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Econometric assessment of the effect of Small and medium enterprises on economic development (The ase of Azerbaijan)

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Abstract. It is important to understand the effect of Small and medium enterprises (hereinafter-called SME) on economic development and to find out whether International Organizations' policy recommendations are "Kicking Away the Ladder" policies or not. Therefore, in this study, we seek to evaluate the causal effect of SME's on growth of 11 different sectors (as suggested by IMF) of economy. To this end, we started with a simple regression model to check whether there is a positive association between SMEs and economic growth at all. The toy regression model we employed was based on the regression of sectoral per capita GDP on the SME growth variable (measured by the labor employed by SMEs in each sector). Furthermore, we checked the robustness of such positive association in different environments determined by the fixed and random effects assumptions and interestingly, we obtained statistically significant positive association no matter which assumption about fixed and random effects were made.

The data used in this study are obtained from the website of the State Statistical Committee of the Republic of Azerbaijan ("The State Statistical Committee of the Republic of Azerbaijan," 2019). We did initial data cleaning and transformations to make the data serve our purposes and these manipulations are given in the paper. The interesting side of the paper is it uses panel data to reveal the relationship of SMEs and growth.

Эконометрическая оценка влияния малых и средних предприятий на экономическое развитие (ASE Азербайджана)

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Аннотация. Важно понять влияние малых и средних предприятий (далее-МСП) на экономическое развитие и выяснить, являются ли политические рекомендации международных организаций политикой "отбрасыванием лестницы" или нет. С этой целью мы начали с простой регрессионнойй модели, чтобы проверить, есть ли положительная связь между МСП и экономическим ростом вообще. Использованная нами модель регрессии игрушек была основана на регрессии отраслевого ВВП на душу населения напеременную роста МСП (измеряемую рабочей силой, занятой МСП в каждом секторе). Кроме того, мы проверили устойчивость такой положительной ассоциации в различных средах, определенных предположениями фиксированных и случайных эффектов, и, что интересно, мы получили статистически значимую положительную ассоциацию независимо от того, какое предположение о фиксированных и случайных эффектах было сделано.

Данные, используемые в данном исследовании, получены с веб-сайта Государственного статистического комитета Азербайджанской Республики ("Государственный статистический комитет Азербайджанской Республики", 2019). Мы провели первоначальную очистку и преобразование данных, чтобы данные служили нашим целям, и эти манипуляции приведены в статье. Интересной стороной статьи является использование панельных данных для выявления взаимосвязи между МСП и ростом.

To the best of our knowledge, no paper has employed macroeconomic panel data to assess the effect of SMEs on each sector of a single country so far. To this end, we use Arellano-Bond estimator which is also called Generalized Method of Moments Instrumental Variable estimator. The essence of this methodology is that current values of the dependent variable cannot have a causal impact on the past values of the endogenous regressors (Arellano and Bond, 1991). Relying on this fact, we construct instruments for possible endogenous SME growth variable using its own past values. After filtering out the variation (noise) in SME growth variable in current period which is not associated with its own lagged values we hope that there will not be any signal left in the predicted values of SME growth variable which can be affected by current period GDP contemporaneously. After doing so, we believe that any positive regression coefficient obtained is purely due to causality flowing from SME growth to GDP and not vice versa. Moreover, we use three different fixed effects model for robustness check purposes and find that the relationship between SME growth variable and GDP in each sector stays positive and statistically significant which makes our results more convincing.

Keywords: SME, GDP growth, econometric assessment, Azerbaijan.

Насколько нам известно, до сих пор ни в одном документе не использовались данные макроэкономических групп для оценки воздействия МСП на каждый сектор отдельно взятой страны. С этой целью мы используем оценку Ареллано-Бонда, которая также называется «Обобщенным методом оценки инструментальных переменных моментов». Суть этой методологии заключается в том, что текущие значения зависимой переменной не могут оказывать причинного влияния на прошлые значения эндогенных регрессоров (Arellano and Bond, 1991). Опираясь на этот факт, мы создаем инструменты для возможной эндогенной переменной роста МСП, используя ее собственные прошлые значения. После фильтрации изменения (шума) в переменной роста МСП в текущем периоде, которая не связана с ее собственными отстающими значениями, мы надеемся, что в прогнозируемых значениях переменной роста МСП не останется никакого сигнала, на который одновременно может повлиять ВВП текущего периода. После этого мы полагаем, что любой полученный положительный коэффициент регрессии обусловлен исключительно причинно-следственной связью между ростом МСП к ВВП, а не наоборот. Кроме того, мы используем три различные модели фиксированных эффектов для проверки надежности и считаем, что взаимосвязь между переменной роста МСП и ВВП в каждом секторе остается положительной и статистически значимой, что делает наши результаты более убедительными.

