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Refocussing on the Value Chain Perspective to Analyse Food, Beverage and Fibre Markets

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Abstract

Global food, beverage and fibre markets can be characterised as networks of global value chains. Increasingly such chains are private and powerful, closely coordinated or fully vertically integrated, self-regulated, global and experience-based. The more that global agricultural and food product trade is conducted in these global value chains, the greater the concern that market efficiency may be compromised and the stronger the argument for having effective regulatory policy on hand for these markets. It is difficult to define appropriate roles for government intervention in these new environments. *A priori*, standard market failure justifications for public interventions are no longer as strong. In this paper the standard public good/market failure argument is summarised, developments in these markets and implications for analyses of agricultural and food

* This paper has had a long gestation. Gow, Griffith and Umberger met in 2010 to scope out a research agenda in the economic analysis of value chains for food and agricultural products and to design a workshop for those interested in collaborating in teaching and applying value chain analysis. The background material presented here was the rationale for undertaking the scoping study. The workshop did not eventuate but several conference papers were presented (Griffith et al. 2012, Fleming et al. 2013b) and some of the material was mentioned in Umberger and Griffith (2011). Fleming and Mounter joined the group in 2011 and by 2012 a new course in value chain analysis was developed and offered at UNE. This has subsequently been extended into undergraduate and postgraduate versions and transitioned in different formats to the universities of Adelaide and Melbourne. The material presented here forms the opening lectures in both courses. Further, some of the earlier concepts of chain failure and chain goods that were developed were applied by a group of UNE staff interested in the grape and wine industries (Fleming et al. 2013a,c, Grant et al. 2013, Griffith et al. 2014). Then in 2014 a major project was completed for Meat and Livestock Australia where the concepts were further developed with case studies from the Australian red meat industries (Griffith et al. 2014). Malcolm was part of that team. Finally, Baker joined UNE in 2013 and began to develop a research agenda in value chains and networks (Baker et al. 2014). During these various iterations and conversations the original background material has been revised and updated, but essentially not much has changed. The authors thought it would be valuable to make available the material to a broader audience.

sector markets are reviewed, and appropriate roles for government in an environment dominated by global value chains are considered. The conclusion is that there are potential roles for government or the governing agency in the value chain. These roles relate to creating or improving chain goods to ameliorate chain failure, rather than customary intervention to provide public goods in the face of market failure

Introduction

Governments around the world are withdrawing from intervening in agricultural and food product markets. Deregulation of markets for food, beverage and fibre products worldwide has increased over the past couple of decades. This has been most apparent and most rapid in Southern Hemisphere countries such as Australia and New Zealand, and in the so-called Cairns group more generally. Northern hemisphere trading blocs, too, are deregulating (Cahill and Legg 1989). In 2009 Australia and New Zealand had the lowest levels of support of the OECD countries. Non-EU Europe and North Asia had the highest.

At the same time, and not unrelatedly, agricultural and food product networks around the world have changed. Food networks have become increasingly private and powerful, closely coordinated or fully vertically integrated, self-regulated, global and experience-based (see for example Burch and Lawrence 2007, Burch, Dixon and Lawrence 2013, OECD 2007, and various publications from FAO, the World Bank and the European Commission). Global agricultural and food product markets now can be characterised as being part of global value chains. These changes are being driven by large food retailers, processors and trading companies who are investing in production and processing facilities world-wide (Australian Food and Grocery Council 2010). For example, the major Australian food retailers have numerous domestic value chains and systems for fresh meat and for other products, but also have numerous global value chains and systems for fresh produce, fish products and canned and packaged foods. The recent academic literature refers to these new environments as “modern agricultural value chains” (Swinnen and Vandeplass 2014) or “modern agricultural markets” (Sexton 2012)¹.

