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The Economics of Agricultural Development: What Have We Learned?

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**Contributed paper prepared for presentation at the
International Association of Agricultural Economists Conference,
Gold Coast, Australia, August 12-18, 2006**

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The Economics of Agricultural Development: What Have We Learned?

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Abstract:

Agricultural development thinking has gone through several stages of fad and fancy, often without an understanding of previous fallacies. Its current doldrums are unfortunate given the unrivaled importance of agricultural development for poverty reduction in most development countries. After reviewing several policy and program areas, lessons are synthesized, and a forward-looking research framework suggested, especially regarding role of specialization in the evolution of economic organization. The corresponding role of government is seen to be the facilitation of economic cooperation, rather than social engineering.

Introduction

At the 1995 UN Social Summit, 117 countries pledged to adopt programs to rid themselves of extreme poverty; the UN Millennium Summit agreed to halve global poverty by 2015. According to the International Fund for Agricultural Development (IFAD, 2001), these targets are not being met. Thirty million people a year should have been released from poverty for the 2015 target to be met. But, says IFAD, the figure is no more than 10 million a year, a rate of progress that makes the target unattainable. Since 75% of extreme poverty occurs in rural areas, IFAD suggests that the whole question be looked at in the context of the rural world. "Current development efforts grossly and increasingly neglect agriculture and rural people," says Dr Michael Lipton, Director of the Poverty Research Unit at Sussex University, who co-authored the report. Between 1987-98, for instance, agricultural aid to low-income or least developed countries, which account for over 85 per cent of the world's poor, shrank by two-thirds.

Since the 1980s, however, the Economics of Agricultural Development has arguably been in decline. Donor agencies have often found agricultural development contrary to the precepts of the Washington Consensus and of even less worth in the face of low agricultural prices. Economists often leave agricultural issues to the Agricultural Economics profession. But development is not a high status enterprise in departments of Agricultural and Resource Economics. This leaves agricultural development twice marginalized in the academe, and non-academic institutions are hard pressed to fill the void, despite the heroic efforts of a few stalwart crusaders and organizations such as IAAE. The following review of agricultural development thinking is offered in the spirit that understanding of previous thinking may help to identify new frontiers that today's researchers will find suitably promising and challenging.

1. Fads and fancies in the Economics of Agricultural Development

The Economic Development literature has gone through recognizable stages of fad and fancy. The 1950s and early '60s was dominated by the planning mentality. The rest of the '60s witnessed an era of dualism wherein import protection of industry was justified by asserting that the marginal product of labor in agriculture was relatively low. The '70s was the "growth with equity" decade. It was an era of modernism wherein social engineers at the World Bank and elsewhere decried market failures and proclaimed the need for redistribution in line with an imaginary social welfare function. The pendulum swung to the opposite extreme in the 1980s. Government was thought to be a greater source of failure than markets and the slogan, "privatize and get the prices right" ruled the day. As the

Washington Consensus faded with the Reagan-Bush era, a post-modern *development microeconomics* evolved from economists' fascination with the East Asian Miracle.

The perceived role of agriculture shifted dramatically as development thinking changed. In the dualistic view, agriculture could be squeezed, even as industry was protected to accelerate the transfer of surplus labor to the modern sector. Proponents of agricultural development (e.g. Mosher, 1966; Mellor, 1966; and Myrdal, 1968) noted that levels-of-living of the poor would not be raised by turning the terms of trade against those whose livelihoods depend on agriculture. Jorgenson (1961) showed how neoclassical forces could account for the relatively rapid increase in manufacturing employment. Johnston and Mellor² went further, describing how agricultural investments stimulate the larger economy through “pro-poor” linkages – lower food prices, higher employment and real wages, and induced demand for non-agricultural products combined with an economic surplus with which to fund their production.

During the interventionist ‘70s, it was natural to seek favorable linkages by subsidies and market interference in the name of Integrated Rural Development. The subsidies were largely delivered through line agencies with little or no accountability (Binswanger, 2004) and discouraged the emergence of spontaneous, unsubsidized institutions (Rosegrant and Hazell, 2000). Confiscatory land reform and a whole range of input subsidies both blunted incentives and provided opportunities for rent-seeking by coalitions of political and commercial elites. Infrastructure projects were characterized by huge discrepancies between project design and realization (Repetto, 1986). Growth in agriculture progressed nonetheless, aided in part by new technologies and rising factor productivity (Federico, 2005).

