Economics for sustainable rural systems

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Received 3 August 1999; received in revised form 25 April 2000; accepted 1 May 2000

Abstract

Critics often reproach the discipline of economics for supporting developments that result in environmental and social degradation. This article identifies where such censure is valid, but proceeds to argue that the rationale underlying economic techniques is at fault, rather than the techniques themselves. Within the rural context, we suggest that economics can make a valuable contribution to the design and achievement of sustainable ways of living. Valid criticism of economics focuses on its assumptions about value, since this has led to emphasis of favourable effects of markets, and laissez-faire. Policies exposing rural areas to more rigorously competitive market conditions encourage their transformation by increasing mechanisation, industrialisation and a less sustainable use of resources. New approaches and policies are required if different outcomes are to be achieved. An initial step is to identify desirable outcomes, a matter of social choice. However, society makes multiple demands on rural resources, and such issues cannot be adequately captured within a neo-classical welfare model. An alternative, hierarchical framework in the tradition of systems thinking, capable of analysing the complex relations associated with rural resource use, provides appropriate emphasis to the economic links between goals at different levels within the system, and appears to have some heuristic value. An empirical counterpart of the hierarchical framework, input–output analysis, generates information to support social choices and can also contribute to the understanding of economic systems and their interaction with the wider social, cultural, ethical and environmental universe. The article concludes with some revised economic policy prescriptions to promote rural sustainability. © 2000 Elsevier Science B.V. All rights reserved.

Keywords: Rural sustainability; Hierarchy theory; Systems thinking; Input–output analysis

1. Introduction

This article examines the role of economic discourse in making progress towards more sustainable rural systems. Because the fundamental argument is in favour of a greater systems approach in economic thinking, this spatial separa-
tion may initially appear paradoxical; however, two considerations suggest that we should specifically address rural issues. First, despite the valuable ecological niches contained in urban areas, the countryside contains far greater natural resources systems, supplying food, leisure opportunities and ecosystem services that must be safeguarded for a satisfactory quality of life. Second, economic analysts of rural land use systems, especially agricultural economists, have acquired a reputation for uncritical application of neo-classical approaches to the issue of sustainability, thereby alienating themselves from allied intellectual perspectives, especially those concerned with assessing the impact of human-induced changes on the environment.¹

The origins of this antipathy are various. Significant contributory elements may be the reductionist character of analytical methods in mainstream economics, especially with regard to ‘resources’, and limited psychological and ethical perspectives (Kerlin, 1998; Smith and Sauer-Thompson, 1998). Whilst the perspective of economists clearly distinguishes between the positive (an attempt to describe things as they exist) and the normative, suspicion arises of guilt by association with the interests of corporate capitalism, due to an (at least implicit) orientation towards market liberalism. Where neo-classical economists have made efforts to incorporate sustainability within their theoretical structure, further distrust has been generated, as they conceive natural capital solely as a productive asset (considering it and ‘human-made’ capital as substitutes) from which to maximise consumption, subject to limiting constraints. The ‘weak’ version (defined by Pearce and Atkinson, 1993) is especially inflammatory to environmentalists, who consider (over)consumption to be the major cause of unsustainable human behaviour.

This article is an attempt to rehabilitate economic analysis by demonstrating that it is not incompatible with recognition of rural environmental concern. We emphasise, with examples of existing techniques, that economics can make valuable contributions to the design and achievement of sustainable ways of living, giving attention to the specific issues raised by rural areas. This theme is developed over four substantive sections. The first examines conflicts over value, in particular criticising conventional theories of market exchange and the resulting policy prescriptions for rural areas. The next section investigates adoption of conscious social choices as an alternative to unrestrained market behaviour, specifically examining the framework in which goals are set. It employs hierarchy theory to demonstrate the superiority of adaptive management strategies over the high levels of aggregation and optimising solutions required for traditional modelling approaches. The third section reviews analyses that can generate information, support social choices, and illuminate the interaction of economic systems with the wider social, cultural, ethical and environmental universe. The conclusion assesses the scope for a reconstructed economics, able to contribute to the formulation of policies for rural sustainability.

2. Values, markets and sustainable rural development

The neo-classical view of economics concerns scarcity and choice, basing value on utility and the availability of resources, of diverse tangibility, to deliver satisfaction. The concept of utility was invented to transcend the division of value into divergent use and exchange components by classical economists, which they had inadequately resolved with the labour theory of value.² Though Marshall (1920) (p. 93) noted that utility — satisfaction of wants — was not the only source of

¹ There are notable exceptions, including Chavas (1993) on sustainability and survival strategies; Toman (1994) on a consensus definition of ‘social capital’ and safe minimum standards; Green (1994) in the context of low-income countries; and Yiridoe and Weersink (1997), who use choice theory to achieve sustainable agroecosystems.

² Earlier, the Physicocrats attempted to locate value in what today might be termed ‘resource content’; modern counterparts include Hannon et al. (1986) and, in the context of this discussion, see also Owens (1994).
value, his conception subtly shifted the emphasis towards the measurable dimension of internal human desires, their external satisfaction through resource utilisation. Consequently, greater potential satisfaction through exchange, mediated by the market and price system, became a governing principle. When the mathematical tractability afforded by optimising equilibrium was added, the complex edifice of comparative static modelling of exchange and welfare functions resulted in an embedded emphasis on the favourable effects of markets and laissez-faire in economic consciousness. In contrast, we argue that rural development policies based on exposure to more vigorously competitive market conditions are likely to result in an unsustainable use of rural resources, even in the weakest sense in which the expression is used. Prominence is given to the tradition of spatial disequilibrium analysis established by Myrdal (1957) except that, rather than being concerned with the effects of consolidated development on a hinterland, the focus is on underdevelopment as a primary barrier to the establishment of sustainable rural systems.

