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Thesis

Financial Inclusion and Economic Growth

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Abstract

Even if the financial inclusion subject is a common and quite famous subject nowadays, it still is very interesting to analyze. The subject of this work is the impact of financial inclusion on economic growth. This work has for main purpose to show how important having a good financial inclusion is for a country and, moreover, it aims to identify how to reduce financial exclusion and what will be the impact of this reduction.

To answer these questions, this study first focuses on a large literature review on financial inclusion, explaining what it is, how to avoid being financially excluded, the main barriers to the financial services, their impacts and the solutions to the exclusion.

Secondly, based on this literature review and on data from the World Bank, we created a model measuring the financial impact on the production channel through total factor productivity and capital per worker. We highlighted an interesting relationship with surprising coefficients; the relation highlighted was different from our initial idea. We noticed that the financial inclusion impacted output per worker directly but also indirectly through capital per worker and total factor productivity. We also noticed that there was no relation between capital per worker and total factor productivity.

Moreover, with the relation we found, we drew a world map showing the countries financially excluded and financially included. Then we calculated the development dividend for financial inclusion deficit or surplus, and we found how the country production differs if the country has a neutral financial situation. This generated very interesting results, like Africa countries having a good financial situation and other, like European countries, having a financial deficit. Another example, the United States, which seems so powerful but it is in a financial deficit situation. Another deficit country is South Africa, it seemed be the most powerful country of Africa, but from a financial point of view, it is in a deficit situation.

We ended this work by explaining its limits and its possible solutions. It would be very interesting to use the coefficient found for each country and to try to calculate the impact of an enhancement of financial inclusion in each country's policies and to try to highlight what the country could do to reach this increase of financial inclusion.

Keywords: Financial inclusion, developing countries, total factor productivity, capital per worker and output per worker.

Résumé

Le sujet de ce travail vise à analyser l'impact de l'inclusion financière sur la croissance économique. Sujet courant et assez populaire de nos jours mais qui n'en reste pas moins intéressant. Ce mémoire démontre combien il est important pour un pays d'avoir une bonne inclusion financière et étudie comment réduire l'exclusion financière en présentant les différents impacts de celle-ci.

Nous commencerons par explorer la littérature étudiant l'inclusion financière, nous définirons ce concept et développerons quelques pistes pour éviter d'être exclus financièrement. Ensuite, nous exposerons les principales barrières aux services financiers ainsi que leurs impacts et les solutions à l'exclusion.

Sur base de cette revue de la littérature ainsi que sur les données issues de la « World Bank », nous avons créé un modèle mesurant l'impact financier sur la production induit par "la productivité totale des facteurs" et "le capital par travailleur". Nous avons ensuite mis en évidence une relation que nous n'avions pas prévue mais qui révèle des coefficients surprenants. Nous avons remarqué que l'inclusion financière impacte directement la "production par travailleur" et l'impacte indirectement via "le capital par travailleur" et "la productivité totale des facteurs". Notons également qu'il n'y a pas de relation entre "le capital par travailleur" et "la productivité totale des facteurs".

Avec la relation trouvée, nous avons dessiné une carte mondiale montrant les pays financièrement exclus et inclus. Nous avons ensuite calculé le dividende de développement pour l'inclusion financière en déficit ou en surplus. Nous avons identifié comment la production d'un pays peut varier si ce pays a une situation financièrement neutre. Cela génère des résultats très intéressants : certains pays d'Afrique ont une bonne situation financière tandis que certains autres en Europe, ont une situation de déficit. Ou encore, les États-Unis et l'Afrique du Sud, pays qui semblent si puissants, ont une situation financière en déficit.

Nous terminons ce travail en expliquant ses limites et ses solutions possibles. Cela serait intéressant d'utiliser les coefficients trouvés pour chaque pays et de calculer l'impact d'une hausse du taux de l'inclusion financière sur les politiques de ce pays.

Mots clés: Inclusion financière, pays en développent, productivité total des facteurs, capital par travailleurs et production par travailleurs.

Resumen

Aunque el sujeto de la inclusión financiera es, hoy en día, un sujeto muy famoso, es todavía muy interesante analizarlo. El tema de este trabajo es el impacto generado de la inclusión financiera sobre el crecimiento económico. Esta tesis enseña la importancia de tener una buena inclusión financiera en un país, y además saber como reducir la exclusión y cuál sería la consecuencia de esta.

Para responder a estas preguntas, primero, este estudio tiene una revisión de la literatura sobre la inclusión financiera, explicando lo que es, como no estar excluido, las mayores barreras de los servicios financieros, sus impactos y sus soluciones.

Después, basándonos sobre esta revisión de la literatura, y sobre los datos de la "World Bank", hemos creado un modelo mediando el impacto financiero sobre la producción debido al "factor total de producción" y "capital por trabajador". Después, destacamos una relación interesante con coeficientes sorprendentes; esta relación es diferente de la que pensábamos. La inclusión financiera tiene un impacto directo sobre la "producción por trabajador" pero también tiene un impacto indirecto sobre la "producción por trabajador" a través del "capital por trabajador" y el "factor total de producción". Hemos observado que no había relación entre el "capital por trabajador" y el" factor total de producción ".

Con la relación encontrada, dibujamos un mapa mundial enseñando los países financieros excluidos y incluidos. Después, calculamos el dividendo de desarrollo para la inclusión financiera de los países en déficit o en excedente, y constatamos que la producción de un país podría ser diferente si este tuviese un nivel neutral de inclusión financiera. Esto genera resultados muy interesantes, por ejemplo, algunos países en África tienen una buena situación financiera pero, es el contrario en algunos países de Europa. Otros, como Estados Unidos y África del Sur, que parecen países muy poderosos, tienen una situación financiera en déficit.

Terminamos este trabajo explicando sus limites y sus posibles soluciones. Sería interesante utilizar los coeficientes encontrados en cada país y calcular cual sería el impacto de un aumento del índice de la inclusión financiera sobre las políticas de estos. Además, poder identificar las cosas que tendrían que hacer estos países para mejorar su situación financiera.

Palabras llaves : Inclusión financiera, país en vías de desarrollo, factor total de producción, capital por trabajador y producción por trabajador.

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Introduction

First of all, all the countries do not have the same access to financial services. According to a recent estimate[1], throughout the world, only fifty percent of adults have an individual account at a formal financial institution. In the high-income economies, the account penetration is nearly universal (more or less eighty-nine percent of adults have a formal financial account). But in developing economies only forty-one percent of the population have a formal financial account. For example, Honohan (2007) shows that in Continental Europe, ninety percent of the population have access to financial services in comparison to Sub-Saharan Africa where less than twenty percent have access to a financial account. Moreover, in some economies around the world (Democratic Republic of Congo, Cambodia, Guinea, Turkmenistan, the Kyrgyz Republic and the Republic of Yemen) less than five percent of adults have access to formal financial services. So approximately 2,7 billions[2] of adults in the world do not have access to formal financial services like for example the savings accounts, loans or credit. A survey made by Ardic, et al (2011) reveals that less than twenty percent of the 2,7 billions unbanked people are in high-income countries and more than seventy percent of unbanked people are in developing countries. In addition, sixty-four percent of the unbanked adults from developing economies are from Africa.

Moreover, the access to credit has a direct impact on the economy's growth and also on the reduction of inequality. To allow an economy to grow, it is primordial to improve the financial system, which is the first condition to have a good banking service. If it were possible for the world to reach a significant expansion of banking facilities, the world would know a massive economic development. The improvement of the financial development will increase positively economic growth; that will be in turn positively impacted by the improvement of private investment, for example.

In accordance with Smith (1776), banking operations allow the country's industrial development. Therefore a reliable financial system concentrated on the financing nations' productive sector can increase economic growth. Furthermore, it is well known that economic growth is a powerful tool to reduce poverty in a country. Access to financial services is

[1] This estimation comes from "AFD et l'inclusion financière"
[2] This estimation comes from World Bank Report (2005)

necessary to lead a normal life in a modern society. This access can be justified by the presence of multiple banks in a country to promote savings or to allow credit issuance. Financial inclusion is therefore a key to economic growth.

For all these reasons, we will first of all highlight from a theoretical point of view, the main impact of financial inclusion, the barriers and the solutions to address financial exclusion. Then, we will try to find mathematically a way to assess the impact of an enhancement of financial inclusion in a county on its production. This work is divided in two parts, and each is subdivided in five chapters. The first part is the literature review; we will firstly speak about the financial inclusion and exclusion, their definitions and their impacts on enterprises and households. Secondly, we will highlight the different formal financial services; we will describe them and explain how they work. Thirdly, we will broach financial barriers preventing the access to financial services; we will differentiate these barriers in two categories, supply side and demand side. Fourthly, we will show the impact of an enhancement of financial inclusion or exclusion on a country (for its welfare, education, etc.). And finally, we will present a wide choice of solutions for reducing the financial exclusion in a country.

The second part is the empirical part. We begin with a chapter devoted to the economic formulas, all the statistical tests, and a path analysis explanation; we have done it to allow the reader to better understand our analysis. Then, the following chapter will be dedicated to the theoretical model used and hypothesizes made according to the relation that we want to highlight. Then, we will explain our methodology and we will present in the same chapter the data used for this test. Later, we will present our empirical results that would be different from the excepted. Lastly, we will show our path analysis and highlight the percentage of effect explained by the model that we have created. In the same part, we will do a simulation, using the coefficient found, for calculating the necessary percentage for a country in deficit (or surplus) to allow it to be in a neutral financial inclusion situation.

We will be able to conclude from this analysis the impact of financial inclusion on a country's economic growth by showing the impact of an enhancement of financial exclusion on the production in a country.

Literature review:

Chapter One – Financial Inclusion and Exclusion

Introduction

This chapter is devoted to the generalities of financial inclusion and exclusion, where we speak about financial inclusion, financial exclusion, the households and the firms.

The first part of this chapter talks about financial inclusion. Different definitions of financial inclusion are proposed by different authors. After, we speak briefly about the impact of the enhancement of financial inclusion and the main problems from not allowing a greater financial inclusion in least developed countries. Then, we explain how it is possible to estimate the financial inclusion according to the Sarma index (banking penetration, availability of banking services, and usage of banking systems).

We present in the second part different definitions of financial exclusion to understand better the difference between inclusion and exclusion.

The next section presents the households from the financial inclusion point of view. We explain the main reasons why some of them have a good financial access, and why others do not. We cite briefly the two main issues for accessing the credit market. Then, we expose the reasons for making a loan.

The last section speaks about firms. We explain why the financial inclusion is important for firms' growth. We follow with the financial services used by the firms according to their size, localization and goal. After, we highlight one of the barriers for the firms' growth, i.e., the lack of credit access for them. We end with the impact of the financial inclusion on the firms (enhancement of start-ups and small companies).

1.1. Generality

1.1.1. Financial Inclusion

a. Definitions

The financial inclusion[3] allows people to have access to different financial services (savings accounts, payment services, credits…) at affordable prices and with equity and dignity. If a country has a good financial inclusion, it means that everybody (rich, poor, urban, rural, from ethnic minorities, or excluded population) can access easily financial services. The financial services differ between the countries because certain types of institutions are more "famous" in some country and the same institution, for example, is not prevalent in another one.

The financial inclusion has become a very important policy in many countries. If the country does not have a good policy, poor people have to rely on their own limited savings to put in their education or to help them to become entrepreneur; as well, the small companies have to rely on their limited earnings to grow. So without a good access to financial services, a country cannot have a good perspective of growth, and inequality will persist. Indeed, observation[4] reveals that the level of financial inclusion and the level of human development are correlated: that means that they move closely together.

According to Ellis, Lemma, Rud et al (2010), when the financial barriers are present on the market (unavailable, too expensive…), people find more accessible to use the informal market. But they argue that sometimes formal and informal financial services are complementary (and not subsidiary) because financial users use both. Normally, we will be more inclined to use the formal financial system when we have to do an investment because the bank services are more able to provide a large sum of money and ensure a safer environment in comparison to an informal financial service.

Kempson et al (2004) notice that a low level of financial inclusion is most of the time related to high-income inequality. If a country would improve its financial inclusion, initiatives have to come from the governments, the financial regulators and the banking industry. In accordance with Rangarajan (2008) the financial inclusion is "*a process of ensuring access to financial services and adequate credit where needed by vulnerable groups such as the weaker*

[3] This definition is based on the center for financial inclusion definition.
[4] Observation comes of a financial inclusion and development paper did by Sarma and Pais (2011)

section and low-income groups at an affordable cost". Moreover, the Breckland council defines: "*The financial inclusion as the ability of an individual, household, or group to access to formal financial services. Without this ability, people are often referred as financially excluded*".

b. Enhancement

Generally when the access to financial services is improved, some changes happen, like the following ones:

- Poverty reduction
- Increase to credit access
- Improve savings
- Enhance the livelihoods as well as the welfare of individuals
- Encourage gender equality

For example, according to the survey done by Karpowizc (2014), people can better save for the future and decrease the risk by diversification, if the financial system is more inclusive. Moreover, a good financial inclusion allows a decrease of the bank's intermediate costs.

But, unfortunately, Chibba[5] (2007) highlight seven key problems that do not allow formal financial inclusion progress (addressing inequality and poverty) in developing countries:

1. One third of the population has informal accounts
2. In these countries, the worry-free attitude ("no matata") is a crucial issue for the spending, borrowing and savings' model
3. Less than fifty percent of the population has access to the formal financial services
4. In small cities or in rural areas, there are no or very few formal financial institutions
5. High market concentration, i.e., two banks dominate the sector
6. A poor environment allowing the private businesses
7. Weak governance in areas such as land ownership, the legal and regulatory framework, government procurement, monetary policy and public sector agency governance.

[5] Chibba (2007) did his survey in Botswana (developing country) and generalize his survey for all the developing countries.

c. Estimation

Sarma (2008) estimates the financial inclusion based on an index with three basic dimensions of an inclusive financial system:

1. The banking penetration:

   An inclusive financial system should have a lot of users (as many as possible). For example one of the measures of the banking penetration is the size of the banked population, corresponding to the number of people having a bank account. But sometimes the number of banked people is not available so we have to use the number of bank accounts, and it is a proportion of the total population having more than fifteen years old.

2. The availability of the banking services:

   In a good financial system every user could have an easy access to the banking services. To measure it, we can use the data available about the number of bank branches (2/3) and the number of ATM per 100,000 populations (1/3). We can also use the number of ATM per 1,000 people or also the number of bank employees per customer. Another solution would be to use the electronic / internet banking services data.

3. The usage of the banking system:

   According to Kempson et al (2004), in some countries with a very high inclusive financial service, a percentage of people with bank accounts amount to unbanked people because they do not use a lot of the services offered. So we notice that having a bank account is not enough for a country to have a good financial inclusion because it is very important that the banking services are used correctly. To measure this indicator, we can use the volume of deposit and credit in proportion of the GDP.

The index is very useful because it captures a lot of interesting information to estimate the financial inclusion. Many different indicators can be used to assess the financial inclusion.

1.1.2. Financial Exclusion

a. Definition

If people do not have access to the financial services, they are excluded. In this case we can talk about financial exclusion. The financial exclusion exists in a lot of different parts of the world, generally in the least developed country, so it affects people without income or with a low income. But actually some countries do not have a good social and economic integration because they are financially excluded.

According to Leyshon and Thrift (1995) the "*financial exclusion is referring to those processes that serve to prevent certain social groups and individuals from gaining access to the formal financial system*". For Carbo et al (2005) the financial exclusion is "*as broadly the inability of some societal groups to access the financial system*". Moreover, according to Mohan (2006) the financial exclusion is "*the lack of access by certain segments of the society to appropriate, low cost, fair and safe financial products and services from mainstream providers*". According to Galor and Zeira (1993), Banerjee and Newman (1993), the financial exclusion, creating a lack of access to financial services, is a big obstacle to investment and continues to support the income inequality. All these definitions highlight the fact that the people reached by the financial exclusion are at the margins of Society.

1.2. Households

Most of the time, households in developed countries have access to formal financial services (a lot of financial institutions everywhere, no collateral guarantee problem, costs are not too high) but in developing countries, less than the half (the majority are rich people) have access.

Many reasons exist to explain why poor households are excluded from the financial market (normal account). Some of them are as follows:

- Physical distance…
- Discrimination…
- Lack of education…
- Minimum balances / high fees…

In order to access a more specific market, the financial credit market, two issues exit:

- The lack of collateral guarantees (do not have a stable job nor a steady wage), so impossible to get a loan.

- It is expensive for the financial institution to deal with small transactions. For example, in Indonesia, Johnston and Morduch (2008) show that many financially excluded individuals look for a loan but it is so small that it is not lucrative even for an original micro lender. One of the solutions will be to increase the size of the loan and like that the default rates will be reduced because the customer will continue to repay and borrow.

Beck and Demirguc-Kunt (2008) bring out the most common reasons for a loan to be made by low-income households:

- School fees
- Daily consumption
- Medical treatment
- Holiday and social expenses
- Remittance

But Gibson, McKenzie and Rohorua (2006) find that the formal remittances, when the competition is nonexistent, are costly. They deduct than the lack of formal financial institutions, in addition to reducing the competition, increases the remittance costs.

1.3. Firms

According to D[r] Deepali Pant Joshi (2013) what is needed is "*expanding access to finance to small and medium enterprises, the unorganized sector, the poor, and remote and underserved areas of the country through technology, new business practices, and new organizational structures; that is, we need financial inclusion*".

According to Demirguc-Kunt and Maksimovic (1998) the financial development has a positive effect on firms' growth. The access to financial services affects through different channels the firms' performance.

a. Financial services

First of all, developed economies' firms use more bank credit than the developing countries. Despite, the fact that in some cases, the distinction between the firms financing or person financing is cloudy. Especially in the poorest part of population and small firms, this segment has to be improving by the governmental policy for enhancing the financial inclusion.

Secondly, about the use of saving and checking accounts, the differences between developed and developing countries are not very important. So in the two situations, a majority of firms

use bank accounts but the difference is the accessibility, namely, for the low-income countries, firms are more financially constrained.

Thirdly an important part of the firms (wherever the countries) never does get a loan. More than sixty percent of the firms are auto-financed. Notwithstanding it, banks finance more or less twenty percent of the firms. Moreover, family loans are not the best solutions because it might bare large non-financial costs.

Finally, we noticed that the firms' size was positively correlated with the access to finance. So, for the small firms, the access to the financial services is a big constraint.

b. Credit access

The lack of financial access (namely problems with the cost of financing and availability) is one of the most important hurdles for the firms. Ayyagari, Demirguc-Kunt and Maksimovic (2012) show that the finance is one of the main constraints for the growth of a firm. The survey made by Chavis, Klapper and Love (2011) shows that the start-ups and the young firms are the most affected by the credit problems, it's very difficult for them to get one because of the lack of information about their performance. They do not use formal financial services so much because they cannot but because they borrow money from friends and family instead.

c. Firms and Financial Inclusion

Beck, Demirguc-Kunt and Maksimovic (2005) have demonstrated that the improvement of financing constraints for small firms is due to the enhancement of the formal financial sector's functioning. Despite, Klapper, Laeven and Rajan (2006) indicate that small firms and start-ups can be boosted by accessing financial services. Moreover, when the financial inclusion is deep, the choice of assets for the firms is larger and allows them to grow faster and better by adopting the best assets choice (Ayyagari, Demirguc-Kunt and Maksimovic (2012)). And finally, a good level of financial inclusion can allow firms to diversify their risks and limit the liability by increasing incentives (Demirguc-Kunt, Love and Maksimovic (2006)).

According to Ayyagari, Demirguc-Kunt and Maksimovic (2008): "*In fast growing economies like China, where the formal financial system serves only a small part of the private sector, the faster growing firms depend on finance from the formal financial system".*

Conclusion

In this chapter we talked about the financial inclusion generally, both in households and in firms. But we did not tackle clearly yet all the different financial services available on the markets. The financial inclusion increases the possible channels through different services, and when the use of these services increases, the financial inclusion increases too. Without knowing all of these different services, it would be very difficult to increase financial inclusion and to determinate how to increase it.

Therefore, the following chapter will talk about the four most important sources of financial services. Based on these, it will be easier to know where the government can help and what kinds of formal financial services it can support most importantly.

Chapter Two – Formal Financial Services

Introduction

In the first chapter, we noticed the importance of the different formal financial services available on the market, in order to know through which formal services to decrease financial exclusion.

We begin this chapter with the formal financial account. We define, according to the Global Findex, an account. Then, we highlight the main differences in the account use: according to the income and inequality, the use of an account in an area will be more or less important. We follow with all the individual characteristics impacting this use. And we finish with the way to use an account.

Then, we look at a definition of formal savings services. We explain the overall differences in the savings: how the individual characteristics can impact this type of services; which savings way is chosen according to some differences. And we finish this section with how the product design can impact the behavior of the saving's user.

After, we explore the formal credit service by beginning with its definition. We develop the main reasons cited for doing a credit. We finish with the importance of product design as, if the credit framework does not look safe, people will not dare do a credit.

The last formal financial service, the insurance, concludes this chapter. In this section we give a definition of insurance coverage. Then, we underline the importance of the insurance, according to the area in which it is applied.

2.1. Accounts

2.1.1. Definition

The Global Findex survey defines an account as "*an individual or joint account at a formal financial institution and notes in the question text that an account can be used to save money, to make or receive payments, or to receive wages and remittances."*

The Global Findex survey measured account penetration *"at the household level, an approach that captures use but not ownership and tends to result in higher estimates for penetration, especially among youth and women. It includes adults age 15 and above. "*

The World Bank Economic Review (2008) refers the account as "*the access to the supply of services, while use is determined by demand as well as supply".*

2.1.2. Overall Differences

a. Income and Inequality

The variation in account penetration all over the world is explained for a majority by the GDP per capita. According to Demirguc-Kunt and Klapper (2012), the national income explains a good percentage of the worldwide variation for the adults with a formal account. But as we know, the GDP is not sufficient to explain this variation in account penetration, so we use also the level of absolute household income. Its role can be estimated by looking at the rate of people living with less than 2$ a day but who have a formal account. So, according to the World Bank[6] data, less than a quarter of the people in these categories own a formal account.

Moreover, in accordance with Demirguc-Kunt and Klapper (2012), the Gini coefficient shows a strong correlation between general income inequality and the inequality in the use of formal accounts. But this strong correlation between these economic variable and financial variable suggests that there are other factors than income inequality that can explain this variation in formal accounts.

b. Individual Characteristics

The account ownership[7] is different by individual characteristics (education level, gender, age, rural or urban residence).

First of all, the gender: in unindustrialized economies, while 46 percent of men own a formal account, only 37 percent of women have one formal account.

Secondly, the education level: in developing countries the people with a higher education level are more than twice as likely to have an account in comparison with people with a low level of education. So we conclude that the education level can explain part of this variation in the use of formal account. Besides this, there is also a correlation between account penetration and investment in education.

[6] Information comes from the World Bank Report (2005)
[7] Information comes from the World Bank Report (2005)

Thirdly, another characteristic that influences the account penetration is the age. Worldwide (regardless if it is an underdeveloped or developed country) people having between 25-64 years are more likely to have a formal financial account in a formal institution than the older or younger persons.

Finally, the rural-urban divide is also an important characteristic to explain the account penetration variation. Normally, when people are living in a city, they are more likely to have a formal account than those who are living in the countryside.

c. Way to use it

Moreover, there are important differences[8] in the use of financial services between the developed economies and the industrialized economies. For example there are some differences in the way that people get access to their accounts; in the used payment system and in the withdrawals or deposit's frequency. Moreover, checks, credit cards, electronic payments are most used in high-income economies than in developed economies. So in least developed economies, people make withdrawals through the counter clerk at the bank once or twice a month that in industrialized countries they do withdrawals trough ATMs (automated teller machines) and electronic payment systems at least six times a month. So the payment systems (the way to do withdrawals and deposits) vary a lot between the high income and developing income. For example, in the industrialized countries the electronics payment and checks are more used than in developing countries. In the developed countries, the common way to save money is to use savings clubs. The savings clubs provide an alternative and allow saving money like in the formal financial institution.

An account is useful for receiving wages and government payments. In high-income economies it is most common to use a formal account to receive wages. For example in Europe and Central Asia, half of the account holders use their account to sell goods or to receive money from their employer (paying to them their salary). Despite this fact, concerning the money received from the government or paid to it, less than half of the people in the high-income countries use their account for this kind of operations.

[8] Information comes from the World Bank Economic Review (2008)

Some people use it to send or receive remittance. According to Ratha (2006), sometimes an account can be used to send or receive a financial support from a relative who normally does not use an account, but they use one to facilitate the wealth transfer. More than a third of the population reported using their account to this kind of relative's wealth transfer. The states more concerned by this kind of usage for family remittance are the states with a fragile economy (like Haiti, Somalia…). In developing countries, the majority of the population uses their account to receive money from family members living in another place, or to receive a wage payment.

2.2. Savings

2.2.1. Definition

Saving allows people to plan future expenses like for example the child's university costs, the wedding, new car… but all over the world, twenty to thirty-three percent have savings. Different informal ways exist to save money, for example putting money under the mattress or accumulating gold or livestock. Normally in industrialized countries, more people save money by using a formal financial savings account. In opposition, in developing countries, less people use formal financial savings accounts to save money; they use more "alternatives".

2.2.2. Overall Differences

a. Individual Characteristics

All around the world, more or less a fourth of the population saves money in microfinance institutions or in a bank or also in a credit union. So the normal saving behavior depends firstly on the region. According to Demirguc-Kunt and Klapper (2012), a lot of people in Sub-Saharan Africa use this kind of saving in comparison to Latin America. Secondly, individual characteristics can influence the kind of savings that people use. For example an adult living in a high-income country prefers saving his money in the formal financial services. Moreover, in the industrialized or developing economies we can notice a big difference of savings between rich and poor people; the rich save more than poor people. Thirdly, the age has an impact on the saving behavior. The population between 25-64 will be more likely to save money than younger or older people.

b. Way to save

In accordance with the survey made by Demirguc-Kunt and Klapper (2012), all over the world, only forty-three percent of account holders save money in formal financial institutions. If some parties of the world use savings accounts, it is because they can put their money in a safe location. In the fragile states, saving seems to be a priority so for example, in Haiti, more than seventy-five percent of account holders have a formal savings account. While in Europe, saving is not so important, and more or less fifty percent account holders have a saving account. Other account holders prefer saving their money in informal methods. But in accordance with Chawla, Betcherman and Banerji (2007) new products that focus on the account holders could be used for motivating people to save their money in a formal financial institutions. This impact could be very interesting for the elderly population. According to Dupas P, and Robinson J (2013) people with concrete savings are more motivated to open a formal savings account. Moreover, the fact of having an account can encourage holders to save through an investment or specific purchase.

2.2.3. The importance of product design

One of the problems in the saving's behavior is the self-control. A lot of people want to save but prefer directly spending all the money they have. According to Laibson (1997) this spending behavior is caused by the fact that some people think that the value of "today's money" will be better in comparison to "tomorrow's money"; therefore they spend everything today. Another reason for the behavior will be that people forget about the fact that they will need money for tomorrow. And the last one is the familial pressure; they cannot save money because they have to send it to their family.

To decrease this problem, a solution will be using commitment savings accounts. According to Ashraf, Karlan et Yin (2006) and to Brune et al (2011), the use of this kind of account can increase the amount of saved money and mitigates the self-control issues.

Banks try, using an account with general automatic saving reminders, to capture the savers' attention by the advantages of a long-term savings account for reducing the spending in the short term. According to Karlan et al (2010) the use of these reminders (text message, letter, mail) will influence the use of a savings account; it will be more effective than an account without reminders.

2.3. Credit

2.3.1. Definition

Everybody needs to borrow money for some expenses like a wedding, the purchase of a new house… When they do not have enough money to face the expense, they have to turn to someone who will be able to lend the money to them. For example, a cousin, a bank, an informal lender can be used to do a credit. As well, credit cards can be used and they are widely used in the high-income country, but in developing economy it is not the case (less than ten percent have one). In both high-income and developed economy, on average, thirty percent of the world population borrow money. According to Djankov, McLiesh and Shleifer (2007) the use of credit varies with the level of tax, the regulatory environment and the legal aspects. Moreover the business loans all over the world are very important because it is correlated with the income of a country. There is a positive net impact between the loan and the income.

The most common way to borrow money in developing countries are reportedly friends and family, but people in high-income countries borrow more from formal financial institutions. Despite this, in some regions, people borrow money from stores. There is not a big difference in this case between poor and rich people or between people with high or low level education. But in the high-income economy, a man in the richest quintile with some third degree education will be more likely to borrow than the poorest quintile. This difference can be explained by the misunderstanding of the loan process or a lower creditworthiness or less demand when the education level is low.

