The major bottlenecks of Micro and Small Scale Enterprises’ growth and alternative strategies in Ethiopia: Econometric and CGE analysis

RESEARCH PROPOSAL
Presented to
Partnership for Economic Policy (PEP)

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ETHIOPIA

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1. **Abstract (100 to 250 words)**

The abstract should state the main research question, the context and its relevance in terms of policy issues/needs in relation to PAGE thematic foci, complete with a brief description of the data that will be used.

Given the fact that Micro and Small scale enterprises (MSEs) are put to be high on the agenda of the Ethiopian government mid-term growth and transformation plan (GTP), this study will aim at investigating the major bottlenecks and contributions of the sector. We particularly seek to answer two research questions using two different data sets applying two different but interrelated techniques. First, we aim to examine the factors that constrain enterprise growth as given by either capital or employment growth. To this end, first, we rely on a survey data of about 3,000 MSEs collected by Ministry of Urban Development and Construction (MUDC) in 2012. Using this data and employing Tobit-2SLS estimation, we opt to determine the major constraints that affect the growth of MSEs in the country. Second, we seek to assess the role of MSEs to reduce unemployment and poverty. For this, we will apply a CGE model calibrated on the recently updated SAM for Ethiopia. There will be major modifications on the SAM and the model to explicitly account for those households who are engaged in MSEs and the disadvantaged (i.e women and youth). Once the major bottlenecks are identified and its role in the economy quantified, we will forward alternative policy recommendations that would enhance the growth of the enterprises and boost their contribution to ease unemployment and poverty.
burden in the country. Towards addressing the objectives, this study has contributions to the literature through major modifications in the CGE modelling and application of up-to-date econometric technique on the first of its kind country level data in the econometrics part.
2. **Main research questions and contributions**

Explain the focus (or key questions) of your research and its policy relevance.

2.1. Explain why you think this is an interesting research question and what the potential value added of your work might be (knowledge gaps). You might want to explain whether or not this question has been addressed before in this context (including key references), and if so, what do you wish to achieve (in addition) by examining the question again?

In developing countries, the development of MSEs is taken as a key strategy for job creation, alleviating poverty and more generally help economic development. According to some studies, for example, the contribution of MSEs along with medium enterprises account for about 30% of employment and 17% of GDP in developing countries (Beck & Demirguc-kunt, 2005). In developed countries, the share of the enterprises is even larger accounting, on average about 50% to GDP and 60% to employment. Thus, naturally, as economies grow, the share and contribution of these enterprises in the economies of developing countries will improve. In these economies, the expansion of these enterprises is doubly important as they are closely associated to the relatively poor and especially so with disadvantaged groups of women and youth (Robu M., 2013).

Micro and small enterprises are playing significant role in the Ethiopian economy also. According to the 2002 nationwide survey of the Central Statistics Authority (CSA), in Ethiopia there were 974,676 cottage/handicraft manufacturing establishments engaging more than 1.3 million people. The Small Scale Manufacturing Survey (CSA 2003) also shows that there were 31,863 small-scale manufacturing industries (of which, 62.8 per cent were in urban areas) engaging 97,782 persons (91.3 per cent male, and 8.7 per cent female). The informal sector, in which most of the MSEs lay, is a large source of employment and livelihood for the urban population particularly. About 25% of people who are working in Ethiopia are engaged in the informal sector in which women account 33.6% and men only 18.7%. Even if this sector is creating job opportunities for the youth and women, there is still gender bias in the major cities of the country. CSA (2014) indicates that the unemployment rate of women is 28% while that of male is 13.8%. This shows us the importance of the informal sector in enrolling women in income generating activities.
Despite this, however, the Ethiopian MSE sector has not been adequately studied empirically.

The government of Ethiopia has placed considerable importance to the role of these enterprises in the economy’s commendable performance as well as the potential of the sub-sector to transform the economy. The 2010/11-2014/15 Mid-term plan of the Ethiopian government which is called the Growth and Transformation Plan (GTP, 2011/12), for instance, envisages that, during this period, MSEs create employment opportunities for about three million people and thereby enhance income and domestic saving, so as to reduce unemployment and poverty; particularly to benefit women and youth from the sector (MoFED, 2014).

However, neither the growth of these enterprises nor their contribution to their primary target has been considerable. According to the recent survey conducted by Ministry of urban Development and Construction (MUDC), the majority of the existing MSEs are owned by male (59.6% in Addis Ababa); contribute very little to employment creation (more than 50% hiring two or fewer) and most (about 60%) have less than 1 year experience (MUDC, 2013). Figure 1 below also confirms, using growth in capital, that the growth of enterprises is very stagnant, probably except for the construction sector.
Literature identifies, inter alia, size of start-up capital, access to credit, access to work premise, access to appropriate training, access to or linkages to markets, and schooling and other demographic characteristics of operators; as main factors determining the performance of the enterprises in the country (See for instance, MUDC, 2012; Gebreeyesus, 2007; Gebremichael, 2014). But most of these studies are either only descriptive, not exhaustive, focus only on single location, methodologically faulty or a combination of these.

In this study, we primarily focus on exploring the determining factors of the annual growth of these enterprises based on a very rich data set collected by MUDC in 2012 employing pertinent econometric technique. Besides, a CGE model will be developed for Ethiopia to investigate the role of MSEs on unemployment and poverty reduction at a country level.
The proposed research work is going to be hugely significant both due to the unique data it employs and the novelty of the econometric and CGE techniques it applies. The completeness of the data in terms of covering key issues of MSEs and its spatial coverage offers the opportunity to critically assess the proposed research questions both at national and across the regions.

The technical contribution comes from additions and modifications to be provided by both the econometric model and the SAM/CGE model. With regard to the econometrics, the main contribution, unlike most of the previous studies, is the causal relationship we aim to establish in a ceteris paribus framework. Second, we explicitly account for the inherent problem of working with currently active MSEs, which in a way excludes those firms who got bankrupt and were expelled out of the sector - referred as censoring. In our econometric analysis, we will use Tobit regression which accounts for the problem of censoring. Third, we will also try to account for demand side factors using interaction terms- location and sector variables. Only very few articles make use of both demand and supply side factors. Literature also suggests that the performance of firms also depend on external factors. To this end, we will try to include particularly variables indicating quality of infrastructure (road quality, travel time to the major towns, etc.); access to electricity; access to tap water; radio and mobile signals from national surveys to account for external factors. Forth, the analysis deals with possible endogeneity in estimation. We will deal with this problem using two stage least square estimation technique. We will also try to exploit the existing variables in the data set as well as external factors as instruments – in due course of the analysis we will also try to come up with satisfactory solution for this problem.

The technical contribution also comes from special features of and modifications in the SAM and the CGE model. The SAM used in this study has some special features. Even on top of that, the SAM will have some modifications to explicitly incorporate MSE activities. Besides, the labor force and households will be disaggregated by gender and occupation (MSE/Non-MSE) which makes the SAM
unique. There will also be additional equations developed in the CGE model to incorporate this disaggregation in the labor market and activities into the production technique. This disaggregation will be extended into the micro-simulation part for gender and occupation based poverty analysis. This gives us the luxury to come up with very original and unique analysis that meets the intended objectives of this research work. This enables us to show and send very important and timely policy recommendation messages about the gender and occupation based alternative strategies towards realizing the planned role of MSE development in the Ethiopian economy.

For the poverty analysis we will employ the very recent, 2010/11 HCES (Household Consumption and Expenditure Survey) data of the CSA (Central Statistics Authority). All previous micro-simulation poverty analyses for Ethiopia use the 2004/05 HICES data which is now an older version (Paul and James, 2009). Usage of the 2010/11 version makes this study different from previous ones.

There will be some more modifications in the CGE model. We will capture the effect of public spending for technical trainings on labor productivity in the MSE sector using the elasticity which will be estimated in the econometric model. The entire contributions of this study and the modifications to be made on the two models are briefly explained in the methodology part.

As a result of all these modifications and use of new and recent data, we will come up with robust results that are relevant from policy perspective. This study is very timely, because the government of Ethiopia is expecting a lot from the MSE sector which is not yet developed. So there are a lot of road blocks on the sector which we will reveal through this study and recommend policy options which can help to improve growth and efficiency of the sector so that it can live up to the envisioned goal.
2.2. Describe the specific policy issues/needs that your research aims to address; how your potential outcomes/findings may be used in policy making?

- Justify timing of your research in terms of policy and socioeconomic needs/context – e.g. reference to existing/planned/potential policies at the national level.
- Evidence of previous consultation with potential users (e.g. policymakers and key stakeholders) to help define your research question is strongly encouraged. Include a list of names, institutions and email addresses when possible.