Rural areas are presently unsustainable in at least two ways, environmentally and demographically. Through escalating competitive pressures, natural resource-based activities have become increasingly like their counterparts in the manufacturing industries (see, for example, Albrecht, 1997). Agriculture, in particular, has reproduced tendencies apparent in the overall economy of increased segmentation and differentiation, greater use of non-renewable resources and divergence from natural and economic processes. The impact on ecosystems has become increasingly invasive, to the point where the integrity of their major component ecosystems systems are being compromised. Pierce (1993) has argued that, whilst there has been rapid physical production growth, adverse outcomes for income, community stability and resource and environmental conservation have emerged. Coupled with this, the countryside is losing population, at least in gross terms. Clark (1998) argues that this is due to increased interdependency, as corporate capitalism extends its global scope. Both aspects are considered in detail in this section.

Rural economies, at least until recently, have been concerned with primary, or ‘near-primary’ production: food, fibre, timber, minerals, and labour-intensive manufacturing. Wider, more vigorously competitive markets have emerged as transport costs have declined and trade barriers have withered. Krugman (1996) comments on the importance of agglomeration economies in development of urban centres: consequences for rural areas include a relative decline in the terms of trade, counteracted only if rural labour productivity improves. Evidence of changing agricultural terms of trade (by inference, incorporating all rural near-primary production) tends to be expressed predominantly in international terms. However, inter-sectoral evidence existing for individual countries unequivocally suggests a decline in the terms of trade (see Gopinath and Roe (1996), for the United States; Tangermann (1994), for the transitional eastern European economies; and Lund (1994), for the UK).

The consequence of terms of trade deterioration, given the medium-term inflexibility of local rural labour markets, is a chronic overall decline in rural incomes, although technological change has counterbalanced the effects, at least for privileged groups. Because of this, attempts to counter such declines have involved economic restructuring, applying the logic of cost-saving industrialisation to rural, predominantly natural resource-based activities, whilst concurrently offering (ostensibly interim, though in practice open-ended) protection for the industries concerned. In essence, this has been the approach of postwar agricultural policy in industrialised countries, with variants also applied to forestry, fishing and energy. As a result, activities have become more systematically organised, exploit economies of scale (particularly to promote mechanisation and the use of agrochemicals) and

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3 Critical scrutiny of the concept of equilibrium has been wide-ranging and includes, for example, Leijonhufvud (1968), attacking the incorporation of Keynesianism into mainstream neoclassical economics. Kornai (1971) has criticised its adverse effect on systems thinking, and Amir (1994) portrays the influence of 19th century mechanistic thinking on economic discourse as malign.
benefit from greater understanding of the physical, chemical and biological basis for production, yielding much technical change in production methods. Increases in throughput encouraged by this process, both per hour of labour and per hectare, contribute to economic growth even though, as Giampietro (1997) argues, ecosystem health is enhanced when throughput is lessened.

Nevertheless, capital-augmentation and industrialisation of farming is not a necessary consequence of an enhanced climate of competitiveness: the utilisation of existing resources can be improved. In a comparative study of tomato production in California and Northwest Mexico, Zabin (1997) found that institutional factors induced higher labour productivity in California, despite similar production technologies. Interestingly, as a result of NAFTA integration, there is evidence of downward convergence of labour incomes in the two regions. This technical change is likely to be more rapid in future since advances in biochemistry and genetic manipulation are gradually being diffused within production processes. Huttner et al. (1995) emphasise enhanced agro-nomic performance as a primary contributor to improving competitiveness in the United States farming sector, though their recognition of the attendant biosafety dangers is less critical than that of Westra (1998).

Whereas policy emphasis has been on competitiveness, other responses have had a measure of success. For example, Damianos and Skuras (1996) describe alternative restructuring options, through a mixture of off-farm work and adoption of unconventional enterprises, successfully adopted in Greece. Lighthall and Roberts (1995), in a case-study of Iowa farmers, show how non-commercial, farm-family ethics have been responsible for formulation and dissemination of low input production systems (with notable absence of support from state-sponsored research institutions). They concluded that technological change is a socially constructed phenomenon, and that alternative rationalities could be derived from different combinations of ecological and social conditions.

Past (and anticipated future) transformations of rural systems resulting from these influences are often associated, in economic jargon, with negative externalities. The visual appearance of the countryside has been altered, with changes in surface cover and alterations to other features. Much recent afforestation has been of uniform age and species plantations; mechanised production of arable crops requires large fields, resulting in the loss of boundary and other marginal features. Several studies of landscape change (including Bonfanti et al. (1997), Poudevigne et al. (1997), and Theobald et al. (1997)) indicate overall losses of biological and cultural richness, despite area-based conservation sites that are the major contribution of standard policies to sustainability. Decline in habitat quality and human appropriation of a larger fraction of total biomass leads many (such as Barbier et al. (1994), and Wood and Juniper (1994)) to argue system support services are vulnerable to catastrophic breakdown. Together with soil erosion, irrigation and consequent salinity, acidification and pollution from biocides, these impacts are portrayed as detrimental to long-term physical productivity of agriculture and forestry, although of course industrialisation has also been responsible for a dramatic increase in current financial productivity.