2.3.2. Reasons

Some reasons[9] for doing a credit are set out below:

- Funeral or wedding loans are more common in the fragile and conflict states.
- Purchase of home or apartment loans. Only 3percent of the developing economy have a loan for this, contrary to 24percent of the high-income economy. According to Warnock and Warnock (2008), *"bankruptcy laws and collateral describe legal rights of lenders and borrowers have also been to affect housing finance".* According to De Soto (2000), *"a mortgage market needs formal property rights and*

[9] IMF 2011

an efficient framework to record property's ownership". This can explain why there is such a big difference between the high income and the developing countries.

- Home construction.
- School fees.
- Emergency or health purposes are the main, common reason. All over the world, eight percent of the richest quintile have a loan for this in comparison to the fourteen percent of poorest quintile.

2.3.3. The importance of product design

The way to design the product has an important impact on the use of the credit by the customers. These features impact the increase of financial inclusion and lighten the markets imperfections. Drugov and Macchiavello (2008) reveal how a small loan can deliver useful information for knowing the risk in larger loans. By Karlan (2007) the groups having good social relations (for example, ethnic groups or geographical proximity) could have a greater savings rate and a lower default savings rate by doing group lending. Giné, Jakiela et al (2010) concluded that joint liability creates higher level of risk and free riding. But in contrary, Giné and Karlan (2009) showed that the joint liability is not always required to attain better reimbursement rates.

According to Field et al (forthcoming) having a loan with payment with a grace period will increase the amount invested in the loan and also show higher profits. But one of the problems of this grace period is the fact that the potential loss rate is higher, for this, some penalty or rewards are applied.

2.4. Insurance

2.4.1. Definition

The insurance service in a country is very important too, because it is related to personal health. Health problems are catastrophic when people do not have a health insurance. A survey realised by Demirguc-Kunt and Klapper (2012) shows that more than seventeen percent of the population in developing countries have a health insurance, but in China forty-seven percent of the population have one. Normally persons who work in fishing, farming, and forestry… need more than others a health insurance but, in developing countries, only few of them have one.

2.4.2. The importance of product design

In least developed countries, the risks of disaster for example expose the income to a large volatility. According to Cole et al (2013) basic insurances are not available for developing countries with a high rate of disasters. And so the price for this kind of insurance will be higher than standard, and further more this kind of insurance is not available for the poor and most vulnerable people living in a country with high risks.

The major problems are the lack of liquidity and the lack of trust that constrain the demand. So two possibilities can help to solve this problem. Firstly, the products need to be created to generate trust among the user population; by this way the client's trust will be increase. Secondly, for avoiding the liquidity matters, a rapid repayment is important.

One of the solutions is the creation of index insurance well suited with the potential natural disaster.

Conclusion

Within this chapter, we noticed that the use of those different formal services varies a lot between the developing countries and the developed countries. But the fact of living in a developed country or not is not the only reason why people do not access financial services. A large number of other reasons, namely barriers, are presented in the next chapter. All of these are important, and shall be explained and well understood.

When you understand well which financial services allow you to impact positively financial inclusion, and which "barriers" you have to address, you can "easily" decrease the financial exclusion rate in a country.

Chapter Three – Financial Barriers

Introduction

We highlighted in the chapter above that the access to financial services varies according to the area of life (developed or developing countries). But other reasons can explain why some people lack access to financial services. We will tackle all the different reasons in this chapter.

We begin firstly with the general barriers, divided in two sections, the demand side and the supply side. We discuss all the different demand barriers present on the market (personal characteristics, financial literacy, poverty, mistrust, and shadow economy). We follow this section with the supply side barriers present on the financial market (absence of collateral and high requirements, small economic base, high operational costs, regulation, dominant firms preventing market entry, and access exclusions). Both categories cited contain different kinds of barriers, and they are explained below.

The second and the third sections categorize the barriers primarily present in the firms and the households. And later on, those present when an individual wants to use one of the four financial services, as explained in chapter two.

3.1. General Barriers

Some major factors[10] are the causes of financial exclusion. These are sorted in two categories in the table below.

Table 1: Determinants of Financial Inclusion[11]

Demand Side Factors	Supply Side Factors
- Personal characteristics - Financial literacy - Poverty - Mistrust - Shadow economy	- Absence of collateral and high requirements - Small economic base - High operational costs - Regulation - Dominant firms preventing market entry - Access Exclusion

[10] These factors came from the financial exclusion and access to credit
[11] This table comes from the working paper by Hariharan and Marktanner (forthcoming).

These obstacles impact most poor people and especially the rural' people because they do not have a lot of financial institutions and they do not have a good financial literacy. Therefore, when people are poor, the part of their income absorbed by the financial costs is most important in comparison to the rich people. Moreover, both "classes" of population (both the rich and the poor) are discouraged when barriers such as heavy red tape, far financial institutions… exist. According to Beck, Demirgüç-Kunt and Martinez Peria (2008), countries with more openness and competition, have less banking barriers. Djankov, McLiesh and Shleifer (2007), suggest that in high-income countries, the most important is creditors rights enforcement whereas in low-income countries, the matter is the information infrastructure.

3.1.1. Demand Side

a. Personal Characteristics:

In this section, a lot of different barriers are tackled. First of all, some part of the population (in rich or poor areas) does not use financial system for religious reasons. This reason is one of the most important for not having a formal account in Middle East, North Africa and South Asia. For example, in Middle East, there is a correlation between the "Islamic finance" (Finance done in Islam) and the bank penetration.

After, the gender and the age can be highlighted as other reasons for exclusion, in the personal characteristics category. Firstly, according to Ellis, Lemma, Rud et al (2010), some differences exist between men and women: the women are characterized by a lack of financial understanding, so the men have a better financial literacy level compared to women. For example, a woman in developing economies has twenty percent less possibility of having an account in comparison to a man. So women without an account face more difficulty to receive government payments or it is impossible for her to save formally. In addition to this a woman without account has less possibility to realize her educational or entrepreneurial ambitious. Legal discriminations against women exist, for example inheritance rights or employment laws. Ashraf, Karlan and Yin (2010); Dupas and Robinson (2013) said that it is not enough for a woman to have only access to an account because she needs to be the owner of her savings account. So according to Hallward-Driemeier and Hasan (2012) the lack of account ownership prevents women to reach self-employment opportunities. Secondly, the age is a barrier, as the people of having less than fifteen years old are normally not owner of an account and in developing countries, the older people use the account of their child. So before

15 years and after a certain age (for elder men and women), people do not generally have accounts because they use the family one.

After that, family relatives is also one of the exclusion reasons, when a family member has already an account. In this case, for example, women do not have one because they are using their husband's account. According to the survey realized by Hallward-Driemeier and Hasan (2012), the lack of accounts owned by women limits their ability to find a job, for example.

Then, in developing countries, when a person is single, he/she is not using an account. Because, most of the time, he/she has just enough money, so it will be inconceivable putting a part of his/her money in an account knowing that he/she has not enough money to eat and pay the rent each day.

Finally, some people are not interested. For example, some workers do not need a bank account to receive their wages, and moreover their salary is not very high. So they can keep it in liquid because they know that in one week, their money will be spent. In this case, it is not necessary to pay for banking services.

b. Financial literacy and time

First of all, the low level of financial literacy in a country, can explain the high rate of exclusion. A study made by Sarma and Pais (2011) noticed that the financial literacy is significantly and positively associated with financial inclusion that means that, higher is the banking literacy, higher is the financial inclusion. The financial literacy is one of the important things impacting the financial inclusion because when people have a good financial literacy, they can take better financial decisions, they can also obtain a best product more adapted for a better price, and it affects the costs of financial services. When they do not have any financial knowledge, they do not use financial services because they are not able to understand.

Then, time is also a financial barrier, if doing a financial operation takes too long, people are not motivated to use financial services and are financially excluded. *In Bangladesh, Pakistan and the Philippines, for example, it takes more than a month to get a small business loan processed* (according to a survey done by Beck T. and Demirguc-Kunt A. and Martinez Peria 2008).

c. Poverty

The poverty can be explained through different ways, and hence is one of the most important reasons for explaining the access exclusion.

To begin, the poverty can be due to the unemployment, if citizens do not work, they do not receive any money. According to Goodwin et al (2000) the financial sector can be linked with the employment. It means that unemployed persons, or those with an insecure or irregular employment, are not included in the financial system for not having money. Some people do not make enough money to have an account because opening an account costs money in most parts of the world and so those people find useless to pay money to have one, while they do not have regular or enough money to use one. According to Allen, Demirguc-Kunt et al (2012), in countries with higher banking costs, the under-banked population said that they do not have an account because of a lack of money. For example, the poor, out of work, or unemployed people do not have an account because they do not have money. In this case, the government and market policy cannot do anything.

The poverty rate in a country can also be linked to the inequality level. Kempson and Whyley (1998), Buckland et al (2005) explain that countries with a low level of inequality (everybody has more or less the same amount of money) would have a high financial inclusion. The more the income inequality in a country is high, the more the financial account penetration is bad. If a country has a high inequality level, its financial inclusion rate will be very low.

Finally, the income inequality (part of the poverty explanation) is also an explanation of exclusion access. According to Kempson and Whyley (1998) in the high income and developed countries that have a well developed banking system, people who are suffering from financial exclusion are persons who belong to low income groups, immigrants, the ethnic minorities …Even if the country has a good financial situation and penetration rate, some people stay under-banked.

d. Mistrust

Some people do not have any trust in banks, they have a very bad image of financial services. According to Demirguc-Kunt, Klapper, Zingales (2012), this lack of trust can result from discrimination against certain population groups, cultural norms, past government history, but also can result from economic crises creating uncertainty.

Moreover, sometimes, some of people have a very special relationship with money and they cannot imagine putting their money on an account, far from them. In this case, the financial exclusion can be the result of saving money "under the mattress".

e. Shadow economy

Shadow economy or also known as "black market" is one of the access exclusion reasons. When people "work" in the black market, they cannot put their benefits in formal accounts for fear that the government sees it and makes trouble for working in the shadow economy. Moreover, according to a survey made by Schneider (2011), the black market and the financial inclusion rates are negatively correlated. Therefore, the more the country has a high level of shadow economy, the less financial inclusion will be high. It is easily understandable, because you cannot imagine somebody putting a large amount of money each month without any work. So this person would use his "black money" in the financial formal market but in liquid.

3.1.2. Supply Side

a. High requirement

A bank has high requirements towards the users, to be protected if the users cannot refund the money lent. But these requirements, sometimes very high, are a cause of exclusion access.

First of all, according to Karpowizc (2014), when the collateral's constraints are less important, the growth and also the total factor productivity are greater. For the person already on the market, the impact of a decrease of collateral is good for them but when the participation costs decrease, of course the impact on them is less important. Moreover the impact of a decrease of collateral or participation costs would have an impact that is more significant for the poor than for the rich.

Secondly, the property rights can be one of the explanations for the wealth distribution functions. Morck, Woflenzon and Yeung (2005) find that when some families own all the country's assets, they can reduce the financial innovation and of course change the capital allocation.

After, when the financial conditions (red tape, collateral requirement) are not adequate to some person, the access exclusion rate can be high. For example, the lack of necessary documentation is one of the reasons for financial exclusion. According to Yikona et al (2011) there is a relation between objective and subjective measures of documentation requirements

and the use of accounts. Moreover all this cautious anti-money laundering and terrorist financing safeguards can have the unintended consequences of excluding legitimate businesses and consumers from the financial system, this has emphasized the need to ensure that such safeguards also support financial inclusion. This lack of information can create an inappropriate product for some customer.

Finally, when a person is not registered in a formal data bank, the formal financial system disagrees to let him access the financial services because they do not have any information about the person's credit history, past, etc.

b. Small economic base

When a region has a small economic base, the financial services are not available for this area. If in a geographical area, there are only 100 people and there is only one commerce, it would be a huge mistake for the bank to locate one of its bank's branches in this area because of the lack of customers.

Moreover, if in this small nearly inhabited area, a company is located, the problem of financial exclusion will impact more the small company compared to the large company. Beck, Demirguc-Kunt, Laeven and Levine (2005) find that the industries with small company will grow faster in country where the financial system is well developed than in developing countries. And they also find that the financial constraints impact less the large firms than the small large. Therefore, by Banerjee and Duflo (2005) views, one of the main causes of the poor growth rate of a small company is the difficulty to access the financial investment services.

c. High operational costs

The fees that the bank or the users have to pay are an important reason of exclusion in the financial market. These fees can be for entering on the market, to access a financial account, to keep using this financial service…

First of all, in the banks case, according to Djankov, La Porta, Lopez-de-Silianes and Shleifer (2002), one of the most unnecessary barriers is the entry barriers and the post entry regulatory costs. For example if, a company wants to enter the market, it has to have a certain number of licenses and has to pay a lot of taxes at its beginning. They noticed that these barriers are most important for the entrepreneurs in developing countries. So these financial costs keep far away from the market, the small banking services would help the citizens of their country.

And because of all these fees, only the huge financial institutions can access the financial market and they locate in the big cities, and never in the rural areas for instance.

Then, in the households' case, the problem is that banks or accounts are too expensive. The annual fees and the fixed transactions costs make the formal account unaffordable for a major part of the world. *For example, in Sierra Leone, the annual fees to maintain a checking account exceed twenty-five percent of GDP per capita* (according to a survey did by Beck T. and Demirguc-Kunt A. and Martinez Peria 2008).

Lastly, according to Beck, Demirguc-Kunt, Martinez Peria (2008), the high costs for maintaining and opening and all these fixed fees are the proof of lack of competition. They find also that the high cost of opening a bank account in developing countries are caused because of a weak level of judicial infrastructure for poor. In some places in the world, the lack of financial institutional infrastructure can create a kind of price monopoly. Besides this, if it would be possible to decrease these costs, the share of adult having a formal account would increase. So competition policy protects a part of the consumers because a good rate of competition allows the consumer to choose its organisation and because of that, the financial services institutions have to provide a good quality service. For example, the bank offers the basic fees account when a new customer wants to create an account.

d. Dominant firms preventing market entry and foreign banks

In countries with poor political institutions the inequality is due to an unequal political influence because the most powerful groups, firms, control nearly everything in the country, so they control also the financial allocation.

Moreover the presence of foreign banks is a treat for national banks and citizens. A negative relation exists between foreign banks' assets and financial inclusion. According to Detragiache et al (2006) a stronger foreign bank presence in poor countries is robustly related with less credit private sector. Besides, they discovered that in countries with a high rate of foreign bank penetration, the growth of credit is slower and the access to credit is not so important. Likewise, Berger et al (2001) found that foreign banks are less motivated to help a small local business to grow than a local bank. But, Clarke et al (2005) find that the large foreign banks have a most important impact on the financial market than the large local banks.

e. Regulation

The regulation plays an important role in the access to financial services.

Firstly, Barth, Caprio and Levine (2006) find that when a country is more open, its democratic institutions will be more tolerant about the entry of banks and will not create so many regulatory restrictions for the banks. So the countries with very strict regulatory restrictions do not have such a good financial market development and also do not have a stable financial inclusion. So a correlation exists between strict regulatory constraints for limiting the financial expansion and the interests limiting banks' entry.

Secondly, government impact can increase or decrease the financial inclusion. A country with weak policy would be the perfect country for a weak financial inclusion, so by improving their policy, the financial exclusion will be less important.

Thirdly, the financial imperfections are a very important reason for access exclusion. Even if the country is developed, or not, or has a high level of technology, or the institutional services are good; the financial imperfections like transaction or information costs prevent the small and medium company or the households (without credit's history or collateral) to access the financial services. For example, according to a survey done by Galor and Zeira (1993), if poor people cannot invest even if they have a high marginal productivity of investments, it is because of the financial market problems between the different financial services.

Fourthly the financial depth has its importance in the financial services access, because if the financial depth is weak, there are not a lot of financial services. According to Allen et al (2012), a lot of financial credits do not correspond to the general use of financial services. One of the reasons is that the credit can be focused between the wealthiest individuals and the largest firms. Another reason is that the use of a formal account has an imperfect relation with percentage of GDP (= measure the financial depth). This survey suggests that the financial inclusion and the financial depth are not so much correlated because a country with a very good percentage of GDP can have an awful percentage of financial inclusion. For example, Vietnam has a GDP of 125percent with only 21percent of people having a formal account in the country. So to raise the financial inclusion, the financial depth could be "a room" for policy interventions.

Finally some political reasons can be highlighted to explain this financial access issue. The democracy evolution can enhance or decrease the access to financial services. According to

Perotti and Volpin (2007), the democracy system will be one of the solutions to avoid all this political influence without the economic conditions. The stronger the democracy, the lesser the political influence and the inequality, and easier will be the enforcement of financial services. Moreover, the political instability (wars, conflict…) creates a bad confidence climate in the country and citizens stop using financial services because they do not trust anymore the financial services.

f. Access Exclusion

Firstly, the geographical area impacts the access to the financial services. According to Leyshon and Thrift (1995), Kempson and Whyley (2001) a geographical factor can influence the financial inclusion. The persons living in rural areas or in locations far from financial centers, would be more financially excluded than people living in the city center. Burges and Pande (2005) show that the better financial inclusion is, the better is the income of poor people and especially in rural areas. For some people the bank is too far. In rural areas the distance from the bank is a good barrier, but nowadays, thanks to technology, this barrier can be reduced. According to the World Bank (2010), in the unindustrialized countries, there is a correlation between the bank branch penetration and the distance from the bank. As well, Sarma and Pais (2011) highlight that a rural population is negatively associated to financial inclusion: higher the urban population, higher the financial inclusion.

As well, most of the time, in developing countries, the banking activity is located in the capital and in the biggest cities and not in the countryside. Beck, Demirgüç-Kunt and Maksimovic (2005) find also that the slow growth of all kind of companies can be explain by a lack of financial services access even if the financial constraints were not applied on the financial market.

Then, a legal framework is necessary to motivate people to invest some capital. In developing countries, people have to go at their agency to do some kind of operation. If the bank does not give fast and good services, people living in this area, prefer to stop going because of its bad quality. But sometimes electricity or road issues can explain this lack of good financial services.

Lastly, in a country with a good investors' protection and a bigger capital markets, the market will be larger and ownership wider. Djankov, McLiesh and Shleifer (2007) show the relationship between the creditor protection (using information sharing and legal system) and the higher private credit to GDP ratio, but this is most important in the richest countries.

3.2. Firms and Households Barriers

3.2.1. Firms

Some formal or informal firms need a loan or access to financial services but do not do so, for some reasons, e.g.:

- The interest rates are high
- The complex application procedures
- Not enough guarantees
- Too much collateral requirement
- Not registered
- No approval
- Informal payments to get bank loans
- Loan size and maturity

3.2.2. Households

Some households do not use financial services for these reasons:

- Not enough money
- Too far from the house
- Too expensive
- Not enough necessary documentation to have one
- Religious or cultural reasons
- Family member already has an account
- An informal financial institution offers bad services and is located on their area,

3.3. Formal Financial Products Barriers

3.3.1. Account

The study realized by Demirguc-Kunt and Klapper (2012) analyses some reasons that can explain that some people don't have an account:

- Poverty
- Fees too expensive
- Geographical area
- Financial Conditions
- Mistrust
- Family member
- Gender – Age
- Cultural – Religious aspects
- Large / Small Company

3.3.2. Savings

The reasons cited below are the most important reasons for not having a savings account in developing countries and also in developed countries.

- No nearby facilities
- They do not understand how the services work
- You need an ID and a referee
- Needing a lump sum to start with
- Not having the money to save
- Do not believe in it
- Costs of service

3.3.3. Credit

Some barriers are always evoked when we ask people why they do not do credit with the formal financial services.

- No collateral
- No guarantee

- No place nearby to get one
- Do not know where to get one
- The partner do not allow it
- Do not have enough money
- They charge too much
- Do not believe in the financial system
- Do not have the documents to do it
- They do not need it

3.3.4. Insurance

The barriers for having access to insurance vary a lot for the insurance they want to use. Doing a list with all the barriers, will be writing down all the barriers explained and cited above.

Conclusion

In this chapter, we saw how many barriers can appear on the financial market, in various financial levels or in different individual characteristics. It is advantageous to try to decrease the impact of all of these barriers on the financial status, to find solutions to reduce their negative impact. But is it very beneficial for a country to have a very good financial inclusion? What will be the impact on its growth, on the welfare of its citizens, on its education, etc.?

The next chapter brings some evidence about the impact of the financial inclusion in a country. This chapter highlights the positive, and also the negative impacts that financial inclusion can have on a country. Knowing all of this, it would be easier for a country to make the right choice. The key is to know if it is worth for the government to do something or not.

Chapter Four – Financial Impacts

Introduction

The role of financial services in the World is of great importance, as financial inclusion contributes indirectly to the development of the country. Taking into consideration that financial inclusion is not turning everybody into borrowers and does not increase access for the sake of access. This increase has a positive impact on the consumption, economic aspects (e.g. the reduction of the poverty) and some health aspects.

For all these reasons, we decided to devote this chapter to all financial impacts that can involve the enhancement of financial inclusion or financial exclusions.

We begin this chapter with a section speaking about the main impacts of an increase of financial inclusion. We explain the financial impacts on income inequality (direct and indirect effects), welfare, economic growth, poverty, rural areas, competition, and taxes.

The second and last section, lays out the various impacts that financial exclusion can have in a country. The main impacts are: increase of thefts, no use of checks and, no access to vital services.

4.1. Financial Inclusion Impacts

a. Income Inequality

The financial inclusion impacts income inequality. According to Douglas et al (2010), the raising of financial services in a country reduces the inequality between poor and rich, as well it reduces the inequality in the periphery (according a better equality).

i. Direct Effects

When a place is good for living but there is no bank, it would be impossible for citizens to do investments or financial operations and, in this case, the income inequality effects will persist. When economic growth expands, all the income grows and the gap between rich and poor decreases. So the reduction of the poverty and the income distribution are positively correlated. Kang (2010), concludes that an increase of financial inclusion helps poor people to have access to a nice panel of financial services and moreover this normally allows poor people to be less vulnerable to economic shocks. Despite, Moorkerjee and Kalipioni (2010)

analyze how the financial service availability can affect the income inequality. They find a strong relationship between income inequality and formal financial services.

ii. Indirect Effects

But some economists conclude that an increase of financial inclusion do not impact directly the income inequality.

According to Beck and Demirguc-Kunt (2008) deeper financial system has an impact on the growth and also on the poor. According to them, when a country grows fast, the poverty reduces and so fills the income inequality gap. Despite this, for them, it is not because the access to the financial service increases that the bank will help to fill in the gap. Beck, Levine and Levkov (2007) conclude that unskilled employment allows the poor people to earn their living and that will affect the distribution of the income between unskilled and skilled labor force. Despite this, Beck et al (2009) concluded that a better repartition of income between skilled and unskilled labor and investments in small companies would reduce the income inequality.

b. Welfare

A financial system upgrades welfare by supplying ways for secure and safe saving practices, and by carrying a complete range of efficient financial services. Ellis, Lemma, Rud et al (2010) hypothesize that a better access to financial services (by this way, increasing the financial inclusion) can allow people to have a better quality of life by starting or expanding a new business but also by investing in agricultural inputs or also by buying new agricultural equipment for a better profitability. Through all these investments, possible thanks to a better access to financial services, the future income will be higher and so will grow. In this way, the poverty will be less important in least developed countries.

When access to financial services is unequal, it impacts household welfare and individual firm development. Claessens and Feijen (2007) highlight that the individuals welfare can be improved by a better financial inclusion, for example the social inequality will be less important: that means that the poor health, the poor level of education, the gender inequality, the rate of hunger, all that will be improved. When the access to the financial service is not good in an area, the household's welfare can be reduced. The microfinance in the poorest countries, also a way to increase the financial development, enhances the individual's welfare, so there is a positive correlation between the household's welfare and the use of micro credit,

microfinance, or other way to go out of poverty (Armendariz de Aghion and Morduch (2005)).

c. Economic Growth

First of all, a better financial inclusion increases economic growth. According to Beck, Levine and Levkov (2010) this increase of financial inclusion creates a bigger benefit to those people at the end of distribution's income, and contributes to complete growth.

Next, a better level of financial inclusion allows a better growth, and at the same time, reduces inequalities. So greater financial inclusion decreases the degree of inequality and also the degree of poverty in a country and increases the growth rates. But some financial barriers like transaction and information costs exit, excluding poor people without collateral from the system. Any reduction in these constraints will be more profitable to the poor than to the rich because the capital allocation's efficiency will be better and also the access to funding will be facilitated so the income inequality will be less important (Galor and Zeira (1993)). But some survey found the opposite, i.e., the enhancement of financial inclusion would be more profitable to the rich. According to Greenwood and Jovanovic (1990) the relationship between income inequalities, financial development and economic development would be nonlinear. The increase of financial inclusion improves the growth, the capital allocation and also helps the poor. But the impact on the poor people depends on the levels of economic development, and the rich would be the only ones enjoying directly the effects of a better financial inclusion.

According to Beck, Demirgüç-Kunt and Levine (2007), a country will also grow faster and will reduce its poverty rate faster when it has a deep financial system. A country not having a good level of financial inclusion does not have a fast economic development because the financial exclusion acts as a break. By Galor and Zeira (1993) & Banerjee and Newman (1993), the main problem with a poor financial inclusion is the impossible increase of growth and decrease of income inequality. And because the income inequality persists in a country financially excluded, the redistribution has to be done again and again but it affects negatively the savings and work (Aghion and Bolton 1997).

Finally, Chibba (2008) says that the financial inclusion can decrease the poverty and that it will boost the "pro-poor growth". As well, the low-income people in under-developed countries and the small business can have an easier life when the financial inclusion rate is better for some reasons:

- Better access to financial services and less fees
- More options in formal financial services than in informal services
- Increased money management

Therefore, financial inclusion is part of the inclusive development with the aim of reducing the poverty.

d. Poverty (Households and Firms)

The financial inclusion has a good impact on the poor people. The impact varies with the financial services used to increase the financial inclusion. With the basic payments and savings, the improvement on poor households is encouraging. For the small and young firms, access to finance services is very positive because it allows creating new job, being more innovative and growing better.

If the access to the credit were improved, that would have a positive impact on poverty and the businesses. Actually a better access to credit allows the small company's development and also allows households to take an insurance against the common risks of life. A survey developed by Bruhn and Love (forthcoming) shows that an increase of access to credit (by opening a new bank's branch) increases the number of informal business in developing countries, increases the income level and also decreases the unemployment. This kind of new bank's branch requires lower income individuals and lower documentations. One notices that access to financial services is important for young and smaller firms particularly.

e. Rural Areas

When the financial inclusion increases, the rural areas grow up thanks to better and cheaper financial services: it's easier, for example, for the farmers to increase and develop their activities. The farmer can access a large panel of different financial services, and considering that they have a better financial literacy, they can choose the best financial services for their needs at a very good price. This way, they have enough money to enhance business and growth until the size they want reach. However, finance is part of the farmer's success but also his good management, his ideas, his knowledge of his activity… But this example is valid for all the people living in rural areas and having "their commerce or activity" there.

f. Competition

A better financial inclusion increases competition between financial banks. In this case, the banks have to offer better and cheaper financial services to customers because, if not, bank

users will go to another bank. Moreover, according to Douglas et al (2010), when the financial inclusion increases, the transparency goes up because local savings are closer tied to investment.

g. Taxes

The only negative one is the tax base. This tax base becomes bigger because the informal sector becomes smaller and the formal financial sector uses more taxes and so is more expensive than the informal.

4.2. Financial Exclusion Impacts

The financial exclusion has some impacts

- It may bar people from accessing vital services, employment… because these activities request an account for paying or for being paid.
- It may raise the number of theft because people keep the money at home and this is attractive for robbers.
- People do not use checks… or if they use them, the price of the services is higher and moreover they do not have access to credit.

Conclusion

In conclusion, financial inclusion involves a series of operations that assure simple access to the formal financial services for everybody in a country. When financial inclusion is good, the banking costs will be lower, the documents to fill in will be less important, and the proximity of the financial services will be better. As noted by economists, it is very important to increase financial inclusion to reduce poverty and improve development.

As we can understand from this chapter, financial inclusion is a very important channel through which one a country can boost its economic development. To this end, in the fifth chapter, we discuss many different kinds of solutions to enhance the financial services in the World with such solutions more or less available on the financial market, it would be easier for governments have a deep financial understanding.

