complex and different natures of the informal economy, characterized by the absence of a globally agreed definition. Various perspectives have been explored, including the need for a clearer portrayal of the informal economy for future research, advocating for a departure from a formal-informal binary perspective. This review has shown that informality's generality varies globally, impacting economic growth, societal dynamics, and developmental aspects of the people. While its causes, implications, and potential mitigative policies have been extensively examined, varying viewpoints exist, including nuanced differentiation between urban and rural contexts. Despite differences, common drivers such as high unemployment rates, intricate regulations, taxation complexities, and limited financial access underscore the need for focused policy interventions. The negative effects of informality on small businesses, tax evasion, institutional trust erosion, and individual productivity have been highlighted, emphasizing the importance of promoting formal economic participation. Recognizing that informality challenges inclusive and sustainable growth, scholars and international organizations suggest education enhancement, tax system reform, financial inclusion promotion, and structural adjustments as potential remedies. This review highlights the need for policymakers to integrate these recommendations to promote formalized economic systems. Moreover, the connection between infrastructure development and informality reduction emerges as a possible solution that could be studied. While infrastructure development could lead to increased income and economic growth, more research could be needed to discover their precise impact on reducing informality. Overall, this literature review contributes to a deeper understanding of the informal economy's complexities and offers insights into potential solutions for its reduction and transformation.

Empirical Study

We have seen through the literature review that the subject of informality has been raised several times in the scientific writings. The causes of informality are mainly social, as described earlier, and little research has focused on the development of countries to explain the evolution of informal economy. This empirical study has for objective the study of a possible relationship between the number of investments in infrastructure per capita and the evolution of informality rates in developing countries over a period of roughly 30 years. In this case, the countries studied will be a set of 51 countries in Central America and sub-Saharan Africa.

I. Description of the data

For this study, we will rely on valuable data gathered by the World Bank, which includes various datasets concerning informality rates in nearly every country worldwide. To calculate these informality rates, economists have employed a dynamic general equilibrium model (DGE). These rates are expressed as percentages of a country's Gross Domestic Product (GDP) and shows the portion of economic activities that operate in the informal sector. To have the most relevant data for our study, we narrowed down our focus to a subset of 51 countries that can be found in the table in the Annex 1. It is important to note that The World Bank offers two datasets concerning informal output as a percentage of GDP.

The first dataset, which we will be using in this study, is based on the DGE approach mentioned earlier. The second dataset is based on a method known as "Multiple indicators multiple causes" (MIMIC) for its calculations. While both datasets yield slightly different results, the overall trends they reveal are quite similar, differing only by a few percentage points. For this case, we will use the DGE dataset, because it has a larger range of information that covers a longer period, which allow us to focus more in depth for our analysis. This dataset combined with the other datasets on the investments in infrastructure will provide us with valuable insights into the evolution of informality rates over time, allowing us to identify patterns and trends that might not be as evident in the MIMIC dataset.

For this research, we think that the data from The World Bank will be a valuable resource to understand the complexities of informality in different countries. Analyzing the informality

rates as a percentage of GDP will help us to understand the significance of the informal sector's contributions to the overall economic landscape in each country. We acknowledge that working with economic estimates based on a DGE model can present challenges, and variations in the datasets might require careful consideration during our analysis. Nevertheless, by focusing on the long-term trends and patterns, we want to focus on any relationships between informality rates and a country's infrastructural development.

Regarding the other part of the analyzed data, the investments in infrastructure, the source of this information is the same, namely the World Bank. However, unlike informality rates, there is no single comprehensive dataset available from the World Bank that summarizes all infrastructure investments for each country. Instead, the institution offers several datasets that focus on specific types of information related to infrastructure. To ensure a comprehensive analysis, we have selected specific datasets from The World Bank that provide valuable insights into infrastructure investments. These datasets include "Investment in transport with private participation (current US$)", "Investment in energy with private participation (current US$)", and "Investment in water and sanitation with private participation (current US$)". We chose those different datasets because it covers the basic infrastructure needed for the population of each country to develop itself.

These datasets will serve as the foundation for our comparison with the informality rates. However, to gain a more in-depth understanding, we will also consider additional datasets from the same source to enrich our analysis further. Now, it's important to note that the World Bank does not provide a single dataset that gives the total investments in infrastructure. To address this limitation, we have taken the liberty to combine the three previously mentioned datasets. We have aggregated the investments in energy, water and sanitation, and transport for each country and each year to create a new dataset, which we have named "Total Investment in Infrastructure". Furthermore, to address the differences between the countries' populations. We divided the total investments by the population for each year and country. This gave us a dataset with the total investments per capita. By doing so, we can now analyze the overall investment in infrastructure across the selected countries and study how these investments correlate with the informality rates. This combined dataset provides us with a comprehensive view of the financial commitments made in different areas of infrastructure, enabling us to identify potential patterns and relationships that may shed light on the impact of infrastructure investments on informality rates. While conducting our analysis, we will remain aware of any

potential challenges that may arise due to variations in the datasets and the need to harmonize the data to ensure accurate comparisons.

All these datasets about our 51 selected countries covering the years 1990 until 2018 will be the basis for our empirical research.

II. Methodology

With our datasets now gathered, we can start our calculations and conduct our analysis. To achieve this, we will rely on the Pearson correlation method, a statistical technique that will enable us to explore potential connections between the amount of US$ spent on infrastructure development per capita and the evolution of the informality rate. In our literature review, we discovered that researchers mainly considered social factors as the primary causes of informality. Consequently, policies proposed by economists were also directed towards addressing these social aspects. However, we believe that the role of infrastructure development in this process needs a closer examination. Furthermore, in countries that have experienced significant development in recent decades, there appears to be a noticeable decline in informality. Despite this observation, only a few studies have truly demonstrated a concrete link between infrastructure development and informality and in specific circumstances.

Hence, our hypothesis:

"There is a negative correlation between the evolution of the informality rate and the amount of investments spent throughout the same period."

This hypothesis suggests that as a country increases its investments in infrastructure, the informality rate is expected to decrease. As mentioned before, we will test this hypothesis using the Pearson correlation method, which will allow us to determine whether there is indeed a significant relationship between the investments per capita made in infrastructure development and the corresponding changes in informality rates over time. The findings could potentially shed light on the effectiveness of infrastructure investments in combating informality, and in turn, inform policymakers on strategies to foster sustainable economic growth with reduced informal economic activities.

Before analyzing our results, we will briefly provide a reminder on the Pearson correlation analysis.

The Pearson correlation formula is as follows:

$$\mathbf{r} = \frac{\mathbf{n}(\sum \mathbf{xy}) - (\sum \mathbf{x})(\sum \mathbf{y})}{\sqrt{[\mathbf{n}\sum \mathbf{x^2} - (\sum \mathbf{x})^2][\mathbf{n}\sum \mathbf{y^2} - (\sum \mathbf{y})^2]}}$$

In our study:
r = Pearson Coefficient
n= number of years studied (29)
∑xy = sum of products of the total investments and the informality rate
∑x = sum of the total investments
∑y= sum of the informality rate
∑x2 = sum of the squared total investments
∑y2 = sum of the squared informality rates

III. Results and analysis

Before looking at correlation results, we will study infrastructure investments and informality rates separately. This will help us understand each aspect better before the Pearson correlation calculation. First, we will examine informality rates to understand their trends. Then, we will explore investment data for transport, energy, and water in various countries. With this background, we will discuss the Pearson correlation to see if there is any connection between infrastructure investments and informality rates.

Our aim, with this method, is to offer a clear analysis and uncover any significant relationships between the two variables. This step-by-step approach, first studying investments and informality separately, and then using correlation to analyze their potential link, will constitute the plan for the empirical discussion of this study.

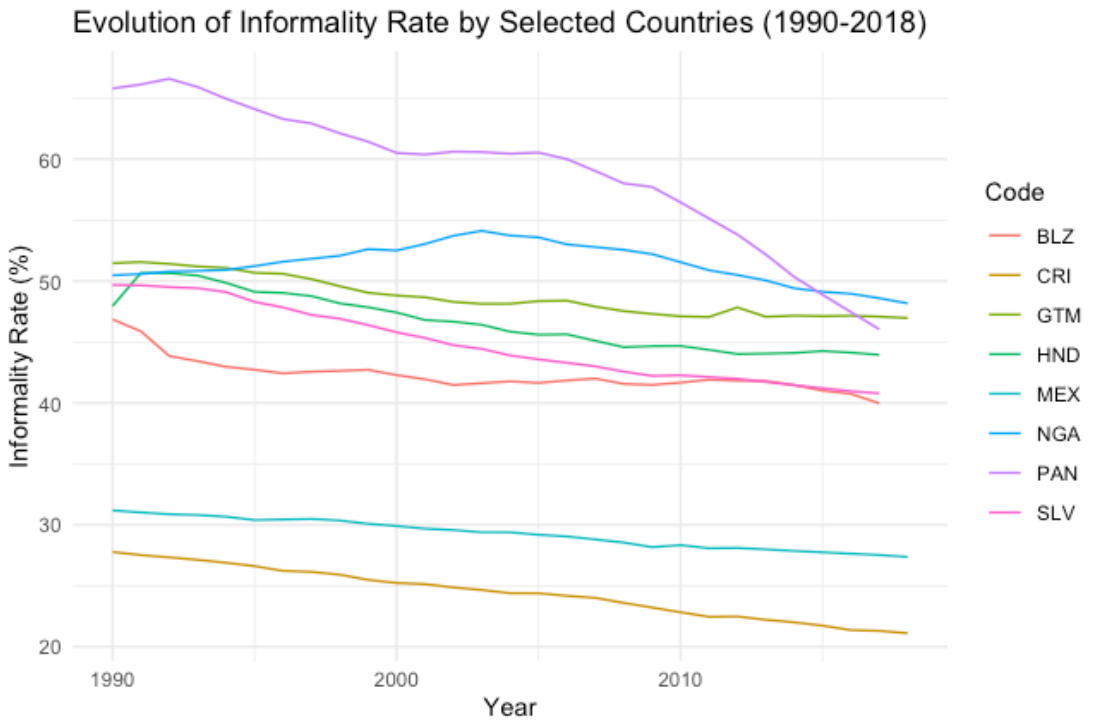
A. Results on the evolution of the informality

We have seen in the literature review a consistent trend of decreasing informality over the last few decades. This pattern is evident when examining the graph for developing countries (Cf. p3). Between the 1990s and 2010s, the average percentage of informality in Latin America and the sub-Saharan African region dropped below 40% each. In contrast, more developed regions also experienced a decrease in their informality rates, but it was not as noticeable as in the regions we studied. The data points to a notable shift in the informality landscape, particularly in Latin America and the sub-Saharan African region, where a large decrease has been made in reducing informality as a percentage of GDP. This trend could have significant implications for these regions' economic development and societal dynamics. In the following parts of our analysis, we will delve deeper into these trends to gain a comprehensive understanding of the factors contributing to the decline in informality. This shows a global trend but let's dig deeper into our data. For the evolution of the informality rates, we decided to divide our countries by geographical area for clarity purpose.

