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CHAPTER 11
ACHIEVING SUSTAINABLE MARKETS

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ACHIEVING SUSTAINABLE MARKETS

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11.1 Introduction

Are markets up to the task of promoting sustainable development? It is an issue of paramount significance in our pursuit of Agenda 2030 and the attainment of the Sustainable Development Goals (SDGs) and the provisions of the Paris Agreement. Against the backdrop of four aspects of markets, this chapter discusses the challenges posited by climate change and sustainable development. Considering their limitations, should markets as a main vehicle for sustainable development be discarded, or can their shortcomings be overcome? Can markets become sustainable in the sense of fostering sustainability outcomes?

Extensively or completely substituting markets, a backbone of modern societies, would be a most disruptive change, especially since our experiences with other allocation mechanisms are not entirely encouraging. To the extent that markets are not simply seen as devices for optimization, they use optimization mechanisms that rely on discrete decisions by a large number of individuals to solve allocation problems within the society. Given environmental concerns where the quality of life and material consumption are not a zero-sum game, we must produce better (not necessarily less), consume differently (not necessarily less), not limit growth but grow in a sustainable manner in the interest of improving the quality of life (with improving environment). This is the message of Agenda 2030 and its SDG 8 (Decent Work and Economic Growth).

However, unless existing trade-offs across the SDGs are successfully dealt with (Bali Swain and Min 2023), and unless, as Lerpold and Sjöberg (2023) point out, complete decoupling is achieved, the goals of the Paris Agreement and Agenda 2030 will not be reached (see also, for example, Ward et al. 2016). The trick of the matter, then, is to retain the benefits that markets provide while leveraging their allocative services and the ability to structure incentives toward sustainability. If this is achieved, markets can be regarded as sustainable, core characteristics of which would be the ability to support a long-term perspective (and not just being viable and long-lasting as such; Aras 2015) and to encourage choices that help achieve environmental and social justice objectives.

The problem is that current approaches, primarily in the form of rectifying market failures, important as these efforts are, do not quite seem to reach that goal (e.g., Sachs et al. 2019; Moyer and Hedden 2020; Lafortune et al. 2022; Leal Filho et al. 2023; Bin-Nashwan et al. 2024). Whether

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this is because the potential of existing tools (e.g., Pigouvian taxes, subsidies, cap-and-trade mechanisms, etc.) is not properly applied, is resisted, or does not mix well with parallel measures of a more direct regulatory type is beyond the scope of our efforts here. Instead, we are interested in the process whereby sustainable outcomes might result from market action.

The objective of this short intervention, therefore, is to explore the sustainability potential of an alternative approach to markets, one that does not primarily see it as a tool for allocating resources efficiently but instead explicitly looks at its ability to deliver sustainability outcomes. Although it would be relevant and entirely feasible to approach markets conceptualized as value-creating structures (Vargo and Lusch 2004) and, hence, stress, for instance, the role of business models, for now we opt to start (albeit not necessarily stay) within the bounds of economics as opposed to business studies. Focusing on choice and sustainability preferences (à la Graciela Chichilnisky) as components of exchange across markets, it shifts the focus to the trade or transaction itself. Will this help us advance the role of markets in the quest for sustainability or at least shore up some of the major shortcomings of markets? Indeed, will it help us bridge the gap between weak and strong sustainability? That binary, which revolves around the substitutability of natural and other forms of capital, in effect, defines the relative standing of the economy versus the natural world that sustains humankind.

11.2 (Not Necessarily) Sustainable Markets

In classical economics, "the invisible hand" metaphor was used by Adam Smith to describe the unintended social benefits resulting from individual actions. The phrase is employed by Smith with respect to income distribution (1759) and production (1776). Whilst the exact phrase is used very sparingly in Smith's writings, it captures his notion that efforts to pursue interest may result in superior outcomes than direct actions that are intended to benefit society. The idea of trade and market exchange automatically channeling self-interest toward socially desirable ends is a central justification for the laissez-faire economic philosophy which lies behind neoclassical economics.

Not just self-interested behavior but also competition is central to the idea of a market that results in efficient resource allocation; prices that reflect relative scarcities, as established by supply and demand, provide the incentives needed to move forward. This, however, presupposes that markets accommodate a number of agents sufficiently large to ensure that no single market actor has the possibility of unilaterally influencing the price. A failure to operate in this manner will result in less-efficient resource allocation, with a commensurate erosion of welfare gains. Markets may also create costs to third parties not involved in the production, exchange, and consumption of the goods or services a market is engaged with. Such negative externalities are a core phenomenon in the creation of environmental problems; if costs are not internalized, an oversupply resulting in more extensive pollution or resource depletion than is societally optimal will result. Conversely, incentives issuing from market exchange might be such that useful goods and services are undersupplied; any positive externalities as might be created, for instance, in the form of ecosystems services, are difficult to capture, with the result that supply will fall short of what is societally desirable. The discussion on externalities, their sources, and how to remedy them is extensive and need not detain us here (but see, for example, Arrow 1970; Wheaton 1972; Chipman and Tian 2012; Rezai et al. 2012). Importantly, though, market failures being a possible outcome, firms and other economic agents will act responsibly if they are made to cover the costs imposed on others. This could be done through taxes or legislation; conversely, some form of inducement is likely needed to make available positive externalities that else might not materialize.