Chapter Five – Solutions

Introduction

According to Banerjee and Newman (1993); Galor and Zeira (1993), important financial exclusion can lead to inequality and poverty traps. It's for that reason that many alternatives exist to avoid that a country is stuck in high financial exclusion. In accordance with the survey made by Galor and Zeira (1993), it is because of a lack of financial services that poor people cannot invest in their education.

For this reason, this chapter is dedicated to financial solutions. We begin with the solutions for the development of the private sector. On the one hand, for the private financial sector, the solutions are multiple: financial liberalization, financial intermediaries, banking correspondent, business models, and related lending. On the other hand, for the non-financial private sector, different solutions exist: electronic banking, mobile banking, and borrower personal identification.

The second section speaks about financial literacy solutions. All the generalities are presented. Then different policies that could apply to increase the financial literacy are evoked: financial education programs, targeting young people, and learning time.

The next section highlights how important the protection and market conditions are. First of all, in this section, we explain that the consumer protection on a financial market (considered as having a lot of risks) can impact a lot the use of services. Secondly, for the creditor, the protection is also important, because without a proper one, he will not accept to do credit, etc.

The fourth part highlights the microfinance alternatives. We explain what it is and how it works.

The fifth part, explains all the policies that can be taken by the government. First of all, for example increasing the legal and regulatory framework, enhancing the creditors' and shareholders' right. Secondly, they can promote the circulation of customers' information by making informational environment policies.

Then, we discuss the formal financial instruments that can be used like alternatives to the formal financial services.

The seventh and the eighth parts are focused on alternatives to "formal" financial solutions. We explain how important can be the role of the market environment and competition when a policy is applied, because, sometimes, one can work perfectly in a country and be a disaster in another. In the last section, eight, we expose an alternative to the basic solution, and some models. These models are five in number: the financial sector consensus model, the public sector leadership model, the private sector model, the civil society / NGO model, and the catalytic model. All of them can impact positively the use of financial services.

5.1. Private sector development

5.1.1. Financial sector development

According to Hossein and Kirkpatrick (2005) this sector is important in the reduction of poverty and growth. In this sector, the measures have to be taken in the medium and long term by regulatory, economic, institutional and related dimensions. For developing a country, it is very important to focus on the enhancement of financial inclusion issues and not only on the financial services development. But we have to notice that this financial development is slow because the liberalization of the financial sector takes time.

a. Financial Liberalization

i. Generality

First of all, the financial liberalization in countries impacts so many things. For example, it relaxes the financial constraints, increases the supply of domestic capital, decreases the costs of capital, brings foreign capital in the country…but the most important are the enhanced growth and investment. As well, according to Levine and Zervos (1996) the liberalization of the capital market has a very good impact on efficiency, assets allocation and growth.

Then, Bekaert, Harvey and Lundblad (2006) find that after the financial liberalization the volatility of consumption will decrease, but not when a country has inadequate political institutions. They conclude, "*Political factors are more important than legal factors in driving consumption growth volatility*".

Finally, according to Das and Mohapatra (2003), when the market is liberalized, the income growth enhances for the twenty percent richest people of the population but unfortunately, the poorest do not enjoy much of this liberalization. Khwaja and Mian (forthcoming) find that sometimes insiders enjoy their position and do abuse on mutual funds reform. Furthermore,

most of the reforms often apply to reduce the inequality in benefits at the insiders level more than at the under-banked people, through growth and rents opportunities or also through allocation of assets. So the insiders are most of the time the first to enjoy the privatization of state-owned banks.

ii. Financial risks due to liberalization

Firstly, the financial reforms and the liberalization create financial risks. Sometimes after the liberalization, crisis can appear, due to the inequality, the moral hazard and also weak political responsibility. Galbraith and Jiaqing (1999) find that these crises enhance the inequality, and mostly in a developing country, and also in the part of the policy where the regime is more liberal. These crises do not touch only the poorest people (who are few to lose out) but also the low middle segment (for example single mothers, people without education…).

Secondly, Dell'Ariccia, Detragiache and Rajan (forthcoming) find that in sectors with few big firm, the impact of the financial crises will be more important for such sectors that for the ones with a lot of big companies. The impact in country with a lot of corruption and few institutions is not uniform.

Lastly, Glaeser, Scheinkman and Shleifer (2003) show that in most of the countries, when there is institutional corruption, the rich do not do institutional reforms but try to help the population, the "Robin Hood" way, by redistributing the assets. This kind of event can affect negatively the growth and economic, social progress.

b. Financial Intermediaries

As well, Beck, Demirgüç-Kunt and Levine (2007) find that a lower income inequality is correlated to a development in financial intermediary. That means that countries will decrease faster their level of poverty or their level of income inequality when they have good financial intermediaries. Moreover the income of the poor people will be increasing more compared to the rich, by the enhancement of financial development.

c. A banking correspondent

A banking correspondent is somebody who works on behalf of one or more banks. For example, it will be somebody doing transactions for a bank but outside of the bank branch's network, like a supermarket, a post office, and gasoline stations. Sometimes a banking

correspondent can be also a mobile agent offering banking services through mobile banking company.

These kinds of correspondents have allowed a rapid growth of financial inclusion with the use of payment technologies and mobile banking (tied to a bank's branches), by reducing the transactions costs. The banking correspondent is an innovative perspective because this links at the same time news delivery channels and mobile technologies. Thanks to that, some banks grow and cover more geographical area. It's a win-win for the bank and also for the population using this system.

One of the advantages of this system, although not necessary to use it is a mobile banking phone. Another, is that this service offers different financial service like for example savings, insurance…According to Allen, Demirguc-Kunt et al (2012), the introduction of banking correspondent increased by five percent the use of formal accounts by the adults in the "bottom income quintile". According to a survey did by Global Findex (2011), Brazil is an evidence of the success of this kind of financial service: in Brazil, for example, the Central Bank pushes the financial institutions to be more available for the poorest minorities by doing a partnership with some retail establishments. So this case proves how the new possibilities of financial services can decrease the financial exclusion in a country.

d. Business models

The financial inclusion can be impacted by the business model used by the financial services institutions. All these institutions use different systems to balance the exchange between sustainability and outreach. So between being able to create profits, to cover operating costs and the possibility to extend to the excluded and poor people; the bank has to find a good balance.

According to the G20 (2010) some reasons can explain a financial institutions failure:

1. When the institutions do not follow a human objective because they do not take the time to understand the needs and the lives of their customers
2. If they do not center their organization, their product's design on the customer (including governance, processes, delivery channels…). The financial services institutions generally misunderstand all of this.
3. An institution can fail when it does not take the time to do some test on new ideas, products, to find out what it is the problem, the failure of new products.

4. Sometimes the failure is due to the lack of government support to promote the new idea. Moreover, sometimes, they did not build a regulatory and supportive framework for helping the financial institutions to grow.

e. Related lending

A solution for a poor informational environment and weak property rights are related lending and joint control. Cull, Haber and Imai (2006) find that the related lending can be one of the good solutions for appropriate institutions environment, but not for the poor institutions environment. According to Khwaja and Mian (2005), when the country is largely under the influence of politicians, the default rates on connected lending will be high. The government's direct control over the financial institutions has to normally regulate the inequality, but according to La Porta, Lopez-de-Silanes and Shleifer (2002), this is inefficient and most of the time the sub-groups and the politically connected firms only benefit from this direct impact.

5.1.2. Non Financial sector development

A lot of new technologies could expand financial inclusion. For example, with tools like mobile payments, borrower identification using biometric data (for example finger print), mobile banking… financial services would be cheaper and more accessible for people. The improvement in the information technologies has allowed financial services to serve more unbanked areas thanks to the improvement of technologies for borrower identification and credit reporting, so it has reduced financial exclusion.

a. Electronic Banking

In 1950, credit cards were introduced and grew quickly between 1950 until 1990 thanks to some card associations like MasterCard and Visa. In the early1990's, the online transactions began because of the sophistication in the information processing and also in telecommunication technologies. In 1980, debit began to appear but in some countries, its introduction took more time because of some issues (for example the lack of infrastructure, the lack of credit information, the success of debit cards, the cultural preferences…). But in the last years, credit cards evolved more than debit cards because people find easy to pay directly with their credit card than to go to the ATM, do a withdrawal of cash and go buy products and services. So the credit card has grown partly thanks to the debit card infrastructure that was in place.

The electronic banking can help to increase the financial inclusion in a country. "Electronic banking" designates all electronic treatment, informatics treatment and telematics treatment necessary for the monetary management, money transaction and funds transfer. The electronic banking corresponds to ATM (automated teller machine) and EPT (electronic payment terminal), those are materiel interface allowing to do financial transactions without paper, thanks to a banking card. In the industrial countries, the financial services are more and more virtual or electronic rather than cash or paper. Internet banking had grown so much these last years in these countries.

b. The mobile banking[12]

i. Generalities

For the mobile money, one condition must be respected, a high penetration of mobile phones in the whole country to develop the mobile banking. Each day the number of mobile money's users increases. Mobile money allows so many people not to be excluded from the formal financial system. Thanks to this, they can execute cheap, reliable and secure transactions. They have also a type of account allowing making deposits and withdrawals channeled through cash transactions at a retail agents network. They can pay bills or transfer money by sending text messaging. But unfortunately customers are charged when they want to send money to others for example.

The study realized by Demirguc-Kunt and Klapper (2012) showed that this alternative worked very well in Sub-Saharan Africa where more than fifteen percent of the population declares having used a mobile phone for paying stuff, receive money, send money… in the past year. In the high-income economy, most of the people using the banking mobile have as well a normal formal account but it is quite different in the developing countries. In developing countries, most of mobile banking users do not access to the formal financial system. Nowadays, in the low-income and middle-income countries, the number of people using a mobile account is more important than the number of people having a formal bank account. For example, according to the same survey done by Demirgüç-Kunt and Klapper (2012), in 2011 in South Africa there were 127 mobile subscriptions for every 100 habitants against fifty-four bank accounts for 100 habitants. Or also, in India, there were seventy-two percent of mobile phones for thirty-five percent of bank account owners. So thanks to this number, we can imagine the impact of mobile banking on the financial inclusion.

[12] "Mobile banking" can also be mentioned in this text as "mobile money".

Nevertheless, mobile technologies have to develop more to allow a better access to financial services. Alonso et al (2013) show that in Mexico, the demand is more important for the mobile money than for bank accounts, the gap being about forty percent.

But we have to keep in mind that the number of transactions done by mobile banking is still small next to the normal banking transactions. For example, according to a survey by Jack and Suri (2011), in Kenya, the introduction of mobile financial services was successful, the number of basic transactions is 700 times more important than of mobile transactions.

ii. Conditions

Knowing that these kinds of applications are quite expensive, the number of participants joining the system has to be quite massive. So the success of such a system will be dependent on the number of users. Moreover this system will be conducted by a large mobile network operator of the country, but if the country does not have such a good mobile banking system, the growth will be slower because of the necessary investment to do it.

Some government policies had to help to increase the adoption of mobile banking. For example, one of these will be "the use of government to person (G2P) payments". This policy could provide a good growth of financial inclusion by affecting a lot of money into financial formal services.

iii. Trouble

But mobile banking is not much allowed to be used like a saving account because it was created as remittance systems.

iv. Impact on The Economic Growth

According to a survey made by Fin Mark (2009) (cited by Andrianaivo and Kpodar (2011)), the largest part of the African population is under-banked or uses informal financial services. So the enhancement through mobile phone would increase the economic growth channeled by the increase of financial inclusion. This increase will be promoted by using information and communication technologies (ICT) reducing the financial intermediaries' transactions costs. Moreover, knowing that according to Rasmussen (2010) branchless banking is cheaper that the formal banks, the ICT would increase the number of branchless banking. And if the country has a good telecommunication network, the asymmetries in information access will be reduced by a better flow of information.

The impacts of the mobile telephony on the financial services are the expansion of financial services and the increase of the access for under-banked people. This increase of the use in mobile phone, enhance in under-developed countries the branchless banking services and so also increase the financial inclusion, because in these areas the cost for a formal bank (distance and time) is very high. Moreover the mobile phone permits a better access to deposit and credit facilities, but also facilitate financial transfers.

According to Andrianaivo and Kpodar (2011), the countries with a lower income will grow faster next to other ones with similar conditions (level of human capital, institutions…) except the income. Moreover, they show that the increase of mobile phone penetration can improve economic growth by the improvement of financial inclusion.

c. Borrower identification

One of the most important problems of the credit market is the lack of reliable information that increases the financial exclusion because banks disagree doing a credit without enough information.

In the developed economies, a national identification system exists to identify each person wishing to make a loan. But in the low-income and middle-income countries, such a system is difficult to implement because no universal identification exists. Moreover when some "formal documentation" exists, it's difficult to be sure about its authenticity.

i. Biometric data

To face the issue of lack of means for borrower's identification, a lot of countries decided to use innovative technological solutions. One of these is the biometric forms of identification. This biometric identification (like fingerprint, iris scans…) linked to the borrower's information and also to his credit history, will allow the reduction of information problems, moral hazard and also the increase of transparency in the credit market. Giné, Goldberg, and Yang (2012) conducted a field experiment in Malawi about the introduction of the fingerprint like a borrower identification form. This study reveals that the use of such a method decreases all identification problems in the financial world. According to them, this led to higher rates of repayment because it raised the credibility of the borrower and moreover it impacted also the "amount's size" of the chosen loan (with the fingerprint's identification, the loan will be smaller) and adverse selection (the fingerprinted person diversified more for decreasing the moral hazard). Also Karlan and Zinman (2009) arrived to the same conclusion by doing a survey in South Africa.

ii. Credit reporting technologies

The credit reporting is an important aspect for the bank because it allows different institutions to share credit information (for example the creditworthiness of borrowers).

One of the problems is that the different banks are not open to share this kind of information with competing banks. One of the matters is that the credit reporting institutions only cover the persons who are inside the formal banking sector.

One of the solutions for enhancing the financial inclusion would be to use these institutions also with the people outside of the formal system (microfinance borrowers and nonbank financial institutions).

5.2. Financial literacy

5.2.1. Generality

The National Foundation defines the financial literacy for Educational Resources (NFER, 1992) as: "*the ability to make informed judgment and to take effective decisions regarding the use and management of money".*

People having a better education will be able to save and borrow because they understand better how it works.

Financial education to the unbanked person or person with limited financial skills will be enhancing the financial inclusion. A good financial education could help people to understand better all the available financial tools. According to a survey done by Financial Development Barometer, an important part of the population considers the lack of financial knowledge as one of the most important barriers to access financial services and products. The enhancement of financial inclusion could be one of the government policy proposed for generating a rise of financial inclusion. The financial education and capability (= financial knowledge, financial skills) are so important all over the world in order to be sure that every citizen can understand what he is doing, because for the moment, only, more or less fifty-five percent of all populations has financial knowledge. According to Lusardi and Tufano (2009), most of the consumers do not know the product's features and sometimes make bad decisions; and formal financial institutions benefit from it. By Gross and Souleles (2002), a lot of credit card users pay high interests because they are in debt even if they have liquid assets on another account. Generally the bank uses irrational choice and imperfect market conditions to their advantages;

also consumers make poor choices (that is, decide without knowing in what they invest for example). Van Order, Firestone and Zorn (2007) noticed that a consumer would do fewer mistakes if he would be better educated. Therefore, (Dwyer, Gilkeson and List (2002)), a good financial literacy is correlated with good financial decision makers.

But in spite of the good financial knowledge, people do not make the right choice each time. So a good knowledge is not always correlated with a financial capability because experience in the sector, the right attitude and motivation are also important to take the right decision. Moreover, according to Van Rooij, Lusardi and Alessie (2011), gender impacts the financial literacy levels, and men are better at having good financial knowledge.

5.2.2. Some Financial Literacy Policy

a. Financial education program

A financial education program would increase the financial capacity and affect behavior and financial knowledge. Kempson, Perotti and Scott (2013) say that people with a high educational level, will perform better with all financial decisions. So the rate of accounts is higher in people with a greater level of education than not.

One notices that, according to Cole, Sampson and Zia (2011), the level of financial literacy has an important impact on the financial inclusion and also, a less important one on the household wealth. Therefore, when a financial literacy training policy is installed, the impact of it will be more important if this policy addresses consumers with low level of financial knowledge.

Moreover, the incentives, the cost barriers, have an impact on the opening of a bank account, for example the incentive can boost the consumers' participation in the financial markets.

b. Targeting young people

In this case, financial literacy policy will be targeting the young people by teaching the financial capability and literacy in the school-based programs. Some economists try to evaluate the impact of such method and the results are mixed. But according to Mandell and Klein (2007) the student engagement with the financial class would be an indicator of good result.

c. Teachable moment

The "teachable moment" means that it would be more interesting to teach the financial knowledge at the time where people want to use it and need it at work for example.

Sometimes, the matter is the way to teach the financial knowledge because firstly it can be expensive and secondly it is quite boring for people because they do not pay a lot of attention even if the teacher tries to do it interestingly, or they become quickly distracted.

Other ways than the traditional ones exist and they are cheaper. For example Berg and Zia (2013), highlight that one of the financial education examples is a soap opera broadcast on the African television. This soap opera contains financially irresponsible behavior and thanks to this, the people can understand that it's not a good idea acting like that. Spader et al (2009) also did a survey on the impact to do a soap opera talking about financial concepts; they found that this kind of program could boost the financial knowledge and skills of the viewers.

5.3. Protection and market conduct

5.3.1. Consumer

The financial markets have risks for the consumers present on this market. It is for that reason that consumer's protection is established for bank users. This protection is useful when there are financial knowledge gaps in the society, and also when the country tries to enhance its financial inclusion by opening new financial institutions or when banks open new distribution channels.

The protection of the bank users can enhance their confidence and boost their motivation to enter the financial system, financial market. According to a survey did by Giné, Martinez de Cuellar and Mazer (2013), clients never receive the product well adapted to their needs for the cheapest price simply because this way, banks can do more profits. As well, Carlin (2009) shows that financial institutions enjoy the information asymmetries and also take advantage of the consumers' limited understanding. Moreover, Brix and McKee (2010) noticed that when a consumer takes the decision to purchase a financial product, a lot of problems can appear (financial staff behavior, client data treatment, product marketing, selling practice). A good policy will be one increasing the fair treatment in business by using for example incentives for encouraging the competitiveness for identifying the good actors.

Therefore, according to Beshears et al (2009), protection policies for customers are more difficult to implement in a low income and low access environment; a good implementation depends on the structure of the local market and depends also on the consumers' skills.

5.3.2. Creditor

In a country with a good investors' protection and a bigger capital market, the market will be larger and ownership wider. Djankov, McLiesh and Shleifer (2006) show the relationship between the creditor protection (using information sharing and legal system) and the higher private credit to GDP ratio, though this is most important in the richest countries.

5.4. Microfinance

Microfinance is one of the most powerful ways to increase the access to financial services. The microfinance provides a financial service to populations excluded from the traditional banking system. But not everybody enjoys this system, so they use informal financial systems that are very expensive or risky. So the microfinance tries to offer a large panel of different and diversified financial services (saving, micro insurance, mobile banking, the green microfinance, electronic transfer, specific credit for SMEs…) to improve the financial inclusion. Moreover the microfinance services providers have a lot of different forms (for example, non-governing organisation, cooperative, public limited company…). The microfinance company (for example AFD (Agence Française de Développement)) helps also underdeveloped countries to grant access to electricity by buying energetic equipment.

Microfinance wants to increase the financial inclusion by supporting the development of:

- Adapted public policy
- Regulatory framework and institutional efficiency
- Market infrastructure
- Financial and non-financial operator
- …

The payment service is available for poor people only at high costs. But this kind of financial cost barriers can be avoided by the informal loan by microfinance institutions that can reach very good repayment rate compared to the formal banks (Robinson (2001)). Moreover, according to Cull, Demirguc-Kunt and Morduch (2007), only half of the microfinance institutions will be profitable. Some reasons can explain this, on one hand, the lack of people using microfinance institutions overall; on the other hand, because of the growth of these institutions, they are less focused on poor people because their only goal is to grow. Therefore, a major part of the microfinance institutions are still alive thanks to the subsidies. Rajan (2006) finds that if these institutions want to stay on the financial market, these have to make money and add value.

5.5. Public sector development

The public policies procedures, accountancy mechanisms or public programs have to support the legislation and ensuring the appropriate regulations to facilitate financial inclusion. The most important role for the government when they want to enhance financial inclusion is to deal with the barriers in the demand and supply of financial services. One of them is asymmetric information, another one is high transactions costs. As well, the government can play different role to help reduce financial problems for avoiding the good development of financial inclusion.

5.5.1. Legal and Regulatory Framework

By developing the legal and regulatory framework, the government can impact positively the bancarization. According to Djankov, McLiesh, and Shleifer (2007), financial inclusion can be enhanced by the government and some legal institutions. Levine (1998) said that the enforcement of creditors and shareholders' rights and the protection of the private property are very important for the enhancement of financial inclusion. The government has to make laws to be sure that the creditors and shareholders rights will be protected as well as the private property, because the efficiency of these laws and enforcement imply a better availability and lower costs of credit for the households.

Warnock and Warnock (2008) show that a country would have a greater housing financial system when it has a strong protection for legal rights. But also some studies revealed that the enforcement and the strength of creditors rights would impact on the households debt refund. Duygan-Bump and Grant (2009) concluded that the households facing an adverse shock and have a poor creditors right protection, will be more inclined not to pay their debts. Moreover, some studies (Di Tella, Galiani ans Schargrodsky (2007)), show the property rights, access to finance and land titles have an important impact on the households' behavior relative to using financial services. Galiani and Schargrodsky (2010) find that the improvement of household's welfare increases the long-term investments.

5.5.2. Information Environment

According to Pagano and Japelli (1993), the sharing of information would reduce adverse selection in financial markers. Therefore, Padilla and Pagano (2000) find that borrowers would be disciplining when the information is shared, one of the impact will be the repayments and the projects of loans. So the government will be able to impact positively the financial inclusion by increasing the access for banks to borrowers' information, or also by

creating a law for forcing banks to share their borrowers information. A study made by Galindo and Miller (2001) shows that in the countries with a high rate of borrowers information sharing (due to the presence of credit registers), the access to banking is easier. But Maddedu (2010) highlights the fact that to be effective, the public registers have to offer a lot of borrowers information.

5.5.3. Subsidies and Debt Relief Program

By improving the subsidies and debt relief program, the government can enhance the financial inclusion. But it is quite difficult to be sure that the subsidies will reach the good target group or also it is not sure that it would have effect hoped-for. Moreover, subsidies can be discouraging competition on the financial market and also hamper the good impact of new financial services. The government can take part of the policies supporting the credit's access at a rate below of the market.

5.5.4. Direct Interventions

By increasing the use of other direct interventions to increase financial inclusion, some strategies are the use of state-owned banks, the government to person (G2P) payments, the use of government postal services…

First of all, in the financial services area, the government can enhance the financial inclusion by using the G2P payments to raise the request for bank accounts. Allen, Demirguc-Kunt et al (2012) said that government policies for increasing the financial inclusion could impact positively the individual perception of bank accounts, by giving the feeling that the financial services are more accessible.

Secondly, by raising the financial competition on the market, because if the competition is more important, the services proposed will be better and more adapted to the country's need. Supporting the financial services to build the good environment for expanding the access, and increasing the market competition.

Then, they can also influence the financial inclusion by teaching the population the financial basics, to increase the awareness, and also allow the population to use their account more responsibly. For a better financial literacy, it would be great to invest in financial education programs to simplify the understanding; the target will be women and rural people.

After that, for the costs reduction and a better availability, it would be good that the government support the financial innovations like, for example, the mobile banking, the e-banking…

Finally, the public sector can remove the non-market barrier for allowing an equitable access to financial services by applying antidiscrimination laws for example.

5.6. "Formal Financial Instruments"

There are a lot of alternative financial institutions like a financial cooperative, MFI's, credit union, factoring company and leasing company. Stein (2002) said that these institutions are more flexible than a bank for micro, small and medium firms or households that do not have all the available documentation or information that a formal bank request.

A study made by Beck, Demirguc-Kunt and Singer (2011) analyses the different kinds of financial institutions. For example, in developing countries, a high share of specialized lenders (like leasing and manufacturing company) and down-market financial institutions (like cooperatives, credits unions, MFIs…) are the most important for allowing a better access to finance. For them the larger institutions are better to enhancing the access of financial services. So in countries with a low GDP per capita level, the down-market institutions and larger banks could improve the access to loan and financial services needed by small company.

In the savings case, everybody is not using a formal saving account but alternatives exist. In the industrialized country, savers could choose between many different kinds of product (but they are more complex and risky). For example some investment products offered by equity, commodities (gold, cash…) or purchase government securities. But in developing country savings clubs are the best alternative. This practice is very common in Africa.

5.7. The role of the market environment and competition

Sometimes, two same countries can adopt exactly the same policy to enhance the financial inclusion, but after one year, the results are completely different.

a. Example: Mobile banking

There is no correlation between the use of mobile phone for doing payments and the subscription of mobile phone. A survey made by Flore-Roux and Mariscal (2010) between Russia (having one of the highest mobile subscription rate of the world with the lowest rate of mobile banking phone) and Somalia (one the lowest rate of mobile phone's subscriptions but one of the highest rates of mobile banking phones) tried to understand why the low correlation exists. In the case of Russia, if the Russians do not use their mobile for this kind of operation, it is because they prefer using cash and they are not very sure about debit and credit cards. So in Russia, the payments by mobile phone are less important compared to other countries with the same level of income and the same level of education. Now, in the case of Somalia, it is completely different because of the security conditions in the country. The impact of the launch of this mobile banking service on the financial inclusion was unexpected, because now Somalis can easily execute payment, transfer money, receive remittance (=70% of the Somalia's GDP) from their family only with their mobile. Flore-Roux and Mariscal (2010) arrive to the conclusion that any factors can explain why a policy works better in a country than in another.

b. Explanation

According to Faz and Moser (2013), the success of providing a financial service to a mass market will depend on the revenue for each probable customer, and moreover the number of probable customers. There is a first strong correlation between the income per capita and the financial inclusion, and also a strong correlation exists between the population's density and the financial inclusion. A second correlation exits, this is highly explained by the economies of scale in a country with a high population density even if the income per capita is low.

With it, three classifications of financial inclusion environments can be highlighted:

1. Low population density and low income:
   This environment is characterized by the lack of banking infrastructure and so a high rate of telecommunication providers.

2. High population density and low income:

   This environment is described by a good telecommunication service but also by a good number of financial infrastructures.

3. Low population density and high income:

   This one is considered by a good telecommunication infrastructure as good banking structure.

These new technologies can change the financial inclusion in a country because they can reduce the prices of financial services. This decrease of costs will be more important in countries with a low population density and also a low income per capita and more specifically for the minorities underserved by the traditional financial services (they were excluded for the high costs of providing this service).

One of the disadvantages of such methods are the high burden for the providers because they have to be sure that the technology will be adopted and secondly that the price of it will be accessible to everyone (unbanked and banked people). Another one will be the environment; it should be legal to implement the new financial technologies by protecting the customers' right. Indeed to collect more easily the information about the borrower, a reduction of the competition will be a good solution.

5.8. Models

According to Chibba M. (2009), five models exist (+Appendix: Literature Review, table 1), and are complementary to financial solutions; which try to enhance financial inclusion:

a. The financial sector consensus model:

"This model is the result of the path-breaking initiatives in South Africa, notably development and adoption of the FSC by formal financial sector institutions, given favorable governmental, institutional and political climate in the post apartheid era" Chibba M. (2009). Its main characteristics are:

- Governmental leadership for a financial development including mechanisms, policies and rules to boost financial inclusion.
- Consensus: it means that formal financial institutions work together to reduce the financial exclusion.
- The information base has to be shared for knowing all the information about unbanked and banked population.

- New financial products or developments are introduced on the market
- The government has to follow providing some public sector intervention and also a good financial environment.

b. The public sector leadership model:

The public sector elaborates the action plan and the strategies, allow the development of banking rules and regulations and helps in the enforcement. The services and products offered are for example financial literacy, microfinance, technological financial products…The government is an important link in the increase of financial development through its public banks.

c. The private sector model:

This sector uses financial and non-financial entities. It acts somewhat exclusively or conjointly, or also does partnerships (with NGO or public sector). Its aim is to improve the financial inclusion initiatives and financial literacy, to support microfinance. Further, the private sector wants to facilitate the financial access by reducing red tape, improving the rules and doing more regulations.

d. The civil society / NGO model:

They are voluntary organizations, non-profit entities, and educational institutions, other NGOs. Their strengths lie in some financial services but also in training and education (=financial literacy).

e. The Catalytic Model:

This model is represented by the bilateral and multilateral organizations. It has financial inclusion objectives and goals through channels such as research, partnership, advocacy, advisory services and facilitation funding.