Ключевые слова: МСП, рост ВВП, эконометрическая оценка, Азербайджан.

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I. Introduction

International organizations interested in stimulating economic growth in developing countries believe that there is certain type of firms usually called small and medium Enterprises, which are drivers of economic growth in any country. Moreover, those organizations have three main arguments about the channels of growth transmission: 1) SMEs boost competition and entrepreneurship and as a result, country take advantage of public externalities such as innovation, economy-wide efficiency and aggregate productivity growth; 2) SME proponents usually believe that SMEs are more efficient than large firms. However, access of SMEs to financial instruments is limited and therefore, local governments can achieve higher efficiency and growth by providing access of SMEs to financial means. 3) SMEs are more labor intensive than large firms and therefore, helping SMEs in their access to financial instruments can be a good measure to alleviate poverty in developing countries (Beck et al., 2005).

However, some authors challenge these so-called pro-SME arguments. Almost all three above mentioned core arguments are challenged in the literature. For example, Pagano and Schivardi (2003) show that firm size is positively correlated with the growth, and larger firms have better opportunities to contribute to growth of a certain sector via influencing R&D in a certain sector. Moreover, the sizes of firms in different sectors of different countries are not exogenously defined rather they are determined by the comparative advantage and other country and sector specific factors (Kumar et al., 2001). Briefly, there is no a uniform view about the effect of SMEs on growth. The topic itself is subject of a big debate and this is particularly important for a developing country like Azerbaijan to know the possible effects of SMEs on economic growth and adjust its policies accordingly.

Indeed, Azerbaijani government has spent many resources to enhance SME sector since 2000s.

According to "Doing Business 2009" report of the World Bank Azerbaijan was the first in the ranking of 10 best reformer countries because of its achievements in 7 out of 10 performance indicators. As a result of legislative and institutional reforms which improved the investment environment Azerbaijan moved from 97th to 33rd place in ranking of countries on the ease of doing business in 2009 (*Doing Business 2009 — World Bank Group*, 2009).

The contribution of SMEs to overall economy is higher and the share of the latter in different sectors is more balanced in developed countries compared to developing countries (Bayramov et al., 2017).

Interestingly, a simple comparison of Azerbaijani SMEs to those of other CIS countries which Azerbaijan shares historical, geographical and political proximity also reveals drastic differences. For example, SME contribution to GDP is 58% in the Ukraine, 43% in Georgia and 42% in Armenia, respectively. However, this figure is only 4% in case of Azerbaijani economy which is probably due to oil exports (Bayramov et al., 2017).

Another interesting comparison is the SME dynamics in Azerbaijan and in the countries of Eastern Partnership. Figure 1 shows indices of institutional and regulatory framework for SME policy implementation in different Eastern Partnership countries from 2012 to 2016. As the Figure suggests Azerbaijan has improved its ranking from 1.95 to 2.47 throughout the mentioned period while other countries have not made significant improvements compared to Azerbaijan ("SME Policy Index: Eastern Partner Countries 2016 | READ online," n.d.).