This view of course is not new. Some 25 years ago, Barkema et al. (1991, 25) wrote: ‘A quiet revolution in the U.S. food market is underway that may change the way farmers and food processors deliver food to consumers... driving this revolution are changes in both consumer tastes and technology...combined, these changes in consumer demand and food technology are changing the way the food market links producers, processors, and consumers.’ They continued (p.25) ‘...generic commodity markets...are becoming obsolete...as food processors aim their products at a growing number of smaller consumer niches. Instead, contractual agreements and vertical integration, or mergers,

¹There is much debate about the terminology (see Baker et al. (2014) and Griffith et al. (2014) for a summary). A value chain is distinguished from a supply chain or network by its market orientation whereby chain participants focus on what Micheels and Gow (2008, 128) referred to as ‘continuous value creation for the customer’. This approach is consistent with the idea espoused by Crook and Combs (2007) that ‘collaborative value chain management’ results in ‘a rising tide that lifts all boats’. It is also consistent with the idea of developing a ‘best value supply chain’, as championed by Ketchen and Hult (2007).

among producers and processors are becoming increasingly common in the food market.' These sentiments hold today, with the exception that, in Europe and Australia at least, food retailers have displaced food processors as the instigators of integration in the value chain (see Hanf (2008) for a review).

These changes are recorded in the Australian literature. In the past 20 years of the *Australasian Agribusiness Review* and *Australasian Agribusiness Perspectives*, at least 15 papers deal with managing value chains in food and agricultural industries. Notable examples are Wheatley (1996), Schroder (1996), and Dunne(2001). Many authors have looked at the benefits of being involved in agricultural and food value chains from the point of view of agribusiness – firms that produce, process or retail food and agricultural products. Less evident are analyses looking at the bigger picture – industry-wide or sector-wide performance and the role of government in facilitating efforts to improve performance.

The argument is put in this paper that the more global agricultural and food product trade is conducted in global value chains, the greater the concern that overall market efficiency may be compromised and the stronger the argument for effective regulatory policy options for these markets. That is, in the ever-present trade-off between operational efficiency and pricing efficiency, cost effectiveness is seen to be outweighing pricing transparency. It is difficult to define the appropriate role for government intervention in these new business environments. *A priori*, standard market failure arguments are no longer as strong. Private under-investment relative to the social optimum cannot be claimed when the gap between private and social outcomes is ever decreasing (Griffith et al. 2012). From a whole-of-chain perspective, do governments have a role in modern food and agricultural product markets?

In this paper the standard arguments for an effective regulatory policy are summarized. Against this backdrop, developments in these markets are reviewed, implications for analyses of agricultural and food sector markets are reviewed, and potential appropriate roles for government in a market environment dominated by global value chains are canvassed.

Concepts of Public and Private Goods and Market Failure

The ability to capture the benefits of developing and introducing innovations in supplying goods or services is a function of the nature of the innovation. Economic theory explains how this ability determines whether or not sufficient investment in particular innovations will be made by individuals pursuing self-interest to maximise their contribution to social welfare. That is, it determines whether the market works or fails in supplying the welfare maximising quantity of a good or service.

One explanation of the causes of markets failing centres on the nature of the good or service. Theory holds that markets work well and add to social welfare when the goods or services producers supply have the characteristics of being excludable and rival in consumption. That is, others cannot benefit from the good or service unless they pay for it, and their use of the good or service prohibits others from gaining the benefits of it. This is what is called a pure private good. Markets fail when neither of these two characteristics exist: suppliers cannot prevent others obtaining the benefits of the good or service, and consumption by one party does not diminish the availability of it to

others. These characteristics are called being non-excludable and non-rival in consumption². This is what is called a pure public good. In these circumstances insufficient, or too much, of something is supplied, and social welfare is sub-optimal. This theory is detailed in modern microeconomics texts such as Gans et al. (2012) and Pindyck and Rubinfeld (2012).

The case for government having a role to play in economic activity rests on both of the following two occurrences: (a) the market fails to supply the desired quantity of something because insufficient incentive exists for potential suppliers to provide it, or the market supplies too much of something undesirable because there is insufficient incentive for those supplying this unwanted good or service not to do so; and (b) the benefits of government acting to change this situation exceed the costs of such action. We will come to the cost question later.

Necessary and sufficient conditions justifying public intervention

First, we provide the standard explanation. The criterion for investment by an agency of a state or federal government should be a *single objective of maximising net benefits for the constituency of the government*. Government intervention in economic activity aims at two objectives – efficiency and equity. Efficiency is using resources to produce the greatest net benefits for the community. Net benefits are broad, and include directly measurable economic benefits as well as environmental and social benefits that may be difficult to express in monetary terms. Equity is the way benefits and costs are shared with in the community. Economic analysis does not resolve equity objectives. The discussion that follows focuses primarily on efficiency considerations in investing in economic activity by the public, while recognising that equity issues are an important concern of government.

