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**Systems Economics: Essay 1 -
Definition of the economic
product.**

By

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ABSTRACT: This essay is the first in a series labelled Systems Economics, that re-examines some fundamental economic concepts using a systems approach with an objective to help guide advice on institutional arrangements for economic exchange in the real world of continuing dynamic change in values and motivations of the entities in a democratic society. These concepts incorporate past insights and evidence from forensic analysis of current human action that shows a gap between theory and practice. The objective is to help explore alternatives to the current institutional arrangements dominated dimensionally by the simplistic binary options of economic exchange between entities being characterized as *market* or *firm* (including *government bureaucracy*) and product characterization as *public* or *private*.

In this essay to put economic action in context I first take a look at the general nature of entities and the resources they control. Then the nature of the rights to resources is explored together with actions that can be applied to such rights, all of which can be characterised as exchange. The motivation of each entity and the role of causality in economic action are explored. This brings us to the definition and role of products, including their dimensions. Finally, the ramifications of focussing on the exchange of accurately defined economic products are briefly contrasted with the current focus on consumption of physical products.

KEY WORDS: *Systems economics; entity; product; motivation; dimension; causality; institutional arrangements; transaction costs; markets, firms; public; private; decision making process.*

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1. General introduction

Economics with and without adjectival modifiers such as monetary, environmental, institutional and so many more, has come to mean many separate different things. Much human action expresses itself in economic terms but in a lot of researching in economic disciplines divided into nooks and crannies by the adjectival scalpel, the connection between the fundamentals of human economic action and the subject of research has become tenuous, forgotten or at worst misleading.

For instance, a person goes to a corner store and buys a litre of milk. This is firstly a mutual exchange of resources between the person and the store keeper. The person has decided to supply some of his resources (usually expressed in money he has) in return for the storekeeper meeting his demand for another type of resources - the milk – which he values at *least* as much as the money he hands over to the storekeeper. The storekeeper demands sufficient resources (money) that he values at *least* as much as the resource he supplies – the milk.

They are *both* demanding and supplying resources, yet contemporary discussion loosely talks of the individual customer as a consumer, even a sovereign consumer, and the shopkeeper as the supplier.

Further, is the person required to physically consume the milk immediately as part of the exchange? No! He has in the exchange acquired the *right* to the flow of benefits he perceives in the resource – the milk - which he can consume any time he likes, subject in this example to appropriate refrigeration.

So as Coase¹ pointed out and was eventually recognized as one of two of his contributions deserving of a Nobel Prize, it is the rights not the physical consumption of the resource that is important to economics.

At the time of the exchange each entity agreed to value the products - the milk, and the money - sufficient to enter the exchange *and with the expectation of being better off* after the exchange than before.

This story can be mined for many other insights when applied to products other than milk and beyond product definition into the economic system itself. It gives a view of economic action as a complete system that can encompass the views held by the economic meta-groups including the classicists, neo-classicists, and institutionalists.

The discussion begins in this paper with the definition of the economic product. While there is general understanding that resources exchanged in the open competitive markets as described by price theory, do so in an efficient manner, the understanding about the exchange of resources meeting aggregate demand, such as networked public infrastructure services, is far from clear.

At a broader scale and perhaps even more limiting to the usefulness of economics is the view of economic action contained within the Theory of the Firm. The neo classicists focus on pricing and production seems to have relegated the exchange of rights between entities labelled as labour, management and owners within firms to something separate from other economic exchange. It is not.

We need better theoretical models to guide advice on institutional arrangements for economic exchange in the real world of continuing dynamic change in values and motivations of the entities in a democratic society. These general theoretical models can incorporate past insights and evidence from forensic analysis of current human action. Such models may help explore alternatives to the current institutional arrangements dominated dimensionally by the simplistic

¹ Coase R H (1960) The Problem of Social Cost; *The Journal Of Law and Economics* V3 No 1, pp 1-44.

binary option of exchange mechanism of *market* or *firm* (including government bureaucracy) and product characterization as *public* or *private*.

