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**Asset Functions and Livelihood Strategies: A Framework for Pro-Poor Analysis,
Policy and Practice ¹**

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Building upon the current emphasis on the importance of assets in increasing the productivity and reducing the vulnerability of poor peoples' livelihoods, a conceptual framework is developed that relates the functions and attributes of poor peoples' assets to their livelihood status and strategies. The framework promotes more integrated consideration of different assets held by the poor, and hence facilitates analysis for policy, capacity building and technological interventions to expand livelihood opportunities for the poor. The application of the conceptual framework is illustrated with preliminary analysis of small livestock keeping by campesinos in south east Mexico.

Introduction

Recent academic and policy debates concerned with attacking (particularly rural) poverty reflect a growing awareness of (a) the importance of a lack of assets as both a symptom and cause of poverty (for example Birdsall and Londono, 1997; De Jainvry and Sadoulet, 2000; Hoddinot *et al.*, 2000), and (b) the value of the livelihoods concept in understanding how the poor call upon a range of different assets and activities as they seek to sustain and improve their wellbeing (e.g. Ellis (2000)).

Formal attempts to develop the concept of asset based livelihoods have led to the development of frameworks for livelihood conceptualisation and analysis (for example Ellis (2000) and the 'sustainable livelihoods approach' in Carney (1998)). Drawing on the work of Chambers and Conway (1992), a livelihood is defined as comprising 'the capabilities, assets

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(including both social and material resources) and activities required for a means of living' (Carney (1998)). Sustainability is achieved when a livelihood 'can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base' (Carney (1998) p4).

As an approach to understanding and facilitating development the 'sustainable livelihoods approach' contains echoes of the basic needs approach and its evolution into concerns with food security and then poverty alleviation and reduction (Maxwell (1998)). It also draws on insights from 'integrated rural development', from farming systems research and from participatory approaches in development. These various strands are linked with appreciation first of the diversity of livelihoods of rural people, second of the roles of different types of assets in rural peoples' livelihoods, and third of the importance of the wider social and political and economic environment in mediating access to assets. Thus while increasing evidence has accumulated that rural people engage in many different types of income generating and livelihood activity (see for example Reardon, Taylor *et al.* (2000), Ellis (1998)), it is also recognised that their ability to engage in (often more profitable) non-agricultural activities is often very dependent on their access to assets (Reardon (1997); Baker (1995) and El Bashir, 1997, cited by Tacoli (1998); Dercon and Krishna (1996), de Janvry and Sadoulet (1996);). These authors show that different types of activity require different combinations of financial, human, social, physical and natural capital.

As Moser (1998) argues, analysis of the linkages between people's access to assets and livelihood diversification goes back into the literature of the late 1980's on people's coping strategies in response to seasonality and famine (for example Corbett (1989); Davies (1989)) and on the role of entitlements and assets in these coping strategies (Sen (1981); Swift (1989)). These coping strategies aim to maintain a minimum level of consumption in the face of changes (trends, cycles and shocks). Assets support consumption by (a) contributing to overall production and income and (b) allowing exchange and/or consumption in periods when there is no income¹. Asset and livelihood diversification therefore have important consumption smoothing, risk management and productive functions. Although the balance and trade-offs between these functions for households in different situations and with different asset portfolios are well recognised in the more theoretical economics and agricultural economics literature, there are often gaps in development practice in the conceptualisation of the roles or functions of assets in the livelihoods approach on the one hand and in the application of insights from the more theoretical literature on the other. Thus, for example, although the savings, buffering and insurance functions of livestock in livelihood strategies have long been recognised, technical research and interventions in livestock development programmes still tend to emphasise productivity improvements (Livestock in Development (1999)). For some types of livestock this will no doubt be appropriate to the changing livelihood strategies of some rural people, but there will be many situations where a careful balance needs to be kept between productivity improvement on the one hand and the need for secure savings and insurance on the other. Here a more sophisticated understanding is needed of the effects of people's changing asset portfolios and access to markets on the benefits of livestock keeping². How often, for example, are questions asked about the ways that changes in livestock keeping and access to microfinance services might compare (and affect each other) in providing means of savings and insurance to poor men and women?

Analysis of assets in rural livelihoods therefore needs to examine the functions of different asset types within the asset portfolios held by poor people with different livelihood strategies. Such analysis must then progress beyond categorisation of the types of capital (as emphasised by the SL pentagon of types of capital) to identify priorities for policy and for other interventions supporting expanded access to assets. Such prioritisation should relate poor peoples' access to different types of asset to the functions of those assets within changing and dynamic livelihood strategies, identifying the most effective livelihood development paths and the changing roles of different assets within those paths. To return to our consideration of

livestock, it is important to question the role of different livestock in the livelihood strategies of the poor. Will livestock production help them to climb out of poverty? How important are livestock as a form of savings of income from other sources and how does this importance vary between different livestock types and different livelihood strategies and strata? How do livestock production and savings compare with other productive and savings activities? How does livestock keeping complement cropping and non-farm activities in its contributions to and demands for income and assets? Questions such as these require a systematic analysis of asset functions in the varied livelihood strategies of the poor.