Governments intervene in markets when the results of the operation of firms and individuals in markets fail to provide satisfactorily for the needs of society. There are four Necessary Principles and two Sufficient Conditions that justify the public providing goods and services³. These principles and conditions relate to public goods, externalities, scale and risk, and are all about efficiency. There are three Guiding Principles as well, two about efficiency – equi-marginal returns and comparative advantage – and one about equity – beneficiary pays. When contemplating public funding of economic activity, the starting point is to ensure that there is adequate, rigorous consideration of the principles and conditions that justify governments intervening in markets.

As well as understanding these principles of public intervention in economic activity that are well-established in economic theory and public practice, it is also useful to grasp the complexity and subtlety involved in applying these concepts. They are difficult to apply in practice because, in most cases, markets, and public interventions, deliver a mix of public and private goods, as shown in Table 1.

²There is sometimes a third criterion proposed: non-rejectability in consumption (Bannock et al. 1984, p. 335). Non-rejectability means that no individual can abstain from consuming the good.

³The same principles and conditions apply to public investment in research to achieve direct environmental outcomes.

Table 1. Private and Public Goods

	Excludable	Non-excludable
Rival	Pure private goods: Rump steaks Lamb chops	Common resource goods: Public parks Tuna in the ocean
Non-rival	Quasi-public goods: Toll roads, pay TV	Pure public goods: National defence Street lighting

Source: Adapted from Hubbard et al. (2015, Figure 15.7).

Necessary principle one: The public good principle

Public goods and services have the characteristics that they are goods and services whose costs would exceed benefits if private suppliers tried to supply them. An individual supplier cannot capture sufficient of the benefits to justify the investment in supplying the good or service. This is because public goods and services are non-rival in consumption and non-excludable. The classic example is national defence.

Another example is agricultural RD&E, whose output, such as knowledge, can be made widely available and freely accessible, and is not diminished by use. Some new knowledge will be embodied in a product that is an input to production, making it rival and excludable. Knowledge that is disembodied (not incorporated in a product) is a public good, meaning it is difficult to exclude farmers who do not pay from enjoying the benefits of the public investment in agricultural RD&E. It is also non-rival in that it can be shared (re-used) by many. The direct benefits of disembodied knowledge flow to farmers in the form of increases in productivity; sometimes processors and consumers within the industry benefit, too, from lower costs and/or better quality products. Direct benefits do not go to people who have no market relationship with the industry.

Necessary principle two: The externality principle

Externalities arise when an economic activity 'spills over' to affect others unintentionally. An obvious example in the context of agriculture is positive and negative environmental impacts of changing practices that are externalities beyond the boundaries of the private firms in the industry, but with no economic consequence at the source. There is always too much of an activity causing a bad externality and too little of an activity causing a good externality. If the benefits exceed the costs, government can act to achieve a better balance from society's viewpoint between economic activity in the industry and associated externalities.

Public investment that enhances productivity also inadvertently delivers external costs and benefits that have environmental and human dimensions, such as bad and good

environmental externalities, or beneficial additions to the capacities of scientific and other communities to perform tasks and meet challenges. A positive externality would be improved efficiency (reduced costs) of using an input in production resulting in less pollution. Examples of externalities with positive social effects are benefits to people in communities in the form of improved capacity of local institutions to adapt to change from new and better information and skills.

Necessary principle three: The scale principle

When the structure of supply of goods and services in the economy is such that average cost per unit of output falls as the scale of the supplying entity increases, it is said that a natural monopoly exists. This is the principle of scale that can justify there being a sole supplier such as the public, or the public regulating the sole supplier of a good or service. Common examples of public ownership are power stations, energy and communication distribution networks, and emergency hospitals (although such facilities are now being increasingly owned and operated by the private sector).

Applications of natural monopoly in an agricultural context would likely be few, such as the provision of RD&E services of a specific nature involving, say, a large investment in a piece of equipment with a very specific use.

