

Economic Discussion Paper

Free Market Efficiency

Conditions, Desirability, Optimality

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Abstract

The efficiency or inefficiency of free markets, and the implications of resource allocation to agents in an economy continues to be a hotly debated topic within economic and political circles. In reality, markets are prone to inefficiencies when a number of factors arise.

This paper addresses a central question in welfare economics on the topic of free market efficiency and the optimal approach to the allocation of resources within an economy. The study initially sets out the reasoning behind a free market and details when and how it occurs followed by a reasoning on economic pathology and the breakdown of efficiency in free markets.

Finally, despite considerable empirical research, and multiple discussion papers on this topic, disparate views are discussed on the quality of markets and the disconnect between equity and efficiency.

Mini case study articles are used in this paper to briefly summarise some of the topical issues relating to each section.

Defining Free Markets

Free market efficiency in welfare economics is concerned with the how effectively an economy functions in allocating of resources.¹ A free market is *efficient* only when a number of conditions are satisfied such that agents in an economy are free to trade and reach natural market equilibrium in price and quantity. In this study, a *free* market is defined as one with no, or negligible government intervention, although different levels of market supplier participation are later considered in depth. We can formally define a free market as;

“A market in which people buy and sell voluntarily, without legal compulsion. Neither the quantities traded, nor the price at which trade takes place are subject to control by third parties. This is not to say that such markets operate without legal regulation. [...] Free markets are contrasted with a planned economy, where one party may be ordered to buy, or the other to sell. Where there are [either price or quantity] controls, a market is partly but not wholly free.”²

When and Why are Free Markets Efficient?

First postulated by Adam Smith in his seminal work, *The Wealth of Nations*³ in 1776, the ‘invisible hand’ or first welfare theorem confirmed a surprising, yet intuitive axiomatic inference that free markets – whilst appearing somewhat chaotic, channel an economic system to reach the correctly required level of production noting that; “it is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest.”⁴ Arrow and Debreu confirmed mathematically that through “exhausting all possible gains from exchange”⁵, free markets reach an equilibrium that is Pareto efficient in allocation.⁶

By definition, a particular allocation of resources is said to be Pareto efficient when, “no other feasible allocation is preferred by one party and is liked at least equally well by the other party”, and therefore any “further mutually beneficial moves are impossible”.⁷ This can be demonstrated graphically along a contract curve within an Edgeworth (1881) Box between two people *A* and *B* trading two goods *x* and *y*.

¹ Whether or not the allocation of resources is *equitable* or not, is discussed later in this paper.

² Black, J. 2002, *Oxford Dictionary of Economics*, Oxford University Press

³ Smith, A., Cannan, E. (Ed.) 1994 (Rp), *The Wealth of Nations*, Modern Library

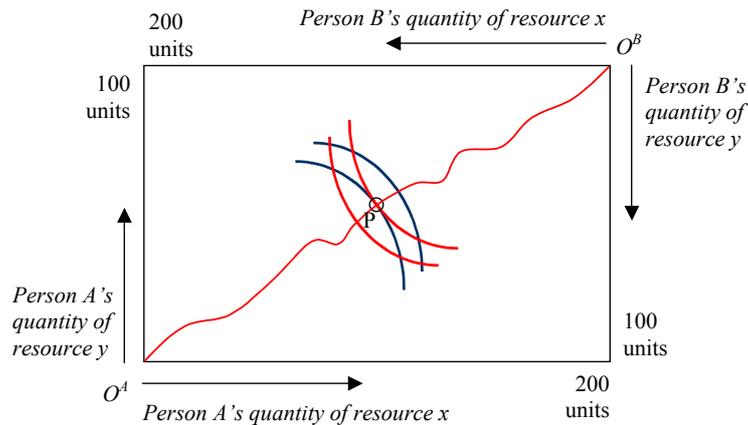
⁴ Smith, A., Op. cit.

⁵ Frank, R. H., 2003, (5th Ed) *Microeconomics and Behaviour*, MacGraw Hill

⁶ Named after Vilfredo Federico Damaso Pareto 1848-1923

⁷ Frank, R. H., 2003, (5th Ed) *Microeconomics and Behaviour*, MacGraw Hill

Pareto Optimality within an Edgeworth Box



After repeated exchanges from their level of endowment⁸, person A and B will reach position P – a Pareto optimal point of allocation of resources,⁹ which demonstrates the dual role in of prices for not only reaching equilibrium between traders, but also for guiding the economy as a whole towards a Pareto-efficient outcome.