As the ‘80s brought new enthusiasm for trade-led growth, agricultural development thinking became more outward oriented (Clarete and Roumasset, 1987; Krueger et al., 1988; Gardner, 1996). Despite this, liberalization of agriculture lagged behind that of manufacturing (Federico, 2005). Rising per capita incomes, increased capital-labor ratios, and agriculture’s increasing concentration and commercialization all contributed to the resiliency of agricultural protection (Balisacan and Roumasset, 1987).

As the participatory development movement of the ‘90s (and beyond) focused increasingly on rural issues, *community driven development* (Binswanger, 2004) was the result. CDD is an approach that aims to “empower communities and local governments with resources and the authority to take control of their development” (Binswanger and Atyar 2003). The four core features of CDD are real participation, improving accountability, technical soundness, and sustainability. The promise of CDD is its recognition that political feasibility is essential for successful policy reform. Realization of its potential will require further conceptual development and synthesis from systematic case studies, however.

To a large extent, the fads and fancies of each decade have been abandoned without a thorough diagnosis of the reasons that they failed to deliver according to expectations. To some extent, new policies have been added without a corresponding dismantling of prior policies – giving rise to the suggestion that development policy has been based on *band-aid economics*. Indeed failing to learn the lessons of the history of development policies may have doomed us to

² E.g., Johnston and Mellor (1961), Mellor (1986) Mellor and Johnston (1984), Mellor (1995).

repeat them. For example, interventions during the '70s were based on the diagnosis of market failure and the prescription of Pigouvian cures. This method commits a *Nirvana Fallacy* by failing to engage in the comparative institutional analysis necessary to balance prospects for improved resource allocation with unintended consequences and implementation failures (Demsetz, 1969). In post-modern interventionism, market failure derives from misallocations in equilibrium, albeit without considering voluntary mechanisms of governance and multilateral cooperation. Like the old fallacy, the new nirvanaism suffers from misplaced exogeneity. The tendency to socially engineer reforms instead of facilitating cooperation persists. Just as the old structure, conduct, performance paradigm was replaced by contestable market theory and other innovations, the prospects for improved empirical work on developing agriculture await the development of an appropriate structural model wherein farm organization, specialization between family and hired labor, and choice of contracts across tasks and economic environment are understood as parts of an endogenous whole. Some of these themes are developed in specific contexts below.

2. Policies and programs

2.1. Behavior: Risk and crop insurance

Before Schultz's *Transforming Traditional Agriculture* (1964), it was implicitly believed that peasant farmers were traditional-bound, ignorant, lazy and backward. Their behavior was thought not to be describable by conventional models of economic rationality. Schultz shattered that belief, showing that poverty among peasant farmers derived from limited resources, including human capital, and from a stagnant technology, not from sloth or decision-making failures. Just as Schultz's book was catching on in the late 60's, however, high-yielding modern varieties (MVs) of rice and wheat were becoming available in Asia and Latin America. Rapid early adoption of MVs was enthusiastically described as a "green revolution."

By the end of the 1960's, however, it became apparent that the MVs were not meeting expectations. The forecasted doubling and tripling of yields was rarely realized. The rate of increase in the incidence of adoption slowed down much earlier than expected and when varietal adoption did take place, farmers generally "failed" to adopt the packages of inputs and cultural practices that were recommended by the international and national research and extension services.

Agricultural development professionals faced a quandary. On the one hand, they had recently been converted to the view that farmers were economically rational. On the other hand, farmers failed to adopt production techniques that were thought far superior to traditional practices. The agricultural development texts of the day (Wharton, 1969; Mellor, 1966) suggested a resolution to the apparent paradox. Farmers were rational but were assumed to be highly risk-averse, due to incomes in the proximity of "subsistence levels-of-living." New varieties and the associated packages of recommended practices were assumed to be much more risky than traditional practices. In summary, low-income farmers are risk-averse (RA), modern technology is more risky, and low-income farmers will therefore underinvest (UI) in modernization.

Empirical evidence for the RAUI hypothesis is mixed. Roumasset (1976) and Walker (1980) reject the hypothesis, but a few studies conclude that the role of risk-aversion in cropping decisions, varietal adoption, and fertilizer use is not unimportant.³ Anderson and Hazell (1994) provide a number of reasons why RAUI has not been more regularly confirmed. First, the modern technology, while more variable, may stochastically dominate the more traditional technology. Second, output variability is often negatively correlated with price fluctuations. Third, risk-reducing strategies, including both diversification and risk sharing (e.g., Walker and Jodha, 1986; Walker, 1989b) reduce the relevance of risk for an individual crop; and fourth, risk-coping strategies for consumption-smoothing (e.g., Deaton, 1990; Paxson, 1990; Townsend, 1994) reduce the importance of risk aversion.

