Barriers to Exit from Subsistence Agriculture[§]

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Abstract

This paper reviews the evidence on the determinants of subsistence agriculture and the barriers that farmers face to switch to market-oriented agriculture. We review a number of recent empirical approaches to the estimation of variable, fixed, and sunk transaction costs, with the weight of the evidence suggesting that those costs are very substantial. Tentative policy implications are drawn in terms of infrastructure and support as well as the organization of intermediation markets.

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1. Introduction

Even though market-oriented agriculture consistently provides higher incomes, subsistence agriculture remains prevalent in poor countries. What do we know about the determinants of these modes of production and about the barriers to exit from subsistence agriculture? Recent empirical research has adopted a variety of innovative approaches to the measurement of transaction costs of all sorts—variable, fixed, and sunk. Most of the studies reviewed in this note suggest that those transaction costs are formidable. However the evidence is still fragmentary and needs to be extended both conceptually (as regards the linkages between intermediation markets and farmers' incentives to innovate) and empirically (as regards the precise nature of sunk costs involved to enter commercial circuits, for instance), in order to generate useful policy advice.

2. The paradox of subsistence agriculture

2.1 What is subsistence agriculture?

Conceptually, subsistence agriculture is easy to define, by analogy with autarky—a situation where the farm household neither sells nor buys, but consumes everything it produces and, consequently, only that. Lack of access to inputs under autarky can be expected to constrain production to particular techniques, like long fallow periods to avoid soil depletion, and in most cases to entail low productivity levels.

However, empirically, things are not that simple. First, the share of output sold on the market and the share of consumption bought from it are both continuous variables on [0,1]. Just along that dimension, where to draw the line between a "subsistence farm" and a "market farm" is a matter of judgment. We will discuss in the following section an econometric method addressing the problem of "where to draw the line".

Second, when there is a functioning labor market, farm households may supply labor for off-farm employment (on other farms or in nearby towns), generating cash income. When that income is used to buy agricultural inputs, even though none of the farm's agricultural output is sold, a key analogy with autarky (not being able to buy inputs because no output is sold) is broken. Thus, a proper understanding of what is subsistence agriculture requires the

identification of which markets exist and which don't. Indeed, the modern analysis of the farm-household can be traced to the seminal work of de Janvry, Fafchamps and Sadoulet (1991) on peasant behaviour in the absence of output or labor markets.

Finally, some crops are relatively easy to characterize as "cash crops" or "food crops". For instance, a farm growing cocoa, tea, coffee, cotton or peanuts is unlikely to be predominantly a subsistence one. The converse is true of a farm growing essentially sorghum or millet. So it may prove convenient to focus, as a shortcut, on the nature of the crops grown instead of the (implied) decision to go to the market or not. The advantage of seeing things this way is that the decision of what to grow can be analyzed fairly naturally as a portfolio-allocation problem, characterized in terms of the risk and return characteristics of food vs. cash crops. Indeed, a number of classic articles, including, inter alia, Fafchamps (1992) or Rosenzweig and Binswanger (1993), proposed formal analyzes of crop choice under uncertainty. However, it should be kept in mind that what is a cash crop in one country can be, for a variety of reasons discussed below, a food crop elsewhere. For instance, rice is a cash crop in Thailand, but it is a food crop in Madagascar.

All in all, there is little doubt that the prevalence of subsistence agriculture is correlated primarily with low income levels (both across countries and across time) and low population density, albeit without a clear direction of causation between the three. The analysis of peasant production relations and implied social structures by Binswanger and McIntire (1987) highlighted the link between the prevalence of subsistence agriculture, the absence of labor markets, and prohibitive per-capita infrastructure costs that characterizes land-abundant (low-density) dry zones in Africa. Perhaps the clearest exogenous factor in their analysis is the importance of non-diversifiable weather risk in semi-arid areas.

2.2 Missed opportunities

The prevalence of subsistence agriculture is paradoxical if it is associated with lower incomes than what farm households could achieve by participating in commercial exchange, unless they face substantial switching costs. Before we get to switching costs, what does the evidence have to say about income differentials?