Micro and small enterprises have great potential to create employment and incomes among the disadvantaged and vulnerable. In order not to achieve these potential, they face several constraints one of which is the lack of access to start-up capital. This problem is particularly severe in developing countries where financial institutions are weaker; the competition for limited credit access is throat cutting and MSEs lack the necessary skill and financial capability to prosper by their own. The availability of this capital to entrepreneurs determines the capacity of the country to create jobs, reduce unemployment, spur growth and reduce poverty.

The second factor that limits the contribution of MSEs to employment and economic growth is slow or stagnant growth in their capital. Growth of the firm as given by growth of its capital somehow indicates the extent of the firm to create employment, absorb risk, and contribute to national output. This, however, could be affected by several factors including the business environment, entrepreneurial capability, beginning capacity, education of the owner(s)/manager, experience of the owner (s)/managers, etc. For instance, regardless of the importance of credit for the success of MSEs, about 80 percent of MSEs state that access to credit from formal financial institutions is their number one constraint. This forces a large proportion (41%) of respondents to start business with their own limited saving. Besides limiting their capacity, this forces them to resort to sources that require extremely large interest rate (Bekele & Muchie, 2009). According to this study, money obtained from relatives and friends, iqqub schemes (social capital) account for 18 percent and 12 percent, respectively. The share of microfinance institutions, banks and private money lenders account for 9.2 percent, 8 percent and 7.2
percent, respectively. The story is exactly the same once the enterprises are operational. Figure 2 below shows the sources of MSEs’ finance and percentage of MSEs reporting them as primary in meeting their working capital needs.

Figure 2: Sources of finance and percentage of MSEs reporting them as primary in meeting their working capital needs

![Bar chart showing sources of finance and percentage of MSEs reporting them as primary](chart.png)

Source: Gebrehiwot and Wolday, 2006

In Ethiopia, a thorough examination of the determinants of growth of MSEs is not undertaken. We therefore, attempt to critically examine the determinants of MSEs’ growth employing appropriate statistical and econometric techniques.

The role of MSEs to employment creation and overall economic growth is strongly emphasized in the literature (See for example Daniels, 1999; Beck et al 2005). For instance, MSEs enhance competition and entrepreneurship and hence have external benefits on economy-wide efficiency, innovation, and aggregate productivity growth. Since they require relatively less financial and human capital, and are more labor intensive, they especially appeal more to the poor and the vulnerable. Hence the expansion of these enterprises could serve as a powerful tool to reduce poverty and spur economic growth without worsening income inequality. In Ethiopia, there are few studies that rigorously examined the role of MSEs on employment, economic growth and poverty. In this study, we aim to address this issue using CGE modeling.
Specifically, we will address the following two research questions:

A. What factors determine and/or constrain the growth of MSEs in Ethiopia? Is there any difference in the growth of MSEs operated by female owners vis-à-vis male owners, how about youth and matured owners?

B. What is the role of MSEs - on reducing unemployment and poverty in Ethiopia, in particular to disadvantaged and vulnerable groups (women and youth)?

The MSEs Sub-sector has huge potential for economic growth, reducing the high unemployment rate and poverty. Understanding this potential, the government of Ethiopia has emphasized the development of MSEs as one of the instruments to achieve the planned broad based growth in the country. The mid-term economic plans; the current GTP I and the coming GTP II are underlining the importance of this sub-sector for the realization of government’s plan to enable the country become one of the middle income countries in the coming few years. However, a study based on a recent survey reveals that the sector is not growing as planned. Besides, the GTP annual progress report also mentioned that expansion of the MSEs and growth in productivity and competitiveness of the already existing enterprises are still lower than the envisaged targets. Therefore, by pinpointing potential areas that could maximize the contribution of the sub-sector, the finding of this study would serve as input to foster the contribution of the sub-sector to the envisaged long term goal. The study will assess the effect of public investment on different areas like giving training and better access to working capital that can improve MSEs’ productivity and competitiveness. Besides, teasing out the major constraints and forwarding possible recommendations to rectify the problems, the study would contribute to enhance the welfare of those that engage on them; the poor and the disadvantaged.

We will be approaching each of the following institutions to gather information about the operation of the sub-sector. We will also be having continuous consultation with each of them about the challenges and constrains the sector is facing. By the time we finalize the draft report, we will go back to them to get their feedback. Through this interaction we believe our study can come up with policy relevant results which will be used as an input for policy makers.
3. Methodology

Presentation of the specific techniques that will be used to answer the research questions and how exactly they will be used to do so. Explain whether you will use a particular technique normally used in other contexts or whether you intend to extend a particular method and how you will do so. Explain if these methods have already been used in the context you are interested in (including key references).

In order to address the aforementioned objectives, we will be using econometric and CGE models. The econometric model will help us investigate the determinants of the growth of MSEs in Ethiopia. It is more appropriate than the CGE model to dig into what determine growth of MSEs using econometrics method. As per our objective, we also want to see how MSEs operated by women owners perform relative to their men counterparts. In order to see if there is difference in the performance of MSEs based on age and gender, we will include age and gender of the owner as explanatory variables in the econometric analysis.

On the contrary, CGE model is found to better fit the second research question given the availability of data. Therefore, CGE modelling approach will be mainly used to investigate the role of MSEs’ development on reducing unemployment and poverty in Ethiopia, specifically for disadvantaged sections of the society: women and youth. Besides, the CGE part will deal with the effect of public investment on MSEs to come up with the planned productivity and competitiveness of the sector.
However, while addressing these questions, the two models will feed in one another in two ways. First, in both models we will try to see the existence of any gender bias and see the validity of the finding of one method with the other. Second, the econometrics model will estimate some essential elasticities to be used in the CGE model. First, in the labor productivity function, elasticity of public investment on training to labor productivity will be estimated using the econometric method. Second, the econometric modeling will estimate capital growth rate of the MSEs from the MUDC data. The CGE modelling will then use the growth rate obtained from the econometric regression, to adjust capital accumulation on the MSE specific activities. This set-up show that there are some parts in the modelling work where the CGE part will be fed by the econometric work with some essential numbers and the two models will be linked to one another.

### 3.1. Econometric Model

We have made detailed survey of the existing literature regarding the operation of MSEs. Tadesse (2014) descriptively analyzed how access to finance affects the sector development in one town. Zemenu and Mohammednur (2014) also used similar analysis to understand determinants of the growth of MSEs operating in another town. Both studies have methodological limitation that emanate from relying on descriptive analysis as this does not take all the growth determining factors into account and unable to make any casual inference.

Ageba and Ameha (2006) also descriptively analyzed how MSEs are financed in Ethiopia. Although in-depth analysis is given on the issue and has a wide coverage, it suffers from the same problem as the above study.
Tefera et.al. (2013) econometrically estimated the growth determinant factors of MSEs in one town of Ethiopia. The authors used probit estimation of the likelihood of MSEs to grow given a number of covariates. The study used growth in employment as an indicator of growth; firms with negative and zero employment growth rate are given zero value while the remaining are given one value. By doing so dichotomous variable is generated to capture MSEs growth. Gender of the owner, initial investment size, location of enterprise relative to road and the enterprise’s sector of operation are considered to be control variables. Although there is theoretical justification for relying on employment, creating clear dichotomy is an imposition or creation of a data structure which might not be the case. We also think that a number of growth explanatory variables are missing in the analysis. Similar methodology is followed by Gebremichael (2014) to look at the impact of subsidy on the growth of MSEs.

In order to analyze the growth of MSEs, we have adopted firms’ growth model provided by Evans (1986) and later adopted by a number of studies; Gebreyesus (2007), Garoma (2012), Hagos et.al. (2014) and others to analyze MSEs growth. Depending on the data set they are working on, the authors have chosen either employment, sales, profits or fixed asset, to measure firms’ growth.

In our study we will be using firms’ capital as an indicator to capture growth. The major drawback that is highlighted in the studies using capital as a measure of growth is inflation. In our study, we will account for inflation by converting the nominal figures to real using national deflator. Following the works of Evans (1987) as cited in McPherson (Mcpherson, 1996) who used similar approach to measure growth indicator, the growth in capital can be measured by taking the real (real meaning after adjusting for inflation) difference in capital at the start of operation with current capital and taking it as a ratio of year of operation.
A number of factors come into interplay to determine firms’ growth. Nichter and Goldmark (2009) identified education of owner- although education has a certain threshold level, work experience, firms age, formality, location of the firm- in house or around the market-, access to finance, value chains and intra-firm cooperation to be some of the factors that determine the growth of firms in developing countries.

