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The 'Common Good' in Pope Francis's Social Welfare Hypothesis*

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Abstract: In conventional welfare economics Pareto optimality requires competitive markets in which *rational* sellers use *pure private resources* to produce *pure private goods and services* for *rational* consumers. Although such theory acknowledges that market failures prevent Pareto optimality, it continues to advocate efficiency alone as the first best policy for society. Pope Francis has argued recently that the current economics of indifference to the common good is responsible for the enormous environmental damage to Earth ('our common home'). He calls for an *integral* approach to consumption and production, one that takes the common good as the source and object of well-being. In that way consumption and production depend on the common good, and so too do associated time-discounted social satisfaction and surplus. This means that a socially desirable program is one that optimizes integral satisfaction and surplus, so that consumption and production functions are a system of endogenous (dynamical) simultaneous equations in which the utility of the integral person is a function of the social utility. I use insights from the economic models of resources (both exhaustible and renewable) to describe what the Pope means. The description is rather loose, but the implications of the exercise are wide and far-reaching. For example, I find that the socially efficient price is not Pareto efficient; it is one that allows for the marginal social utility, marginal social surplus, and marginal social royalty to the common good. In other words, under conventional welfare economics the marginal cost of generating the present value of the social surplus that eats up the present value of the rent to the common good guarantees the disutility of the integral person even as it meets the utility of the rational person. One policy implication of such a result recommends consideration of the common good as a key variable in both production and consumption. Precisely how that can be done is the direction in which future research must go. The question this result raises is about how to quantify the common good. For Pope Francis the level of analysis is integral subsidiarity, where the environment would be a good proxy for the common input to production and the common outputs are reduce poverty, inclusion (reduced inequality), and the protection of the common input.

Keywords: Social welfare, papal social welfare, common good, Pareto optimality, integral individual, integral firm, integral optimality, Pope Francis's social welfare hypothesis, rational individual, rational firm

JEL Code: D63, B59, D62, D31, Q32, Q5, Q29, N5, I31, E2, H44, Z13

*Throughout this paper I use the British style of single quotations marks ('...'). Within quotations, [...] means I have added words to the quotation to stress or clarify my understanding of it without changing its original meaning.

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1. Introduction

To the extent it is both the object of economic growth and the basis for the ‘development of social welfare structures,’ wellbeing is ultimately the only common goal of all living beings, more especially human beings (Medar, Oun, and Loring, 2012). While wellbeing is a common good, both policy and research approaches have remained divided and dominated by the conventional economic approach, which has led to large short-term private benefits along with even larger long-term social costs, leaving the external gap unaccounted for. On balance, evidence is increasingly showing that human consumption and production activities have hugely damaged the common good – compare to evidence about climate change.

In his *Laudato Si* Pope Francis calls the world’s attention to the ‘Care for Our Common Home.’ The background to the call is nothing extraordinary; it is catholic.¹ Pope Paul VI, for example, remarked upon the same issue or set of issues, noting that ‘... the most extraordinary scientific advances, the most amazing technical abilities, the most astonishing economic growth, unless they are accompanied by authentic social and moral progress, will definitely turn against man’ (quoted in Pope Francis, 2015a, p. 8). As a related example, Pope Leo XIII (1891) in his encyclical ‘Rerum Novarum: On Capital and Labor’ criticized the economics behind “the wealth of a few as opposed to the poverty of the many” (http://w2.vatican.va/content/leo-xiii/en/encyclicals/documents/hf_l-xiii_enc_15051891_rerum-novarum.html, cf. Sanders, 2015). Like his predecessors Pope Francis insisted that what is needed is an ‘authentic human ecology,’ and improving the human ecology ‘entails profound changes in lifestyles, models of production and consumption, and the established structures of power which today govern societies’ (ibid., p. 9). *Laudato Si*, expands on this catholic tradition by appealing to *all* humans, irrespective of their religions.

The public speeches Pope Francis gave to the U.S. Congress in Washington DC (Pope Francis, 2015d), United Nations General Assembly in New York (Pope Francis, 2015f), as well as in subsequent visits to East Africa (2015g), all draw heavily on *Laudato Si* to inform a particularly noteworthy worldview. The Pope speaks of ‘*sustainable* and *integral* development’ and of ‘*integral* and *inclusive* models of development’ (italics added). Whereas reference to sustainable and inclusive development has been in vogue (cf. UNDP SDGS/Global Goals, <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>), *integral development* certainly is not, and it cannot be confused with integrated development popularly espoused for a while by rural and agricultural economists, and other experts in the 1970s to mid-1980s (cf. Cohen, 1987). By *integral person* the Pope means the *whole person*, so that *inclusive* means inclusive of the integral person. This interpretation is clear from his statement to the U.S. Congress in which he praised members of Congress as representatives of the people, elected (a) to produce legislation that enables the governance of the nation, and (b) ‘defend and preserve the dignity of your fellow citizens in the tireless and demanding pursuit of *the common good*, for this is the chief aim of all politics. A political society endures when it seeks, as vocation, to satisfy *common needs by stimulating the*

¹Here I am using the word ‘catholic’ in its both its mundane and its orthodoxical meaning.

growth of all its members, especially those in situations of greater vulnerability or risk (italics added). The legislative activity is always based on care for the people. To this you have been invited, called and convened by those who elected you' (Pope Francis, 2015d, p. 2). Moreover, according to this view representative institutions not only do, they are morally obligated to, promote the maximization of social satisfaction (utility) by enabling efficient legislation for the production and consumption of the common good. This Pope only puts a new emphasis on an idea already popular among socio-economists (cf. Szirmai, 2005).