Prima-facie evidence of income differentials between subsistence and commercial farmers is of course likely to be gravely misleading if differences in individual characteristics and endogenous selection are not controlled for. Kennedy (1994) partly overcame the problem by looking at the income effect of participation in a Kenyan government sugarcane outgrower program, using a two-period panel of farmers surveyed in 1984-85 and 1985-87. Non-participants and "switchers" (farmers who took on sugarcane cultivation upon joining the program) had similar initial incomes, but the latter saw theirs grow by 96.2%, against 40.7% for nonsugar farmers and 30.8% for "always-sugar" farmers. This indeed suggested large gains from adopting the cash crop, but Kennedy's result had anomalies (e.g. the fact that switchers had final incomes vastly in excess of that of "always-sugar" growers), did not quite control for selection (the two may be related), and was partly driven by an artificially high, subsidized producer price of sugarcane.

In general, the analysis of income differentials between modes of production—subsistence vs. market—requires two ingredients. First, selection on observables (individual characteristics) must be carefully controlled for. Second, it is possible that the mode of production affects not only the level of income, but also the return to factors of production. For instance, when the market takes the form of large foreign buyers offering outgrower contracts, an increasingly prevalent mode of integration into commercial agriculture (see World Bank 2008, ch. 5), contractual requirements may be easier to understand and satisfy for farmers with some education. The return to education is thus likely to be higher for contract farmers than for subsistence ones, and this should be taken into account when "explaining" income on the basis of production regime and individual characteristics.

Taking into account differentials in factor returns in addition to income levels means that, in samples including both commercial and subsistence farmers, income equations should have the following form. Let *i* index farmers, and let y_{i1} and y_{i2} be income under the market and subsistence regimes respectively. The income equations are

$$y_{i1} = \mathbf{X}_i \beta_1 + u_{i1} \tag{1}$$

$$y_{i2} = \mathbf{X}_i \beta_2 + u_{i2} \tag{2}$$

where $\mathbf{X}_i$ is a vector of individual characteristics. However, the econometrician can never observe both (1) and (2) at the same time. *Observed* income is equal to either y_{i1} and y_{i2}, depending on the value of a switch variable I_i:

$$y_i = \begin{cases} y_{i1} & \text{if } I_i = 1 \\ y_{i2} & \text{if } I_i = 0. \end{cases} \tag{3}$$

The value of I_i is itself determined by individual characteristics through a selection equation of the form

$$\Pr(I_i = 1) = f(\mathbf{X}_i; \mathbf{Z}_i). \tag{4}$$

The reader will have recognized a so-called "switching-regression" problem whose logical structure is close to that of Heckman's selection model, but with an important difference. Namely, here the income of individuals not participating in the market can be considered as observed if self-consumed output is valued at market prices (this may be a trickier assumption than it looks, though—more on this below).

The appropriate estimation technique depends on two aspects of the problem. The first is whether the switch point between regime 1 and regime 2 is observed or not. As we noted earlier, how much a farmer sells is a continuum and it may be hazardous to set an arbitrary switch point. The econometrician may instead want to "let the data speak for itself" and determine the switch point simultaneously with the model's other parameters. The second is the scope for reverse causality, which is of course unavoidable as income differentials *should* be the main driver of selection. Together, these two features of the problem (unknown switch point and endogenous selection) call for a particular ML estimation technique inspired of Heckman's selection model.[1] Consistent estimation of the parameters in (1) and (2) makes it possible to calculate an individual's predicted income in both regimes, including the unobserved one, and hence to estimate the income differential conditional on individual covariates.

[1] Dutoit (2006) provides a through survey of switching-regression techniques, together with Stata applications.

Applying this technique to farmers surveyed in Madagascar's *Enquête Permanente des Ménages*, Cadot, Dutoit and Olarreaga (2006) found a switch-point at zero market sales, which defined subsistence farmers as those that were in true autarky (10% of the sample), and an average income loss of 43% for those farmers, conditional on covariates and controlling for endogenous selection.

Thus, although parametric evidence is fragmentary, it is suggestive of very substantial income differentials after controlling for individual effects, begging the question, what prevents subsistence farmers from exploiting profitable market opportunities? Clearly, if subsistence farmers forsake substantial income by not going to the market, or not producing what the market would buy, they must face formidable barriers to "going commercial". What are those barriers?