Although Arrow's and Debreu's proof demonstrates the ability of free markets – without intervention – to reach a Pareto-optimal outcome, it is only valid under a number of idealised conditions that are often not applicable in practice – which include; imperfect competition such as a monopoly, the existence of markets for all possible goods, difficulties in achieving negligible transaction costs, the presence of externalities, or the inescapable provision of public goods in an economy,¹⁰ and even social priorities that favour a certain distribution of resources.¹¹ Each of these is considered in the following question.

⁸ The value and equity of endowment is considered later in this study, and these can include; innate abilities, human capital and wealth. As Feiwel notes, Walras has brilliantly shown us this affect through a series of successive trials or *tâtonnements*.

⁹ Efficiency in consumption means allocating goods between consumers so that it would not be possible by any reallocation to make some people better off without making anybody else worse off.⁹ –*Oxford Dictionary of Economics*

¹⁰ Certain public goods are practically impossible to bring into the private domain, such as the air or sea.

¹¹ Often, these arise from special interest groups, or aims of political parties.

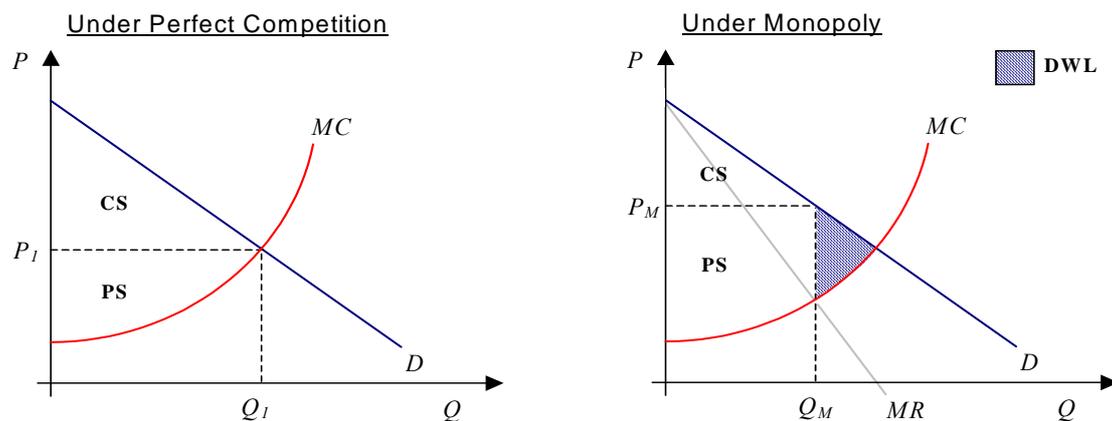
Economic Pathology

When are Free Markets Inefficient?

As Kenneth Arrow and Gerard Debreu noted, although a free market system results in a Pareto-efficiency, this can only occur under very restrictive idealised conditions that are unlikely to be realised in practice.¹² This is most certainly never the case with a centrally planned economy¹³ as a result of imperfect information at the economic centre as well as poor incentives to set optimal levels of pricing and production.¹⁴ However, even under a decentralised economic system, a number of possible distortions where marginal social costs and marginal social benefits are not equated and can result in market failures that affect the efficiency and quality of a free market in the allocation of resources, these restrictive assumptions are discussed under four main classifications of follows;¹⁵

Under Imperfect Competition

A free market can operate under varying degrees of supplier participation and control. When perfectly competitive, market forces shape price and quantity such that firms receive only normal profits. This type of market is relatively rare, and many would suggest is impossible in practice, citing that most free markets carry some degree of imperfect competition that allows buyers or sellers to exert some level of prices or output such as a monopoly, monopsony, oligopoly, oligopsony, and monopolistic competition.



¹² Adapted from *Welfare Economics*, Wikipedia, retrieved on 6th December 2005, available at http://en.wikipedia.org/wiki/Welfare_economics

¹³ The economic and social tradeoffs between centrally planned versus decentralised economies are briefly discussed, but this study focuses more closely on inefficiencies arising in economies with no or minimum levels of government intervention.

¹⁴ Black, J. 2002, *Oxford Dictionary of Economics*, Oxford University Press

¹⁵ Hicks (1939b) also suggests that indivisibilities any form of government and even money are barriers to freely efficient markets.

