

On efficiency

*This short paper discusses the use of the word "efficiency" in the context of policy discussions. It is not a fully referenced document and is intended to inform policy discussions.*¹

Context

In the course of a discussion of what principles and objects should underline the Convergence Review², one participant noted that he hadn't yet heard a reference to efficiency.³ A short discussion then ensued about the meaning of efficiency, and the initial commentator simply said "but we all know what efficient is."

This paper addresses that question and highlights the fact that the word "efficient" in a policy sense has the meaning given to it by orthodox economics. The paper goes on to explain this definition relative to other definitions of efficiency. It concludes with consideration of why efficiency should not be accorded the pre-eminent position given to it in public policy.

"Efficiency" as used in public policy

The word "efficiency" is used in a public policy context to describe a specific economic goal. The word is used in the *Competition and Consumer Act 2010* as part of the objects of the Part IIIA access regime (s44AA reads in part "to promote the economically efficient operation of, use of and investment in the infrastructure by which services are provided, thereby promoting effective competition in upstream and downstream markets") and in the definition of the Long-Term Interests of End Users in Part XIC (s152AB states that one limb of the LTIE test is "the objective of encouraging the economically efficient use of, and the economically efficient investment in[infrastructure]").⁴

The Australian Competition and Consumer Commission (ACCC) has explained in the context of access declaration decisions under Part XIC its interpretation of the objective of efficiency.⁵

In the Commission's view, the phrase 'economically efficient use of, and economically efficient investment in, ... infrastructure' refers to the economic concept of efficiency. The concept of 'efficiency' consists of three components.

Productive efficiency. This is achieved where individual firms produce the goods and services that they offer to consumers at least cost.

Allocative efficiency. This is achieved where the prices of resources reflect their underlying costs so that resources are then allocated to their highest valued uses (i.e. those that provide the greatest benefit relative to costs).

Dynamic efficiency. This reflects the need for industries to make timely changes to technology and products in response to changes in consumer tastes and in productive opportunities.

The first two of these concepts are familiar to new economic students. They are described by first introducing a concept called a "production-possibility frontier" which is the boundary of all the different quantities of outputs that could be produced using all the available inputs. It is conventionally demonstrated as a simple curve of all the possible combinations of two products (often guns and butter) that could be produced using all the resources available in the economy.⁶

The concept of “productive efficiency” is then easily defined as a combination of outputs that represents a point on the frontier. Any point closer to the origin represents a point where more of at least one good could be produced, a point further away from the origin is impossible.

“Allocative efficiency” is used to refer to the way of choosing the point on the curve that represents society’s choice. For this a concept called Pareto efficiency is introduced.

A combination of outputs is Pareto efficient if no-one could be made better off with a different choice of production without making someone worse off. This standard seems fine until you realise that the way it is translated is through the price system.

A consequence of that is that those who have the most resources (money) get to have a disproportionate say in what gets produced (in an allocatively efficient market).

The position becomes worse when you realise that in determining whether one outcome is more efficient than another the analysis tool adds the “Kaldor-Hicks criterion”. This states that one state is to be preferred if “no one could be made better off with no one being made worse off, or being bribed (or compensated) for being worse off”. This is the standard used in the technique known as Cost-Benefit Analysis.

In the real world, however, the bribe or compensation rarely occurs. Doing so is seen as an unjustified transfer.⁷

Let’s look at a really simple model of an economy. We have two goods that can be produced, which we will call necessities and luxuries. For convenience we assume that no one can consume more than one of either product, and that the economy can produce a total of two thousand and that luxuries and necessities each require the same resource.

For convenience we will assume a population of two thousand people, of whom one thousand are rich (have ten currency units) and one thousand are poor (have exactly one currency unit). All are prepared and can afford to pay one currency unit for a necessity, but the rich will pay up to nine currency units for a luxury.

Any combination that produces a total of two thousand demonstrates productive efficiency. But producing one thousand necessities and one thousand luxuries is what the theory says is allocative efficiency.

In real world policy discussions the concept of allocative and productive efficiency get criticised for being only “static” measures. The concept of “dynamic” efficiency is not as well understood. The term itself only tells us that something is changing over time.

An example of a policy consideration of “dynamic efficiency” is provided by Srzich.⁸ He provides a formal definition of dynamic efficiency;

The dynamic efficiency is the expected, present value of current and future total market surplus within a given time period, conditional on the timing of the incumbent making an irreversible investment at a point during the period under investigation. (P.51)

In his analysis he goes on to state;

The aim of regulation is to maximise dynamic efficiency by choosing a suitable policy recognising that prices and the timing of the firm’s investment may depend on this policy. (P.52)

His evidence, however, that this is the aim of policy seems to be his own projection;

Although not specifically expressed in these terms, an interpretation of the intended purpose of the new regulations was to enhance dynamic efficiency. The government

compared the performance of the New Zealand telecommunications sector and regulatory policies with those of other OECD countries and came to the view that New Zealand's performance would be enhanced by following the regulatory policy adopted by other OECD countries. The government stated that the policies were to ensure that the telecommunications sector becomes more competitive, with particular emphasis that the availability and quality of broadband services was a key enabler of economic growth. (P.100)

This discussion of dynamic efficiency misses the subtlety of the static efficiency concepts. The decision that is modelled is exclusively one of the timing of an investment and the maximisation of welfare. An alternative is the consideration of what investment to make, and indeed by whom. These would be the dynamic equivalents of the productive and allocative static concepts (the best time for the investment versus the best investment).

