



## Modeling and Policy Impact Analysis (MPIA)

### **Proposal MPIA 12617 Title**

# Macroeconomics implications of female entrepreneurs facing financial frictions to access to credit: a DSGE Model approach in Cameroon

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## Abstract

This proposed research aims to assess the consequences of not having access to credit for female entrepreneurs on macroeconomics performances in Cameroon and provide possible policies to overcome these obstacles. In fact, female entrepreneurs facing financial frictions to credit access has become a growing concern, in both advanced and developing countries. In Cameroon, credit access across the country remains divided along gender lines. Even when women entrepreneurs are given credit, the amount is too low so that their activities are overrepresented in the informal sector and among the poor. Theoretical and empirical evidence state that the challenges of growth, job creation, and inclusion are closely intertwined with women entrepreneurship. While growth and development are necessary to give women the opportunities they need, women's participation in the entrepreneurship is also a part of the growth and development equation.

To address this important issue, we use a Dynamic Stochastic General Equilibrium model. The model captures most features of the Cameroon' financial sector and is suitable to assess macroeconomics dynamics of this economy depending on the share of credit-constrained entrepreneurs versus non credit-constrained entrepreneurs. The theoretical model would be empirically analyzed by the calibration technique. From baseline scenario, different simulations would be made to emphasize macroeconomic implications and policy relevance of the proposed research. The counterfactual scenarios we propose to simulate would be based on four exogenous shocks, namely, technology shock, monetary policy shock, fiscal policy shocks and risk factor shock. As result, the research proposal is expected to implement policies that remove credit access distortions and create a level playing field for all, which give women the opportunity to develop their potential and enhance their participation in economic activity, for broader macroeconomic performances and economic development.

**Keys Words: Females Entrepreneurs, Financial Frictions to Access to Credit, Macroeconomics Implications, DSGE Model, Calibration Technique, Cameroon.**

## **1. Research Background**

Female entrepreneurs still have limited access to credit in Cameroon, despite progress made towards achieving gender equality, both at the global level and in Africa<sup>1</sup> (Fondo and Mbaye 2010; Oluwu 2012; Damiano and Mwakubo 2014). The constraints of gender credit access refer to the socio-cultural context which highlights social norms, social values and social practices (Ifelunini and Wosowei 2013). The gender credit constraints related to female entrepreneurs can be classified in two categories: endogenous factors and exogenous factors (Essel 1996).

Endogenous constraints due to female are first related to their financing capabilities to undertake an activity. The existence of information asymmetry related to the different types of entrepreneurship within financial institutions reduces accessibility to credits for female. Most of societies in Africa are patriarchal and the man hold the property of the family and it can easily improve the guarantee process (Asiedu and al. 2012). A specific study in Kenya revealed that few female entrepreneurs hold land on their own name (Feldman, 1984). So it is difficult for them to use the wealth of the family as collateral without the agreement of their husband (Ifelunini and Wosowei 2013). Another endogenous factor that explains the credit constraint for female is linked to their family. A specific socio-cultural constraint is the number of children each female entrepreneur has. There is a positive relationship between the number of child of a female and a risk of default. The commercial banks take into account this default risk in the evaluation of the loans contracts related to hazard moral and adverse selection. The hazard moral reveals the choice done by female entrepreneur. Their choice is based on the family's vital needs where the priority is given to the well being of their children (Wekwete 2014).

Identification of exogenous factors in women contractor is directly related to the operation of the banking sector. Indeed, banks are rigid in the process of granting credit. This rigidity is explained by the conditions imposed by banks and the time of acquisition of the credit that evaluates as the time between the demand for credit

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<sup>1</sup> Progress towards achieving gender equality at the global level include the Convention on the Elimination of all forms of Discrimination against Women (CEDAW) of 1991; the Global Platform for Action; the Beijing Declaration of 1995; the Millennium Development Goals (MDG); the 1994 International Conference on Population and Development (ICPD). At the regional level, the African Union Protocol of the Rights of Women in Africa adopted in 2005. At the National level, the preeminence role plays by women, in the Cameroon Growth and Employment Strategy Paper of 2009.

and obtaining effective of this credit. Others exogenous factors can be related to the development of their activity. The credit constraint can be explained by the type of the activity and the size of the activity). Female entrepreneurs are easily engaged in agricultural and commercial sectors. Despite the fact that their activity is small in term of capital assets, their activity remains in a start-up development process. In that process, there is a minimum capital required. But their equity is insufficient and they usually take credit to finance their activity. Those credit required are given by the banks with a high interest rate. As the study of Stiglitz and Weiss (1981) related to credit rationing, those types of projects have high risk default, and the banks to manage those risky projects fixed a high interest rate. The default risk level is negatively related to the interest rate and the random of the projects is positively related to the interest rate (Asiedu and al. 2012; Ifelunini and Wosowe 2013; Wekwete 2014).

Efforts to alleviate female credit discrimination could therefore have far reaching implications to macroeconomics outcomes and economic development. Female entrepreneurs access to credit matters as an instrument for development as it enhance economic efficiency and improves macroeconomics outcomes in several ways (Berik and al 2008; Damiano and Mwakubo 2014).