Paradoxically, through protection and substantial increases in the volume (if not the value) of rural output, increased poverty in the countryside has become ambiguous. Cloke (1995) argues that the standard transatlantic perspective on rural poverty needs to be updated to account for cultural changes, redefining responsibilities of the individual, community and state. This cultural shift is blurred by counterurbanisation, the tendency for people to move out from cities and suburbs into rural areas.4

The experiences of Europe and America have been different in some respects. In rural USA, the enduring concentrations of rural poverty noted by

4 This has been noticed more or less throughout the industrialised world since the late 1960s and early 1970s. In the UK, for example, rural populations increased between the population censuses of 1961 and 1971 for the first time since the census procedure had been undertaken. This trend has continued in more recent censuses; see Halfacree (1994) and Green (1996).
Lichter and McLaughlin (1995) are most associated with female heads of household (though Brown and Hirschl (1995) found that rural households have the highest probability of poverty even when household and contextual factors were eliminated). Albrecht and Albrecht (1996) observe that classical urban/rural divergences in population characteristics were, in fact, a farm/non-farm divergence, and that major demographic shifts have obscured rather than eliminated them. There are also sub-regional differences, as Barkley et al. (1996) demonstrate in case-study areas in the Eastern United States; urban–rural migration has been more marked in peri-urban areas, but populations were stable or declined in tracts distant from nodal centres. Even if ethnic and regional problems commonly characterising rural social exclusion are absent, there can still be disguised rural distress: see, for example, the analyses of rural communities in upstate New York by Fitchen (1991, 1995).

The impact of counterurbanisation elsewhere is also generally well documented: for example, in Australia, by Walmsley et al. (1998); Britain, by Champion (1994) and Spencer (1995); Canada, by Dahms (1995); France, by Cavailhes et al. (1994); Germany, by Kontuly (1991); Spain, by Hoggart (1997a); and Switzerland, by Schaeffer (1992). The process normally involves migrants with significantly greater wealth than the indigenous population, contributing a spatial dimension to the generally sharpening division between rich and poor in industrialised countries (Hugo, 1994; Saraceno, 1994; Boyle, 1995, 1997; Riebsame et al., 1996). However, some less affluent immigrants, seeking a potentially better lifestyle quality in rural areas, may combine to enlarge indigenous deprivation. These have been christened the nouveaux pauvres by McLaughlin (1986); see also Cloke et al. (1995).

Whilst numbers of the less well off have diminished, the relative distance between their quality of life and the average has increased more than proportionately. Structures of service provision are considerably affected by mobility. Levels of car ownership in rural areas are high (in Britain, for example, upwards of 70% of rural households have at least one car, with many enjoying multiple car ownership), and rural–urban road networks are improving. Yet for the car-less minority, the increasing assumption of private mobility causes an absolute decline in accessibility to services. Public transport costs in rural areas have risen disproportionately as volumes of private traffic have increased. Mobility has also contributed to the appropriation of rural housing by the wealthier, since greater accessibility makes the countryside more attractive for commuters, or to retire to while still retaining non-rural links (Hoggart, 1997b). In a few cases, entrepreneurial individuals relocate themselves and their businesses as well, seeking the same attractions of space, tranquillity, freedom from pollution, and an integrated sense of community: access to these is taking on the character of an increasingly scarce ‘positional good’ (Hirsch, 1977). Some evidence (Milbourne, 1997) suggests that in-migrants take over representative institutions like community councils, wildlife, environment and amenity groups, in order to protect the desirable qualities of their acquired rural spaces. This influence prevents developments offering opportunity for less privileged inhabitants, contributing to the cycle of cumulative causation in which divisions between the affluent majority and the rest become deeper.

Thus, increasing competition and technological change, far from promoting sustainability, have increased appropriation of future survival prospects by the present. Deconcentration of population from urban and suburban areas into the countryside has masked disadvantage and lack of opportunities, intensified polarisation, and skewed the demographic structure towards the elderly. Shifts in the production structure of natural resource-based industry suggest that prospects for an environmental dividend from economic liberalisation are optimistically naïve. It seems clear that the economic focus on market equilibrium, optimisation and comparative advantage, based predominantly on comparative static approaches, is too reductionist to comprehend the complexity of cultural, technological and economic changes influencing human interaction with the rural environ-

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5 However, poverty, as narrowly defined here solely in income terms, does not necessarily accord with quality of life.
ment. Its entrenchment in a limited psychological and ethical perspective is a further barrier to broader perception. Consequently, and depressingly, primacy is still accorded to the functioning of markets as a ‘rational’ means of allocating resources. As an example, the UK government’s most recent statement of rural policy asserts the need to encourage ‘the operation of market forces in the agriculture sector’, explicitly linking it to an overall aim to ‘encourage and support the creation of productive, sustainable and inclusive rural economies’ (Cabinet Office, 1999, p. 8).

The following section describes a potentially broader framework of interpretation, within which market influences are recognised, accommodated, but not accorded supremacy.