What follows is the first of several essays on some of the forgotten fundamentals of economics and how their incorporation in theoretic models can expand the scope understanding and usefulness of economic enquiry. Essentially the essays apply a systems analytic approach that seeks to explain the economy in the entirety of exchanges between entities of any rights to valued resources whether they are monetised or not. The driving attitude can be described as based in the tradition of and drawing upon: the broadest interpretation of political welfare economics; the Austrian Economic School typified by the work of von Mises and Hayek; and institutional economics including the more recent work led by Williamson and Ostrom.

The collective label proposed for this approach is **SYSTEMS ECONOMICS**.

What the type of theorizing in the essays is not is also worth mentioning. It is not compartmentalized, for example by the aforementioned binary division of exchange in the economy into market or firm, and economic products as either public or private, nor by the strictures of instrumentality that remake complex causal relationships into mathematically friendly statistical cartoons, and not by an objective to specify a static optimum of welfare or utility for a society for a particular exchange (a project investment) however defined.

The objective of the essays is to provide a systems perspective on economic action placing several fundamentals in their rightful position as essential to all economic discussion at all levels of action from research to implemented policy with the goal of improving the institutional arrangements that frame human economic action.

The **first essay** more fully develops the economic **product definition** introduced above to show how to define what products, as revealed by the economic action of actual exchanges within existing institutional arrangements, policy analysis should focus upon.

The **second essay** will explore the role of **constraints** in selecting viable (economically feasible) alternative product options both at the level of project investment analysis and at the level of design of institutional arrangements. It will show that options for our exchange choices are relatively small in number and hence easier to define and analyse than the unconstrained choices suggested by current approaches based on popular mathematically based analytical tools.

The **third essay** will then explore the implications of **dimensional scale** of product in defining **governance or control** structures for entities exchanging products with scale dimensions of supply that differ from the scale dimensions of demand by the other entity in the exchange.

The **fourth essay** will then describe the underlying **generic decision making process** (DMP) that applies to all economic exchange by entities of all scales.

And finally in this series will be a **fifth essay** that explores examples of designs of **institutional arrangements** that embody the forgotten fundamentals and insights that emerge from highlighting them in the preceding essays and in the broader framework of Systems Economics.

2. Products

2.1 Introduction

There is not much of use in a concept of economics that is static, looking only at instantaneously optimal size and distribution of resources among entities. Quiet contemplation of resources under one's control may elicit feelings ranging from fear of loss to satisfaction but if nothing is done with those resources there is nothing for economists to contribute. Economics would be without purpose. The same can be said of the entity holding those resources. Purpose comes with applying resources to produce economic action.

Similarly there is not much of use in a concept of economics that is only concerned with actions constrained to financial resources. Our concepts of value and utility of rights to resources go far beyond the financial.

Economic action does not take place in a vacuum or more precisely in an unconstrained manner. Over time for economic efficiency all of the elements of economic action such as value/utility, constitutional rules designating broad rights, legal and regulatory frameworks for control or governance systems for particular types of economic action such as banking, and rules for specific exchange, have all evolved into what are collectively known as *Institutional Arrangements*².

To put economic action in context I first take a look at the general nature of entities and the resources they control. Then the nature of the rights to resources is explored together with actions that can be applied to such rights, all of which can be characterised as exchange. This brings us to the important definition and role of products. Finally in this essay, the ramifications of focussing on the exchange of economic products are briefly contrasted with the current focus on consumption of physical products.