Basically the link between gender credit inequality and macroeconomics performances is a subset of a broader body literature on the relationship between intergroup inequality and growth in the tradition of Michael Kalecki (1954), a contemporary of John Maynard Keynes (1936) (Seguino and Were 2014). Kaleckian macroeconomics emphasizes the demand side effects of inequality on growth and development (Dutt 2010; Damiano and Mwakubo 2014). However, kaleckian and Keynesian research does not explore the role of gender credit inequality, nor focus on the supply side effects of inequality. Seguino and Were (2014) look at both demand and supply side effects of gender inequality when considering the relationship between gender and macroeconomics in Sub-Saharan Africa. The authors also look at the transmission mechanism on the macro-economy both in the short and the long run, to understand the extent to which macro policies are socially sustainable. Nevertheless, the research of Seguino and were (2014) does not take in account the limited access of credit faced by female entrepreneurs in Africa.

The effect of absolute and relative gender inequality on macroeconomics is also based on the neo-classical and structuralist approaches. The mainstream neo-classical approaches explore the long run effects of inequality on economy growth and largely focus on the impact of capabilities inequality<sup>2</sup>. In contrast, structuralist macroeconomist and feminist economists emphasize the short run effects as well as long run effects, and the role of inequality in livelihoods (Were and Kiringai 2003; Doss, 2006; Berik et al. 2009; Damiano and Mwakubo 2014; Seguino and Were 2014).

Regarding the impact of macroeconomics dynamics in gender inequality, several conceptual frameworks includes Marxist, Neo-classical, modernization perspectives, women in development (WID), gender and development (GAD) and gender empowerment approaches. The neo-classical and modernization approaches argue that economic growth is likely to promote greater equality between male and female. The WID approach posits that economic growth will only promote gender equity after policymakers' intervention to correct the gender imbalances that accompany the initial stages of development, such promoting greater credit access among women. The gender and empowerment approach goes beyond the short term goals of increasing women access to credit, by advocating for changes to laws, regulations and policies that constrain women's economic participation (). In the same vein, Wekwete (2014) demonstrates that gender inequality continues to be a major challenge in Africa. It has been stated that female tend to occupy very different parts of economic space from men and are concentrated in lower productivity activities, self-employment and the informal sector. Even for those in the formal economy, female are concentrated in occupations at lower levels which are low paying. However, the major lacuna of the research is the non inclusion in the analysis, the limited access of female entrepreneurs to credit (Blackdern et al. 2006; Balamoune-Lutz 2007; Dejene 2007; Ellis et al 2007; Wanjala and Were 2009; Wamboye and Seguino 2012).

The shortcomings of the above researches reveal that more intellectual work is needed to flesh out a viable gender-equitable macroeconomic framework in Africa. The proposed research would thus complements research on Gender and Macroeconomics in Africa by focusing on the macroeconomics implications of female entrepreneurs facing financing frictions to access to credit in Cameroon.

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<sup>2</sup> Capabilities refers to the requisite functioning's necessary to enter into productive work, be it paid or unpaid, and includes such measures as educational attainment and health.

## **2. Main Research Questions and Contributions**

The proposed research seeks to answer the following questions:

What type of credit access reform is needed in Cameroon to overcome the difficulties encountered by female entrepreneurs?

How does female entrepreneurship could be improved for broader macroeconomic performances and economic development in Cameroon?

Female make up a little over half (50.1%) the Cameroon's population in 2012, but their contribution to measured economic activity, growth, and well-being is far below their potential, with serious macroeconomic consequences (Fondo and Mbaye 2010; Esta 2013). Despite significant progress in recent decades, credit access across the country remains divided along gender lines, and progress toward gender equality seems to have stalled. Female credit access has remained lower than male entrepreneurs in Cameroon, with only 25% of female entrepreneurs accessing in credit rather than 60% for male entrepreneurs. And when women entrepreneurs are given credit, only 15% of the amount demanded is given, amount which is too low so that their activities are overrepresented in the informal sector and among the poor. This explains why on 47.3% of the Cameroon's population which lives in rural areas, where almost 94% of those classified in the poorest quintile live, more than the half are women (WDI 2012). Lack of credit is thus one of the principal impediments faced by female entrepreneurs in Cameroon. In many cases, distortions and discrimination in the credit market restrict women's options for decent job creation, and entrepreneurship remains low (GESP 2009; Fondo and Mbaye 2010).

Overall, Cameroon has made some major progress regarding the issue of gender equality and women empowerment over the past decades<sup>3</sup>. In the 2011 World Economic Forum Global Gender Gap Report, Cameroon received a score of 0.6073, where 0 represents inequality and 1 represent equality. Female life expectancy at birth has increased considerably to reach 53.2 years against 51.1 years for male life expectancy in 2012, leading the Gender Ratio Female/Male to 1.06. Moreover,

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<sup>3</sup> Cameroon's Constitution upholds the principle of gender equality. Cameroon ratified the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) in 1994. In 2005, Cameroon also ratified the Optional Protocol to the Convention, which came into effect in the same year.