Central America

The first graph shows the evolution of the Central American region from1990 until 2018[1].

[1] For a better comprehension, all the country codes are in Annex 1.



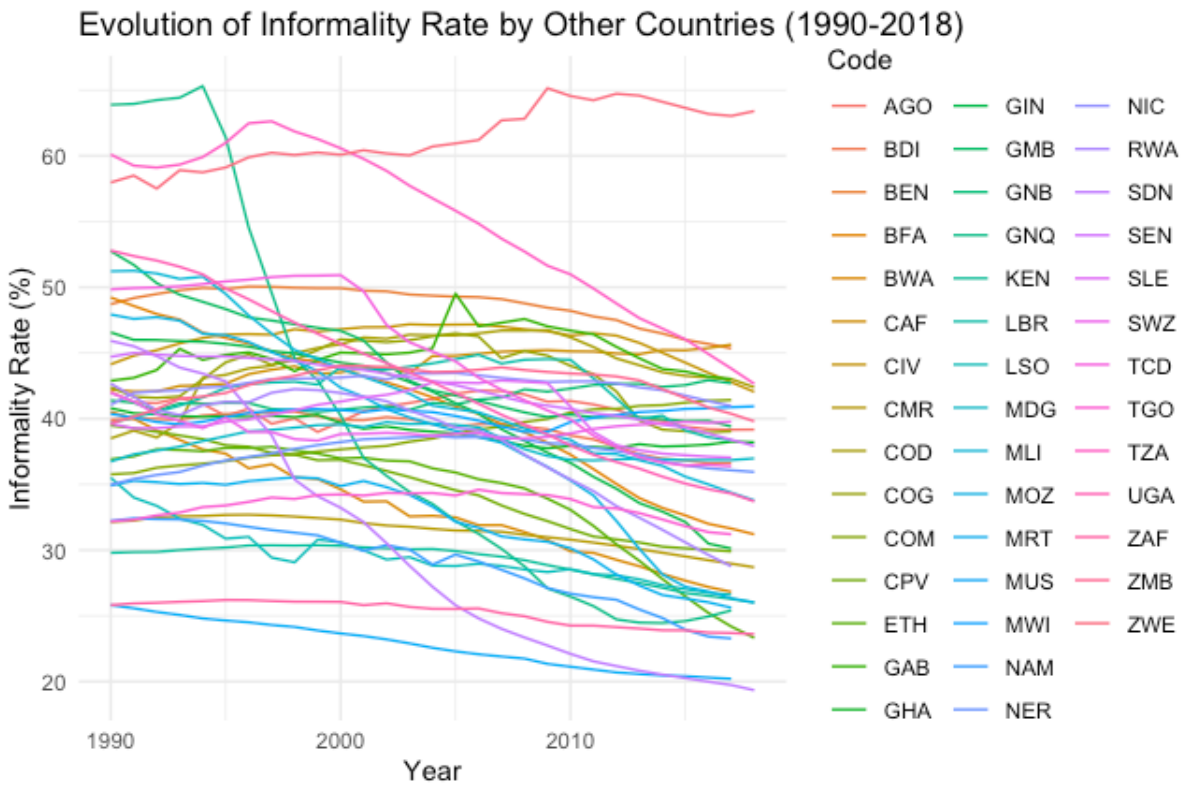
Source: The World Bank (2021)

We can clearly notice different trends on this graph. The first being a general decline in the informality rate for nearly every country. With some decreases more important than others, for example, if we take a look at Panama and Salvador, that respectively dropped from 65.8% in 1990 to 46% in 2017 and 49.7% in 1990 to 40.8% in 2017 (Note that these two countries do not have data for 2018 but we can assume that it follows the same trend). Those countries have respectively witnessed a decline of 30% and 41%. Other countries have had a different scenario, like Nicaragua, for example. This country has first witnessed a rise in informality, with a peak at 43.5% in 2005. The rate has dropped since to 41% which is approximately the same level as in 1990.

Another trend out of this graph is the formation of two groups of countries. The first being composed of Costa Rica and Mexico that have significant lower informality rates as the second group composed by the other countries. Furthermore, Costa Rica and Mexico have experienced a decline in their informality rate as well, from 31.2% in 1990 to 27.4% in 2018 for Mexico and from 27.8% in 1990 to 21.1% in 2018 for Costa Rica. This last country is now closer to the average of Europe than the average of Central America.

Sub-Saharan Africa

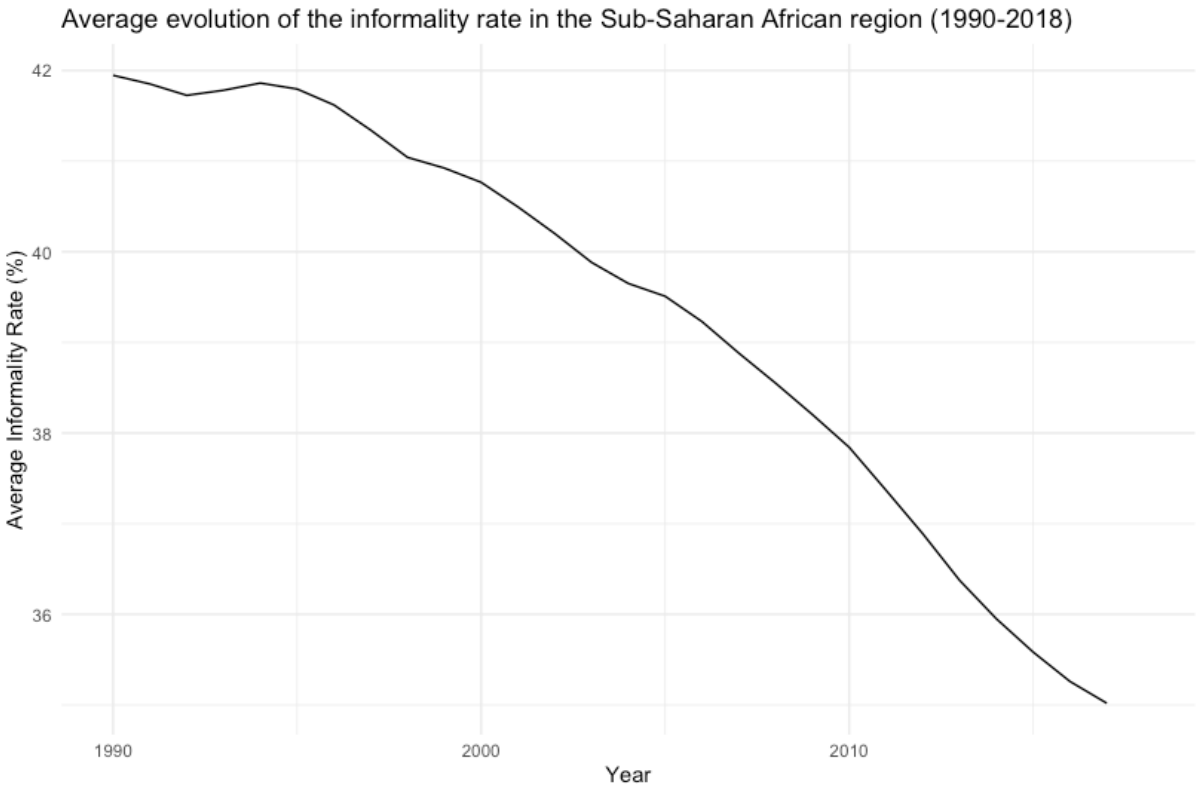
We will now analyze the results for our second group of countries. This group is composed of the majority of countries out of our sample hence, graphics might not be very easy to interpret at first like the following graph.



Source: The World Bank (2021)

The graph clearly illustrates that, with only a few exceptions, the overall trend in this geographical region is a decline in the informality rate. This observation can be confirmed with the findings from the first bar chart discussed in this chapter, as well as the following graph showing the average evolution of the informality rate in sub-Saharan Africa. The data supports the fact that informality is on a downward trajectory in the region, this could be due to progress in formalizing economic activities and addressing the challenges associated with informal sectors. However, some countries like Equatorial Guinea have decreased their informality rate from 63.9% to 25.4% over the same period, which is the biggest decline in all our sample and constitutes a drop of 60%. We can also point out the case of Zimbabwe. One of the few countries that have seen its informality rate increase over the past 30 years. Going from 58% in 1990 to 63.4% in 2018. Note that like Costa Rica for the Central American region, some countries from

the sub-Saharan African group have an informality rate in 2018 at the same level as European countries. For example, Mauritius, Sudan, Namibia.



