The Birth of Entrepreneurship in the Developing World

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We study the the birth of non farming enterprise in the developing world. We test if such activities are led by skills or are an ex-post income smoothing device for uninsured households. We find that farmers become entrepreneurs in response to negative productivity shocks to farming, while credit constraints do not seem to play a substantial role. Importantly, and consistently with irreversible (Acs 2006) investment or learning-by-doing, these reluctant entrepreneurs do not revert to full farming following new positive productivity shocks. These entrepreneurs are typically under performing entrepreneurs while they were above average farmers. This selection might contribute to the understanding of the dual phenomenon of low-productivity units coexisting in developing countries.

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I. Introduction

The process of starting new non-farm enterprises (NFEs) is extremely important for the development prospects of largely rural and agriculture-dependent countries in Sub-Saharan Africa (SSA). These activities bring important diversification opportunities that can positively affect the prosperity of millions of small family businesses. A salient feature of NFEs development in the context of SSA is the potentially ambiguous effect of income. On the one hand, individuals with higher incomes may be able to start NFEs, either through own resources or due to better capacity to provide collateral for borrowing (Banerjee and Newman 1993) and therefore afford the initial investment in the presence of credit constraints. On the other hand, individuals with lower income may be forced into entrepreneurial activities out of necessity, as an ex-post income smoothing strategy, rather than business opportunity or ex-ante risk management strategies ((Acs 2006); (Gollin 2008)). When credit and insurance markets are not perfect, poverty could be the driver of the emergence of a number of reluctant entrepreneurs ((Banerjee and Duflo 2011); (Charman and Petersen 2009)).

Regressing a measure of income at the individual level on a measure of NFEs

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may not isolate the causal effect of income on the emergence of NFEs since unobservable heterogeneity may be critically correlated with poverty (e.g., abilities and cognitive skills). Moreover, income may be higher for those who have NFEs, and higher income may foster more entrepreneurial activities. This paper aims to resolve this inference problem. We use a two-pronged approach. We use panel data to control for time invariant characteristics and we exploit exogenous variation in rainfall anomalies during the growing season to proxy for exogenous changes in income. In rain-fed production systems, where markets for credit and insurance are imperfect, rainfall during the growing season dictates harvest and income ((Miguel et al. 2004)). Anomalous negative rainfall events, such a severe drought during the growing season, translate into negative income shocks ((Barreca et al. 2013); (Harari and Ferrara 2012)). These indeed are the periods when rainfall matter the most as it does affect the growth and the development of the crops.

We find that farm households that are exposed to random negative rainfall anomalies are more likely to start non-farm enterprise. More specifically, experiencing weather driven income shocks increases the probability of starting non-farm activities by 20%. This indicates that small entrepreneurial activities, such as charcoal trading and hand-crafting, are guided by necessity. These activities also turn out to be sub-optimal in the sense that those who start a business out of necessity tend to fare rather poorly in terms of profits. Yet these reluctant entrepreneurs keep their small enterprise, even when the negative income shocks have disappeared. To our knowledge, compared to the existing literature on entrepreneurship ((Nagler and Naude 2014)), these are novel results.

However it appears to be not entirely consistent with (Lagakos and Waugh 2013).(Doug et al. 2014) as our selection out of farming and its persistence in entrepreneurship do not automatically generate a large productivity gap between farming and non-farming sectors.

This paper relates and contributes to three important strands of literature. The most obvious is the economic literature on the determinants of entrepreneurship and the implications of occupational choice (e.g., (Lucas 1978); (Evans and Jovanovic 1989); (Murphy et al. 1991); (Banerjee and Newman 1993), (Gollin 2008)). While this body of literature is mainly theoretical, we provide robust empirical evidence on the role of income at the micro level. Our results could also be useful in explaining poor economic performance of NFEs in developing countries. Ex-post insurance devices that would be able to insure away consumption fluctuations coming from local level weather shocks could therefore play an important role. In this respect our paper is also related to the work on income and consumption smoothing ((Townsend 1994); (Angelucci et al. 2017)). One of the consequences of the existence of reluctant entrepreneurs is, indeed, that due to short-term downfalls in income household might choose low return activities. Similarly, the failure to appropriately insure against weather shocks might arise because of saving constraints ((Dupas and Robinson 2013); (Karlan et al. 2014)). The second contribution is to the literature investigating the pro-