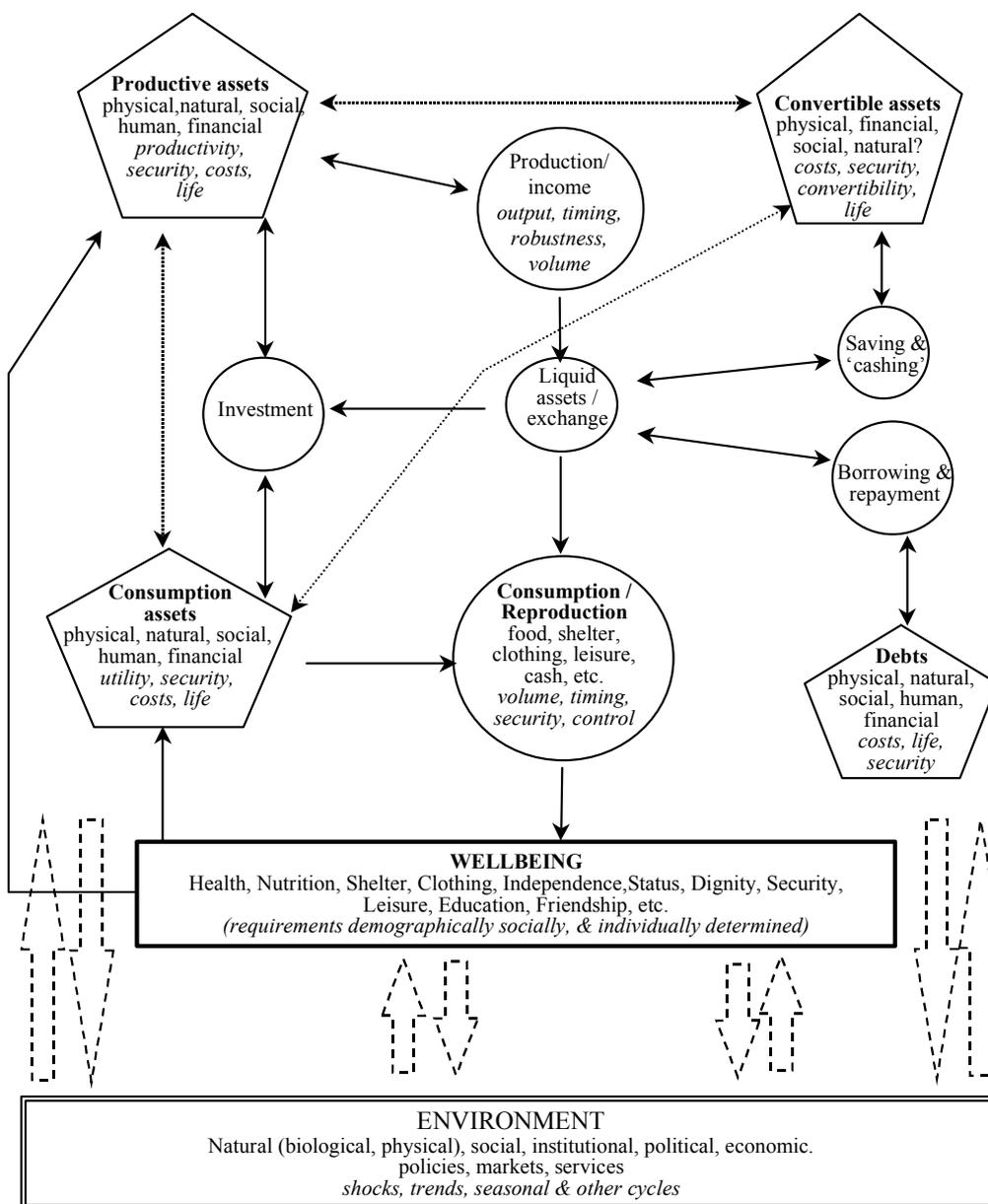
The Asset Function Framework

We now develop a conceptual framework to bring together the relationships between the different livelihood functions of assets. The framework is presented diagrammatically in Figure 1. The central vertical axis of Figure 1 shows production/ income activities and processes employing productive assets (in the top left corner of the diagram) to generate resources for consumption and social reproduction. This can be taken as representing simple income approaches to defining poverty and well-being. The well known shortcomings of such approaches are highlighted, however, if we begin to unpack on the one hand the multiple and often intangible elements that make up people's wellbeing and on the other the need for flows of resources for consumption to match patterns of resource flow necessary to maintain wellbeing.