Necessary principle four: The risk principle

If the risk of an investment is such that private suppliers will be inhibited from supplying the quantity of a good or service that society would prefer, a public provider may have a role to play because the public can be risk-neutral for any particular component of their total portfolio of investments. The public with capacity to invest with a risk-neutral attitude is able to have a portion of high-risk investments in their portfolio that may not fit into private investment portfolios. Various types of natural disaster insurance schemes and basic research projects such as in some Cooperative Research Centres would fall into this category.

If any of the circumstances to do with the supply of goods and services described above as Necessary Principles 1-4 exist in the economy, recognising that there are time and space dimensions to markets failing in the ways defined, then there exists a *prima facie* case for government intervention in the operation of relevant markets. Whether or not a government agency *should* proceed to intervene in the markets in question depends on the following two important Sufficient Conditions.

Sufficient condition one

This condition refers to whether, given the best form of intervention, the benefits of doing so are expected to exceed the likely costs, including the opportunity costs of other publicly funded investments such as health and education.

Sufficient condition two

This condition concerns whether the government agency proposing the intervention is the appropriate government agency to tackle the market failure. For example, depending on the situation, intervention by one of a federal, state or local government may be best. The levels, agencies and forms of intervention are important determinants of the nature and extent of both the benefits and costs of intervention.

Principles guiding collective action to correct a market failure

Once the case for collective action to correct a market failure is made, the next questions are about putting these principles into practice. To do this, the three key questions are: (i) how to allocate scarce funds amongst competing uses?; (ii) who should do the intervention?; and (iii) how best to fund the investment? The first two questions are of an economic nature; the third question is one of equity.

These questions are answered by resort to three Guiding Principles: two principles of economics – the principles of equi-marginal returns and of comparative advantage – and a principle (or social view) about equity.

Guiding principle one - Equi-marginal returns: Maximising the net benefits from the portfolio of potential activities to correct market failures becomes a question of balancing activities within the portfolio. Balancing a portfolio means applying the principle of equi-marginal returns such that an additional dollar would earn the same expected benefit in each element of the portfolio. In practice, allocating resources so as to equate net benefits between alternative investments can only be applied approximately. Industry benefits can be estimated because the consequences show up in and are traded in markets, but beneficial externalities, such as reduced environmental costs and improvements to human and scientific capacities, are difficult and expensive to value.

Guiding principle two - Comparative advantage: The economic principle of comparative advantage dictates that, as in international trade, collective action is most efficient when it is done by those who are best at doing it (specialists) and outputs are traded with other specialists. In the context of an industry, the principle of comparative advantage dictates that the organisations around the nation who are best able to solve problems in particular areas should do the work in those areas, and outputs should be traded between the firms.

Guiding principle three - Equity: Equity questions arise because collective action may deliver a mix of public, private and industry goods that affects parties to the action unequally. Note the preceding discussion about economic considerations – benefits exceeding costs – determining what investments ought to be made, and fairness considerations dictating that beneficiaries should pay something. There are three possible options: (a) the public fund it fully; (b) private sources of finance fund it fully, with public intervention being the regulatory means to facilitate the accumulation of private funds and allocate them to research activity; and (c) a mix of public and private funding is used.

In practice, funding constraints apply to all government and private activities and government departments and private firms need to choose between alternative uses of funds. A fundamental tenet of taxation, albeit one that is high level and often difficult to measure and apply accurately, is that members of society should contribute to tax revenues proportionate to the share of the benefits that society bestows on them, subject to maintaining appropriate incentives to contribute to economic output. The ‘beneficiary pays’ principle dictates that where there is a clear beneficiary of government and private investment, governments can choose to require beneficiaries to

pay a share of the benefits received. This principle of “beneficiary pays” is primarily an equity criterion and not an efficiency criterion. In Australia, in agricultural RD&E, the main mechanism to tackle equity issues has been the development of the system of Research and Development Corporations.

Summary

Public goods and services have the characteristics that they are goods and services whose costs would exceed benefits if private suppliers tried to supply them. An individual supplier cannot capture sufficient of the benefits to justify the investment in supplying the good or service. This is because public goods and services are non-rival in consumption and non-excludable. A traditional example is agricultural RD&E, whose output, such as knowledge, can be widely available and freely accessible, and not diminished by use. Direct benefits do not go to people who have no market relationship with the industry. The market mechanism thus fails to deliver the appropriate quantity of agricultural RD&E so, in this well-defined public good/private good world, there is a role for government to fund some of the RD&E.