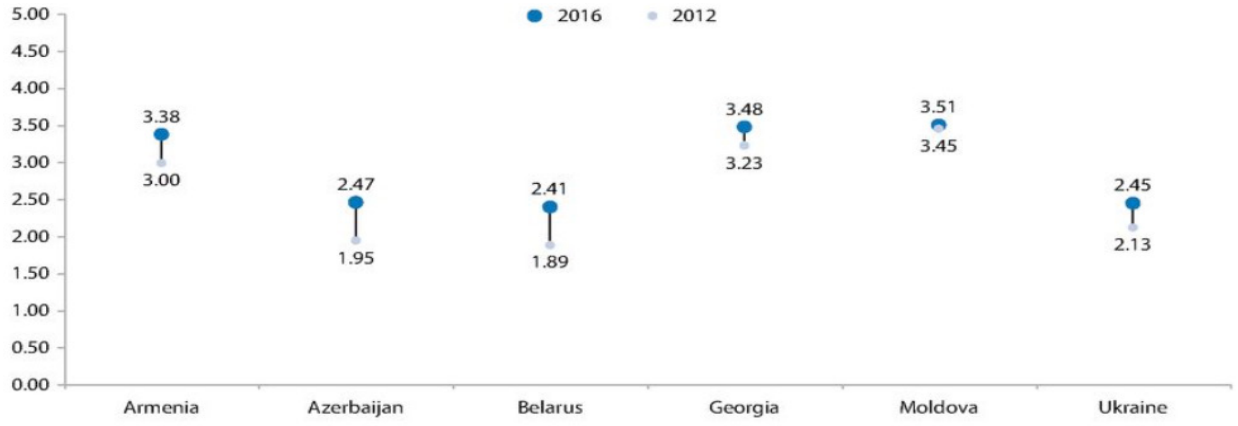

Figure 1. SME Policy Index for Eastern Partner Countries for 2016
Source: ("SME Policy Index: Eastern Partner Countries 2016 | READ online," n.d.)

As the presented evidence so far suggests Azerbaijan has spent significant resources to develop SME sector and in fact it has had many achievements in this sphere. However, the contribution of SMEs to GDP of Azerbaijan is very small and the natural question is to ask whether it is worth to spend efforts to development of SME sector any more. Moreover, the far from uniform distribution of SMEs across different sectors another stylized fact that draws attention. Therefore, the aim of this paper is to evaluate the effect of SME development and growth relationship in different sectors of Azerbaijani economy. Particularly, the focus of this research is to elucidate whether efforts of the government directed to boost SME performance is a meaningful way of achieving economic growth. The novelty of this paper is comprised in the assessment of SME and Economic growth relationship in the context of different sectors of Azerbaijani economy and there is hardly any research taking such an approach and particularly aiming Azerbaijan.

II. Literature Review

SME — economic growth relationship is a centerpiece of both public and scientific debates. There are two mainstream theories about the role of SMEs in economic development: classical and modern. According to classical theory of SMEs which is mainly due to the works of Hoselitz (1959), Fisher (1967) and Anderson (1982) countries should support large enterprises with a bright future instead of focusing on small ones because in the course of economic development large companies will predominate (Brako, 2014). On the other hand, the modern theory of SMEs mainly due to efforts of Berry and Mazumdar (1991) and Levy and Powell (1998) emphasize the significant role of SMEs in economic development relying on the stylized facts from European and other developed countries (Tambunan, 2014).

In general, as it was mentioned previously the proponents of the pro-SME policies rely on three core arguments: i) SMEs are more efficient than large firms; ii)

SMEs boost competition which in turn, leads to higher efficiency, innovations and higher overall productivity; iii) SMEs are more labor intensive compared to large companies and therefore, supporting SMEs can be seen as a good measure of alleviating poverty (Beck et al., 2005). There are enough number of studies supporting the positive relationship between SME development and economic growth. For example, Obi et al., (2018) conduct a research to elucidate the effects of SMEs on job creation, poverty alleviation and improvement of standard of living and find statistically significant impact while testing all three hypotheses. The authors rely on survey data obtained from different states of Nigeria. The study emphasizes the significance of SMEs particularly for developing economies in transition. Moreover, Tahir et al. (2018) use panel data for different sectors of Malaysian economy comprising the period from 2005 to 2016 and find that SMEs are statistically significant drivers of the economy and their contribution is on average 32% per 1% of SME development. Furthermore, Brako (2014) finds the positive contribution of SMEs to job creation, income generation and distribution. Besides, it seems that classical theories of SMEs are currently less supported because most of the international aid organizations have been helping SMEs to boost economic development in the Third World countries. It is a known fact that 80% of World Bank programs are directed to SME finance and 20% is aiming institutions assisting SMEs in different ways (Tambunan, 2014; "World Bank Group," 2013). However, the support to classical theories is growing in the empirical literature. The opponents of pro-SME policies mainly rely on the following 4 arguments (Beck et al., 2005):

1) SMEs cannot be more efficient than large enterprises because the former cannot take advantage of so called "economies of scale". On the other hand, large enterprises can effectively reduce their average costs and finance research and development (R&D) projects. For example, Pagano and Schivardi (2003) find robust positive relationship between firm size and economic growth while studying the sectoral distribution of firs size for a set of European economics. The authors argue that larger size of firms foster their productivity because of increasing returns from research and development activities which obviously cannot be undertaken by SMEs;