The goal of this paper is to reinterpret broadly and shallowly the Pope's message in a language familiar to economists and their intellectual cousins. The shallowness is deliberate, designed to bring clarity and simplicity to issues already very complex. I pursue the goal with four manageable tasks in mind. First, I contrast the objective of a *rational (optimizing, economic) individual* to that of the Pope's *integral person* for whom optimization is but one element. The contrast shows that, unlike the rational individual whose indifference curves are always intransitive, for the integral person "nothing is indifferent – a notion clear in Kaldor (1939), Scitovsky (1941), and Little (1950). Second, I demonstrate with familiar formulations, but without formal proofs, that the production and consumption under an *integral economy* are intertwined.² The denial of that fact is to be blamed for the weak responses to eminent threats to the 'common good.' Third, I state the Pope's problem as a maximization of an integral social welfare function, the Pope Francis's apparent social welfare function (hypothesis). Finally, I conclude with tentative and modest statements for policy and further research.

2. Social Welfare in the World of Indifference

Standard economic theories of consumption and production, even in its general equilibrium framework, are anchored in the assumption that the consumer is a *rational* individual who *alone* uses his/her budget in a way that maximizes his/her total utility. Likewise the firm *alone* seeks maximum possible profit given its prevailing cost. Hence, standard welfare economics is simply an extension of standard economic theory. Allan M. Feldman (1991) traces the key theorems underlying welfare economics to Adam Smith (cf. 1937[1776]). He argues that the 'theoretical side of welfare economics is organized around three fundamental propositions' (p. 714). The first proposition asserts that under *Laissez-faire* the 'Invisible Hand' drives the growth of the common wealth of nations. The pursuit of self-interest motivates competition in which consumers seek to enlarge their consumer surpluses by demanding lower prices even for goods and services they value very highly. The seller on the other hand seeks a large producer surplus even for goods and services that cost little to nothing to produce. Apparently society is served efficiently under competition because a surplus leads prices to decrease; a shortage causes prices to increase. The most beautiful rendition of the Invisible Hand is in Frederic Bastiat's 'How does Paris get fed' (1996[1845]). An admirer of Adam Smith, A.C. Pigou (1920) also concluded that 'the free play of self-interest' leads to the greater 'national dividend' (quoted in Feldman, 1991, p. 715) characterized as Pareto optimality in the

²I am cognizant of the fact that Paul Rome (2015) laments 'mathiness' is an obstacle to rigorous economic theory.

framework of a competitive (Walrasian) equilibrium.

However, Feldman (ibid.) adds that while the first proposition is mathematically sensible, it is economically non-sensible. For one, preferences are *endogenous*, and as such sensitive to such things as advertisement which make the Pareto equilibrium both unstable and dynamic. Despite the *ad Hoc* Pigovian tax (subsidy) and Coase theoretic solutions, Pareto efficiency (optimality) ignores market failures like externalities, public goods, common resources, information asymmetry, and principal-agent problems in which the choice of one agent has consequential implications for the choice of another. As Fiocca (1994) puts it, ‘economic results’ are subject to ‘endogenous constraints.’ The distribution of a Pareto outcome, is another oversight of conventional welfare economics that could bother society (Sher and Pinola, 1981). *Generally societies would prefer a fair optimality to an unfair one. In other words, society may prefer a plan that leads to fairness even if such a plan is inferior to alternative plans with high Pareto optimality and high unfairness* (cf. McKenzie, 1968). I have always thought this is a situation Paul Samuelson had in mind in saying that ‘... every good cause is worth some inefficiency’ (quoted in Lohr, 2004, p. 10).

‘How can the distributional problem be solved?’ – was the domineering question. The answer: Either via a command economic system or by transferring (the purchasing power of) income through free markets. The latter motivated the the second proposition of welfare economics, which holds that under competition Pareto optimality obtains if a lump-sum tax (subsidy) is imposed on (transferred to) market participants. The Kaldor (1939) superiority of Pareto optimality is the idea that ‘if all those who suffer as a result [of Pareto efficiency] are fully compensated for their loss, the rest of the community will still be better off than before’ (Feldman, 1991, p. 720). This compensation criterion is ‘theory inconsistent’, and the Scitovsky’s (1941) paradox shows Kaldor improvement to be a ‘two-edged’ criterion. However, since winners can potentially compensate losers and still remain better-off (compensating variation), losers are thus bribed into accepting a socially inferior status quo, which Little (1950) accepts as valid so long as the distribution does not worsen further (equivalent variation). Specifying the relevant functions and solving them is a challenge, but a different one from the objective of this essay.

The third proposition of welfare economics is now known as ‘Arrow’s Impossibility Theorem (Paradox)’ – a hypothesis Arrow himself has called ‘the general possibility.’ The possibility is ‘impossible’ because an individually Pareto optimal choice does not necessarily imply the true Condorcet-Arrow generality in which rational individual preferences are subject to (perhaps even subjugated by) indeterminate social preferences so that it is possible for an individual to be better (worse) off with a social choice the individual thought was inferior (superior). For instance, an individual who voted against President Obama in 2008 may actually has found himself or herself on a higher social utility curve than his or her individual utility curve, convincing him/her to vote for Obama in 2012. However, this time around there is still no guarantee that the individual utility, calculated on the basis of past social utility, is going to be higher than the social utility post-2012.

Although the Bergson (1938)-Samuelson (1947) social welfare function came before Arrow’s impossibility theory, it is clear that both theories were informed by the same set of concerns. A key

assumption for both is that an 'economic welfare function' (W) exists and it depends on labor and non-labor factors of production (x), and consumption goods and services (q) such factors create. The social problem is to maximize W . Theoretically, as De V. Graaff (1967[1957]) shows, maximizing W assumes the utility of homogenous consumers, each one maximizing his/her well-defined and differentiable individual utility function. For example, we can assume a level of utility (u) of homogenous individuals to be,

$$u = u(q, x), \quad (1)$$

where q is the amount of the good or service consumed, and x are the labor and nonlabor energy (used and wasted) that went into producing q . However, (1) is a realistic explanation only if the consumer produces his/her own consumption goods and services. Ordinarily producers of goods and services do not produce only for one rational consumer, or even for equally rational homogenous consumers, but also for heterogeneous consumers of differentiated goods and services. The aggregate production function would be something like