Methodological problems may also exaggerate the importance of risk aversion. In particular, failing to fully specify the consequences of different choices may result in risk being a proxy for omitted non-linearities. This can be avoided by a complete specification of payoffs for each production technique in each state of the world, allowing the analyst to compute optimal behavior under the competing objectives.

The RAUI hypothesis has been a convenient rationale for subsidizing crop insurance. The prevailing orientation of agricultural development planning during the '60s and '70s was largely shaped by Mosher (1966)'s, *Getting Agriculture Moving*. The idea was to locate the bottleneck to development and design government intervention to remove it. The RAUI hypothesis fit into this thinking perfectly. Risk aversion was the culprit, and crop insurance appeared to be the natural tool to break the constraint.

By the early 1980's, however, it had become apparent that crop insurance was not a particularly effective instrument for promoting agricultural development. A new consensus emerged that crop insurance was good in theory but too costly in practice because of adverse selection, moral hazard and related administration costs (see especially Hazell 1992, Hazell et. al., 1986; and Nelson and Loehman, 1987). It may be, however, that crop insurance is bad in practice precisely because it is bad in theory, and the time has come to give it up and turn to more promising approaches to agricultural development.

As explained in Quiggin (1992), crop insurance causes positive negligence as well as negative negligence. Negative negligence is the tendency, even for a risk neutral farmer, to overuse risk-reducing inputs such as pesticide. Positive negligence is the tendency to overuse inputs that are yield increasing in the good state and yield decreasing in the bad state, e.g. fertilizer in drought prone areas. For a risk averter, the input effects of crop insurance result from a combination of the moral hazard effect (both kinds of negligence) and the risk-bearing effect. For inputs with a negative marginal product in the bad state (and a high enough marginal product in the good state to warrant use) crop insurance will lower the risk-bearing cost of the input, i.e., the effect on input use is positive. On the other hand, if the marginal product in the bad state is positive enough to decrease risk, crop insurance will decrease the use of that input. In these two cases, crop insurance exacerbates positive and negative negligence. Accordingly, crop insurance may produce

³ See Anderson and Hazell (1994) for references.

negative benefits. The higher the subsidy, the greater these negative benefits will be. Subsidized crop insurance will also partially displace risk-reducing and risk-coping strategies causing additional excess burden.

Another fallacy in the conventional view of crop insurance is that utility functions in current period income or wealth are typically taken as given. As shown by Spence and Zeckhauser (1972) and Roumasset (1979), however, such functions are inherently indirect and depend on the structure of assets, liabilities and transaction costs. Making subsidized crop insurance available or mandating insurance will change the utility function, in particular truncating the lower end. Among other things the indemnities obfuscate idiosyncratic transaction costs that the efficient decision maker takes into account. In short, the insurance promotes getting-the-incentives wrong.

2. 2. Marketing, parastatals, and price policy

Rashid et al. (2005) review the original motivation of parastatals and conclude that their dismantling should be accelerated. Their case against parastatals is actually somewhat conservative. The traditional case for parastatals presumes that governments *can* stabilize prices. Williams and Wright (1991) show, however, that trying to insulate domestic markets from international price fluctuations is counterproductive. Indeed the best means of stabilizing prices involves *using* international markets to stabilize domestic prices (Clarete, 2004).

Evidence to the effect that domestic prices vary less than international prices should not be construed as implying that governments have succeeded in stabilization. First, international markets are residual markets implying greater variability and that variability in the two markets are non-commensurate (Siamwalla). Second, data on "domestic prices" already contains a huge amount of averaging/smoothing. Third, such evidence may be selective. Some authors maintain that domestic prices are not more stable. Fourth, there is a non-observed counterfactual. We don't know how stable domestic prices would have been in the absence of government controls. Moreover, price stabilization may decrease economic welfare. Some argue that stabilization is a political necessity, but it appears that what is political is fooling some of the people into believing that government is in fact stabilizing when they are in fact extracting rents.⁴

Timmer (2002) makes a compelling case that border prices do not confer correct signals for agricultural development. Given the pro-poor and development linkages of agricultural development, increased incentives for agricultural growth may be warranted. This does not imply that agricultural price protection is warranted, however. Subsidized prices, especially when administered via monopolized import controls, fragment the economy and pull entrepreneurial resources into rent-seeking instead of productive innovation (Roumasset, 2002).