Mcpherson (1994), doing cross country analysis, identified firms’ age, firms’ size, sector of employment, whether the firm is located in commercial district or traditional market place, and human capital variable- including business training, mode of establishment- sole proprietorship or partnership arrangement, and socio-economic variables of the owner to be critical factors in determining firms growth in micro and small enterprise setting (for detail also refer to Mcpherson, 1994).

Based on the above theoretical discussion, demographic factors, employment, and amount of additional capital obtained from MFI and/or formal banks, number of hired permanent employees, average number of temporary employees, trainings received related to the business, number of years in the business, any policy change introduce while the business is in operation- for example change in the lending cap. In our analysis, unlike previous studies, we will be using employment growth as one of growth explanatory variable. We argue that labor is one key input of the firm which is similar to credit, training, land and resources that firms use to build up their capital1.

Based on the arguments we have put, the methodological framework that we will be relying on to see the growth of MSEs’ can be written as follows;

\[
\frac{\Delta \ln C_t}{\text{firm's age}} = \ln C_0 + \beta X \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (2)
\]

\[\Delta \ln C_t = \ln C_t - \ln C_0\] represents the change in firm’s growth

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1 As a show case, we will be estimating our models using capital growth and employment growth, although our interpretation will solely be based on capital growth model.
Where: \( \ln C_t \) is firm’s log of real current capital, and \\
\( \ln C_0 \) is firm’s log of real initial capital

While the vector \( X_s \) represents owner’s characteristic- demographic characteristics of the head: age, gender, number of years in school, marital status, and other constructed variables, like age square- to control of non-linearity.

We augment the model with two external policy environment factors that MSEs faced in the country. When we look at the data set the age of firms extends to 40 years implying that there has been a regime shift and as well as introduction of new policies with the current government. To capture these factors we will introduce two policy dummy variables.

\[
\Delta \ln C_t = \ln C_0 + \beta X + \delta_1 \text{policy shift} + \delta_2 \text{regime change} \quad \ldots \ldots (3)
\]

Where: \( \delta_1 \) policy shift dummy for the introduction of new policy related to MSE \\
\( \delta_2 \) Dregime shift.

In our data set we have firms who have been operating since the previous regime (i.e. prior to 1992). We want to control for such factors by incorporating a dummy for the firms which are operational since 1992.

MSEs growth can be positively influenced by a number of factors. Receiving land or working premise and training are the two main positive shocks which encourages the growth of these firms, (see also Mead and Liedholm, (1998)). To account for these factors we have included two variables and the expanded equation will be given by

\[
\Delta \ln C_t = \ln C_0 + \beta X + \delta_1 \text{policy shift} + \delta_2 \text{regime change} + \rho \text{premise} + \sigma \text{training} \quad \ldots \ldots \ldots \ldots (4)
\]

Where: \( \rho \) premise is positive shock dummy for firms that receive land or working premise as positive shock \\
\( \sigma \) training, whether the owner has received training related to the business
Liedhom (2001) argued that sector of employment that MSEs are engaged in and the location of the firm can be taken as two indicators to control for demand for firms product. In order to capture the contribution of each of these factors we have included two variables in our regression framework: sector and location

\[
\frac{\Delta \ln(\text{firm's age})}{\Delta \ln(C)} = \ln(C_0) + \beta X + \delta_1 \text{policy shift} + \delta_2 \text{regime change} + \rho \text{premise} + \sigma \text{training} + \gamma \text{location} + \alpha \text{sector} \quad \ldots \ldots \quad (5)
\]

Where: \(\gamma\) location is a dummy that controls for the location of the firm

\(\alpha\) sector captures sector of employment

The source of their initial capital will have its own implication on the returns from MSEs investment and also how the return could be reinvested to prop-up the growth of the firm. Thus source dummy is incorporated in the model to account for it.

\[
\frac{\Delta \ln(\text{firm's age})}{\Delta \ln(C)} = \ln(C_0) + \beta X + \delta_1 \text{policy shift} + \delta_2 \text{regime change} + \rho \text{premise} + \sigma \text{training} + \gamma \text{location} + \alpha \text{sector} + \theta \text{Source} \quad \ldots \ldots \quad (6)
\]

Where: \(\theta\) Source denotes source of start-up capital: formal banks, micro finance, friends, relatives, neighbors, NGO, government, other

The \(\beta, \delta_1, \delta_2, \gamma, \alpha, \rho, \sigma\), and \(\theta\) are the parameters that we intend to estimate. Thus equation 6 will represent our estimable growth function.

In the analysis stage we will also try to control for any possible non-linear nature of the variable by including squared terms. We will also try to add interaction terms to account for the existence of possible scale factors. In this regard, for instance, Garoma (2012) relying on the works of Goedhuys, and Sleuwaegen (2009), used interaction between firms and size to control for the role of reputation for firms growth. Hall (1987) also underscored the importance of firm size for the growth of the firm. In the analysis stage we will also give due emphasis for such factors depending on the nature of the data set we have at hand.
From the above specification, if there exist any possibility of reverse causality between the growth of capital and that of start-up capital, resulting in problem of endogeniety, it calls for a better estimation technique: either instrumental variable or two-stage least square (2SLS) estimation method. These should be applied to have reliable and consistent estimate from the model. Thus, we will adopt existing novel methods to deal with this problem and other issues that will arise during the analysis. (see also, Green 2003; Wooldridge, 2002; and Cameron, 2007).

The other problem that we suspect our data will suffer from is that it only contains information on firms that are currently operating, which in a way means it excludes those who are dropouts of the sectors. Thus it runs in to the problem of truncation. To deal with this problem, following Amemeya (1984), we will be using Tobit estimation method of censored regression analysis.

We believe that using these two estimation methods: tobit- instrumental variable estimation; econometrically it is referred as maximum likelihood estimation of iv tobit estimation.

Unlike previous studies that suffer from omitted variable bias, which in most cases is introduced due to limited sample size as their sample is obtained from a specific locality, in our analysis we will account for such factors by utilizing unique nature of the data set we obtained from MUDC (2012). The data set is representative of all thirteen major towns of the country. This will allow us to control for locational differences by using regional dummies in our regression analysis.

In the estimation stage we will also run a number of regressions to see the existence of any possible difference in the growth of firms. Following the works of Belay (2012), we will examine any possible difference in the growth patterns of small and large firms by running the regression into five capital quintile groups.
Test of Internal validity

To test the validity of our results, we will use standard tests on each of our regression framework. Specifically, we will run mean difference test to check the statistical significance difference across male and female MSE operators and youth and mature operators. We will also run joint and individual significance tests of our model.

With regard to the econometric model, we fear that some of the explanatory variables to be correlated with the error term leading to endogeneity problem. This calls for application of instrumental variable (IV) estimation techniques. Two of the susceptible variables, in this regard, are the initial capital and training (or capacity building programs offered to firms). To address this problem, among other things, we intend to use instrumental variable (IV) method. Though the validity and appropriateness of selected instruments will be determined while actually running the regressions, we elect to use access to credit during start up as a potential instrument for initial capital while road quality and travel time to major cities as potential instruments for training. We are also doing more researching of the literature to choose other pertinent instruments. To test the validity of our instruments, we will run standard econometric tests of instrumental validity before making any inference.

Test of External Validity

In order to project our findings to the entire MSE sector, we will mainly depend on the result of the previous survey study that is reported by the ministry, MUDC (2012). To check the validity of our result we will make comparison with the result of this study. Moreover, we will also put our result in parallel with other studies.
3.2. CGE Model

A CGE model is a multipurpose and flexible model that has been widely applied for macroeconomic and sector specific policy analysis in many developed and developing countries (Lofgren et al, 2002). The model has dynamic extension of a recursive (or sequential) type. First why dynamic is because static models basically lack the ability to capture growth effects, and labor and capital accumulation effects makes them inadequate for analysis of medium and long term economic policies and their impact on poverty. Dynamic models overcome these limitations. Second, why recursive is because in this kind of dynamic model, economic agents are assumed to make their decision based on adaptive expectations. These agents have myopic behavior. A sequential dynamic model is basically a series of static CGE models that are linked between periods by an exogenous and endogenous variable updating procedure (Annabi et al, 2004). Myopic expectations assume that there is no change in decision parameters over time. Economic agents with adaptive expectations consider only the past for their optimizing problem (Springer K., 2010). This type represents developing countries like Ethiopia better than the inter-temporal one. Because economic agents in these countries rely more on their past experiences and they are not assumed to have perfect information about the future. The future is uncertain which can be manifested by market failures for instance.