ductivity gaps across farming and non-farming sectors in developing countries. Given the selection out of farming and into NFEs we conjecture that there will be mis-allocation of talents and therefore aggregate effects on the productivity gaps. In particular our analysis contributes to the understanding of persistence of low productivity firms in developing countries ((Hsieh and Klenow 2010) and (Hsieh and Klenow 2009); (Bloom et al. 2010).; (Bartelsman et al. 2013)) and to the analysis of productivity gaps ((Lagakos and Waugh 2013); (Doug et al. 2014); (Hicks and Miguel 2017)).

The third contribution is to the small and growing literature on poverty and economic decisions. These include studies on the negative effect of poverty on cognitive skills ((Mani et al. 2013)), and on the ability to make inter-temporal choices ((Carvalho et al. 2016)). Our results contribute to this debate by providing causal evidence of the link between poverty and ill suited economic decisions such as occupational choices. Third, this paper can also be seen as a contribution to the expanding literature on adaptive responses to climatic factors ((Mendelsohn 2000); (FalcoS. and Bulte n.d.); (Barreca et al. 2013)). Our results highlight important economic implications of adaptive responses to climatic driven income shocks in a developing country context. The remainder of the paper is organized as follows: Section II introduces the development and concepts of entrepreneurship. Section **??** presents a simple theoretical framework and provides the testable implications we take to the data. Section IV presents the data sources and weather shock measures; while Section V details the econometric strategy used for the empirical analysis. Section VI presents the findings and discusses the results; with a series of robustness checks provided in Section VII. Finally, Section VIII concludes and provides a list of open questions and discusses further research.

II. Entrepreneurship development in Africa

Having experienced economic crisis in the 1980s, several African countries, in particular those south of the Sahel, adopted the structural adjustment programs. One of the conditions of these programs was for countries to become more market-oriented and to support the private sector development. As a consequence, many countries have gradually moved away from centrally planned economy to a market structure that allows entrepreneurial activities ((Nwankwo 2011)). Entrepreneurship and the private sector in general, have ever since been considered as a key to create numerous jobs and alleviate poverty. In Africa, however, entrepreneurship is a multi-faceted phenomenon. Often, it comes in the form of small informal business. Opportunity-driven entrepreneurs tend to be pulled into new business and they usually have better assets, income, skills and access to credit, whereas necessity-driven entrepreneurs are typically pushed by external factors including weather and socio-economic shocks. This latter type of entrepreneurship is started because people have no better choices to secure their livelihoods or as a reaction to negative shocks.

Necessity-motivated entrepreneurs are therefore more likely to participate in

NFEs that are low cost and with immediate income potential. Based on a survey of entrepreneurs in several countries, the Global Entrepreneurship Monitor (GEM) report indicates that necessity-driven entrepreneurship is concentrated in consumer-oriented activities such as retails, consumer, and social services (Reynolds et al., 2001). The GEM report also indicates that necessity-entrepreneurship is relatively higher in countries with low economic development, relatively closed economies, and less developed social security systems. This is in support of our hypothesis that most NFEs in Ethiopia and in several other African countries are induced as a result of farmers exposures to multiple shocks.

However, it must be noted that rural households do have several unique capabilities and assets such as experience, diversity, social capital, and some level of education, which may enable them to start businesses that are opportunity driven ((Barrett et al. 2001); (Bhaumik et al. 2011)). Rural households may also be pulled into NFEs because of new demand and better access to markets ((**?**)). We will address some of these issues in the section below.