2.3 Land and labor markets

The efficiency case for land reform has traditionally been based on two planks – the relative inefficiency of large, commercial farms in the utilization of labor, and the inefficiency of share tenancy. A number of studies have suggested that hired labor is inefficient relative to family labor.⁵ Utilizing family labor economizes on recruiting and supervision costs, the latter because family labor stands to lose from both quality and effort shirking. These labor

⁴ Roumasset, 2003.

⁵ See e.g. Binswanger and Rosenzweig (1986), Binswanger, Deininger, and Feder (1995).

market imperfections are said to result in the productive superiority of family farms (Deininger, 2003, p. 84) and to the characterization of hired labor as inefficient (Otsuka, 2005). In contrast, Benjamin (1992) finds that hired labor is neither significantly more nor less productive than family labor.

The empirical case for inefficiency rests largely on the notorious inverse relationship between size and productivity (Berry and Cline, 1979). Recent evidence is mixed, however. Some studies confirm the inverse relationship (e.g. Burgess 2001 and Udry 1996). Others fail to reject constant returns to scale (e.g. Dow and Putterman, 2000; Wan and Cheung, 2001).

Even for samples wherein the inverse relationship exists, it does not follow that the allocation of labor is inefficient, however. First-best efficiency predicts that landlords will equate the marginal product of labor across diverse land qualities by adjusting the size of family farms thus leading to the observation of higher per hectare yields on smaller farms (e.g. Roumasset and James, 1979). Indeed, Benjamin (1995) shows that the inverse relationship is at least partly due to the bias induced by omitting land quality from the regressions.⁶ Deininger asserts, however, that the inverse relationship persists even after controlling for land quality with proxies such as land value. But land value is not an accurate indicator of land's potential agricultural productivity, nor is distance-to-market and other proxies. Lacking a perfect measure, one cannot confidently reject the hypothesis that the inverse relationship is due to land quality nor conclude that the relationship implies higher productivity of small-farm labor.

A second-best efficiency explanation for the inverse relationship is that the shadow price of labor for farm households that hire labor at the margin is higher than that for households who supply all of the farm labor, especially so for households who supply labor to other farms as well as their own (Sah, 1986). To the extent that the inverse relationship is sourced in this cause, no inefficiency is indicated. In the second-best equilibrium, shadow prices vary over space, time, and economic agents. Using a first-best standard of efficiency risks drawing policy implications that have efficiency-decreasing consequences.

Future documentation of the inverse relationship should distinguish between family and commercial farms. Feder (1985), Eswaran and Kotwal (1986), Carter and Wiebe (1990), and Deininger (2003) discuss the possibility that the inverse relationship could reverse for larger farms, noting that that their disadvantages in the labor market could be outweighed by their advantages in credit and other markets. Indeed, Uy (1979) finds an inverse relationship on family farms but a positive relationship between productivity and farm size on commercial farms. Likewise, in the *new supermarket economics* (Reardon et al., 2005), dedicated wholesalers coordinate specific farmers with specific retailers with appropriate procurement, quality, safety, and timing standards and thereby confer transaction cost advantages on large farms. The currently populist World Bank displays a curious schizophrenia here. They are quick to legitimize breaking up large farms because small farms allegedly economize on the transaction costs of hiring labor. But when faced with evidence that large farms have transaction cost advantages in credit and marketing, they call for cooperatives to appropriate those advantages, despite theoretical and empirical obstacles.

⁶ See also Roumasset (1976, ch. 4).

For the empirical literature on hired labor, and agricultural organization generally, to progress, two improvements are needed. First, the different types of transaction costs must be distinguished. Transaction costs have been defined by Nobel Laureate Kenneth Arrow as costs of running the economic system and are the economic equivalent of friction in physical systems (Williamson, 1985). The primary category of transaction costs is contracting costs, including the costs of participant-selection, negotiation, and enforcement. Lower costs of transportation, communication and institutional innovations that lower enforcement costs facilitate falling *unit transaction costs* per worker. But as intensification and specialization increase, for example, as the number of workers per hectare rises, *transaction expenditures* tend to increase, even as unit transaction costs fall.⁷ Making this distinction is essential for future empirical work.