2) The second skeptical view argues that SMEs are not more labor intensive and better job creators compared to large enterprises. For example, Snodgrass and Biggs (1996) relying on cross sectional study find no significant association between the scale of operation and labor intensity and productivity. They argue that as a country develops the average plant size in manufacturing industry rises and the contribution of SMEs falls significantly. They further argue that 60 percent of manufacturing employment comes from large plants rather than small ones except in deviant cases like Japan and Italy (Snodgrass and Biggs, 1996);

3) Another skepticism is about exogeneity of the size of enterprises to economic growth. Optimal firm size is determined by policies, institutions, natural resource endowments, the level of technological knowledge and many other factors. For example, Azerbaijan is endowed with vast petroleum and gas resources and considering capital intensity of the petroleum industry and the current SME definition set forth by Azerbaijani legislation there is hardly any small enterprise operating in the sector in question;

4) The last category of counter SME arguments stress the importance of enhancing general business environment facing all firms rather than focusing on the former. For example, Edmiston (2007) stresses that the best policy recommendation for policy makers regarding SMEs is creating fertile environment for all business, both small and big, and letting the market to decide the optimal size of the enterprise.

After careful inspection of up to date literature we have identified several reasons for the difficulty of isolating the effect of SMEs on economic growth and for the variety of opinions about the matter. The major challenge facing authors in determining the impact of SMEs on economic growth lies in endogeneity of SME growth. The most prevalent methodology to cure this problem is using instrumental variable regressions which have different variations (Angrist and Pischke, 2009; Brooks, 2008; Gujarati, 2014; Wooldridge, 2012). The second issue is the difference of SME definition in different countries. Gibson (2001) mentions 3 critical issues in universal definition and categorization of SMEs. Firstly, he mentions that the discrepancy between the SME definitions of member states and that of international aid agencies may hinder an effective access of the latter to financial instruments. Interestingly, the SME definition of the World Bank group, EBRD, ADB, UN and that of different countries are totally different from each other. This fact not only creates an impediment to effective access of SMEs to financial instruments but also creates problems for researchers focusing on cross-country SME analysis. For example, Beck et al. (2005) while assessing the importance of SMEs on economic growth in the context of cross-country data impose an artificial cutoff of 250 employees for SME definition. This self-selected cutoff cannot serve as an efficient measure for the analysis because SME sector receives financial and other types of support from local governments based on the definitions of the local governments. Under these circumstances, the results of studies based on self-selected SME250 definition will not provide an efficient assessment of SME — growth

nexus because that measure will underestimate the SME sector in some countries and overestimate in others. Therefore, we believe that the results of such studies (which use SME250 index) are flawed and because of the latter, they usually find insignificant causal relationship between SME and economic growth. This fact actually was pointed out in Levine and Zervos (1993) who mention that the conclusions drawn about policy and growth relationships from cross-country regressions are actually invalid because of huge differences among countries. To put it in simple terms countries are so much different that treating them as being drawn from the same population is a very strong assumption. The second issue raised by Gibson (2001) is about using employee number as a main rationale behind SME definition. He argues that using turnover would be a more relevant tool for such a definition. However, we strongly disagree to the author at this point and support the view that number of employees is a good tool both for the definition of SMEs and for measuring their growth rate because SMEs — as the name suggests — possess little capital and their production is usually based on labor. The last crucial point put forth by the author is the uniform definition of SMEs by international aid agencies such as World Bank imposed on all countries regardless of their level of development. The author argues that such definitions should be a function of each country's macroeconomic variables such as GDP. We agree with the author in this issue but find it unnecessary to elaborate on this issue because that is away from the scope of our analysis.

III. Data and Methodology

Pursuing research about Azerbaijan is quite difficult. The first problem arises from the fact that Azerbaijan is a transition economy and it has no a long history as an independent state. Therefore, economic and financial time series is short and low quality. However, as the country's collaboration with International Organizations is growing the Statistical Committee improves its data quality and range. This fact has also been documented in country specific reports of different organizations few of which have already been mentioned. The short time series of SME sector and growth rate of GDP leaves no room for a usual time series regression of GDP growth on SME dynamics. Therefore, this research relies on panel data of different sectors of economy covering 2010-2015 years period. Moreover, the data for the research are not readily available and we have to do some transformations to get the useful for our objective information.