III. Conceptual framework

We propose here a simple conceptual framework of time allocation between farming and entrepreneurship, where setting up an enterprise requires relatively small set-up costs. The productivity of farming is negatively affected by negative rainfall anomalies such as a severe drought. It is instead positively affected by positive anomalies. In the area of study agriculture is essentially rainfed. Water availability for crop production is therefore dictated by rainfall and investment in water supplies from wells or canals are very rare in particular for the study period . The individual has to perform an occupational choice between farming and entrepreneurship and she is subject to an exogenous productivity shock to farming in the form of a rainfall shock. At the same time we allow business acumen, or NFEs individual productivity, to vary across individuals in an orthogonal fashion to farming skills. Given the empirical set-up we restrict our choice set to only two sectors: agriculture and non-farm enterprise. Weather shocks affect the productivity in the agricultural sector, and are non insurable ex-ante; in such a setting it is preferable for the agent to engage in some entrepreneurship, however setting up an enterprise is costly as it needs some irreversible capital investment either as physical or human capital, e.g. learning a specific production process that is only used in that specific non-farming activity. For instance, starting a very basic activity like selling charcoal at the local village market requires some tools to chop trees and cut branches, a drum where to light the wood, a chariot to transport the charcoal and a stand. This means that in good times (absent negative rainfall shocks) those farmers with low business attitude will completely specialize in farming as we assume there are no present and future (option value) gains from diversification. In bad times, (ex-post) after the shock is realized, farmers with low business attitude might find optimal to become entrepreneurs in order to attempt at (ex-post) smoothing her consumption. After a severe enough negative

shock, agricultural productivity will be low enough so that farming the land is not efficient, and the farmer becomes a necessity entrepreneur. However, as mentioned, this process involves some initiation costs as well as possibly some learning of the entrepreneurial human capital. As long as those costs are irreversible, as they appear to be in the data, once a farmer starts being an entrepreneur she will continue being an entrepreneur as well as a farmer (in normal times).

We will assume a decision process with 2 periods, with no discounting of the future, to be described below as a sequence of decisions and events. At the beginning of each period the household will decide the occupational choice. By the end of period 1 the household can re-evaluate her decision, for ease of exposition that happens just after the shock is realized and lets assume it doesnt dissipate any resources, i.e. no effort has been exerted yet so that the individual has her full-time endowment available e=1. The individual is endowed with some strictly positive bounded measure of land (and human capital , and can allocate an indivisible (per decision period) unit of labor to farming or non-farming enterprises (NFEs). The risk-neutral individual maximizes her consumption, and faces an uncertain farming environment where all the ex-ante uncertainty is due to rainfall. All consumption happens at the end of each period. Farming requires land (L), (good) rainfall (with probability equal to π), and labor e, but no capital. So that if entrepreneurial production requires an irreversible investment in human capital or physical capital in the first period, e.g. learning how to run the business is non-trivial and has no value for farming and some basic tools (initial physical capital) are needed for the NFE set-up. So, if , profits in the enterprise are in the first period of entrepreneurship and in the second period of entrepreneurship. Where is a small fixed cost of entrepreneurship k, the entrepreneur can finance this using some fraction of the land endowment as rental (for simplicity we will not model explicitly such market) or some endowment, prior revenues saved-up (not explicitly modeled). As mentioned k is an irreversible investment, so that it has zero resell value. In the land market we are implicitly assuming that while rental of small fraction of ones land is possible, land markets are not developed for land sell and purchase. This latter assumption seems consistent with the existing empirical evidence (Otsuka and Place, 2011). At the beginning of period 1 the household would allocate its unit of time to farming if the discounted present value of farming exceeds the same object for entrepreneurship.

Which will be true ex-ante at least for some households, i.e. those with larger or smaller . These households would be ex-ante farmers in both periods. There will also be hardcore farmers, i.e. These households are not very interesting, as even in the worst-case scenario, they will be farmers, even ex-post and in the realization of the negative shocks in both periods these agents decide to be farmers. Alternatively, we can define those who would be entrepreneurs irrespective of the shocks to farming, or hardcore entrepreneurs i.e. As for their farmers equivalent these agents are essentially uninteresting in this model sketch.