Illiteracy rates have decreased noticeably. Female illiteracy rate decreases from 41.3% in 1990 to 37% in 2012, contrast to male illiteracy rate which rises from 20.8% in 1990 to 21.1% in 2012. In primary school, female gross enrolment ratio increases from 89.3% in 1990 to 110.9% in 2012. Hence, the ratio of girls to boys' enrollment at the primary level is one of the Millennium Development Goal which is likely to be attained by 2015 in Cameroon. Moreover, in secondary school, female gross enrolment ratio is more important, which rate increases from 20.2% in 1990 to 47.0% in 2012. Most strikingly, Female has entered the labor force in massive numbers and in 2012 female represents 46.1% of Cameroon economically active population. The proportion of seats held by women in the national parliament of Cameroon has also been a jagged progress. Indeed, if during the 1992-1996 legislatures, women held 12.8% of the seats, the last national elections in Cameroon elected women to 14 % of parliamentary positions. In addition, Women in ministerial level positions in Cameroon reached 12% in 2012<sup>4</sup>.

However, in some areas, progress toward gender equality has been limited or very slow. Discriminatory customary practices continue to restrict female's access to land. Due to discriminatory inheritance practices, very few female owns land, particularly in rural areas. Moreover, female are not fully entitled to use, enjoy or sell their property. The husband has the right to administer communal property, to sell or mortgage the couple's property without the wife's consent, even the right to manage his wife's personal property, and exercises all rights to it (Evou et al. 2006; KUEPIE et al. 2013). Those factors make it difficult for the majority of female entrepreneurs in Cameroon to gain access to bank loans. For instance, barriers to female's access to land and property restrict women's capacity to offer guarantees. In the event that women own property jointly with her husband, often only the name of the husband is on the title. Although women have the freedom to establish their own businesses, the Commercial Code allows husbands to end their wives' commercial activity by simply notifying the clerk of the commerce tribunal of their opposition based upon the family's interest. These patterns of progress and stagnation matter in shaping developments outcomes and were discussed in the World Bank's flagship report (WDR 2012).

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<sup>4</sup> The statistics are extracted from African Development Bank Gender Indicators Data base (2013).

Indeed, the challenges of growth, job creation, and inclusion are closely intertwined with women entrepreneurship. While growth and development are necessary to give women the opportunities they need, women's participation in the entrepreneurship is also a part of the growth and development equation. In particular, higher female credit access can boost growth by mitigating the impact of a shrinking wealth creation. Better opportunities for women can thus contribute to broader economic development in Cameroon, and in Africa as whole (Fonjong 2001; Kevane 2004; Boko and others 2005; Balamoune-Lutz and McGillivray 2007; Asiedu and al 2012; Hansen and Rand 2012; Bandiera and Natraj 2013).

There is ample evidence that when women are fully involved in entrepreneurship, there are significant macroeconomic gains (Were 2003; Stotsky 2006; Berik and al 2008; Loko and Diouf 2009; Brunnermeier and others 2012). Productivity differentials among companies owned by men and by women have been found to be mainly the result of differences in access to productive inputs (Muravyev and others 2009). A reduction of this productivity gap through equal access to productive resources yields considerable output gains (Revenga and Shetty 2012). Also, better opportunities for women to earn and control income contribute to broader economic development in developing economies (Heintz 2006; Stotsky 2006; Miller 2008; Henrik and Rand 2012).

The credit access of women on an equal basis as men would allow companies to make better use of the available talent pool, with potential growth implications (Loko and Diouf 2009; Asiedu and al 2012). There is evidence of a positive impact of women's presence on boards and in senior management on companies' performance. Companies employing female managers could be better positioned to serve consumer markets dominated by women and more gender-diverse boards could enhance corporate governance by offering a wider range of perspectives (Revenga and Shetty 2012; Aguirre and others 2012). In their analysis of companies with a focus on innovation, some authors find that female entrepreneurship can improve macroeconomic performance (Cutura 2007; De Mel and others 2009). This result is supported by an earlier study by Catalyst (2004) that finds a positive correlation between gender diversity and financial performance, namely, return to equity and total return to shareholders.

Nevertheless in Cameroon, as in many low income African countries, the lack of basic necessities, as credit, inhibits women's potential to become entrepreneurs (Fonjong 2001; Bigsten and others 2003; Blanchard and others 2008; Aterido and others 2011). Across Cameroon, female representation in entrepreneurship remains low, and when women are involved, they are more likely to be financially constrained (Fondo and Mbaye 2010). Micro-level evidence suggests that gender stereotypes may hamper women's access in credit (Bird and Sapp 2004; Angelucci and others 2013; Ifelunini and Wosowei 2013). In some cases, restrictions on women's credit access curtail their economic potential. Consequently, women dominate the informal sector, characterized by vulnerability in employment status, a low degree of protection, mostly unskilled work, and unstable earnings (Diagne and others 2000; Cutura 2007; GESP 2009; Barsh and Yee 2012).