Source: The World Bank (2021)

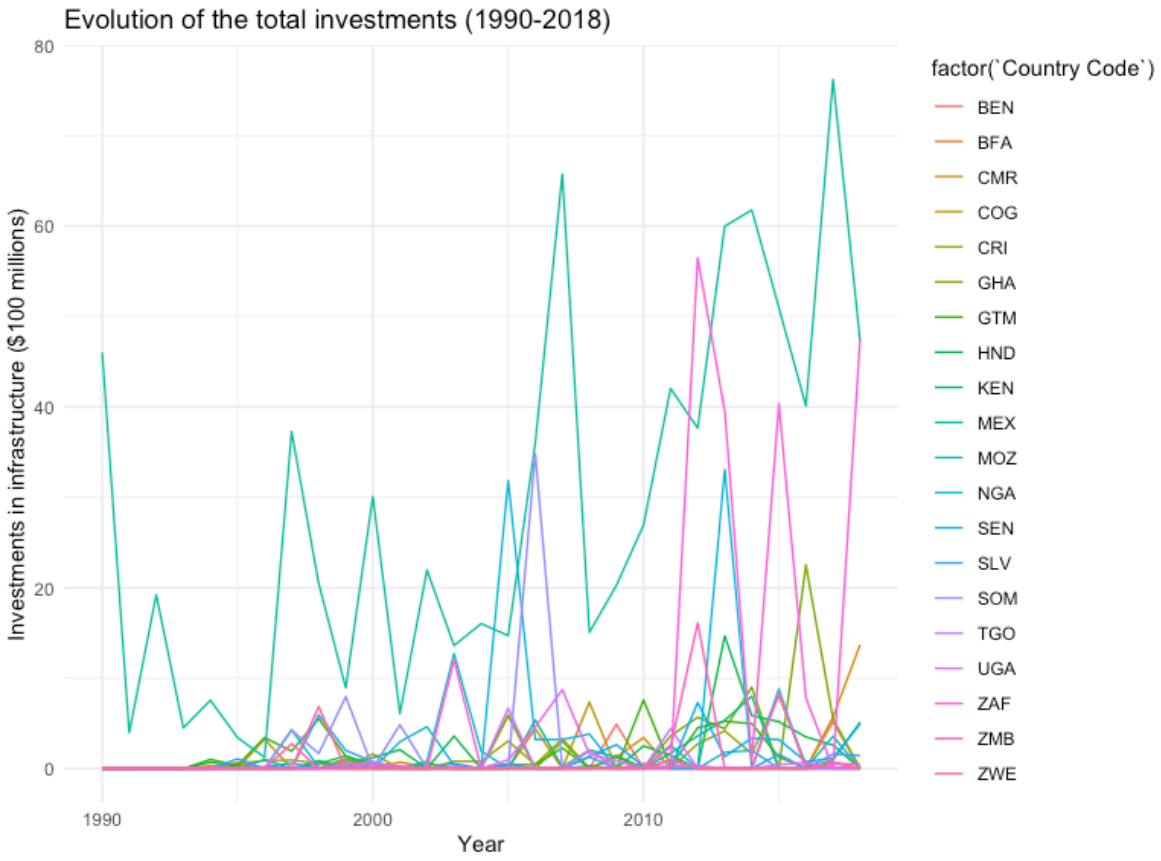
In our analysis over two geographically distinct groups and a total of 51 countries, the main trend is a reduction in informality rates, except for a few notable exceptions we discussed earlier. This overarching observation highlights a significant shift in developing countries towards formalization over the course of the past three decades. Throughout our study, we have observed varying degrees of decline in informality, with some countries experiencing more substantial decreases than others. This diversity in outcomes suggests that the process of formalization is not uniform and may be influenced by different factors depending on each country. The data points to a future path of formalization across developing countries, meaning potential economic and social advancements.

This analysis could contribute to the growing body of knowledge on informality dynamics and provides valuable insights into the global trend of shifting towards formalization in the studied countries. Understanding these trends will help us analyze the possible correlation that we will discuss later.

B. Results on the evolution of the investments in infrastructure

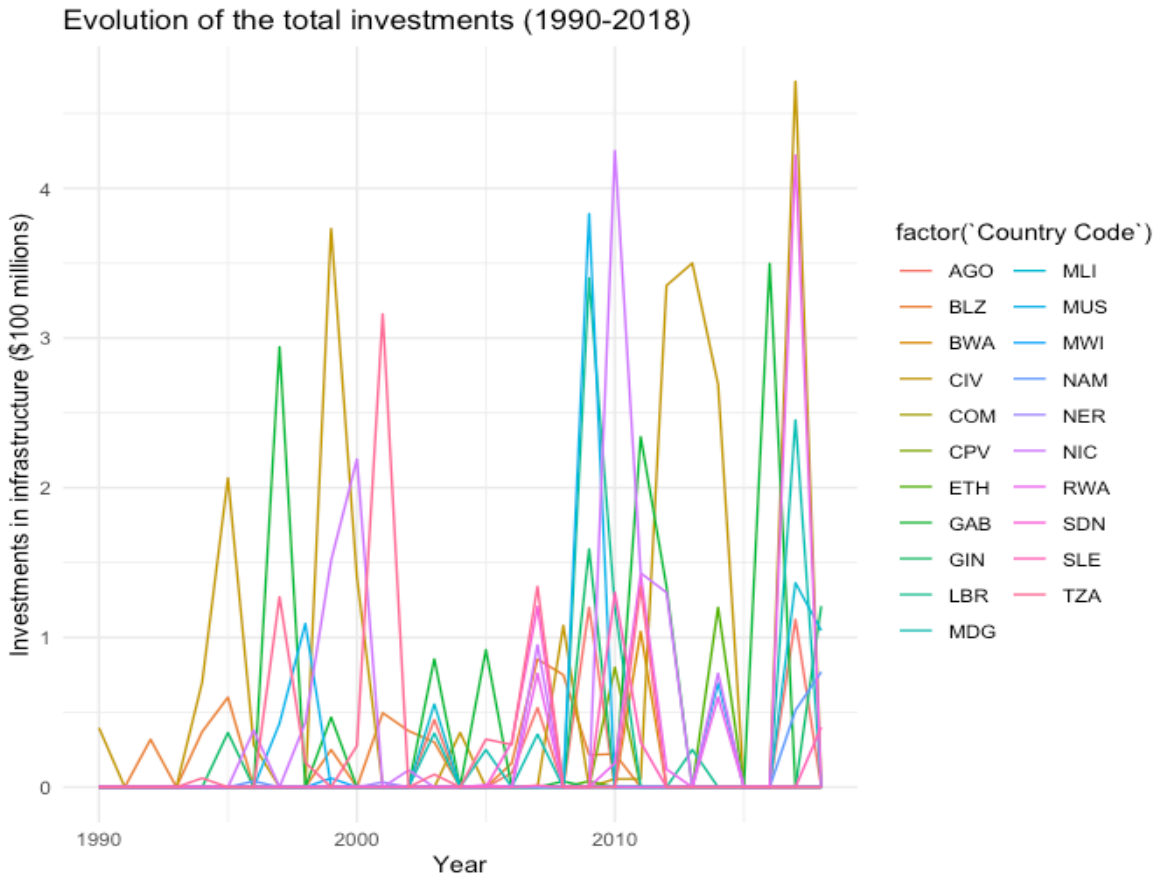
We will now tackle the evolution of the infrastructure in the countries in our study. To make the data more accessible and facilitate the examination, we have divided our datasets into two parts based on the varying amounts of investments made by each country. This approach enables us to analyze the evolution of infrastructure investments more deeply, as some countries have large differences in their investment amounts due to various factors. To illustrate the trends in infrastructure investments, we have created two graphs. These graphs show the evolution of total investments in infrastructure from 1990 to 2018. Analyzing the graphs allows us to understand the different levels of investments in infrastructure across the countries in our sample. It also enables us to understand how infrastructure levels changed over the period studied

This first graph regroups countries that have higher amounts of investments.



Source: The World Bank (2023)

This second graph regroups countries that have lower amounts of investments.



Source: The World Bank (2023)

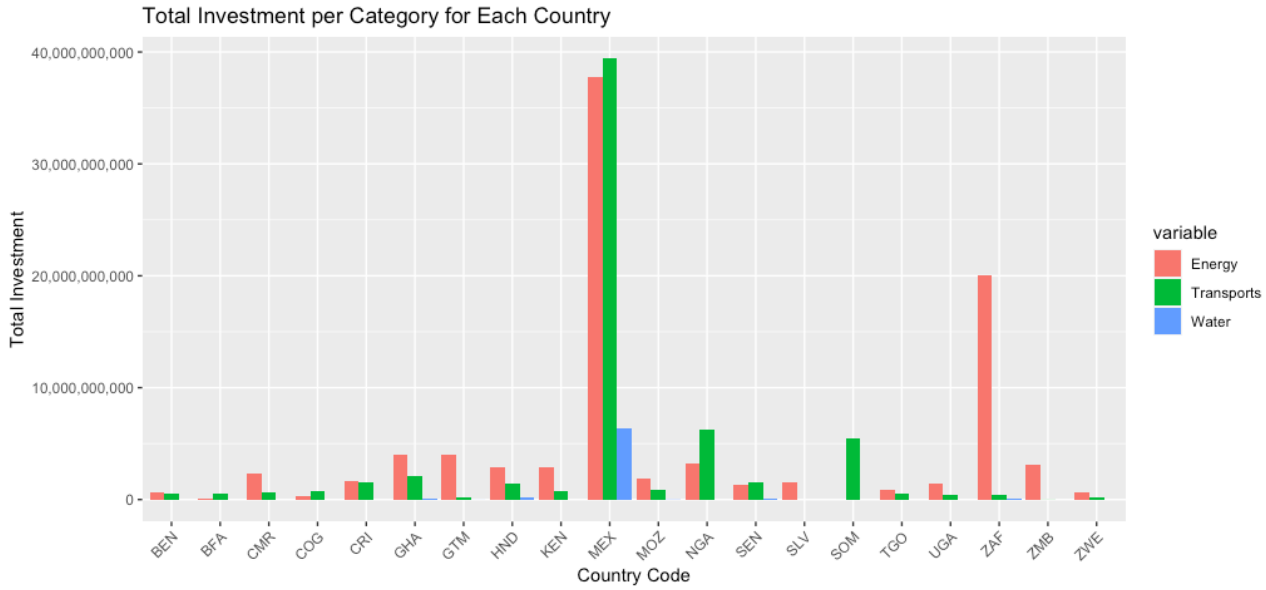
While analyzing the graphs depicting infrastructure investments, a notable observation is that the investments are not continuous for each country. Instead, we observe fluctuations in the amounts of investments over the years. These variations signify that different countries have experienced diverse trajectories in terms of infrastructure spending.