Focussing on the latter issue, for most livelihood activities production or income is discontinuous and to a greater or lesser extent uncertain, affected by seasonal changes, trends and shocks. Discontinuity tends to be particularly strong for rainfed crop production, and for associated off-farm and upstream and downstream non-farm activities, but seasonality affects income from many other types of activity too (Gill (1991)). Income uncertainty can arise as a result of variability in a wide range of natural, market, social or political variables. Resultant flows of resources from income, therefore, may not match resource demands for consumption. These demands are made up of reasonably continuous elements (for example daily food and other needs), time-specific direct consumption elements (such as for seasonal festivals or school fees³), time-specific investment in consumption assets⁴ (for example house building or repairs may need to be carried out at particular seasons, or certain goods may only be available from traders at certain times of the year), and time neutral investment in consumption assets (for example in assets that can be obtained at more or less any time that resources are available). Consumption demands are also subject to uncertainty, as a result of social obligations or sickness, for example.

People adopt livelihood strategies to try to match expected resource availability with expected demand, while also allowing for unexpected falls in resource supply or increases in demand. They do this by making savings in assets that can be converted later to liquid or consumption assets (denoted as convertible assets in figure 1, for example holding of livestock or investing in social relations), by borrowing to gain current resources at the expense of later debt repayments⁵, and by adjusting their consumption patterns (both levels of daily consumption and the timing of investments in consumption assets). They also try to select and diversify their productive activities and time their investments in productive assets to even out and buffer resource availabilities.

ASSET FUNCTIONS IN LIVELIHOOD STRATEGIES



Key

Flows & transformations



Activities/
processes

Overlaps/ blurred distinctions



Assets
components
attributes

Figure 1: The Asset Function Framework

The layout of Figure 1 stresses the dynamic relationship between assets with different functions (in the corners of Figure 1) and various livelihood activities and processes (in the centre of the diagram) in the pursuit of wellbeing. This is not intended to imply that there is always a clear distinction between consumption, productive and convertible assets⁶. On the contrary, the same asset may fulfil all three functions to some extent, but assets will differ in relative effectiveness with regard to each function. Savings in a highly convertible asset like cash give no direct production or consumption benefits. Investments may take many forms, and may or may not be associated with production or consumption benefits. Savings in an interest bearing deposit account do yield an income (provided that the real interest rate is positive). The productivity of savings in livestock will vary with markets, management, the type of livestock, etc.

How may this analysis of asset functions in people's livelihood strategies facilitate understanding of these strategies? We suggest that the approach's strengths lie in its bringing together, in a fairly simple and readily assimilated framework, a number of complex components and attributes of livelihoods. These components and attributes are widely recognised amongst development practitioners and theorists working in different fields, but can be difficult to bring together and integrate. In the remainder of this paper we explore ways in which the integration proposed here may be developed and applied to assist in identification of technological, institutional, social and policy interventions to support sustainable livelihood improvement. We first consider ways in which the framework may be extended and developed, and then attempt to apply the framework in analysis of the role of small livestock in the livelihoods of *campesinos* in four villages in Yucatan, Mexico.

Asset functions: extending the framework

Asset/process integration

Perhaps the most obvious feature of the framework presented in Figure 1 is its emphasis on integration between four different types of process (production/income, investment, saving/cashing, and borrowing) and four associated functions of assets in effective livelihood strategies. The balance between these processes and asset functions, and the balance between the different nature of processes and types of capital asset (human, natural, financial, social and physical) on which they are based will vary between different situations, but one may hypothesise certain broad patterns of change associated with improved livelihoods. Four related hypotheses that might be suggested here, for example, could be to relate improved livelihoods with (i) a declining proportionate reliance on natural capital and associated processes⁷, (ii) declining relative importance of savings and convertible assets, (iii) increasing integration of convertible asset functions with productive or consumption assets, and (iv) increasing relative importance of market based processes and financial assets. Such hypotheses have important practical implications, and analysis of the ways that different types of process and asset relate to livelihoods can provide a constructive framework for developing cross-sectoral and inter-disciplinary approaches to research and action in the support of livelihood development, and a basis for developing indicators for livelihood change⁸.

Asset attributes

Recognition of different asset functions leads onto consideration of the attributes determining the effectiveness of assets in fulfilling these functions. Relevant attributes for each function are listed in Figure 1, and a number of attributes are, as one would expect, relevant to more than one asset function. This is illustrated in Table 1 which provides more detail on these asset attributes.

