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**Advances in coffee economics: recent studies  
on the impact of coffee price volatility**

### **Background**

In accordance with Article 34 of the International Coffee Agreement 2007, the International Coffee Organization is required to provide Members with studies and reports on relevant aspects of the coffee sector. This document contains a review of literature on advances in coffee economics: recent studies on the impact of coffee price volatility.

### **Action**

The Council is requested to take note of this document.

## **ADVANCES IN COFFEE ECONOMICS: RECENT STUDIES ON THE IMPACT OF COFFEE PRICE VOLATILITY**

### **Introduction**

1. This document contains a review of three recently published studies<sup>1</sup> which add empirical evidence to the literature on the impact of coffee price volatility on farming households. Specifically, the studies investigate (i) the effect of rising and falling prices on intra-household labour supply, (ii) the role of micro-enterprises as a way of mitigating coffee price shocks, and (iii) the potential benefit of innovative mobile phone based financial services for consumption smoothing of rural households. The studies provide new insights into coping mechanisms available to coffee farmers in regions with credit market imperfections and suggest policies to support rural households.

2. All three studies acknowledge that coffee growers are exposed to a variety of risks but often lack the ability and tools to mitigate such risks.

3. On the one hand, farmers are faced with significant production risk, e.g. frequent weather shocks, such as early, late, insufficient or abundant rainfall, drought and frost, as well as the spread of pests and diseases. Adverse climatic events usually affect larger geographical areas and hence affect many producers simultaneously, rendering typical informal risk-sharing tools insufficient.

4. Market risk on the other hand is related to volatile coffee prices which can significantly vary between production seasons. Price risks are difficult to manage as coffee farmers are price takers and smallholders in particular have only limited access to formal hedging mechanisms. Price risks have potentially increased as volatility of commodity prices was higher in the 2000s than in previous periods.

### **Coffee prices and intra-household labour supply**

5. Beck, Signal and Tarp (2016) investigate the effect of rising and falling prices on intra-household labour supply using the example of small-scale coffee growers in Vietnam. In the

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<sup>1</sup> **Beck, Singhal, and Tarp (2016)**. *Coffee price volatility and intra-household labour supply - evidence from Vietnam*. UN-WIDER Working Paper 2016/16

**Adhvaryu, Kala, and Nyshadam (2015)**. *Booms, busts, and household enterprise: evidence from coffee farmers in Tanzania*. Working Paper, University of Michigan

**Sekabira and Qaim (2016)**. *Mobile phone technologies, agricultural production patterns, and market access in Uganda*. Paper presented at 5th Conference of the African Association of Agricultural Economists in Addis Abeba

case of shocks negatively affecting revenues from coffee production, these households look for ways to maintain (or “smooth”) consumption. In the absence of significant savings and functioning credit markets, labour may be reallocated across alternative income generating activities. Hence, it can be observed that besides growing other cash and subsistence crops or raising livestock, coffee farmers also engage in labour off-farm or operate a micro-enterprise.

6. Using ICO data and local price information gathered via household surveys, the authors establish a clear link between fluctuations of the world market price for coffee and the farm gate price. These have a significant impact on revenues and thus the household’s ability to spend. The study finds that a one standard deviation increase in international coffee prices accompanies a 3.6% higher monthly household expenditure on food.

7. At the same time coffee prices affect the households’ propensity to participate in the labour market. There is a negative correlation between coffee prices and off-farm employment. A one standard deviation increase in coffee prices lowers the probability for household members to take a job in the local economy by 6.3% in the sample under investigation. In other words, high coffee prices retain family labour on the farm as outside options are less attractive.

8. The study also analyses the impact of changes in the coffee price on labour supply of individual household members. To this end the sample of household members is divided in three age groups, children (aged 6-14 years), adolescents (15-19 years), and working-age adults (20-54 years).

9. The authors find evidence for countercyclical wage employment among adults. A one standard deviation increase of the international coffee price leads to a 19 % lower propensity to work off-farm. Simultaneously, an increase in the coffee price reduces the probability of children and adolescents working on the farm by 19% and 10%, respectively. These results imply that children are more likely to work the family coffee farm when coffee prices are low.

10. The study does not find evidence that school attendance is lower when coffee prices fall. However, the authors raise concerns about potential negative effects on educational attainment as the quality of the learning may well have been negatively affected. Furthermore, there could be adverse consequences in other dimensions not measured in the study such as health and psychological wellbeing.

11. This empirical evidence from a sample of small-scale farmers in Vietnam is relevant as world-wide around 70% of coffee is produced by smallholders who often engage in more than one income generating activity in order to diversify risk.