In the extreme of production control, a monopolist, or any divergence from the perfectly competitive model¹⁶ can cause an excessively high price in the market that creates an inefficient Dead Weight Loss (DWL) for society, demonstrated above;¹⁷

Similarly, two further requirements for efficiency that are often not empirically observed are that; markets must exist for all possible goods – which is unlikely to be strictly possible, and that transaction costs are negligible – which are rarely observed due to the costs of performing trade. Furthermore, under a natural monopoly it may in fact be more efficient as a result of long run declining average costs. In order to limit the effect of monopolies as a barrier to market efficiency they can be curtailed by anti-trust policies, or have their markets otherwise closely regulated by government.¹⁸

Public Goods

Historically in the UK, many businesses and even whole industries have become deregulated in a bid for greater efficiency, however some industries such as national defence and nuclear power continue to be held in the public domain. If these were privatised, a free market could undermine the level or quality of the service. Many public

Case: The Tragedy of the Commons is a popular analogy that demonstrates the conflict for common resources.

“Each man is locked into a system that compels him to increase his herd without limit. [...] Ruin is the destination toward which all men rush, each pursuing his own interest in a society that believes in the freedom of the commons.”

Garrett H., *The Tragedy of the Commons*, Science, 162(1968):1243-1248

goods however, such as transportation systems or even the use of street lamps suffer from the free-rider problem that demonstrates the conflict for resources between individual interests and the common good. A classic example of this is the tragedy of the commons. This inefficiency of public goods can, to some extent be remedied by obliging citizens to pay for taxes and ensure that payment systems better reflect the amount of good or service that is utilised by each individual.

¹⁶ As Bonnano notes, “real-world economies are characterised by the widespread presence of large firms, whose behaviour can hardly be captured by the hypothesis of price-taking”.

¹⁷ Graphs: Author’s own

¹⁸ Bonnano notes that the conclusion from this is that appears to be an “asymmetry between the general equilibrium theory with perfect competition and the various equilibrium theories put forward.”

Externalities

When a market does not implicitly take into account the impact of an economic activity other than through prices, externalities may arise. These can be both positive and negative and as free markets cannot induce agents to take account of these indirect effects, inefficiencies appear from social costs in production or benefits in consumption as a result of divergences between marginal *private* benefits or costs; and marginal *social* benefits or costs.¹⁹ However, corrective action can be taken against externalities that internalises the welfare of all who are affected by the activity, although an efficient solution is seldom ever zero. A number of methods include; state regulation, a tax or subsidy, or by developing property rights that stake out clear guidelines in cases where ownership is uncertain, thus reducing the inefficiencies that arise from ambiguous ownership in protection, investment or requisition of property.

Incomplete or Asymmetric Information

Many markets suffer from asymmetric information between sellers and buyers and many other pricing or output decisions are made on the basis of incomplete information (e.g. the classic lemons in used car sales). This inherent issue may result in private choices that do not then represent the best interests of individuals or society as a whole.²⁰

Under Taxation and Tariff Distortions

Taxation can distort an otherwise perfectly competitive equilibrium by adjusting the pricing system between marginal private costs and marginal social costs resulting in inefficiencies within the economy. Decisions therefore, on whether to impose taxes revolve around a cost-benefit analysis undertaken by the government in question who will balance the equity of distribution based on innate levels of endowed resources against the inefficiency costs of applying the tax.²¹ This paradox of undesirability in free markets is discussed in the following section.

¹⁹ Begg, D., Fischer, S. and Dornbusch, R., 1997 *Economics* McGraw-Hill

²⁰ Ibid

²¹ According to D. Begg and S. Fischer, in considering the seminal work of R. G. Libsey and K. Lancaster, on the *General Theory of the Second Best*, Review of Economic Studies, (1956-57), if there *must* be a distortion, it is a mistake to concentrate the distortion on one market, and that it is more efficient to spread its effect more thinly over a range of markets.

Market Failure?

Why may Free Markets Not be Desirable, Even When They are Efficient?

Despite markets operating under efficiency, they can be deemed to be undesirable. Although allocative efficiency itself is highly attractive to economists, it does not necessarily follow that it is also the most equitable outcome.²² To understand how a market can be simultaneously efficient and sub-optimal, a clear distinction is important between free market efficiency and equity in distribution. The second theorem of welfare economics recognises that, “any allocation on the contract curve [of the Edgeworth exchange box] can be sustained as a competitive equilibrium”²³. As British economist John Stuart Mill noted, although markets may be efficient, the “distribution of resources may not necessarily be deemed desirable”,²⁴ as social optimality is a distributional judgement.

Case: Inheritance tax is on the increase... but why?