Some of the distinctions made between attributes or their components in Table 1 may appear a little arbitrary, and there is scope for considerable overlap in places, but the breakdown is intended to ensure that the important attributes are allowed for and can be summarised in Figure 1. Although the attributes of productivity, utility, and security may be relatively

straightforward conceptually, their objective measurement is not straightforward, due to problems with standardising units, particularly in the context of risk and uncertainty. Under the attribute ‘holding costs’ are included the various costs involved in holding and using an asset for production or consumption: costs involved in acquiring it or disposing of it are allowed for separately under ‘life’ (which describes the frequency of exchange) and ‘convertibility’ (which allows for the various costs involved in converting or exchanging an asset), to distinguish between the production and consumption costs in use from costs of converting or exchanging assets.

Table 1 Asset Attributes and Components

<i>Main Attribute</i>	<i>Components</i>
Productivity	‘Normal’ productivity; variability; sensitivity to and resilience under different conditions; probability of these different conditions; appreciation of asset value
Utility	‘Normal’ utility; variability; sensitivity to and resilience under different conditions; probability of these different conditions
Security	Risk of theft, loss of control or access; susceptibility to pathogens or other ‘natural’ event. For debts: risks to collateral or collateral substitutes
Holding costs	Maintenance and input costs (including time, claims, etc) borne by different stakeholders: under normal conditions; variability under different conditions; probability of different conditions Depreciation in time and in use: under normal conditions; variability under different conditions; probability of different conditions
Life	Expected period over which asset will be held: under normal conditions; variability under different conditions; probability of different conditions Asset value profile (seasonal, lifecycle changes)
Convertibility	Exchange costs: under normal conditions; variability under different conditions; probability of different conditions Access: under normal conditions; variability under different conditions; probability of different conditions Lumpiness
Complementarity	Effects on and of other assets and their functions
Ownership/ control	Private (individual, household); communal; public; gendered rights and responsibilities for disposal, acquisition, costs and returns

While it may be expected that high productivity and utility, low holding cost and longer life will be almost universally desirable asset attributes⁹, what is desirable in terms of convertibility is more ambiguous and contextually determined. Theoretically, high convertibility would appear to give more flexibility and lower costs, but it is widely reported that poorer people (and not just the poor) often impose disciplines and protection on their saving for longer term investment or for future consumption by placing savings ‘out of easy reach’ to prevent them from being cashed and spent by themselves or by others (for example relatives or neighbours) on more immediate consumption needs. Examples of this abound, from pension schemes in more developed economies to the poor investing in ‘lumpy’ assets

such as jewellery or livestock, or in informal (group or other) savings schemes in economies with less developed financial markets. Shipton (1990), for example, writing about rural communities in the Gambia states that ‘money is seen as something to get rid of to convert into longer lasting forms. Several features make money an unstable form of wealth in the Gambia: its nearly universal fungibility, its divisibility and its portability. These features make money contestable. Everyone needs it for something..... Rural Gambian saving strategies, then, are largely concerned with removing wealth from the form of readily accessible cash without appearing antisocial’ (p16-17). People thus try to maintain a balance between more and less liquid convertible assets to enable them to maintain their regular consumption requirements while at the same time protecting savings for larger scale investments or to meet large expected consumption needs in the future. Indeed, rather than receiving income from interest on their financial savings, poor people often pay charges to deposit savings.

If low convertibility is preferred, then this may be achieved by investment in assets that are relatively lumpy or have high transaction costs or barriers to access. Lumpiness is associated with reduced diversification, with consequent risk implications (of loss or of forced sale at low price) and with difficulties (for the poor) in building up sufficient other assets to obtain it. Barriers to access may involve some loss of control over a resource, and this too carries risks. High transaction costs may be a deterrent to ‘cashing’ small asset values, but will be important if and when this may be necessary. Savings in less convertible and more lumpy assets will thus tend to be less common among the poor, but may be something that the poor aspire to and work towards.

Similar ambiguities may be encountered as regards asset control. While private (individual or household) control may allow greater capture of benefits from an asset, this may be offset by lower productivity or utility, lower security and greater holding costs. The balance between these attributes is likely to vary with the overall asset holding and livelihood strategy of different individuals ¹⁰.

Assets and entry points in livelihood development

The roles of particular assets in the livelihoods of particular poor people can now be examined in terms of their mix of asset functions and attributes. Thus ownership (or potential ownership) of different types of livestock (such as bees, chickens, goats or cattle) needs to be considered in terms of interactions between the attributes of these assets and their functions within the overall asset holdings and livelihood strategies of their owners. Looking at it from another angle, the effectiveness of a particular asset in fulfilling desired asset functions is determined by its various attributes as listed in table 1. The attributes of a particular asset in turn depend upon other (complementary) assets held; on natural, social, institutional, economic and political influences and conditions in the environment; and on the technological characteristics of the activities and processes it supports. The productive, consumption and convertible functions of keeping chickens, for example, vary with access to the complementary assets used in keeping them (such as buildings, feed, labour, drugs); with environmental aspects (for example climate, local disease prevalence, gender roles in chicken keeping, and markets); and with the technology used (breeds, housing, disease control, feeding or other aspects of husbandry).