2.2 General nature of economic action

The foundations of our modern framework of economics begins with the Scottish Enlightenment ideas from Smith³ including how moral sentiments move humans to act to improve their welfare and through price theory solve the coordination problem inherent in economic exchange. These foundations have brought us to the dominance of institutional arrangements containing open market features within a social framework of representative democratic principles. The neo-classicists economists developed price theory and theory of the firm to explain how Smith's proposition worked⁴. When it came to the institutional arrangements in which exchange is best done, there were broadly two competing views of the moral sentiments underlying human behaviour. One was based on the liberal belief that men are inherently moral, competent, and intelligent and can rule themselves as expressed, for example, by Locke⁵. And the other view was based on a paternalistic, aristocratic view that men are naturally evil and need to be controlled by an elite entity exercising dominant power as expressed, for example, by Hobbes⁶.

The dichotomy remains today. The bottom up or subsidiarity principle of locating decentralized economic control at the lowest possible level of aggregation inherent in the views of liberals and the top down centralization of economic control views of paternalistic aristocrats inherent in the structure and governance of Judea-Christian religions, military and many commercial corporations, are both represent in policy discussion in modern democratic economies, competing against each other and in so doing lead to much confusion and contention about how economic action should be framed by institutional arrangements.

A first step towards clarity requires that the discussion is founded on precise definition of the elements used to describe economic action beginning with entities.

² Williamson O E (2000) The New Institutional Economics: Taking Stock, Looking Ahead, Journal of Economic Literature V 38 Sept pp 595-613.

³ The foundations of Adam Smith's famous An Inquiry into the Nature and Causes of the Wealth of Nations are found in his The Theory of Moral Sentiments which is highly recommended to researchers into economic fundamentals.

⁴ For a description of the process of development of Smith's thesis see: Harold Demsetz, Ownership, Control and the Firm Volume I, page 145.

⁵ Various commentaries and further information on the thesis and influence of John Locke's Two Treatises of Government, originally published in London, edited by A. Millar et al. in 1764, are available on line.

⁶ Again many commentaries are available on line regarding Thomas Hobbes: Leviathan or The Matter, Forme and Power of a Common Wealth Ecclesiasticall and Civil, commonly called Leviathan first published 1651.

2.2.1 Entities

All discussion of human economic action is founded on the action of individuals. And for an economic individual that action is undertaken with the expectation of betterment measured on a scale of utility denoted in whatever terms the individual deems appropriate. How these notions of utility are established depends on high level institutional arrangements and will be more fully discussed in another essay in this series on a generic model of the economic decision making process.

In many cases of economic action it may be prudent for an individual to join with other individuals to form larger entities for collective action to increase the utility of resources held by each individual after the collective action, compared to when acting alone for the same purpose.

In summary we have entities constituted by individuals acting alone and at many different larger scales of aggregation of the rights of individuals.

2.2.2 Character of economic resources

The subject of economic action by an entity is the utility to that entity of resources under its control. As expressed by Coase⁷ what are significant to an entity in controlling resources are the **rights** to the flow of value available from these resources to the entity. In his Nobel Prize speech (1991) he said:

“I explained in “The Problem of Social Cost” (1937) that what are traded (exchanged) on the market is not, as is often supposed by economists (or politicians), physical entities but the rights to perform certain actions and the rights which individuals possess are established by the legal system”.

In the context of establishing the institutional arrangements for the value rational exchange of resources, use of the **rights** to perform certain actions of consumption as the reference unit of measurement gives a substantially different to using the units of the **act of consumption** itself as the reference unit. For example, in transport the right to make a trip is very different to actually making it. And when the nature of the right to make a trip is considered, the majority of rights required to enjoy such transport service are secured not at the level and time of rights to resources exchanged when deciding to make a particular trip, but at the level and time of exchange of the right to resources that constitute network accessibility. This example will be further developed below in 2.4.1.

To generalize Coase’s reference to the legal system as the means of establishing control of rights, what is necessary to enjoy these resources and the flow of utility from them is the **power to enforce those rights** and not have them expropriated by other entities. Without that power the rights are useless and it is why economic activity in countries with enforcement characterised by the “rule of law” over rights held by many entities is so efficient as compared to economies where each entity has to use substantial resources to provide the power to protect and enjoy those rights itself.