An alternative explanation: Transaction costs

The second requirement for government intervention – benefits exceeding costs – leads to an alternative explanation of the existence of market failures due to externalities - too many ‘bad’ things and too few ‘good’ things being supplied. It is commonly referred to as the “transactions cost” explanation. The standard explanation that externalities and public goods result from non-rivalry and non-excludability characteristics of phenomena is somewhat abstract in that little or no account is taken of the likelihood and magnitude of transaction costs that would be involved in changing a situation. The transaction cost explanation for externalities and public goods simply holds that these will occur when the transaction cost to individuals of supplying more of something that is good but under-supplied, or less of something that is bad and over-supplied, is less than the expected benefits. Thus, market failures abound because only some are worth fixing.

If the cost of some action to supply a potential desired state of affairs is more than the benefits, then the potential desired state of affairs will not become an actual state of affairs and the undesirable state of affairs will, and should, prevail. Boiled down to a case-by-case investigation of transaction costs versus benefits, the transaction costs explanation of market failure offers less abstract, more practical, guidelines for action than does the standard explanation of market failure. The costs of collecting information about the impacts of externalities and the costs of amelioration are often-overlooked transactions costs.

But no matter which explanation is preferred - the characteristics of market failure “front end” or the costs of market failure “back end” – the debate is still within the context of a public good/private good view of the world.

An economic question is whether there is still a role for government intervention in the new world of increasingly private and powerful, closely coordinated or fully vertically integrated, self-regulated, global and experienced based value chains and systems – that have characteristics of both private and public goods and services.

The Changing Situation for Agricultural and Food Products and Markets

'Old world' commodity markets and their characteristics

What is known about so-called 'old world' commodity marketing systems? These systems are populated by large numbers of small players who are predominantly price-takers and have insufficient individual incentive to invest in more efficient outcomes – especially dynamic efficiency. Characteristics of such systems are the following: arms-length governance; open coordination; free but aggregate information; spot markets; no excess rents; profit driven by on-farm efficiency in terms of reducing costs; and supply-driven innovation. These characteristics define competitive markets as described in the standard micro-economic texts, such as Gans et al. (2012) and Pindyck and Rubinfeld (2012). In this world, food experiences (in the home) were not purchased but were created from raw materials by the 'consumer cook'.

The role of government in the 'old commodity-oriented' world is justified by reference to the standard arguments for providing public goods, as outlined above. Governments therefore: provide public RD&E; provide public information systems; provide public extension systems; advocate for free trade; establish common (global) regulations and standards; and establish cooperatives/single trading desks/industry boards to facilitate a 'level playing field' if there is any evidence of non-competitive behaviour in the market.

These were the food and agricultural product markets that dominated from the 1950s to the mid-1980s.⁴

The world has changed

Consumer markets have changed radically in the past couple of decades. These changes have been caused by a wide range of external forces, as outlined by Barkema et al. (1991) and others. The incentives produced by the agricultural support policies of earlier times led to the increasing industrialisation of agriculture. More recently, the external forces have been to the fore: rapidly rising incomes in key Asian markets; greater participation by women in the workforce; greater urbanisation, especially in developing economies; further globalisation; the rise of the internet; deregulation of capital flows; deregulation of exchange rates; further movement to free trade regions; fewer restrictions on foreign direct investment; development of new stock exchanges; breakup of the former Soviet Union; and transition from public to private pension schemes.

The emerging economies have rapidly expanding middle classes. These cohorts of wealthier consumers demand new and different goods and services, changing the way new products are supplied. Private firms have collaborated through market innovation and RD&E to solve the new needs being expressed in markets. This has led to a progression from the old style 'commodities' to 'products' and 'services', and now to 'experiences' - all characterized more specifically in terms of form, space, time, place. It is no longer sufficient to supply the differentiated products of monopolistic competition –

⁴The fact that there was also widespread government intervention in these markets in many countries does not change the basic characteristics. Such intervention was primarily for equity and populist reasons, shoring up the incomes of residual agricultural producers, or catering to the interests of pressure groups under the guise of social and cultural objectives.

in the new experience market, buyers demand credence attributes, services combined with the product, and community service requirements. These bundles of attributes are increasingly delivered by firms operating in closely coordinated value chains which: are private; have excess rents; impose transaction costs; are disaggregated; differentiate; target segments of markets; are governed by relationships; have closed systems; are fee based; practice exclusion; seek investment; and focus closely on value.