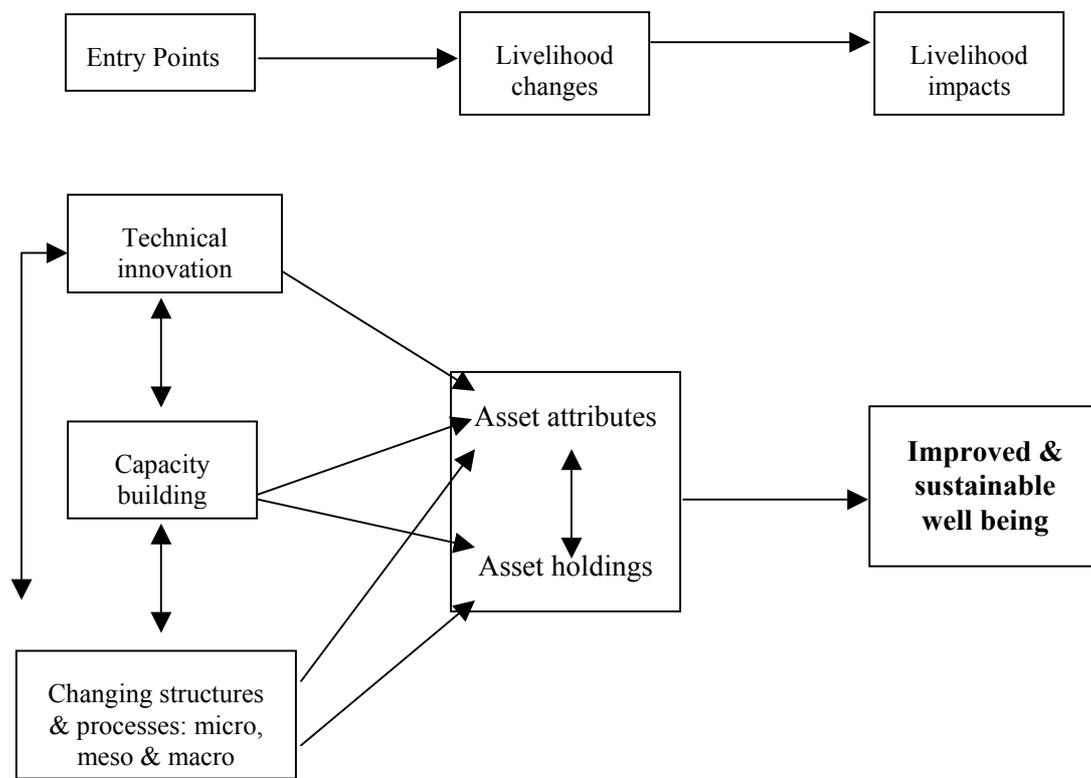


Figure 2. Entry Points and Livelihood Change ¹¹

Investigating asset functions in Yucatan, Mexico

Background

In the final section of the paper we describe a preliminary application of thinking about asset functions to investigation of the roles of livestock in livelihoods of poor families in four villages in the Yucatan, SE Mexico. Livelihoods in the area are based on low yielding production of traditional maize (the staple crop) in a ‘milpa’ slash and burn system (Gündel (1997)), production of maize and other crops for sale on arable land, keeping of livestock (poultry, pigs and cattle), (mostly seasonal) local wage employment, migrant employment in nearby cities and in the US, beekeeping, and shop keeping and transport. ‘Backyard’ pig keeping is an important activity in many households, but poses something of a puzzle for conventional economic analysis: pigs are fed significant quantities of maize grain, but this apparent competition with their owners for sometimes scarce stocks of food yields low growth rates and weight gains, and hence negative financial returns, even before any labour costs are imputed (Drucker, Gomez *et al.* (1999)).

As part of an action research project investigating the potential for improving crop and livestock productivity through greater integration between small stock (pig and poultry) keeping and cultivation of leguminous cover and forage crops, a well-being ranking exercise was carried out in the four villages. Although the detailed structure of rankings differed across the four villages, it is possible to identify four broad well-being strata.

The 'poorest' tend to consist of elderly couples or newly-wed families with small children. They tend to live a 'hand to mouth' existence, working as casual labourers all year to meet immediate consumption needs. In the words of local people 'they only look for what to eat today' and 'They always have to go out to work, live on a daily basis, and work as labourers in order to buy maize. They do plant maize, but mostly they can only carry out the first planting and this is risky as they may lose their harvest, or not harvest enough to last the whole year' (field interviews). All households in this stratum keep poultry, and a little more than half also keep pigs. Households in this stratum have very low incomes, are socially marginalised, and very vulnerable.