This fluctuation in investments can be attributed to various factors, including the political situations in each country. For instance, let's consider the case of Mexico. While it stands out as the country with the highest overall investments from 1990 to 2018, we can see that there is no pattern in its investment history. In 1990, the amount spent was only $120 million lower than the amount spent in 2018. However, the country experienced peaks in its investments over the years, with a notable high of $7.6 billion in 2017 compared to the year 1996 during which the country only invested for $1.2 billion in its infrastructure.

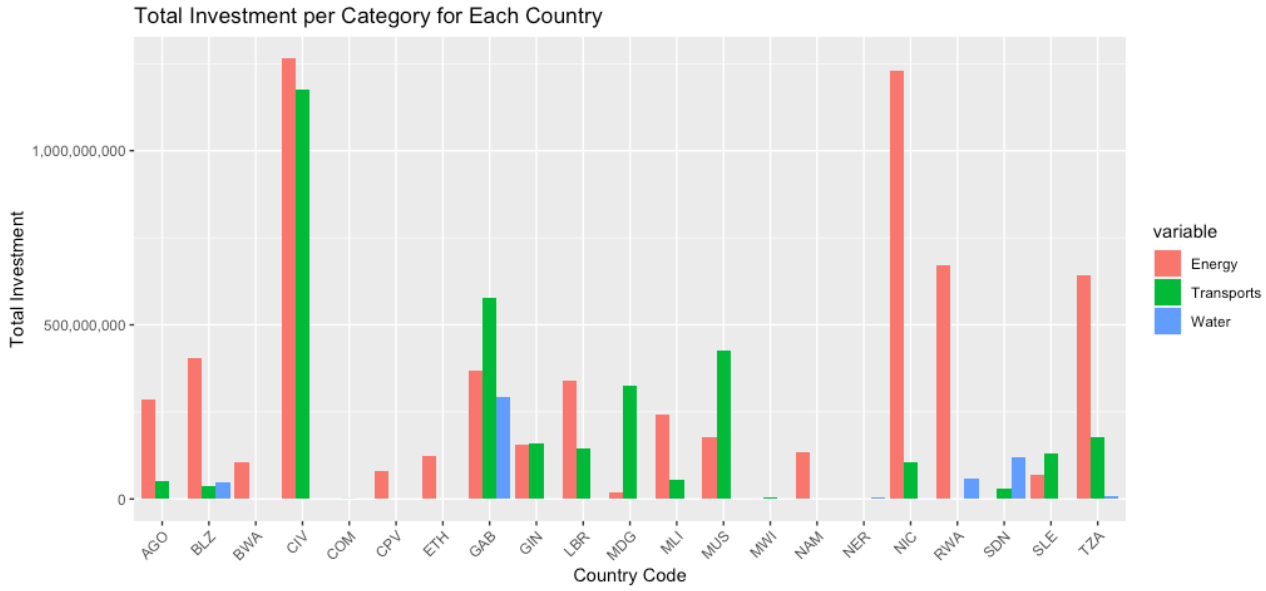
Such fluctuations in investment patterns highlight the dynamic nature of infrastructure development in each country. Understanding these variations can provide valuable insights into

the drivers behind infrastructure spending and the implications for a nation's economic and social progress. Our analysis seeks to shed light on the significance of infrastructure spending in fueling economic growth and reducing informality.

The following graphs depict the sectors in which each country invests the most. As said previously (Cf. P21) we decided to focus on three main categories of investments. The investments in energy, transports, and water. The amount of investment per country is the sum of the investments per category for the period 1990 till 2018.

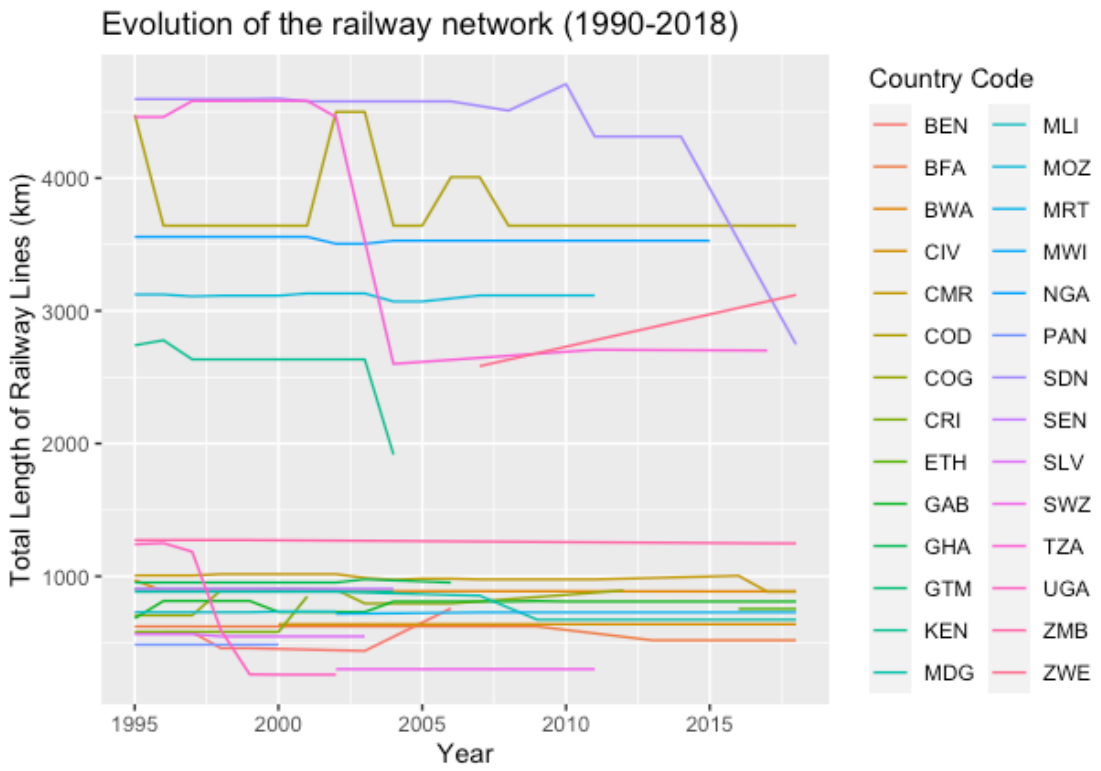


Source: The World Bank (2023)



Source: The World Bank (2023)

Based on the insights from the two charts, it becomes clear that a significant portion of the investments made over the years has been directed towards the energy category. This allocation of funds highlights the importance of energy infrastructure in the countries studied. The second category that received the most investments across our sample is the transport sector, this broad term includes various modes of transportation such as fluvial, railway, truck transport, and air transport. Because the data of the World Bank does not allow us to precisely determine the nature of these transportations, we can see on a dataset provided by the institution the evolution of railroads across the countries in our sample. The graph depicting the evolution of the railway network across these countries reveals that, on a global scale, there has been no significant increase in the total kilometers of railway network over the years. This finding suggests that the railway infrastructure has not been a priority during the observed period. Hence, we can assume that the countries studied prioritize other means of transportation.