3. Barriers to exit

3.1 Risk

In the absence of properly functioning insurance mechanisms, food self-sufficiency can be seen by farmers as insurance if cash crops are perceived as inherently riskier than food crops. This conjecture is perhaps the oldest in the analysis of subsistence agriculture.

When income-generating production is risky, farmers can, using the terminology of Alderman and Paxson (1992), adopt either (or both) "risk-management" strategies—e.g. diversifying crops whenever possible to reduce income risk—or "risk-coping" ones—e.g. saving in order to reduce the transmission of income risk to consumption. Risk-management strategies have been extensively studied in the literature (see e.g. Shahabudin 1982, Binswanger and Sillers 1983, or Fafchamps 1992 to name but a few). Unsurprisingly, a running theme of that literature is that price uncertainty on cash-crop markets raises the weight of food crops in the optimal allocation of land relative to what a comparison of returns would suggest.

Dercon (1996) argued that reliance on risk management should be a decreasing function of a farmer's stock of liquid assets like cattle, since selling them could be used to smooth consumption in periods of negative income shocks. This suggested an obvious identification strategy: regress the share of

food crops on the stock of cattle at the farm level (in addition to other individual characteristics, of course). This is what Dercon did on a sample of Tanzanian farmers for whom growing drought-resistant sweet potatoes for food was a low-risk, low return strategy. When the cattle stock was made endogenous using an asset-accumulation equation, the partial correlation between the share of food crops and the stock of assets was, as expected, negative.[2]

Dercon's and other studies provided empirical support to the view that over-reliance on food crops could be understood if one looked not just at the first moment of the distribution of returns, but also at its second moment. The culprit was then the absence of more efficient insurance mechanisms, something that has led to widespread, and largely failed, policy experiments in price stabilization. However, Jayne (1994) observed that nine smallholders out of ten grow food crops in semi-arid areas of Africa where cash crops are actually *more* resistant to local conditions. Thus, something else than just risk management must be at play.

3.2 Missing markets

The analysis of peasant behaviour when some markets are missing goes back to the seminal work of de Janvry, Fafchamps and Sadoulet (1991), whose objective was to rebut old claims that peasants are irrational. They showed that feeble supply responses to price signals (see de Melo's contribution in this volume for a recent version of that observation) reflect the dampening effect of induced variations in the shadow price of non-traded goods (either labor or one of the farm's crops).

Missing markets are a limiting case. Between deep and perfectly liquid markets and no markets at all, there is a range of situations characterized by various levels of variable, fixed, and sunk costs of transacting. All three can explain why some potential participants are excluded or why, in extreme cases, nobody participates. Thus, if we want to understand why markets fail, we need to understand which transaction costs are prohibitive, for whom, and why. Of course, transaction costs are rarely observed in practice, so a number

[2] Dercon estimated the model recursively, with cattle accumulation not a function of crop choice, even though an argument could be made for making it a full simultaneous model if the share of land allocated to low-risk, low return food crops affects the pace of cattle accumulation.

of ingenuous empirical strategies have been devised to get indirectly a hold on them.

When transaction costs prevent or limit arbitrage, the lack of market integration typically shows up as limited co-movement of prices, and the study of price co-movement, by various techniques, has been a prime vehicle to test for market integration. Recently, Moser, Barrett and Minten (2005) argued that those tests may be of limited validity in the presence of seasonally reversing flows across markets, and they proposed an alternative approach with a typology of situations. When all arbitrage opportunities are taken, price differentials across markets should just equal the cost of transportation between those markets. When transportation costs are higher than price differentials, arbitrage is prevented. When they are smaller, something else must be preventing arbitrage, like e.g. anti-competitive practices. They dub these three regimes 1, 2, and 3 respectively. On a sample of 1'400 communes in Madagascar, they find about two thirds of them integrated locally (i.e. for which the probability of being in regime 1 is highest), but also two thirds of them in regime 3 vis-à-vis regional cities, suggesting substantial barriers to competition.[3]