The features of these modern markets are very different from the old-style commodity markets, and in some cases are diametrically opposed.

Implications of these changes

The strong implication is that the agricultural and food sector is no longer selling/marketing a commodity or even a product but rather a consumer food (beverage and fibre) 'experience'. Consumers seeking their food experience are willing, and expect, to pay extra, and are demanding about the bundle of attributes they have selected, which they expect to be delivered precisely when, where and in the form required, with guaranteed safeness and the selected quality, every time.

Satisfying this consumer food experience requires highly coordinated systems of delivery. Consequently, costs are higher, risks are higher and there is greater uncertainty at many levels. It is no surprise that these three issues are related closely to the reasons for value chains forming in the agricultural and food sector:

1) Capturing efficiencies and controlling costs

- reducing high fixed costs at all stages of production and distribution provides a strong incentive to stabilise the volume of throughput,
- capacity can be better utilised,
- production practices can be better attuned to specific end uses,
- conforming to specific quality standards may be accomplished at a lower cost with a contract system, and
- horizontal/vertical alliances can be employed to achieve economies of scale.

2) Reducing risk (quality, quantity and food safety)

- contracts to reduce input and output price risk,
- vertical integration into input supply or product distribution channels,
- reducing safety/health risks in food production, and
- value chain governance: the relationships among the buyers, sellers, service providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use.

3) Responding to consumer demands for attributes

- quality control
- availability of products with specific characteristics.

All these things are better done in value chains with closed information sharing. In addition, co-ordination and co-operation among chain partners in these agricultural and food networks are mandatory if they are to be profitable and sustainable (Carter and

Easton 2011). The required coordination demands strong relationships among the partners because of the inevitable trade-offs of benefits between them (Mueller et al. 2007). Chain governance has widely been identified as the key to overcoming challenges such as the complexity of transactions and enabling information to be codified (Gereffi et al. 2005), facilitating innovation, and reconciling retail market power with the pursuit of competitive advantage by firms at other stages of the chain (Simmons et al. 2003, Soosay et al. 2012).

A consequence of the changing agricultural and food markets is that they are no longer populated by the large numbers of small players of the past, who were predominantly price takers lacking the incentive to invest in more efficient outcomes. Modern agricultural and food markets are systems or networks of private, consumer-driven value chains. Inevitably then, value chains have become the preferred unit of enquiry for analysing and evaluating agricultural and food sectors (Baker et al. 2014).

What are value chains?

The Value Chain concept was developed and popularized by Porter (1985) as part of a competitive strategy to achieve superior business performance. Porter defined value as the amount buyers are willing to pay for what a firm provides, and he conceived the 'value chain' as the combination of nine generic value-adding activities operating within a firm – activities that combine to provide value to customers. Porter linked the value chains between firms to form a 'Value System'. Nowadays, with often radical redefinition of the boundaries of firms to obtain inputs and numerous and close collaborations, the linkage between the value-creating processes of multiple firms has more commonly become known as 'the value chain'. As the term value chain implies, the primary focus in value chains is on the benefits that accrue to customers, the interdependent processes that generate value and the resulting demand and funds flows that are created. An industry value chain (also known as the supply chain) is a physical representation of the various processes that are involved in producing goods (and services), starting with raw materials and ending with the delivered product. It is based on the notion of value-added at each stage of production. The sum total of stage value-added yields total value. This is sometimes called 'chain surplus' (Chopra and Meindl 2013, Feller et al. 2006).

The Role of Government in Modern Food and Agricultural Product Markets

The encompassing economic issue for participants in modern agricultural and food product markets is how to align all the chain partners to deliver food experiences that maximise consumer willingness to pay within the constraint of achieving operational and pricing efficiency? And, what, if any, is the role of government in organising or facilitating these systems?