$$f(Q, X) = 0, \quad Q = \sum q, \quad X = \sum x. \quad (2)$$

where Q is a social bundle of heterogeneous consumption goods and services, and X is a social bundle of heterogeneous factors of production. It is reasonable to assume that even when consumed in equal amounts Q gives different levels of U . A combination of (1) and (2) implies that there exists some social utility, $W = W(U)$, $U = \sum u$, which society pursues as

$$W = \max W(U) + \lambda[f(Q, X)] = \max W[u(q), x] + \lambda[f(Q, X)], \quad (3)$$

for which the first order conditions can be generalized to:

$$\begin{aligned} \frac{\partial W}{\partial Q} &= W \frac{\partial U}{\partial Q} + \lambda'_Q = 0 \\ \frac{\partial W}{\partial X} &= -W \frac{\partial U}{\partial X} + \lambda'_X = 0 \\ \frac{\partial W}{\partial \lambda} &= f(Q, X) = 0, \end{aligned} \quad (4)$$

where f'_i are the first derivatives with respect to the i th variable. However, previous literature shows that Pareto optimality emerges from (4) only when the number of consumers is very large (see Bergson, 1938, Samuelson, 1947, Feldman, 1991, de V. Graaff, 1967[1957]). If the number of

consumers is small, maximizing W simply reflects the preferences of the theorist. This left the question about how to find W since society does not always agree and even when it does agree there are additional questions arising from differing time horizons and time discount rates as well as perceptions and responses to risk and uncertainty (Harris, 1970, McKenzie, 1968, Harsanyi, 1953, Vickery, 1945). Arrow's 'constitution problem' was an attempt to address such problems, and those who work on consumer choice and demand would appreciate the difficulties involved here (Camerer and Fehr, 2006, Farmer, Shubik, and Smith, 2005, Rabin, 1998).

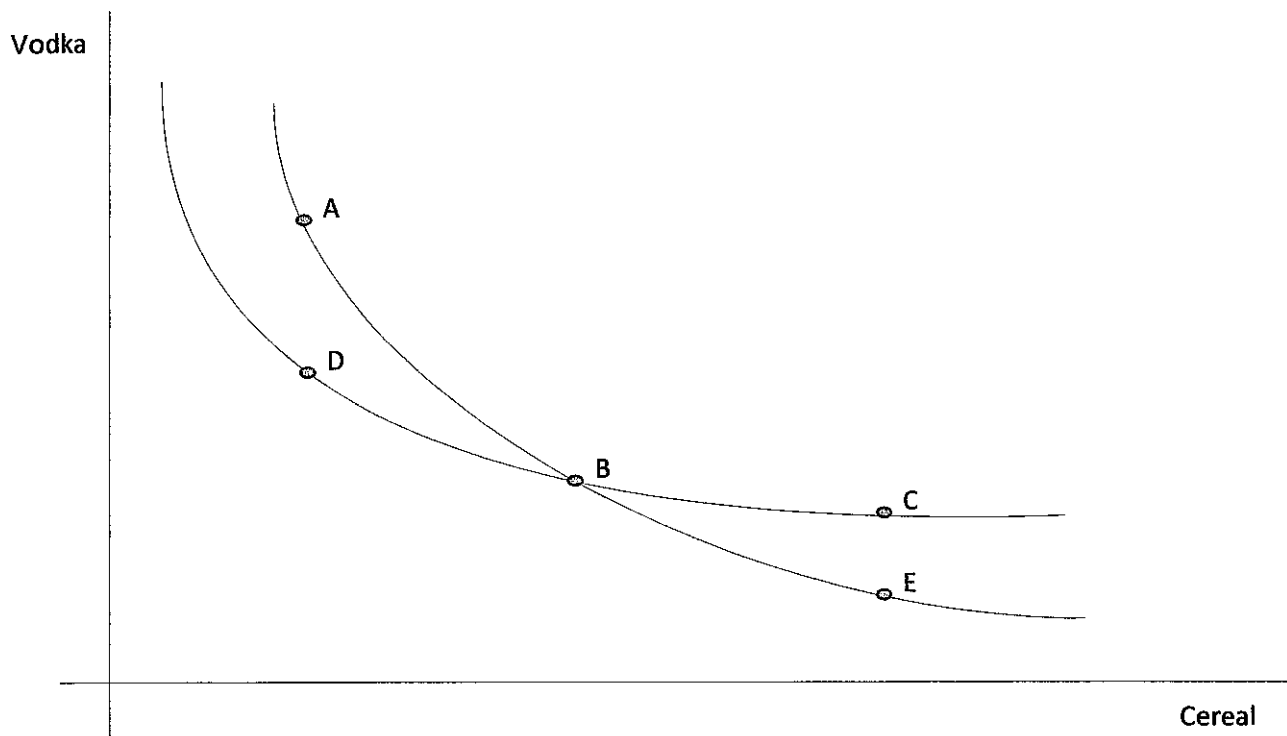
3. *Social Welfare When 'Nothing in This World Is Indifferent to Us'*

The world of indifference is an unrealistic world, because in it the utility function of a rational individual is always intransitive, i.e., it cannot cross, or cross and remain Pareto optimal. In Pope Francis's view 'nothing is indifferent', because production and consumption activities are social. As social activities, they should aim at satisfying the *integral* person in ways that safeguard the 'common good.' In other words, all consumption and production activities are joint activities as society itself cannot exist at all if all its members have absolutely nothing in common. If so, then utility functions of *whole* persons, as opposed to those of *rational* individuals, *are not only transitive, they should be transitive*. For most goods and services and in most situations, the utility of a young child is not independent of that of the child's caring parents. In many traditional and rural societies, the utility functions of aging parents are key arguments in the utility functions of their children. In those instances it is conceivable that the utility of children is the disutility of parents, because ordinarily parents do not like being unnecessary burdens to their children.

As another example, consider the utility a pregnant woman would derive from consuming a combination of alcoholic drink (Vodka) and fortified breakfast cereal (Cereal). In Figure 1, a high level of Vodka consumption (A) would give her a high individual utility (ABE), but low (D), social utility on DBC. A low Vodka consumption yields low individual, but high social, satisfaction. This means the two utility functions cross at B where social and individual satisfaction are exactly the same, i.e., $ABE = DBC$. This level is inconsistent with conventional utility maximization, but it is possible where behavior is 'controlled by norms' (Kornai, 1983). In that case the correct social utility function is $DBC + ABE = ABC$, suggesting that social improvement is possible with more Vodka consumption to the left of B if the rational individual preferences dominate, and to the right of B if society's consumption of Cereal is assumed (Figure 1).