Inheritance tax offends many principles. Bury it

“[...] Inheritance tax has big disadvantages. Although not very costly to administer, it distorts spending patterns, encouraging consumption over savings, and stimulating investment into exempt assets like farms and family businesses. And it fuels the tax-avoidance industry.”

Inheritance, or ‘death’ taxes are still strongly favoured by governments as they continue to be perceived one of the fairest methods of re-distributing resources.

The Economist, *It just won't die*, Aug 26th 2004, Economist Publications

Efficiency Optimality vs Social Optimality

The Edgeworth box below²⁵ demonstrates that although each point is an efficient competitive equilibrium along the contract curve, the points Q and R could have very different levels of perceived social equity at P. Two concepts exist – one of horizontal equity (treating all agents equally), or vertical equity (fairness when considering the disparity between rich and poor), and ultimately a decision between the two, and whether $R > P$ or $P > Q$ will be highly subjective.

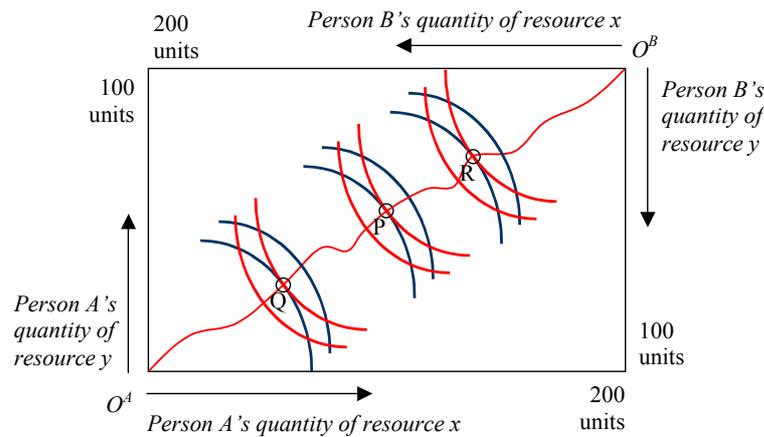
²² Although often confusingly used, Pareto-optimality implies nothing of social equity.

²³ Frank, R. H., 2003, (5th Ed) *Microeconomics and Behaviour*, MacGraw Hill

²⁴ Anon., *Welfare Economics*, Wikipedia online encyclopedia at http://en.wikipedia.org/wiki/Welfare_economics

²⁵ Diagram: Author's own

Pareto Optimality & Equity along the Contract Curve



The blurred line between this normative question on distribution in efficient markets is highly politicised such that in reality, “no modern economy leaves income distribution entirely to the marketplace” as many favour some form of welfare state since “the underlying commitment to norms of equality is strong and plays a pivotal role in almost every debate on public policy”.²⁶ Despite some allocations being efficient, governments may decide to reject a market clearing price and quantity, “in favour of rationing, queues, or oversupply in distribution”²⁷ if an otherwise efficient policy is perceived to be unfair by the public²⁸.

Interestingly, proponents of the welfare state, suggest that it is not merely equitable, but also efficient, since the absence of this provision of minimum standard of living leads to externalities in the form of crime, poor public health and the failure to become employable. Critics however, point out to the costs associated to both providing the goods and to limiting access to them that create externalities in themselves.²⁹ Additionally, under the perfectly efficient model, issues arise from the inability of firms to create an economic profit that would suppress their viability.³⁰ As firms themselves are essential parts of the economic circle of investment between households and industry, it would not be in the interests of an economy if

²⁶ Frank, R. H., 2003, (5th Ed) *Microeconomics and Behaviour*, MacGraw Hill

²⁷ Ibid

²⁸ The underlying reasoning behind this most probably stems from the inherent need for governing parties in a democratic system to justify their policies in order to secure election, or re-election.

²⁹ *Welfare Economics*, Wikipedia, retrieved on 6th December 2005, available at http://en.wikipedia.org/wiki/Welfare_economics

³⁰ Although, as Bonnano notes that a firm may end up “maximising profits, and yet be only at a local – but not global – maximum of its true profit function.”

firms were unable to return any profit to workers or to reinvest in improved products or services for all agents.