Conclusion

We presented in this chapter all the financial possibilities to get a better financial depth in a country. But all these solutions are not easy to apply, they are expensive and they take a lot of time to implement. As we highlighted here, sometimes a policy can be a success in a country and a disaster in another. So the country never knows if the financial modification will be impacting their production positively. How the government can be sure of its choice, without having the feeling to take a risk?

Moreover in all the literature review, we explained how important the financial inclusion can be for a country, for its development, but also for its citizens.

In the second part of this work, we try to develop an equation to calculate the impact of a financial improvement on the production channel trough total factor productivity and capital per capita. We hope that, thanks to this equation, it would be easier for a country taking such a decision to be sure of its choice and not loosing money by applying this one. So we run a path analysis, with which we simulate the impact of an increase (or decrease) of financial inclusion if the country is in financial inclusion deficit (or surplus). That way a government could make its decision knowing the “real” impact on its production if it is in deficit (or surplus). If the country is in surplus, it could dedicate a part of the amount for financial inclusion to another area, like health or education, for instance. Or, in the deficit situation, try to find a way to collect necessary means and make the good policy decisions to increase its financial inclusion.

Empirical Part

Introduction of empirical part

The literature on the impact of financial inclusion on growth and development is typically concerned with microeconomic case studies focusing on rural development, gender and aspects of inequality. Such studies generally lend support to the hypothesis that an increase of financial inclusion has positive effects on these socioeconomic variables. Little, however, is known about the exact macroeconomic transmission mechanism from financial inclusion to economic growth and development. A still unanswered question, at least according to our knowledge, is the following: Does financial inclusion stimulate economic growth through higher total factor productivity, through higher capital per worker or both? Answering this question is the objective for this empirical part of our work. This part will show the impact of an enhancement of financial inclusion on production through total factor productivity or through capital per worker, or through both of them.

This question is highly relevant for public policy: Does financial inclusion serve the public good or are its benefits only consumed privately? If, on the one hand, financial inclusion works through an increase of capital, which is more a private good, the development of financial services for the unbanked should be left to private initiatives. If, on the other hand, financial inclusion works through total factor productivity, a public good, the development of access to banking opportunities must be seen as a public policy priority. In this part, we provide strong evidence for the fact that an increase of financial inclusions carries both a strong social and private development dividend.

This part is organized as follows. We present a theoretical part of formula, statistic tests and path analysis that are used in the study in chapter six. In chapter seven we introduce our theoretical model and hypothesized relationships between financial inclusion and the economic growth parameters total factor productivity and capital per capita. In chapter eight, we discuss our data and methodology. A discussion of our results follows in chapter nine. And finally in chapter ten we carry a simulation of their estimated economic significance. We conclude with a summary of the main findings and outlook, as part of the conclusion.

Chapter Six – Tools required

6.1. Introduction

This chapter highlights and explains all the theoretical concepts needed to better understand the study. We begin by explaining, the formulas on which we based ourselves to create our theoretical model (Cobb-Douglas production function and Solow model). We follow with the statistical tests (OLS and TSLS) used to test our model. And we finish with the explanation of the path analysis that we used for knowing the coefficient used in the simulation part.

The explanations of the theories that follow were sought through five different books ("Introduction to quantitative research methods, an investigative approach"; "From basic to advanced modeling techniques"; "Theory and problems of statistics and econometrics"; "Using Econometrics: a practical guide"; "Econometric Analysis of Cross Section and Panel Data"). Moreover, we also used the Gretl User's Guide to explain them, because we tested our model on Gretl Software (a statistics program). We did not refer the different theories to specific books, as we used all of them for each theory. When we used other sources than those mentioned, they will be referenced.

6.2. Formula

6.2.1. Cobb-Douglas Production Function[13]

a. Generality

In 1928, the economist Paul Douglas and his friend, a mathematician, Charles Cobb invented the Cobb-Douglas production function. The function is:

$$Y = A\,K^{\alpha}L^{\beta} \qquad (6.1.)$$

Where:

- Y = total production / output (value of all the production of the year),
- A = total factor productivity,
- K = capital input (the value of all buildings, equipment and machinery),
- L = labor input (total number of workers in one year, in hours),

[13] According to Border (2004) and Bao Hong (2008)

– α & β = output elasticities of capital and labor respectively, the value of α/β is constant. The value represents output responsiveness to an input change (worker or labor).

→ Therefore, this formula represents the correlation between an output and inputs.

b. Conditions

– K & L: K ≥ 0 and L ≥0, they represent K, capital and L, labor and they are never negative.

– α & β: $0<\alpha<1$, $0<\beta<1$ and $\alpha + \beta = 1$. Moreover those coefficients have to be constant over time and similar between the same sectors in a developed economy.

c. Problems:

But this formula has limits, because it was not developed by an engineer or person having knowledge in the production management or technology, hence there are no micro foundations. When we consider two sectors having the same technology according to Cobb-Douglas, the labor and capital will be exactly the same for both sectors. Therefore, the key repartition in this formula between labor and capital is constant over time and in developed countries but those constant coefficients are, today, criticized.

6.2.2. Solow Model[14]

a. Generality

Robert Solow and Trevor Swam invented the Solow Model, an optimism (it does not provide for crisis situation) neoclassical production function, and mathematical description of economy. This model, based on the Harrod-Domar model, was created to describe the World economy in an easy and simple way.

This neoclassical economic function is based on Cobb-Douglas, and solves the limits of the Cobb-Douglas functions:

$$Y(t) = F[K(t), L(t)] = K(t)^{\alpha} L(t)^{1-\alpha} \quad (6.2)$$

$$\rightarrow Y = AK^{\alpha} L^{1-\alpha} \quad (6.3)$$

[14] According to Acemoglu (2011) and Solow Growth Model.

Where:

- Y = total production
- L = labor
- K = capital stock of the economy
- A = level of technology, total factor productivity
- α = capital share
- $1 - \alpha$ = labor share

b. Hypothesis

- The main hypothesis is that the capital is subject to diminishing returns. It implies that the impact on output of the last unit of capital accumulated will be less important than the one before.
- Closed economy, no international trade or government (→ Y = I + C)
- Infinite horizons (continuous time)
- Single good produced with a constant technology
- The supply is equal to the demand; all production factors are completely used
- The initial value is given for K (capital) and L (labor)
- Labor force grows at the constant rate n = $\frac{\dot{L}}{L}$
- The saving rate and the depreciation rate are constant

According to those hypothesis:

- If we increase the capital quantity, the growth increases and so with a more important capital, the labor increases its productivity
- The poor countries have a highest rate than the rich countries because they have less capital accumulation, namely that a capital increase will impact most importantly the production in comparison to a rich country.
- Because of the diminishing returns of production function, the economy will reach at some point the amount of new capital produced, to be just enough to cover the existing capital amount lost due to depreciation. At this moment, the economy will cease to grow (hypothesis: no technological progress or labor force growth). But this is found to be foolish because nobody has ever reached this point, because the technological progress increases the factor of productivity.

c. Limits

The problems are the fact that technological progress and source of growth are staying unexplained. As well, this model is not very realistic because of the very simple hypothesis. For some economists, it is unrealistic to think that it is possible to explain economic growth with only three factors (labor, capital and technological progress), whilst it does not take into consideration the natural resources and the energy.

But it is very useful to explain the wealth differences. According to the Solow model, output per worker depends negatively on the depreciation rate and the population growth rate, and positively on the saving rate. So rich countries are rich because they have a high saving rate and a low population growth rate in comparison to developing countries.

6.3. Regression methods and problems

6.3.1. OLS

We begin the statistical tests with Ordinary Least Squares (OLS), because this is one of the simplest and most useful methods for doing regressions and testing a model.

a. Definitions

We use the OLS linear regressions when we want to understand dependent variable "y" explained by independent variables "x" (used to predict y). Moreover, we have "n", the number of independent variables used. The regression is therefore the task of predicting "y" knowing "x_n", and regressions try to predict real numbers for the dependent variable.

b. Linear regression

This method is used to solve the problem (the value of y) by hypothesizing that the dependent variable is a linear function:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots + \beta_n x_n \qquad \text{where } \beta_n \text{ are constants} \qquad (6.4)$$

The aim is to find the best value for these constants and to achieve the most precise formula possible. The coefficients' accurate value will be chosen by looking at the corresponding y value, and the past example x_n values.

c. Least squares regression

The OLS method says that we will pick these constants; therefore for each example from the training data (sample of y values matching to x values) we minimize the sum of squared

differences between the actual dependent variable and our predicted value for the dependent variable. In other words, we want to minimize the sum of the values (actual y – predicted y)^2 for each training point.

$$\rightarrow (y - (\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \cdots + \beta_n x_n))^2 \quad (6.5)$$

We apply this formula for each training data that we have, we solve it, and we will then find the coefficients.

d. Problems

Only the problem that we meet will be noted below:

- Outliers
- Non linearities
- Too many variables can affect badly the model, for example R^2 go up. In this case, we have to sort out the variables to be sure that the variables used are necessary (no redundancy for example). The size of training data has to be bigger than the number of independent variables. And a lot of other solutions can be used
- Dependence among variables
- Wrong choice of error function
- Unequal training point variance (heteroskedasticity)
- Wrong choice of features, no strong relationship between y and x
- Noise in the independent variables

e. Outlier

i. Generality

Outliers are a statistical problem difficult to deal with; this statistical issue can easily confuse the regressions. Therefore, we cannot drop off an outlier just because it does not follow "his data friends". An outlier is a data having an unreasonably small or large value for dependent variable in comparison to the rest of the "training data". Knowing the method of OLS, minimizing the sum of squared error, a data with a value extremely different from the other values, will negatively impact the results. The more the dependent value is abnormal, the more this value will impact strongly the OLS solutions. Moreover, when the outlier's value is very high, the other values near the outlier value will be ignored, hence this value can be predicted precisely.

ii. Causes

- Sometimes they are due to incorrectly measured data, one can abandon this observation when the results are impossible (a person with a weight of 10kgs)
- When the outlier is far away of the other observations in a graph, if it does not affect the results but affects the hypothesizes. But when the outlier affects both, we have to run the regression with and without, before abandoning it.
- When the outlier creates the relationship between X and Y, you have to abandon it.

Sometimes, you can fix the outlier problem by doing a log transformation and the results will be better after it. Another model can be tried, to fix this issue, for example, we change a linear model for a non-linear one.

iii. To eliminate outlier

We use an Excel formula to highlight the outlier, and we create a new column of data, called "outlier", then we insert it in Gretl and use it in the regression.

f. Log transformation – Double natural log regressions[15]

i. Generality

The log transformation is used when the residuals get bigger for more important dependent variables values. "*Such trends in the residuals occur often, because the change in the value of an outcome variable is often a percent of the value rather than an absolute value"* [16]. Even if the percentage error is the same, if the variable value has a bigger value, it means a bigger absolute error, and the residuals will be more important. In this case we apply the natural log to the variable values, and the logs come in the residuals for more important values. In our case, we modified the data when the Chi-squared was too high.

ii. Equations of log transformation[17]

The log transformation happens in three different steps, as explained below.

1. This regression specification is called "level-level" the y values (the raw one) will be regressed on x values (raw one too).

$$y = \beta_0 + \beta_1 x_1 + \epsilon \qquad (6.6)$$

[15] According to Hopkins (2000)
[16] According to Hopkins (2000)
[17] According to Guse (2012)

Where:

- β_1: is the marginal effect of x on y found thanks to the differential for x_1.

$$\rightarrow \frac{dy}{dx} = \beta \quad (6.7)$$

2. The second regression is "log-level" specification, here the first equation was transformed by the natural log on y values regressed on raw x values. We run this because the increases in x value reach to an increase of constant percentage in y.

$$\log(y) = \beta_0 + \beta_1 x_1 + \epsilon \quad (6.8)$$

Where β_1 can be interpreted as:

- Solution to solve it:

$$\log(y) = \beta_0 + \beta_1 x_1 + \epsilon$$

$$\rightarrow y = e^{\beta_0 + \beta_1 x_1 + \epsilon} \quad (6.9)$$

To get the marginal effect, we differentiate it:

$$\rightarrow \frac{dy}{dx_1} = \beta e^{\beta_0 + \beta_1 x_1 + \epsilon} = \beta_1 y \quad (6.10)$$

We can see that the marginal effect is correlated to the y values, and moreover β is the growth rate:

$$\rightarrow \beta_1 = \frac{dy}{dx_1}\frac{1}{y} \quad (6.11)$$

3. The third regression is "log-log" specification, and here the second equation was transformed by the natural log on x values. We do it because the increases in x value reach an increase of constant percentage in y.

$$\log(y) = \beta_0 + \beta_1 \log(x_1) + \epsilon \quad (6.12)$$

Where to know the marginal effects,

We solve for y:

$$\log(y) = \beta_0 + \beta_1 \log(x_1) + \epsilon y = \beta e^{\beta_0 + \beta_1 \log(x_1) + \epsilon} \quad (6.13)$$

And differentiate with regard to x:

$$\frac{dy}{dx_1} = \frac{\beta_1}{x_1} e^{\beta_0 + \beta_1 \log(x_1) + \epsilon} = \beta_1 \frac{y}{x_1} \quad (6.14)$$

And so the marginal effect is:

$$\frac{dy}{dx_1} = \beta_1 \frac{y}{x_1} \quad (6.15)$$

And β_1 is:

$$\beta_1 = \frac{dy}{dx_1} \frac{x_1}{y} \quad (6.16)$$

6.3.2. Dummy

a. Definition

According to Shrivanek, "*A dummy variable is an artificial variable created to represent an attribute with two or more distinct levels*"[18].

A dummy is used when you want to affect in your estimation an attribute variable (for example, a type of defect). Let's imagine that you have five kinds of defects, you cannot subtract the defects between themselves, because each number corresponds to one defect. We therefore use these dummies to trick the regression, to allow it to analyze these attribute variables. Moreover, in the defect case, four dummy defect variables are created because if none of the four first dummies are the defect, we know easily that it is the fifth one.

b. Conditions

- A dummy variable can only take two values, 1 or 0, to indicate if the dummy is in the membership
- The number of dummy that has to be created to represent an attribute variable is the number of categories of this variable minus one
- A dummy cannot be a simple linear relation of another dummy
- If the interaction of two variables can create a dummy, three dummies will be created, two for the variables used for the interaction, and one for the interaction variable (this latter one will be the product of the two first dummies)
- The dummy variables have to be mutually exclusive and exhaustive

[18] According to Shrivanek.

6.3.3. Significance of tests

a. Adjusted R^2

It allows to know the proportion of variation in the y variable created by the variation in x variables. The adjusted one is used to penalize the model with large number, and increases only when the new term added gives better results for the models, and it is always lower than the simple R squared. We used the adjusted R squared when models with different numbers of predictors had to be compared.

In the TSLS case, the Adjusted R-squared value is the square of the correlation between the fitted value and the dependent variable.

b. F-test

When F-stat is used in TSLS process, the sum of squared residuals from the second-stage regression (explained above) is requested.

F-type statistic:

$$F \equiv \frac{(\widehat{SSR_{\bar{r}}} - \widehat{SSR_{\overline{ur}}})}{SSR_{ur}} \cdot \frac{(N-K)}{K_2} \qquad \text{Distributed approximately as } F_{K_2,N-K} \qquad (6.17)$$

- $\widehat{SSR_{\overline{ur}}}$ = the usual sum of squared residuals from the unrestricted second-stage regressions y on $\hat{x}_1$, $\hat{x}_2$.
- $\widehat{SSR_{\bar{r}}}$ = the sum of squared residuals from the restricted second-stage regression, y on $\hat{x}_1$.
- SSR_{ur} = the TSLS sum of squared residuals

6.3.4. The problem of simultaneity (-TSLS)

During the regression that we did, we highlighted a simultaneity issue; that we controlled. Here are the theoretical explanations of this issue and how we solve it.

a. Definitions and generality

According to Wooldridge: "*Simultaneity arises when at least one of the explanatory variables is determined simultaneously along with y".* For example, if x_m is determined as a y function, hence x_m and h are correlated. Let's say that y is the obese rate in USA, and x_m the fast food number in USA, the fast food rate would be partly determined by the obese rate. For this kind of problem, we have to isolate one of the variables with instrumental variables.

b. Instrumental variables and TSLS:

i. Generality

In order to use the instrumental variables method, we have to have an equation in which one of the independent variables is correlated with the error term. In other words, the error term is not correlated with all explanatory variables, except one (x_k). When an endogenous explanatory variable problem occurs, this method provides a solution. To solve this problem, some observable variables can be used if it satisfies two conditions:

- These observable variables ($z_1, z_2 \dots z_M$) cannot be correlated with the error term (ε_t), its covariance has to be equal to zero. ($\text{Cov}(z_h, \varepsilon_t) = 0$)
- The endogenous variable (x_k) is "correlated to the observable variable" (z_1), but to be more precise, according to Wooldridge, *"the z_1 is partially correlated with x_k once the other exogenous variables $x_1, \dots, x_{k-1}$ have been netted out"*[19].

When the observable variables satisfy those conditions, those variables are named instrumental variables for the endogenous variables. Most of the time, the instrumental variables, a full list of instrumental variables, is called instruments. But the instruments used are to be well correlated with the endogenous variable, because it is not so easy to find good ones, as they have to satisfy two conditions.

The simplest way to know if the instrumental variables used are good estimator, we can use TSLS under certain hypothesis. "*The two-stage least squares (TSLS) estimator is the most efficient instrumental variables estimator*"[20].

The following steps allow us to test the quality of the instrumental variables[21]:

1. The first-stage regression: Obtain the fitted values $\hat{x}_k$ from the regression it means, x_k on $1, x_1, \dots, x_{k-1}, z_1, \dots, z_M$
2. The second-stage regression: Run the OLS regression y on $1, x_1, \dots, x_{k-1}, \hat{x}_k$

Those two steps allow to create $\widehat{\boldsymbol{\beta}}_j$, but this is not very easy to realize, it is better and easier to use a software package with the possibility to run TSLS (like Gretl).

[19] According to Wooldridge (2010), chapter 5 p83.
[20] According to Wooldridge (2010), chapter 5 p90.
[21] According to Wooldridge (2010), chapter 5 p91.

ii. Conditions

- In z (observable variables), x (exogenous variables) and constant are included
- The x (exogenous variables) will be linearly independent in the population
- The number of instrumental variables used has to be at least equal or more important that the number of explanatory variables, because if we do not have enough instruments, the β is not defined. But when too many instruments are used, sample problems can occur

iii. Pitfalls

- If at least one of the explanatory variables is an endogenous variable, the instrumental variable method is never unbiased.
- If the number of explanatory variables is equal to the number of instruments, the instrumental estimator does not have an expected value. To address this problem, we use large-sample analysis to justify TSLS
- When the instruments are too weak, even if a large sample is used, the instrumental method can go wrong.
- The TSLS standard error is normally a large one; it means that the TSLS standard error is larger than the OLS one. This error can be improved by the quality of the instruments used in the estimation

iv. Solutions

- When the TSLS standard error is so large that nothing is significant, we used an estimation having a small standard error even if it is inconsistent (OLS)
- Leaving the omitted factor in the error term
- Use indicators of the unobservable

c. Tests Interpretation

i. Hausman Test

This test estimates the consistency of an estimator. Moreover it also helps to know if a statistical model corresponds to the data. This test realized hypothesizes to know if the estimators are valid or not. Under the null hypothesis, all the estimators are consistent, and under the alternative hypothesis, at least one of the estimators is not consistent.

In our scenario, this case was used to verify that there are not any correlation between the independent variable and the model errors; this is the null hypothesis. If the null hypothesis is

not rejected (p-value lower than 0,05), it means that we do not have to use the TSLS method; we can simply use OLS.

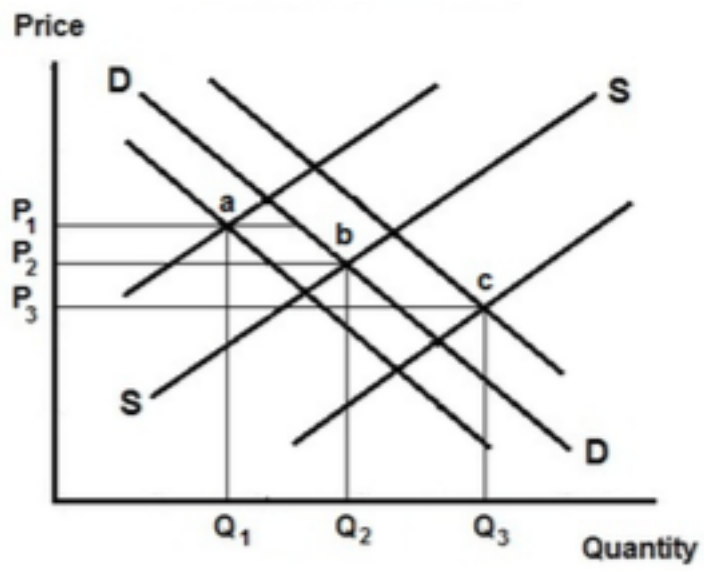
ii. Sargan Test[22]

This test was created for statistical models using instrumental variables from cross sectional data. It is used for testing the validity of instruments; it is an over-identifying test. The Sargan hypothesis checks if the instruments are not correlated to some set of residuals and also if the instrumental variables are healthy and acceptable. Under the null hypothesis (when p-value is lower than 0,05), the instruments are valid (they are uncorrelated), and therefore under the alternative hypothesis, the instruments are not valid.

d. Example[23]

The estimation of demand and supply curves determined by two variables, quantity and price, that are simultaneously determined. Below is the graphic representation.

Figure 1: Supply and demand[24]:



In this case, the equilibrium of the Supply-Demand curve determines the equilibrium price and quantity. When the price decreases, the quantity increases along the demand curve, and vice versa for the supply curve.

$$Q = \alpha + \beta P \tag{6.18}$$

[22] According to EconTerms and Gretl user Guide
[23] This example comes from paper made by Floyd (2013).
[24] This graph comes from paper made by Floyd (2013).

In the Figure 1, the estimation of the population equation is done by the regression of the quantity on the price.

$$Q_t = \alpha + \beta P_t + \varepsilon_t \quad (6.19)$$

Where:

- ε_t = error term, it is negatively correlated with the price (P_t).

In this situation, the problem is that the error term ε_t is correlated with (P_t). When many periods of time are used in the situation estimates, the error term can take many values.

Nonetheless, this error can be reduced by adding some exogenous variables. Those exogenous would shift the demand curve to the demand equation and also would shift the supply curve to the supply equation. For example, we can add to the demand equation as independent variables, the prices of substitute goods and also the level of income. For the supply equation, we can add the prices of other goods and the level of productivity as independent variables. Indeed, these exogenous variables can take in consideration everything that could determine the supply or demand quantities, the respective correlation error terms with the price will stay.

So the ultimate solution, to eliminate this error term, will be to find a variable correlated with the price but not with the errors terms. These variables are called instrumental variables. To achieve this, two operations have to be done, firstly the regression of the price on the instrumental variables and also on the other exogenous independent variables and save the fitted values. These fitted values of the price variables are not correlated with $\varepsilon_t$in the first stage regression because of the regression analysis proprieties. Secondly a second stage regression of the quantity on the fitted values of the variable is made, without the ε_t thanks to the first stage regression, more the independent exogenous variables for the demand and supply, in accordance with the equation that is estimating. If the instruments used are good enough, the result coefficient of the fitted value of the price level will be unbiased. Therefore, this coefficient will be an unbiased measure of right price variable coefficient in the supply or demand curve.

To illustrate those instruments, we can use an example presented by Maddala (1988), cited by Floyd (2013). This example estimates the supply and demand curves for the loans of commercial banks. The equations representing the supply and the demand are:

Demand: $QLOANS = \beta_0 + \beta_1 PRIMRATE + \beta_2 CBNDRATE + \beta_3 INPROD$

Supply: $QLOANS = \delta_0 + \delta_1 PRIMRATE + \delta_2 TBRATE + \delta_3 TOTDEP$

Where:

- $QLOANS$ = Quantity of commercial loans made by banks
- $PRIMATE$ = Bank's prime rate on commercial loans
- $CBNDRATE$ = Interest rate on corporate bonds
- $TBRATE$ = 30 Day treasury bill rate
- $INPROD$ = Industrial production
- $TOTDEP$ = Total bank deposits
- All coefficients except β_1 and δ_2 are positive.

We first test it on Gretl, for an ordinary least squares regression. After, to be able to run TSLS, it is necessary to decide what instruments will be used in both equations. Maddala highlight that it would be necessary to take instruments for the demand (or supply) equation not correlated with the supply (or demand) error term to be sure that those instrument do not have any influence on the supply (or demand) curve. Knowing that the exogenous variables used in each equation do not have any impact on the error term of the opposed equation, we use these variables as instrumental variables. A series of fitted values called FITPRATE is created for the prime rate on business loans in both equations for the second stage. In the OLS estimation, the fitted value is not correlated with the error term.

We run it on GRETL, and in GRETL, the TSLS function takes for each set of variables, a constant term and takes also two variables sets. Firstly, we have the basic regression that we want to run with the first variables set. Secondly, we run the set of instruments with the independent variables. The Hausman Test used by Gretl (and runs in its TSLS function) allows knowing if a simple OLS regression is consistent. When the Hausman null hypothesis is valid, we can use an OLS regression, and if we cannot reject the null hypothesis, TSLS is not necessary because the OLS regression is sufficient. But if we can reject this hypothesis, we need to use TSLS. So when we use, the good regression in the good case, we will not have any more a simultaneity problem in the equations used.

6.4. SEM – Path Analysis[25]

a. Generality

SEM is the general category in which is, a special method called Path analysis. It is a path analysis hypothesis that all the variables are calculated without error and each variable has an indicator.

A path analysis is used to describe the dependence relationship between a set of variables. It is comparable to a multiple regression analysis. It analyses a model from matrix correlation in which, at least two models are compared. The path analysis is represented by arrow (one notices that a double arrow shows the covariance between two variables) and square showing the causation, representing a diagram (showing dependent, independent and intermediate variables). To predict a path analysis, the models normally used are OLS, TSLS, maximum likelihood methods.

i. Some definitions

A path coefficient is found by a normal regression coefficient (β) highlighting the direct and indirect effects of xn (independent variable) on y (dependent variable).

Exogenous variables are not determined by the model. On the contrary, endogenous variables are determined by the exogenous variables, the variables inside the model.

ii. Rules

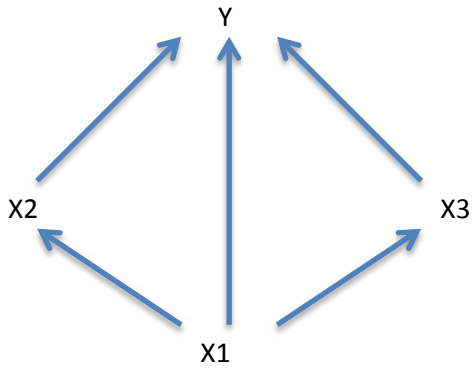
According to Wright (1934), "*the correlation between two variables is equal to the sum of the contribution of all pathway through which the two variables are connected*". The rules for path tracing are the following ones:

- You can trace in a lot of different directions but never trace forward and then back
- You can only pass once through a variable when you are tracing a relation between all variables
- Never more than one double direction arrow in one path-chain.

Below you have a simple relation for explaining how the coefficients are found.

[25] According to StatisticsSolutions and Xue.

b. Example



	Total Effect (1)	Direct Effect (2)	Indirect Effects (3)	Total Causal Effect (2)+(3) = (4)	Residual (1) – (4) = (5)
Coefficient from Bivariate Regression X1 on Y	1				1-0.6 = 0.4
Coefficient of X1 on Y in regression with all independent variables		0.2		0.2+0.4 =0.6	
Indirect effect of X1 on Y through X2			1*0.1= 0.1		
Indirect effect of X1 on Y through X3			0.6*5 = 0.3		
Total Indirect effect			0.1+0.3 = 0.4		

Direct effect is when the arrow in the diagram links directly the independent variable to the dependent variable.

Indirect effect is when the arrow does not link directly the independent to the dependent, because this relation is channeled trough another independent variable before reaching the dependent variable.

Total effect is a simple regression X1 on Y, and the coefficient used, is the regression's coefficient.

Total Causal effect is the percent of effect explained by the model.

Residuals are the percent of effect not explained by the model.