3. Social choice encompassing multiple values

A starting point for considering what is requisite for rural systems to develop in a sustainable fashion is systems thinking (Checkland, 1981; Checkland and Scholes, 1990). Systems thinking provides a means of approaching complex problems such as this, to achieve greater congruence between dynamic human systems and ecosystems.

One of the core features of systems thinking is the conceptualisation of reality as existing in layers within a hierarchy. Such layers are referred to as scales or holons and result from emergent properties within the system. These emergent elements have relevance at particular scale levels in the system, but can be insignificant in terms of individual components at lower scales. Thus, as is often noted within systems, the whole is more than the sum of the parts (Checkland and Scholes, 1990). For a system to survive in a changing environment it has to adapt, and therefore communication and control between the hierarchical scales are vital.

Within rural systems, the predominance given to the market mechanism has led to a greater reliance on prices to provide information, but as the previous section has made clear, prices have not given sufficient feedback on social and ecological parameters, leading to instability within these spheres. In order for rural systems to develop in a sustainable manner, information on changes in all relevant components needs to be effectively transmitted to provide the opportunity for balanced adaptation. Over time both price and non-price transmission mechanisms have tended to become less effective at reflecting social and ecological factors. Giampietro (1994) draws attention to the shift in type of resource input from renewable to non-renewable and notes that although this has removed immediate natural resource constraints, it has made economies relatively immune to feedback via productivity effects. He concludes that this makes social feedback mechanisms all the more necessary. However, it seems that many of these too have become weakened as economies have engaged in greater trade. One of the consequences of market expansion has been that businesses have become less integrated with the local economy and less entwined with the social community within which they operate. While higher levels of material wealth have been realised because of gains from trade, the prices of resources and products have become less related to local conditions. Furthermore, with a lower degree of economic interdependence between people living within a locality, the extent of social interaction has been lessened, reducing the likelihood of non-price information being informally transmitted and accommodated. Thus the system gravitates towards becoming more influenced by exchange values, and less sensitive to other values.

To counter destabilising effects within rural systems, it is clearly necessary, within the system, to have both good information flows and responsive mechanisms. It is not so immediately clear how this can be achieved as rural systems are composed of an amalgam of micro level ecosystems, of businesses, and of individuals and communities. Together they make up an elaborate system, which is itself part of and influenced by a wider ecological, economic and social system. Furthermore, rural systems are expected to fulfil a variety of functions. Traditionally they are viewed as

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6 Neither the use of the term ‘hierarchy’ nor ‘control’ implies the need for authoritarianism. ‘Hierarchy’ is used in the technical sense and ‘control’ refers to an ability to manage the system.
suppliers of primary products, food, timber, minerals, but recently their significance as suppliers of ecological services has been acknowledged. Ecological services have value not only at the local level, but also at higher levels up to the global. For example, woodlands can contribute to balance within a regional ecosystem, while the carbon-fixing properties of tree growth are beneficial to the global carbon cycle. Similarly, biodiversity at lower levels within the system can be important for local resilience, and at the same time have considerable implications for maintaining the gene pool at the national and global level. Rural systems also have an important role as a place where humans can interact with the natural world, either on a temporary basis as visitors, or more permanently as residents. If the residential population is not to be dominated by retired people with outside sources of income, or commuters engaged in business elsewhere, then the rural system needs to be able to provide the means for earning a livelihood. The livings that are derived from the primary and near-primary industries may be considered of particular value because they are a principal determinant of the distinctive culture of rural areas. Rural social goals thus may be interpreted as not only a commitment to fairness, to ensuring adequate living standards, but also the achievement of modes of living that interact and are in balance with the natural environment.

3.1. A hierarchical framework for rural systems

Hierarchy theory was initially developed to study ecological systems by observing them as a series of nested scales, defined both spatially and temporally, but it has since been extended to social systems (see for example, Checkland, 1981; Allen and Starr, 1982). The strength of a hierarchical framework within the rural context is that it can include economic phenomena, but, unlike economic models does not focus exclusively on them. Instead it emphasises the need to comprehend not only the physical, chemical, biological, intellectual and emotive attributes of components at each scale, but also the ‘rules of the game’ that determine interactions among them (Weston and Ruth, 1997).

Within this approach, components are identified within hierarchical scales, recognising that they are made up of smaller parts (for example, a farm is composed of a collection of enterprises) yet are also part of a greater whole (the farm is a component of the national agricultural sector). This dual dimension of components gives them multi-factoriality, which means that they can both be changed by other components, while themselves acting as a change agent (Clayton and Radcliffe, 1996). Friction can occur within the system because the identity of a component has to be secured in competition with others at the same scale, yet the competitive process can destabilise other scales within the system on which it depends (Giampietro, 1994). While stability is desirable, nonetheless, stability is not synonymous with immutability, but rather refers to the ability of entities to maintain self-organisation while evolving. Indeed, evolution occurs precisely as a result of interactions between the scales (Weston and Ruth, 1997).