The concept of dynamic efficiency advanced by Srzich also implies an environment in which the "incumbent" firm is freely able to choose when to make the investment. That, however, is a luxury that only a firm that doesn't face competitors is able to make. To create that kind of dynamic efficiency we therefore are expected to give the firm the market power that forecloses the dynamic efficiency afforded by alternative investors.⁹

Relation to other meanings of efficiency

The theories of eliminating monopolies and of free trade are both based on the benefits of allocative effects, not the benefits of increased production. Leibenstein outlined a number of studies that demonstrated that the concept of allocative efficiency much loved by policy theorists has an almost negligible effect on output.¹⁰

He introduced instead a concept he called X-efficiency, which related more to managerial efficiency within firms rather than distributive efficiency in the economy.

Farrell addressed the problem of measuring productive efficiency.¹¹ He identified two components of the productive efficiency of a firm. The first was "technical efficiency", this measures the success of a firm in producing the maximum output with a given proportion of inputs. The second was "price efficiency" by which was meant the success of the firm in choosing an optimal mix of inputs.

There is some relationship between this price efficiency and allocative efficiency as properly understood. The classical treatment of allocative efficiency refers to the choice of mix of outputs of the economy, whereas the definition advanced by the ACCC refers to the mix of inputs, just as "price efficiency" does.

The accepted public understanding of efficiency is merely about doing more for less. We talk of fuel efficiency of a car as the number of litres per 100 kilometres, water efficient shower heads let you have a shower using less water, the energy efficiency of a fridge or television (the star ratings) refers to how many kilowatt hours of energy is consumed to keep your food cool or yourself entertained.

But this kind of efficiency is only what the economists call "productive efficiency".

In management literature a distinction is made between efficiency and effectiveness.¹² Effectiveness means "doing the right things" while efficiency means "doing things right". The latter concept is what we would understand as productive efficiency while the former is what the economists call allocative efficiency.

In the managerial context we think at least we know what the "right things" are, or can determine them, against an objective criterion.

A current example from the telco policy space of how the economic definition of efficiency deviates from the ordinary language definition can be seen in the consideration of spectrum policy. A relatively large block of spectrum with good propagation characteristics is being made available through the conversion to digital television.

Emergency services organisations have expressed an interest in building a new radio network in this frequency, but it would require a large infrastructure investment and would be under-loaded. They will not rely on commercial networks as they can't secure guarantees of access in times of high demand.

The technology that will be deployed (LTE) by commercial operators will support service prioritisation which could give priority to the entire network resource to emergency services. The technically efficient outcome is for emergency services to be a commercial client with committed priority.

But the economic theory is that allocative efficiency will be derived from an auction of the spectrum.

Conclusion

The concept of efficiency is invoked repeatedly to justify policy decisions. The definition used is one that relies more on the allocative than the productive effect, but the term is almost universally understood by the public and even businesses to refer exclusively to productive efficiency.

The criterion used by orthodox economists is not based on equity, but is actively anti-equity. The preference of people with more money counts more in the calculus of determining what is "efficient". The results of the studies based on it are also often wilfully misrepresented – eagerly quoting how much the "average" Australian has benefitted from a policy reform, trying to create the impression that EVERY Australian has benefitted.¹³

A consequence of the myopic anti-equity focus of policies based on efficiency, which becomes competition and markets, is that it creates an automatic tension between competition and universal access. A working market may result in some consumers being denied the ability to acquire the things they want (or need) to, as in the simplified example. This is not a market failure but the market working.

Not only is the term "efficient" not well understood, the context in which it is used in policy is actually misleading as it mostly refers to allocative outcomes but appeals to the public's understanding of the term in its productive meaning.

This masks the fact that there can be a conflict between the definitions of efficiency. Recently the man who mows my lawn advised me that he would no longer be doing so, but introduced me to another mower. It was explained that the two of them had realised their territories overlapped and they were each visiting some streets to mow lawns. By doing a customer swap so only one of them went to a street they reduced travel time and increased technical efficiency. But it also reduced competition.

The way the policy debate often runs is large firms argue the benefits of allocative efficiency to deregulate markets, then argue productive efficiency to justify firm consolidation, with an appeal to dynamic efficiency as the saving grace for ongoing concentration.

"Efficiency" is not only open to interpretation, it is wilfully misused in policy discussions.

¹ Paper prepared by David Havyatt. This is the fourth version of the paper (following minor additions on dynamic efficiency and added detail to a footnote) and was published on 7 June 2011.