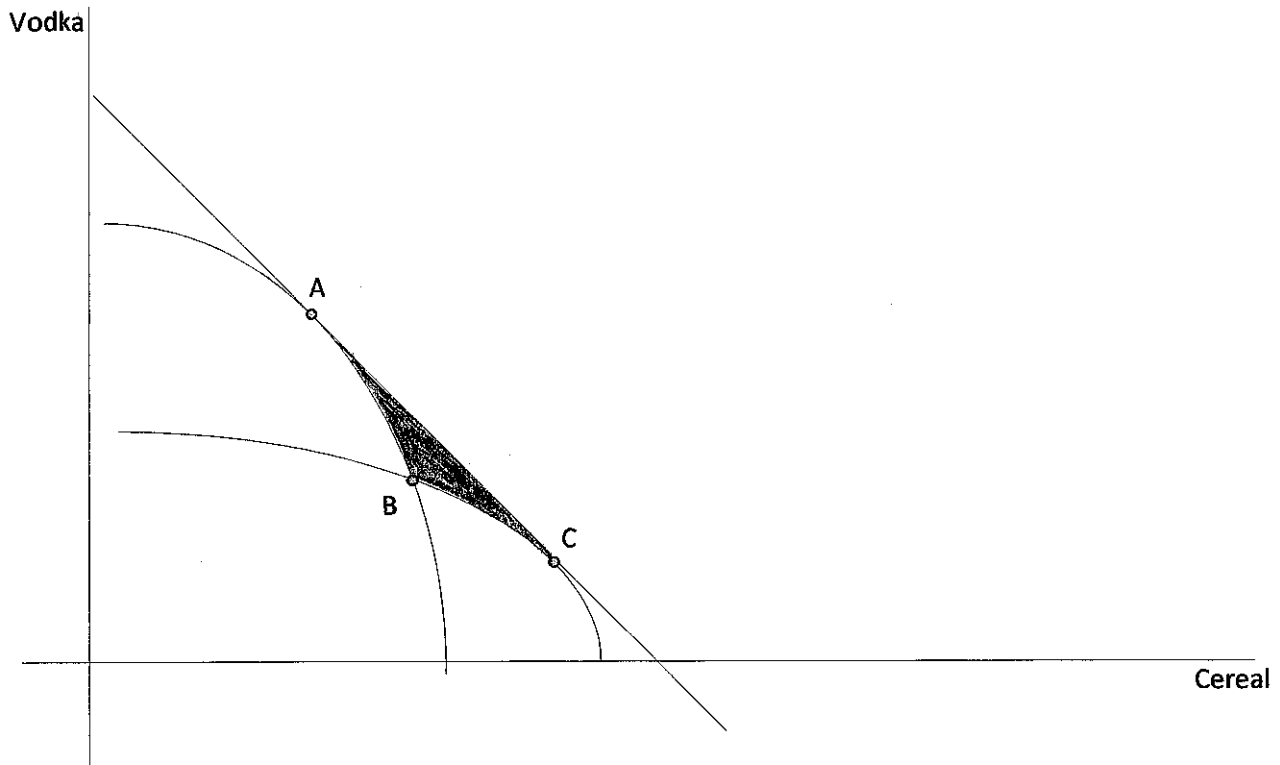
This kind of argument is good on the supply side as well, and the vast literature on joint production functions offers excellent examples. Figure 2 below is a simple illustration of two equally 'feasible' production possibilities curves (PPCs), BC and AB. At B, $AB = BC$, but their marginal rates of transformation are not equal, implying both cannot be simultaneously Pareto optimal. However, at A and C the slope of the two PPCs is the same, making possible ABCA, which is impossible from the perspective of the two PPFs individually. Hence, the shaded area ABCA

Figure 1: Integral satisfaction (utility)



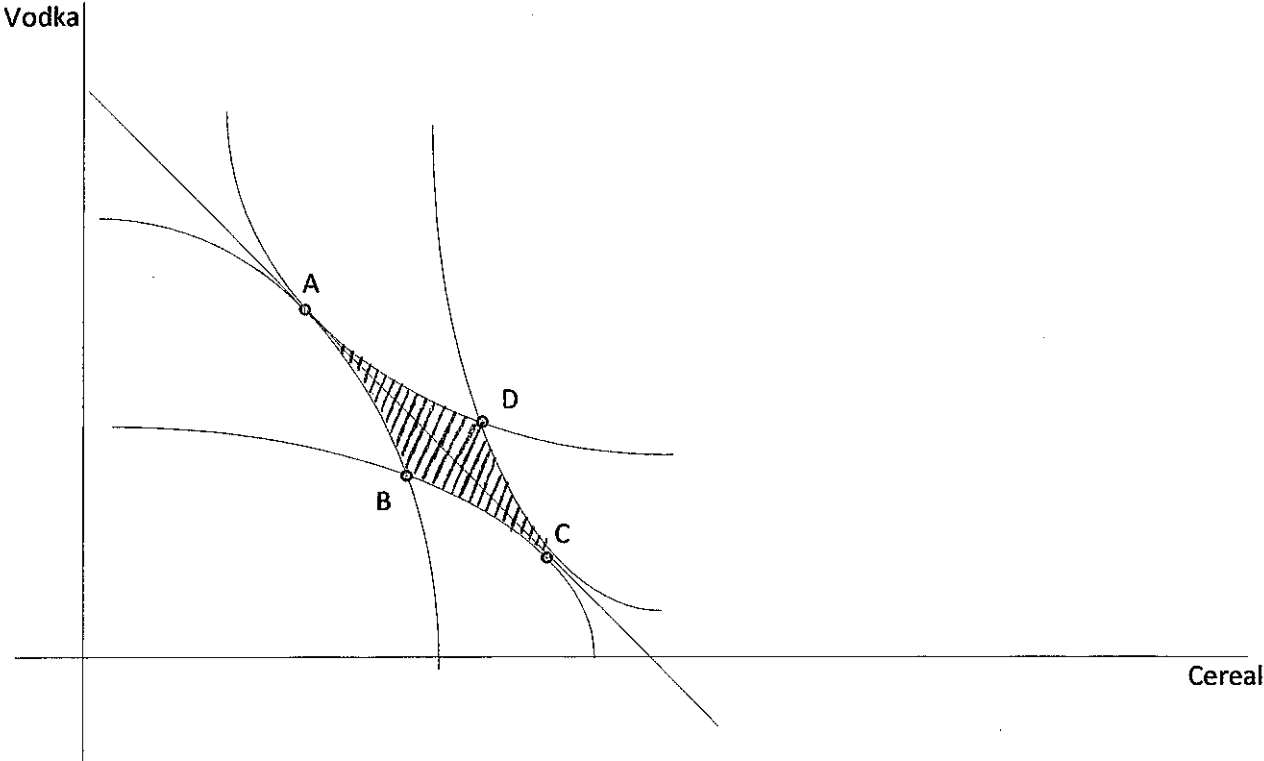
Note: Line $ABC = ABE + DBC$ is integral curves. To the left of B there is greater satisfaction from consuming more Vodka than Cereal, suggesting the individual preferences dominate social preferences. To the right of B more Cereal and less Vodka gives more satisfaction, and society's preferences trump individual's preferences. Hence improvements are possible in the Wedges ABD and CBE.