The second needed improvement is to recognize that the choice of hired vs. family labor (using the market) is endogenous and that the two kinds of labor will naturally differ in both tasks and skills. In the simple version of the wedge model (Roumasset, 1981; de Janvry et al., 1991) household and hired labor are assumed to be perfect substitutes, and labor is hired because of the rising opportunity cost of household labor. An additional reason for hiring labor is that it facilitates specialization such as teams of workers that move from farm-to-farm doing the same task.⁸ On the prototypical farm in which both family and hired labor are employed, economics implies that there will be a non-random division of tasks between family and hired labor according to the comparative advantages of each.

The market failure view of share tenancy was based on the so-called Marshallian model, which was Pigouvianism before Pigou.⁹ According to Marshall's famous footnote, the rational tenant equates his marginal opportunity cost of labor with only his share of the marginal product. This alleged inefficiency was commonly used to advocate the banning of share tenancy. Cheung (1969) debunked this view, observing that the Marshallian model could hardly be an equilibrium contractual solution inasmuch as the landlord and tenant could renegotiate about the share and amount of output or inputs that must be provided or used, thereby making both parties better off.

Stiglitz (1974) proposed a principal-agency model wherein sharecropping is viewed as a pairwise-efficient means of incentivizing labor, relative to wage contracts, without the cost of risk-bearing that would be imposed under rent contracts. He thus resurrected Marshallian inefficiency and the proposition that share tenancy should be outlawed. Indeed Stiglitz (1994, 2002) has often used the institution of share tenancy to exemplify how economic organization can be in equilibrium but massively inefficient, asserting that a landlord's share of 1/2 would have the same disincentive effects as a 50% income tax. Hayami and Otsuka (1993) conclude that the risk-aversion vs. moral hazard model indeed "justifies the existence of share tenancy in the theoretically most consistent manner..." and econometric studies (e.g. Shaban, 1987) have concluded that the model is empirically sound.

As is the case with the literature on the inefficiency of large farms and hired labor, however, the inefficiency conclusion is premature. First, the canonical model does not imply, as originally claimed (Stiglitz, 1974),

⁷ The share of the transaction sector tends to grow with economic development North and Wallis (1982).

⁸ See e.g. Roumasset and Uy (1980).

⁹ It is easy to show that Marshallian underemployment is readily cured by a Pigouvian labor subsidy.

that the optimal share, β , varies positively with the tenant's degree of risk aversion. Risk aversion also blunts the tenant's incentive to shirk. Second, the model is incapable of explaining the empirical distributions of tenant shares, which cluster around of 50%, with a smaller cluster around 2/3.¹⁰ But the larger problem is that the theory fails to recognize the nature of share tenancy, a typically long-term contractual arrangement for bringing management together with land and that facilitates the tenant's learning-by-doing about production decisions (Reid, 1976; Murrel, 1983; Eswaran-Kotwal, 1986; Roumasset, 1995). Share tenants themselves hire substantial amounts of labor, especially for harvesting, weeding, and transplanting.

Judging the relative efficiency of different organizational forms commits the most fundamental fallacy in economics – judging performance without understanding the nature and causes of the phenomenon of interest.¹¹ Prescribing policy reforms based on the premise that politicians, bureaucrats, and academics can socially-engineer institutions superior to those shaped, tested, and improved in the crucible of competition is a recipe for government failure.

For example, land reform in the Philippines outlawed share tenancy. As a result, land reform beneficiaries hired permanent workers who were paid a fixed amount for the season. Hayami and Otsuka (1993) conclude that this has been an inferior substitute for share tenancy. Another Philippine example concerns the failure to properly base landlord compensation on land quality. By basing compensation on the principle that 25% of yield is a fair rent, reform confiscates value from owners of good and average farms but actually over-rewards owners of poor-quality land (Roumasset and James, 1979). As a result, friends and relatives of poor-quality landowners submit bogus claims that they have been working the land as tenants so that the landlord receives more than the land is worth (and landownership remains in the family).