Discrimination artificially restricts the ability of women to participate to entrepreneurship. The women's participation in the credit market has a tangible impact on wealth creation, and thereby on macroeconomic outcomes (Brunnermeier and others 2012; Wamboye and al 2012). Policies to promote economic opportunities for women, in both private enterprises and the public sector, have been shown to correlate positively with country's economic success (Barsh and others 2008; Barsh and Yee 2012; Chant and Sweetman 2012). Stotsky (2006) examines the implications of gender differences in economic behavior for macroeconomic policy, finding that reducing gender inequality and improving the status of women may contribute to higher rates of economic growth and greater macroeconomic stability.

Empirically, there is convincing evidence on the existence and pervasiveness of financial constraints. Financial frictions can lead to large and persistent wealth destructions potentially spilling over to the real economy (Nissanke and Aryeetey 1998; Camen and others 1996; Cull and others 2004). The literature offers different micro-foundations for different financing frictions. First, there is the costly state verification framework a la Townsend (1979). The basic friction is due to asymmetric information about the future payoff of the project. This is in contrast to quantity rationing as in Stiglitz and Weiss (1981) for non collateralized credit. Hart and Moore (1994) opened the door for models with incomplete contracts. The literature that uses collateral constraints and the literature on limited enforcement of contracts fall

in this category (Kehoe and Levine 1993; Alvarez and Jermann 2000; Cooley and others 2004). Holmstrom and Tirole (1997) provide a model of intermediary monitoring of entrepreneurs with a moral hazard problem. Since the entrepreneurs, are borrowing constrained, their net worth matters. If an intermediary monitors the entrepreneur the borrowing constraint is relaxed but the arrangement requires intermediary net worth.

As consequence, in the past ten years there has been a move towards large scale Dynamic Stochastic General Equilibrium (DSGE) models that build on the earlier Real Business Cycle (RBC) and New Keynesian traditions (Kydland and Prescott 1982; King et al. 1988; Cooley 1995; Carlstrom and Fuerst 1997; Bernanke et al. 1999; Smets and Wouters 2003). In the most prominent models, the financial sector plays no role (King et al. 1988; Gail 1998). Notable early exceptions are Bernanke et al. (1999), and further are Gail (2004), Gali (2008), Badarau et Leveuge (2011), Gertler & Kiyotaki (2011), who add a banking sector with financial frictions and several shocks. In most of those DSGE models, the net worth of the financial intermediary sector plays a key role, and the key frictions are financial-constrained agents. The role of financial intermediaries is to mitigate these financial frictions. The health of the financial system determines the transmission mechanism and overall economic growth.

The choice of a DSGE framework for the empirical analysis of the proposed research is thus motivated by a number of factors. First, DSGE models are derived from microeconomic foundations of constrained decision-making. That is, they describe the general equilibrium allocations and prices in the economy where all agents dynamically maximize their objectives subject to budget or resource constraints. Following the calibration of deep parameters, therefore, it is possible to avoid the Lucas Critique, where only models in which the parameters that do not vary with policy interventions are suited to evaluate the impact of policy change. Indeed, DSGE models should not be vulnerable to the Lucas Critique, unlike the more traditional macroeconomic forecasting models. Second, DSGE models are structural, implying that each equation has an economic interpretation which allows clear identification of policy interventions and their transmission mechanisms. Third, DSGE models are forward looking in the sense that agents optimise model-consistent forecasts about the future evolution of the economy. Fourth, DSGE models allow for a precise and an unambiguous examination of random disturbances. This is

facilitated by the stochastic design of the models, (Woodford 2003; Peiris and Saxegaard 2007; Tovar 2008). Fifth, DSGE models that include financial sector are able to explain more accurately the dynamic of the economy where economic agents are credit-constrained for macroeconomics and policy implications (Christiano & al. 2010; Arend 2010; Gertler & Kiyotaki 2011). Finally, the ability of DSGE models to fit macroeconomic data improves significantly if one allows for the presence of financial accelerator mechanisms (Christensen & Dib 2008; Queijo von Heideken 2008; Gilchrist & al. 2009; Gerali & al. 2010). To the best of our knowledge, there is no study that has examined the interaction of credit constrained entrepreneurs versus non credit constrained entrepreneurs and their impact on economic activity in Cameroon using a macroeconomic model developed within the context of a financial micro-founded DSGE model.

Given the discussions between the International Monetary Fund (IMF), the World Bank, the International Finance Corporation and the Cameroon officials to address Gender gap financial discrimination issue and economic development, the research proposal is expected to provide policy relevant information about how and what sort of policy can improve female entrepreneurs' credit access for broader economic performance in Cameroon. The results of this study would contribute to alleviate the Gender gap financial discrimination challenges faced by policymakers by helping to returning to the country-wide gender financial balance, facilitate access to financial services to female entrepreneurs and to move them to higher productivity activities.

Basically, the proposed research would contribute to the existing literature, regarding gender credit inequality and macroeconomic performances, in several respects. First, it is the first research trying to build a DSGE model for an overview analysis of the relation between credit-constrained female entrepreneurs and macroeconomic performances in Cameroon. Furthermore, our study can also shed some light on the potential effects of gender financial frictions on economic development, by means of macroeconomic outcomes. Finally, the proposed research would reveal that enhancing access to credit among female entrepreneurs could foster economic growth in Cameroon, and social acceptance of women in the credit market in Cameroon would contribute to higher female participation in the formal labor force and in entrepreneurship.