Almost all households in the 'poor' stratum keep pigs and poultry. Maize production is normally insufficient to support household needs through the year, although they do produce significantly more than households in the poorest stratum. Household labour is hired out at critical times of the year (generally from June to September, either locally or in urban centres) in order to earn cash to purchase maize (for human and livestock consumption) and other household goods.

The 'not so poor' and 'well off' strata produce sufficient maize and/or gain regular incomes from trading income, produce sales or regular remittances from migrant labour. They have a number of pigs and cattle. These two strata make up some 30% of the population, the 'poorest' and 'poor' strata accounting for over 70% of the population.

About 12 women from the two lower well-being strata in each village formed livestock experimentation groups to examine possible changes in health and feed practices for their small stock. As part of this, members made monthly estimates of the grain fed to their animals and recorded changes in stocks of pigs, turkeys and chickens, by age category over a 15 month period from August 1998 to October 1999. This data, which was not always complete due to occasional absences from monthly meetings, was then interpreted with the women to examine the different ways that women in the two well-being groups managed their small stock, and the reasons for these differences.

Asset functions

Table 2 provides a broad summary of the main holdings of natural, human and physical capital for each of the four well-being groups, identifying the activities that they are associated with and some of their attributes. The summary is very 'broad brush', and the attributes selected for inclusion in the table, and the way that they are broken down, are specific to the nature of the livelihoods of poorer people in the study villages, and reflect researchers' prior interests in livestock. Little information is available about financial or physical capital, and no attempt is made here to include any explicit examination of social capital, although there was tendency for female headed households to be found in the lower groups.

Looking at Table 2, we can see how asset holdings and their attributes change as we move down well-being groups: changes occur both in the attributes of the overall asset portfolio, and in the attributes of the individual assets or groups of assets making up that portfolio. We examine these changes first to learn about the role of different livestock in the livelihoods strategies of households in different strata, and then to test four hypotheses suggested earlier in the paper.

Looking at changes in asset holdings in Table 2, the value of the asset portfolio and the range of assets held decreases as one moves down the table. Particular assets (generally the larger and more productive assets) are held only by the better off (for example steers, bee hives, shops and trucks). Human capital also changes, as more skilled and higher earning labour resources are found in better off families. One of the defining characteristics of the poorest families is a tendency to be acutely short of labour and to lack the financial resources to buy in labour.

Table 2 on this page

The asset portfolio held by households in higher well-being groups is also more productive. Although data are not available for estimation of differences in the marginal value product of capital, the proportion of productive assets in the asset portfolio is higher for the higher well-being groups, and when they own similar assets these also tend to be more productive. This variation in portfolio composition and in asset productivity is associated with (a) poorer groups placing more emphasis on holding convertible assets¹² and (b) complementarity between asset holdings with poorer households being constrained from keeping more productive assets with higher holding costs (or from incurring costs necessary to support higher productivity of the assets they hold). This relationship between asset productivity, convertibility and costs is illustrated by comparison of pig keeping strategies between the different well-being strata.

Detailed examination of the seasonal holdings of different categories of pig by the 'poorest' and 'poor' well-being strata reveals different livelihood strategies in pig keeping. Only in two villages do members of the 'poorest' strata keep pigs. Amongst pig keeping households, however, the number of sows and piglets kept (0-3 months) is very similar between the two strata. However, while 'poor' households rear these piglets to maturity and then sell them at 6-9 months, the poorest households sell almost all of their young pigs over the period June to November, to meet immediate cash needs to purchase grain¹³. The 'profitability' of rearing piglets and selling them at such a young age is very low, whereas households (in the 'poor' stratum) who are able to keep piglets until they are ready for slaughter achieve a better return (see table 3). The best return on pig keeping is made by the 'not so poor' and 'well off' households who buy piglets (below cost) from the 'poorest' households and then fatten them up, as these households do not have to incur the cost of holding a breeding sow for the purchased piglets.

Table 3. Returns to keeping piglets and young pigs (US\$)

Annual rearing 1 litter to 3 months		Keeping young pigs		
	0 to 3 months		4 to 9 months	10 to 15 months
Annual costs keeping sow	750	Opening valuation	160	350
Piglets raised per year	5	Feed costs, 6 months	135	270
Cost/piglet	150	Total cost /pig	295	620
Sales price/piglet	160	Sales price	350	800
Margin/piglet	10	Margin/pig	55	180
Total margin/year (1 litter /year)	50	Margin/pig/month	9	30
Margin/pig/month	1			
Annual return to capital (ignoring labour costs and capital invested in sow and housing)	7% on sow feed costs	Returns to capital over 6 months (ignoring labour costs and capital invested in housing)	19%	29%

The poorest households therefore keep piglets as part of an overall portfolio that includes (in declining order of importance) (a) a breeding sow as lumpy and not very convertible 'savings', (b) rearing of piglets as a means of seasonal, diversified saving and (c) the possibility of this 'savings driven' strategy yielding returns and accumulated savings should it be possible to keep a piglet long enough to fatten it. As a result of greater access to complementary assets (of maize and cash), households in the 'poor' stratum are able to keep their piglets longer, invest more in them in the way of feed, and get a more productive return from their investment, although this is still low. A similar pattern of variation between strata is found in turkey keeping, where again the poorest tend to sell young turkeys, whereas the poor tend to keep them until they are mature (sometimes selling them to buy a pair of young pigs).