Figure 2: Integral production possibilities curves



Note: Social PPC = ABC = AB + BC. Thus, AB suggests equal opportunity costs at A and C such that Area ABCA represents opportunities for improvements that were integrally, but not Pareto efficient.

Figure 3: Integral versus rational social contract curves



Note: ABCDA is the area where social improvements can be made, and the line from the origin through B to D represents the integral social contract, quite distinct from the Rousseau-Edgeworth social contract curve which passes from the origin either through A or through C.

represents possibilities for improvement, and such improvement would be socially, though not Pareto, efficient if it falls anywhere on AC. In fact, if one draws an Edgeworth-like box (, i.e., combining Figures 1 and 2), one would find a kite-shaped area ABCDA in Figure 3, represents papal possibilities, which would be impossible under the Rousseau-Edgeworth social contracts (OA and OC). In this case the ‘social contract line’ , OBD, would not go through the Pareto efficient points A and C. This is not a new observation: In conventional production theory with specialization and trade, the ‘tradeline’ illustrates the non-income benefits of trade which allow trading partners to consume outside their PPCs. But even more than that, Rousseau himself was critical of Baconian notion of efficiency brought about by technology and science as saviors of mankind. He argued that although ‘man is born free, ... everywhere he is in chains’ of society (1984, 1968). The distinction among ‘the individual good,’ ‘the common good,’ and ‘the general good,’ suggesting competing social contracts – ‘Arrow’s impossibility theorem.’

How can an impossibility be possible? Because Pareto optimality requires full employment only of pure private resources. Essential social resources are not counted; in some circles even government is ridiculed as only an obstacle to individual efforts. To the contrary, the Pope has said, for example, that ‘many elderly persons who are a storehouse of wisdom forged by experience, and who seek in many ways, especially through volunteer work, to share their stories and their insights’ (Pope Francis, 2015d, p. 3) enhance productivity. This is not a strange notion since experience, on-the-job training, and formal education are the key components of human capital, an idea long seeded by Becker in his studies of human capital (Becker, 1993) and marriage and family (Becker, 1991, 1974, 1973).³ It is a reasonable case for the Pope to make that some deaths improve society even as they sadden individuals – call it ‘utility from disutility’, if you wish. The Pope points out that while relatives and friends were deeply hurt by the assassinations of Martin Luther King Jr and Abraham Lincoln, paradoxically the deaths of these two men elevated the U.S. common good (freedom). The Pope expressed the same dilemma in his reflections on the terrorist attack at the 911 Memorial in New York City (Pope Francis, 2015e). From such experience I find acceptable his statement that ‘a people with this spirit can live through many crises, tensions and conflicts, while always finding the resources to move forward, and to do so with dignity. These men and women offer us a way of seeing and interpreting reality. In honoring their memory, we are inspired, even amid conflict, and in the here and now of each day, to draw upon our deepest cultural reserves’ (p. 4). Such an approach is essential, Pope Francis insists to the UN General Assembly, because it is not possible to build unity where there is no difference; unity is a set of diversity stitched together (Pope Francis, 2015f, p. 3). Hence, ‘our efforts must aim at restoring hope, righting wrongs, maintaining commitments, and thus promoting the well-being of individuals and of peoples. We must move forward together ... for the common good; pool our resources and talents, and resolve to support one another, with respect for our differences and our convictions of conscience. Such cooperation is a powerful resource in the battle to eliminate new global forms of slavery, born of grave injustices which can be overcome only through new policies and new forms of social consensus. ... Building a nation calls us to recognize that we must constantly relate to others, rejecting a mind-set of hostility in order to

³ *Journal of Demographic Economics*, Volume 81, Issue 1, March 2015, is all dedicated to Becker’s work on these matters.

adopt one reciprocal subsidiarity, in a constant effort to do our best' (ibid., p. 5ff). All this shows that there exists social utility functions over and above individual utility functions.

4. '*United by the Same Concern[s]*' about Social Welfare

The pursuit of a common objective is constrained by common concerns. From the Pope's perspective production and consumption activities are intimately intertwined. Consider the following: 'The fight against poverty and hunger must be fought constantly and on many fronts, especially its causes' – the fight is a common fight for a common good. For instance, a common fight is important because 'the right use of natural resources, the proper application of technology and the harnessing of the spirit of enterprise are essential elements of an economy which seeks to be modern, *inclusive* and *sustainable*' (Pope Francis, 2015f, p. 9, cf. Pope Leo XIII). Only a 'culture of care' and an 'integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature [by] putting technology at the service of another type of progress, one which is healthier, more human, more social, more integral [because] a good leadership (sic) always opts to initiate processes rather than possessing spaces' (ibid., pp. 10-11), only such culture and approach can succeed. Hence, 'the financial agencies should care for the sustainable development of countries and should ensure that they are not subjected to oppressive lending systems which, far from promoting progress, subject people to mechanisms which generate greater poverty, exclusion and dependence' (ibid., p. 9).