2.4 Rural credit

Beginning in the 1950s and '60s, and expanding rapidly in the '70s, many governments concluded that small farmers lacked access to adequate capital and established *directed credit* policies. These programs typically provided subsidized credit to agricultural and rural banks, instructing the banks to lend to an agricultural and rural clientele without exceeding controlled interest rates. Meyer and Nagarajan (2000) show that loans were disproportionately given to large commercial clients, that there were high default rates and that the financial repression repressed the efficient evolution of credit markets.¹²

In concluding that modest financial restraint was a key ingredient in the *East Asian Miracle*, Stiglitz and Uy (1996) imply that the conclusions of the "Ohio School" may be too extreme, however. Making financial markets

¹⁰ Deweaver and Roumasset (2001), show that, for parameters representative of the Philippine case, the model predicts that optimal tenant's share declines from one to 80% as the tenant goes from risk neutrality to moderate risk aversion and increases back to one as risk aversion increases further.

¹¹ In Coasean terms, this is known as *blackboard economics*.

¹² As early as 1972, the US Agency for International Development Spring Review for Small Farmer Credit found that "the major increases that occurred in formal finance have mainly gone to larger farmers." Similarly, Gonzalez-Vega (1984) found that subsidized interest rates actually benefit the rich. Meyer and Nagarajan (2000) conclude that three decades of rapid changes and government interventions have left "a fragile financial system with limited outreach."

work better and improve resource allocation without picking winners e.g. through savings promotion, regulations to improve solvency, creation of financial-market institutions (e.g. bond and equity markets), and broad-based regulations that direct increased credit to the corporate relative to the household sector. The last policy is said to promote external economies, especially technological and marketing spillovers. Promoting slightly lower interest rates may decrease savings by households but increases savings among corporations.

As the directed credit program waned, due to low repayment rates and inability of rural banks to survive without large infusions of new subsidies, focus turned to the micro credit cooperative approach where “peer monitoring” substitutes for collateral (Conning and Udry, 2005). Morduch concludes however that while micro credit institutions are more profitable than the directed credit approach, they are typically not sustainable without administrative subsidies.

In order to analyze the consequences of credit market policies, we need to model the provision of credit. The first challenge is to explain the co-existence of formal and informal credit. Formal lenders also have a comparative advantage in utilizing formal enforcement institutions, while informal lenders rely on repeated exchange and reputation effects for enforcement (Roumasset, 1986). Hoff and Stiglitz (1998) provide a model in which formal sector subsidies allow lenders to expand their informal lending activities. Said expansion results in loans to less reliable and higher cost borrowers, resulting in a higher interest rate. Ghosh et al. (2000) obtain a similar result from a model with differential bargaining power of lenders relative to borrowers, where relationships are exclusive and interest rates are uniform.

Bose (1998) assumes that there are two types of informal lenders – the informed and the uninformed – and replaces the assumption of one price per market with the assumption that lenders offer their clients a menu of loan sizes and interest rates. When the government subsidizes credit, the perfectly informed lender offering lower interest rates increases his lending activity, choosing to lend only to reliable clients. The uninformed lender then faces a higher proportion of risky clients and lower expected profits, and must raise his rates and ration credit. This allows the informed lender to increase his interest rates.

Future models may elaborate on how the menu of contracts varies with both lender and borrower characteristics. The directed credit approach and the new informational approach can be combined by acknowledging government failure. Directed credit policies have artificially fragmented capital markets. Further subsidies will worsen allocative efficiency unless severe interest rate and sectoral controls are relaxed. By understanding the evolution of credit market deepening where it has been successful, insights into a facilitation approach can be attained.

2.5. Research and extension

Birkhaeuser et al. (1991) review 9 studies published between 1973 and 1988 on the rate of return to extension. These estimates range from negative to 115%. Evenson (1998) reviews another 6 studies conducted between 1973 and 1989. Between the two reviews, a total of 26 linear estimates of returns to extension were reported. Of these 26 estimates, only 11 were significant at the 90% confidence level. Of all of these, none found extension to increase total crop value by more than 27%.

Owens et al. (2003) note, however, that these estimates tend to be biased upwards due to endogenous program placement and two-way selection bias (agent selects farmer and/or farmer selects agent). Using productivity and farmer data (e.g., crop production and yields, revenues, land used in agricultural production, labor input, levels of education, rainfall, land quality, slope, soil type, and distance to market) from rural Zimbabwe, Owens et al. find that agricultural extensions (as defined as regular visits once or twice per year) raise the value of crop production by 15%. Inasmuch as these corrections cannot entirely control for within-location quality variation and differences in farmer characteristics some upward bias may remain however.