2.2.3 Types of rights to economic resources

Economic rights to resources have been categorized in many ways but in the broadest form of economics, such rights are typically divided into **property** (land and capital), and **labour** (physical and mental), and **political** rights. Comprehending property and labour economic rights held by individuals is straight forward but, as noted above, economic efficiency of supply leads to some individual rights being aggregated within larger entities. The most prominent aggregation of rights is what we commonly refer to as political economic rights which refer to those property rights (including taxing powers) an individual passes to political representatives to be held and exercised on their behalf together with similar rights from other qualified

⁷ Coase R H (1960) The Problem of Social Cost; *The Journal Of Law and Economics* V3 No 1, pp 1-44.

individuals. In other words they are placed in a political entity, which is larger than an individual, to hold and undertake actions with such rights when, as stated above, for efficiency it is prudent to do so. Defence is the classic example. It will be shown in a later essay on constraints to economic action that political rights can be presented as a special form of property rights when the twin concepts of feasible economic products and consequent scale of aggregation of individual rights are applied to economic action.

These rights to resources expressed in the three categories are so designated when the entity holding them has the means to exercise and enforce *control* over them. In other words the entity can determine how and when the flow of utility in the resources that is valued by the entity can be applied to some action, including doing nothing.

This again highlights the distinction between having the control of the resources and doing something with those resources. Physical consumption does not immediately or necessarily come into it. Economic rights are about control of the value they represent not the actual consumption of physical resources. This brings us to what entities do with these rights.

2.2.4 Exchange of rights

Exchange of rights between entities is the fundamental human action in economics. Everything that is done in the name of economics is ultimately aimed (or should be aimed) at improving the outcome in the sense of total utility of resources held by the participating entities from exchange between these entities.

Note that it does not matter in what environment of enforcement of rights the exchange is taking place. It could be between individuals in an open market subject to contract law. It could be in a firm between an employer and an employee (subject to labour law). And in a special case of the firm that will later be explored in more detail in the DMP Model essay, it could be between an entity exchanging labour resources for physical resources that the same entity controls to create additional valued rights to resources under the entity's control. As a final example it could be a suitably regulated exchange between a monopoly supplier of large scale infrastructure service and an individual, relatively small scale consumer.

In an exchange, each of the two entities separately undertakes some form of a process of analysis of options to choose which rights to resources under its control to exchange for rights to resources under the control of the other entity, with the expectation of growth of the utility of resources under its control, which they value in their own terms (Figure 1).

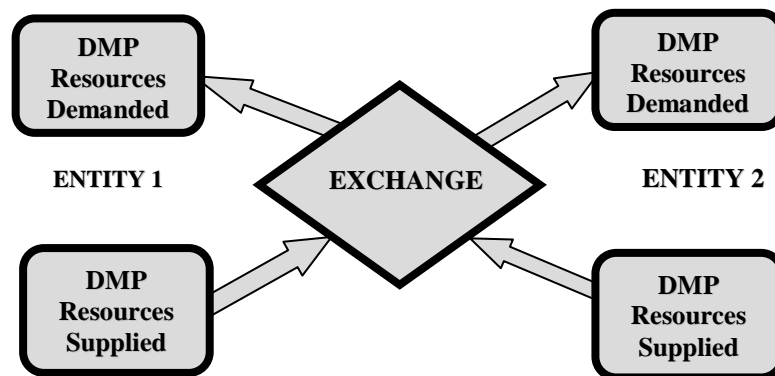


Figure 1: DMPs by ENTITY

In contemplating the exchange each entity has a measure of utility to it of resources to be given and their value in exchange in mind that is verified at the time of exchange in accordance with neo-classical price theory. And similarly the same entity has a general concept of utility of the resources to be received that is also precisely quantified in utility to that entity at the time of exchange as exceeding the utility to it of the resources to be supplied in exchange.