Protecting the environment is essentially ending exclusion and granting respect. The environment needs respected because: (a) it 'entails ethical limits [upon] which human activity depends, and (b) it is a living fundamental common good. The misuse and destruction of the environment are also accompanied by a relentless process of exclusion, [and] economic and social exclusion is a complete denial of human fraternity and a grave offense due to human rights and the environment' (ibid., pp. 3-5). The Pontiff rephrases the same themes in his speeches in Africa where he asserts that

... we are confronted with a choice which cannot be ignored: either to improve or to destroy the environment. Every step we take, whether large or small, individual or collective, in caring for creation opens a sure path for that 'generous and worthy creativity which brings out the best in human beings.'

The climate is a common good, belonging to all and meant for all; climate change is a global problem with grave implications: environmental, social, economic, political and for the [production and] distribution of goods; it represents one of the principal challenges facing humanity in our day. Our response to this challenge 'needs to incorporate a social perspective which takes into account the fundamental rights of the poor and the underprivileged,' [for] the misuse and destruction of the environment are also accompanied by a relentless process of exclusion.

How we respond is important because 'no country can act independently of a common responsibility' – no 'globalization of indifference, [which makes us] incapable of feeling compassion at the outcry of the poor, weeping for other people's pain, and feeling a need to help them, as though all this were

someone else's responsibility and not our own' (Pope Francis, 2015?, Chapter 3, cf. Sanders, 2015, p.5). The response acknowledges that "integrated human development and the full exercise of human dignity cannot be imposed. They must be built up and allowed to unfold for each individual, for every family, in *common with others, and in a right relationship with all those areas in which human social life develops* – friends, communities, towns and cities, schools, businesses, provinces, nations, etc., [because] the full meaning of individual and collective life is found in selfless service to others and in the sage and respectful use of creation [consumption and production] for the common good.' As Walter Nicholson (2002, pp. 620-621) and T. Haalvemo (1960) put it, education is an example of a common good produced by consuming it. The remaining danger is what Pope Francis has termed 'radification' of progress, which means the speed of development has outpaced the speed of 'biological evolution,' and hence it has harmed 'integral and sustainable development.' The resulting 'irrational confidence' breeds a 'throwaway culture' which is the ultimate source of pollution and waste, and consequently of climate change. Pollution damages water and biodiversity, and leads to the 'decline in the quality of human life, the breakdown of society, and the increase in global inequality of income and wealth, making inevitable 'both the cry of the earth and the cry of the poor' (ibid., p. 35).

5. Common Responses and the Solution to the Social Welfare Problem

The Pope, given his theological vantage, casts some of the 'weak responses' in the Gospel terms (Pope Francis, 2015a, pp. 45-68). Let the experts explain that part. From a layman's perspective, 'the human roots of the ecological crisis' are not hard to understand. Technology is a blessing and a curse (cf. Ogburn, 1957). The curse part of technology has been worsened by the 'globalization of the technocratic paradigm', built around 'the modern anthropocentric' view of the environment (ibid., pp. 72-78ff). Of course, some biblical interpretations that the Earth and everything on it God gave to humans to use as they wish without care have aided conventional approaches in ensuring failure. Pope Francis calls for the 'care of our common good' to usher in integral world.

The solution to such a failure is an 'integral ecology' (ibid., pp. 93-108), consisting of the 'environmental, economic, and social ecology, cultural ecology, and [temporal] ecology, which are elements of the principle of the common good.' Hence, the human ecology is a complex function of the common good – it is a part of a system of endogenous simultaneous equations.

How are we to approach and take action toward the human ecology? The Pope suggests a transparent national and international dialogue.⁴ For the political and economic dialogue to succeed, it must advance 'human fulfillment.' Human fulfillment is both objective (scientific) and normative (subjective). Although there are good analyses of how norms can control economic behavior (Kornai, 1983), conventional economics has stressed mainly the objective (material) side of human fulfillment. Pope Francis argues that such treatment is inadequate!

⁴It is too early to assess whether the Paris agreement and subsequent UN discussions are true or false starts of the dialogue.

6. Pope Francis's Social Welfare (W^*) Hypothesis

Amavilah (2010) has concluded that modern economics has moved too far away from its social foundations. Nonetheless, it does not mean that all of the tools it developed along the way are entirely useless. In fact, much of what constitutes the foundation of economics remain very good. Many of us still enjoy Adam Smith's (2006[1759]) *The Theory of Moral Sentiments*. Also the mathematical economic theories of exhaustible as well as renewable resources are still useful research and policy guides (cf. Baumol and Oates, 1988, Hotelling, 1933, Campbell, 1987, Dasgupta and Heal, 1979, Fisher, 1985, Nehaer, 1990, Arrow, 1965, Hardin and Baden, 1977).⁵ Indeed, we can shed light on what Pope Francis promotes by modifying these conventional models.

For example, assume the utility of the integral person (u^*) is a function of the social utility ($U^* \Rightarrow u^*(U^*)$, $u^* \supset u$) is transitive and Arrow-additive. Since $u^* > u$, maximizing Pope Francis's social welfare function is solving

$$W^* = \max \int_0^{\infty} [u^*(U^*(Q^*(X^*, t))) + \lambda(P(Q^*(X^*, t)) - C(Q^*(X^*, t)))] e^{-\rho t} dt, \quad (5)$$

where the first term of (5) is the discounted present value of social utility [consumer side], and the difference between the second term and the third is the discounted present value of social surplus [producer side], and ρ is the social time discount rate. Clearly, (5) is a complex function in which the utility of the integral person is a function of the social utility which is a function of production using social, along private, inputs. The Hamiltonian mechanics of (5) are approximately:

$$H = u^*(U^*(Q^*(X^*, t))) + \lambda[PQ^*(X^*, t) - CQ^*(X^*, t) + \theta[g(X^* - Q^*(X^*, t))], \quad (6)$$

where $g[X^* - Q^*(X^*, t)] = dX^*/dt$ is some measure of the evolution of the human ecology in all its dimensions.