² The Convergence Review refers to an independent review “to examine the policy and regulatory frameworks that apply to the converged media and communications landscape in Australia” see http://www.dbcde.gov.au/digital_economy/convergence_review

³ This discussion occurred at the Network Insight Institute seminar “Internet, Telecoms and Convergence: the legal and policy challenge” held on 9 May 2011 see http://www.networkinsight.org/events/9_may_2011.html/group/7

⁴ S44AA was inserted following the review of the Part IIIA access regime by the Productivity Commission. (http://www.pc.gov.au/data/assets/pdf_file/0020/18173/access.pdf) It should be noted that AAPT Limited in a submission for which the author of this paper was responsible was one of the parties advocating the need for an objectives clause in Part IIIA.

⁵ ACCC *Telecommunications services — declaration provisions — a guide to the declaration provisions of Part XIC of the Trade Practices Act Dec 1999* P.55 (see <http://www.accc.gov.au/content/index.phtml/itemId/324247>)

⁶ The Wikipedia entry is quite useful. http://en.wikipedia.org/wiki/Production-possibility_frontier

⁷ That the condition of Pareto optimality is accepted in modern capitalist democracies is extraordinary given that Pareto himself was anti-democratic instead believing not only that elites do run society, but that they should run society.

⁸ Antony Srzich ‘The Effect of Technological Change and Regulation on the Evolution of the New Zealand Telecommunications Market’ A thesis submitted to the Victoria University of Wellington in fulfilment of the requirements for the degree of Doctor of Philosophy in Economics Victoria University of Wellington 2010 available at

<http://researcharchive.vuw.ac.nz/bitstream/handle/10063/1467/thesis.pdf?sequence=2>

⁹ This is not the place for this discussion, but this opens up the whole area known as the innovator’s dilemma, and how industry change occurs because incumbents don’t invest in new technology and entrants do.

¹⁰ Harvey Leibenstein ‘Allocative Efficiency vs. “X-Efficiency”’ *American Economic Review* Vol 56 No 3 pp 392-415 Jun 1966.

¹¹ M. J. Farrell ‘The Measurement of Productive Efficiency’ *Journal of the Royal Statistical Society* Vol 120 No 3 Pp 253-290 (1957).

¹² See for example

http://www.businessandeconomics.mq.edu.au/undergraduate_degrees/undergraduate_units/ug_units/units/BBA_units/bba313_marketing_management_effectiveness_and_efficiency

¹³ As an example of this see the BCA release ‘BCA Calls for Reinvigorated Competition Policy Reforms to Boost Productivity’ at <http://www.bca.com.au/Content/99271.aspx> which estimates “National Competition Policy helped to increase the average wealth of Australians by \$83,000”. A worse example of the craft appeared in a news story on 7 June 2001 “Australians will each be \$8000 richer by the turn of the decade even with a carbon tax, according to figures Treasurer Wayne Swan will release today.” Shane Wright, Economic Editor, The West Australian ‘Richer years ahead with carbon tax: Swan’ (see <http://au.news.yahoo.com/thewest/a/-/newshome/9590502/richer-years-ahead-with-carbon-tax-swan/>) (There was one BCA release that actually said EVERY but I can’t find it now).

About DigEcon Research

Purpose

DigEcon Research is a stand alone research body. Ultimately, its pursuit is policy research, the focus of which is the meaning and significance of the Digital Economy. This policy research encompasses both economic and social research.

Researching the significance of the Digital Economy

The concept generally referred to as the Digital Economy is frequently discussed but there is little shared meaning in the term. A key definitional issue is whether the Digital Economy is something yet to happen or in which we are now embedded.

DigEcon Research focuses on the analysis of social and economic change rather than an analysis of a notionally static "Digital Economy". Analysis of the change as it occurs should highlight those areas where there is genuine policy choice rather than merely a need to adapt policy to changes that have already occurred.

Before Thomas Kuhn popularised the idea of "paradigms" J.K.Galbraith railed against the "conventional wisdom". There is no denying that what Kuhn called "normal science" or the repeated application of existing theory to new problems results in most practical developments. It is equally true that the application of existing theory to problems they were not designed for results in, at best, vacuous solutions and, at worst, wildly dangerous outcomes.

The Digital Economy challenges the fundamental concepts of neo-classical economics. It also challenges most of the precepts of how societies are organised. In this context policy research needs to focus on what is different, not on what is the same. The Digital Economy is not just a matter of means of production but about the fundamental structures of social organisation.

Work program

This research is designed both to inform policy makers and to assist those who would seek to influence policy makers or to make business decisions. DigEcon Research however does not provide strategy recommendations nor undertake policy advocacy on behalf of any party.

A key element of the research will relate to the direct regulation of the converging industries of telecommunications, media, consumer electronics and information technology. However, the agenda encompasses the wider economic and social policy issues.

The scope of the research agenda will ultimately depend upon the researchers who wish to participate in what is more an idea than an entity.

In the crowded Australian research field there are a number of "bodies" that share some of the objectives of DigEcon Research. DigEcon Research aspires to contribute to the work of these and any other researchers in the field.