6.5. Conclusions

All those tests allow us to begin our empirical study. All of them will be used in the following chapters of this part. The formulas will help us to elaborate our estimation for calculating the impact of the financial inclusion. OLS and TSLS will help us test our equation, and to know if this equation is significant. Of course, we meet some issues and we have to resolve them (dummy, outlier, simultaneity). After choosing the right coefficient and the elaboration of the right relation between financial inclusion, production, capital per capita and total factor productivity, we do a path analysis. Using the coefficient total casual effects, we do a simulation for knowing how many percent a country has to increase or decrease, to have a neutral financial inclusion.

Most of them are used through statistics software, Gretl. The results will be presented in this part and more results are available in the appendix.

Chapter Seven – Theoretical model and Hypothesizes

7.1. Theoretical model

Financial inclusion has some intuitive effects on a standard neoclassical production function of the following kind:

$$y = F(A,k) = Ak^{\alpha} \quad (7.1)$$

where

y = gross capital formation

A= total factor productivity

k= capital per capita

α = production elasticity of factor capital

This equation comes from the Solow model (6.3), but here the small k is equal to the big K divided by L (labor), and same thing for the small y.

7.2. Hypothesizes

We summarize these intuitive relationships in the following three hypotheses:

First of all, financial inclusion increases capital per worker through two indirect channels. First, because people being financially excluded have to spend a greater share of their income protecting their savings, and a greater interest rate when borrowing in the informal sector; access to banking services will increase household's savings and therefore capital accumulation opportunities. Secondly, financial inclusion will be associated with a reduced population growth rates. This is because financial exclusion is often a rural problem and a problem that affects women in particular. Inheritance laws often are to the disadvantage of women whenever land titles are available. But also when legal land titles are available, cultural reasons regularly do not lend women a lot of bargaining power. Financial exclusion frequently overlaps with gender inequality. Reversing this process through greater financial inclusion of women has therefore empowering effects that translate into greater self-determination, part of which will be to choose fewer children. Fewer children, in turn, will also increase household savings and household capital formation.

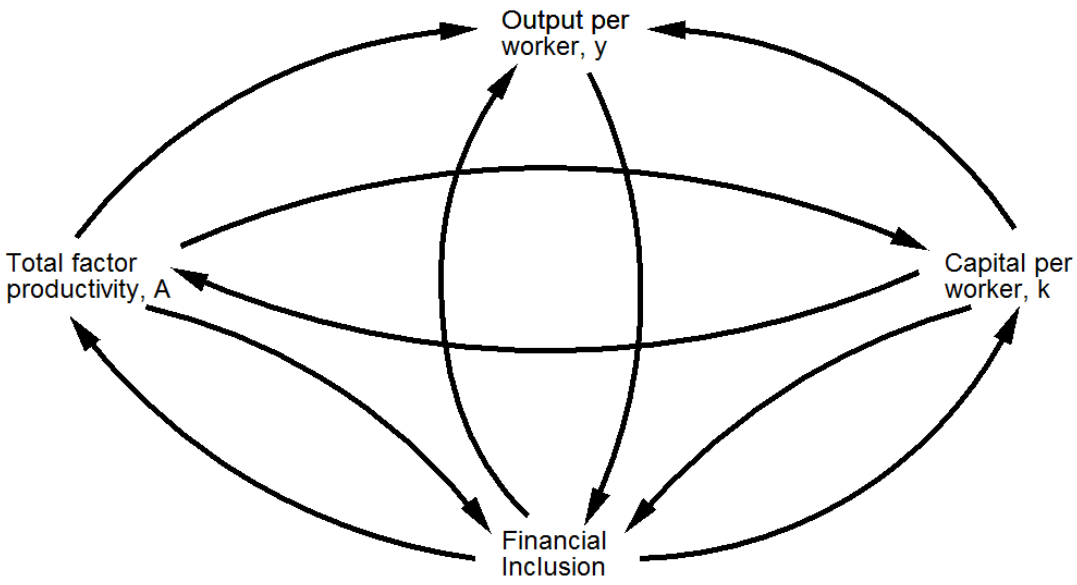
In addition, financial inclusion increases total factor productivity. This effect is largely channeled through greater financial intermediation opportunities, especially in rural areas. The introduction of banking services to rural areas has regularly contributed to greater rural development, agriculture productivity and reduced excessive rural-urban-migration. These benefits have the characteristics of a public good.

Lastly, because a society's total factor productivity, similar to widespread financial inclusion, has the characteristic of a public good, we also hypothesize a positive effect from total factor productivity on capital formation. Likewise, an increase in capital per capita is likely to increase total factor productivity through positive effects.

Figure 2 summarizes our main hypotheses. The schematic overview shows the hypothesized relationships between gross capital formation, total factor productivity and capital per capita.

Figure 2:

Financial Inclusion and Solow Growth Model:



Chapter Eight – Methodology and Data

8. 1. Methodology

The basic equations to be estimated are:

$$y_i = \beta_0 + \beta_1 Acct_i + \beta_2 A_i + \beta_3 k_i + \beta_j \sum_j RegionalDummy_i + u_i \quad (8.1)$$

$$A_i = \gamma_0 + \gamma_1 Acct_i + \gamma_j \sum_j RegionalDummy_i + u_i \quad (8.2)$$

$$k_i = \theta_0 + \theta_1 Acct_i + \theta_2 A_i + \theta_j \sum_j RegionalDummy_i + u_i \quad (8.3)$$

where

y = Real GDP per worker at constant 2005 national prices

Acct = Account at a formal financial institution (% age 15+)

A = Total factor productivity

k = Capital stock per worker at constant 2005 national prices

i = country i

j = coefficient number

Because of the expected simultaneity between all variables, we pursue the following estimation strategy. We estimate the alleged endogenous right-hand-side variables with instruments and run the regressions with the instrumented variables (two-stage-least squares).

We use the open-source software package "Gretl" to estimate our equations. When using Gretl's two-stage least square procedure, a Hausman Test is automatically conducted. The Hausman test hypothesizes the null hypothesis says that OLS yields consistent estimators. If the Hausman null hypothesis cannot be rejected, we rely on OLS estimates. The software package also conducts a so-called Sargan Over-Identification test, which tests the null hypothesis that all instruments are valid.

In order to instrument our right-hand-side variables, we only use variables that are intuitively purely exogenous. Specifically, we use a dummy for whether a country is landlocked, for whether the country is tropical, the origin of the legal system (British or French), percentage

of Christian and Muslim proportion of the population, arable land per capita, renewable freshwater resources per capita, the percentage of land mass below five meters of elevation, land area, fractionalization indicators (ethnic, language, and religious), average temperature, average rainfall, and regional dummies (Eastern Europe and Central Asia -EECA, East Asia and the Pacific – EAP, Latin America and the Caribbean - LAC, Middle East and North Africa - MENA, South Asia - SA, and Sub Saharan Africa - SSA).

Our instruments essentially capture historical, religious, social, geographical, and climatic factors. Economic plausibility strongly suggests that these factors influence the emergence of a banking industry, the accumulation of capital per worker, and total factor productivity. For example, countries with access to the ocean are more likely to have a tradition of commercial trade, which in turn requires financial services. Social cohesion factors are also important to the development of banking industries, as people in more cohesive societies are more likely to trust the anonymity of financial intermediation. The colonial legacy also played an important role in developing banking industries. British colonial rule is typically credited with a greater impact on financial development than was the case under French mandates. Last but not least, geographical and climatic factors are conducive to economic activity in general and the need for baking opportunities in particular. For example, the countries without rainfall or with very high temperatures are less developed, because in these kinds of conditions, it is not easy developing a good economic environment, and they generally do not have a good access to financial services.

In running the regressions we expect multicollinearity problems. Variables like financial inclusion, total factor productivity, and capital per worker are strongly correlated. We therefore expect that some model specifications bring statistically non-significant results due to multicollinearity when in fact the variables are all economically significant. In order to support our interpretation of the regression results, we present a complete correlation matrix of all variables in the appendix (Appendix 2).

We run all regressions as double-natural log regressions in order to be able to interpret the coefficients as elasticities. Elasticities can also be conveniently incorporated into a path analysis to estimate the various direct and indirect effects of an increase or a decrease of financial inclusion on the various variables.

In addition to running for each equation an OLS and two-stage least squared (TSLS) procedure, we always also run two different model specifications. The first always focuses

only on the key variables of each equation without regional dummies. This specification is chosen in order to get a first idea of the significance of the variables. Since this approach may be criticized for an omitted variable bias, we always specify a second model that includes regional dummies' fixed effects controlling for "everything else" and probing the robustness of our key variables. We also screened our dataset for outliers in all variables and instruments. We define an outlier as an observation that is either 1.5 inter-quartile-ranges (IQR) below the first quartile or 1.5 IQRs above the third.

We also estimate, for each country for which we have data and which are not outliers, the development potential of greater financial inclusion. For this purpose, we first identify countries as either a financial inclusion deficit or surplus country. Whether a country is labeled as a deficit or surplus country depends on the country's residual in a logistic regression of the following kind:

$$Acct_i = \frac{100}{1 + e^{-b \times \ln y_i}} \tag{8.4}$$

Countries with a positive residual are labeled a financial inclusion surplus country, countries with a negative residual a deficit country. Then, in order to calculate the financial inclusion growth dividend, we follow two steps. In step one we calculate, for each deficit country, the necessary percentage increase (grFI) of financial inclusion to the predicted value ($\hat{y}$). In step two, we multiply "grFI" with the total causal effects' elasticity obtained from our path analysis (ε). The development potential from closing the financial inclusion deficit is then calculated as

$$\hat{y} = y_{actual} \times (1 + grFI \times \varepsilon) \tag{8.5a}$$

We also calculate for each financial inclusion surplus country the growth dividend reaped from financial inclusion using the same basic idea.

8. 2. Data and sources

Table 2 summarizes the variables used in our analysis and their sources. Each observation is the last available observation as of the writing of this thesis (March 2015). The full dataset is in appendix (Appendix 1).

Table 2:

Variables Abbreviation, Descriptions, and Sources:

	Variable Abbreviation	Variable Definition	Source
	Acct	Account at a formal financial institution (% age 15+)	World DataBankGlobal Financial Development, http://bit.ly/1F0r8p1
Solow Growth Parameters	Y	Real GDP at constant 2005 national prices (in mil. 2005US$)	Penn World Table, http://bit.ly/18DT8R7
	A	Total Factor Productivity	Calculated from Penn World Table
	K	Capital stock at constant 2005 national prices (in mil. 2005US$)	Penn World Table, http://bit.ly/18DT8R7
	L	Number of persons engaged (in millions)	
	Labshr	Share of labour compensation in GDP at current national prices	
	d	Capital depreciation rate	Calculated as d=(D*PPPconv)/(K*1000000), where D=Adjusted savings: consumption of fixed capital (current US$) (Source: WDI), PPPconv=United States Consumer Price Index (2005=100) (source: WDI)
	gcf	Gross capital formation (% of GDP)	World Bank Development Indicators Database (WDI), http://bit.ly/1dRZxcO
	n	Population growth (annual %)	
Reginoal Dummies	EAP	East Asia and the Pacific	
	EECA	Eastern Europe and Central Asia	
	WE	Western Europe	
	LAC	Latin America & Caribbean	
	MENA	Middle East & North Africa	
	NAM	North America	
	SA	South Asia	
	SSA	Sub Saharan Africa	
–	LANDLOCKE	dito	Easterly, W. (2001), Global Development

	D		Network Growth Database, http://bit.ly/1FxA9og
	leg_british	Legal origin: British	
	leg_french	legal origin: French	
	Christians	Percentage of Christians in the Country	The Association of Religion Data Archives (ARDA), http://bit.ly/1BRxtRa
	Muslim	Percentage of Musilim in the countries	
	Arable	Arable land (hectares per person)	World Bank Development Indicators Database (WDI), http://bit.ly/1dRZxcO
	Water	Renewable internal freshwater resources per capita (cubic meters)	
	LandBLW5	Land area where elevation is below 5 meters (% of total land area)	
	area	Countries' area	Easterly, W. (2001), Global Development Network Growth Database, http://bit.ly/1FxA9og
	EthFrac	Ethnicities of the World's fractionalization	
	LangFrac	Languages of the World's fractionalization	The MacroData Guide ,http://bit.ly/1CRjltt
	RelFrac	Religions of the World's fractionalization	
	tropical	Tropical	
	Temp	Annual temperature	Easterly, W. (2001), Global Development Network Growth Database, http://bit.ly/1FxA9og
	Rain	Annual precipitation	World Bank Development Indicators Database (WDI), http://bit.ly/1dRZxcO

Chapter Nine – Results

9.1. Empirical Estimation Results

a. Ln y

The results suggest that the variables financial inclusion, total factor productivity, and capital per worker, are significant in estimating income per worker. The Hausman test of the TSLS procedure model two indicates that OLS estimates are acceptable. When comparing the OLS estimate of model one with model two, we see that the variable total factor productivity (A) loses its significance even though its coefficient in model two seems statistically not different from the coefficient in model one. We attribute the loss of significance of "A" in model two to problems of multicollinearity, not economic insignificance. In fact, as a look into the correlation matrix of all variables in the appendix suggests, correlation between ln "A" and other right-hand-side variables is clearly a plausible explanation for the loss of statistical significance. Most importantly, our key variable, which is the proxy for financial inclusion as measured by the percentage of the population age 15+ having a bank account (lnAcct) appears significant and robust.

Table 3:

Estimation Results of Per Capita Income Equation

	Model 1		Model 2	
DV=lny	OLS	TSLS	OLS	TSLS
Const	0.900 *** (0.258)	0.873 * (0.446)	1.711 *** (0.455)	2.851 ** (1.173)
lnAcct	0.126 ** (0.0498)	0.101 (0.118)	0.169 *** (0.051)	0.371 ** (0.161)
lnA	0.029 ** (0.014)	0.059 (0.038)	0.017 (0.015)	0.003 (0.053)
lnk	0.766 *** (0.032)	0.767 *** (0.065)	0.695 *** (0.0435)	0.535 *** (0.124)
Outlier	0.019 (0.119)	0.222 (0.364)	0.129 (0.127)	1.050 ** (0.527)
EECA	/	/	-0.0652 (0.110)	-0.096 (0.169)
EAP	/	/	-0.314 ** (0.134)	-0.582 ** (0.227)
LAC	/	/	-0.086 (0.125)	-0.099 (0.179)
MENA	/	/	-0.097 (0.125)	-0.253 (0.214)
SA	/	/	-0.361 * (0.198)	-0.593 * (0.319)
SSA	/	/	-0.305 ** (0.150)	-0.542 * (0.294)
n	137	119	137	119
Adj. R2	0.918	0.909	0.921	0.891
F-Stat	383.85	244.39	159.19	83.62
Hausman Test (p-value)	/	0.204	/	0.192
Sargan Test (p-value)	/	0.395	/	0.947

***=significant at 1%, **=significant at 5%, *=significant at 10%, standard errors in parentheses.

b. Ln A

As far as the estimation of the total factor productivity equation is concerned, the variable financial inclusion is strongly significant across all model specifications and all estimation procedures. The Hausman test again suggests that the preferred estimation method is OLS. The coefficient of the variable capital per worker carries the expected sign in model one, but is not significant, which is again due to multicollinearity, not economic insignificance. The correlation coefficient between total factor productivity and capital per worker is 0.44 and there is also a strong correlation between capital per worker and the dummy for Sub Saharan Africa of -0.69. These correlations most likely also explain the flipping sign in the OLS

estimate of model one. We conclude that while capital per worker may have some effect on a country's total factor productivity, isolating this effect is difficult and we prefer to read the data such that this possible effect is sufficiently absorbed by the financial inclusion variable.

Table 4:

Estimation Results of Total Factor Productivity Equation

	Model 1		Model 2	
DV=lnA	OLS	TSLS	OLS	TSLS
Const	-3.703 ** (1.538)	-6.226 *** (2.379)	0.798 (2.672)	-4.039 (5.948)
lnAcct	1.365 *** (0.279)	1.137 ** (0.664)	1.419 *** (0.276)	1.682 ** (0.688)
lnk	0.216 (0.193)	0.465 (0.395)	-0.092 (0.255)	0.206 (0.638)
Outlier	0.114 (0.723)	-3.57 * (2.131)	1.105 (0.741)	-0.066 (2.718)
EECA	/	/	-0.687 (0.645)	-0.232 (0.872)
EAP	/	/	-2.350 *** (0.757)	-1.630 (1.085)
LAC	/	/	-1.276 * (0.727)	-0.372 (0.916)
MENA	/	/	-2.309 *** (0.721)	-1.501 (1.023)
SA	/	/	-3.391 *** (1.123)	-2.407 (1.504)
SSA	/	/	-1.817 ** (0.869)	-0.475 (1.511)
n	137	119	137	119
Adj. R2	0.322	0.214	0.387	0.329
F-Stat	22.58	16.075	10.556	7.703
Hausman Test (p-value)	/	0.001	/	0.171
Sargan Test (p-value)	/	0.468	/	0.277

***=significant at 1%, **=significant at 5%, *=significant at 10%, standard errors in parentheses.

c. Ln k

Lastly, the regression results of the capital per worker equation also reveal a strong effect of financial inclusion on capital per worker across all models and specifications with the preferred estimation procedure again being OLS. The variable total factor productivity shows a similar performance pattern in Table 5 as it does in Table 4. We again conclude that, while total factor productivity is an important factor behind capital per worker, it is difficult to isolate this effect in combination with the variable financial inclusion. Yet, because the

variable financial inclusion is with a correlation coefficient of 0.69 highly correlated with total factor productivity, the effect of the variable financial inclusion on capital per worker also reflects an increase of total factor productivity.

Table 5:

Estimation Results of Capital per Worker Equation

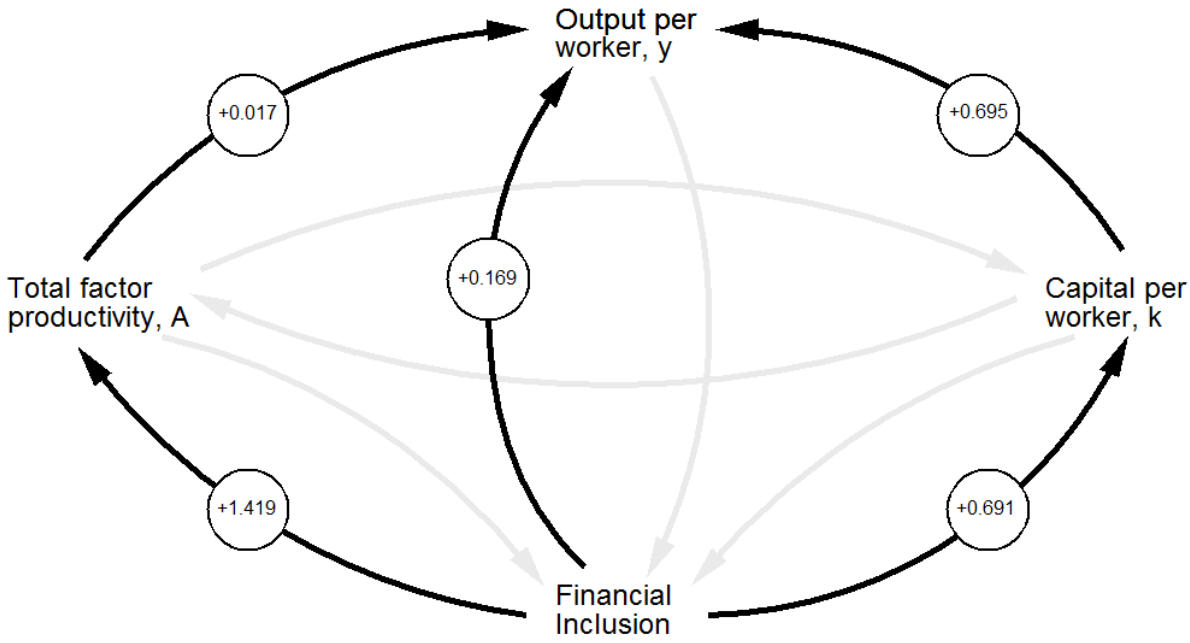
	Model 1		Model 2	
DV=lnk	OLS	TSLS	OLS	TSLS
Const	7.129 *** (0.332)	5.93 *** (0.638)	9.502 *** (0.388)	8.849 *** (0.753)
lnAcct	0.965 *** (0.106)	1.16 *** (0.257)	0.631 *** (0.089)	0.698 *** (0.232)
lnA	0.043 (0.039)	0.160 (0.105)	-0.011 (0.031)	0.047 (0.093)
Outlier	1.057 *** (0.310)	2.611 *** (0.919)	0.743 *** (0.251)	-0.452 (0.279)
EECA	/	/	-0.509 ** (0.220)	-0.598 * (0.318)
EAP	/	/	-0.872 *** (0.261)	-0.470 * (0.255)
LAC	/	/	-0.941 *** (0.242)	-0.656 ** (0.277)
MENA	/	/	-0.390 (0.258)	0.028 (0.317)
SA	/	/	-1.749 *** (0.373)	-1.406 *** (0.462)
SSA	/	/	-2.121 *** (0.243)	-1.716 *** (0.341)
n	137	119	137	119
Adj. R2	0.518	0.496	0.737	0.736
F-Stat	49.781	41.11	43.239	39.72
Hausman Test (p-value)	/	1.95724^{-008}	/	0.430
Sargan Test (p-value)	/	0.037	/	0.005

***=significant at 1%, **=significant at 5%, *=significant at 10%, standard errors in parentheses.

From the above regression results, we can gain a closer understanding of the transmission mechanism of financial inclusion on economic growth. This transmission mechanism is graphically summarized in Figure 3 where the numbers represent the regressions' coefficients from our selected models. In the language of path analysis, these coefficients are the so-called direct effects. Thus, our model suggests that financial inclusion directly affects total factor productivity, capital per worker and output per worker. Output per worker is moreover directly affected by total factor productivity and capital per worker.

Figure 3:

Financial Inclusion and Solow Growth Model – Direct Effects:



Chapter Ten – Path Analysis and Simulation

10.1. Path Analysis

In the regression results, the coefficients are the direct effects in this path analysis. Thus, our model suggests that financial inclusion directly affects total factor productivity, capital per worker and output per worker. Output per worker is moreover directly affected by total factor productivity and capital per worker.

Our path analysis also reveals two indirect effects of financial inclusion to greater output per worker, one going trough total factor productivity and the other through greater capital formation per worker. The sum of direct and indirect effects is known as the total causal effect. This total causal effect is largely driven by the very strong indirect effect that financial inclusion exercises on capital per worker. The indirect effect of financial inclusion on output per worker accounts for roughly seventy-three percent of the total causal effect; twenty-seven percent can be attributed to the indirect effect through total factor productivity. Lastly, the total causal effect explains roughly sixty-three percent of the total effect, which is simply the bivariate regression coefficient obtained from regressing output per worker on financial inclusion. Table 6 summarizes the results of our path analysis.

Table 6:Path Analysis:

	Total Effect (1)	Direct Effect (2)	Indirect Effects (3)	Total Causal Effect (2)+(3) = (4)	Residual (1) – (4) = (5)
Coefficient from Bivariate Regression lnAcct on lny	0.948				0.948-0.629 = 0.319
Coefficient of lnAcct on lny in regression with all independent variables		0.169		0.169 + 0.463 =0.632	
Indirect effect of lnAcct on lny through lnA			1.419*0.017= 0.024		
Indirect effect of lnAcct on lny through lnk			0.631*0.695 = 0.439		
Total Indirect effect			0.024+0.439 = 0.463		

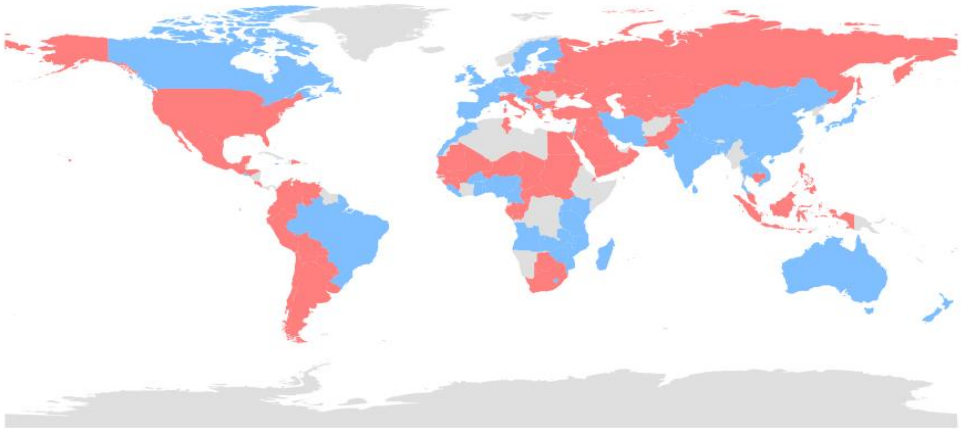
10.2. Simulation

Economic Significance of financial Inclusion – A Cursory Assessment

Figure 4 provides an overview of financial inclusion deficit and surplus counties around the world.

Figure 4:

Relative Financial Inclusion Deficit and Surplus Countries



Red = deficit countries, Blue = surplus countries, Grey = no information

The financial inclusion deficit and surplus countries are the observations that are marked below and above the trend line in the following scatter plot (figure 5), which was constructed from the results of a logistic regression of the variable account on output per worker (natural log).

Financial inclusion deficit countries can be interpreted as countries with an untapped financial inclusion development potential. Similarly, financial inclusion surplus countries can be perceived as countries with financial inclusion development dividend that were already tapped in. We calculate for financial inclusion deficit countries the positive growth rate necessary in order to get from the current level of financial inclusion to the one predicted by the trend line as estimated in Figure 5. Likewise, for financial inclusion surplus countries, we calculated the negative growth rate necessary to move a country from its actual level of financial inclusion to the one predicted by income per worker. These growth rates are then

used as exogenous stimuli in our path analysis, allowing for the estimation of the predicted income per worker, $\hat{y}$, which can be attributed to either closing the financial inclusion deficit or reversing the financial inclusion surplus. Following our path analyses as summarized in Table 6, this predicted income per worker can be written as the direct effects of financial inclusion on per capital income:

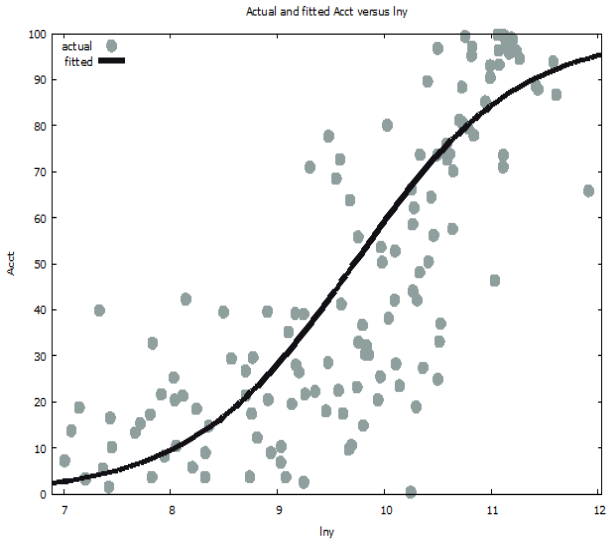
$$\hat{y} = y_{actual} \times (1 + grFI \times 0.632)$$

(8.5b)

where grFI = growth rate is necessary to move the actual level of financial inclusion to a predicted value.

Figure 5:

Logistic Regression Results of Variable Account on Output Per Worker



Estimation Result:

$$\widehat{Acct_i} = \frac{100}{1 + e^{-(const + b \times lny_i)}}$$

With

	Coeff	Std. Err
Const.	12.750***	1.009
lny	1.312***	0.103
n	137	
Adj.R^2	0.542	

***= significant at 1%.

In a final step, we calculated for financial inclusion deficit and surplus countries the untapped and tapped development dividend (FIDD) simply as

$$FIDD = \left(\frac{\hat{y}}{y_{actual}} - 1\right) \times 100 \times (-1)$$

(7)

where, in line with the intuition that deficit and surplus countries should be described by negative and positive values, respectively, positive values indicate an already tapped positive FIDD, and negative values, an untapped potential FIDD.

In Table 7 we present the tapped and untapped FIDD for countries whose deviation of the actual financial inclusion value from the trend line falls within the interquartile range of all residuals in Figure 5. We limit the illustration of economic significance to the observations within-IQR in order to prevent unrealistic predictions. Since our analysis is still preliminary and explorative, we are mostly interested in the economic significance of FIDD for countries that can be represented by a model that is still rather simple.