Recent extensions to the theory of market failure

The public good principle for intervention in markets as outlined earlier applies to any collective of interested parties in which no individual in that group has enough incentive to provide a good or service because costs exceed benefits due to non-rivalry and non-excludability: conversely, where members of the group act together, they can overcome these problems. For example, producers in the same industry can pool resources and

fund RD&E and overcome problems of non-rivalry and non-excludability. This is called the 'industry good' case in which the public good principle applies.

Sometimes the argument is put that, if all the direct benefits of an investment in a particular area are confined to participants in an industry, the amount these beneficiaries are willing to pay, such as via research levies, is the total amount of investment that should be committed and there is no role for public investment. This thinking has the implicit and mistaken assumptions that: (i) there are no public (beyond-industry) benefits; and (ii) participants in the industry are levying themselves the amount to invest that achieves maximum economic efficiency (marginal benefit equals marginal cost). This thinking goes on to conflate efficiency and equity (beneficiary should pay) considerations – the amount beneficiaries are expected to pay is a fairness notion whereas the efficient amount of investment is the amount that maximises net social welfare. The economic efficiency approach holds that investments should be made if economy-wide benefits exceed costs, regardless of the source of funding, as this adds to national welfare. Furthermore, the efficiency criterion dictates that investments should proceed up to where the marginal benefit of the marginal investment just equals its marginal cost. Whether beneficiaries pay or not is an income distribution (equity) issue.

The over-riding idea is that if collective action to supply goods and services by the public or by an industry or by a combination of the two will provide the goods and services that are currently under-supplied, and the benefits of doing so are expected to exceed the costs, then collective intervention is warranted because there will be a net gain in social welfare.

Introducing the concept of chain goods

The ability of food producers to benefit from creating value is constrained by the potential for misalignment between the financial incentives for individual firms and the collective incentives. This misalignment is similar in some ways to, but different in other respects from, the typical under-investment in public goods found in the general economy or in 'old world' commodity markets. If coordination through and of chains is lacking or deficient, and value chain participants maximise their private net benefits, this leads to 'chain failure'—sub-optimal performance of the whole chain because of under-investment in 'chain and system goods' and the presence of 'chain and system externalities'.

A chain good comes from the broader concept of a club good - a sub-type of a public good, without the condition of non-excludability - and is related to the concepts of 'local public goods' and 'local club goods' in the local government literature. McNutt (1999) observed that club goods could be considered as public goods without the condition of non-excludability. Chain goods resemble club goods in that they are non-rivalrous and selectively excludable. Members of society outside the value chain are excluded from sharing in any benefits derived from collective action within the chain unless there is free-riding or non-cooperative behaviour. Chain goods are those types of goods and services that allow effective coordination across value chain partners. They resemble what used to be called the 'facilitating functions' of agricultural markets - standardisation, financing, risk-bearing, and market intelligence (Kohls and Uhl 1980). They also resemble what is often referred to as 'cross-functional drivers' in the literature

about supply chain management – information, sourcing and pricing decision making (Chopra and Meindl 2013).

Absent or poorly functioning chain goods lead to chain failure caused by externalities or high transaction costs. Strategic alliances formed among groups at the same level across different levels in chains form to internalise chain goods. Under-investment in chain goods is likely to be especially damaging to the small-scale producers of food because they have limited scope to internalise positive externalities of chain goods (Mounter et al. 2011).

Meat Standards Australia as a chain good

A prominent example of a chain good is the Meat Standards Australia (MSA) voluntary beef grading scheme. It is designed to predict beef eating quality that was introduced in the domestic market in Australia in 1999/2000 (Griffith et al. 2010). The MSA grades are based on the untrained consumers in taste panels (Griffith and Thompson 2012) while the system uses a “total management approach”, from animal genetics through to cooking method (Polkinghorne et al. 1998, Thompson 2002).

The rationale for investing in the original RD&E that underpinned the MSA model was that beef consumers in Australia in the early 1990s were consuming less beef because the eating quality experience they were seeking and willing to pay for could not be guaranteed each time they bought beef. Eating quality was subjective and based on vague notions of breed, age and feeding regime, and there was no relationship between consumer preferences, willingness to pay, and the quality differentials on offer to potential consumers. The way carcasses were classified and quality-described varied widely between suppliers. Brands were rare at the retail level. There was no objective, uniform system to provide the information that consumers wanted, let alone any guarantees.