The model is designed as a set of simultaneous linear and non-linear equations, which define the behavior of all economic agents, as well as the economic environment in which these agents operate. This environment is described by market equilibrium conditions, macroeconomic balances, and dynamic updating equations.

In the model a multi stage production function is used. Producers are assumed to maximize profits subject to production technologies, taking prices (to output and intermediate inputs) and factor wages as given. Producers in the model make decisions in order to maximize profits subject to constant returns to scale, with the
choice between factors being governed by a constant elasticity of substitution (CES) function. This specification allows producers to respond to changes in relative factor returns by smoothly substituting between available factors so as to derive a final value-added composite. Profit maximization implies that the factors receive income where marginal revenue equals marginal cost based on endogenous relative prices (Thurlow, J., 2008).

Our model uses labor and capital as factors of production. For our purpose, we disaggregate labor by gender. Incorporating this feature into the original model is the first value addition or contribution of this research work. For this extension we followed G. Kiyondo and Margaret M. (2009). The production line originally starts with a value added function which uses CES specification to combine the different types of factors of production. But we improved that and now it starts with a gender function where we used CES specification to combine gender disaggregated labor in each activity. Then the original value added function which uses CES specification to combine the composite labor with capital follows.

Equation 7 below illustrates how men and women employed in the same activity combine to form a composite labor force (QLa) at the beginning of the production line. We opt for CES specification at this stage, to enable the aggregate mix between male and female labor to vary following the availability of some techniques. In order to maximize its profit each activity uses a set of factors (including male and female labor) up to the point where the marginal revenue product of each factor is equal to its wage or rent.

\[
QL_a = A_a \cdot [\alpha_a \cdot QL_{male_a}^{-\rho_a} + (1 - \alpha_a) \cdot QL_{female_a}^{-\rho_a}]^{-(1/\rho_a)} \quad \ldots (7)
\]

Where: \(QL_a\) composite labor force in activity \(a\)
\(\rho_a\) is a substitution parameter,
\(QL_{male_a}\) is male labor in activity \(a\),
\(QL_{female_a}\) is female labor in activity \(a\),
\(\alpha_a\) is CES activity function share parameter, and
\(A_a\) is efficiency parameter in the CES activity function.
Equation 8 generates the relative demand functions for male and female labor. The equation shows relative demand for male and female labor rely on a share parameter, the relative wage rate ($W_{male}/W_{female}$), and the sectoral elasticity of substitution. The optimal mix of male and female labor is a function of the relative wage rates of male and female labors.

\[
\frac{QL_{female_a}}{QL_{male_a}} = \left[ \left( \frac{W_{male_a}}{W_{female_a}} \right) \left( \frac{1-\alpha_a}{\alpha_a} \right) \right]^{\frac{1}{1+\rho_a}} \tag{8}
\]

Where: $W_{male_a}$ is wage for male labor,
$W_{female_a}$ is wage for female labor
$\left( \frac{1}{1+\rho_a} \right)$ is sectoral elasticity of substitution

Activity level wage rate for the composite labor is calculated (somehow) as a weighted average of wage for male and female labors in equation 9. This specification will be improved through modifications during the entire work.

\[
W_a = \frac{(W_{male_a}.QL_{male_a}) + (W_{female_a}.QL_{female_a})}{QL_a} \tag{9}
\]

Where: $W_a$ is the activity level wage rate

In each sector a CES production function takes care of the aggregation of the composite labor and capital so as to come up with a final value-added composite. The CES specification is shown in equations 10 and 11.

\[
QVA_a = \alpha_{va}^{\alpha_a} \cdot \left[ \delta_{va}^{\delta_a} \cdot K_a^{-\rho_{va}^{\delta_a}} + (1 - \delta_{va}^{\delta_a}) \cdot QL_a^{-\rho_{va}^{\delta_a}} \right]^{\frac{1}{1-\rho_{va}^{\delta_a}}} \tag{10}
\]

Where: $QVA_a$ is quantity of value added in activity $a$
$\alpha_{va}^{\alpha_a}$ is efficiency parameter in the CES value-added function,
$\delta_{va}^{\delta_a}$ is CES value-added function share parameter for a factor in activity $a$,
$K_a$ is quantity demanded of factor capital from activity $a$,
$\rho_{va}^{\delta_a}$ is CES value-added function exponent,

\[
\frac{K_a}{QL_a} = \left[ \left( \frac{W_a}{r_a} \right) \left( \frac{\delta_{va}^{\delta_a}}{1-\delta_{va}^{\delta_a}} \right) \right]^{\frac{1}{1+\rho_{va}^{\delta_a}}} \tag{11}
\]

Where: $r_a$ is activity specific capital rent rate
Once determined, these value-added composites are combined with fixed-share intermediates using a Leontief specification. The use of fixed-shares reflects the belief that the required combination of intermediates per unit of output, and the ratio of intermediates to value added, is determined by technology rather than by the decision-making of producers (Thurlow, J., 2008).

In the industry and service sectors there will be two lines of production producing two similar and substitutable outputs. In this study the disaggregation in the production part of the model will go down to scale of operation level especially in the manufacturing and construction from the industry sector and trade and hotel and restaurant activities from service sector. We select these sectors because most of the MSEs in Ethiopia are engaged in them\(^2\). The two lines of production will follow two different production technologies to produce the two types of outputs. CES functional structure will be used to supply a single product composite of the two products from the two production lines. Thus a commodity is a product of two production lines; produced by the MSEs and other one produced by the Non-MSEs. These two products are considered as substitutable but they are not assumed to be perfect substitutes.

Profit maximization drives producers to sell their products in domestic or foreign markets based on the potential returns. It is assumed that marketed domestic output is allocated to two alternative destinations: domestic sales and exports. The model shows imperfect transformability between these two destinations, via the use of constant elasticity of transformation (CET) functions (Lofgren, H. et al, 2002). In an analogous way, the model incorporates imperfect substitutability between domestically produced and imported goods (i.e. Armington assumption).

Domestic output net of exports, combined with the imported products creates total supply to satisfy domestic demand. This demand is the sum total of all demand by economic agents: it constitutes final consumption demands by households, and government and investment demand, intermediate consumption demands by activities and transaction services’ demand. Households have final consumption

\(^2\) Operations at micro (classified under handicraft and cottage according to a classification by CSA) and small level will be grouped under the MSEs while operations at medium and large level will be grouped under non-MSEs.
demands with the objective of utility maximization subject to budget constraints. The model has one representative consumer per household type, rendering identical preferences for all consumers in a given category. Households get their income from both factor and non-factor sources. The non-factor sources we already have in our SAM are government transfer (social security for instance) and remittance. Representative household groups maximize their incomes by allocating factors of production across activities.

All households will be disaggregated by gender. Different studies like Arndt et al (2011) shows households’ labor income patterns vary by gender. The model captures these differences by distributing factor incomes to households based on their factor endowments. The disaggregation will also consider spatial pattern of households and will be extended to cover major source of income (MSE Non-MSE classification) to the households.

Our research objective needs a gendered household and MSE Non-MSE classification in activities and also households to look at effects of external interventions on females and those engaged in MSEs. Our study focuses on the urban households only. So, the disaggregation based on source of income (or occupation) will be applied only on urban households. Regarding source of income, MSE households, whether they are male or female headed, will get their income from factors that are employed in the MSE sector and follow the income pattern of urban poor households for non-factor income. We also assume MSE households can get some portion of their income from factors employed in the Non-MSE activities.

A separate consumption based micro-simulation module with the households disaggregated by gender and occupation will be prepared. This links each respondent in the 2009/10 HICE survey to their corresponding representative household group in the model. Thus we will employ a top-down approach in which changes in commodity prices and households’ consumption spending are passed down from the CGE model to the micro-simulation module, where per capita consumption and standard poverty measures are recalculated. Poverty will be modeled using the Foster-Greer-Thorbecke (FGT) measures (Foster et al, 1984). This measure is noted as:
\[ p_\alpha = \frac{1}{n} \sum_{i=1}^{q} \left( \frac{z-y_i}{z} \right)^\alpha \] ................................. (12)

Where: \( \alpha \) is the poverty aversion parameter,
\( n \) is population size,
\( q \) is the number of people below the poverty line,
\( y_i \) is income,
\( z \) is the poverty threshold.

The FGT \( p_\alpha \) class of additive decomposable poverty measures allows us to measure the proportion of poor in the population; poverty head count ratio if \( \alpha = 0 \), poverty depth if \( \alpha = 1 \), and severity of poverty if \( \alpha = 2 \).