Table 7a, which captures the FIDD of financial inclusion deficit countries, suggests that financial inclusion development carries a substantial development dividend. For the case of Cambodia, for example, an increase in the percentage of the population aged 15+ having a bank account from roughly 3.7% to 13.9%, would allow to predict an increase in income per worker from $4,131 to 11,405$.

Table 7a:

Untapped Financial Inclusion Development Dividend for Financial Inclusion Deficit Countries

Country	$Acct$	$\widehat{Acct}$	y	$\hat{y}$	$FIDD$
Cambodia	3,7	13,9	4131	11405	-176,12
Niger	1,5	4,7	1680	3904	-132,38
Congo Republic	9,0	26,5	7653	17091	-123,31
Guinea	3,7	7,7	2512	4252	-69,27
Senegal	5,8	12,1	3675	6192	-68,48
Djibouti	12,3	23,4	6736	10598	-57,32
Guatemala	22,3	38,4	11582	16842	-45,41
Paraguay	21,7	35,5	10541	14760	-40,03
Indonesia	19,6	31,8	9310	12994	-39,57
Chad	9,0	13,9	4142	5586	-34,86
Swaziland	28,6	42,2	13065	16990	-30,05
Ecuador	36,7	52,7	18032	22969	-27,38
Bosnia and Herzegovina	56,2	72,7	35051	41540	-18,51
Philippines	26,6	33,8	9951	11660	-17,17
Mauritania	17,5	22,2	6379	7462	-16,97
Honduras	20,5	25,9	7450	8678	-16,47
Italy	71,0	86,2	67207	76295	-13,52
Bulgaria	52,8	62,4	24478	27287	-11,47
Bolivia	28,0	32,9	9674	10746	-11,08
Oman	73,6	86,2	67315	74612	-10,84
Costa Rica	50,4	58,6	21667	23906	-10,33
Belarus	58,6	67,3	28841	31551	-9,39
Ukraine	41,3	46,1	14781	15885	-7,47
Bahrain	64,5	72,1	34276	36819	-7,42
Poland	70,2	77,2	42104	44754	-6,29
Serbia	62,2	67,7	29207	30827	-5,55
South Africa	53,6	58,2	21420	22577	-5,40
Mali	8,2	8,9	2827	2978	-5,35
Central African Republic	3,3	3,6	1351	1423	-5,34
Kuwait	86,8	92,3	110348	114784	-4,02
Hungary	72,7	75,9	39819	40925	-2,78
Greece	77,9	81,3	51046	52448	-2,75
Lithuania	73,8	76,5	40812	41756	-2,31
United States	88,0	90,6	93267	95017	-1,88
Hong Kong SAR China	88,7	90,3	91146	92200	-1,16
Malaysia	66,2	66,9	28464	28670	-0,72
Slovak Republic	79,6	80,2	48403	48657	-0,53

In this context, however, it is important to remember that the variable "Account" is only a proxy for the development of the overall financial system. In economic practice, the variable "Account" captures much more than simply the percentage of people keeping an account with a bank. It also captures the opportunity to gain access to capital and a lower interest rate than what would have to be aid in the shadow economy. On average, it also reflects empowerment aspects of women and new development opportunities for rural communities. This implies that an expansion of financial services to the unbanked includes much more than simply opening bank account. The implicit understanding is that greater financial inclusion grants formerly unbanked economic actors, especially for women and citizens in rural areas, like actors' access to loans, which in turn increases total factor productivity for the economy as a whole but also capital per worker.

Table 7b shows the FIDD realized by the financial inclusion surplus countries, indicating that this dividend can almost reach twenty percent, as is the case of Lesotho. When looking at table 7a and 7b from a development economic perspective, we would strongly argue that the numbers seem generally plausible and policies towards greater financial inclusion promise a considerable development dividend.

Table 7b:

Tapped Financial Inclusion Development Dividend for Financial Inclusion Surplus Countries

Country	$Acct$	$\widehat{Acct}$	y	$\hat{y}$	$FIDD$
Lesotho	18,5	12,7	3814	3052	+19,96
Nigeria	29,7	22,5	6465	5471	+15,37
Lao PDR	26,8	20,9	6040	5208	+13,77
Madagascar	5,5	4,4	1590	1385	+12,89
Angola	39,2	32,8	9611	8612	+10,39
India	35,2	30,9	9010	8313	+7,74
Croatia	88,4	79,0	45704	42643	+6,70
Morocco	39,1	35,0	10388	9711	+6,52
France	97,0	87,1	71467	66880	+6,42
Korea Republic	93,0	84,2	59561	55985	+6,00
Canada	95,8	87,1	71177	67077	+5,76
Belgium	96,3	88,0	75726	71579	+5,48
Spain	93,3	85,6	64715	61349	+5,20
Brazil	55,9	51,3	17296	16401	+5,17
Israel	90,5	84,2	59546	56940	+4,38
Luxembourg	94,6	88,4	78394	75172	+4,11
Macedonia FYR	73,7	69,3	30898	29724	+3,80
Portugal	81,2	78,4	44504	43538	+2,17
Benin	10,5	10,1	3152	3091	+1,95
Cameroon	14,8	14,4	4286	4220	+1,54
Cyprus	85,2	83,4	56898	56119	+1,37
Ireland	93,9	92,0	107432	106095	+1,25
Vietnam	21,4	20,9	6043	5968	+1,24
Czech Republic	80,7	79,2	45997	45461	+1,17
Trinidad and Tobago	75,9	75,7	39521	39444	+0,19
Iran Islamic Republic	73,7	73,6	36316	36287	+0,08

Conclusion of empirical part

The purpose of this part is to explore the effects of greater financial inclusion on economic growth. We linked the variable "Percentage of the population aged 15+ with a bank account" to a neoclassical production function. Our findings suggest that financial inclusion has strong direct effects on growth of real income per worker, but also strong indirect effects through an increase of total factor productivity and capital per worker.

Using path analysis, we showed the strong correlation between financial inclusion and total factor productivity, which must be seen as a public good. This dimension is important to highlight as it suggests that policies to increase financial inclusion are a public responsibility. Likewise, low levels of financial inclusion must be seen as indicative of both market and regulatory failures.

While our study focused on financial inclusion as a means of increasing income per worker, it is clear that policy towards greater financial inclusion go far beyond economic growth effects, and also generates social and human development. Financial inclusion opens marginalized economic actors access to "market access capabilities". Policies to increase access to financial services are therefore also social and peace oriented policies.

The reasons for the lack of financial inclusion are well known, and revolve around the absence of collateral, which in turn is commonly the result of unclear land titles or absence of land titles. Getting the market fundamentals for the development of banking market rights is therefore a daunting and surely costly task. While these costs need to be determined on a case-by-case study, our model may help showing that the benefits overweigh these costs.

Conclusion

In this work we highlighted the impact of financial inclusion on the production. We explained, from a theoretical point of view, how it would be possible to impact financial inclusion, how to increase it. In the empirical part, we developed a model to explain in which financial inclusion situation (deficit or surplus) is the country and also what will be the impact of an increase/ decrease of financial inclusion on its production.

To achieve this, we first did a review of financial inclusion in the literature, through which we looked for a possible "theoretical" way to change a financial situation in some area. After, we explained the instruments used and presented in our model. In order to do this, we firstly collected the necessary data and based on it(s), we did a large data sample, and we began to do our model on statistical software program.

The results obtained are very interesting because they were quite different from our financial relationship conception. Our idea at the beginning was, that the impact of financial inclusion on production was more important through total factor productivity that through capital per capita, but the result revealed the reverse situation. Moreover, the results obtained on the simulation part, about the country in deficit or in surplus area, were very intriguing and pleasant at the same time. How can it be that United-States was a deficit country and that countries as Lesotho or Madagascar were on surplus.
As well, we saw how the enhancement or diminishing of financial inclusion could impact highly the production of the country.
Finally, we used a large number of instruments to estimate our theoretical model due to the simultaneity problem, and we had significant and good results.

This work has some limits. One of the first one(s), will be the lack of analysis for the tables seven (the tables showing the impact of an enhancement or diminution of financial inclusion for each country), it would be interesting to analyze each one, and to try to find how all the countries, and each one separately, could improve its situation through policy, for example, education, new banks implementation, etc. But since we were doing more a macroeconomic analysis and not a microeconomic, it was not adequate to do that.
Another one is the lack of country in the final results, more or less sixty countries on a total of 214 countries in the world, which is not a lot. It would be a nice idea, to find another way to do the same analysis (especially looking for data) but finding more countries on which to do

it. Also, one of the limits is the channel used for knowing the impact of an increase of financial inclusion. It would perhaps be possible to do it by using more variable(s), like the savings rate, or the Gini coefficient. Like that the relationship estimated (will) (would) be more specific.

Some future work idea could be based on this work. It would be interesting to extend this work by doing a more complex model, by using more variables, in order to have a more accurate analysis of the production as impacted by financial inclusion. For example, by doing a grouping of different financial variables and weighting it according to their importance in the financial inclusion. Variables like "Automated teller machines (ATMs) per 100,000 adults", "access to saving accounts"… could be used for doing a better proxy to capture the financial inclusion in a country.

It would also be interesting, to select a part of the world (let's say, Latin America) and try to reach a very great financial inclusion rates for this whole area by trying to do policies for all of them at the same time. For example do a borrower information base for everybody in this area, which would be easier for them, and for banks to access to financial services everywhere. Based on an informational survey, in an area of the world, for example Africa, try to know which method works better to boost the financial inclusion in this area (mobile banking, microfinance institutions, etc.). After doing this survey, try to simulate the improvement of financial inclusion, using the best financial instruments for this, and to reach a high percentage of financial inclusion.

In this work, we anticipated that a lot of different tracks could be explored, for example through the improvement of the model. Working on it was more than interesting and we encourage every single people interested in the topic to pursue and expend it.

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Appendix

Literature Review

Table 1: Financial Inclusion Models: 2009, European Association of Development Research and Training Institute in the Chibba M. (2009). "Financial Inclusion, Poverty Reduction and the Millennium Development Goals".Paper submitted by European Journal of Development Research 21, 213–230.

Model	Financial sector consensus	Public sector leadership	Private sector	Civil society / NGO	Catalytic
Approach and process	Given a favorable governmental, institutional and political climate, the financial sector takes strategic action to address financial exclusion (FE) through a consensus-driven process.	Public sector prepares the strategy/action plan and then calls on stake holders to participate and/or forms direct partnerships.	Private sector (financial and non-financial firms): individually, jointly or through partnerships, designs and implements market-based approaches. (In addition, advocacy and lobbying is collectively pursued for an improved business/investment climate).	N GOs, voluntary organizations, charities, non-profit orgs. incl. research and policy institutes, act individually, jointly or through partnerships, to tackle FE.	FI is supported through various catalytic channels – eg, advocacy, research, facilitation, funding, advisory services and partnerships.
Lead players	Formal financial institutions and government.	Government – esp. central bank, public sector bank(s); with support from the private sector	Financial and non-financial firms.	All types of civil society/ non-profit organizations/ charities, research/policy institutes.	Multilateral/bilateral organizations (World Bank, UN agencies, ADB, IDB, DFID and so on)

Main mechanisms /instruments	1. Legislation 2. Financial Sector Summit and Financial Sector Charter (FSC); 3. Data collection / analysis on unbanked ; 4. Financial sector develops new products, services and delivery mechanisms	Various options: 1. Planning and banking codes and standards with the central bank's guidance (India); 2. Central bank plans and co-ordinates financial literacy (Trinidad & Tobago); 3. Partnership of central banks & pubic bank (Mexico – US)	Market-based, such as : 1. Credit from non-financial firms (eg, Cemex of Mexico); 2. Partnership/ technology/ innovation-driven options – eg, e-banking. Examples: Prodem FFP, M-Pesa, Wizzit, Globe Telecom, ICICI Bank; 3. Non-financial firms form banking units (eg, Banco Wal-Mart)	Grassroots-level microfinance and; financial literacy, research/analysis by non-profit/policy/ research institutes; funding from philanthropic bodies and businesses (eg, Citibank to NGOs and other intermediaries)	Advocacy; research and evidence-based lessons learned; facilitation; funding; equity participation; and technical assistance
Implementation	Led by financial institutions	Overall program led by the central bank with support from other gov't entities; private sector firms otherwise take the lead	Private sector financial and non-financial firms	Led by civil society/ non-profit sector organizations/other intermediaries/policy-research institutes	Multilateral/bilateral organizations; executing agency (government, NGO, or funding recipient)

Products / services	Basic accounts; e-banking; M&E; financial literacy; money transfer; other financial services	Microfinance; basic bank accounts, financial literacy; and other pro-poor financial services (eg, e-banking, money transfers)	Microfinance; basic accounts; e-banking; partnerships; (limited) financial literacy; other financial services (eg, payment facilitation, money transfers)	Research, evaluation, surveys; microfinance; advocacy; and financial literacy	Advocacy; publications; project financing; equity participation; risk sharing; TA
Country	South Africa	India; Trinidad & Tobago; Mexico	Numerous countries in all regions (eg, Bolivia, Kenya, Philippines, India, Brazil)	Numerous countries in all regions (eg, Bangladesh, South Africa, China)	Numerous countries in all regions
Financial inclusion pillar addressed	All four	One, more or all of the pillars	All four. However, mainly PSD and microfinance, with financial literacy and public sector support pillars to a limited extent only	Primarily, microfinance and financial literacy	All four; but in a catalytic and supporting role

Empirical Part

Appendix 1: Dataset Part 1

		Financial Inclusion	Solow Growth Instruments				Regional Dummies							
Country	Code	lnAcct	lny	lnA	lnk	Labshr	EAP	EECA	WE	LAC	MENA	NAM	SA	SSA
Afghanistan	AFG	2.303	..	..	..	..	0	0	0	0	0	0	1	0
Albania	ALB	3.376	10.112	-1.393	11.505	0.000	0	1	0	0	0	0	0	0
Algeria	DZA	3.535	..	..	..	..	0	0	0	0	1	0	0	0
American Samoa	ASM	..	..	..	..	..	1	0	0	0	0	0	0	0
Andorra	ADO	..	..	..	..	..	0	0	1	0	0	0	0	0
Angola	AGO	3.694	9.171	-0.738	9.908	0.000	0	0	0	0	0	0	0	1
Antigua and Barbuda	ATG	..	..	-0.694	..	0.000	0	0	0	1	0	0	0	0
Argentina	ARG	3.530	10.519	3.813	11.748	0.429	0	0	0	1	0	0	0	0
Armenia	ARM	2.917	9.616	5.635	10.613	0.625	0	1	0	0	0	0	0	0
Aruba	ABW	..	..	..	..	..	0	0	0	1	0	0	0	0
Australia	AUS	4.606	11.194	5.844	12.506	0.572	1	0	0	0	0	0	0	0
Austria	AUT	4.586	11.174	6.304	12.390	0.607	0	0	1	0	0	0	0	0
Azerbaijan	AZE	2.766	9.807	1.866	10.331	0.231	0	1	0	0	0	0	0	0
Bahamas The	BHS	..	10.698	3.885	11.473	0.406	0	0	0	1	0	0	0	0
Bahrain	BHR	4.182	10.442	2.703	12.052	0.358	0	0	0	0	1	0	0	0
Bangladesh	BGD	3.703	8.500	-1.159	9.659	0.000	0	0	0	0	0	0	1	0
Barbados	BRB	..	10.850	8.226	10.649	0.754	0	0	0	1	0	0	0	0
Belarus	BLR	4.088	10.270	6.014	11.285	0.623	0	1	0	0	0	0	0	0
Belgium	BEL	4.578	11.235	6.487	12.480	0.620	0	0	1	0	0	0	0	0
Belize	BLZ	..	9.918	0.029	9.890	0.000	0	0	0	1	0	0	0	0
Benin	BEN	2.439	8.056	4.577	9.087	0.617	0	0	0	0	0	0	0	1
Bermuda	BMU	..	10.954	7.251	11.340	0.673	0	0	0	0	0	1	0	0
Bhutan	BTN	..	9.559	8.344	10.982	0.889	0	0	0	0	0	0	1	0
Bolivia	BOL	3.368	9.177	3.635	10.091	0.451	0	0	0	1	0	0	0	0
Bosnia and Herzegovina	BIH	4.047	10.465	6.787	11.290	0.674	0	1	0	0	0	0	0	0
Botswana	BWA	3.442	9.859	1.377	11.258	0.247	0	0	0	0	0	0	0	1

Brazil	BRA	4.041	9.758	4.867	11.057	0.558	0	0	0	1	0	0	0	0
Brunei Darussalam	BRN	..	11.718	-0.987	12.705	0.000	1	0	0	0	0	0	0	0
Bulgaria	BGR	3.986	10.106	4.282	11.064	0.474	0	1	0	0	0	0	0	0
Burkina Faso	BFA	2.664	7.674	4.083	8.523	0.579	0	0	0	0	0	0	0	1
Burundi	BDI	2.109	7.013	3.843	7.790	0.593	0	0	0	0	0	0	0	1
Cabo Verde	CPV	..	8.998	-1.744	10.741	0.000	0	0	0	0	0	0	0	1
Cambodia	KHM	1.539	8.326	-0.847	9.173	0.000	1	0	0	0	0	0	0	0
Cameroon	CMR	2.761	8.363	3.778	9.219	0.503	0	0	0	0	0	0	0	1
Canada	CAN	4.573	11.173	6.060	12.255	0.583	0	0	0	0	0	1	0	0
Cayman Islands	CYM	..	..	..	..	..	0	0	0	1	0	0	0	0
Central African Republic	CAF	1.459	7.208	0.263	8.311	0.164	0	0	0	0	0	0	0	1
Chad	TCD	2.299	8.329	5.615	8.557	0.683	0	0	0	0	0	0	0	1
Channel Islands	CHI	..	..	..	..	..	0	0	1	0	0	0	0	0
Chile	CHL	3.765	10.310	3.991	11.421	0.447	0	0	0	1	0	0	0	0
China	CHN	4.172	9.681	3.318	10.949	0.419	1	0	0	0	0	0	0	0
Colombia	COL	3.448	9.822	3.995	11.099	0.475	0	0	0	1	0	0	0	0
Comoros	COM	3.122	7.917	-1.563	9.480	0.000	0	0	0	0	0	0	0	1
Congo Dem. Rep.	ZAR	1.547	..	..	..	..	0	0	0	0	0	0	0	1
Congo Rep.	COG	2.302	8.943	-0.850	9.793	0.000	0	0	0	0	0	0	0	1
Costa Rica	CRI	3.939	9.984	5.942	10.634	0.620	0	0	0	1	0	0	0	0
Cote d'Ivoire	CIV	..	8.188	3.869	8.703	0.504	0	0	0	0	0	0	0	1
Croatia	HRV	4.493	10.730	6.362	12.088	0.639	0	1	0	0	0	0	0	0
Cuba	CUB	..	..	..	..	..	0	0	0	1	0	0	0	0
Curacao	CUW	..	..	..	..	..	0	0	0	1	0	0	0	0
Cyprus	CYP	4.457	10.949	5.456	12.417	0.558	0	0	1	0	0	0	0	0
Czech Republic	CZE	4.402	10.736	5.525	12.015	0.566	0	1	0	0	0	0	0	0
Denmark	DNK	4.613	11.066	7.269	12.353	0.693	0	0	1	0	0	0	0	0
Djibouti	DJI	2.586	8.815	5.056	10.258	0.633	0	0	0	0	1	0	0	0
Dominica	DMA	..	..	0.347	..	0.000	0	0	0	1	0	0	0	0
Dominican Republic	DOM	3.669	10.044	3.243	11.017	0.383	0	0	0	1	0	0	0	0
Ecuador	ECU	3.631	9.800	1.310	11.181	0.241	0	0	0	1	0	0	0	0
Egypt Arab Rep.	EGY	2.372	9.671	2.966	10.371	0.353	0	0	0	0	1	0	0	0

El Salvador	SLV	2.692	7.075	-1.590	8.665	0.000	0	0	0	1	0	0	0	0
Equatorial Guinea	GNQ	..	10.893	0.099	10.794	0.000	0	0	0	0	0	0	0	1
Eritrea	ERI	..	..	..	..	..	0	0	0	0	0	0	0	1
Estonia	EST	4.583	10.504	5.929	11.626	0.607	0	1	0	0	0	0	0	0
Ethiopia	ETH	..	7.568	-0.853	8.420	0.000	0	0	0	0	0	0	0	1
Faeroe Islands	FRO	..	..	..	..	..	0	0	1	0	0	0	0	0
Fiji	FJI	..	9.269	4.124	10.343	0.503	1	0	0	0	0	0	0	0
Finland	FIN	4.612	11.124	6.201	12.475	0.605	0	0	1	0	0	0	0	0
France	FRA	4.585	11.177	6.527	12.454	0.627	0	0	1	0	0	0	0	0
French Polynesia	PYF	..	..	..	..	..	1	0	0	0	0	0	0	0
Gabon	GAB	2.993	10.302	1.746	11.583	0.261	0	0	0	0	0	0	0	1
Gambia The	GMB	..	8.221	-0.739	8.960	0.000	0	0	0	0	0	0	0	1
Georgia	GEO	3.526	9.762	3.563	10.779	0.425	0	1	0	0	0	0	0	0
Germany	DEU	4.596	11.151	6.351	12.276	0.609	0	0	1	0	0	0	0	0
Ghana	GHA	3.415	8.573	-0.874	9.447	0.000	0	0	0	0	0	0	0	1
Greece	GRC	4.369	10.840	4.950	12.209	0.518	0	0	1	0	0	0	0	0
Greenland	GRL	..	..	..	..	..	0	0	1	0	0	0	0	0
Grenada	GRD	..	..	-0.654	..	0.000	0	0	0	1	0	0	0	0
Guam	GUM	..	..	..	..	..	1	0	0	0	0	0	0	0
Guatemala	GTM	3.149	9.357	3.691	9.797	0.422	0	0	0	1	0	0	0	0
Guinea	GIN	1.545	7.829	-0.909	8.738	0.000	0	0	0	0	0	0	0	1
Guinea-Bissau	GNB	..	7.649	-1.780	9.429	0.000	0	0	0	0	0	0	0	1
Guyana	GUY	..	..	..	..	..	0	0	0	1	0	0	0	0
Haiti	HTI	3.136	..	..	..	..	0	0	0	1	0	0	0	0
Honduras	HND	3.069	8.916	4.943	9.825	0.596	0	0	0	1	0	0	0	0
Hong Kong SAR China	HKG	4.496	11.420	5.486	12.581	0.528	1	0	0	0	0	0	0	0
Hungary	HUN	4.300	10.592	6.042	11.743	0.612	0	1	0	0	0	0	0	0
Iceland	ISL	..	10.926	7.780	12.450	0.747	0	0	1	0	0	0	0	0
India	IND	3.590	9.106	3.996	9.941	0.486	0	0	0	0	0	0	1	0
Indonesia	IDN	3.024	9.139	3.642	10.304	0.467	1	0	0	0	0	0	0	0
Iran Islamic Rep.	IRN	4.313	10.500	1.895	11.619	0.259	0	0	0	0	1	0	0	0
Iraq	IRQ	2.447	9.697	2.480	10.273	0.298	0	0	0	0	1	0	0	0

Ireland	IRL	4.553	11.585	5.822	12.248	0.529	0	0	1	0	0	0	0	0
Isle of Man	IMY	..	..	..	..	..	0	0	1	0	0	0	0	0
Israel	ISR	4.516	10.995	5.701	12.030	0.560	0	0	0	0	1	0	0	0
Italy	ITA	4.277	11.116	5.456	12.614	0.551	0	0	1	0	0	0	0	0
Jamaica	JAM	4.277	9.307	4.773	10.290	0.559	0	0	0	1	0	0	0	0
Japan	JPN	4.579	11.075	5.101	12.544	0.524	1	0	0	0	0	0	0	0
Jordan	JOR	3.276	9.968	3.993	11.567	0.483	0	0	0	0	1	0	0	0
Kazakhstan	KAZ	3.764	10.100	3.392	11.319	0.407	0	1	0	0	0	0	0	0
Kenya	KEN	3.769	8.147	5.183	8.936	0.668	0	0	0	0	0	0	0	1
Kiribati	KIR	..	..	..	..	..	1	0	0	0	0	0	0	0
Korea Dem. Rep.	PRK	..	..	..	..	..	1	0	0	0	0	0	0	0
Korea Rep.	KOR	4.544	10.995	5.407	12.293	0.545	1	0	0	0	0	0	0	0
Kosovo	KSV	3.814	..	..	..	..	0	1	0	0	0	0	0	0
Kuwait	KWT	4.475	11.611	1.751	12.702	0.224	0	0	0	0	1	0	0	0
Kyrgyz Republic	KGZ	1.560	8.745	4.366	9.378	0.533	0	1	0	0	0	0	0	0
Lao PDR	LAO	3.324	8.706	-1.247	9.953	0.000	1	0	0	0	0	0	0	0
Latvia	LVA	4.507	10.407	5.616	11.541	0.585	0	1	0	0	0	0	0	0
Lebanon	LBN	3.638	10.530	3.392	12.299	0.420	0	0	0	0	1	0	0	0
Lesotho	LSO	2.970	8.246	4.387	9.716	0.603	0	0	0	0	0	0	0	1
Liberia	LBR	2.986	7.151	-0.806	7.957	0.000	0	0	0	0	0	0	0	1
Libya	LBY	..	..	..	..	..	0	0	0	0	1	0	0	0
Liechtenstein	LIE	..	..	..	..	..	0	0	1	0	0	0	0	0
Lithuania	LTU	4.314	10.617	5.323	11.455	0.538	0	1	0	0	0	0	0	0
Luxembourg	LUX	4.560	11.270	5.032	12.576	0.504	0	0	1	0	0	0	0	0
Macao SAR China	MAC	..	11.716	3.690	12.247	0.345	1	0	0	0	0	0	0	0
Macedonia FYR	MKD	4.313	10.338	5.266	11.657	0.565	0	1	0	0	0	0	0	0
Madagascar	MDG	1.875	7.372	-1.124	8.496	0.000	0	0	0	0	0	0	0	1
Malawi	MWI	2.865	7.439	-1.485	8.924	0.000	0	0	0	0	0	0	0	1
Malaysia	MYS	4.207	10.256	4.812	11.617	0.531	1	0	0	0	0	0	0	0
Maldives	MDV	..	10.587	-1.062	11.649	0.000	0	0	0	0	0	0	1	0
Mali	MLI	2.221	7.947	-0.510	8.457	0.000	0	0	0	0	0	0	0	1
Malta	MLT	4.567	10.820	5.320	11.908	0.538	0	0	0	0	1	0	0	0

Marshall Islands	MHL	..	..	..	..	..	1	0	0	0	0	0	0	0
Mauritania	MRT	2.916	8.761	3.212	10.173	0.455	0	0	0	0	0	0	0	1
Mauritius	MUS	4.396	10.032	3.578	11.157	0.421	0	0	0	0	0	0	0	1
Mexico	MEX	3.347	10.366	3.168	11.349	0.366	0	0	0	1	0	0	0	0
Micronesia Fed. Sts.	FSM	..	..	..	..	..	1	0	0	0	0	0	0	0
Moldova	MDA	2.948	9.459	5.444	10.777	0.627	0	1	0	0	0	0	0	0
Monaco	MCO	..	..	..	..	..	0	0	1	0	0	0	0	0
Mongolia	MNG	4.366	9.483	3.691	11.177	0.482	1	0	0	0	0	0	0	0
Montenegro	MNE	3.940	10.416	-1.105	11.522	0.000	0	1	0	0	0	0	0	0
Morocco	MAR	3.691	9.248	3.970	10.544	0.499	0	0	0	0	1	0	0	0
Mozambique	MOZ	3.711	7.338	2.704	7.871	0.411	0	0	0	0	0	0	0	1
Myanmar	MMR	..	..	..	..	..	1	0	0	0	0	0	0	0
Namibia	NAM	..	9.383	4.495	10.547	0.537	0	0	0	0	0	0	0	1
Nepal	NPL	3.270	8.033	-1.340	9.373	0.000	0	0	0	0	0	0	1	0
Netherlands	NLD	4.602	11.204	6.452	12.255	0.612	0	0	1	0	0	0	0	0
New Caledonia	NCL	..	..	..	..	..	1	0	0	0	0	0	0	0
New Zealand	NZL	4.610	10.759	4.989	11.750	0.509	1	0	0	0	0	0	0	0
Nicaragua	NIC	2.723	..	..	..	..	0	0	0	1	0	0	0	0
Niger	NER	0.925	7.426	2.844	8.879	0.484	0	0	0	0	0	0	0	1
Nigeria	NGA	3.423	8.774	3.302	9.052	0.396	0	0	0	0	0	0	0	1
Northern Mariana Islands	MNP	..	..	..	..	..	1	0	0	0	0	0	0	0
Norway	NOR	..	11.556	5.771	12.472	0.536	0	0	1	0	0	0	0	0
Oman	OMN	4.312	11.117	2.520	12.328	0.303	0	0	0	0	1	0	0	0
Pakistan	PAK	2.425	9.039	-0.939	9.978	0.000	0	0	0	0	0	0	1	0
Palau	PLW	..	..	..	..	..	1	0	0	0	0	0	0	0
Panama	PAN	3.255	10.504	3.773	10.983	0.387	0	0	0	1	0	0	0	0
Papua New Guinea	PNG	..	..	..	..	..	1	0	0	0	0	0	0	0
Paraguay	PRY	3.123	9.263	4.822	10.207	0.565	0	0	0	1	0	0	0	0
Peru	PER	3.066	9.944	2.031	11.291	0.299	0	0	0	1	0	0	0	0
Philippines	PHL	3.316	9.205	3.059	10.439	0.411	1	0	0	0	0	0	0	0
Poland	POL	4.265	10.648	5.555	11.628	0.562	0	1	0	0	0	0	0	0
Portugal	PRT	4.410	10.703	6.654	12.135	0.666	0	0	1	0	0	0	0	0