### 3. The Methodology

We address the main research questions using a Dynamic Stochastic General Equilibrium (DSGE) model with financial micro-foundations. The theoretical model is similar in many aspects to the Real Business Cycle (RBC) approach except on the monetary policy side (Mankiw 2006; Tovar 2008; Ngalawa and Viergi 2010; Badarau & Leveuge 2011; Suh 2012).

To fully capture the problem of credit access inequality and its macroeconomics implications, the theoretical model is based on main features of Cameroon economy. Firstly, we introduce two types of entrepreneurs in the production sector. A credit-constrained entrepreneurs and non credit constrained entrepreneurs. Both types of entrepreneurs are financially constrained, but difference appears when accessing to the credit to finance their investments. Depending on the share of credit-constrained agents versus no credit-constrained agents in the model, the dynamics of the economy could eventually evolve differently. Secondly, the production sector is separated into two segments. A Formal production sector, and an informal production sector. Thirdly, the labor sector is constituted by two groups of agents. Labor intensive agents, and capital intensive agents. Fourthly, banking sector is the dominant source of external finance of entrepreneurs and central bank credit to the banking system is the main instrument of monetary policy.

Financial friction appears mainly because entrepreneurs face an external finance premium on the money borrowed from the bank. It posits the existence of an asymmetric information problem between lenders (banks) and borrowers (entrepreneurs), which in turn leads to a situation where credit is rationed and the entrepreneur's net worth influences the ability to borrow. This external finance premium depends inversely on the financial condition of the borrowers. For instance, a borrowing entrepreneur with high financial leverage will face a higher external finance premium. This premium influences the cost of capital, it has, thus, a negative impact on investment decisions which in turn influence the output in the economy. This mechanism corresponds to the financial accelerator mechanism of Bernanke et al. (1999). In such a model, any technological or institutional change that can reduce the underlying information problem enhances entrepreneurs' ability to borrow and can improve welfare. In addition, any policy that facilitates the

accumulation and pledging of net worth also enhances their ability to borrow and thus potential welfare.

For the development of the model, we use a simplified framework including representative agents. Overall, we would consider an economy populated by Households, Entrepreneurs, Commercial Banks, Monetary Authority and Government.

**a. Household program**

A continuum of infinitely-lived households gains their utility from consumption, labor supply and real cash balances. Households supply hours of labor and own retailers. They receive wages from entrepreneurs and profits from retailers, and use them for consumption and savings. Households also pay lump-sum taxes to the Government, necessary to finance the public expenditures.

**b. Production sector**

Entrepreneurs in their wholesales goods production process are financially constrained. The production sector is thus characterized by two categories of entrepreneurs, non credit-constrained entrepreneurs and credit-constrained entrepreneurs, depending on their bank financing source. Those agents evolve in two parallel production sectors.

**b.1. Non Credit-constrained Entrepreneurs and Formal Production Sector**

Non credit constrained entrepreneurs receive credit from the banking sector to finance their investment project. As entrepreneurs face financing constraints, the production serves as collaterals in the credit market to obtain funds for financing investment. Non Credit-constrained Entrepreneurs have better access to credit because they have an advantage in their ability to accumulate and pledge net worth.

Non credit constrained entrepreneurs operates most of the time in the formal production sector, where the production function depends on labor, private capital and public capital. The formal production sector has relatively high productivity but high minimal scale. The objective of the non credit constrained entrepreneurs in the formal production sector is thus defined by the maximization of future operating cash flows, under the constraint of law of motion. At the optimum, the non credit

constrained entrepreneurs' demand for capital insures the equality between the expected marginal cost for the external financing and the expected marginal return on capital.

#### b. 2. Credit-constrained Entrepreneurs and Informal Production Sector

Credit-Constrained Entrepreneurs not always receive funding from the banking sector to meet their investment project. Credit-constrained Entrepreneurs not have better access to credit because they have a disadvantage in their ability to accumulate and pledge net worth.

Basically, most of the time, the value of their collateral is below the repayment promised to the lender, so the banking sector relocate the funds to the opposite agents. And even when credit-constrained entrepreneurs receive funds from banking sector, the amount is too low so that they activity is overrepresented in the informal sector. Consequently, credit-constrained entrepreneur, most of the time operates in informal production sector.

Informal production sector has low productivity but low barriers to entry. However, credit-constrained entrepreneurs will find it difficult to enter the high-productivity sector because of their poor access to credit. Credit-constrained entrepreneurs in the informal sector use only informal labor as input, without capital and technologies, to fulfill their production function.

#### c. Labor Sector

Entrepreneurs in their wholesales goods production process use production inputs, namely labor, differently. The labor market structure is thus characterized by two groups of agent.

##### c.1. Labor intensive agents

Credit-constrained entrepreneurs are among labor intensive agents, which lack credit to purchase capital input and mainly operate in the informal sector where the informal labor is the unique production input.