By adopting a hierarchical perspective, some clarification can be achieved. Scaling brings recognition that different levels within the system function in different ways; an appreciation of this can contribute to more effective management. Sometimes there are trade-offs between scales, with often a change desirable at one level causing losses at another. For example, a reduction in the price of agrochemicals at the world market level might lead to higher food output and lower food prices at the national level, but destabilise local ecosystems. The standard economic approach for dealing with trade-offs is to assign money values to each effect, and aggregate them to assess the value in monetary terms of each possible outcome. Thus in the case of an agrochemical price reduction, the benefits of lower product prices less the estimated cost of ecological damage are estimated and the change is considered beneficial if the net benefits are positive. Such an approach has allowed the continued application of optimising models favoured by economics, but the results have limited value because of the significant information loss.\(^7\) Opportunities for considering

\(^7\) See Vatn and Bromley (1994) for a full discussion of the information losses occurring with monetary valuation.
whether output might be increased with less environmental damage are forsaken; they are not included within the choice framework. For improved social decision-making, where trade-offs exist, but there is a need for stability at various scale levels, knowledge and information on the relationships between the scales is vital and can stimulate more creative problem solving.

While the hierarchical scaling approach may have superiority over the purely economic approach in providing more information and thus cultivating more options, it needs to be recognised that the defined scales are constructs, reflecting the perceptions of the hierarchical model builders (Wilby, 1994) and hence may themselves be restrictive. On the same grounds, Curry (1995) has warned of the dangers in the use of Geographical Information Systems when they rigidly define context and thereby limit discourse. This pitfall is potentially avoidable if hierarchy theory is approached as a methodology rather than as a technique. Checkland and Scholes (1990) argue for a distinction to be made between hard systems analysis and soft systems methodology. A hard systems approach assumes that the world is made up of clearly definable scales, and uses techniques to solve problems (see Midmore (1996) for a critique of their use in agricultural economics); by contrast, soft system methods use system models as a means of creating cyclic processes of enquiry; their main purpose is to help to articulate and operate a learning cycle from understanding to purposeful action, without imposing a rigid technique. Crucially important for the success of a soft systems approach is inclusiveness within the learning cycle. With regard to rural systems, the involvement of rural populations in the development process is critical for resource management because it is only in the detail at the local level that imaginative resolutions can be found to achieving complementarity between economic, ecological and social goals. Sustainable development objectives challenge societies to adjust the way in which they operate, so that they are fully inclusive. Asby and Midmore (1995) have argued that planning for economic vitality in marginal regions can only be attained through an effectual structure that provides for ‘empowerment’ of local communities. This is required all the more to counteract the disempowering effects of market liberalisation on rural economies. Market liberalisation has meant that, via the price mechanism, higher scales within the system have had greater predominance over the lower. In general, the primary sectors, so significant in defining the character of rural areas, have been subject to declining terms of trade. The resulting cost-price squeeze has pressed primary producers, perhaps most noticeably farmers, to adopt new, typically capital-biased technologies. Capital-biased technological change is relatively easily transferable between regions, in contrast to technology more reliant on labour and local natural resources, and consequently its propagators have benefited from expanding markets. With such developments, ecological conditions have become a less significant influence on income levels, and thus have been subject to neglect, while market conditions have become more important. The farm scale has been, in effect, a channel through which forces originating from higher levels in the system have impacted at a lower level on the ecosystem, with insufficient regard paid to maintaining stability.

Pressures similar to those driving change within the agricultural industry have also been brought to bear on other primary and near-primary production activities, with similar destabilising effects on rural areas. Capital-biased labour-saving technologies have reduced the opportunities for livelihoods to be gained from natural resource management and have caused environmental damage. With fewer opportunities to generate a livelihood in rural locations, migration has been inevitable. Furthermore, the shift to capital-intensive technology within the primary and near-primary sectors has not only reduced the demand for direct labour, but also increased the amount of spending on inputs from businesses outside the region. Consumer spending on goods outside the region has also increased, as reduced transport costs have made rural economies more open: local multiplier effects accordingly diminish. Thus while market liberalisation and technical change have raised production in the economy as a whole, they have altered the distribution of income both within rural areas and between rural and urban
areas. Aggregate prosperity at the country level has been gained at the expense of certain groups and at environmental cost. If areas are to become more demographically sustainable, attention needs to be paid to the resource and financial flows within rural regions and between them and their urban poles (Saraceno, 1994). Crucially, attention needs to be given not only to the level of prices, but also to the way in which economic activity is organised, the *rules of the game* within the system.

### 3.2. Changing the rules of the game

In order to counter destabilising market forces, suitable action needs to be taken at the appropriate social and geographical scale. Rosser (1995) emphasises the necessity of having institutions that operate at relevant levels within the ecological hierarchy. Similarly, institutional structures are required for addressing social and related economic issues. A frequent cause of instability is the lack of integration of local information and objectives into higher level decision-making (Wolf and Allen, 1995). Knowledge from grassroots-based organisations not only needs to be incorporated, but to be empowered, those organisations also need access to knowledge produced in other parts of the system (Harris et al., 1995). Partnerships that encompass local, regional and national levels of government and their agencies are vital for establishing the necessary links between the different scales.

Rural populations might want to consider changing the rules of the game with respect to trade. They might consider engaging in more local trade, reducing dependence on outside markets where current prices may be more favourable, but in the long term, less robust. Such an idea challenges conventional wisdom that holds that greater trade not only raises wealth, but also reduces the vulnerability of small economies, as they are less affected by local shocks. Nevertheless, while a degree of trade can be beneficial, high levels of trade can result in economies becoming over-specialised and thereby overexposed to increased levels of external competition and variable market conditions. Thus if stability within a rural economy is valued, means for promoting more local trading might be explored (Douthwaite, 1996). Furthermore, local production for local use can bring a wider range of benefits if the producers and consumers share community goals of fairness and respect for the surrounding environment.