Each entity in the exchange transaction is acting as both demanding and supplying resources. Interestingly, for similar sized (rights & power) entities, there is no intrinsic role-specific asymmetry in the rights and power of each entity when acting in either the role of demander of product or the supplier of product. There is nothing in this exchange process that suggests labelling one entity as a “sovereign” customer with power disproportionate to the other as each entity acts as a customer demanding resources as well as a supplier of resources. This does not reduce the significance of the admonition that “the customer is always right” but extends comprehension of motivation for the process of exchange to the system of ongoing two-way interaction between entities along the lines described as entrepreneurial discovery by economists of the Austrian school, such as Kirzner(1997)⁸.

2.2.5 Motivation for exchange

The motivation for an entity to enter into an exchange is the expectation of an increase or growth in utility to it of the rights to the resources the entity has after the exchange. The measurement of increase in utility is a matter for the entity alone. Neo-classical economics particularly in its pricing theory and the optimization models of production and consumption has made much of the static concept of establishment of value of the resources at the time of exchange as being equal to the value of the next best opportunity foregone by each entity. The Austrian economists have highlighted the dynamic concept of the significance to economic action of the expectation of gain from the exchange.

The primacy of gain in utility to the entity as the motivation for economic action through exchange, and the fact of measurement being in the hands of the individual give strong support to the importance of the design of institutional arrangements that influence that class of exchange.

The primacy of gain in utility to the entity as the motivation for economic action through exchange also highlights the role of causality between actions that an entity proposes to take and the resulting increase in utility of rights to resources of the population of entities affected.

2.2.6 Role of causality

An individual is in a position to voluntarily undertake an action because she has a sense of what change that action may bring. Without that idea of cause and effect our actions are without meaning. This statement does not require perfect knowledge for validity. Its validity rests on the existence of a notion of causality between the means applied to produce the change and the end state that is expected to result.

In simple exchange between entities consisting of a single individual the role of causality between an entity’s exchange action and the resulting increase in utility to the entity is bounded entirely by the entity’s concept of value of the rights to resources involved. Causality in terms of utility is more difficult to observe when economists are called upon to give advice on likely outcomes of exchange between entities on a single project that consist of the aggregated rights of more than one individual.

The difficulty is magnified when the discussion moves from efficient processes for a single project exchange to appropriate institutional arrangements for all exchanges in the project’s

⁸ Kirzner I M (1997) Entrepreneurial Discovery and the Competitive Market Process, An Austrian Approach. Journal of Economic Literature, March (1997).

product category, particularly when institutional arrangements for exchanges by entities representing more than one individual are involved.

In other words, in the ongoing assessment of the relative contributions of instrument rationality and value rationality to society's economic wellbeing, causality can become a casualty as the capacity to forecast and demonstrate cause and effect becomes difficult. As the mostly mathematically based techniques of instrument rationality are applied to optimize institutional arrangements against some agreed objective function there is the necessary judgement applied in deciding whether the relationships are acceptable representations of human action. And behind the optimization analysis of general equilibrium modelling, similar issues apply to the statistical relationships used to model inputs to the optimization calculation.

The *challenge* to identify and justify causality increases with complexity and the scale of impacts. The *need* for a causality hypothesis similarly increases. Otherwise it is impossible to confidently add to our knowledge of economics and hence to improve the institutional arrangements that frame economic exchange.

Fundamentally all economic analysis is aimed at testing some explicit or implicit hypothesis regarding the causality between actions; say raising interest rates to slow economic activity, or introducing congestion pricing and the resulting impact on the human condition.

It follows that all advice by economics on the broad span of institutional arrangements should *always* be backed by a statement of the underlying causality hypothesis.

In summary, human action with economic consequences is all about the exchange of rights to resources between entities and those entities enter into exchange with a model of causality between such actions and the impact on their wellbeing (utility of the rights to resources under their control) that must be explicit. This finally brings the discussion to the role of products in the economic project.