Difficulties in measuring welfare

Improving our understanding of welfare by measuring the benefit to different agents in an economy proves problematic as an objective measure of cardinal utility has yet to be found.³¹

$W = u_1 + u_2$	<i>Utility functions form the overall welfare function</i>
$W(u) = \sum_{i \leq n} a_i u_i$	<i>Where $i \leq n$ denotes a special interest</i>
$W(u) = \text{Min} \{u_1, \dots, u_n\}$	<i>Maximising the minimum welfare function gives the most egalitarian social welfare function,³² yet how can we determine the poorest person in society, and more importantly, how do we measure the value of cardinal utility?</i>

Difficulties arise in making statements about levels of, and the size of changes in welfare so as to aggregate utilities between people with dissimilar levels of marginal utility.³³ The 'majority rule' whilst appealing in making social choices can often lead to inconsistency.³⁴ Ultimately we can only use subjective assumptions on value, made explicit in the social welfare function and implicitly under efficiency in order to make improvements on the distribution of resources.

Inferences to Democratic Society

Arrow's Implausibility Theorem³⁵ developed in the late 1940s offers a disconcerting testimony to the quality of social optimality under a democracy.³⁶ In an elegant proof of deduction, Arrow suggests that the social welfare theorem satisfies three properties of social preferences that ultimately must ultimately be identical to one member – or dictator – in society. The result of this is to effectively discount the voting system of democracy as an inherently imperfect model for economic social welfare when there are three or more choices.

³¹ Although recent research in the London School of Economics suggests that there may be opportunities to identify levels of utility by scanning the brain under experiments where a patient receives a good.

³² Jin, J., 2005, *EC3201 Economics Lectures*, University of St Andrews

³³ i.e. differences between relatively rich, or relatively poor people.

³⁴ Jin, J., 2005, *EC3201 Economics Lectures*, University of St Andrews

³⁵ Sometimes referred to as Arrow's Paradox. Arrow later co-won the 1972 Nobel Prize for economics.

³⁶ Arrow, K. 1950, *A Difficulty in the Concept of Social Welfare*, *The Journal of Political Economy*, August, Volume 58, Issue 4, pp. 328-346.

Conclusions

This study has address the central questions in understanding when and why free markets are efficient, as well as the conditions required to fulfil this state. The specific set of circumstances has been closely analysed in a bid to understand the separation between theory and practice and the resultant inefficiencies that in reality permeate our economies. Together with the use of brief case study examples, this study illustrates the reasoning behind each of the topics discussed.

Fundamentally, this essay addresses a number of normative issues in welfare economics that raise questions for governments and economists³⁷ around the world in their attempt to determine how well their economies function, and what improvements can be made either in efficiency or equity. Our current system of equity of distribution and efficiency in allocation is the most effective system we have yet encountered in our approach to national economies. In order to continue understanding how can we can improve the efficiency in allocating resources with that offers an improved level of equity further research on this important area of economics will be required.

³⁷ Hahn suggests that some have taken a “cowards way of avoiding the important questions thrown up by the real economic world.”

Bibliography & Appendix**Books, Journals, Papers and Articles**

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In recognition and thanks to the libraries of the University of St Andrews, London School of Economics, University of Pennsylvania and the British Library Archives.

Appendix³⁸

Let A be a set of outcomes, N a number of voters or decision criteria. Denote the set of all full linear orderings of A by $L(A)$ (this set is equivalent to the set S_N of permutations on the elements of A).

$$F : L(A)^N \rightarrow L(A)$$

A social welfare function is a function which aggregates voters' preferences into a single preference order on A . The n -tuple (R_1, \dots, R_N) of voter's preferences is called a preference profile.

In its strongest and most simple form, Arrow's impossibility theorem states that whenever the set A of possible alternatives has more than 2 elements, then the following three conditions become incompatible:

Pareto efficiency

If alternative a is ranked above b for all orderings R_1, \dots, R_N , then a is ranked higher than b by $F(R_1, R_2, \dots, R_N)$.

Non-dictatorship

$$\neg \exists i \in N \text{ s.t. } \forall (R_1, \dots, R_N) \in L(A)^N : F(R_1, R_2, \dots, R_N) = R_i$$

There is no individual i whose preferences always prevail..

Independence of irrelevant alternatives

For two preference profiles R_1, \dots, R_N and S_1, \dots, S_N such that for all individuals i alternatives a and b have the same order in R_i and S_i , alternatives a and b have the same order in $F(R_1, R_2, \dots, R_N)$ and $F(S_1, S_2, \dots, S_N)$.

³⁸ Tabarok, A. Department of Economics, *Arrow's Impossibility Theorem*
Ball State University, Retrieved on 7th December, available at: [Hhttp://mason.gmu.edu/~atabarro/arrowstheorem.pdf](http://mason.gmu.edu/~atabarro/arrowstheorem.pdf)