Another rule of the game that can be challenged is the mode of technology. Mainstream economics has tended to assume that market conditions will determine the most efficient technology, but as Arthur (1989) has argued, dynamic increasing returns to an embedded technology can crowd out a superior technology. The effect of the increasing returns can be so great that small changes to prices provide insufficient inducement for superior technologies to emerge (Goodstein, 1995). A consequence of this is that for the path of technology to alter, a conscious choice has to be made. This needs to be accompanied by the introduction of institutional changes and possibly short-term subsidies to stimulate the development and uptake of alternatives. In the case of agriculture, farming in balance with local ecosystems is likely to require technology that makes greater utilisation of natural endowments rather than external capital inputs. Since natural endowments vary between locations, this would necessitate more regionally based research and the input of the local knowledge of farmers.

These forms of approaches, which involve the rural population and concentrate on the modes of economic activity, contrast with traditional economic policy measures to deal with environmental and social problems, which have tended to focus on adjustments to market signals (Schütz, 1999). Typically, when negative environmental effects of market activity have been identified and market failure acknowledged, economists have advocated policy instruments such as taxes or subsidies to internalise the external market effect. Thus, what were previously non-market effects are fed back into the private decision-making arena so that, supposedly, confidence can be placed in the market again. This type of approach can be powerful for disseminating information relevant for achieving goals at higher levels in the system. For example, price adjustments at the country level can be appropriate for achieving country level
targets, such as raising agricultural output, or increasing countrywide tree cover. In addition, price signals can have a place in providing continuous incentives for encouraging adaptation towards ecocyclic principles (Ring, 1997). But for attaining specific goals at lower levels in the system, price adjustments are normally inadequate because implementation costs prohibit the high degree of variation required to tailor the policy instrument to diverse local conditions. With insufficient information transmitted through market signals, the response is deficient at the local level. Neither are price adjustments adequate for dealing with social problems, as agricultural price support has demonstrated. Government intervention to uphold agriculture product prices in the wake of declining terms of trade has not been able to prevent a decline in farm incomes (Harvey, 1991).

The hierarchical framework does not reveal a clearly definable desideratum for sustainable development in rural areas, but instead draws attention to the need to adopt an integrative systems approach. This involves making conscious choices to take appropriate action to guide development and promote stability. Through scaling, the hierarchical framework begins to clarify some of the complexities within the system, helping to identify the links between multiple goals and the sources of destabilising pressures. The need for better information flows and institutional change to provide opportunities for betterment is emphasised. While this approach contrasts with a reliance on the market mechanism to achieve optimal welfare levels, it does not deny the role of economic factors, both in contributing to and solving problems. Furthermore, as the next section demonstrates, a methodology derived from economics can be useful in generating some of the information requirements necessary for making more informed social decisions.

4. An empirical framework for analysis of rural sustainability

Economic analysis is notable for a consolidation of its spatial focus around just two major perspectives, the aggregate functioning of the overall system (macroeconomics) and the basis for individual decision-making as consumption and production units, mediated by markets (microeconomics). This dichotomous approach lacks coherent connection, a source of historical controversy. Nevertheless, although ecological economists have made substantial efforts to distance themselves from neo-classicism, it must be recognised that any evolution of this kind is a mixture of original and existing concepts, and their literature can be characterised by similar divisions. For example, Daly (1991) has set out the elements of an environmental macroeconomics in which the notion of global carrying capacity figures strongly. Others, for example, El Serafy (1995, 1997), have designed systems of accounting that encompass both financial and natural resource flows. The construction of an Index of Sustainable Economic Welfare by Daly and Cobb (1990) provides a defensible alternative to transactions-focused measures of aggregate activity. At the individual decision-making level, substantial effort has been made to assess the value of environmental resources for public decision-making purposes, mainly through contingent valuation methods (though by no means exclusively; some of the issues surrounding evaluation founded on human assessment are explored by Blamey et al., 1995).

In terms of developing insights from hierarchy theory for rural systems, however, the ecological economics approach lacks scope for integration over a range of spatial scales. This section explores the potential that an intermediate, but less emphasised approach — based on the method of input–output analysis of Leontief (1951) — might offer for development within this context as a framework for improved understanding. A full description is outside the scope of this discussion.8

8 See Weintraub (1979) for an attempt to impose a uniformly neoclassical view, with considerable resonance for the ‘new classical’ school of macroeconomists.

9 There are a number of good, basic introductory texts. See, for example, Otto and Johnson (1993); the regional dimension is covered thoroughly in Dewhurst et al. (1991); and for a comprehensive introduction, see Bulmer-Thomas (1982).
however, in essence the method involves an unravelling of sales and purchases of production units in an economy (rather than netting them out to calculate aggregate value-added), demonstrating interdependence between the economic sectors comprising the entire economy. It is possible, by extending the basic technique, to investigate regional social and environmental dimensions. The relevance of each dimension is examined in turn, below, to appraise the scope of input–output methods for analysis of the hierarchical relations that affect rural issues. In particular, drawing on the analysis of the previous section, we examine appropriateness of the approach for insight into the instability between hierarchical levels.