Source: The World Bank (2023)

The bar charts representing the categories of investments offer interesting observations, showing that there is no uniform pattern for countries to follow in terms of allocation. Each country seems to have its unique approach to infrastructure investment. For instance, we find countries like Mexico that prioritize investments in the transport sector over energy. This

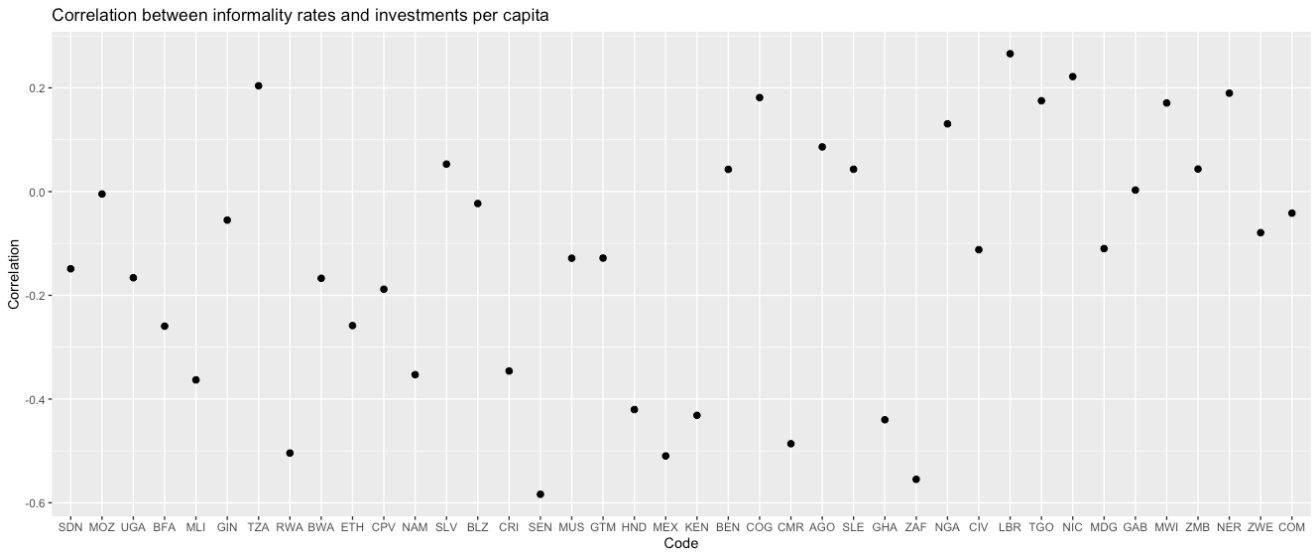
indicates diverse strategies in addressing their infrastructure needs, with some nations directing more resources towards transportation development. However, when it comes to investments in water and sanitation, we notice a distinct pattern.

Among the countries in our sample, Sudan emerges as the only nation that has made this category its priority. This singular focus on water and sanitation investments by Sudan stands out as an exception, this could mean that the nation is dedicated to address critical issues related to clean water access and sanitation facilities. The variations in investment patterns among countries highlights the complexities and multifaceted nature of infrastructure development decisions. Factors such as national priorities, economic conditions, and environmental considerations all play significant roles in shaping investment strategies.

C. Results on the Pearson correlation

We have seen the different evolutions of our factors, now we will discuss the results of our calculations. The graph displays the outcomes of our Pearson correlation calculations, examining the relationship between the evolution of informality and total investments per capita made from 1990 to 2018. Notably, the countries depicted on the chart are arranged in order of the variation in their informality rates during this period. Sudan occupies the top position on the chart, indicating the country's substantial decrease in informality rate, making it the most significant improvement observed among the studied countries. On the other hand, the Comoros is positioned at the other end, signaling an increase of 5.7% in its informality rate over the same period.

Note that for the correlation calculation we divided the total amount of investment by the countries' populations. This will allow us to strength our calculations by excluding the size of the countries and their populations out of our variable without changing the patterns in investments that we described earlier.



Source: The World Bank (2021 and 2023)

In our results, the graph presenting the results shows the various correlations observed within our sample. Upon analyzing the results, we find no visible pattern concerning the outcomes which indicates that there is no global correlation between the decrease in informality and the amount of investment per capita spent on infrastructure. These findings need to be discussed in a deeper analyze to understand the relationships between the factors.

Upon closer examination, we observe distinctive patterns within individual countries. For countries like Mexico, Senegal, South Africa, and Cameroon, we discern a noteworthy trend, namely a decline in informality rates coinciding with an increase in infrastructure investments. These cases exhibit a negative correlation above 0.50, signifying a substantial linkage between these two factors.

On the other hand, countries like Tanzania, El Salvador, and Nicaragua display a positive correlation between the two variables. While the informality rate decreased, the amount of investments over the years also decreased. However, it is crucial to note that the positive correlation in these instances is under 0.25, except for Liberia, where it equals 0.26. This indicates that the strength of these correlations is not significant, yet it is contrast with the previously mentioned countries' results.

These complex and divergent results prompt us to carefully reject our initial hypothesis, which posited that the informality rate would drop if the amount of investment increased. With the

data revealing contrasting scenarios for different countries, we are obliged to reconsider our assumptions and draw more nuanced conclusions.

These findings call for a deeper analysis of the intricate dynamics influencing informality and infrastructure investments in individual countries. The interplay of economic, social, political, and institutional factors may contribute to the observed variations in these relationships.

As we progress in our thesis, by critically evaluating our results and considering the broader implications, we strive to contribute meaningful insights to the existing body of knowledge on informality dynamics and infrastructure development. Our research seeks to enrich the discourse on economic growth and informality reduction strategies, fostering evidence-based policymaking to create sustainable and inclusive economic environments in the countries under study.

D. Analysis of the results, recommendations, and limitations

In our analysis, it became evident that the evolution of informality in various countries across the globe exhibited a strikingly similar pattern within our carefully chosen sample. While there were a few exceptions to this trend, a noticeable and consistent output of informality, in terms of percentage of the GDP, indicated a prevalent decrease in developing countries. This intriguing finding resonated with our previous research in the existing literature, where we established that informality decreased in these regions.

Delving deeper into the data, we found that the decline in informality was not uniform across all countries; rather, it exhibited nuanced variations depending on each nation's unique circumstances. Despite our initial expectations, we were astonished to discover that geography appeared to play a minimal role in influencing this phenomenon. Our sample comprised countries from two distinctive and geographically distant parts of the world, but our results unveiled no significant advantage for either region. This realization was particularly surprising, as we anticipated that regional factors might exert a more pronounced influence on informality trends.

Nonetheless, the trend of declining informality was present globally, which led us to identify the possible factors behind this phenomenon. Among these multiple factors stated in the literature review, we could not identify structural factors such as development.

Furthermore, governmental policies aimed at formalizing the economy may also have played a crucial role in fueling this observed decline in informality. In recent years, several scientists emphasized policy reforms, such as improved labor regulations, enhanced social protection systems, and increased access to formal financial services. These policy interventions may have encouraged workers and businesses alike to transition from informal to formal economic activities, contributing to the observed global reduction in informality. But we aimed to discover the role of infrastructure development in this decrease.

Hence, we studied the evolution of the infrastructure in our sample of 51 countries. To narrow our analysis and make it feasible we focused on three main sectors of infrastructure namely energy, transports, and water and sanitation. These three sectors seemed to be the most important in the economic and social development of a country. We discovered that the investments in nearly every country were rather cyclical, this could be due to the different economic cycles. Apart from a few exceptions, such as in Mexico, there is not a single country that had invested consistently during the period of 1990 to 2018. This could be due to a lack of data from the World Bank, or for political or other specific reasons for each country.

Yet some trends appeared in the data we analyzed on the investments. It seemed to us that most countries were investing in energy and transport and tended to underinvest in water and sanitation infrastructure. This was well described in the graphs, and no link was discovered between the total amount of investment and its distribution. Furthermore, in terms of amounts of investments, there was no visible pattern as well. Each country had its own politics and invested different amounts in its infrastructure.

This led us to our calculation on a possible link between the drop in informality and the investments in infrastructure. As stated previously, we rejected our hypothesis based on the inconsistent results of the Pearson correlation we obtained. Indeed, for some countries, the level of investment had an impact on the informality rate. This indicated by a negative correlation between those two factors over the time. It appeared that it was not true for every country in our sample and most of them showed a low negative correlation, under -0.25. Furthermore,

some other countries that have seen their informality rate drop as well had a positive correlation between those two factors, yet under 0.25 which does not indicate a strong correlation. This means that for example Togo, a country that reduced its informality rate by only 1%, the total investments of about $1.37 billion did not play a role in this decrease on the contrary.

Our findings strongly suggest that policymakers should prioritize investments in infrastructure due to its undeniable positive impact on the local population. Improved infrastructure can enhance the quality of life, promote economic development, and address various social challenges. However, it is important to acknowledge that while infrastructure development is crucial for societal well-being, it may not directly contribute to the formalization of the economy. Policymakers must adopt a multi-faceted approach that includes targeted strategies suggested by other scientific literature to address informal economic practices and encourage the transition to formal employment and businesses.

It is important to acknowledge the limitations of this thesis. We are fully aware that the data used for this empirical study was provided by a trustful organization, yet it can include some errors for various reasons. Furthermore, the sample studied covered a large panel of countries but not all developing countries, which may make these recommendations not applicable for every country. Further research on the phenomenon is needed to fully understand the multiple factors of informality and the role of development in this phenomenon. We also reckon that informality is not always a choice for people, but rather a need for some local population to live in dignity. The social aspects of informality need to be taken into consideration while making political decision.

Conclusion

After having described what the informal economy was and discovered its causes and consequences, according to the existing literature, we dug deeper into the subject with an empirical analysis. In this analysis, we wanted to discover a possible linkage between the informal economy and the development of the countries. To do so, we analyzed first the evolution of the informality rates in our sample of 51 countries. Countries were chosen in two specific geographical regions, namely Central America and sub-Saharan Africa. The results were globally the same for each country and indicated a decline of the informality as a percentage of the GDP. We then analyzed the evolution of the development of the countries by focusing on investments in three infrastructure categories: energy, transports, and water and sanitation. We then calculated a possible correlation between these two evolutions.

Out of this analysis it appeared that while there is for some countries a strong correlation between their development and the decrease of informality, this indicated by a correlation below -0.5. Some other countries showed no strong correlation or even a weak positive correlation, suggesting that there was no real link between our two factors. Hence, we were obliged to reject our hypothesis. We can assume that although it is evident that the developing countries have known a growing formalization of their economies, this phenomenon is due to other factors than their infrastructural development.