Now, if we wish we can let $Q^*(X^*, t)$ take on some specific functional form such as Cobb-Douglas, Romer (1990), Lucas (1993), and so on.⁶

Differentiating (6) with respect to the Q^* and X^* , and setting the results equal to zero gives:

⁵Hardin and Baden's (1977) book is among the clearest statements in terms of providing a good balance between mathematical models of the commons and the policies such models seek to enhance.

⁶I personally prefer transcendental variable elasticity of substitution production functions.

$$\frac{\partial H}{\partial Q^*} = \frac{\partial u^*}{\partial Q^*} + P - \frac{\partial C}{\partial Q^*} - \Theta^* = 0 \quad (7)$$

$$\frac{\partial H}{\partial X^*} = \frac{\partial u^*}{\partial X^*} + \lambda \left[\frac{P \partial Q^* - C \partial Q^* + \theta \partial g(X^*) - \partial Q^*}{\partial X^*} \right] = 0,$$

where the P in (7) is really P^* , i.e., $P^* = \partial u^* / \partial Q^* + MC_{Q^*} + \Theta^* \neq P, \forall \Theta \neq 0$. This means that the socially efficient price (P^*) is one that covers the marginal social utility, marginal social cost, and marginal social 'royalty' to the common good. In other words, the papal optimality requires that $\partial H / \partial X^* = \partial H / \partial Q^* = \partial H / \partial u^*$ – which is not likely equal to (4) above. Again, looking at (8), an integral person derives satisfaction from Q^* ($\partial u^* / \partial Q^*$) and from X^* ($\partial u^* / \partial X^*$) whereas the consumer derives satisfaction only from output. To simplify further, define the first term of (6) as $E(u^*)$; the second as Φ^* ; and the third as Θ^* . Then compactly,

$$H = E(u^*) + \lambda[\Phi^* + \Theta^*], \quad (8)$$

Eqs. (7) and (8) show that the utility of the *integral* person depends on the social utility of the *integral* community. To the extent that the whole person is included in H, he or she does not have to be rational (optimizing). So, setting (8) to zero, it is clear that

$$\Phi^* + \Theta^* = -E(u^*)/\lambda. \quad (9)$$

Eq. (9) means that the cost of generating the time-discounted present value of social surplus ($\Phi^* = P - \partial C / \partial Q^*$) that exhausts the time-discounted present value of the common rent ($\Theta^* = [\theta \partial g(X^*) - \partial Q^*] / \partial X^*$) leads to the disutility of the integral person and society even as it satisfy the rational individual. Alternatively, a large loss of Θ^* brings about a small gain in Φ^* . In other words, rational consumption and production activities do not create returns sufficient to compensate for the loss of the common good, and that is what Pope Francis is concerned about. Hence, (8) can only be met *iff* consumption and production pays to the common good a sufficient "royalty" rate equal to:

$$\frac{d\Theta^*}{dt} = \Theta^* P - \Theta^* \frac{dg}{dX^*} + \frac{\partial C}{\partial X^*}. \quad (10)$$

Hence, for $d\Theta^* / dt = 0$,

$$\frac{dg}{dt} = \frac{\Theta^*P - \partial C}{\Theta^*\partial X^*} \Rightarrow \Theta^* = \left(\frac{\partial C}{\partial X^*}\right)\left(\frac{dX^*}{PdX^* - dg}\right) \quad (11)$$

Alternatively, $P^* = P = MC_Q$ iff $dg/dt = 0$, $Q = Q^*$, which is very unlikely, if not impossible in the world where ‘nothing is indifferent.’ As Clark (1977) illustrates mathematically the conventional approach leads to the ‘overexploitation’ of the commons because it assume the objectives of profit maximization and competitive exploitation of common resources are always incongruent, which we know from Ostrom and Ostrom (1977), and Ostrom (1977, 2009) is incorrect.

7. History Defends Pope Francis’s Social Welfare Hypothesis

History defends Pope Francis from both the ordinal utility and cardinal utility sides. From the ordinal view, the Bergson-Samuelson welfare model assumes a community of homogenous rational individuals with ethical values (z_i), generating some satisfaction (u_j), so that $W_{B-S} = W_{B-S}(z_i) \rightarrow W_{B-S}(u_j)$, where B-S is for Bergson-Samuelson. As Samuelson (1947, pp. 219-249) illustrates, if the B-S assumptions are violated, the welfare function and the associated technical transformation functions have different properties (cf. De V. Graaff, 1967, Chapters 2, 4, and 5), although we can still say that $W = \max [\text{Utility Function}] + \lambda[\text{Possibilities Function}]$. However, both Bergson and Samuelson argue that while it is reasonable to assert the existence of a theoretical Pareto possibilities frontier, the possibilities themselves are far too many to allow for a unique Pareto optimality, which is determinate only axiomatically and under strong conditions (Samuelson, 2004). For this reason, Fleming (1952, 1957) made the Bergson-Samuelson function axiomatic so

that $W_F = \sum_i^s f_j(u_j)$, which essentially overrides the assumption of indifference and permits

transitivity. Doing so, however, suggests that every solution that is not Pareto optimal is not only bad, it does not exist – again, a very strong *ceteris paribus*. Kemp and Ng (1976) interpret Fleming differently. They argue that if a minority is indifferent to a choice by the majority, then the preferences of the majority should determine Pareto optimality, i.e., policy should prefer ‘ordinalism’ to ‘individualism.’ But even before Kemp and Ng, the Harsanyi (1953, 1957) welfare function has

intimated a weighted Fleming of the type $W_H = \sum_i^s a_j \mu_j$, where a_j , unlike f_j , is a 0-1 constant,