### c.2. Capital intensive agents

Non credit-constrained entrepreneurs are among capital intensive agents, which using their investment funding to purchase capital, and mainly operate in the formal sector where labor, private and public capital are production inputs.

### d. Commercial Banks Program

The main role of the commercial banks in the model is to provide funds to entrepreneurs to finance their investment project.

The financial contract between banks and entrepreneurs is based on the existence of the collateral. In fact, since entrepreneurs face financing constraint, the production serves as collateral in the credit market to obtain extra funds for financing investment. Entrepreneurs' default of their loans when the value of their collateral is below the repayment promised to the lender.

Moreover, to provide credit to entrepreneurs, commercial banks receive funds from households and Central Bank. The Central Bank provides commercial banks resources using its refinancing rate policy in the one hand. In the other linking, commercial banks collect additional funds from households' deposits.

Thus the commercial banks would maximize their profits subject to two constraints: 1) borrowers are able to supply collateral to the banks. This assumption is to feature one of the reasons of female entrepreneurs' credit discrimination in Cameroon. 2) Households accept to save in the banks and Central Bank accepts to refinance the banks.

### e. Monetary Authority Program

The Monetary Authority uses its monetary policy instruments to intervene in the economy and sustains the banking sector. We would use a forward-looking monetary policy rule that treats the bank rate as an operating tool of monetary policy (Ngalawa and Viergi 2010). The rule calls for adjustment of the bank rate based on the return on investment, the expected change in output and expected inflation.

#### **f. Government program**

Governments intervene in the economy, by an active policy of public spending, funded by lump sum taxes.

#### **4. Empirical methodology of the DSGE Model: Calibrations**

The theoretical DSGE model would be empirically analyzed by Calibration procedure. The calibration procedure within the DSGE empirical literature is the specification of priors' beliefs. Priors are values assigned to theoretical DSGE model parameters, steady state values and exogenous variables. These priors beliefs are formed through past experience, the validity of economic theories, opinion of senior experts in the institution in question, value judgment, stylized facts about the economy in question and existing empirical literature (An & Schorfheide 2007; Adebayo and Mordi 2010 ; Fernandez- Villaverde 2010).

#### **5. Simulations of different scenarios.**

From baseline scenario, different simulations would be made to emphasize macroeconomic implications and policy relevance of the proposed research. The model would be solved using DYNARE in MATLAB.

The counterfactual scenarios we propose to simulate would be based on four shocks. Firstly, a positive production technology shock, characterized by an unexpected improvement in production technology. Secondly, a monetary policy shock identified by an unanticipated decrease in the bank rate for credit constrained entrepreneurs. Thirdly, a fiscal policy shocks features by the increase of public capital in the production sector where mainly operate credit constrained entrepreneurs. Fourthly, a risk factor shock represented by a sudden increase in the probability of success for high risk borrowers.

The impact of different policy proposals will be enacted by means of monetary policy and fiscal policy. Firstly, a benchmark for comparison will be established, with

credit constrained entrepreneurs. Next, simulations will be repeated under counterfactual scenarios that alleviates the credit constraint. As a result, policies facilitating credit access could have important welfare benefits.

## **6. Policy influence plan or research communication strategy**

The beneficiaries of the findings of the proposed research would be mainly policymakers and other key stakeholders, namely; Ministry of Employment and Social Welfare, Ministry of Economy, Planning and Regional Development, Ministry of Finance, the Bank of Central African States (BEAC), the Cameroon Entrepreneurs Group (GICAM), the IMF, the World Bank and the African Development Bank (AfDB).

- **Ministry of Employment and Social Welfare:** This ministry involves of female entrepreneurship in Cameroon through a policy that fostering gender equality in the Labor Market in Cameroon. The aim of the policy is to put in place strategies that enhance female participation and empowerment in labor market, by exonerated them by some financial requirements concerning the recruitment of workers when submitting their project of creation of enterprises and when demanding for credit from banks. This is to allow female entrepreneurs to have enough money, or obtain their credit, in other to achieve their project. Consequently, as one of a key policymaker of the economy of Cameroon, the result of the proposed research would be in greater interest for this Ministry. We already make contact with **Dr. Ibrahim ABBA**, the “**Chargé d' Etudes Assistant**” in the Ministry, which would be our contact within the Ministry. Tel.:(237) 22 23 60 53.
- **Ministry of Economy, Planning and Regional Development:** this ministry, since 2007, has established a policy to facilitate access to credit to female entrepreneurs in Cameroon. The policy is based on two strategies. In the one hand, the Ministry has programs with the European Union (EU) and other International Institutions (IO), enabling female entrepreneurs to obtain credit from banks under certain conditions. In the other linking, the Ministry has a partnership with the African Development Bank (AfDB) to support female entrepreneurs in Cameroon. This partnership aims to strengthen the capacity

of female entrepreneurs in the areas of, building-up investments projects, creating firms, and to encourage them to move from informal activities to formal sector. Funding of this partnership is available for female entrepreneurs in some banks. As result, the Ministry of Economy, one of a key policymaker of the economy of Cameroon, would benefit from the findings of the proposed research. We already make contact with **Ms BEKOLO born TATAW AWUJONG Dorothy, General Director of Cooperation and Regional Development, in the Ministry**, which would be our contact within the Ministry. Email: [owoundijoseph@yahoo.fr](mailto:owoundijoseph@yahoo.fr); Tel.: (237) 22 23 66 13.