However, given the time structure of our problem we need to look into the be-

havior of those households that would be ex-ante farmers but not ex-post. In the midst of period, given the ex-ante decision and the realization of the rainfall shock, the household can decide to switch into entrepreneurship if the shock is negative (there is no reason to switch with a good rainfall). As for some households, in this case households would switch and ex-ante prefer to be entrepreneurs in the second period. In the next period the entrepreneur will stay an entrepreneur ex-ante if , or switch back to farming . If we impose that the return of learning by doing in entrepreneurship are large enough, with small enough, then so that this wouldnt be the population of reluctant entrepreneurs. These are those who would have not made the switch to start with. This means that those who started their enterprise reluctantly would not switch back. In principle we can look at what happens ex-post in period 1 to 2 in the case of a positive rainfall shock, although this would stretch the timing of events as farming starts before entrepreneurship, i.e. it requires some ex-ante commitment. However we can look at

And it is easy to show that Essentially this confirms that ex-post, reluctant entrepreneurs will not switch back to full-farming even if they were able to and given a positive rainfall shock. We can summarize all those conditions into a simple figure, like Figure 1.

Figure 0. Ex-ante Choice between Entrepreneurship and Farming

We will test in the data the basic implications of this simple conceptual framework. We can summarize our testable implications (HP-1 to HP-4) as the following tests:

$$\frac{\Delta NFE}{\Delta NegativeShock}\ 0, \qquad [HP-1]$$

$$\frac{\Delta NFE}{\partial Land \Delta NegativeShock}\ 0, \qquad [HP-1INT]$$

$$\frac{\Delta NFE}{\Delta PositiveShock} = 0, \qquad [HP-2]$$

$$\frac{\Delta NFE_t}{\Delta PositiveShock_t | NFE_{t-1}=1} = 0, \qquad [HP-3]$$

$$E[ProfitsNFE_{t+j} | ReluctantNFE_t] - E[ProfitsNFE_{t+j}] \leq 0, \quad \forall j \qquad [HP-4]$$

$$E[SalesFarming_{t-j} | ReluctantNFE_t] - E[SalesFarming_{t-j}] \leq 0, \quad \forall j \qquad [HP-5]$$

In essence we will test whether farmers become entrepreneurs out of need in bad times (1), while short-term lack of capital doesnt appear to be crucial in the choice (2) aside from the initial capital constraint (HP1int), once the choice to initiate an NFEs is made farmers do not revert back to full farming (3), however reluctant entrepreneurs are drawn from the left tail of the profitability distribution (4). Testable implication HP-4 translates into the following statement those entrepreneurs who made the transition between farming and enterprise because of a negative productivity shock to farming (i.e. the compliers, Imbens and Angrist (1994)) are bound to be drawn from the lower tail of the entrepreneurial ability distribution and therefore have lower profits than other entrepreneurs. Such an entrepreneurial selection might explain why so many farmers turned en-

trepreneurs in rural/poor communities perform so poorly and yet keep on being non-farm entrepreneurs.

IV. Data description

We employ data from the 2004 and 2009 rounds of the Ethiopian Rural Household Survey (ERHS) that covers a number of villages in rural Ethiopia (Dercon and Hoddinott, 2004). The data has been collected by Addis Ababa University in collaboration with the International Food Policy Research Institute (IFPRI) and the Oxford University Centre for African Economies. It covers fifteen Peasant Associations (PA) in four major administrative regions (Tigray, Amhara, Oromia and Southern Nations Nationalities and People Region(SNNPR)) of the country. We make use of the 2004 and the 2009 rounds of the ERHS, since these are the most recent ones containing all the key variables of interest in the analysis (see Wossen et al., 2015). The survey contains detailed information on a variety of individual and household socio-economic attributes, such as consumption expenditure, assets, detailed non-farm and local business activities, social capital endowments and household demographics. Non-farm enterprise (NFEs) measures We define engagement in NFEs as self-employment in all economic activities that are not related to the main agricultural activities of rural farm households. These are mostly small and informal trading and handicraft activities. In particular, the variables used for measuring NFEs activities are derived from the following question in the survey material: In the last 12 (13 Ethiopian) months, have you or other members of your household been involved in non farm activities? Table 1 presents the list of NFE activities included in our analysis, along with the proportion of households engaged in each activity. In our sample about 33.5% of households own a NFEs. NFEs owning households derive about 15% of their income on average from running the enterprise. In fact, the poorest 10% of households get about 26% of their income from NFEs while the richest 10% of households get only 3% of their income from NFEs. These figures underline that the reason for NFEs ownership may be poverty and necessity instead of opportunity. For our empirical analysis, we consider all the different activities listed in table 1 as a measure of NFEs. We created a dummy variable that takes a value of one if the household undertakes at least one of the above-mentioned practices and zero otherwise. We also use in our analysis the set of activities separately. We find that there are four main non-farm activities: collecting and selling charcoal, handicraft, livestock trading intermediation and general trade. All these activities require some sort of investment (e.g., tools) and have different levels of profitability. We can rank them as follows. Charcoal collection and sale is the activity that requires low investment and delivers low profits. It entails fuel wood collection in the forest, the production of charcoal and the sale at the village market. The production of handicraft requires more tools (and skills) and it provides low/ medium profits. Livestock trading intermediation requires mostly time and some transport. It entails collecting information on who is willing to