Puerto Rico	PRI	..	..	..	..	..	0	0	0	1	0	0	0	0
Qatar	QAT	4.203	11.916	1.265	12.911	0.175	0	0	0	0	1	0	0	0
Romania	ROM	3.820	..	..	..	..	0	1	0	0	0	0	0	0
Russian Federation	RUS	3.895	10.334	5.924	11.597	0.620	0	1	0	0	0	0	0	0
Rwanda	RWA	3.519	7.835	5.099	8.175	0.665	0	0	0	0	0	0	0	1
Samoa	WSM	..	..	..	..	..	1	0	0	0	0	0	0	0
San Marino	SMR	..	..	..	..	..	0	0	1	0	0	0	0	0
Sao Tome and Principe	STP	..	8.554	6.038	9.617	0.738	0	0	0	0	0	0	0	1
Saudi Arabia	SAU	3.859	11.037	2.651	12.331	0.320	0	0	0	0	1	0	0	0
Senegal	SEN	1.920	8.209	2.369	9.613	0.392	0	0	0	0	0	0	0	1
Serbia	SRB	4.147	10.282	6.039	11.580	0.634	0	1	0	0	0	0	0	0
Seychelles	SYC	..	..	..	..	..	0	0	0	0	0	0	0	1
Sierra Leone	SLE	2.794	7.722	4.569	8.612	0.634	0	0	0	0	0	0	0	1
Singapore	SGP	4.597	11.192	4.112	12.630	0.439	1	0	0	0	0	0	0	0
Sint Maarten (Dutch part)	SXM	..	..	..	..	..	0	0	0	1	0	0	0	0
Slovak Republic	SVK	4.389	10.787	5.381	11.820	0.543	0	1	0	0	0	0	0	0
Slovenia	SVN	4.586	10.823	6.975	12.280	0.687	0	1	0	0	0	0	0	0
Solomon Islands	SLB	..	..	..	..	..	1	0	0	0	0	0	0	0
Somalia	SOM	3.466	..	..	..	..	0	0	0	0	0	0	0	1
South Africa	ZAF	4.001	9.972	4.783	10.868	0.523	0	0	0	0	0	0	0	1
South Sudan	SSD	..	..	..	..	..	0	0	0	0	0	0	0	1
Spain	ESP	4.546	11.078	6.720	12.471	0.651	0	0	1	0	0	0	0	0
Sri Lanka	LKA	4.242	9.554	6.380	10.616	0.701	0	0	0	0	0	0	1	0
St. Kitts and Nevis	KNA	..	..	..	..	0.000	0	0	0	1	0	0	0	0
St. Lucia	LCA	..	9.856	-0.244	10.100	0.000	0	0	0	1	0	0	0	0
St. Martin (French part)	MAF	..	..	..	..	..	0	0	0	1	0	0	0	0
St. Vincent and the Grenadines	VCT	..	9.569	-0.422	9.991	0.000	0	0	0	1	0	0	0	0
Sudan	SDN	2.067	9.034	-0.078	9.112	0.000	0	0	0	0	0	0	0	1
Suriname	SUR	..	10.103	3.812	11.604	0.458	0	0	0	1	0	0	0	0
Swaziland	SWZ	3.387	9.478	5.386	11.052	0.630	0	0	0	0	0	0	0	1
Sweden	SWE	4.605	11.134	6.806	11.884	0.636	0	0	1	0	0	0	0	0
Switzerland	CHE	..	11.162	7.491	12.232	0.700	0	0	1	0	0	0	0	0

Syrian Arab Republic	SYR	3.189	9.749	-1.216	10.965	0.000	0	0	0	0	1	0	0	0
Tajikistan	TJK	1.263	9.250	2.038	10.301	0.300	0	1	0	0	0	0	0	0
Tanzania	TZA	2.905	7.814	2.632	8.716	0.405	0	0	0	0	0	0	0	1
Thailand	THA	4.300	9.590	2.972	10.959	0.396	1	0	0	0	0	0	0	0
Timor-Leste	TMP	..	..	..	..	..	1	0	0	0	0	0	0	0
Togo	TGO	2.415	7.455	6.192	8.529	0.852	0	0	0	0	0	0	0	1
Tonga	TON	..	..	..	..	..	1	0	0	0	0	0	0	0
Trinidad and Tobago	TTO	4.343	10.585	3.507	10.664	0.336	0	0	0	1	0	0	0	0
Tunisia	TUN	3.502	9.837	3.717	11.137	0.451	0	0	0	0	1	0	0	0
Turkey	TUR	4.071	10.641	3.365	11.255	0.354	0	0	1	0	0	0	0	0
Turkmenistan	TKM	0.340	10.250	-1.383	11.633	0.000	0	1	0	0	0	0	0	0
Turks and Caicos Islands	TCA	..	..	..	..	..	0	0	0	1	0	0	0	0
Tuvalu	TUV	..	..	..	..	..	1	0	0	0	0	0	0	0
Uganda	UGA	3.066	8.044	-0.482	8.526	0.000	0	0	0	0	0	0	0	1
Ukraine	UKR	3.744	9.601	5.679	11.191	0.650	0	1	0	0	0	0	0	0
United Arab Emirates	ARE	4.106	..	..	..	..	0	0	0	0	1	0	0	0
United Kingdom	GBR	4.587	11.141	6.717	12.046	0.633	0	0	1	0	0	0	0	0
United States	USA	4.488	11.443	6.691	12.573	0.622	0	0	0	0	0	1	0	0
Uruguay	URY	3.200	10.146	3.994	11.356	0.458	0	0	0	1	0	0	0	0
Uzbekistan	UZB	3.157	9.574	-0.361	9.936	0.000	0	1	0	0	0	0	0	0
Vanuatu	VUT	..	..	..	..	..	1	0	0	0	0	0	0	0
Venezuela RB	VEN	3.809	10.271	2.973	11.382	0.359	0	0	0	1	0	0	0	0
Vietnam	VNM	3.108	8.707	-1.428	10.134	0.000	1	0	0	0	0	0	0	0
Virgin Islands (U.S.)	VIR	..	..	..	..	..	0	0	0	1	0	0	0	0
West Bank and Gaza	WBG	3.017	..	..	..	..	0	0	0	0	1	0	0	0
Yemen Rep.	YEM	1.539	9.082	-1.293	10.375	0.000	0	0	0	0	1	0	0	0
Zambia	ZMB	3.107	8.119	-1.104	9.223	0.000	0	0	0	0	0	0	0	1
Zimbabwe	ZWE	3.705	8.909	5.743	7.128	0.556	0	0	0	0	0	0	0	1

Appendix 1: Dataset Part 2:

		Instruments part 1							
Country	Code	LANDLOCKED	leg_british	leg_french	Christians	Muslim	lnArable	lnWater	lnLandBlw5
Afghanistan	AFG	1	0	1	0.000	0.996	-1.342	7.342	0.000
Albania	ALB	0	0	0	0.214	0.630	-1.510	9.136	1.786
Algeria	DZA	0	0	1	0.008	0.990	-1.629	5.663	0.301
American Samoa	ASM	0	1	0	..	..	-2.911	..	2.939
Andorra	ADO	1	..	..	0.907	0.009	-3.486	8.290	0.000
Angola	AGO	0	0	1	0.891	0.010	-1.447	8.838	0.189
Antigua and Barbuda	ATG	0	1	0	0.914	0.000	-3.103	6.361	3.509
Argentina	ARG	0	0	1	0.852	0.015	-0.045	8.860	0.802
Armenia	ARM	1	0	0	0.951	0.000	-1.890	7.743	0.000
Aruba	ABW	0	..	..	..	..	-3.936	..	3.420
Australia	AUS	0	1	0	0.615	0.022	0.729	9.965	0.762
Austria	AUT	1	0	0	0.730	0.048	-1.828	8.778	0.000
Azerbaijan	AZE	1	0	0	0.024	0.950	-1.589	6.760	3.043
Bahamas The	BHS	0	1	0	0.966	0.000	-3.839	3.989	4.290
Bahrain	BHR	0	1	0	0.098	0.896	-6.714	1.387	3.690
Bangladesh	BGD	0	1	0	0.002	0.897	-3.003	6.510	2.713
Barbados	BRB	0	1	0	0.643	0.008	-3.248	5.642	2.815
Belarus	BLR	0	0	0	0.568	0.002	-0.539	8.277	0.000
Belgium	BEL	0	0	1	0.692	0.050	-2.630	6.979	2.327
Belize	BLZ	0	1	0	0.737	0.002	-1.424	10.736	2.347
Benin	BEN	0	0	1	0.400	0.265	-1.314	6.906	0.768
Bermuda	BMU	0	1	0	..	..	-4.472	..	4.422
Bhutan	BTN	1	1	0	0.012	0.010	-2.004	11.547	0.000
Bolivia	BOL	1	0	1	0.943	0.000	-0.893	10.256	0.000
Bosnia and Herzegovina	BIH	0	..	..	0.520	0.450	-1.338	9.135	0.071
Botswana	BWA	1	1	0	0.692	0.027	-1.950	7.080	0.000
Brazil	BRA	0	0	1	0.882	0.000	-1.007	10.249	0.794
Brunei Darussalam	BRN	0	1	0	0.030	0.813	-4.635	9.921	1.467

Bulgaria	BGR	0	0	0	0.823	0.129	-0.790	7.970	0.357
Burkina Faso	BFA	1	0	1	0.294	0.579	-1.009	6.605	0.000
Burundi	BDI	1	0	1	0.889	0.025	-2.192	6.899	0.000
Cabo Verde	CPV	0	0	1	0.948	0.032	-2.353	6.401	2.742
Cambodia	KHM	0	0	0	0.004	0.019	-1.288	8.983	1.577
Cameroon	CMR	0	0	1	0.495	0.214	-1.253	9.415	0.080
Canada	CAN	0	1	0	0.766	0.019	0.278	11.303	1.222
Cayman Islands	CYM	0	..	..	..	..	-5.662	..	4.116
Central African Republic	CAF	1	0	1	0.492	0.150	-0.922	10.327	0.000
Chad	TCD	1	0	1	0.340	0.552	-0.932	7.065	0.000
Channel Islands	CHI	0	..	..	..	..	-3.624	..	..
Chile	CHL	0	0	1	0.913	0.000	-2.570	10.824	1.406
China	CHN	0	0	0	0.058	0.025	-2.546	7.637	0.868
Colombia	COL	0	0	1	0.970	0.001	-3.405	10.757	0.664
Comoros	COM	0	0	1	0.001	0.981	-2.098	7.399	2.672
Congo Dem. Rep.	ZAR	0	0	1	0.930	0.013	-2.239	9.498	0.015
Congo Rep.	COG	0	0	1	0.806	0.019	-2.102	10.818	0.054
Costa Rica	CRI	0	0	1	0.882	0.000	-2.976	10.052	1.137
Cote d'Ivoire	CIV	0	0	1	0.375	0.375	-1.923	8.238	0.176
Croatia	HRV	0	..	..	0.914	0.015	-1.553	9.089	1.394
Cuba	CUB	0	0	0	0.659	0.001	-1.258	8.127	2.615
Curacao	CUW	0	..	..	..	..	..	..	..
Cyprus	CYP	0	1	0	0.745	0.203	-2.513	6.529	2.004
Czech Republic	CZE	1	..	..	0.214	0.000	-1.203	7.132	0.000
Denmark	DNK	0	0	0	0.817	0.040	-0.838	6.975	2.927
Djibouti	DJI	0	0	1	0.014	0.975	-6.063	5.843	1.271
Dominica	DMA	0	1	0	0.920	0.000	-2.481	..	2.342
Dominican Republic	DOM	0	0	1	0.870	0.000	-2.553	7.611	1.637
Ecuador	ECU	0	0	1	0.903	0.000	-2.602	10.244	1.111
Egypt Arab Rep.	EGY	0	0	1	0.121	0.864	-3.361	3.133	1.619
El Salvador	SLV	0	0	1	0.861	0.000	-2.190	7.810	1.239
Equatorial Guinea	GNQ	0	0	1	0.892	0.039	-1.814	10.444	0.653

Eritrea	ERI	0	..	..	0.575	0.401	-2.184	6.094	1.416
Estonia	EST	0	0	0	0.284	0.002	-0.758	9.174	1.471
Ethiopia	ETH	1	0	1	0.616	0.344	-1.788	7.168	0.514
Faeroe Islands	FRO	0	0	1	..	..	-2.803	..	2.744
Fiji	FJI	0	1	0	0.640	0.060	-1.668	10.386	2.514
Finland	FIN	0	0	0	0.794	0.005	-0.878	9.887	0.746
France	FRA	0	0	1	0.702	0.079	-1.278	8.018	1.121
French Polynesia	PYF	0	..	..	..	..	-4.696	10.556	3.653
Gabon	GAB	0	0	1	0.747	0.150	-1.614	11.494	0.430
Gambia The	GMB	0	1	0	0.044	0.900	-1.404	7.392	2.867
Georgia	GEO	0	0	0	0.798	0.099	-2.418	9.469	0.887
Germany	DEU	0	0	0	0.708	0.049	-1.916	7.191	1.778
Ghana	GHA	0	1	0	0.703	0.176	-1.686	7.065	0.569
Greece	GRC	0	0	1	0.944	0.024	-1.474	8.568	1.993
Greenland	GRL	0	0	1	..	..	-4.145	16.182	2.849
Grenada	GRD	0	1	0	0.870	0.005	-3.560	..	3.124
Guam	GUM	0	1	0	..	..	-5.093	..	3.063
Guatemala	GTM	0	0	1	0.950	0.000	-2.286	8.862	0.445
Guinea	GIN	0	0	1	0.080	0.850	-1.339	9.865	0.718
Guinea-Bissau	GNB	0	0	1	0.109	0.399	-1.713	9.147	2.351
Guyana	GUY	0	1	0	0.558	0.075	-0.639	12.616	1.313
Haiti	HTI	0	0	1	0.820	0.000	-2.320	7.140	1.597
Honduras	HND	0	0	1	0.890	0.000	-2.052	9.323	1.397
Hong Kong SAR China	HKG	0	1	0	..	..	-7.744	..	3.242
Hungary	HUN	1	0	0	0.674	0.001	-0.814	6.409	0.000
Iceland	ISL	0	0	0	0.916	0.005	-0.973	13.171	1.689
India	IND	0	1	0	0.023	0.134	-2.069	7.053	0.856
Indonesia	IDN	0	0	1	0.106	0.840	-2.352	8.997	1.871
Iran Islamic Rep.	IRN	0	0	1	0.002	0.990	-1.462	7.415	0.953
Iraq	IRQ	0	0	1	0.019	0.950	-2.252	6.961	1.614
Ireland	IRL	0	1	0	0.930	0.006	-1.366	9.274	1.601
Isle of Man	IMY	0	1	0	..	..	-1.378	..	2.572

Israel	ISR	0	1	0	0.020	0.200	-3.290	4.544	2.177
Italy	ITA	0	0	1	0.794	0.012	-2.124	8.017	1.823
Jamaica	JAM	0	1	0	0.688	0.001	-3.116	8.150	2.097
Japan	JPN	0	0	0	0.020	0.002	-3.403	8.125	1.929
Jordan	JOR	0	0	1	0.030	0.970	-3.383	4.669	1.101
Kazakhstan	KAZ	1	0	0	0.290	0.593	0.310	8.237	2.038
Kenya	KEN	0	1	0	0.806	0.105	-2.043	6.148	0.215
Kiribati	KIR	0	1	0	0.960	0.000	-3.920	..	4.582
Korea Dem. Rep.	PRK	0	0	0	0.017	0.000	-2.355	7.898	1.230
Korea Rep.	KOR	0	0	0	0.286	0.002	-3.492	7.164	1.668
Kosovo	KSV	1	..	..	0.759	0.191	-1.754	..	..
Kuwait	KWT	0	0	1	0.000	0.920	-5.784	0.000	2.288
Kyrgyz Republic	KGZ	1	0	0	0.101	0.770	-1.480	9.054	0.000
Lao PDR	LAO	1	0	0	0.015	0.010	-1.522	10.244	0.000
Latvia	LVA	0	0	0	0.790	0.000	-0.546	9.026	1.394
Lebanon	LBN	0	0	1	0.407	0.540	-3.062	6.980	1.009
Lesotho	LSO	1	1	0	0.942	0.001	-1.987	7.833	0.000
Liberia	LBR	0	1	0	0.850	0.113	-2.126	10.749	0.302
Libya	LBY	0	0	1	0.030	0.970	-1.275	4.735	0.574
Liechtenstein	LIE	1	..	..	0.868	0.055	-2.503	..	0.000
Lithuania	LTU	0	0	0	0.830	0.001	-0.279	8.568	1.069
Luxembourg	LUX	1	0	1	0.911	0.020	-2.139	7.518	0.000
Macao SAR China	MAC	0	0	1	..	..	..	..	3.594
Macedonia FYR	MKD	1	..	..	0.637	0.342	-1.626	7.849	0.000
Madagascar	MDG	0	0	1	0.586	0.055	-1.852	9.596	0.850
Malawi	MWI	1	1	0	0.723	0.146	-1.445	6.895	0.000
Malaysia	MYS	0	1	0	0.083	0.610	-3.412	9.879	1.384
Maldives	MDV	0	1	0	0.005	0.980	-4.726	4.477	4.615
Mali	MLI	1	0	1	0.030	0.940	-0.772	8.274	0.000
Malta	MLT	0	0	1	0.973	0.010	-3.842	4.790	3.013
Marshall Islands	MHL	0	..	..	0.934	0.000	-3.269	..	4.605
Mauritania	MRT	0	0	1	0.003	0.970	-2.250	4.643	0.716

Mauritius	MUS	0	0	1	0.325	0.173	-2.833	7.690	2.088
Mexico	MEX	0	0	1	0.969	0.000	-1.653	8.115	1.372
Micronesia Fed. Sts.	FSM	0	..	..	0.865	0.000	-3.945	..	3.537
Moldova	MDA	0	0	0	0.821	0.036	-0.674	5.642	0.834
Monaco	MCO	0	..	..	0.802	0.008	..	..	4.615
Mongolia	MNG	1	0	0	0.019	0.030	-1.462	9.414	0.000
Montenegro	MNE	0	..	..	..	..	-1.284	..	..
Morocco	MAR	0	0	1	0.010	0.989	-1.397	6.779	0.532
Mozambique	MOZ	0	0	1	0.473	0.244	-1.495	8.264	1.041
Myanmar	MMR	0	0	0	0.078	0.042	-1.585	9.843	1.716
Namibia	NAM	0	1	0	0.870	0.005	-1.038	7.892	0.252
Nepal	NPL	1	1	0	0.014	0.044	-2.563	8.872	0.000
Netherlands	NLD	0	0	1	0.579	0.058	-2.808	6.486	4.085
New Caledonia	NCL	0	0	1	..	..	-3.728	..	2.201
New Zealand	NZL	0	1	0	0.541	0.011	-2.034	11.207	1.320
Nicaragua	NIC	0	0	1	0.901	0.000	-1.385	10.154	1.520
Niger	NER	1	0	1	0.039	0.915	-0.076	5.285	0.000
Nigeria	NGA	0	1	0	0.420	0.508	-1.574	7.150	0.433
Northern Mariana Islands	MNP	0	..	..	..	..	-3.976	..	3.369
Norway	NOR	0	0	0	0.840	0.020	-1.822	11.228	1.767
Oman	OMN	0	0	1	0.033	0.899	-4.588	5.957	0.734
Pakistan	PAK	0	1	0	0.017	0.957	-2.135	5.714	0.884
Palau	PLW	0	..	..	0.861	0.022	-3.033	..	3.108
Panama	PAN	0	0	1	0.979	0.003	-1.961	10.473	1.549
Papua New Guinea	PNG	0	1	0	0.960	0.000	-3.173	11.603	1.044
Paraguay	PRY	1	0	1	0.951	0.001	-0.416	9.753	0.000
Peru	PER	0	0	1	0.938	0.000	-1.978	10.897	0.321
Philippines	PHL	0	0	1	0.917	0.056	-2.859	8.491	1.948
Poland	POL	0	0	0	0.905	0.000	-1.261	7.239	0.986
Portugal	PRT	0	0	1	0.857	0.009	-2.267	8.198	1.196
Puerto Rico	PRI	0	0	1	..	..	-4.107	7.583	2.167
Qatar	QAT	0	0	1	0.145	0.470	-5.061	3.289	2.667

Romania	ROM	0	0	0	0.975	0.004	-0.825	7.658	1.362
Russian Federation	RUS	0	0	0	0.742	0.116	-0.179	10.311	1.066
Rwanda	RWA	1	0	1	0.895	0.046	-2.272	6.694	0.000
Samoa	WSM	0	..	..	0.954	0.000	-3.162	..	2.120
San Marino	SMR	0	..	..	0.863	0.000	-3.442	..	0.000
Sao Tome and Principe	STP	0	0	1	0.944	0.015	-3.074	9.332	2.755
Saudi Arabia	SAU	0	1	0	0.030	0.938	-2.192	4.434	0.393
Senegal	SEN	0	0	1	0.035	0.939	-1.410	7.510	1.697
Serbia	SRB	1	..	..	0.912	0.031	-0.785	7.069	0.173
Seychelles	SYC	0	0	1	0.937	0.017	-4.481	..	3.805
Sierra Leone	SLE	0	1	0	0.191	0.553	-1.239	10.176	1.387
Singapore	SGP	0	1	0	0.182	0.142	-9.040	4.720	2.204
Sint Maarten (Dutch part)	SXM	0	..	..	..	..	..	..	..
Slovak Republic	SVK	1	..	..	0.755	0.000	-1.357	7.753	0.000
Slovenia	SVN	0	..	..	0.670	0.030	-2.483	9.112	0.186
Solomon Islands	SLB	0	1	0	0.900	0.003	-3.365	11.285	2.529
Somalia	SOM	0	1	0	0.001	0.995	-2.227	6.350	0.449
South Africa	ZAF	0	1	0	0.809	0.017	-1.472	6.738	0.126
South Sudan	SSD	1	..	..	..	..	..	7.742	..
Spain	ESP	0	0	1	0.806	0.030	-1.327	7.778	0.814
Sri Lanka	LKA	0	1	0	0.073	0.096	-2.789	7.855	1.583
St. Kitts and Nevis	KNA	0	1	0	0.898	0.003	-2.372	6.096	2.997
St. Lucia	LCA	0	1	0	0.922	0.001	-4.099	..	2.200
St. Martin (French part)	MAF	0	..	..	..	..	..	..	..
St. Vincent and the Grenadines	VCT	0	1	0	0.899	0.001	-3.085	..	3.134
Sudan	SDN	0	1	0	0.072	0.710	-0.825	4.409	0.090
Suriname	SUR	0	0	1	0.480	0.196	-2.187	12.120	1.493
Swaziland	SWZ	1	1	0	0.784	0.007	-1.951	7.656	0.000
Sweden	SWE	0	0	0	0.761	0.060	-1.298	9.788	0.928
Switzerland	CHE	1	0	0	0.806	0.041	-2.986	8.516	0.000
Syrian Arab Republic	SYR	0	0	1	0.075	0.902	-1.569	5.747	0.058
Tajikistan	TJK	1	0	0	0.020	0.900	-2.231	8.953	0.000

Tanzania	TZA	0	1	0	0.478	0.360	-1.193	7.442	0.162
Thailand	THA	0	1	0	0.006	0.100	-1.394	8.117	1.642
Timor-Leste	TMP	0	..	..	0.980	0.007	-1.971	8.848	1.358
Togo	TGO	0	0	1	0.480	0.140	-0.919	7.431	0.456
Tonga	TON	0	1	0	0.942	0.000	-1.881	..	3.725
Trinidad and Tobago	TTO	0	1	0	0.559	0.050	-3.980	7.960	2.195
Tunisia	TUN	0	0	1	0.004	0.990	-1.334	5.957	1.333
Turkey	TUR	0	0	1	0.004	0.986	-1.280	8.016	0.706
Turkmenistan	TKM	1	0	0	0.090	0.890	-0.981	5.595	1.841
Turks and Caicos Islands	TCA	0	..	..	..	..	-3.479	..	3.994
Tuvalu	TUV	0	..	..	0.970	0.001	..	..	4.615
Uganda	UGA	1	1	0	0.833	0.120	-1.662	6.946	0.000
Ukraine	UKR	0	0	0	0.852	0.010	-0.338	7.063	0.933
United Arab Emirates	ARE	0	1	0	0.071	0.675	-5.277	2.836	1.731
United Kingdom	GBR	0	1	0	0.626	0.043	-2.328	7.724	2.153
United States	USA	0	1	0	0.745	0.009	-0.705	9.096	1.000
Uruguay	URY	0	0	1	0.818	0.000	-0.659	10.206	1.067
Uzbekistan	UZB	1	0	0	0.050	0.930	-1.923	6.294	0.051
Vanuatu	VUT	0	1	0	0.850	0.000	-2.515	..	2.540
Venezuela RB	VEN	0	0	1	0.950	0.001	-2.406	10.184	1.190
Vietnam	VNM	0	0	0	0.091	0.001	-2.630	8.296	2.918
Virgin Islands (U.S.)	VIR	0	1	0	..	..	-4.657	..	3.464
West Bank and Gaza	WBG	0	..	..	..	..	-4.499	5.277	2.763
Yemen Rep.	YEM	0	..	..	0.000	0.990	-2.954	4.466	0.445
Zambia	ZMB	1	1	0	0.870	0.006	-1.309	8.616	0.000
Zimbabwe	ZWE	1	1	0	0.819	0.011	-1.233	6.766	0.000

Appendix 1: Dataset Part 3:

		Instruments part 2							
CountryName	Code	lnarea	EthFrac	LangFrac	RelFrac	tropical	Temp	Rain	Outlier
Afghanistan	AFG	13.372	0.769	0.614	0.272	0	12.921	311.322	0
Albania	ALB	10.264	0.220	0.040	0.472	0	11.270	1053.235	0
Algeria	DZA	10.053	0.339	0.443	0.009	0	22.576	81.974	0
American Samoa	ASM	5.231	..	0.173	0.640	1	..	..	1
Andorra	ADO	6.152	0.714	0.685	0.233	0	..	..	0
Angola	AGO	9.430	0.787	0.787	0.628	1	21.511	991.306	0
Antigua and Barbuda	ATG	6.136	0.164	0.106	0.684	1	..	..	0
Argentina	ARG	10.234	0.255	0.062	0.224	0	14.215	559.046	0
Armenia	ARM	10.325	0.127	0.129	0.458	0	6.374	502.282	0
Aruba	ABW	5.209	..	0.389	0.411	1	..	..	0
Australia	AUS	11.321	0.093	0.335	0.821	0	21.507	473.091	1
Austria	AUT	11.337	0.107	0.152	0.415	0	6.186	1161.184	0
Azerbaijan	AZE	11.366	0.205	0.205	0.490	0	12.224	433.883	0
Bahamas The	BHS	9.463	0.423	0.185	0.681	0	25.063	1280.084	0
Bahrain	BHR	6.233	0.502	0.434	0.553	0	..	..	1
Bangladesh	BGD	11.853	0.045	0.092	0.209	0	25.471	2266.524	0
Barbados	BRB	6.087	0.142	0.093	0.693	1	..	..	0
Belarus	BLR	..	0.322	0.467	0.612	0	6.295	610.067	0
Belgium	BEL	10.329	0.555	0.541	0.213	0	9.514	874.298	0
Belize	BLZ	9.992	0.702	0.630	0.581	1	25.064	2089.264	0
Benin	BEN	11.664	0.787	0.791	0.554	1	27.462	1034.268	0
Bermuda	BMU	3.674	..	..	0.711	0	..	..	1
Bhutan	BTN	10.650	0.605	0.606	0.379	0	8.575	1780.460	0
Bolivia	BOL	9.472	0.740	0.224	0.208	1	20.975	1095.560	0
Bosnia and Herzegovina	BIH	..	0.630	0.675	0.685	0	9.017	1071.757	0
Botswana	BWA	13.271	0.410	0.411	0.599	1	21.479	394.476	0
Brazil	BRA	11.352	0.541	0.047	0.605	1	24.916	1762.971	0
Brunei Darussalam	BRN	8.660	0.542	0.344	0.440	1	25.934	3160.775	0