4.1. The regional dimension

Whilst decomposition of national economic performance was an initial focus for input–output analysis, its use in a regional context rapidly followed. However, to link relationships between different levels of the hierarchical system, the ‘ideal’ inter-regional framework (Isard, 1960) permitted analysis of interdependence between several regional, or even local, economies. Recent applications of this type of regional input–output analysis have highlighted issues discussed in previous sections (for a review, see Midmore et al., 1997). Robison (1997) sets out the most important requirements for an input–output approach tailored to the needs of rural areas. It must convey an individual community focus; definition of the household sector must specifically capture the great openness of rural community economies; there must be a degree of closure that provides an assessment of the community economic base; and the model must be defined to include estimates of inter-community trade, and inter-community multiplier effects. Douglas and Harpman (1995) examine the job impacts of expenditures derived from non-market recreational benefits, concluding that the outdoor recreation sector of the economy is relatively labour-intensive. However, poor local economic structure leads to swift leakage of expenditures; Keith and Fawson (1995) concluded that the impact of expenditures of wilderness users in Utah were not sufficiently large to significantly influence the local county economies.

4.2. The social dimension

The standard input–output model, and its extension to regional economic interaction, primarily concentrates attention on flows between productive economic sectors or industries. The Social Accounting Matrix (SAM) approach extends this basic framework to recognise the importance of distribution of value-added between enterprises, households and the state, allowing issues relating to distributive justice to be explored. Hence, for example, Marcouiller et al. (1995) showed the differential impact of natural resource management programmes and policies on timber development on three groups of household, by income level. Its flexibility allows development over a range of spatial scales. At one extreme, the SAM of Parikh and Thorbecke (1996) identifies interdependencies within a rural village in India; at the other, the investigation by Roberts (1995) of linkages between UK agriculture and the wider economy reveals the magnitude of benefits leaking from the farm sector. The SAM of Leatherman and Marcouiller (1996) for a small rural region in Wisconsin concluded that local policy could influence distributional patterns through targeting specific economic sectors for growth.

10 Whilst lack of correspondence between administrative regions and the appropriate framework for such analysis, the bioregion, should be noted, it falls beyond the scope of the present article (however, see, for example, McTaggart, 1993).

11 So-called, because it requires information on transactions between regions which is, in practice, difficult to obtain.

12 Pioneers of the approach, examining estate, agricultural and urban households in Sri Lanka, were Pyatt and Roe (1977); see also Pyatt and Round (1979).
4.3. The environmental dimension

The input–output system is based, in principle, on physical interactions between economic sectors; it may thus be extended to account for ‘external’ flows such as pollution and natural resources utilisation (for a review, see Briassoulis, 1986). In practice, to provide consistent accounts, shadow prices must be calculated to accommodate the monetary framework normally used, or it must be entirely recast to reflect the underlying physical flows. The nature of interchanges within the ecological system causes further problems: they are synergistic, non-linear, and dynamic, and do not adapt easily into the fixed coefficient, static (or at best, comparative static) input–output modelling context. Yet unless these can be satisfactorily described, the model cannot be closed to provide a coherent analysis of the economy/environment linkages.

Analysis of this type thus tends to be less ambitious, simply accounting for pollutant emissions activities (see Hafkamp (1991), for a review of this approach). Others have followed the approach of Leontief (1970) in estimating the ‘footprint’ of defensive expenditures: Nestor and Pasurka (1995) use the inputs of anti-pollution economic sectors to link abatement costs to derived demands through the rest of the US economy. Relatively few studies of this kind specifically identify rural pollution or natural resource issues. Marcouiller et al. (1995) has been referred to above: Schroder (1995) models Danish agricultural energy and materials balances within an input–output framework, determining impacts of reduced nitrogen emissions. Wernstedt (1995) combines an input–output and income allocation matrix (a hybrid input–output/SAM approach) to estimate the distributional consequences of regional level environmental policy decisions that enhance fish populations in the Columbia River Basin. Harrison-Mayfield et al. (1998) use an input–output model to identify both the backward and forward linkages of conservation policies in agriculture, suggesting that effects for English rural areas are positive, whereas negative impacts are dispersed through the dominant urban economy or capital-intensive agricultural supply and food industries.

4.4. Problems of an integrated perspective

This brief, somewhat selective review suggests the possibility of extending the input–output approach to encompass hierarchical relationships. Its appeal for ‘systems thinking’ economists is in relating subsystems (industrial, institutional, regional) at a high level of spatial disaggregation, and its extension to the natural environment. It could guide policies to strengthen internal linkages of rural economies, developing resilience toward globalisation pressures. It can also trace out indirect, and possibly unanticipated, feedbacks from ostensibly rational goals. Yet there are several serious problems, two of which are considered here. Firstly, the ability to transcend boundaries in the disciplinary framework is acquired at the cost of considerable reductionism. Secondly, accounting within a common framework for the multiple, complex nature of inter-regional, inter-institutional, human-environment interaction is clearly a task of heroic (and costly) proportion.

The linear algebra used in input–output models requires assumptions of fixed relationships between inputs and outputs, and zero price and income inelasticities of demand. Whilst these circumscribe realism and explanatory capacity, they do not inevitably demand support from neo-classical axioms concerning psychology or ethics. Thus, the approach can serve as an incremental stage in investigating the real entities and structures constituting the material and social world, through further scrutiny and development (Lawson, 1989), although the integrated perspective required for developing sustainable rural systems suggests an enlargement of present scope. Attempts at limited combination of different approaches involve significant and erratic compounding of error structures. Midmore (1993), investigating the regional agricultural forecasting ability of a combined input–output/econometric approach, found that unless final demand were forecasted accurately, overall performance was poor. Conversely Rey (1997), and Rey and Dev (1997), exploring embedding of regional input–output within dynamic econometric models, concluded that all various possible
integration approaches are sensitive to errors associated with the input–output components.