These results need to be put into perspective because of the limitations of this thesis. Indeed, the countries studied are from specific geographical regions. Hence, it is excluding other developing countries that could have given interesting results. Furthermore, it was difficult to gather enough credible information on the investment to strongly affirm the non-existing correlations of our two factors. Further research could be provided on the subject. We also want to remember that although the calculations of the World Bank on the informality rates were scientifically worthy to be studied, it will remain impossible to know the exact output of informality because it is intrinsically linked to the absence of information and exhaustive data. Hence, the rates are only estimates. We would however recommend the policymakers to continue to invest in the development of the countries' infrastructures as it clearly improves the quality of life of millions of their citizens according to Calderón, C., & Servén, L. (2014). Furthermore, while formalizing the economy brings undeniable benefits for an economy,

country, population, this phenomenon is impossible to eradicate and will always be part of our living. The policymakers should remember that it will allow people to survive.

This thesis should contribute to the existing literature on the subject and provide a new perspective on the phenomenon. Further research can be made on the other possible causes of informality, or the evolution of the informality rates during the pandemic of Covid-19.

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Appendices

Annex 1: Country codes

Angola	AGO	Kenya	KEN
Belize	BLZ	Lesotho	LSO
Benin	BEN	Liberia	LBR
Botswana	BWA	Madagascar	MDG
Burkina Faso	BFA	Malawi	MWI
Burundi	BDI	Mali	MLI
Cabo Verde	CPV	Mauritania	MRT
Cameroon	CMR	Mauritius	MUS
Central African Republic	CAF	Mexico	MEX
Chad	TCD	Mozambique	MOZ
Comoros	COM	Namibia	NAM
Congo, Dem. Rep.	COD	Nicaragua	NIC
Congo, Rep.	COG	Niger	NER
Costa Rica	CRI	Nigeria	NGA
Cote d'Ivoire	CIV	Panama	PAN
El Salvador	SLV	Rwanda	RWA
Equatorial Guinea	GNQ	Senegal	SEN
Eswatini	SWZ	Sierra Leone	SLE
Ethiopia	ETH	South Africa	ZAF
Gabon	GAB	Sudan	SDN
Gambia, The	GMB	Tanzania	TZA
Ghana	GHA	Togo	TGO
Guatemala	GTM	Uganda	UGA
Guinea	GIN	Zambia	ZMB
Guinea-Bissau	GNB	Zimbabwe	ZWE
Honduras	HND		

Annex 2: Evolution of informality 1990 till 2004

Code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AGO	42,0	41,3	41,2	41,6	41,1	40,2	40,8	39,6	40,0	39,0	39,8	40,6	40,9	41,2	41,5
BLZ	46,9	45,9	43,8	43,4	43,0	42,7	42,4	42,6	42,6	42,7	42,3	41,9	41,5	41,6	41,8
BEN	48,7	49,2	49,5	49,8	49,9	49,9	50,1	50,0	50,0	49,9	49,9	49,7	49,7	49,4	49,4
BWA	40,5	40,0	39,1	38,4	37,7	37,3	36,2	36,5	35,5	35,4	34,6	33,7	33,7	32,6	32,6
BFA	49,2	48,6	48,0	47,5	46,5	46,1	45,7	45,1	44,6	44,3	43,8	43,2	42,8	42,2	41,6
BDI	39,9	40,0	40,0	39,9	40,2	40,4	40,4	40,5	40,5	40,2	39,9	39,9	40,1	40,0	39,6
CPV	39,5	39,3	39,0	38,7	38,4	38,0	37,9	37,4	37,3	36,8	36,9	36,5	36,0	35,6	35,0
CMR	32,1	32,2	32,5	32,6	32,6	32,7	32,7	32,6	32,6	32,4	32,3	32,1	31,9	31,8	31,6
CAF	42,2	42,1	42,1	42,5	42,5	42,7	43,4	43,7	44,0	43,4	43,5	43,8	43,9	43,5	44,8
TCD	49,8	49,9	50,0	50,1	50,2	50,4	50,6	50,8	50,9	50,9	50,9	49,7	47,1	45,8	45,1
COM	35,8	35,9	36,3	36,4	36,6	36,8	37,0	37,2	37,3	37,5	37,7	37,8	37,9	38,2	38,5
COD	38,5	39,1	38,6	39,7	43,1	43,3	43,8	44,0	45,0	45,4	45,7	46,2	46,1	46,4	46,3
COG	42,4	41,7	41,6	41,7	43,0	44,3	44,9	44,1	44,5	45,2	46,0	45,9	45,8	46,0	46,3
CRI	27,8	27,5	27,3	27,1	26,9	26,6	26,2	26,1	25,9	25,5	25,2	25,1	24,9	24,7	24,4
CIV	44,1	44,8	45,2	45,7	46,1	46,4	46,4	46,4	46,8	46,6	46,8	47,0	47,0	47,2	47,1
SLV	49,7	49,7	49,5	49,4	49,1	48,3	47,8	47,2	46,9	46,4	45,8	45,3	44,7	44,4	43,9
GNQ	63,9	63,9	64,2	64,4	65,3	61,4	54,5	49,6	44,6	42,9	40,2	37,0	35,7	34,4	33,5
SWZ	42,0	41,3	40,3	39,8	39,3	40,1	39,0	39,0	38,4	38,3	38,8	38,9	38,9	38,8	38,7
ETH	36,9	37,1	37,7	37,6	37,5	37,8	37,8	37,9	37,6	37,3	37,0	37,0	36,8	36,8	36,2
GAB	42,9	43,1	43,7	45,3	44,5	44,9	45,0	44,5	43,6	44,5	45,0	45,0	44,9	45,0	45,4
GMB	52,8	51,7	50,3	49,4	48,9	48,3	47,7	47,5	47,2	46,9	46,7	45,9	44,3	42,9	42,1
GHA	40,8	40,4	40,3	40,2	40,1	40,2	40,1	40,2	40,1	40,3	39,7	39,2	39,4	39,2	39,0
GTM	51,5	51,6	51,4	51,2	51,1	50,7	50,6	50,2	49,6	49,0	48,8	48,7	48,3	48,1	48,1
GIN	46,6	46,0	46,0	45,9	45,9	45,7	45,5	45,1	45,0	44,6	44,3	44,0	43,4	42,8	42,1
GNB	41,4	41,2	40,6	41,2	41,1	41,2	41,2	40,7	40,7	40,5	40,7	40,9	40,9	40,7	41,2
HND	47,9	50,7	50,6	50,5	49,8	49,1	49,0	48,8	48,2	47,9	47,4	46,8	46,7	46,4	45,8
KEN	29,8	29,8	29,9	30,0	30,1	30,2	30,4	30,4	30,3	30,4	30,3	30,2	30,1	30,1	30,1
LSO	35,5	34,0	33,4	32,4	31,9	30,9	31,0	29,4	29,1	30,8	30,6	30,0	29,3	29,5	28,8
LBR	39,7	40,1	40,5	41,0	41,6	42,3	42,6	42,8	42,8	42,6	43,9	43,8	43,7	44,0	44,2
MDG	36,7	37,3	37,6	37,9	38,3	38,7	39,0	39,1	39,3	39,5	39,6	39,4	39,7	39,6	39,6
MWI	40,4	40,1	39,8	39,6	39,8	40,1	40,4	40,6	40,7	40,7	40,7	40,5	40,7	40,6	40,5
MLI	51,2	51,3	51,0	50,6	50,8	49,5	47,9	46,5	45,2	44,5	43,8	43,2	42,6	41,9	41,0
MRT	34,9	35,3	35,2	35,0	35,1	35,0	35,3	35,4	35,5	35,5	34,9	35,3	34,8	34,2	33,3
MUS	25,8	25,6	25,3	25,1	24,8	24,6	24,5	24,3	24,2	23,9	23,7	23,5	23,2	22,9	22,6
MEX	31,2	31,0	30,9	30,8	30,7	30,4	30,4	30,5	30,4	30,1	29,9	29,7	29,6	29,4	29,4
MOZ	47,9	47,6	47,7	47,5	46,5	46,4	45,8	45,1	44,4	43,6	42,4	41,7	40,7	40,1	39,6
NAM	32,2	32,4	32,4	32,3	32,2	32,0	31,8	31,5	31,3	31,1	30,6	29,9	30,4	30,0	28,9
NIC	41,1	42,0	42,1	42,1	42,4	42,5	42,7	43,0	43,1	43,1	43,1	43,3	43,0	43,4	43,4
NER	35,0	35,4	35,7	35,9	36,4	36,8	37,1	37,4	37,7	38,0	38,2	38,4	38,5	38,6	38,7
NGA	50,5	50,6	50,8	50,8	50,9	51,2	51,6	51,8	52,1	52,6	52,5	53,0	53,7	54,1	53,7
PAN	65,8	66,1	66,6	65,9	65,0	64,1	63,3	62,9	62,1	61,4	60,5	60,4	60,6	60,6	60,5
RWA	42,7	41,7	40,6	40,3	41,0	41,3	41,3	42,0	42,2	42,2	42,0	41,7	41,3	40,6	40,0
SEN	44,7	45,0	44,9	44,8	44,7	44,7	44,6	44,5	44,4	44,1	43,9	43,7	43,4	43,1	42,9
SLE	39,6	39,3	39,3	39,4	39,4	39,8	39,9	40,3	40,6	41,1	41,3	41,6	41,8	42,2	42,8
ZAF	25,8	25,9	26,0	26,1	26,1	26,2	26,2	26,1	26,1	26,1	26,1	25,8	26,0	25,7	25,5
SDN	45,9	45,5	44,8	43,9	43,4	42,8	40,7	38,7	35,4	34,1	33,2	32,1	30,5	28,8	27,2
TZA	60,1	59,3	59,1	59,3	59,9	61,0	62,5	62,6	61,9	61,3	60,6	59,8	58,9	57,7	56,8
TGO	32,2	32,3	32,6	32,9	33,3	33,4	33,7	34,0	33,9	34,2	34,2	34,2	34,4	34,3	34,3
UGA	52,8	52,4	52,0	51,6	51,0	49,9	49,1	48,2	47,3	46,5	45,7	44,9	44,2	43,5	42,8
ZMB	39,6	40,1	40,7	41,5	41,7	42,0	42,6	43,0	43,3	43,7	44,0	44,0	43,9	43,8	43,5
ZWE	58,0	58,5	57,5	58,9	58,7	59,1	59,9	60,2	60,1	60,3	60,1	60,4	60,2	60,0	60,7