What is clear is that the returns to extension can be substantial and that sometimes extension fails to deliver a positive return. Accordingly research needs to shift from the question of how much extension to the question of how extension services should be delivered. Research on farmer behavior relative to recommended practices affords some tentative conjectures. First, top-down extension that attempts to coerce, cajole, or subsidize farmers into adopting “accepted practices” is risky business. Extension agencies are typically unable to tailor recommended practices in accordance with economic efficiency given the enormous diversity in agro-climatic, economic, and institutional environments. Instead, extension should offer farmers a menu of promising practices that may be suitable for their conditions and simultaneously communicate those conditions and farmer concerns back to the research establishment. Second, measures of extension agent performance are needed such that suitable agent incentives can be designed and implemented. Until this happens, horizontal and vertical accountability in extension will remain buzzwords.

3. Synthesis and New Directions

The tendency to leap to policy implications from a ad hoc explanation of a stylized fact perseveres. Not only do explanations need to be more complete in the sense described, but multiple explanations, with potentially different implications, should be entertained. Politicians, and many academics, have the incurable disease of top-downism. As recognized by Adam Smith, they are forever designing rules, regulations, and institutions to be coercively imposed on the economy.¹³ For example, despite decades of failed land reform legislation that have resulted in untold waste and injustice, land reform efforts continue to this day. The palliative for top-down tinkering with institutional design is an understanding of institutional choice and evolution. More specifically, we need a theory of how agricultural organization evolves from a self-sufficient peasant economy to a more specialized and intensive market economy. As also envisioned by Adam Smith, the division of labor affords a window into market development generally.

¹³ “The man of system, on the contrary, is apt to be very wise in his own conceit; and is often so enamoured with the supposed beauty of his own ideal plan of government, that he cannot suffer the smallest deviation from any part of it. He goes on to establish it completely and in all its parts, without any regard either to the great interests, or to the strong prejudices which may oppose it. He seems to imagine that he can arrange the different pieces of a great society with as much ease as the hand arranges the different pieces on a chessboard. He does not consider that the pieces upon the chess-board have no other principle of motion besides that which the hand impresses upon them; but that, in the great chess-board of human society, every single piece has a principle of motion of its own, altogether different from that which the legislature might chuse to impress upon it. – Adam Smith (1976), *Theory of Moral Sentiments*, VI.ii.2.17

Specialization is limited by the size of the potential market, and the size of the market is limited by population, incomes, and transaction costs.

On the other hand, a healthy respect for the role of efficiency in institutional change should not lead one to ignore the conventional role of government in the provision/internalization of public goods/externalities and the less conventional role of facilitating economic cooperation more generally. In particular, investing in agricultural research and legal as well as physical infrastructure will stimulate the coevolution of the division of labor and the corresponding institutional change. As specialization proceeds, more and more complex patterns of coordination are facilitated. In Reardon et. al's (2005) supermarket metaphor, for example, farmers are increasingly linked to specific retailers by means of complex chains that transform farm products over space, time, and form; thereby replacing the cumbersome and costly method of indirect coordination via inventories. The transaction sector that produces such transformation actually grows, even as the per-unit costs of coordination fall (North and Wallis, 1982). The agricultural development that ensues from this approach is likely to have a high growth elasticity of poverty reduction (e.g. Lipton and Ravallion, 1995). Not only does the facilitation strategy generate the traditional pro-poor linkages associated with lower food prices and higher demand for labor, but it aids workers whose wages are net of lower unit transaction costs as well as small farmers who benefit from falling transaction costs being subtracted from their sales and added to their purchases. Central design may actually fragment economic connectivity and stagnate efficiency-enhancing evolution.

One lesson from the history of thought that bears learning (lest one repeat it) is that the fads and fancies of development strategy have shifted one to another without adequate appreciation of the successes and failures of previous stages. In particular, investments in agricultural infrastructure and research were often successful, albeit their potential was not fully realized due to organizational problems in their implementation and remaining policy distortions.

The role of government is to *stop* fragmenting the economy through subsidies and constraints, *push* agriculture, e.g. through research and well-designed investments in irrigation, and to *facilitate* cooperation. To understand how to proceed with the third mission, further positive research is warranted. For example, how did capital markets evolve in different countries from fragmented institutions to integrated, complex, and deep markets? How did specialization evolve and how was it related to the movement of factor prices and productivity? These questions call for explorations in many countries over several centuries, i.e. they provide an apt challenge for economic historians.

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