2.3 Products

2.3.1 Product defined

The rights to resources offered for exchange by one entity and accepted by the other entity, constitute a *product* (Figure 2). Note that in any exchange (Figure 1) there are at the instant of exchange two *products* of equal value, one given and one received by each entity. This definition of a product in the context of our broad definition of economic action provides no distinction between intermediate or final products or any distinction based on the circumstances of the exchange such as whether it occurs in an open market, a regulated market, or within a firm. It only depends on two entities entering into an exchange of rights to resources.

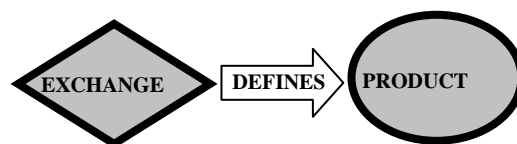


Figure 2. Product definition

Applying Coase's definition of an exchange transaction in a generalized and broadened form, as occurring with the transfer of legal *and other enforceable rights to resources that constitute a product*, we have a picture of economic activity as exchange between entities of rights to resources packaged as "products" with the objective of exchange being growth of utility of rights to resources held by each entity with utility to each entity defined in whatever terms chosen by that entity.

2.3.2 Product dimensions

To this point *rights* to economic resources have been defined as the fundamental unit when contemplating economic action and the measurement of their utility to an entity as the only dimension required. The existence of rights with utility to an entity is subject to constraints on feasibility of enjoying their utility in the various channels of measurement including physical, financial, social and environmental. Further complexity comes from the finite time over which an entity can enjoy the utility of rights to resources.

In a static view of economics it would suffice to instantaneously measure utility to the relevant entity of rights to resources. But the static view is simplistic and inaccurate, and so we use adjustments including what are commonly called discount factors to account for the value of rights available at different times. And we use money units to put utility of rights on a common measurement basis (and of course to lower transaction costs) while, as observed above, we recognize the variability of the utility of the same rights to different entities. Even the definition of the utility to an entity of rights to resources as the *flow* of utility available from controlling the resource rights points to the need to include a *time dimension* for products.

This time measure and its variability for different products and different entities has created many challenges in developing useful theory for both ranking options for individual exchange between entities (investment analysis) and more fundamentally for the analysis of alternative institutional arrangement to guide and lower the transaction cost of such exchange over time.

A later essay will look at how existing static approaches to ranking alternative institutional arrangements cope and will suggest an alternative dynamic perspective on the appropriate objectives of institutional arrangements.

But first and importantly for theory and subsequent optimization analysis, the significance of clearly defining products will be discussed.

2.4 Significance of clear definition of product

With exchange as the fundamental human economic action then the definition of each product arising from exchange is of central importance to all economic analysis. Whether economists are forecasting, doing project investment analysis, or giving policy advice on institutional arrangements that guide exchange between entities, the definition of an economic product is central. This applies whether the entity involved is a single individual or the aggregation of resource rights and power of many individuals. Get the product definition wrong and the conclusions of economic analysis will be distorted and often economically and financially costly. This is especially true in formulating institutional arrangements.

The importance of product definition comes from the fundamental nature to economic efficiency of institutional arrangements. Institutional arrangements exist to constrain in the interests of economic efficiency, the options considered for an individual exchange. Consequently observation of the nature and timing of exchange directs us to the appropriate action point to define the product and hence analysis of efficient institutional arrangements. And yet current policy analysis that shapes institutional arrangements can be focussed on usually physical "products" that are not the result of the actual exchange of rights to economic resources.

In less abstract terms, if institutional arrangements say for entering into a payment agreement (exchange) for a service such as transport are formulated to correspond to the precise exchange

place, quantum and time, when rights to transport service are acquired, then exchange will be more efficient and society will be better off than with a convention that bundles together all contributing exchanges of separate physical products that constitute transport service. In other words it is more efficient in terms of transaction cost and utility of rights to resources after exchange if the entity is undertaking a decision making process of choosing among a small number of clearly defined similar product options within an efficient framework of institutional arrangements than in an unconstrained environment of the mythical perfect knowledge. In general the goal of transaction cost efficiency will drive institutional arrangements to evolve to define economic products of appropriate characteristics.