Bulgaria	BGR	11.617	0.402	0.303	0.597	0	10.397	602.844	0
Burkina Faso	BFA	12.520	0.738	0.723	0.580	1	28.176	774.287	0
Burundi	BDI	10.140	0.295	0.298	0.516	1	20.266	1262.812	0
Cabo Verde	CPV	8.337	0.417	..	0.077	1	..	..	0
Cambodia	KHM	12.102	0.210	0.210	0.096	1	26.940	1918.678	0
Cameroon	CMR	10.742	0.863	0.890	0.734	1	24.528	1613.072	0
Canada	CAN	11.481	0.712	0.577	0.696	0	-7.145	457.469	0
Cayman Islands	CYM	5.624	..	..	..	1	..	..	1
Central African Republic	CAF	13.340	0.830	0.833	0.792	1	24.839	1354.668	0
Chad	TCD	9.446	0.862	0.864	0.641	1	26.651	330.506	0
Channel Islands	CHI	5.290	..	..	..	0	..	..	0
Chile	CHL	13.517	0.186	0.187	0.384	0	8.370	631.170	0
China	CHN	11.430	0.154	0.133	0.664	0	6.326	574.774	0
Colombia	COL	9.342	0.601	0.019	0.148	1	24.404	2618.585	0
Comoros	COM	7.616	0.000	0.010	0.014	1	23.987	1846.394	0
Congo Dem. Rep.	ZAR	..	0.875	0.870	0.702	0	..	..	0
Congo Rep.	COG	12.751	0.875	0.687	0.664	1	24.520	1635.051	0
Costa Rica	CRI	10.849	0.237	0.049	0.241	1	23.851	3268.266	0
Cote d'Ivoire	CIV	12.676	0.820	0.784	0.755	1	26.300	1356.082	0
Croatia	HRV	..	0.369	0.076	0.445	0	10.471	1037.348	0
Cuba	CUB	11.587	0.591	..	0.506	1	25.130	1329.487	0
Curacao	CUW	..	..	..	..	..	..	..	0
Cyprus	CYP	9.131	0.094	0.396	0.396	0	18.714	436.255	0
Czech Republic	CZE	..	0.322	0.323	0.659	0	7.665	666.998	0
Denmark	DNK	10.665	0.082	0.105	0.233	0	7.819	698.650	0
Djibouti	DJI	9.969	0.796	0.656	0.043	1	27.643	196.185	1
Dominica	DMA	6.596	0.200	..	0.463	1	..	..	0
Dominican Republic	DOM	10.782	0.429	0.039	0.312	1	23.930	1417.072	0
Ecuador	ECU	12.456	0.655	0.131	0.142	1	21.329	1945.274	0
Egypt Arab Rep.	EGY	13.793	0.184	0.024	0.198	0	22.120	32.913	1
El Salvador	SLV	9.925	0.198	..	0.356	1	24.771	1672.810	0
Equatorial Guinea	GNQ	10.211	0.347	0.322	0.120	1	24.126	2213.308	0

Eritrea	ERI	11.698	0.652	0.653	0.425	1	26.068	257.704	0
Estonia	EST	10.707	0.506	0.494	0.498	0	5.031	629.787	0
Ethiopia	ETH	9.329	0.723	0.807	0.625	1	22.370	830.515	0
Faeroe Islands	FRO	..	..	..	0.315	0	..	..	0
Fiji	FJI	9.871	0.548	0.548	0.568	1	23.371	2905.115	1
Finland	FIN	12.705	0.131	0.141	0.253	0	1.348	524.701	0
France	FRA	13.240	0.103	0.122	0.403	0	10.544	838.929	0
French Polynesia	PYF	8.014	..	0.608	0.581	1	..	..	1
Gabon	GAB	12.468	0.769	0.782	0.667	1	25.000	1819.439	0
Gambia The	GMB	9.272	0.786	0.808	0.097	1	26.772	990.478	0
Georgia	GEO	11.158	0.492	0.475	0.654	0	7.365	959.437	0
Germany	DEU	12.782	0.168	0.164	0.657	0	8.504	713.500	0
Ghana	GHA	12.334	0.673	0.673	0.799	1	27.252	1184.945	0
Greece	GRC	11.785	0.158	0.030	0.153	0	13.656	668.223	0
Greenland	GRL	1.780	..	0.219	0.459	0	..	..	1
Grenada	GRD	5.905	0.266	..	0.590	1	..	..	0
Guam	GUM	6.350	..	0.732	0.408	1	..	..	0
Guatemala	GTM	11.588	0.512	0.459	0.375	1	23.071	2606.331	0
Guinea	GIN	10.107	0.739	0.773	0.265	1	25.548	1693.563	0
Guinea-Bissau	GNB	10.407	0.808	0.814	0.613	1	26.608	1646.949	0
Guyana	GUY	12.256	0.619	0.069	0.788	1	25.795	2364.686	0
Haiti	HTI	10.209	0.095	..	0.470	1	24.475	1480.201	0
Honduras	HND	11.633	0.187	0.055	0.236	1	23.386	1945.758	0
Hong Kong SAR China	HKG	6.850	0.062	0.213	0.419	1	..	..	1
Hungary	HUN	11.442	0.152	0.030	0.524	0	10.061	571.755	0
Iceland	ISL	11.433	0.080	0.082	0.191	0	1.351	1039.821	1
India	IND	10.399	0.418	0.807	0.326	0	23.945	1072.217	0
Indonesia	IDN	9.868	0.735	0.768	0.234	1	25.719	2801.535	0
Iran Islamic Rep.	IRN	9.693	0.668	0.746	0.115	0	16.927	227.358	0
Iraq	IRQ	10.673	0.369	0.369	0.484	0	21.580	196.336	0
Ireland	IRL	11.560	0.121	0.031	0.155	0	9.108	1110.629	0
Isle of Man	IMY	6.356	..	..	0.473	0	..	..	0

Israel	ISR	9.950	0.344	0.552	0.347	0	19.698	248.689	0
Italy	ITA	10.338	0.115	0.115	0.303	0	11.501	930.194	0
Jamaica	JAM	9.310	0.413	0.110	0.616	1	24.469	2114.184	0
Japan	JPN	12.835	0.012	0.018	0.541	0	10.363	1603.757	0
Jordan	JOR	11.407	0.593	0.040	0.066	0	18.353	102.306	0
Kazakhstan	KAZ	10.214	0.617	0.662	0.590	0	5.988	252.265	0
Kenya	KEN	13.260	0.859	0.886	0.777	1	24.499	678.113	0
Kiribati	KIR	6.956	0.051	0.024	0.554	1	..	..	1
Korea Dem. Rep.	PRK	11.700	0.039	0.003	0.489	0	4.857	1110.425	0
Korea Rep.	KOR	11.476	0.002	0.002	0.660	0	10.660	1344.731	0
Kosovo	KSV	..	..	..	..	..	8.424	862.642	0
Kuwait	KWT	9.743	0.660	0.344	0.674	0	25.153	108.587	1
Kyrgyz Republic	KGZ	..	0.675	0.595	0.447	0	1.093	390.721	0
Lao PDR	LAO	12.344	0.514	0.638	0.545	1	23.217	1758.347	0
Latvia	LVA	11.067	0.587	0.580	0.556	0	5.627	638.870	0
Lebanon	LBN	9.240	0.131	0.131	0.789	0	15.613	721.112	0
Lesotho	LSO	10.321	0.255	0.254	0.721	0	11.974	775.667	0
Liberia	LBR	11.481	0.908	0.904	0.488	1	25.252	2460.080	0
Libya	LBY	9.692	0.792	0.076	0.057	0	21.900	45.977	0
Liechtenstein	LIE	5.061	0.573	0.225	0.334	0	..	..	0
Lithuania	LTU	11.073	0.322	0.322	0.414	0	6.245	651.722	0
Luxembourg	LUX	7.878	0.530	0.644	0.091	0	8.882	848.806	0
Macao SAR China	MAC	2.380	..	0.252	0.551	1	..	..	1
Macedonia FYR	MKD	..	0.502	0.502	0.590	0	9.854	632.504	0
Madagascar	MDG	13.291	0.879	0.020	0.519	1	22.014	1475.676	0
Malawi	MWI	11.456	0.674	0.602	0.819	1	21.979	1112.291	0
Malaysia	MYS	12.696	0.588	0.597	0.666	1	25.139	2992.793	0
Maldives	MDV	4.658	..	..	..	1	..	..	1
Mali	MLI	9.437	0.691	0.839	0.182	1	28.300	303.009	0
Malta	MLT	5.806	0.041	0.091	0.122	0	..	..	0
Marshall Islands	MHL	..	0.060	0.060	0.521	0	..	..	0
Mauritania	MRT	9.251	0.615	0.326	0.015	1	27.693	90.005	0

Mauritius	MUS	7.191	0.463	0.455	0.638	1	23.127	1953.017	0
Mexico	MEX	9.892	0.542	0.151	0.180	1	20.545	738.139	0
Micronesia Fed. Sts.	FSM	6.553	0.701	0.748	0.647	1	..	..	1
Moldova	MDA	10.422	0.553	0.553	0.560	0	9.667	538.893	0
Monaco	MCO	8.422	0.684	0.730	0.305	0	..	..	0
Mongolia	MNG	9.669	0.368	0.373	0.080	0	-0.499	227.232	0
Montenegro	MNE	..	..	..	..	..	7.907	1227.182	0
Morocco	MAR	13.421	0.484	0.468	0.003	0	17.225	322.267	0
Mozambique	MOZ	13.567	0.693	0.812	0.676	1	23.689	1007.806	0
Myanmar	MMR	13.399	0.506	0.507	0.197	1	22.957	2007.701	0
Namibia	NAM	13.615	0.633	0.701	0.663	1	20.038	273.831	0
Nepal	NPL	11.912	0.663	0.717	0.142	0	12.744	1406.412	0
Netherlands	NLD	10.640	0.105	0.514	0.722	0	9.202	766.069	0
New Caledonia	NCL	9.860	..	0.663	0.546	1	21.965	1456.207	1
New Zealand	NZL	12.508	0.397	0.166	0.811	0	9.976	1790.946	1
Nicaragua	NIC	11.685	0.484	0.047	0.429	1	24.589	2406.969	0
Niger	NER	9.378	0.652	0.652	0.201	1	27.239	160.803	1
Nigeria	NGA	13.714	0.850	0.850	0.742	1	26.782	1138.532	0
Northern Mariana Islands	MNP	6.365	..	0.775	0.481	1	..	..	0
Norway	NOR	12.631	0.059	0.067	0.205	0	0.754	1051.841	0
Oman	OMN	12.658	0.437	0.357	0.432	1	25.454	88.207	0
Pakistan	PAK	11.280	0.710	0.719	0.385	0	19.981	301.018	0
Palau	PLW	..	0.431	0.316	0.715	..	..	..	0
Panama	PAN	11.211	0.553	0.387	0.334	1	24.722	2487.027	0
Papua New Guinea	PNG	13.026	0.272	0.353	0.552	1	25.054	3106.058	0
Paraguay	PRY	12.898	0.169	0.598	0.212	0	23.480	1093.895	0
Peru	PER	9.470	0.657	0.336	0.199	1	19.457	1513.242	0
Philippines	PHL	12.586	0.239	0.836	0.306	1	25.327	2317.593	0
Poland	POL	12.652	0.118	0.047	0.171	0	7.869	600.659	0
Portugal	PRT	11.529	0.047	0.020	0.144	0	14.970	835.347	0
Puerto Rico	PRI	9.112	..	0.035	0.495	1	24.278	2126.021	0
Qatar	QAT	9.311	0.746	0.480	0.095	0	26.917	65.221	0

Romania	ROM	12.380	0.307	0.172	0.237	0	..	..	0
Russian Federation	RUS	9.731	0.245	0.249	0.440	0	-6.321	434.795	0
Rwanda	RWA	10.041	0.324	..	0.507	1	19.012	1162.804	0
Samoa	WSM	7.938	0.138	0.011	0.787	1	..	..	1
San Marino	SMR	..	0.293	..	0.198	..	..	..	0
Sao Tome and Principe	STP	4.088	..	0.232	0.187	0	..	..	1
Saudi Arabia	SAU	9.871	0.180	0.095	0.127	1	24.651	73.403	0
Senegal	SEN	9.887	0.694	0.696	0.150	1	27.873	701.101	0
Serbia	SRB	..	..	..	..	..	10.179	726.464	0
Seychelles	SYC	5.345	0.202	0.161	0.232	1	..	..	0
Sierra Leone	SLE	11.179	0.819	0.763	0.540	1	26.044	2471.721	0
Singapore	SGP	6.243	0.386	0.384	0.656	1	..	..	1
Sint Maarten (Dutch part)	SXM	..	..	..	..	..	..	..	0
Slovak Republic	SVK	..	0.254	0.255	0.565	0	7.269	767.516	0
Slovenia	SVN	..	0.222	0.220	0.287	0	8.040	1361.807	0
Solomon Islands	SLB	10.230	0.111	0.525	0.671	1	25.676	3157.369	1
Somalia	SOM	13.369	0.812	0.033	0.003	1	26.767	265.353	0
South Africa	ZAF	9.405	0.752	0.865	0.860	0	17.597	474.776	0
South Sudan	SSD	..	..	..	..	..	26.928	956.581	0
Spain	ESP	13.136	0.416	0.413	0.451	0	13.025	622.987	0
Sri Lanka	LKA	11.098	0.415	0.464	0.485	1	26.755	1699.407	0
St. Kitts and Nevis	KNA	5.617	0.184	..	0.661	1	..	..	0
St. Lucia	LCA	6.406	0.177	0.317	0.332	1	..	..	0
St. Martin (French part)	MAF	..	..	..	..	..	..	..	0
St. Vincent and the Grenadines	VCT	5.965	0.307	0.018	0.703	1	26.820	1585.970	0
Sudan	SDN	10.129	0.715	0.719	0.431	1	26.824	234.036	0
Suriname	SUR	11.888	0.733	0.331	0.791	1	25.766	2316.810	0
Swaziland	SWZ	9.751	0.058	0.172	0.444	0	20.414	798.371	0
Sweden	SWE	13.003	0.060	0.197	0.234	0	1.546	621.150	0
Switzerland	CHE	10.625	0.531	0.544	0.608	0	4.749	1646.412	0
Syrian Arab Republic	SYR	12.144	0.540	0.182	0.431	0	17.646	296.372	0
Tajikistan	TJK	11.889	0.511	0.547	0.339	0	3.025	492.023	0

Tanzania	TZA	13.695	0.735	0.898	0.633	1	22.306	1052.384	0
Thailand	THA	13.152	0.634	0.634	0.099	1	26.250	1532.477	0
Timor-Leste	TMP	..	..	0.526	0.425	..	..	..	0
Togo	TGO	10.956	0.710	0.898	0.660	1	26.799	1189.114	0
Tonga	TON	6.546	0.087	0.378	0.621	1	..	..	1
Trinidad and Tobago	TTO	8.547	0.648	0.125	0.794	1	25.863	1831.407	0
Tunisia	TUN	11.955	0.039	0.012	0.010	0	19.363	267.088	0
Turkey	TUR	13.564	0.320	0.222	0.005	0	10.934	573.283	0
Turkmenistan	TKM	..	0.392	0.398	0.233	0	15.220	156.752	1
Turks and Caicos Islands	TCA	..	..	..	..	..	..	..	0
Tuvalu	TUV	..	0.163	0.137	0.252	..	..	..	0
Uganda	UGA	12.231	0.930	0.923	0.633	1	22.596	1207.895	0
Ukraine	UKR	13.296	0.474	0.474	0.616	0	8.206	561.789	0
United Arab Emirates	ARE	11.579	0.625	0.487	0.331	1	26.826	67.812	1
United Kingdom	GBR	12.339	0.121	0.053	0.694	0	8.310	1154.300	0
United States	USA	11.438	0.490	0.251	0.824	0	6.755	654.537	0
Uruguay	URY	12.090	0.250	0.082	0.355	0	17.567	1250.477	0
Uzbekistan	UZB	13.017	0.413	0.412	0.213	0	12.519	191.822	0
Vanuatu	VUT	9.436	0.041	0.579	0.704	1	23.840	2662.110	1
Venezuela RB	VEN	13.728	0.497	0.069	0.135	1	25.318	1957.654	0
Vietnam	VNM	12.707	0.238	0.238	0.508	1	24.070	1835.161	0
Virgin Islands (U.S.)	VIR	5.844	..	0.314	0.636	1	25.743	2131.473	0
West Bank and Gaza	WBG	..	..	0.010	0.034	0	..	..	0
Yemen Rep.	YEM	12.901	..	0.008	0.002	1	23.157	166.539	0
Zambia	ZMB	13.519	0.781	0.873	0.736	1	21.584	1004.753	0
Zimbabwe	ZWE	12.866	0.387	0.447	0.736	1	21.031	668.975	0

Appendix 2: Correlation Matrix: Part 1

	lnAcct	lny	lnA	lnk	Labshr	EAP	EECA	WE	LAC	MENA	NAM	SA	SSA
lnAcct	1.000	0.728	0.574	0.694	0.460	0.147	0.059	0.388	-0.028	0.020	0.129	-0.059	-0.443
lny	0.728	1.000	0.474	0.944	0.323	0.117	0.157	0.428	0.038	0.159	0.165	-0.095	-0.683
lnA	0.574	0.474	1.000	0.439	0.976	-0.030	0.150	0.389	-0.071	-0.071	0.167	-0.100	-0.290
lnk	0.694	0.944	0.439	1.000	0.324	0.154	0.164	0.429	-0.021	0.191	0.133	-0.074	-0.690
Labshr	0.460	0.323	0.976	0.324	1.000	-0.030	0.141	0.307	-0.115	-0.063	0.128	-0.081	-0.185
EAP	0.147	0.117	-0.030	0.154	-0.030	1.000	-0.178	-0.175	-0.219	-0.148	-0.054	-0.089	-0.242
EECA	0.059	0.157	0.150	0.164	0.141	-0.178	1.000	-0.154	-0.193	-0.131	-0.047	-0.078	-0.213
WE	0.388	0.428	0.389	0.429	0.307	-0.175	-0.154	1.000	-0.189	-0.128	-0.046	-0.077	-0.209
LAC	-0.028	0.038	-0.071	-0.021	-0.115	-0.219	-0.193	-0.189	1.000	-0.161	-0.058	-0.096	-0.262
MENA	0.020	0.159	-0.071	0.191	-0.063	-0.148	-0.131	-0.128	-0.161	1.000	-0.039	-0.065	-0.177
NAM	0.129	0.165	0.167	0.133	0.128	-0.054	-0.047	-0.046	-0.058	-0.039	1.000	-0.024	-0.064
SA	-0.059	-0.095	-0.100	-0.074	-0.081	-0.089	-0.078	-0.077	-0.096	-0.065	-0.024	1.000	-0.106
SSA	-0.443	-0.683	-0.290	-0.690	-0.185	-0.242	-0.213	-0.209	-0.262	-0.177	-0.064	-0.106	1.000
LANDLOCKED	-0.268	-0.266	-0.027	-0.265	0.018	-0.155	0.258	-0.013	-0.177	-0.161	-0.058	0.092	0.194
leg_british	0.191	-0.004	-0.086	-0.074	-0.136	0.164	-0.259	-0.142	0.020	-0.101	0.176	0.235	0.048
leg_french	-0.237	-0.172	-0.067	-0.127	0.005	-0.255	-0.311	0.030	0.158	0.241	-0.115	-0.136	0.198
Christians	0.245	0.152	0.291	0.099	0.232	-0.086	0.028	0.221	0.366	-0.419	0.057	-0.305	-0.016
Muslim	-0.393	-0.168	-0.357	-0.144	-0.302	-0.176	0.009	-0.179	-0.301	0.535	-0.067	0.157	0.103
lnArable	-0.166	-0.230	0.082	-0.225	0.107	-0.264	0.315	0.038	-0.085	-0.268	0.055	-0.045	0.219
lnWater	0.005	-0.033	0.115	-0.026	0.111	0.203	-0.001	0.136	0.217	-0.537	0.108	-0.057	-0.043
lnLandBlw5	0.304	0.337	-0.051	0.315	-0.128	0.314	-0.209	0.038	0.179	-0.002	0.075	-0.019	-0.324
lnarea	-0.117	-0.169	0.052	-0.137	0.103	-0.104	0.131	-0.021	-0.140	0.031	-0.071	0.031	0.134
EthFrac	-0.423	-0.501	-0.320	-0.506	-0.230	-0.250	-0.085	-0.268	-0.058	0.012	0.067	0.062	0.486
LangFrac	-0.325	-0.524	-0.228	-0.530	-0.155	-0.011	-0.051	-0.166	-0.310	-0.131	0.009	0.128	0.485
RelFrac	0.107	-0.063	0.096	-0.124	0.082	0.151	0.061	-0.191	0.010	-0.304	0.164	-0.103	0.176
tropical	-0.366	-0.528	-0.452	-0.566	-0.395	0.206	-0.404	-0.413	0.323	-0.196	-0.129	-0.112	0.407
Temp	-0.424	-0.525	-0.496	-0.541	-0.416	0.064	-0.545	-0.414	0.269	0.155	-0.237	0.015	0.430
Rain	-0.012	-0.160	-0.138	-0.170	-0.125	0.400	-0.257	-0.121	0.390	-0.413	-0.078	0.040	-0.037
Outlier	-0.040	0.154	0.067	0.166	0.069	0.381	-0.113	-0.068	-0.154	0.105	0.072	-0.003	-0.142

Appendix 2: Correlation Matrix: Part 2

	LANDLOCKED	leg_british	leg_french	Christians	Muslim	lnArable	lnWater	lnLandBlw5
lnAcct	-0.268	0.191	-0.237	0.245	-0.393	-0.166	0.005	0.304
lny	-0.266	-0.004	-0.172	0.152	-0.168	-0.230	-0.033	0.337
lnA	-0.027	-0.086	-0.067	0.291	-0.357	0.082	0.115	-0.051
lnk	-0.265	-0.074	-0.127	0.099	-0.144	-0.225	-0.026	0.315
Labshr	0.018	-0.136	0.005	0.232	-0.302	0.107	0.111	-0.128
EAP	-0.155	0.164	-0.255	-0.086	-0.176	-0.264	0.203	0.314
EECA	0.258	-0.259	-0.311	0.028	0.009	0.315	-0.001	-0.209
WE	-0.013	-0.142	0.030	0.221	-0.179	0.038	0.136	0.038
LAC	-0.177	0.020	0.158	0.366	-0.301	-0.085	0.217	0.179
MENA	-0.161	-0.101	0.241	-0.419	0.535	-0.268	-0.537	-0.002
NAM	-0.058	0.176	-0.115	0.057	-0.067	0.055	0.108	0.075
SA	0.092	0.235	-0.136	-0.305	0.157	-0.045	-0.057	-0.019
SSA	0.194	0.048	0.198	-0.016	0.103	0.219	-0.043	-0.324
LANDLOCKED	1.000	-0.078	-0.072	-0.043	0.032	0.251	-0.028	-0.483
leg_british	-0.078	1.000	-0.652	0.020	-0.078	-0.242	-0.105	0.233
leg_french	-0.072	-0.652	1.000	0.037	0.185	0.008	0.012	-0.138
Christians	-0.043	0.020	0.037	1.000	-0.771	0.117	0.377	0.087
Muslim	0.032	-0.078	0.185	-0.771	1.000	-0.106	-0.477	-0.072
lnArable	0.251	-0.242	0.008	0.117	-0.106	1.000	0.342	-0.537
lnWater	-0.028	-0.105	0.012	0.377	-0.477	0.342	1.000	-0.151
lnLandBlw5	-0.483	0.233	-0.138	0.087	-0.072	-0.537	-0.151	1.000
lnarea	0.097	-0.208	0.010	-0.148	0.046	0.510	0.126	-0.594
EthFrac	0.128	0.034	0.202	-0.220	0.270	0.130	0.032	-0.365
LangFrac	0.206	0.146	0.019	-0.171	0.147	0.141	0.013	-0.259
RelFrac	0.038	0.360	-0.323	0.231	-0.346	0.003	0.126	0.037
tropical	-0.125	0.220	0.132	0.055	-0.026	-0.192	0.098	0.103
Temp	-0.179	0.226	0.337	-0.177	0.250	-0.321	-0.186	0.129
Rain	-0.223	0.183	0.001	0.260	-0.372	-0.228	0.614	0.266
Outlier	-0.119	0.189	-0.083	-0.062	0.117	-0.411	-0.093	0.383

Appendix 2: Correlation Matrix: Part 3

	lnarea	EthFrac	LangFrac	RelFrac	tropical	Temp	Rain	Outlier
lnAcct	-0.117	-0.423	-0.325	0.107	-0.366	-0.424	-0.012	-0.040
lny	-0.169	-0.501	-0.524	-0.063	-0.528	-0.525	-0.160	0.154
lnA	0.052	-0.320	-0.228	0.096	-0.452	-0.496	-0.138	0.067
lnk	-0.137	-0.506	-0.530	-0.124	-0.566	-0.541	-0.170	0.166
Labshr	0.103	-0.230	-0.155	0.082	-0.395	-0.416	-0.125	0.069
EAP	-0.104	-0.250	-0.011	0.151	0.206	0.064	0.400	0.381
EECA	0.131	-0.085	-0.051	0.061	-0.404	-0.545	-0.257	-0.113
WE	-0.021	-0.268	-0.166	-0.191	-0.413	-0.414	-0.121	-0.068
LAC	-0.140	-0.058	-0.310	0.010	0.323	0.269	0.390	-0.154
MENA	0.031	0.012	-0.131	-0.304	-0.196	0.155	-0.413	0.105
NAM	-0.071	0.067	0.009	0.164	-0.129	-0.237	-0.078	0.072
SA	0.031	0.062	0.128	-0.103	-0.112	0.015	0.040	-0.003
SSA	0.134	0.486	0.485	0.176	0.407	0.430	-0.037	-0.142
LANDLOCKED	0.097	0.128	0.206	0.038	-0.125	-0.179	-0.223	-0.119
leg_british	-0.208	0.034	0.146	0.360	0.220	0.226	0.183	0.189
leg_french	0.010	0.202	0.019	-0.323	0.132	0.337	0.001	-0.083
Christians	-0.148	-0.220	-0.171	0.231	0.055	-0.177	0.260	-0.062
Muslim	0.046	0.270	0.147	-0.346	-0.026	0.250	-0.372	0.117
lnArable	0.510	0.130	0.141	0.003	-0.192	-0.321	-0.228	-0.411
lnWater	0.126	0.032	0.013	0.126	0.098	-0.186	0.614	-0.093
lnLandBlw5	-0.594	-0.365	-0.259	0.037	0.103	0.129	0.266	0.383
lnarea	1.000	0.146	0.073	-0.045	-0.106	-0.126	-0.088	-0.393
EthFrac	0.146	1.000	0.706	0.140	0.340	0.417	0.014	-0.123
LangFrac	0.073	0.706	1.000	0.257	0.264	0.280	-0.003	-0.034
RelFrac	-0.045	0.140	0.257	1.000	0.152	-0.005	0.185	0.127
tropical	-0.106	0.340	0.264	0.152	1.000	0.778	0.504	0.095
Temp	-0.126	0.417	0.280	-0.005	0.778	1.000	0.352	0.099
Rain	-0.088	0.014	-0.003	0.185	0.504	0.352	1.000	-0.008
Outlier	-0.393	-0.123	-0.034	0.127	0.095	0.099	-0.008	1.000