sell livestock and find a potential buyer in another village. This activity is considered of medium profitability. Last main activity is trade. It entails the larger amount of investment (e.g. a stand at the market). It is also the most profitable activity. [Insert Table 1 About here] Weather driven income shock measures In this paper, we focus on rainfall anomalies since rain-fed agriculture forms the basis of livelihood for many smallholders in Ethiopia. In fact self-reported drought shock is one of the most important shock that affected households income and consumption in 2009. About 52% of farm households reported drought shock as the most important shock that affected their livelihood. Potentially, we can use this self-reported drought shock as a measure of weather shock. However, the use of self-reported drought shock as a measure of negative income shock is problematic due to the potential endogeneity of self-reporting negative rainfall shocks. We therefore construct an exogenous measure of rainfall shock by using actual village level rainfall. The presumption is that such rainfall anomalies, and in particular lower than long-term, average rainfall will negatively affect agricultural productivity. At the same time, and up to a certain extent, higher than average rainfall should positively affect productivity. We will therefore employ several definitions of anomalies, to exactly mimic positive and negative shocks. [Insert Table 2- About here]

Table 2 shows the distribution of rainfall across the survey villages over a period of 30 years from the nearest rainfall station. Negative rainfall anomalies are measured by dummy variables. This variable is equal to one if the rainfall levels in the village in the 12 months preceding the survey fall one standard deviation below the long-term mean (Dercon, 2004; Porter, 2012; Harari and La Ferrara, 2012). Econometric strategy We focus on the effect of rainfall anomalies on NFEs development. The link between unexpected rainfall variation in the growing season and NFEs development is addressed through a simple specification as follows:

Where Y are our outcomes of interest, while S measures rainfall anomalies faced by agent , in village v, at time . added to test for the stability of the main results, captures other factors, such as household and farm characteristics, and are vectors of parameters to be estimated. As the rainfall shocks are exogenous to the households decisions the parameter identifies the causal effect of rainfall shocks on to the outcomes of interest. In particular we focus on the testing hypotheses HP-1 to HP-5. If negative rainfall shocks affect the establishment of NFEs, we expectto be positive and significant, captures unobserved household-specific fixed effects, refers to time fixed effects introduced to account for omitted variables that are fixed across households but might vary over time, is a time varying random shock. To test for the robustness of the main results we add a more extended battery of controls as part of the Xs. As mentioned in HP1int, following the model sketch, we will also test for the non-linear effect of negative shocks with respect to land holding, i.e. the probability of becoming a NFE given a negative shock is hump-shaped in land ownership.

A. Descriptive statistics

Table 3 reports definition and descriptive statistics of the main variables used in the regression analysis. It shows that average household monthly food expenditure varies from 419 birr ($45) in 2004 to 817 birr in 2009. In order to make a reasonable comparison across rounds, we converted all nominal prices into real prices by deflating each price variable with a weighted price index using the 1994 survey period as a base year. In the regression analysis, we used shares from the real per capita consumption expenditure instead of nominal expenditure values. In terms of independent variables, we have included several household characteristics, such as age (which captures the effects of experience in dealing with shocks), household size and educational attainment. Average household size varies from 5.8 members in 2004 to 5.9 members in 2009, while the proportion of literate households increased from 37% in 2004 to 53% in 2009. To capture the wealth (income) effect we included TLU (total livestock endowment in tropical units) as a proxy for the capacity to cope with shocks and invest in NFEs. In addition, we include institutional and access variables, such as access to credit and access to water, roads, and electricity due to their relevance for NFEs development. [Insert Table 3 - About here]