Is the MSA grading system a chain good? Consider the preceding discussion. Chain failure occurs when a value chain fails to maximise chain surplus because it supplies a sub-optimal throughput and value (Griffith et al. 2012). An economically efficient value chain, where chain economic surplus is maximized, is where no single participant in the chain can be made better off without another participant being made potentially worse off. The degree to which chain economic surplus is not maximized measures the degree of chain failure.

As noted by Griffith et al. (2009), Doljanin (2012) and Griffith and Thompson (2012), the value of the MSA scheme is reaped at the retail level where consumers are willing to pay premiums for beef cuts that are guaranteed tender (MSA-graded beef), in contrast to ungraded beef marketed through conventional grid systems where minimal inducements are offered for improvements in the eating quality of product. The feedback on carcass quality received by registered producers, combined with adherence to MSA certification standards, facilitates consistent product to consumers.

In the whole fresh beef value system in the early 1990s the system failure was clear. This failure of the system had all the hallmarks of classic market failure: a ‘chain bad’ - a poorly functioning beef grading scheme - as well as asymmetric information leading to adverse selection, moral hazard and the principal-agent problem. Further, the investment required to undertake the collection of data from many thousands of animals

in the field and in processing plants, and to conduct 86,000 consumer taste tests, was too large to be contemplated by any one firm in the beef value system; and a firm that could not capture all the benefits of such an investment regardless.

Thus, a properly designed grading scheme is a perfect example of a chain good. It is based on consumer preferences, and has associated pricing systems that allow the willingness of consumers to pay for quality to be captured and transmitted to other chain participants.

Roles for the governing agency

Based on the above discussion, the governing agency in a value chain or system (such as the dominant firm or an industry body) can be expected to have a potential role to play in counteracting many different types of chain failure. The following checklist of areas prone to chain failure provides a useful means to assess where intervention and/or investment is needed and justified to correct for this failure in food and agricultural product markets:

- Strategic RD&E
- Regulation of markets and transactions within the value chain
- Enhancing consumer and channel knowledge
- Chain sustainability
- Education and training in value chain analysis, operation and management
- Chain governance and relationship management
- Inventory aggregation
- Transportation policy
- Exploiting scale and scope economies in capital investment through joint action
- Risk sharing.

The first six of these forms of intervention/investment warrant should be accorded the highest priority as they offer the greatest scope to increase chain surplus and net social benefits. The other potential roles are important but tend to be areas that are less prone to chain failure.

Conclusion and Implications

Economists have been inculcated with the idea that price mechanisms in markets act as an 'invisible hand', allocating resources to provide the types, quantities and qualities of goods and services people want that maximise social welfare. Governments are justified intervening in the market when the 'invisible hand' fails in its task and the benefits of intervening outweigh the costs. There is also a 'collective invisible hand'. This occurs when chain participant stake collective action to correct a failure of the market. When this occurs, government does not need to intervene to correct the problem: it has already happened. The phenomenon of the working of the 'collective invisible hand' has grown as the agricultural and food sector markets fewer commodities and the demand for a consumer food, beverage and fibre 'experience' has become more prominent. While the operation of the 'collective invisible hand' relates to creating or improving chain goods to overcome chain failure, the 'collective invisible hand' may also suit Coasian solutions in which some participants in a value chain negotiate independent actions. Other times, solution may require direction from a governing

agency in the value chain acting for all participants in the chain to resolve a chain failure.

Areas typically prone to failure in the chain are a useful focus when assessing where and whether intervention or investment is needed to correct for failure in food and agricultural product markets. Some such areas include: strategic RD&E; regulation of markets and transactions in the value chain; enhancing consumer and channel knowledge; chain sustainability; education and training in value chain analysis; operation and management; and chain governance and relationship management. Regardless of the extent of chain action, the conclusion is there remains a set of potential roles for government to intervene where collective action by value chain members fails or is absent.

There is also a core institutional implication of recognising the legitimacy of different avenues for market intervention. Effective governance of value chains requires institutional innovation, relating to structure, funding, information flow, selection of matters deserving intervention, facilitating Coasian solutions, distributing costs and benefits of actions taken by the chain governor, and with involvement of government at all levels from international to local.

In subsequent papers some of these ideas will be developed in more detail.

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