making u_j interpersonally comparable, and hence inconsistent with standard theory. Harsanyi also showed that individuals have different risk profiles, but he did not show that individuals with similar risk profiles may still prefer risk differently (cf. McKenzie, 1968, Vickery, 1945), while Hammond (1987) has suggested a reasonable reconciliation of Harsanyi and Arrow. All the same, according to Arrow (1963) it is ‘impossible’ to write Pareto optimal constitutions (policies) and still meet the reasonable assumptions about: (a) unrestricted domain, (b) social ordering (collective rationality), (c) weak Pareto, (d) nondictatorship, and (e) independence of all irrelevant alternatives’ (Henderson and Quandt, 1980). To address these issues, in a computable fashion, Nash or Nash-like bargain games

have attempted to generate Pareto-like optimality. However, the new reformulations require multiplicative functions like $W_N = (\Delta u_1)(\Delta u_2)(\Delta u_3)\dots(\Delta u_n)$, $\Delta u_i = u_i - u_i^0$, $u_i^0 = \text{status quo } u_i$. Hence, Arrow's has remained the clearest generalization of the endogenous welfare functions in which individual orderings determine social orderings and vice versa. This means that different individual orderings can map to different social orderings, which is Arrow's key result – 'the general possibility theorem' is itself 'impossible,' and therefore an optimal policy (constitution) is impossible under true Pareto conditions. Practice tells a different story. We know that: the U.S. Constitution is not only respected by most Americans, it is also revered and copied by many foreign countries. If it is not an efficient document (policy solution), it has still been both an influential and desirable document (Reynolds and Smolensky, 1977).

In cardinal terms W is measured as the sum of broad economic outcomes like per capita income, or on the input side as narrow indicators like human capital in its health (life-expectancy) and education (schooling) dimensions (Amavilah, 2014). For example, $W = \sum_i^n Y_p$ where $Y_i = Q_i P_i$ is the money (real or nominal) value of income. The implication is that as Y increases, so too do both W and the underlying utility of individuals. But it is not clear what the standard of living is from this. Therefore, a d j u s t m e n t i s m a d e s u c h t h a t $W = \bar{y} = 1/n \sum Y$, where $n = \text{population } \forall \text{ labor}$, \bar{y} is average Y . This too is not precise since the average can be pulled up or down by high or low Y ends, so that W and the associated utility are either over- or under-estimated, which raises questions about whose utility function drives W – the poor's or the rich's. Moreover, it invokes issues about the relationship between (income) and happiness – issues for which there remains unanswered and unanswerable questions as many have shown over the years (Easterlin, 2001, 1974, cf. Clark, Frijters, and Shields, 2008, Layard, 2006, cf. Helliwell, Layard, and Sachs's World Happiness Reports). However, in Pope Francis's framework these questions do not arise because the unit of analysis is the subsidiarity, which is consistent with John Rawls's (1974, 1971) modified utilitarian principle that the best policy for society to pursue is the betterment of the poorest, i.e., to maximize the minimum average income (socalled max-min).

The last of the cardinal representation of social welfare adjust W for all kinds of inequality, such that

$$W = \delta n^{-1} \sum Y = \bar{y} \delta, \quad (12)$$

where δ is an index of inequality such as the Gini coefficient for Sen (1973), the Atkinson (1970, cf. Biewen and Jenkins, 2005) entropy index, or the Theil (1967, cf. Conceicao and Ferreira, 2000) index. These are familiar indices, and I am not going further with them, except noting that for it to be consistent with the papal welfare function, $\bar{y} = Q^* P^*$, $Q \in Q^*$, $P^* > P$.

The papal function allows for both the impossible to be possible, and for the possible to be impossible, which is what Arrow meant by 'the general possibility.' Consider the U.S. presidential elections. During primaries millions of Democrats and Republicans express their individual

preferences of any number of running candidates – key revealed presidential preferences. In the end there remains only one social preference represented by the winner on both sides. The same process is repeated during the general elections, and the winner becomes the U.S. President presumably because he or she delivers the highest social utility even if the lowest individual utility for some. Again, this means *society is inclusive of the integral person, and for the person to be integral he or she is bound by society in ways more than material satisfaction*. In other words, human fulfillment has both objective and subjective dimensions; just as individual body parts do not alone tell what the whole body must do, so too it is the case that the rational individual alone does not decide the common good. Obviously the individual can, but to be integral, should not run society.

If we take the Pope's word, then frankly the conventional economics of welfare function is flawed, and therefore 'we need change, real change, structural change' (Pope Francis, 2015d, p. 2). Bringing about such change Pope Francis recommends three tasks: (a) to put the economy to the service of people – not money, exclusion, and inequality, (b) to unite people for world peace and justice, and (c) to promote the wellbeing of 'our common home' for our own wellbeing depends on it. These tasks and how to go about them the Pope stresses in *Laudato Si 13*, and re-emphasizes again and again in subsequent speeches, most recently in Africa.

8. Concluding Remark

Pope Francis argues that conventional welfare economics is partly responsible for justifying the behavior of the rational consumer and producer. Such behavior has damaged the common good, leading to observed lopsided development, inequality, poverty, and exclusion. This means social welfare is a function of the common good. The marginal social utility is the difference between the marginal social benefit and marginal private costs, where marginal social benefit is the sum of marginal social surplus and the royalty earned by the common good. Hence, socially optimal welfare is more than Pareto optimality because it is based on the notion that integral individuals differ from rational individuals in non-trivial ways. In an integral economy preferences are Arrow optimal, which is Pareto impossible. In other words, Arrow optimality is a general case of which Pareto efficiency is a special case that obtains only under strict conditions, and hence 'Arrow's impossibility.' The opposite is not true.

A final result is a question about how to quantify the common good ($Q^*(X^*)$). For Pope Francis the level of analysis is the integral subsidiarity. There the environment is a good proxy for the common input (X^*), and Q^* would be the outcome and its implications for poverty reduction, inclusion, equality, and in turn the protection of X^* . The implications for policy and future research are obvious.

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