Large transaction costs do not only prevent market integration: they can also feed back on crop choices. The argument, due to Jayne (1994), goes like this. Suppose that a large transaction cost τ creates a wedge between the farmgate price p of a food crop and its buying price $p+\tau$ (say, from neighbours or local dealers if there is a village market). Suppose that one hectare of land produces one unit of the food crop. For a farm that is more than self-sufficient in food grain, the opportunity cost of planting one hectare with a cash crop is p (what it would get by producing the food crop on that hectare); for a farm that is less than self-sufficient, it is $p+\tau$ (the cost of *procuring* the food crop). This discontinuity means that "grain-deficit" households may not find it profitable to diversify into cash crops when "grain-surplus" households do. Indeed, this is what Jayne finds on the basis of prices observed in a 1990 survey of 276 Zimbabwean farmers. Parametric evidence, however, is not so clear-cut, as there is no statistically significant jump in the surface planted with cash crops at the point where households reach self-sufficiency.

[3] These are barriers to entry on city markets. Madagascar's informal trucking cartel biases results in favour of regime 2 (high transportation costs) rather than regime 3.

Consider now fixed transaction costs (that is, independent of volumes transacted). These may include the cost of searching for partners, of enforcing contracts with distant buyers, of establishing quality, and so on. Vakis, Sadoulet and de Janvry (2003) provide interesting survey evidence from Peru on these costs as perceived by the farmers themselves (more on this below). Whereas variable transaction costs are supply or demand shifters, fixed costs make supply and demand curves discontinuous, calling for particular estimation techniques. Renkow, Hallstrom and Karanja (2004) estimated simultaneously, by maximum likelihood, a system of three equations looking roughly like this:

$$x_i^s = \begin{cases} \alpha_0 + \alpha_1 p_i + \boldsymbol{\alpha}_2 \mathbf{x}_i + \delta_v + u_{1i} & \text{if } p_i > p_i^A + \tau_i \\ 0 & \text{otherwise} \end{cases} \tag{5}$$

for supply (where p_i^A is farmer *i*'s autarky price, p_i is the price he receives in the market, $\mathbf{x}_i$ is a vector of individual demand and supply shifters, δ_v are village effects, and τ_i is the ad-valorem equivalent (AVE) of the fixed transaction cost farmer *i* faces, assumed to be symmetric between selling and buying);

$$x_i^d = \begin{cases} \beta_0 + \beta_1 p_i + \boldsymbol{\beta}_2 \mathbf{x}_i + \delta_v + u_{2i} & \text{if } p_i < p_i^A - \tau_i \\ 0 & \text{otherwise} \end{cases} \tag{6}$$

for demand, and

$$\ln(1+\tau_i) = \ln\left[1+e^{\bar{\tau}}\right] + u_{3i} \tag{7}$$

where τ is the common component of transaction costs (that is, transaction costs are identical in expectation across farmers). Estimating (5)-(7) on a cross-section of 324 maize-producing farmers in Kenya, Renkow et al. obtain a surprisingly low 15% for the AVE of fixed transaction costs.

Vakis et al. (2003) take a different route and propose an interesting approach where transaction costs are retrieved from the farmers' choice of where to sell. They use a 2001 cross-sectional survey of small Peruvian farmers, in which 1'096 potato transactions are observed individually on five markets. The problem is to estimate simultaneously a price equation (the price effectively received by a farmer on transaction *i* in market *k*), a transaction-costs

equation (also on transaction *i* in market *k*) and a market-choice equation. The price equation is

$$p_{ij} = \mathbf{P}_{ij}\gamma + u_{ij1} \tag{8}$$

where $\mathbf{P}_{ij}$ includes determinants of the price received on transaction *i* in market *k*: the price level on market *j*, the volume sold (which must of course be instrumented), and a vector of farm characteristics. The transaction-cost equation is

$$t_{ij} = \mathbf{T}_{ij}\delta + u_{ij2} \tag{9}$$

where $\mathbf{T}_{ij}$ includes determinants of transaction costs on market *j*, including distance etc., and the market-choice equation is