(The World Bank 2023)

Annex 3: Evolution of informality 2005 till 2018

Code	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AGO	41,9	42,1	42,1	41,8	41,3	41,4	41,1	40,7	40,0	39,8	39,4	39,2	39,2	39,2
BLZ	41,6	41,8	42,0	41,6	41,5	41,7	41,9	41,8	41,8	41,5	41,0	40,7	40,0	
BEN	49,3	49,2	49,1	48,8	48,4	48,2	47,8	47,5	46,9	46,5	46,0	45,7	45,3	
BWA	32,5	31,9	31,9	31,4	30,8	29,9	29,8	29,3	28,8	28,2	27,7	27,2	26,8	
BFA	40,9	40,4	39,6	39,0	38,2	37,3	36,2	35,0	34,0	33,2	32,6	32,0	31,6	31,2
BDI	39,4	39,6	39,6	39,4	39,2	38,7	38,4	37,9	37,3	37,0	36,8	36,6	36,6	
CPV	34,6	34,2	33,4	32,8	32,2	31,6	31,0	30,8	30,6	30,3	30,1	30,0	29,9	
CMR	31,5	31,5	31,4	31,2	31,0	30,8	30,6	30,3	30,1	29,8	29,5	29,2	29,0	28,7
CAF	44,8	44,9	45,1	45,2	45,2	45,1	45,1	45,0	44,9	45,2	45,2	45,4	45,6	
TCD	44,4	43,1	42,2	41,4	40,6	40,0	38,7	37,8	37,1	36,7	36,4	36,5	36,4	
COM	38,9	39,2	39,4	39,7	40,0	40,5	40,7	40,8	41,0	41,0	41,2	41,4	41,4	
COD	46,3	46,5	46,7	46,7	46,7	46,2	45,5	44,6	44,1	43,5	43,3	43,1	43,0	42,4
COG	46,5	46,3	44,6	45,2	44,8	44,0	43,4	42,1	39,9	39,2	39,0	39,0	39,0	
CRI	24,4	24,2	24,0	23,6	23,2	22,8	22,5	22,5	22,2	22,0	21,7	21,4	21,3	21,1
CIV	47,2	47,2	47,0	46,8	46,7	46,3	46,5	46,3	45,8	45,0	44,3	43,5	42,8	42,0
SLV	43,6	43,3	43,0	42,6	42,2	42,3	42,1	42,0	41,7	41,5	41,2	41,0	40,8	
GNQ	32,2	31,2	30,1	28,8	27,1	26,5	25,7	24,7	24,5	24,5	24,6	25,0	25,4	
SWZ	38,9	38,9	38,5	38,5	38,6	38,9	39,2	39,4	39,5	39,6	39,7	39,7	39,8	
ETH	35,9	35,4	35,1	34,7	33,9	33,1	31,8	30,4	29,2	27,8	26,5	25,2	24,2	23,3
GAB	49,5	47,0	47,3	47,6	47,0	46,7	46,4	45,5	44,6	43,8	43,6	43,2	43,0	
GMB	41,8	41,4	40,9	40,5	40,1	40,3	40,1	40,1	40,1	40,0	39,8	39,8	39,4	
GHA	38,9	38,6	38,3	37,9	37,8	37,9	37,9	37,8	38,1	37,9	37,9	38,0	38,3	38,2
GTM	48,4	48,4	47,9	47,5	47,3	47,1	47,1	47,8	47,1	47,2	47,1	47,2	47,1	47,0
GIN	41,2	40,4	39,2	38,3	37,4	36,6	35,6	34,7	33,6	32,9	32,1	30,5	30,1	
GNB	41,1	41,5	41,6	42,2	42,1	42,3	42,6	42,6	42,7	42,4	42,6	42,9	42,7	
HND	45,6	45,6	45,1	44,6	44,7	44,7	44,4	44,0	44,1	44,1	44,3	44,1	43,9	
KEN	29,9	29,7	29,5	29,2	28,9	28,5	28,2	27,8	27,5	27,1	26,7	26,5	26,3	26,0
LSO	28,8	29,0	28,8	28,8	28,3	28,6	28,2	28,1	27,8	27,3	27,0	26,8	26,6	
LBR	44,5	44,9	44,2	44,5	44,5	44,5	43,1	41,5	40,0	40,2	39,1	38,6	38,4	
MDG	39,5	39,3	38,5	37,7	37,2	36,9	36,8	36,9	37,0	36,9	36,9	36,9	36,9	37,0
MWI	40,2	39,9	39,4	39,0	39,0	39,7	40,1	40,3	40,5	40,6	40,7	40,8	40,9	40,9
MLI	40,7	40,5	39,9	39,2	38,8	38,4	37,4	37,3	36,8	36,4	35,6	35,0	34,4	33,8
MRT	32,2	31,7	31,0	30,8	30,6	30,1	29,3	28,1	27,3	26,6	26,3	26,0	25,6	
MUS	22,3	22,1	21,9	21,7	21,3	21,1	20,9	20,7	20,6	20,5	20,4	20,3	20,2	
MEX	29,2	29,1	28,8	28,5	28,2	28,3	28,1	28,1	28,0	27,9	27,8	27,6	27,5	27,4
MOZ	39,1	38,6	38,2	37,2	36,3	35,3	34,2	32,2	30,1	28,2	27,2	26,9	26,3	26,0
NAM	29,7	29,1	28,5	27,9	27,1	26,7	26,4	26,2	25,5	24,8	23,9	23,4	23,3	
NIC	43,5	43,3	43,1	42,9	42,8	42,8	42,8	42,7	42,4	42,2	41,8	41,3	41,0	
NER	38,6	38,6	38,6	38,4	38,1	38,1	37,8	37,5	37,3	36,8	36,4	36,2	36,1	35,9
NGA	53,6	53,0	52,8	52,6	52,2	51,5	50,9	50,5	50,1	49,4	49,1	49,0	48,6	48,2
PAN	60,5	60,0	59,0	58,0	57,7	56,5	55,1	53,8	52,2	50,3	48,9	47,5	46,0	
RWA	39,3	39,1	38,4	37,3	36,3	35,4	34,5	33,3	32,5	31,5	30,6	29,6	28,8	
SEN	42,6	42,1	41,7	41,3	41,0	40,7	40,4	40,2	39,9	39,6	39,3	38,9	38,4	37,9
SLE	42,7	42,7	42,9	42,8	42,7	40,9	39,0	38,0	37,6	37,3	37,2	37,1	37,0	
ZAF	25,5	25,6	25,2	25,0	24,5	24,3	24,3	24,1	24,0	23,9	23,9	23,7	23,7	23,6
SDN	25,8	24,8	24,0	23,4	22,7	22,1	21,5	21,2	20,8	20,5	20,3	20,0	19,7	19,3
TZA	55,8	54,8	53,7	52,7	51,6	51,0	49,9	48,8	47,6	46,9	46,0	44,9	43,8	42,6
TGO	34,2	34,6	34,3	34,3	34,2	33,9	33,3	33,2	32,8	32,3	31,8	31,4	31,2	
UGA	42,0	41,1	40,3	39,6	38,8	38,0	37,3	36,7	36,2	35,6	35,1	34,6	34,3	33,7
ZMB	43,6	43,7	43,9	43,7	43,6	43,4	43,4	43,2	42,9	42,2	41,6	40,9	40,4	39,8
ZWE	60,9	61,2	62,7	62,8	65,1	64,6	64,2	64,7	64,6	64,1	63,6	63,2	63,0	63,4

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Annex 4: Evolution of the investments in infrastructure (1990 to 2004)