Associated with differences in assets and asset portfolio productivity and convertibility are differences in holding costs. The asset portfolios of the better off strata tend to involve higher holding costs (which are more than outweighed by their higher productivity). Increased well-being also appears to be associated with investments in assets with longer life (although the less poor strata also have more liquid assets such as maize grain). There is also a tendency for female control of assets (generally associated with shorter term, smaller, less productive and non-marketed assets) to decline as a proportion of total household assets, and possibly in absolute terms too, in better off households.

We may now ask if the changes in asset portfolios, attributes and functions described above conform with the four hypotheses suggested earlier, relating dynamic changes in portfolio composition and function with improving livelihoods. The extent to which they can be tested in the case study villages is limited not only by the limited data available, but also by omission of examination of the effects of rural-urban migration, although urban migration is a major path out of rural poverty in Mexico (de Janvry and Sadoulet (2000))¹⁴. Nevertheless, the first hypothesis appears to hold, even for households who stay within the rural economy, as increased well-being is associated with declining relative importance of natural capital.

Support for the second and third hypotheses (that improved livelihoods are associated with declining relative importance of savings and convertible assets and with increasing integration of convertible asset functions with productive or consumption assets) is more equivocal. For pigs, turkeys, livestock as a whole, and indeed all assets except maize stocks, the proportion of assets that are held mainly as convertible assets falls, and the integration of productive and convertible assets increases for the higher strata (as evidenced, for example, by changes in the structure of pig keeping). However, the other striking change in asset holding between the strata is in holdings of maize: increased holdings of this highly convertible asset by the better off strata does not support the general hypothesis¹⁵.

There is insufficient information on households' holdings of financial assets to properly test the fourth hypothesis (that improved livelihoods are associated with increased relative importance of market based activities and financial assets). However, it seems clear that the poorest households are more dependent on markets than households in the 'poor' stratum, as a much greater proportion of their labour is hired out, and more of their maize is bought in. Moving from the 'poor' to the 'not so poor' and 'well-off', livestock and cropping activities do appear to be more market based, but the picture is not so clear for labour, as some households become more involved in wage earning while others develop their own business.

Conclusions

How much, then, has the development and application of the 'asset function framework' contributed to the work in south east Mexico, and how much may it contribute in other work? It depends, of course, on how much is already known in an area, and in many ways in the work in Mexico the framework has only drawn on and developed understanding that had already existed, within local communities and within the research team. However, much

earlier use of the framework would have helped in designing research approaches, in working with and learning from rural people, and in developing cross-disciplinary understanding within the research team. It would also have encouraged the asking of a wider set of questions.

A more explicit understanding of the varying roles of pig keeping in the different well-being strata poses important questions for livestock research and development. The classic technical and commercial response to low profitability and low productivity is to raise returns to the fixed costs of keeping a sow, by breeding and feeding for larger litter sizes, by trying to increase the frequency of litters and, by more intensive feeding, to reduce the time to fattening. However, larger and more frequent litters are only beneficial if a household has the resources to feed the piglets, and for the poorest households the greatest productivity benefits may come not from producing more piglets but from being able to keep one or two through to maturity. Better management of feed (with better feed efficiency) and better access to maize and alternative feeds (such as forage) may therefore offer the greatest potential for improvement.

More fundamentally, however, one may question if trying to improve the productivity of pig keeping should be a priority in supporting livelihood improvement: if pigs are kept by the poorest as a rather costly and risky means of saving, better approaches may be either to look for ways of making small stock keeping a less risky and less costly way of saving, or to look for other forms of saving which are less costly, more secure, and have the same (or more desirable) attributes as regards accessibility and (gendered) control¹⁶.

A final comment concerns the use of the framework as a basis for identifying monitoring indicators. Earlier use of the framework would have enabled earlier identification of critical monitoring indicators, both for the women's groups and for the project. However, our experience suggests that improved livelihoods cannot be related to universal patterns of change in the attributes of asset portfolios (as suggested by the four hypotheses suggested earlier). Different paths out of rural poverty involve different strategies and hence different patterns of change in asset holdings, functions and attributes. We would all benefit from greater understanding of these paths and of the asset changes associated with and required for movement at various stages along them: the framework presented here may also provide pointers for improving analysis and understanding of these pathways.