In every period of the model run, the capital stock continues updated with the total amount of new investment and depreciation. The model allocates new capital formation (or investment) to activities based on their previous capital share. On top of that, capital accumulated in the MSE activities will increase exogenously with the actual average annual capital growth rate in the MSE sector. As a result, we will model public investment for MSEs’ development (in terms of provision of credit) through exogenous increase in MSEs’ capital. On the other hand, total labor supply is also updated by the population growth rate of the country, i.e. the total labor supply increases together with the population growth.

So the hypothesized flow of effects of government’s effort on capacity building of operators and improved access to capital on MSEs is; public spending on technical trainings give the operators better knowledge of production and business management which improve their capacity in the sector. Thus it leads to augmented labor productivity in the MSE sector. On the other line, better access to working capital will give MSE operators chance to invest more money into their production activities. This new capital formation is distributed to its particular production line and augmented the capital stock in the activity. Thus the increased income from improved labor productivity and more accumulated capital stock leads to better
income in the MSE sector which finally resulted in increased households’ spending on different commodities. This rate of change directly goes to the micro simulation part to determine effects of MSEs and targeted public spending on poverty.

Using this model the study will test two sets of simulations. The first will be exploring scenarios that will consider impact of MSEs’ growth and prevailing external government intervention on MSEs. The scenarios in this simulation will be:

1. Raising MSEs’ labor productivity with the prevailing access to training,
2. Capital growth in the MSEs sector at the current average rate

This simulation run will measure impacts of their actual growth and public investment on the sector on unemployment and poverty.

The second set of simulation scenarios focuses on more public spending on trainings for the MSE operators and better access to working capital as planned in the MSEs development package. The scenarios in this simulation will be:

1. Raising MSEs’ labor productivity as planned,
2. Capital growth in the MSEs sector in line with the planned provision of credit. We will use elasticity of loan and capital growth to come up with the magnitude of the capital growth rate.

The outcomes of these simulation scenarios will show us how large the role of MSEs would have been in terms of reduction of unemployment and poverty if the interventions went as planned. Thus, based on this difference on the outcomes we will recommend some alternative strategies for MSEs’ development.
4. **Data requirements and sources**

This is a critical part of the proposal. The key issue is to explain the reason for the use of the particular data. You must establish that they are ideal for the question you wish to address. Please consult the “Guide for designing a research project proposals” for more detail.

As stated above, in this study, we aim to answer two key research questions. First, we seek to identify the major determinants of the growth of firms in Ethiopia. Second, we examine, the role of MSEs to reduce unemployment and poverty. For the former question, we rely on a survey undertaken by Ministry of Urban Development and Construction (MUDC) on about 3000 enterprises in 2012. The survey covered 13 major cities in the country with a population of more than 100,000\(^3\).

The objective of the survey was “....to generate adequate, up-to-date and reliable information on growth oriented Micro and Small Enterprises (MSEs) ....”. To this end, detailed information on the characteristics of the operators of the enterprises (age, gender, education level, experience); profile of the enterprises (establishment year, initial capita, current capital, number of employees at the time of establishment, current number of employees); and major constraints facing the enterprise, were collected, among others (MUDC, 2012).

This data set is ideal to answer the proposed research question. First, the data has enough observation to test our hypothesis both at national and regional level and hence help check the robustness of the results at different levels of aggregation. Second, the existence of varied covariates of the outcome variable is critical to reduce omitted variable bias in the econometric estimation. Third, as discussed in the methodology section, our estimation might suffer from endogeneity problem stemming from possible correlation of initial and capital growth. To mitigate this problem, we will be using two stage least square (2SLS) estimation technique. Since the data is collected from currently active MSEs, we do not have information from MSEs that exit from the sector. Thus, we will be using Tobit estimation technique to account for the problem of working with censored MSEs data set.

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\(^3\) The complete list of the surveyed cities include Addis Ababa, Hawassa, Mekele, Gondar, Bahirdar, Dessie, Jimma, Shashemene, DireDawa, Bishoftu, Adama, Jijiga, and Harar.
For the second key research question we rely on CGE modelling. The CGE model used in this study will be calibrated on a Social Accounting Matrix (SAM) of Ethiopia. This SAM was first developed by EDRI (Ethiopian Development Research Institute) for 2005/06 Ethiopian economy. It was later updated for 2009/10 for a research work on alternative financing of the GTP plan. The procedures taken to update the SAM are discussed here: the first move was to simulate the growth of the Ethiopian economy based on actual economic developments from 2005/06–2009/10 using dynamic CGE model. A new and balanced SAM for 2009/10 came out as a result. Then the projected 2009/10 SAM and the GDP were then converted to current prices. Activities’ shares of actual value added and actual aggregate demand components of 2009/10 (from national accounts) were then used to adjust sectors’ value added in the projected 2009/10 SAM. This resulted in an unbalanced SAM, which was then balanced using a cross entropy program (Ermias et al, 2011).

The SAM originally has more disaggregated accounts. There are 65 activities and equal number of commodities. 24 of the activities are agricultural which are further disaggregated based on the four agro-ecology zones of Ethiopia. While 30 of the activities are industrial and the remaining 11 are in the service sector. 17 factors of production which holds different types of labor, land and livestock factors together with a capital factor are included in the SAM. However, now we assume we will have gender disaggregated one type of labor and capital for simplicity sake. But this can be revised during the entire work. The capital factor is created by merging land and livestock factors with the already existing factor capital in the SAM. There are also 12 households that are disaggregated by location (urban/ rural) and income level (poor/non-poor). Government, ‘saving-investment’, ‘rest of the world’ and different tax types are also components of this SAM. The SAM we use has this structure:
In order to make the SAM fit our objective there will be some modifications in line with the modifications made in the model. The production block is further disaggregated by level of operation into MSE and Non-MSE. For this purpose we got the data from manufacturing sector surveys (small scale and cottage manufacturing survey and large and medium scale manufacturing and electricity survey) of the CSA to calculate the shares of the two groups from total value added in each activity. So this can give us a room to build MSEs’ account explicitly into the SAM with all its production and supply features together with the operators’ value addition, income gain and consumption expenditure features. So now, one industrial commodity will be produced from two production lines.

With the objective of looking into the gender bias in the sector, the labor market will be segmented into male and female labor, treated as separate factors of production. This intends to reflect gender bias in terms of wages and employment.
opportunities in the Ethiopian labor market, and also occupational differences. We use value of male and female workers in each production line from manufacturing sector surveys of CSA which enables us got the appropriate share of male and female workers from the entire labor value addition in each industrial and service activity even at the level of operation. The same figures will be calculated for the agricultural sector from agriculture sample survey data of CSA. Thus, we use those shares to split the already existing labor account for each production activity.

This labor disaggregation based on gender will also be extended to the households in the SAM and the micro-simulation part. Any household type, rural or urban/MSE or Non-MSE, will be disaggregated into male and female headed households to capture gender based differences on spending pattern. Gender of the respondent household head in the HICES (Household Income Consumption and Expenditure survey) data will be used for the disaggregation purpose. From this data set in 2009/10 31.5% were female headed households while the remaining 68.5 were male headed households. We will calculate their food and non-food spending separately because the literature underlines the fact that female headed households spend more on food items than male headed ones. Studies find that women, relative to men, tend to spend their income disproportionately on food for the family (A. R. Quisumbing et al, 1995).

We need to set a specification for households’ income sources. The Non-MSE households are assumed to continue with the original set up which is already there in the SAM. But MSE households will get their income from factors that are employed in the MSE sector and for non-factor income, they will follow the income pattern of urban poor households in our original SAM. We also assume MSE households can get some portion of their income from factors employed in the Non-MSE activities. We will use income levels for household members (including household head) and source of income data reported in the HICES. The source of income gives us the list of activities the household members engaged in to get that particular income.
Thus we will use household members’ level of income from different activities and calculate the share of each source (or activity) and get the major one. Then for rural households we will take the shares and set up the pattern of income sources and the households’ income from male/female labor. For urban households, we will use the same analogy and because we couldn’t get any other means to disaggregate the households in the microsimulation into MSE and Non-MSE, we intend to use the share of income sources to get the major activity from which the household is getting its total income. If this major activity is either manufacturing, construction, trade or hotel and restaurant for urban household we will consider that household as MSE. We know that this is a crude conclusion which includes households that are actually Non-MSE into MSE. Thus to exclude those households that are actually not engaged in MSEs, the labour value added share of MSEs in these activities will be used to multiply the rate of change in household’s consumption which will be used in the microsimulation part. This will be one contribution of our study to the literature even if it needs more work to polish the mechanism.