Country Code	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
AGO	0	0	0	0	0	0	0	0	0	0	0	0	0	45000000	0
BLZ	0	0	31900000	0	37000000	60000000	0	0	0	25000000	0	49600000	37600000	30000000	0
BEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BWA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BFA	0	0	0	0	0	63300000	0	0	5600000	0	0	0	0	0	0
BDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CPV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CMR	0	0	0	0	30800000	0	0	0	0	90000000	0	70300000	21500000	0	0
CAF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TCD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COM	0	0	0	0	0	0	0	0	0	0	0	0	0	500000	0
COD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COG	0	0	0	0	0	0	325000000	0	0	0	0	0	0	0	0
CRI	0	0	5800000	0	15000000	58100000	85700000	92900000	58500000	3400000	161000000	0	0	80000000	80000000
CIV	39600000	0	0	0	70000000	206500000	28000000	0	0	37300000	140000000	0	0	0	36400000
SLV	0	0	0	0	0	106000000	0	0	59400000	20020000	75000000	10000000	0	0	0
GNQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SWZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ETH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GAB	0	0	0	0	0	0	0	29400000	0	46700000	0	0	0	85600000	0
GMB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GHA	0	0	0	0	0	0	0	0	0	11000000	10000000	0	0	0	0
GTM	0	0	0	0	100000000	34800000	342000000	192100000	550400000	137700000	50000000	0	60000000	0	0
GIN	0	0	0	0	0	36400000	0	0	0	0	0	0	0	0	0
GNB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HND	0	0	0	0	70000000	25300000	0	0	86800000	10500000	120000000	207900000	0	358800000	0
KEN	0	0	0	0	0	0	99000000	0	53400000	13900000	0	0	0	0	0
LSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LBR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MDG	0	0	0	0	0	0	0	0	0	0	0	0	0	36000000	0
MWI	0	0	0	0	0	0	0	0	0	6000000	0	0	0	0	0
MLI	0	0	0	0	0	0	0	0	0	0	0	0	0	55400000	0
MRT	0	0	0	0	0	0	0	42600000	109300000	0	0	0	0	0	0
MUS	0	0	0	0	0	0	0	3726300000	2045500000	892300000	300790000	606800000	2195400000	1359700000	1602300000
MEX	4603400000	395500000	1921800000	450600000	755000000	342320000	123600000	426000000	15000000	25500000	0	0	77700000	1270000000	192700000
MOZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NAM	0	0	0	0	0	0	4000000	0	0	1000000	0	0	0	0	0
NIC	0	0	0	0	0	0	38000000	0	43000000	15140000	21900000	0	11300000	0	0
NER	0	0	0	0	0	0	0	0	0	0	0	3400000	0	0	0
NGA	0	0	0	0	0	0	0	0	0	0	0	29500000	46200000	34000000	0
PAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RWA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SEN	0	0	0	0	0	0	20000000	59000000	0	65000000	0	0	0	55400000	0
SLE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ZAF	0	0	0	0	0	30000000	0	0	0	56900000	47200000	28400000	0	120000000	0
SDN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TZA	0	0	0	0	60000000	0	0	127000000	16500000	0	27690000	31600000	0	85000000	0
TGO	0	0	0	0	0	0	0	0	0	0	67700000	0	0	0	0
UGA	0	0	0	0	0	0	0	0	0	0	0	0	0	18100000	0
ZMB	0	0	0	0	0	0	0	27400000	0	0	0	3000000	0	15550000	0
ZWE	0	0	0	0	18000000	0	0	0	68500000	0	0	0	0	0	0

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Annex 5: Evolution of the investments in infrastructure (2005 to 2018)

Country Code	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
AGO	0	9400000	53000000	0	120000000	0	0	0	0	0	0	0	112000000	0
BLZ	0	16000000	85500000	75000000	21500000	22200000	0	0	0	0	0	0	0	0
BEN	59000000	0	0	0	48900000	0	0	0	0	0	0	0	0	0
BWA	0	0	0	0	0	0	104000000	0	0	0	0	0	0	0
BFA	0	0	0	0	0	0	0	0	0	0	0	0	51660000	0
BDI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CPV	0	0	0	0	0	80000000	0	0	0	0	0	0	0	0
CMR	0	440000000	0	0	126000000	342000000	0	0	0	0	0	0	568000000	1369420000
CAF	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TCD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COG	0	0	0	735000000	0	56000000	0	0	0	0	0	0	0	0
CRI	304200000	430000000	330000000	0	144000000	0	0	273000000	415600000	165000000	806000000	46000000	0	0
CIV	0	0	0	108000000	0	5500000	5500000	335000000	350000000	269000000	0	0	471300000	0
SLV	0	0	0	127400000	0	16000000	0	0	0	0	156740000	0	160000000	143000000
GNQ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SWZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ETH	0	0	0	0	4000000	0	0	0	0	120000000	0	0	0	0
GAB	91770000	0	0	3900000	0	0	234000000	134000000	0	0	0	349700000	0	0
GMB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GHA	590000000	0	300000000	0	140000000	0	360000000	566000000	440000000	900000000	0	2252000000	550000000	0
GTM	41600000	43500000	226800000	6700000	0	758000000	24000000	450000000	523000000	496700000	127500000	0	0	0
GIN	0	0	0	0	159000000	0	0	0	0	0	0	0	0	121000000
GNB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HND	0	0	0	30000000	0	250000000	144500000	0	1466100000	584800000	517900000	349300000	259600000	0
KEN	0	536500000	150000000	205000000	127000000	0	169700000	360000000	533970000	809400000	0	0	96890000	513920000
LSO	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LBR	0	0	0	0	340000000	120000000	0	0	2500000	0	0	0	0	0
MDG	25000000	0	35300000	0	0	0	0	0	0	0	0	0	245100000	0
MWI	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MLI	0	0	0	0	0	0	0	0	0	0	0	0	136440000	104500000
MRT	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MUS	0	0	0	0	383000000	0	0	0	0	69500000	0	0	0	0
MEX	1471300000	3598530000	6572900000	1505980000	2027040000	2692100000	4204000000	3765040000	5998650000	6177940000	5098600000	4009300000	762070000	4724310000
MOZ	0	0	0	0	0	0	0	0	178670000	200000000	0	0	357000000	0
NAM	0	0	0	0	0	0	0	0	0	0	0	0	51370000	77000000
NIC	0	0	95000000	0	0	425000000	143000000	130000000	0	76000000	0	0	0	0
NER	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NGA	3183440000	322140000	3200000000	3820000000	0	0	259400000	0	3307300000	0	880000000	0	70000000	0
PAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RWA	1580000	0	76000000	0	0	16000000	142000000	12000000	0	60100000	0	0	422000000	0
SEN	52910000	0	0	134000000	264000000	220000000	0	730000000	132000000	337000000	320150000	75510000	113900000	493600000
SLE	0	0	1180000	0	0	130000000	30000000	0	0	0	0	0	0	40000000
ZAF	7000000	9900000	0	0	0	6000000	0	5648610000	3951690000	870000000	4035440000	779400000	0	4755240000
SDN	0	30000000	1207000000	0	0	0	0	0	0	0	0	0	0	0
TZA	32000000	28400000	134000000	0	0	0	134100000	0	0	0	0	0	0	0
TGO	66690000	0	0	196000000	0	0	442000000	0	0	0	0	0	0	0
UGA	95830000	458800000	871800000	160000000	88000000	0	30000000	34000000	0	0	45400000	64040000	193000000	0
ZMB	0	0	0	0	0	0	239000000	1610000000	0	0	830000000	0	59000000	45000000
ZWE	0	0	0	0	0	0	97000000	0	0	0	0	0	65700000	0

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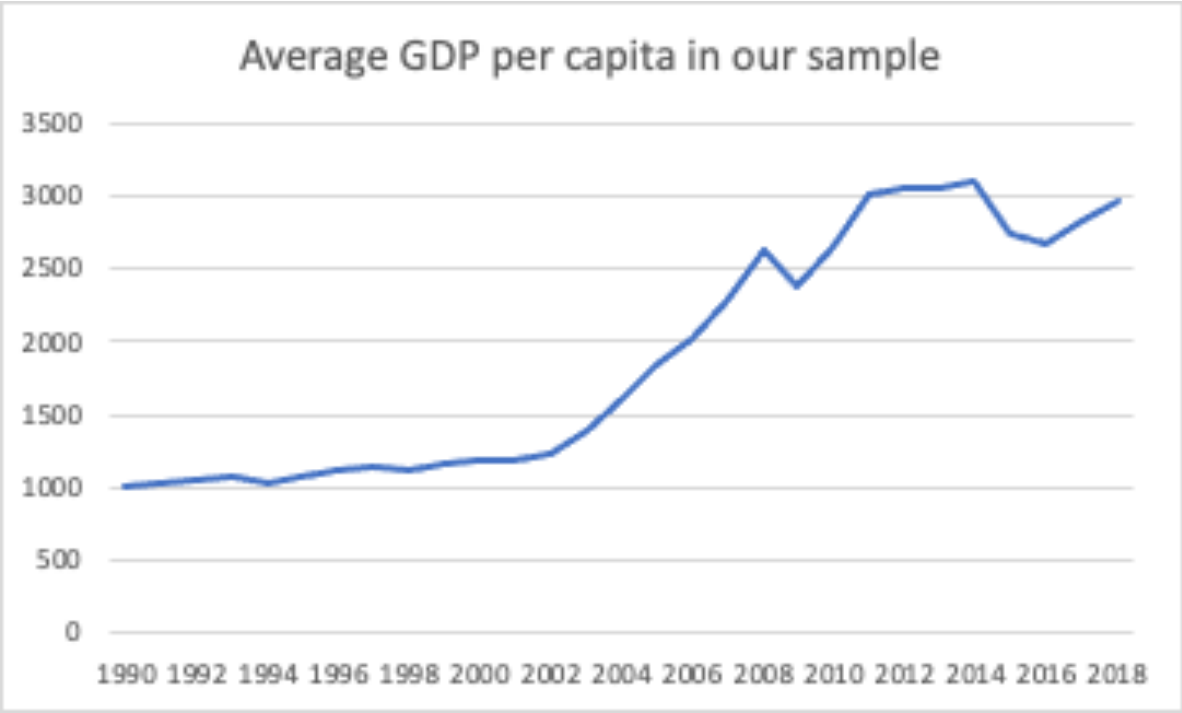
Annex 6: Evolution of the average GDP per capita in our sample



(The World Bank 2023)

While many countries achieved a successful development throughout the past decades, plenty of people still rely on odd jobs to survive. Addressing the informal economy should not only help those people out of poverty, but could be an important contributor in a country's development. This paper focuses on the role that infrastructure development could play as a solution to reduce the informality rates in developing countries. To address the subject, this thesis first states the existent scientific literature. Secondly, an empirical study is conducted to find out whether infrastructure development has played a role in the past 30 years in the formalization of developing countries.

UNIVERSITÉ CATHOLIQUE DE LOUVAIN
Louvain School of Management
Place des Doyens, 1 bte L2.01.01, 1348 Louvain-la-Neuve
Boulevard Emile Devreux 6, 6000 Charleroi, Belgique
Chaussée de Binche 151, 7000 Mons, Belgique
www.uclouvain.be/lsm