### **The pitfalls of micro-enterprises in smoothing consumption**

12. The study by Adhvaryu, Kala, and Nyshadam (2015) builds on the observation that, besides off-farm employment, engaging in enterprise activity is a common strategy in mitigating the impact of low coffee prices. Specifically, the authors have analysed market data provided by the ICO as well as survey data from a sample of coffee growers in north-west Tanzania to investigate the impact of a price collapse on enterprise ownership.

13. The study finds that enterprise ownership increases by 22% above mean ownership when coffee prices are low. In fact, the authors find that entrepreneurship can be a way to generate additional revenues helping households to maintain consumption.

14. However, there is an important caveat to this result as the viability and thus consumption smoothing capability of these enterprises can differ depending on their nature. Enterprises can be 'intermittent' or 'persistent': the former are enterprises which are started in times of low coffee prices and shut down when prices are high, while the latter are maintained in both booms and busts.

15. Those coffee farmers who engage in enterprise activities both in booms and busts (persistent enterprises) tend to invest more and expand their business when coffee prices are high. The authors offer a number of possible explanations for this finding.

16. Investments in enterprise activities require funds which are more likely to be available in times of favourable coffee prices and hence higher resulting cash flow. With falling prices, a smaller share of the shrinking revenues from selling coffee can be diverted into setting up or expanding micro-enterprises.

17. Furthermore, local general equilibrium price effects increase opportunities for micro-businesses in times of high coffee prices. In communities which are highly dependent on coffee production, periods of firm international prices lead to significantly higher household incomes and thus demand for goods and services offered by micro-enterprises. In other words, during a coffee boom entire communities flourish generating a favourable business climate.

18. On the other hand, the viability and thus consumption smoothing capability of intermittent enterprises is low as these are started precisely when local purchasing power is low and demand is suppressed. The authors argue that even talented entrepreneurs find it hard to operate a non-farming business during a coffee price bust especially in view of the limited access to regional markets where demand may be less negatively affected.

19. Hence, while engaging in enterprise activities is a rational attempt to diversify income sources during a coffee price bust, starting a micro-enterprise is often an economically inefficient response.

### **The impact of modern technology on household welfare**

20. The increasing availability of digital mobile phone applications has a profound impact on households in rural areas and can help to buffer the impact of volatile coffee markets. In their recent research paper, Sekabira and Qaim (2016) analyse the impact of mobile money (MM) services on a sample of small-scale coffee farmers in Uganda.

21. MM services enable users to transfer money via mobile phones and previous studies have found that the use of MM services leads to significantly lower transaction costs when buying inputs or selling outputs, fosters saving and facilitates receiving remittances.

22. This study confirms the growing adoption rates of MM. In 2012 only 23% of the coffee farmers in the sample were using MM services. By 2015 the share of MM users had almost doubled to 44%.

23. The authors find that the use of MM services accompanies higher input use and increased yields. Furthermore, compared to non-users, rural households using MM services sell 46% more of their coffee produce in a high-value form as shelled beans. This enables MM using households to obtain a price premium and increase their revenues from coffee farming. Additionally, MM using households generate significant income via non-farming activities including wage labour and receive more remittances. In summary the preliminary results of this study indicate that household incomes are up to 31% higher for MM-users. These households are also able to smooth more effectively consumption during coffee price busts.

### **Conclusion and policy recommendations**

24. The three studies presented in this document confirm that price volatility in the coffee market remains a serious concern as smallholders often lack the ability to buffer price shocks.

25. The main research results are:

- Households cope with lower coffee prices by increasing off-farm wage labour of adults. At the same time children and adolescents fill the gap, working more hours on the farm and in home production with potentially negative effects on educational attainment.
- Starting an enterprise is a common strategy of income diversification during coffee price busts. However, the economic viability of intermittent micro-enterprises is limited.
- Increased access to digital services such as mobile money can lead to welfare improvements for coffee farmers via lower transaction costs for buying and selling farm input and output and through the ability to receive remittances.

26. There is a need to mitigate the negative impact volatility has on household welfare by strengthening farmers' resilience against shocks and building social safety nets as a last resort. The key policy recommendations derived from the research discussed in this document are:

- To enable households to smooth consumption, credit markets need to be deepened; land and labour market related constraints need to be addressed. In view of the intra-household substitution of labour, benefits of public work programmes may be limited by negative effects related to children spending more time on the family farm.
- To increase the profitability of micro-enterprises, coffee communities need to be better linked with distant markets through improved physical infrastructure and the removal of informational trade barriers.
- In order to facilitate rural households' access to modern digital technologies the roll-out of networks and services needs to be accelerated. This requires creating an investor friendly climate, reducing red tape and establishing effective competition policies.

27. The results presented above stem from case studies which cover limited time periods and geographies; at this stage some of the conclusions, while innovative, may remain country-specific. Hence, more research is necessary in order to confirm the validity of the results and explore if the findings and recommendations can be easily transferred to other settings.