$$j_i = \arg\max_k \pi_{ik}^* \tag{10}$$

where profit is given by

$$\pi_{ik}^* = \mathbf{X}_{ik}\beta + q_i\beta_k + u_{ik3} \tag{11}$$

and

$$\mathbf{X}_{ik} = \left[\, p_{ik} - t_{ik}; z_{ik}^f \,\right]. \tag{12}$$

In (12), z_{ik}^f is a proxy for the fixed costs of transaction *i* on market *k*, for which Vakis et al. use the percent of a village's farmers stating that they know prices in market *k*. The first argument in (12) is the source of problems, because prices p_{ik} and transaction costs t_{ik} can be estimated only for transactions that take place; not for off-equilibrium transactions. The solution is, once more, a Heckman-type two-step approach that goes roughly like this.

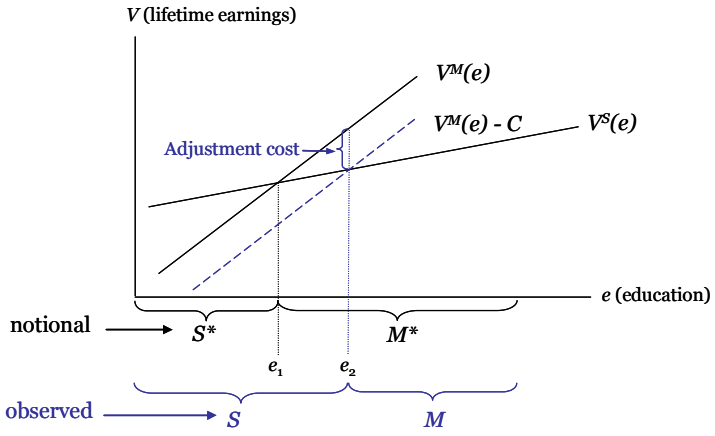
First, a version of (10) is estimated with exogenous market prices p_k used in lieu of transaction-specific prices p_{ik}. This yields predicted choices and the estimated Mills ratio $\hat{\lambda}_{ij}$. The latter is introduced into second-stage price and transaction-cost regressions (8) and (9), giving predicted prices and transaction costs $\hat{p}_{ij}$ and $\hat{t}_{ij}$. Those are used to generate an estimate of $\mathbf{X}_{ij}$:

$$\hat{\mathbf{X}}_{ik} = \left[\hat{p}_{ik} - \hat{t}_{ik}; z_{ik}^{f} \right]. \qquad (13)$$

The last step consists of re-estimating (10)-(11) using (13) instead of (12). The price equivalent of the fixed transaction costs can be taken as the ratio of the coefficients on the first and second arguments in (13), since their ratio gives the marginal rate of substitution between "net prices" and fixed costs along a constant probability of choosing market *k*. The result is a whopping 77% of the average sales price for the fixed transaction cost, against about 15% -30% for the transportation cost. Clearly, fixed costs of that magnitude have very different implications from the 15% of Renkow et al.

As for sunk costs, Cadot et al. (2006) used their estimate of earnings differentials to generate an estimate of the sunk cost of leaving autarky. The story is illustrated in Figure 1, where the horizontal axis measures a farmer's individual trait, say education, and the vertical one measures lifetime earnings. The $V^S(e)$ curve represents the present value of earnings when the farmer is currently under subsistence (as determined by the switching-regression algorithm described earlier in this paper) and $V^M(e)$ the same thing when he is in "on the market".

Figure 1



Notionally, farmers should be in subsistence only up to e_1, where the two curves cross. But they are observed to be in subsistence up to e_2. At that point, $V^M(e)$ is above $V^S(e)$ by an amount *C*. This is the "revealed" cost of switching from subsistence to market farming (say, through the introduction of a new

crop on the farmer's tract of land), taken as a once-and-for-all sunk costs since it is calculated from a comparison of lifetime earnings.[4] Cadot et al. estimate this cost at between 124% and 153% of annual output (valued at market prices). This is a formidable barrier, although the low level of the estimated share of households in subsistence means that the aggregate value of the switching cost is very small relative to GDP.[5]

Thus, all in all, the empirical evidence, while still scant, is suggestive of very substantial transaction costs, especially if one thinks of adding up the disparate estimates of variable, fixed and sunk costs (although adding up figures obtained from different estimation techniques would be hazardous).