For the poverty analysis we will employ the very recent, 2009/10 HICES data of CSA. The households from this data will be disaggregated into MSE/Non-MSE and male/female headed using the technique discussed above. Thus it enables us to undertake gender and occupation based poverty analysis which is also very important for policy recommendation. Using the very recent HICES data set is a contribution by itself to the micro-simulation extension of the standard IFPRI CGE model which only uses the older version (2005/06) of this data set4.

In MSE activities informal sector has played a significant role. This is true also in Ethiopia. However our study doesn’t explicitly include the informal sector because there is only labour data we have already got and we know that it is hard to get complete information on the informal sector. So it will be a lot of work if we try to cover the informal sector too. We will try to consider the sector implicitly when splitting the industry and service accounts into MSE and Non-MSE. We can take employment share of the sector into consideration for instance. So logically

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4 Look at Paul D. and J. Thurlow (2009)
share of the MSE line will be the formal MSE and the informal MSEs.
5. **Policy influence plan (or research communication strategy)**

- Referring to the policy context described in section 2.1., identify potential users of your research findings, including policymakers and other key stakeholders. Provide a list of institutions and, whenever possible, specific individuals to be targeted for effective policy influence. Please also indicate whether you have already made contacts within the institutions.

- How, in the elaboration and execution of your project (from design to dissemination), will you consult/communicate with these users to both gather their inputs and keep them informed of your project (expected contributions and uses), in order to increase chances of your findings to be taken-up into policymaking?

You can refer to [PEP's research communications strategy and guidance](#) to have a better idea of what is expected in terms of activities for policy outreach and dissemination.

The following table constitutes a list of institutes that are going to be targeted for effective implementation of the policy prescriptions. As we have already stated in the previous sections, we will be approaching each of the following institutions to gather information about the actual operation of the sector. We will also be having continuous consultation with each of them about the challenges and constrains the sector is facing.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Contact</th>
<th>Target</th>
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<tbody>
<tr>
<td>Micro and Small Enterprises Development Agency</td>
<td>Yes</td>
<td></td>
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<tr>
<td>MSE Development Offices</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Ministry of trade and industry</td>
<td>Not yet</td>
<td></td>
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<tr>
<td>Ministry of Urban Development and Construction</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Addis Ababa City Administration MSE section</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Bureau of Works and Social Affairs</td>
<td>Not yet</td>
<td></td>
</tr>
<tr>
<td>Ministry of Women's, Children and Youth Affairs</td>
<td>Not yet</td>
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</table>
We have already done discussion with few government officials at Micro and Small Enterprises Development Agency, Ministry of Urban Development and Construction and Addis Ababa City Administration MSE section and with some researchers who have been engaged in MSE and microfinance related studies currently or in the past. Moreover, we will have continuous consultation sessions with these government officials from different government offices which are our target institutions.

During these sessions the team plans to introduce this research proposal and undertake discussions on simulation areas and variables, structures and design of the models (i.e both the econometrics and the CGE) and possible implications of the output. Besides, we will closely follow government policies and strategies to adjust our models and simulation. We strongly believe that this will allow policy makers and other concerned bodies to follow the progress of the study.

As part of our dissemination strategy, we will have meetings with experts from MSEs Development Agency, and experts on MSE related works from Ministry of Urban Development and Construction, Addis Ababa City Administration MSE section, Ministry of industry, Bureau of Works and Social Affairs, and Ministry of Women’s, Children and Youth Affairs. During these meetings, the team will be presenting the findings with major emphasis on the objective, methodology, and the policy recommendations of the study. We expect insights from these experts how to use the results of the study as an input for preparation of the next GTP plan and its strategies and policy formulations even in future.

During our discussion with few of government officials, we learnt that they are keen to review this kind of studies and use it as input in developing alternative strategy and even to supplement the next GTP plan. We strongly believe that the findings of this study will be asset for policy makers in allocation of resources for development of MSEs and to have clear understanding of the bottlenecks of the sector, design to solve factors that hinder MSEs growth; and maximize the contribution of the sector to reduce unemployment and poverty.

It is our belief and plan to work in consultation with policy makers in the course of the
study. The team has also plan to organize a workshop to present preliminary findings to policy makers and academicians at Ethiopian Development Research Institute (EDRI), to get their feedback and comments which we believe is invaluable to improve the quality and relevance of the work. We have also plan to present the paper during the EEA (Ethiopian Economics Association) annual international conference. From past experiences, this conference is well known for creating a platform where policy makers, academicians and practitioners are all gathering. As a result of this conference, we anticipate that our findings can be more widely disseminated and we will benefit from constructive comments and feedbacks from participants with different insights which will strengthen the paper. Besides as a strategy to reach the wider audience, we plan to publish the final paper on one of peer reviewed local or international journals.
6. **List of Team Members**

Indicating their age, sex, as well as relevant/prior training and experience in the issues and research techniques involved (start with team/project leader).

Note that PEP favors gender-balanced teams, composed of one senior (or experienced) researcher supervising a group of junior researchers, including at least 50% female researchers, all contributing substantively to the research project. PEP also seeks gender balance in team leaders and thus positively encourages female-led research teams. (Each listed member must post an up-to-date CV in their profile on the PEP website – refer to “How to submit a proposal”)

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Sex (M, F)</th>
<th>Training and Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ermias Engida</td>
<td>31</td>
<td>M</td>
<td>Holds M.Sc. in economics (Applied Trade Policy Analysis). He took his B.A in economics. He has taken several professional trainings on CGE modeling, GAMS software, and applied Micro econometrics by renowned professors with several years’ experience in teaching and research. He has extensive experience in macro-economic modeling. He has played vital role in the design of Ethiopia’s Growth and transformation plan employing CGE modeling and examined different aspects of the plan overtime including alternative financing options. He has also applied CGE modeling to examine agricultural productivity, public investment, role of livestock, and public services. He also applied CGE to examine alternative policy schemes and their implication to welfare. His areas of research are multi sectorial and goes beyond national boundaries as could</td>
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</table>
easily be seen from attached CV in detail. He is working as a research officer at International Food Policy Research Institute (Ethiopian Strategic Support Program) where he has produced several policy relevant papers independently and jointly with varied international researchers. As part of Ethiopia strategic Support program’s capacity building project he is advising several graduate and post graduate students with their thesis on CGE modeling. Before he joined IFPRI he used to teach at Arba Minch University where he lectured core departmental courses. He is fluent in English and Amharic languages.

<table>
<thead>
<tr>
<th><strong>Ibrahim Worku</strong></th>
<th>33</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Holds</strong> M.Sc. (Economic Policy Analysis) and B.Sc. in economics. He has also successfully completed training by the World Bank on “Impact Evaluation in Agriculture and Community Driven Development Program”. Economic policy analysis using GAMS and CGE Software. He works for International Food Policy Research Institute (Ethiopian Strategic Support Program and Ethiopian Development Research Institute) as research officer. In this capacity he has written and published several papers relevant for both the academia and to</td>
<td></td>
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</table>
inform policy. He has expert level skills in several statistical and econometric softwares including STATA, SPSS, and GAMS. He has extensive experience in coordinating large surveys. He also has proven experience in cleaning, analyzing, and publishing papers based on these massive datasets. Before he joined IFPRI, he was teaching as a lecturer and working on different projects as a researcher at Addis Ababa University, department of Economics. He also briefly took a research position at Ethiopian Development Research Institute (EDRI) where he collaborated with experienced researchers in several studies. He is fluent in English and Amharic languages.

| **Mekdim Dereje** | 33 | M | Holds M.Sc. (Finance and economic development) and B.Sc. in economics. He has successfully completed training in survey management and CSpro Data entry and processing application. He works for International Food Policy Research Institute (IFPRI). At IFPRI, he has, independently and jointly with colleagues, published in working papers and peer reviewed journals. He has also taken part in report writing, survey coordination, data management, analysis and presentation at conferences and seminars organized by government offices, research |
institutes and the academia. He has expert level skill in several statistical and econometric soft wares including STATA, SPSS, and GAMS. He has extensive experience in coordinating large surveys. He also has proven experience in cleaning, analysing, and publishing papers based on these massive datasets. Before he joined IFPRI he used to be a lecturer at Haramaya University, department of Economics where he participated both in research and teaching. He also worked as a research assistant in Copenhagen University, Denmark and chief economist in Wabekon Consult. He is fluent in English, Afan Oromo and Amharic languages.