Before moving to causal relationship between SME and GDP growth we would like to show whether any statistically significant positive association is present between the two. To that end, we employ different versions of the following regression equation:

$$\log(gpdshare_{it}) = \beta_i * \log(SMELABORSHARE_{it}) + \Gamma_i * \text{sector}_i + \Omega_i * X_{it} + H_i * time_t + \epsilon_{it} \quad (1)$$

where $\log(gdpshare_{it})$ is logarithm of share of the sectors i's output in per capita Gross Domestic Product at time t, $\log(smelabor share_{it})$ is logarithm of the share of labor force employed by SME's in sector i normalized by the total labor force, sector_i is a dummy for each sector, X_{it} is the set of observables specific to each sector i at time t, time_t is a dummy variable for time periods and ϵ_{it} is the error term. Basically, we are in search of the consistent estimators of the coefficient matrices of β, Γ, Ω and H.

Using labor share of SME's is a vastly employed proxy in the literature for the SME development (Beck et al., 2005). It makes an intuitive sense because SMEs are more labor intensive, and capital hardly plays a role in their growth. Moreover, growth rate of per capita GDP is used as a measure of productivity growth.

Having both left- and right-hand side variables specified we would like to move on to analyze whether statistically significant positive association between SME and economic growth is present. If the coefficient of $log(smelaborshare_{it})$ variable is positive and statistically significant this will mean that there is a positive association between SME and economic growth (Note that $log(smelaborshare_{it})$ and $LSME_{it}$ are equivalent and two names of the same variable and the latter is used for convenience across the dissertation).

To check whether the significant positive association is invariant under different regimes we run two-way, period and cross-section regressions both with fixed and random effects model the results of which are summarized in Figure 2.

In addition, the analysis of Figure 2 confirms the fact the positive association between SME development and GDP growth is established by our analysis even under minor departures from our baseline specification. Obviously, the coefficient of the $LSME_{it}$ variable is positive and statistically significant under all alternative regimes and it means that there is a statistically significant positive association between SME and growth. However, as mentioned in the literature this positive association does not mean causality simply because SME's may employ more people as the country develops. This kind of mere correlations does not mean causality in true sense and the regression equations run using such data is called "spurious regression" (Brooks,

2008). There are examples of set of variables which are unrelated in reality but are in high spurious correlation (For interesting examples see: ("15 Insane Things That Correlate With Each Other," n.d.)).

Having all the above mentioned said, our main task becomes to cure this endogeneity bias and check the causal effect of each sector with the growth. A natural idea would be to use DIF-IN-DIF type estimators to check the effect of SME subsidy programs on the growth of the "treated SME's" ("Difference-in-Difference Estimation | Columbia University Mailman School of Public Health," n.d.).

Matching on observables may be a natural idea to check the effect of those programs (Angrist and Pischke, 2009). However, the main problem is that the treatment is gradual such that some firms got treatment at time t and some of them at t+1 and some did not get any treatment at all. Another identification strategy may be using Instrumental Variable approach (Angrist and Pischke, 2009; Stock, n.d.). There are several Articles where ethnic fractionalization and dummies for transition were used as an instrument for SME development (Beck et al., 2005). However, we cannot employ that approach because we are specifically dealing with the different sectors of one country.

	Sector Fixed Effects	**Period Fixed Effects**	**Sector and Period Fixed Effects**	**Sector Random Effects**	**Period Random Effects**	**Period and Sector Random Effects**
LSME coefficient	0.274***	0.614***	0.169*	0.316***	0.613***	0.244***
Standard deviation	0.069	0.075	0.067	0.065	0.075	0.064
T-Statistic	3.992	8.145	2.529	4.890	8.217	3.839

**** and ** correspond to the significance levels of 1% and 5%, respectively.*

LSME coefficient *shows the percentage increase in the sectoral per capita GDP when SME development in a specific sector increases by 1%*

Standart Deviation *— the typical deviation of the LSME coefficient*

T-statistic *is obtained by dividing the LSME coefficient by its respective standard error and according to the rule of thumb" we reject the null hypotheses of insignificant LSME coefficient if the obtained t-value is greater than 2 in absolute value*