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Endnotes

¹ Income is taken to include own produce for consumption as well as cash income.

² Non-productive and non-market asset functions are particularly important in economies where markets are thin and there is limited growth and formal employment.

³ Although here we have loosely categorised seasonal festivals and school fees as time specific consumption expenditures, both should also be considered as very important investments in assets, the former in social capital and the latter in human capital.

⁴ We make a distinction here between direct consumption of liquid assets (for example food, fuel, medicines and/or cash to buy them) and consumption of services from ‘consumption assets’ (such as housing, clothing, or cooking equipment). While the consumption of both liquid assets and services may be continuous, the acquisition of consumption assets will often require lumpy, discontinuous investment. The role of assets in providing ‘protection’ (DFID, 1999) is not explicitly allowed for in the framework as presented, but is important in supporting the other assets functions.

⁵ Rutherford, S., L. Mutesasira, H. Sampangi, H. Mugwanga, J. Kashangaki, F. Maximambali, C. Lwoga, D. Hulme and G. Wright (1999). Savings and the Poor: the methods, use and impact of savings by the poor of East Africa MicroSave-Africa, East African Savings Study distinguishes three ways by which poor people use small bits of income to accumulate larger lump sums: ‘saving up’ (saving, with income before use of the lump sum paying for it), ‘saving down’ (borrowing, with income after receipt of the lump sum paying for it), and ‘saving through’ (insurance, with income before and/or after receipt of the lump sum paying for it). ‘Saving through’ is not shown in Figure 1, but conceptually fits best as a form of saving to gain access to convertible assets.

⁶ Debts, as a negative asset, are more distinct.

⁷ Reardon, T., J. E. Taylor, K. Stamoulis, P. Lanjouw and A. Balisacan (2000). "Effects of non-farm employment on rural income inequality in developing countries: an investment perspective." Journal of Agricultural Economics 51(2): 266-288., for example, suggest three alternative patterns of variation of non-farm *income* shares with total income: a negative relationship, a positive relationship, and a U shaped relationship. They suggest ‘a rough pattern’ (with exceptions) of ‘a positive relationship between non-farm income share (and level) and total household income and/or landholding in much of Africa, a negative relation in much of Latin America, and a very mixed set of results in Asia’ (p272).

⁸ One issue in the operationalisation of the Sustainable Livelihoods approach within the UK Department for International Development is the development of relatively simple M&E indicators that summarise but take account of (complex) changes in assets, income, vulnerability and other elements of the sustainable livelihoods framework.

⁹ Even low holding cost may not be desirable in itself if it tends to be associated with low productivity.

¹⁰ Recognition of different types of control opens up the possibility of analysis of asset holdings, functions and attributes at different scales of analysis – individual or household, communal, meso and macro scales for example.

¹¹ For ease of presentation, feedback from impacts to livelihood changes to entry points are not shown, although they are expected to be significant.

¹² We discuss later the relative importance of convertible and productive assets in the portfolio, but there is a general tendency for the proportion of convertible assets to be higher for poorer groups, *except* for lower holdings of maize stocks.

¹³ Sale of these piglets may also be to escape the costs of purchasing grain to feed them (compared to households in the ‘poor’ stratum, a higher proportion of pig keeping households in the ‘poorest’ stratum feed purchased maize to pigs and rates of feeding per animal appear to be similar across the two strata).

¹⁴ Some families in the experimental groups did have men who travelled to the US during the study.

¹⁵ A number of issues are relevant here, first the cultural importance of households having enough subsistence production if they can (which leads to better off households producing larger quantities of maize), and second the cultivation by poorer households of hybrid maize, which does not store well and therefore has to be sold shortly after harvest. Hybrid maize has higher yields but poorer storage

qualities, whereas non-hybrid maize has lower yields, is preferred as regards tasset and cooking qualities, and stores well (and so can be kept on farm without the losses involved in selling maize at times of lower price and buying at times of higher price). Finally, data limitations mean that maize stocks are being considered in isolation from other convertible assets, such as cash, informal cash savings, etc).

¹⁶ As the research described in this paper was being wound up, an NGO working in the area was working with (male) farmers in one village to start a maize grain bank. In potentially providing a means of savings and cheaper and greater access to maize during the pre-harvest shortage season, this has the potential to undermine or enhance the savings function of pig keeping among poorer households. The links between the grain bank and pig keeping may be further complicated by male control over the grain bank, when both maize and pigs are traditionally controlled more by women. A purely 'savings' based view of piglet keeping by the poor may, however, miss the opportunities that piglet keeping may allow for a poorer household to make some income if things go well and it is able to keep a piglet longer.