**Feiruz Yimer**  
31 F 
Holds M.Sc. (Economic Policy Analysis) and B.Sc. in economics. She has also successfully completed training Economics policy analysis using CGE and GAMS software. She has also taken training on “Impact evaluation on agricultural and community driven development programs”; Training on leadership skills and training on GAMS/CGE –dynamic version. She works for International Food Policy Research Institute (Ethiopian Strategic Support Program and Ethiopian Development Research Institute) as research officer. In
this capacity she has written and published several papers relevant for both the academia and to inform policy. She has expert level skill in several statistical and econometric soft wares including STATA, SPSS, and GAMS. She also has proven experience in cleaning, analyzing, and publishing papers based on massive datasets. Before she joined IFPRI, she was teaching as a lecturer and working on different projects as a researcher at Addis Ababa University, department of Economics. She served as a coordinator of Gender office of Faculty of Business and Economics at Addis Ababa University. Addis Ababa, Ethiopia. She has also participated in several community development programs such as creating awareness to youth regarding HIV-AIDS and importance of women empowerment. She is fluent in English and Amharic languages.

<table>
<thead>
<tr>
<th>Saba Yifredew</th>
<th>31</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holds M.A. (Economics of International Trade), M.A (Economics) and B.Sc. in economics. She has also successfully completed training on Economics policy analysis using CGE and GAMS software; Training on leadership skills and training on GAMS/CGE –dynamic version. She is currently the head of the department of economics at Addis Ababa University. She</td>
<td></td>
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</table>
is also Academic Programs Unit Head of Addis Ababa University. She has independently and jointly with colleagues at Addis Ababa University and elsewhere written several research papers. She has extensive experience in report writing and communication with affiliate organizations.

7. Expected capacity building
Description of the research capacities that team members (and potentially their affiliated institutions) are expected to build through their participation in this project.
This is an important aspect in the evaluation of proposals and should be presented in some detail. What techniques, literature, theories, tools, etc. will the team and their institutions learn (acquire in practice) or deepen their knowledge of? How will these skills help team members in their career development? Also indicate which specific tasks each team member would carry out in executing the project.

The research team is composed of individuals with different specializations. For some of the team members this will be the first CGE type research (Mekdim and Ibrahim) while the experiences of the three remaining researchers ranges from more than 6 years (Ermias) to roughly 2 years (Saba and Feiruz). This, therefore, creates an excellent platform, particularly, for two new members to grasp the basics of CGE modeling. The team leader will devote reasonable amount of time introducing the different steps of CGE modeling including data compilation, model implementation, simulation and debugging to Mekdim and Ibrahim. On the other hand, Ibrahim and Mekdim are well acquainted with econometric techniques pertinent to establish the type of relationship we seek in this study including dichotomous data model estimation and instrumental methods (IV method). This would give an opportunity for Ermias and possibly Saba and Feiruz to learn rigorous econometric techniques. The team members would also hugely benefit from proved report writing experiences of Saba and data management skills of Feiruz. This varied, yet vital, skills will help the team to produce quality research while simultaneously equip members in their future research endeavor.
Below we present specific tasks each team member would carry out in executing the project:

<table>
<thead>
<tr>
<th>Name</th>
<th>Task/contributions</th>
</tr>
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<tbody>
<tr>
<td><strong>Ermias Engida</strong></td>
<td>He is the team leader. Overall responsible in coordination of activities. He serves as a focal person for meetings with government officials and MSEs leaders, and communicating proposal and research outputs of the team to all stake holders. He will also take active part in CGE modeling and mentoring of team members to develop capacity for future research.</td>
</tr>
<tr>
<td><strong>Ibrahim Worku</strong></td>
<td>Responsible to coordinate the sub-team that do econometric modeling. He will focus on running and testing the binary and IV regressions and establish the results with different sensitivity tests. He will also help the CGE team by producing elasticity estimates that would be used as inputs for the different simulation.</td>
</tr>
<tr>
<td><strong>Feiruz Yimer</strong></td>
<td>Will be coordinating the econometric work to estimate elasticity for the CGE part. She will be responsible to clean and make ready the data that is used in this estimation. She will also help in organizing and synthesizing pertinent literatures and to cross check the consistency of the result with other studies. She will also be responsible for writing the section on conceptual framework of the basic models.</td>
</tr>
<tr>
<td><strong>Mekdim Dereje</strong></td>
<td>Will mainly be working on the descriptive analysis of the study. He will produce tables and graphs on key variables to complement the econometric modeling. Together with Feiruz, he will also take active part in literature review.</td>
</tr>
<tr>
<td><strong>Saba Yifredew</strong></td>
<td>While taking active part both in CGE and econometric modeling, she will be coordinating the report writing. She will ensure coherence between the different sections of the report. Her extensive experience in this regard will also be essential for other team members to share her experience as to how to effectively develop our future research work.</td>
</tr>
</tbody>
</table>
### 8. List of past, current or pending projects in related areas involving team members

Name of funding institution, title of project, list of team members involved

<table>
<thead>
<tr>
<th>Name of funding institution</th>
<th>Title of project</th>
<th>Team members involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>ReSAKSS-ECA</td>
<td>Role of livestock in the Kenyan Economy: Policy Analysis using Dynamic CGE model for Kenya</td>
<td>Ermias Engida</td>
</tr>
<tr>
<td>PEP</td>
<td>Alternative Policy Strategy to ADLI for Ethiopia: A Dynamic CGE Framework Analysis</td>
<td>Ermias Engida</td>
</tr>
<tr>
<td>IFPRI</td>
<td>Ethiopia’s Growth and Transformation Plan: A CGE Analysis of Alternative Financing Options</td>
<td>Ermias Engida</td>
</tr>
<tr>
<td>Ethio-Telecom</td>
<td>Three rounds of Customer satisfaction survey</td>
<td>Saba Yifredew</td>
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<tr>
<td>World Bank</td>
<td>Responsiveness of Rural Households to cereal Price Changes</td>
<td>Saba Yifredew</td>
</tr>
<tr>
<td>DFID</td>
<td>Exploring Demand and supply factors behind recent cereal prices</td>
<td>Saba Yifredew</td>
</tr>
<tr>
<td>Ethiopian Development Research Institute</td>
<td>Inflation-Growth nexus- Estimation of Inflation threshold for Ethiopia</td>
<td>Saba yifredew</td>
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<tr>
<td>Ethiopian Development Research Institute</td>
<td>Cereal Consumption and Demand Patterns in Urban Ethiopia</td>
<td>Saba Yifredew</td>
</tr>
<tr>
<td>Ethiopian Development Research Institute</td>
<td>Road Sector Development and Economic Growth in Ethiopia</td>
<td>Ibrahim Worku</td>
</tr>
</tbody>
</table>

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

Nothing worth mentioning at least at this stage.
References and plagiarism:

Applicants should also be very careful to avoid any appearance of plagiarism. Any text that is borrowed from another source should be carefully contained between quotation marks with a reference to the source (including page number) immediately following the quotation. It is essential that we be able to distinguish what you have written yourself from what you have borrowed from elsewhere.

Note also that copying large extracts (such as several paragraphs) from other texts is not a good practice, and is usually unacceptable. For a fuller description of plagiarism, please refer, for example, to the following website:

- [http://writing.yalecollege.yale.edu/advice-students/using-sources/understanding-and-avoiding-plagiarism](http://writing.yalecollege.yale.edu/advice-students/using-sources/understanding-and-avoiding-plagiarism)

PEP will be using a software program to detect cases of plagiarism.


Bekele E. & Muchie M, 2009: Promoting micro, small and medium Enterprises (MSMEs) for sustainable rural Livelihood Development, Innovation and International Political Economy Research (DIIPER); Aalborg University, Denmark; DIIPER Research Series; Working Paper No. 11


Kinyondo G. and Margaret M. (2009). The general equilibrium effects of a productivity increase on the economy and gender in South Africa. Department of Economics, University of Pretoria


Robu M., 2013: The dynamic and importance of SMEs in economy


Appendix
Comments on presentation
The major bottlenecks of Micro and Small Scale Enterprises’ growth and alternative strategies in Ethiopia: Econometric and CGE analysis. (MPIA-12849)
By Ermias Engida, Mekdim Dereje, Ibrahim Worku, Saba Yifredew and Feiruz Yimer.

Reflections for comments from reviewers

For the 1st comment by Sothy Ear
“This research mainly simulate the impact of the MSE on the economy such as the factor market. And, it is proposed to use the dynamic model. I wonder how you are going to tackle the growth of the MSE, when they reach the Medium or Large enterprises. Then, the impact of MSE is not clear if it is from MSE or Medium or large enterprises.”

Our dynamic model will be run for 5 years period. We will look at the effect of external interventions from the government side when the firms were at the MSE level. The firms may grow during this period as a result of the interventions. That’s what is expected and we want to study. But what matters is the level of growth of the enterprises at the beginning point, which is micro and small.