It may therefore safely be presumed that extension incorporating more dimensions will require greater accuracy and detail from the data sources on which the approach is based, and this leads on to the second complication, the volume of data required. Difficulties in obtaining data in sufficient detail and quality increase disproportionately, as the scope of the modelling framework is extended. Harrison-Mayfield (1996), attempting to disaggregate the UK input–output table into rural and urban components in order to appraise spatial interdependency, concluded that due to prohibitive costs involved in collecting supplementary data, it may be preferable to concentrate on local case-study areas than attempt to model the rural economy as a single entity.

Norgaard (1994) (pp. 19–20) has identified seven increasingly comprehensive levels of regional analysis on which an operational definition of sustainable development could be based. These begin with agricultural and industrial activity within a region, and progress outwards through the footprint produced by interdependencies outside the region itself. Before even arriving at the fourth level, the range of diverse transactions requiring monitoring, in compound regional systems with intricate socio-economic structures, becomes overwhelming:

“One of the challenges of sustainable development … would be to devise ways of keeping track of multiple flows without all of the labor force working full time as energy and materials accountants … This line of inquiry has clearly gotten out of hand. There is no way that societies could keep track of all of the flows that are quantifiable, no way they could make sense of them if they did, and no way to keep track of the unquantifiable flows at all.”

This assessment has discouraging implications for an economics that aims to incorporate hierarchy theory into the understanding of rural relationships, both internally and with other structures. Nevertheless, whilst in practice the costs of such a full accounting are excessive, the theoretical framework itself is useful, in terms of emphasis on inter-relationships. Although the research discussed in this section is remarkable for its fragmentary nature, as a whole it can contribute to an intuitive understanding of the relations between different levels of the spatial hierarchy. A suitable ambition for economic inquiry might be to influence, rather than determine, the outcome of decision-making processes. Hence it would not be necessary to construct an all-embracing, exact representation of the structural characteristics of the rural system. Indeed, doing so (as, hopefully, we have demonstrated) can actually be harmful because it curbs the scope for creative adaptation. The multiple goals and complex relationships involved in rural sustainability require only general policy direction, not exact policy goals. Instead, recognising the rhetorical role of economics and the importance of its value structure, a shift in its emphasis is required.

5. Rehabilitating economics for rural sustainability

Our survey of the literature on rural change clearly identifies that increasing commercialisation and technical change have led to developments that under various criteria might be regarded as unsustainable. Thus we consider that economic advice for promoting the sustainable development of rural regions needs to be more circumspect in its advocacy that rural areas should be more open to trade. With an acceptance that market values are not representative of all values, economics needs to adopt a more unassuming position, advising society on how it might creatively meet its aspirations, rather than pedantically asserting that society must adapt to an anarchic market. Obviously market forces cannot be ignored, and economic analysis can provide some understanding on how they condition behaviour, and how their effects ramify through the system. Nevertheless, this should not require acceptance of the view that we are completely beholden to them. After all, market forces are simply an emergent property of an anthropogenic system. Market prices result
from an amalgam of influences that can be crudely identified as a mixture of preferences, technology and institutional arrangements. It is these factors that need to change over time in order to develop more sustainable systems, and in the long run will have an impact on prices. A current challenge is how to begin to make those adjustments while conditioned by existing prices.

Given the weight ascribed to both economic analysis and prescriptions by the policy-making community, it is important that the rhetoric of economics is encouraged into a more evolutionary idiom, acknowledging the social context of economic values and the range of opportunities for long-term development. There needs to be a shift away from an identification of problems as purely ones either of market failure or of unfortunate distributional consequences, typically addressed by adjustments to the market mechanism in the former case, and by transfer payments in the latter. In place, more emphasis should be given towards developing systems that avoid the creation of environmental problems, and which are socially fully inclusive. This requires a more integrative approach to development.

The concept of integrated rural development is not new, but finding ways of achieving integration has remained a perpetual challenge, particularly to the intellectual community, and none more so than economists, whose tools are chiefly designed for solving clearly limited problems within defined parameters. Inevitably integration is in practice a messy process, which requires the actors within the system to explore potentialities. The role of the intellectual community should be analogous to providing maps, rather than designed solutions. Economics can contribute to this map-making with the application of input–output frameworks that explore linkages between levels of the spatial hierarchy. It can be used not only to identify the economic ramifications of change within a regional economy, but also to track environmental footprints and explore redistributive consequences. Economics also can assist also in the design of policies to transmit information and influence behaviour.

The idea of developing a perspective on the desired direction of development rather than accepting free market outcomes marks a return to the classical economic approach espoused by Schumpeter (1954). More recently, Costanza et al. (1996) have asserted the need for a practical shared vision of both the way the world works and of a sustainable society as a vital element in achieving a sustainable system. The specific destination may be unknown, and the actual journey is one of exploration. Adopting a systems method of thinking encourages a more considered and reflective exploration.

Acknowledgements

We thank anonymous reviewers for their comments, although final responsibility for opinions, errors and omissions is ours.

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