Less abstractly and more topically consider the exchanges for collective products that are used to establish Public Private Partnerships (PPP) in all their various manifestations. Many politicians and certainly many investment banks, construction companies and their advisers would suggest that the PPP procurement process provides efficient access to acknowledged open markets. But the process is limited by the vagaries of assembling a consortium and as such is distinctly sub-optimal economically (even financially or in the vague *value for money* terms).

The chances of getting the best financial package with the best design and construct package and the best operation and maintenance package are remote. For example, if we have say 5 suppliers in each of these markets the selection of the best supplier product (by price meeting defined criteria) in each category is relatively straight forward and 100% certain. If we then have to combine one of each of the supplier's products from the three markets into a consortium package before selection, then the probability of selecting the "best" consortium package is low. Again assume for simplicity that all products in all markets are the same and the suppliers independent. Then in a random selection process there is a 1/5 or 20% chance of having the "best" product from each market in any one consortium package and only a 1/125 ($=1/5 \times 1/5 \times 1/5$) or 0.08% chance of having all three "best", in a "combined best package" consortium.

The real world of consortium package assembly is less straightforward but the probability of a "best" consortium package being selected is clearly low. Competitive tendering it may be but when one product of each market participant is required to be bundled up in a consortium package, it is not the most efficient market.

In summary the argument is that by observing when rights are exchanged rather than physical consumption or in other words when the flow of utility from resources occurs, we identify products which are the appropriate subject of policy analysis and hence the resulting institutional arrangements.

2.4.1 Transport example

As another step towards realism tease the above transport example out further, by considering an entity of a single individual undertaking a household to work urban trip in a private road vehicle. There is a series of resource exchange transactions leading up to that trip.

The series of transactions starts with resources committed by the entity as the result of a residence location/accessibility decision process leading to exchange of resources by the entity to acquire the right to locate there. Under current arrangements these location rights include ***rights to access the transport network with its underlying resources of; the right-of-way land; and track facilities in it.*** To exercise these rights the entity also has to have secured ***rights to a private road vehicle licensed to access the network.*** If the individual is a public transport user then she only has her share of these vehicle costs.

Then there is the exchange for the trip product (for roads that have no toll) consisting in the case of the car, of its operating costs for the trip, and in the case of the public transport user the users contribution to the cost of the vehicle operating costs for the trip.

The magnitude of the network accessibility and vehicle ownership rights products are much greater in terms of resources involved in those exchanges than the exchange of resources for the trip product.

This suggests that the institutional arrangements around exchange of resources to use public infrastructure which in this example is the investment in land for transport rights of way and civil works track facilities, should be more focussed in the first instance on exchange of resources for the product *accessibility*, as defined by the *rights* to use resources allocated to the *network* relevant to the trip-maker rather than the rights to the resources exchanged in the transaction for this one particular trip product.

Given that transport service trips have varying lengths defining the relevant network could be seen as a challenge. UK statistics suggest⁹ that by length, around 65% of all trips (all modes) are less than around 15 kilometres and 90% less than 45 kilometres. So the definition of relevant network could be divided into areas or zones at say three interconnected scales: local, intra-regional, and inter-regional (including international gateways). The challenges of boundary effects and variation of trip length within the zone are recognized but these are not new problems and can be dealt with effectively statistically. This pattern of demand also points to the significance of the local network in meeting the demand for service and hence in the economy.