4. Conclusions and policy implications

4.1 Infrastructure

The variable (per-transaction) component of transaction costs is obviously linked to transportation costs. The need to improve rural roads is a cliché in development policy, but it is nevertheless true. Jacoby (2000) found a low elasticity of land prices—taken as the present value of agricultural rents—to distance (about 0.2), but he also found that the distributional effect of road investments is progressive, as remote farmers are typically the poorest. Incidentally, reducing transportation costs does not mean only paving roads, sometimes the "quick-fix" approach for governments that do not want to tackle governance or policy issues seriously. Transportation costs are artificially inflated by informal cartels (as in Madagascar), cartels blessed by regulation (as in West Africa), or irregular payments at roadblocks (as in most of Africa).

The work summarized above has also highlighted the importance of fixed transaction costs; in particular, judging from the results of the Peruvian survey used by Vakis et al. (2003), costs related to search, matching, and bargaining. Those are typically high in the countryside, but the 2008 World

[4] The figure illustrates the case of a single covariate (education). With many, the technique consists of taking the subsistence farm with the highest propensity score.
[5] Note that the estimation technique can detect only one switch point at a time. It could possibly be repeated in each sub-sample (say, by distinguishing farmers who sell only at farmgate from those who sell in more distant markets), generating evidence of further switching costs.

Development Report (WB 2008, ch. 5) reports a number of initiatives to improve the spread of agricultural information via radios, mobile phones and other media. If fixed transaction costs are as high as suggested by the estimates, this is a large source of reduction in the barriers preventing farmers from taking up market opportunities.

Large estimated sunk costs of exiting subsistence agriculture are, so far, largely a black box. Although the existence of substantial sunk costs in agriculture has not been questioned since the work of Eswaran and Kotwal (1986), we don't know much about what those costs are; direct, survey-based evidence would be useful to inform policy in this area. It is worth noting again that the estimation exercise on Malagasy farmers suggested that the number of farmers in need of adjustment assistance to get out of subsistence was small, implying that the level of adjustment assistance required would be modest. It would also be interesting to know whether outgrower contracts with large Northern buyers (e.g. supermarkets) reduce the share of those costs borne by farmers.

4.2 Intermediation markets

Minten, Randrianarison and Swinnen (2007) analyzed the experience of outgrower contracts for producing French beans for export in Madagascar and showed that farmers who joined the contracts changed their production methods not only for French beans but for other crops as well, in particular rice (which is, as already noted, a food crop in Madagascar). For instance, they resorted to more consistent use of fertilizers and manure. As a result, their productivity rose not just in the part of their plot devoted to the contract crop, but on all their land. This interesting result suggests three remarks. First, it reinforces the point that market-oriented farming generates substantial benefits; here, it leverages complementarities in knowledge. Second, it shows that incentives to innovate, and hence to become capable of switching from subsistence to market agriculture, may come, at least in certain cases, from the buyer side, highlighting the importance of intermediation markets. Third, it brings welcome nuance to the view that food standards are always and everywhere a barrier to trade. Here, tight standards combined with buyer assistance actually improved productivity and hence the ability of farmers to sell to *any* buyer. However, this comes with a caveat. Maertens and Swinnen (2006) also showed, in the case of Senegal, that outgrower contracts with smallholders progressively gave way to procurement from large plantations.

Smallholders were then increasingly driven into those plantations as laborers. The impact effect was a reduction in poverty, but such a fundamental change in the organization of production may prove, in the long run, to have far-reaching—and possibly unwanted—socio-political implications.