For the 1st comment by Tabitha Mwangi
“…..The design of the research with the econometric informing the CGE is good. However, on the econometric model the 'regime change variable based on the firms age that extends for more than 40 years on RHS could be correlated to firm's age on LHS. The test of internal validity will check this, maybe. The team could check on this.”

The left hand side (LHS) variable of equation 3 is the average annual growth of firms’ capital. It is, therefore, computed as the difference between final and initial capital divided by the age of firms. The ‘age of firms’ variable used here is a continuous variable indicating the number of years since the firm commenced operation. On the other hand, the ‘regime change variable’ we will be using on the right hand side (RHS) is a dummy that assumes a value of zero for periods before the regime change in 1992 and 1 for periods afterwards. This is helpful to serve as a summarized indicator of the changes that happened with the regime change. Hence, we don’t expect to see abnormal correlation between these two variables. Nevertheless, we will run different internal validity tests to make sure that our econometric regression does not suffer
from any of such problems.

**For the 2nd comment by Tabitha Mwangi**

“The rationale to simulate training does not come out well in the model. I think is an alternative strategy but you could add a few studies that have done same as well as (my thoughts) stats on proposed/projected increases in training funds/needs for the country.”

We will run econometric estimation for the elasticity of public fund for training and labour productivity. However the mechanism set to model public spending on training is subject to revisions based on literature throughout the project period. We will look for the best strategy.

**For the 2nd comment by Sothy Ear**

“….In your econometric model, the determinants of the firm growth is mainly the internal factors such as the firm age, training, etc. In firm theory as well as in reality, the determinants factors of firm growth is not only about the internal factor but also the external factor, i.e. the business environment such as the electricity cost, cost of business registration, etc (you may see the doing business website of the IFC to find the data on these factors).

Instrumental variables selection is controversial in any econometrics model. You may need to do more literature to choose the appropriate IV for your regression.”

The suggestion to use external factors that could potentially affect firms’ growth together with the internal factors is quite helpful. We would also like to commend the suggestion to use the doing business website of the International Finance Corporation (IFC) for this purpose. Unfortunately, the data obtainable from this website could not be used in a regression framework as these are not disaggregated at regional or zonal levels. We will, however, try to include particularly variables indicating quality of infrastructure (road quality, travel time to the major towns, etc.); access to electricity; access to tap water; radio and mobile signals from national surveys to account for external factors.
As acknowledged before, we anticipate that our econometric regression might suffer from endogeniety problem. Two of the susceptible variables are the initial capital and training (or capacity building programs offered to firms). To address this problem, among other things, we intend to use instrumental variable (IV) method. Though the validity and appropriateness of selected instruments will be determined while actually running the regressions, we elect to use access to credit during start up as a potential instrument for initial capital while road quality and travel time to major cities as potential instruments for training. We are also doing more researching of the literature to choose other pertinent instruments.

**For the 3rd comment by Sothy Ear**

“I'm not sure if you are going to use the coefficient estimated from the regression in the CGE model. If it is the case you need to be more cautious as you may get the unexpected sign of the coefficient. Or you may want to do it separately as it could be the complement result of the CGE model.”

The set-up of our analysis is that we have both the econometric and CGE analysis. Using firm level data of 3,000 Micro and Small Enterprises (MSEs) and employing Tobit-2SLS estimation, we seek to determine the major constraints that affect the growth of MSEs in the country. We will apply a CGE model calibrated on the recently updated SAM for Ethiopia to assess the role of MSEs to reduce unemployment and poverty. Though we are going to use the econometric and CGE analysis for separate objectives, they will be interlinked when we estimate rate of growth of labor productivity in the MSEs sector as a result of public investment in training for the operators to be used in the CGE part.

**For the comment by Akhilesh Kumar Sharma**

“Issues of formal and informal SMEs need more clarification.”

There is no universally accepted definition of informal MSEs. We, therefore, adopt the working definition used by Central Statistical Authority (CSA) of Ethiopia in this study. CSA characterizes informal enterprises as enterprises that are small scale (less than 10 persons); operate without license and paying taxes (CSA, 2003). The 2003 CSA urban informal sector survey shows that the informal sector operators contribute to more than 50% of the urban employment. In the MUDC survey we are using, this share of informal MSEs is about 31%. Though we don't have a variable that clearly identifies whether a firm is informal or not in our data to be able to use it in a
regression, the CGE model will try to account for this by using shares of this kind of enterprises.

**Reflections for comments from PEP resource persons**

1. **The sector, MSE is not described at all.**
   
   We now include a concise description of the MSEs in Africa and in Ethiopia as well.

2. **Will your research include the informal sector?**
   
   In MSE activities informal sector has played a significant role. This is true also in Ethiopia. However our study doesn't explicitly include the informal sector because there is only labour data we have already got and we know that it is hard to get complete information on the informal sector. So it will be a lot of work if we try to cover the informal sector too. However, we will try to consider the sector implicitly when splitting the industry and service accounts into MSE and Non-MSE. We can take employment share of the sector into consideration for instance. So logically share of the MSE line will be the formal MSE and the informal MSEs.

3. **How are you going to model the production function?**
   
   We will have two production lines, MSE and non-MSE, in the manufacturing, construction, trade and hotel and restaurant activities. The two will follow two different production technologies to produce an output. We will use a CES functional structure to supply a single product composite of the two products from the two production lines. Thus a commodity is a product of two production lines; produced by the MSEs and other one produced by the Non-MSEs. For the time being we are assuming the products from the two production lines are considered as substitutes but not perfect.

4. **How are you going to direct sector specific public spending (investment) to the particular sector only? You cannot decide on private investment to go together to that particular sector without their motivation.**
   
   We dropped this one and go for a better strategy to address the issue. To begin with we wanted to model government’s financial support to the MSEs in the form of loan. We were thinking of modeling this through endogenous capital growth by
investing more money to that particular sector by the government. That was why we intend to make some kind of modification on the model to make it channel that sector specific investment from the government reach the intended target without being distributed to other sectors/activities. But now we decided to go for modelling the provision of the loan through exogenous capital growth for MSEs’ which is straight forward. We will calculate the average annual capital growth rate for MSEs from the survey data. Then we will make MSEs’ capital to grow by that growth rate alike the other sectors.

5. How are you going to link labor income to the different households?

1st. We will split the manufacturing sector activities and construction, trade and hotel and restaurant into MSE and Non-MSE using the two manufacturing sector survey data; small scale and cottage survey data and large and medium scale manufacturing and electricity survey data. For the non-manufacturing activities we have no other data source so we will rely on information for the manufacturing sector. We will search for any better data source for the non-manufacturing activities.

Using the two datasets we can get value added share of factors of production (i.e labour and capital share) from the two sources (MSE and Non-MSE) which will be used to split value added in each activity into MSE and Non-MSE. We will also use output share of the two sources from the two data sets in order to split the intermediate inputs and output of the manufacturing sector and the non-manufacturing as well.

2nd. We will then use gender composition in every sector using the two data sets for the manufacturing and the non-manufacturing sectors and agriculture sample survey data for the agriculture sector. We will calculate the share of male and female and split the labor force in each activity. We will take this disaggregation to the level of operation (MSE and Non-MSE) in the case of the manufacturing sector. Thus we will use the same datasets to split the labor force into male and female in both MSE and Non-MSE in the manufacturing and the non-manufacturing sectors.
After disaggregation of the activities and the labor force, now we need to set a specification for households’ income sources. The Non-MSE households are assumed to continue with the original set up which was already there in the SAM. But MSE households will get their income from factors that are employed in the MSE sector and for non-factor income, they will follow the income pattern of urban poor households in our original SAM. We also assume MSE households can get some portion of their income from factors employed in the Non-MSE activities. We can use income levels for household members (including household head) and the source of income reported in the HICES data. The source of income gives us the list of activities the household members engaged in to get that particular income. Thus we will use household members’ level of income from different activities and calculate the share of each source (or activity) and get the major one. Then for rural households we will take the shares and set up the pattern of income sources and the households’ income from male/female labor. For urban households, we will use the same analogy and because we couldn’t get any other means to disaggregate the households in the microsimulation into MSE and Non-MSE, we intend to use the share of income sources to get the major activity from which the household is getting its total income. If this major activity is either manufacturing, construction, trade or hotel and restaurant for urban household we will consider that household as MSE. We know that this is a crude conclusion which includes households that are actually Non-MSE into MSE. Thus to exclude those households that are actually not engaged in MSEs, the labour value added share of MSEs in these activities will be used to multiply the rate of change in household’s consumption which will be used in the microsimulation part. This will be one contribution of our study to the literature even if it needs more work to polish the mechanism.