To take the urban transport case a step further to realism, the products ranked in importance by size of rights to resources involved are: - access to the relevant network; access to the facilities therein; a vehicle of acceptable standard; and finally the resources exchanged for that particular trip. The resources in each product providing transport service will depend on many location specific variables but to get some idea of the relative amounts of resources involved assume a network made up of four lane limited access roads. Assuming network geometry of a regular grid, for the relevant network the resources involved for each product will be proportional to those of a unit length of say 1 kilometre. In urban Sydney the order of magnitude value of a kilometre of: - right of way for a four lane limited access road is say \$36,000,000 (60,000sq.m @ \$600 per sq.m); the construction cost of a four lane road itself is say \$10,000,000; the vehicle say \$30,000; and the operating costs for a kilometre trip say \$0.75. The figures are definitely wrong but from an exchange decision making point of view the relative orders of magnitude of resources involved in each decision, taking facilities as 100 are:

ROW	360
Facilities	100
Vehicle	0.03
Trip	0.00000075

These figures will vary for different parts of the relevant network, say local roads compared with arterials, but again it would be surprising if the rank ordering were to change. The point of relevance is that in terms of the resource allocation that enters into the decision making process of the relevant entity (currently in Australia the State Government), the size and hence importance of the rights to resources in the network ROW are significantly greater than the facilities, vehicle or trip.

In summary the definition of the economic products that constitute transport service suggest different institutional arrangements to those currently in place.

It is possible to argue that current exchange practice for the provision of urban road service gets to the same point by aggregating demand for trips on particular links to get an overall picture of demand for network accessibility and use. However the focus of current practice for example, in urban motorway provision by Public Private Partnerships (PPPs) is on a project by project

⁹ Adapted from data in UK Eddington Transport Study Volume 1, Fig 1.2

single mode approach to an investment (exchange of rights) that is at best link-related, rather than related to accessibility to the relevant urban transport network as a whole. In some jurisdictions the single mode “link” approach has evolved to a “corridor” approach to mitigate the distortions of the single mode perspective but this still falls short of the right of way and existing facilities *network* product approach that best describes the significant major resources allocated to meet the transport service demanded in these exchanges.

2.5 Implications for institutional arrangements

As noted the fourth essay in this series will more fully address the Institutional Arrangements implications of accurate product definition. The premise for extending the “product” discussion to institutional arrangements is that much of the frustration with current institutional arrangements can be put down to the political economy having built institutional arrangements around wrong product definitions, and hence many existing institutional arrangements are not aligned with the actual human economic action involving exchange that defines those products.

For example the products that constitute transport service are not necessarily focussed on any one mode but several distinct products. The demand for the accessibility product is not segmented by technological characteristics, so why does convention discuss different modes as separate and competing? Convention today conducts transport policy analysis and even project analysis in the separate mode frame with distorting consequences. From a land use allocation efficiency point of view, imagine if transport service was designed to be constrained to a network of right of ways and that surrounding permissible land use (defined by compatible functional impact type, for example, pollution emissions rather than the current specification of type of use), could evolve to say higher density of use and the transport facilities in the right of ways also evolve to meet the resulting increasing demand for transport service as it evolved.

The implications of the proposed approach to economic product definition are not confined to public goods and services. Consider the way we calculate inflation. Currently we cost a basket of goods that are specified primarily by their physical characteristics. For example, fruit and vegetables are specified by physical type such that if a natural disaster constrains supply and forces up prices for a particular item such as bananas, this is reflected in the Consumer Price Index and hence inflation. In the real economy the relevant product is a quantum of intake of nutrition and consumers shift their purchasing from bananas to say apples with less of an impact on underlying inflation. The Reserve Bank tries to manage this by focussing on underlying inflation rates which have been statistically smoothed to cut out such aberrant data points, rather than the headline inflation rate of the cost of specific physical products focussed on by the media.

3. Summary

The exchange of rights to resources between entities is at the heart of economic action. The bundles of rights that are exchanged reveal the products that are valued by entities. Hence it is these products that are or should be the focus of all economic policy that defines the institutional arrangements for making growth of economic welfare as efficient as possible.