Figure 2. Estimation results of the regression (1) under different fixed- and random-effects assumptions

As it was mentioned previously, datasets related to Azerbaijan is very hard to obtain and unfortunately, the time series about the field of interest of the dissertation is very short. Therefore, finding an appropriate instrument list for endogenous variable is very difficult. The natural idea under these circumstances is to use lags of the endogenous variable as an instrument relying on GMM (Generalized Method of Moments) method (Arellano and Bond, 1991; Douglas et al., 1988). This approach is specifically useful when the number of cross-sections is quite larger than the number of time periods as in the analysis in question (Arellano and Bond, 1991). Figure 3 describes the summary of the estimation of the coefficient of interest under different set of assumptions.

The intuition behind the GMM-IV approach lies in the fact that the pre-determined lags of the endogenous variable has an impact to current realizations of the endogenous variable, but the dependent variable's current realization cannot have an impact on previous values of the regressor. By projecting the current realization of the endogenous regressor on its past values we hope to filter out the noise in the current values of the endogenous variable that is not associated with the past values and then the obtained fitted values of the endogenous variable are used as a regressor in the primary regression instead of the actual realization of the latter. By doing this we hope to deter the reverse causality issue arising under circumstances when both dependent and independent variables have effects on each other (Arellano and Bond, 1991).

According to Figure 3 even small departures from the baseline fixed effects model does not change the statistically significant effect of SME development on GDP. In all three alternative GMM-IV models we obtain statistically significant coefficients of SME, and robustness of results to alternative specifications makes the estimated coefficients more convincing.

	Two-way GMM	Cross-Section Fixed Effects	Period Fixed Effects
LSME Coefficient	0.1881580938***	0.3268661391***	0.6136511576***
Standard Error	0.06758956106	0.01741495654	0.199350442
T-statistic	2.78383364	18.76927676	3.078253309
P-value	0.00761199351	2.510142903e-25	0.00315728621

**** and ** correspond to the significance levels of 1% and 5%, respectively.*

LSME coefficient *shows the percentage increase in the sectoral per capita GDP when SME development in a specific sector increases by 1%*

Standart Deviation *— the typical deviation of the LSME coefficient*

T-statistic *is obtained by dividing the LSME coefficient by its respective standard error and according to the rule of thumb" we reject the null hypotheses of insignificant LSME coefficient if the obtained t-value is greater than 2 in absolute value*

Figure 3. Summary of the estimation of LSME coefficient with GMM-IV under different assumptions

Conclusion

We tried to evaluate the causal effect of SME's on growth of 11 different sectors (as suggested by IMF) of economy. To this end, we started with a simple model to check whether there is a positive association between SMEs and economic growth at all. The toy regression model we employed was based on the regression of sectoral per capita GDP on the SME growth variable (measured by the labor employed by SMEs in each sector). Furthermore, we checked the robustness of such positive association in different environments determined by the fixed and random effects assumptions and interestingly, we obtained statistically significant positive association no matter which assumption about fixed and random effects were made.

The interesting side of the paper is it uses panel data to reveal the relationship of SMEs and growth. To the best of our knowledge, no paper has employed macroeconomic panel data to assess the effect of SMEs on each sector of a single country so far. To this end, we used Arellano-Bond estimator which is also called Generalized Method of Moments Instrumental Variable estimator.

Last but not the least, we identified several problems in SME support policies of the government and came up with policy recommendations. Firstly, we believe that building a reliable and comprehensive database about SMEs is key to the assessment of success of SME sector and policies directed to its development. Secondly, we believe that it is more important for the policy-makers to liberalize financial sector and pursue policies directed to bank interest rate reductions rather than to subsidize SMEs' access to financial instruments artificially because the first policy concerns not only SMEs but all types of businesses. Thirdly, insufficient competition in goods and services market is another important challenge facing SMEs. We recommend establishing an independent from the government body as in EU and the US and in many other developed countries obliged to sustain competitive environment, to reveal and deter unfair practices and provide free entry and exit to both financial and goods market. Fourthly, given the positive effects of SMEs on economic growth and the vast agricultural resources of the country higher number of SMEs should be involved in this sector. As research suggests clusters can play a significant role in regional development, competitiveness and innovation and particularly, in the context of globalization clusters should be supported as an innovative model of rural communities (Brasier et al., 2007).

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