V. Empirical Strategy

VI. Results

In this section we will test the hypotheses formulated in Section XX. Firstly, we show that (negative) rainfall shocks cause the emergence of the reluctant entrepreneur emerge, i.e. these negative rainfall shocks have a positive effect on the probability of becoming an entrepreneur (HP-1). The mechanism is quite simple, given the fall in land productivity the farmer resolves into ex-post income smoothing activities so to stabilize consumption. At the same time positive rainfall shocks, increasing land productivity do not have an effect on the probability of becoming an entrepreneur (HP-2). We will then proceed to show that such an initial effect is long lasting, i.e. a reluctant entrepreneur doesnt revert back to full farming even in normal or good times (HP-3), consistently with the existence of irreversible set-up costs to NFEs. Lastly, we show (HP-4) that reluctant entrepreneurs are indeed low ability entrepreneurs and have low profits. Testing HP-1: Are there necessity or reluctant entrepreneurs? Table 4 we report fixed-effect regression results on the link between negative weather driven income shocks and the probability of starting a NFEs. Column 1 in table 4 presents our baseline specification where we include only rainfall shock along with time fixed effects as explanatory variables. We estimate a very large and significant effect of a negative rainfall shock on the probability of becoming and entrepreneur, a test of HP-1. After a village-wide negative anomaly strikes, farmers, without previous NFEs, have an increase in the probability of performing a NFE of about

25%. Moving along the Table we added controls such as age, household size, education, farm size, access to a road, electricity, telephone, although the reduced form results presented should be unbiased as the rainfall shock is exogenous. We also introduce as an additional control the local agricultural wage to proxy for the general economic conditions. We also test the hypothesis by household fixed effects and controls. The key parameter estimate is essentially unaffected. This confirms the robustness of the result. [Insert Table 4 Here] In our main empirical analysis, negative rainfall anomalies were measured by dummy variables. These take a value that is equal to one if the rainfall levels in the village in the growing season preceding the survey fall one standard deviation below the village level long-term mean (30 years mean). Such definition pools together smaller and larger shock which might have different effects on to the probability of starting an NFE. It is important to understand whether the results are driven by large shocks or whether even smaller shocks are capable of such effects. We therefore construct two rainfall shock dummies to capture the relationship between NFEs ownership and magnitude of shocks. We build a set of dummies as follows: negative rainfall anomaly1 = -1¡=SAI¡-0.5, Negative rainfall anomaly2 = SAI¡-1, Positive rainfall anomaly1= 0.5¡=SAI¡1, Positive rainfall anomaly2= SAI¿1, where SAI is equal to the standardized anomaly. To further probe whether engagement in NFEs is necessity or opportunity driven, we controlled for differences in asset endowment among farm households. In particular, we constructed four asset quartiles based on the size of land and livestock (two important wealth measurements in the context of Ethiopian farmers) and include them as additional controls in our econometric specification. Results are shown in APPENDIX TABLE. We found that households in the bottom quartile are more likely to run NFE activities when compared to households in the top quartile. This result underscored that engagement in NFEs is more likely to be necessity driven as a result of poverty. Essentially the tests I proposed above are a better version of this observation on assets. This underlines our hypothesis that when poverty is pervasive, necessity rather than business opportunities may drive the emergence of large numbers of reluctant entrepreneurs. If engagement in NFE activities is driven by poverty and necessity, access to formal financial resources should play an important role. In particular, as a result of access to modern sources of credit, households should move away from non-profitable NFE activities. When examining the interaction effect between access to credit and asset ownership, we found that the probability of owning NFE activities become negative and insignificant for farm households in the bottom quartile. In the literature, poverty is often cited as a major driver of the emergence of a number of reluctant entrepreneurs as poor farm households may reluctantly start NFEs due to a lack of alternative income sources. [Insert Table 5 Here] Testing HP-2: Positive shocks have no effect on NFEs We turn now to asking the question on whether positive shocks have an effect on NFEs, we report our results in Table 5. Interestingly, and consistently with the hypothesis of the necessity or reluctant entrepreneur, we found that only negative rainfall