- **Ministry of Finance:** The Ministry helps to support female entrepreneurship in Cameroon, by financial facilities of some projects in an earlier stage, and by funding and modernizing means of production. As result, the Ministry of finance, as one of a key policymaker funding the economy of Cameroon, would benefit from the findings of the proposed research. Our contact within the Ministry would be **Gédéon Adjomo, Head of Communication Division at the Ministry of Finance**. E-mail: [adjengoto@yahoo.fr](mailto:adjengoto@yahoo.fr); Tel: (237)96918906.
- **Bank of Central African States (BEAC):** the research Department of the BEAC is very in interest of this subject, following the recommendations concerning the relevance of Research on Gender and Macroeconomics in Low Income Countries for Economic development, of the 2013 Executive Board discussion between, the International Monetary Fund (IMF), the Bank of Central African States (BEAC), the Central African Banking Commission (COBAC), and the Central African Economic and Monetary Community (CEMAC). Furthermore, as the Central Bank of the CEMAC countries member, the BEAC is a key Actor in the policy of sustaining economy activity via the banking sector. The BEAC could play a major role concerning the accessibility of credit by female entrepreneurs in Cameroon. We already make contact with **Dr. Emile Thierry Mvondo, Director of Research Department of the BEAC**. He would act as our contact within BEAC. Email: [mvondot@beac.int](mailto:mvondot@beac.int); Tél. : (237) 22 21 03 41.
- **Cameroon Entrepreneurs Group (GICAM):** the GICAM is a stakeholder which encompasses most enterprises of Cameroon. The GICAM, with its economic

weight of 68% of GDP in Cameroon, represents the foremost of entrepreneurs' organization in Cameroon. Since the promotion of entrepreneurship is one of its main objectives, the findings of the proposed research would be useful in the implementation of its missions. Our contact in GICAM would be **Ms AMOUGOU, in Charge of Female Entrepreneurship in GICAM**. Email: [gicam@legicam.org](mailto:gicam@legicam.org); Tel: (237) 22 23 12 24/ (237) 22 23 12 25.

- **International Monetary Fund (IMF):** the IMF Research Department, by means of its Resident Representation in Cameroon would benefit from the findings of the proposed research. The IMF contributes to enhancing the analysis of the macroeconomic effects of gender inequality and inclusion, namely the case of female entrepreneurs facing credit discrimination and the consequences on economic development. Gender credit equality and female empowerment are central to the development agenda because gender credit equality makes good economic sense and helps advance other development objectives. Our contact within the IMF would be, **Ms Boriana Yontcheva, the IMF Resident Representative to Cameroon**. Email: [byontcheva@imf](mailto:byontcheva@imf).
- **The WORLD BANK:** the World Bank in its strategy of poverty alleviation in low income countries involves in female entrepreneur credit discrimination in several ways. By completing the action of the IMF in the related issue, the World Bank focuses broadly on gender-related development issues. Hence, gender equality and female empowerment remains fundamental to the development objectives in low income countries. Consequently, the outcomes of this proposed research would be relevant for this international organization. Our contact within the World Bank would be, **Mr. Raju Jan Singh, Director of Operations in Central Africa for the World Bank**. Email: [rsingh9@worldbank.org](mailto:rsingh9@worldbank.org);
- **The African Development Bank (AfDB):** the AfDB promotes female entrepreneurship in Cameroon. One of his major achievements in this domain is the establishment of a Partnership with the Ministry of Economy, Planning and Regional Development to support female entrepreneurs in Cameroon.

This partnership aims to strengthen the capacity of female entrepreneurs in the areas of, building-up investments projects, creating firms, and to encourage them to move from informal activities to formal sector. Funding of this partnership is available for female entrepreneurs in some banks. As result, the findings of the proposed research would be useful for this partnership, and also for others programs concerning gender and development in Cameroon, through which AfDB is involved. Our contact at the AfDB would be, **Mr. Racine KANE, the AfDB Resident Representative to Cameroon**. Email: [r.kane@AFDB.org](mailto:r.kane@AFDB.org); Tél : (237) 22202761 / (237) 22202765.

Furthermore, the outcomes of this research would impact, not only Cameroon, but developing countries worldwide. Implementing policies that remove credit distortions and create a level playing field for all would help boost female entrepreneurship, with sound macroeconomic performances and in turn, economic development;

As response, in order to increase chances of the findings of the proposed research to be taken-up into policymaking, we plan to adopt the following dissemination strategy in collaboration with the PEP Research Communication Strategy. At the initiative stage of this research, we have already begun to discuss with some policymakers in the framework of **consultation**, in other to have their general ideas concerning the relevance of the research in their areas of expertise. The preliminary discussion about this research has helped us to build and ongoing **research network**, which could help us during the evolution of the project to disseminate the findings, from the preliminary results to the final result. We would thus organize **policy dissemination workshops (two for the discussion of partial results and one for the dissemination of final result)**, in the presence of the above mentioned users, academic and civil society, in other to communicate and debate about the different findings of the research. The findings of the proposal would help us to make available, **a Final Report of the research, a PEP working paper and a Policy brief**, toward the above mentioned policymakers and others various institutions. Moreover, for broader dissemination, the research would be presented at the **foremost International Conferences**, such the Annual Conference of OXFORD University among others, where the Lead Researcher usually participates.