In other cases, like the Kenyan program studied by Eileen Kennedy, government purchases on fixed terms may also provide incentives—albeit artificial when prices are subsidized—for farmers to switch from food to cash crops (see also Goetz, 1993). But the experience with price stabilization funds has been dismal throughout Africa, and so has been the experience with export monopolies acting as sole buyers. By and large, there is nothing to regret from Africa moving away from State buying, even though the experience with privatization has itself been uneven. Brambilla and Porto (2006) showed that when Zambia's cotton export monopoly was privatized in 1994, entry led to a period of failure as farmers would, for instance, seek credit from one intermediary, sell to another, and default on the loans. The market disorganization that followed and lasted until about 2000 led to widespread retreat into subsistence agriculture and a reduction of productivity by half. However, improvements in market organization (essentially through different contract design) led to a subsequent recovery, with productivity ending up 19% above pre-privatization levels. This suggests two concluding remarks: First, the long-term supply response to market signals proved positive, even though it took time for the right contractual arrangements to emerge; second, even though barriers to exit from subsistence agriculture are formidable, in this case they did not prove insurmountable, perhaps, though, because the retreat into subsistence had been of short duration.

References

Alderman, Harold, and C. Paxson (1992), "Do the Poor Insure? A Synthesis of the Literature on Risk and Consumption in Developing Countries » ; World Bank Policy Research Working Paper 1008.

Binswanger, Hans, and J. McIntire (1987), "Behavioral and Material Determinants of Production Relations in Land-abundant Tropical Agriculture"; Economic Development and Cultural Change 36, 73-99.

Brambilla, Irene, and G. Porto (2006), "Farm Productivity and Market Structure: Evidence from Cotton Reforms in Zambia"; mimeo

Cadot, Olivier, L. Dutoit and M. Olarreaga (2006), ”The cost of Moving Out of Subsistence”; mimeo, University of Lausanne.

Dercon (1996), “Risk, Crop Choice, and Savings: Evidence from Tanzania”, Economic Development and Cultural Change 44, 485-513.

Dutoit, Laure (2006), "Switching-regression and Selection Models: A survey"; mimeo, University of Lausanne.

Eswaran, Mukesh, and A. Kotwal (1986), “Access to Capital and Agrarian Production Organization”, Economic Journal 96, 482.498

Fafchamps, Marcel (1992), “Cash Crop Production, Food Price Volatility, and Rural Market Integration in the Third World”; American Agricultural Economics Association Journal

Goetz, Stephan (1993), “Interlinked Markets and the Cash Crop-Food Crop Debate in Land Abundant Tropical Agriculture”; Economic Development and Cultural Change 41, 343-361.Jacoby, Hanan (2000), “Access to Markets and the Benefits of Rural Roads”; Economic Journal 110, 713-737.

De Janvry, Alain, M. Fafchamps, and E. Sadoulet (1991), “Peasant Household Behaviour with Missing Markets: Some Paradoxes Explained”; Economic Journal 101, 1400-1417.

Jayne, T.S. (1994), “Do High Food Marketing Costs Constrain Cash Crop Production? Evidence from Zimbabwe”; Economic Development and Cultural Change 42, 387-402.

Kennedy, Eileen (1994), “Effects of Sugarcane Production in Southwestern Kenya on Income and Nutrition”; ch. 16 of J. von Braun and E. Kennedy, eds., Agricultural Commercialization, Economic Development, and Nutrition; IFPRI.

Maertens, Miet, and J. Swinnen (2006), “Trade, Standards, and Poverty: Evidence from Senegal” Leuven: Centre for Transition Economics, LICOS Discussion Paper Series 177/2006.

Minten, Bart; L. Randrianarison and J. Swinnen (2007), “Spillovers From High-Value Agriculture For Exports On Land Use In Developing Countries: Evidence From Madagascar”; Agricultural Economics 37, 265-275.

Moser, Christine; C. Barrett and B. Minten (2005), “Missed Opportunities and Missing Markets: Spatio-temporal Arbitrage of Rice in Madagascar”; mimeo, Colgate.

Renkow, Mitch; D. Hallstrom and D. Karanja (2004), “Rural Infrastructure, Transaction Costs and Market Participation in Kenya”; Journal of Development Economics 73, 349-367.

Rosenzweig, Mark, and H. Binswanger (1993), “Wealth, Weather Risk and the Profitability of Agricultural Investment”; Economic Journal 103, 56-78.

Vakis, Renos; E. Sadoulet and A. de Janvry (2003), “Measuring Transaction Costs from Observed Behaviour: Market Choices in Peru”; mimeo.