shocks trigger engagement in NFEs. Positive rainfall shocks have small and insignificant effects. When adding the exstensive list of control the main effect of negative shock is essentially identical to the baseline estimate. This is a very crucial finding, since drought shocks are very prevalent in rural Ethiopia. Further, we controlled for agricultural wages, as it may directly affect the decision to own NFEs. If the main motive of owning NFEs is business opportunities, agricultural wages should not play any role on the decision to own NFEs. However, in this context, we found that agricultural wages have a negative and statistically significant effect on the probability of owning NFEs This result implies that, engagement in NFEs may not be profitable which underlines our hypothesis that the main motive of self-employment in the context of Ethiopia is necessity or ex-post smoothing rather than opportunity and ex-ante risk mitigation.

Testing HP-3: Do reluctant entrepreneurs abandon NFEs in good times? [Insert Table 6 Here]

The above result confirms that, households derive large part of their food expenditure from non-farm income sources. However, the result says nothing about the possibility of consumption insurance through NFEs during rainfall shocks. Herein, we explored the possibility of consumption insurance and risk coping through NFEs against rainfall shocks. Results are reported in Table 9. We found that the effect of NFEs ownership on consumption growth is not statistically significant implying the absence of risk sharing and insurance against rainfall shocks through NFEs. Testing HP-4: Are reluctant entrepreneurs bad entrepreneurs? [Insert table 7 about here] [Insert table 7.1 about here]

A key issue is whether the entrepreneur of necessity are bad entrepreneurs. We thus test if these individuals choose low profitability activities. In the table 7 we report the causal impact of the shock on the NFEs profits. Interestingly we find that those who received a random negative shock perform less well in terms of profits. We further probed this relation and we focus on the subgroup of the individuals that experienced a negative shock. We observe their chosen NFEs activities. Again we find that this group performs less well.

VII. Robustness Checks

In this section we present robustness cheeks for our model specifications. In particular, we undertake the following robustness tests: How sensitive estimated impacts are to the coding of our dependent variable. In our previous estimation strategies we considered all the different NFE activities together as a single measure of participation in NFEs by creating a dummy variable that takes a value of one if the household owns at least one of the NFEs practices and zero if the household owns none. However, lumping all forms of NFEs into one practice might be misleading, as some NFE activities might be unrelated. As a result, we introduced each specific NFE type as a dependent variable to examine the robustness of the effects of social capital. Our results are consistent ad available upon request. Placebo Test We also run a placebo test by testing the impact of

rainfall outside the growing season on HP1 and HP 2. The results are reported in the table 8. We find that negative and positive rainfall shocks outside the growing season do not affect significantly the probability of undertaking NFEs. This result stresses the fact that the economic dimension of these weather shocks are central in the decision to undertake NFEs. Rainfall shocks outside the growing season have basically no impact on household income as it does not affect the harvest. ¡¡Insert Table 8 Here¿¿

VIII. Conclusions

In this paper we presented an empirical analysis of the link between negative income shocks and development of NFEs in rural Ethiopia. In particular, we combined household panel data, detailed data on non-farm activities, and weather data to analyse how climatic driven income shocks may affect NFEs. We find that entrepreneurial activities are guided by necessity or ex-post income smoothing rather than business opportunity or ex ante risk management strategies. Experiencing weather driven income shocks increases the probability of starting non-farm activities by 20%. These activities turn out to be sub-optimal in the sense that those who start a business out of necessity tend to fare rather poorly in terms of profits. Yet these reluctant entrepreneurs keep their small enterprise, even when the negative income shocks have disappeared. Business initiated because of necessity tend to perform poorly and persist overtime. The policy implications of our results are potentially very large. Understanding the effect of weather driven income shocks on the emergence of NFEs is extremely important.For example, weather driven income shocks are pervasive for millionsof rural households in Sub Saharan Africa. Consequently, understanding individual responsesto these environmental challenges bytheacademic community and society at large willgreatlyimpact on sustainable development efforts, not least due to projections of increased weather shocks under a changing climate (IPCC, 2014). In this context the diffusion of safety nets programs and insurance mechanism may play a crucial role in preventing ill-suited entrepreneurial decisions and reduce poverty persistence.

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