## 7. List of team members

Name	Age	Sex (M,F)	Training and experience
Dr. Thiery KAME BABILLA	31	Male	Research: Macroeconomics, Dynamic Stochastic General Equilibrium modeling, Economic Development, Financial Frictions
Sandra KENDO	33	Female	Research: Microeconomics, Gender Discrimination, Economic development, Inequality and Poverty
Martin Ndzana		Male	Research: data analysis, Gender Discrimination, female entrepreneurship
Dr. Adele Ngo Bilong		Female	Research: data analysis, Gender Discrimination, female entrepreneurship

## 8. Expected capacity building

The proposed research would build research team capacity in several domains. Firstly, the research proposal would help research team to acquire knowledge about a series of commitments emphasizing gender concerns in social and economic spheres, including, Protocol to the African Charter on Human and people's Rights' on the Rights of Women in Africa (2003), the Solemn Declaration on Gender Equality in Africa (2004), the African Union Gender Policy (2009), the Beijing and Dakar Platforms of Action, and the Commission on the Status of Women (2013). Secondly, the research team would learn about the theoretical and empirical literature review on the differences between credit access of female entrepreneurs in developing countries and advanced countries, the difference between their mechanism transmission on real economy in developing country and advances countries, the specificity of financial system in developing countries relatively to international standard, and the relationship between all this features with broader macroeconomic stability.

Thirdly, the research team will learn to construct a harmonized long-term dataset for Cameroon, by making a country sector analysis to collect micro and macro information. The data will complete the existing data, in other to have comprehensive information about Cameroon features concerning credit policy and female entrepreneur, and how these features can affect macroeconomic

performance. More importantly, the proposed research would help the team leader to recruit young researchers in order to develop their technical capacity on the design, implementation, calibration and estimation of DSGE model, in relation with gender issue and development.

Finally, the team would acquire skills to build up a macroeconomic model for economic policy analysis, namely a Dynamic Stochastic General equilibrium model. The particularity of this new model is that, it would include in its specification, the main features of Cameroon economy, for sound macroeconomic implications.

<b>Name</b>	<b>Task</b>
<i>Dr Thierry KAME</i>	<i>Macroeconomic analysis, Dynamic Stochastic General Equilibrium modeling, Simulations, Calibration, Estimation,</i>
<i>Sandra KENDO</i>	<i>Gender analysis, Microeconomic analysis, Literature review, Data analysis, Statistical analysis.</i>
<i>Martin Ndzana</i>	Research: Data analysis, Gender Discrimination, female entrepreneurship, Literature review
<i>Dr. Adele Ngo Bilong</i>	Research: data analysis, Gender Discrimination, female entrepreneurship, Literature review

9. **List of past, current or pending projects in related areas involving team members**

<b>Name of funding institution</b>	<b>Title of project</b>	<b>Team members involved</b>
<b>AERC</b>	Financial regulation for economic performance and development in Africa: a case study of Central African countries	Cristina Badarau (LAREFI)/University of Montesquieu-Bordeaux IV, Bordeaux-France  Thierry Kame Babilla (Ph.D) University of Yaoundé II, Yaoundé-Cameroon
<b>OXFORD University</b>	Bank-lending channel of monetary policy transmission and Economic development in WAEMU: a Bayesian DSGE model approach	Thierry Kame Babilla (Ph.D) University of Yaoundé II, Yaoundé-Cameroon

African Development Bank	Trade and Currency Unions issues for Regional Integration in Africa: Evidence with a DSGE model in CFA Zone	Thierry Kame Babilla (Ph.D) University of Yaoundé II, Yaoundé-Cameroon
AERC	Mandate and Monetary Policy Strategy of the upcoming West African Central Bank (WACB): Evidence of Macroeconomic Performances using a DSGE model	Thierry Kame Babilla (Ph.D) University of Yaoundé II, Yaoundé-Cameroon
CAPEC IRDC Project	Social norms, Managerial Capacity, ICT, and Enterprises performance in Sub-Saharan Africa	Martin Eloundou
AERC	The Determinants of Innovation in Small and Medium Enterprises in Sub-Saharan Africa	Martin Eloundou

**10. Describe any ethical, social, gender or environmental issues or risks that should be noted in relation to your proposed research project.**

*In order to maintain the progress achieved to date and to meet long-term challenges, it is important for both main and female entrepreneurs to have fully credit access.*

- The female credit policy aims to feel the gender gap but not to discriminate or lead to men crowding out of credit market in Cameroon, or in developing countries.
- Overall policies for encouraging entrepreneurship for both male and female also need to be looked at or factored in.
- Other institutional factors like Self Help groups, Non Governmental Organization (NGO) support, can be looked into for the overall development of female economic activity.

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