A second aspect that is likely to have an impact on the operations of markets (including with respect to sustainability outcomes) focuses on their geographical range. Markets can operate

locally, within the national boundaries, cross-boundary (exports and imports), or a combination of all. Although trade or exchange is conducted on a particular good or service, from the perspective of sustainability, this particular dimension of the markets, within which trade (perhaps quite literally) takes place, can have important ramifications. Trade may shift the burden of negative externalities from one country to the next just as off-shoring of production may imply the off-shoring of emissions, too, yet remain driven by consumption at the original location of production. Furthermore, also as they are locally generated, some externalities have global reach, greenhouse gas emissions being but the most obvious example. Therefore, as Ayres et al. (2001: 167) propose, "regional and national sustainability should be consistent with global sustainability." This does not happen automatically.

Third, yet another dimension of sustainability is time. Intertemporal or intergenerational decisions are the hallmark of most sustainability decisions, and the choice is between the present and future generations or time periods. These intertemporal/intergenerational decisions impose a construct where the decision must be between consumption of a particular good (resource) in the present vis-à-vis consumption in the future. In a setting of finite means, it can be seen as a choice between investment or consumption, the latter potentially eroding the former by reducing the resources available for future generations.

Fourth, technological developments and the introduction of new products and services, especially clean energy and green technology, are critical to solving the environmental problems humankind faces. Investment in research and development, including innovations that benefit the environment, is a high-risk activity and it may prove difficult for the innovator to capture the value created. This is one reason, however, that innovation is not only an issue of technology in a narrow sense. Developments such as new business models might also prove decisive. Indeed, beyond new ways of capturing value that would else accrue to third parties (thereby undermining the initial incentives to innovate), such advances may prove their worth in other ways, for instance, in the form of designs allowing circular economy solutions.

11.3 Toward Sustainable Markets

This leads us on to the possibility of *sustainable markets*, defined as those markets that support outcomes that advance or at least are in line with prevalent notions of sustainability, be it of the environmental, social, or economic variety. Precisely because this has become the preferred way of interpreting sustainable markets, however, there is a certain irony in that early use of the term itself included the ability of the market to retain its integrity as a market. That is, a market, and in particular one that supplies above-normal profits, resistant to competition. This contrasts with the contestable markets that, in principle, can be challenged and therefore induce a measure of constraint lest new entrants might be attracted to it or set their mind to providing workable substitutes. Originating in the work of William J. Baumol and colleagues (Baumol et al. 1977, 1982, 1983; Baumol 1982), it was subject to intense debate in the early 1980s (Schwartz and Reynolds 1983; Weitzman 1983; Shepherd 1984), subsequently being integrated into the thought and vocabulary of neoclassical economics.

Likely as they are to accept the idea of contestability, other economists have turned their back on the associated use of the term sustainable markets, instead opting for the usage present in other disciplines (e.g., Gordon et al. 2011; Aras 2015; Mattsson 2016; Ottosson et al. 2020). A prominent example is Graciela Chichilnisky's research on sustainable markets. Her contribution rests with shifting the attention from the market as such and the generic implications of supply and demand to the transaction across that market. If sustainable markets are markets that deal with the market failures caused by environmental externalities to produce sustainable outcomes instead, how might they be achieved? Can sustainable markets so defined help resolve the four potentially

problematic aspects of markets as identified earlier? To what extent is Chichilnisky's contribution able to provide advice on how to proceed? Setting out to address these questions, in the following section, we take a closer look at Chichilnisky's technically advanced (and axiomatic rather than empirical) investigation into the issue of whether markets can indeed further the cause of sustainability. We try to do so in plain language, although this might come at the expense of the finer yet enlightening points raised by her analysis.

11.4 Sustainable Markets à la Chichilnisky

Setting out from the idea that "neither the 'present' nor the 'future' should be favored over the other" (Chichilnisky 1997b: 468; see also, for example, Chichilnisky 1996), hers is a formulation that considers the basic needs of the present without sacrificing the needs of future generations, or vice versa. As such, it is essentially consonant with the definition of *sustainability* made famous by the Brundtland Report (WCED 1987: 41) and in line with Hartwick's (1977) version of what has since become known as weak sustainability. Against that background, Chichilnisky (2012) was the first to define *sustainable markets* as markets where traders have sustainable preferences with possibility for limited arbitrage. She argues that markets with sustainable preferences overcome impatience and thereby embody the needs of present and future generations for sustainable development.

To start with the most obvious of the four issues, then, Chichilnisky (1997a, 1997b, 2012) suggests a resolution to the conflict between short-term market objectives with sustainable development by allowing for prices that at once reflect both the value of instantaneous consumption and the value of the long-run future, thus resulting in a market where the invisible hand delivers sustainable and efficient solutions. She derives the conditions under which this could happen and notes that Koopmans's (1960) impatience axiom—the idea that a dollar tomorrow is worth less than a dollar today—introduces an economic bias against the future (Chichilnisky 1996; Chichilnisky and Heal 1998; Chichilnisky 2012). This has implications for economic *growth*, a body of theory that Chichilnisky (1997b) actively engages with, where a core issue is how to balance investments and consumption within globally finite resources and subject to concurrent budget constraints. More consumption leads to less room for investment, thereby reducing the production capacity tomorrow, in turn implying lower incomes and levels of consumption than would otherwise have been the case. Koopmans's theory also leads to an understanding of markets where the limits and the value of the Earth's resources may be ignored (Chichilnisky 2012). Were it not for the impatience axiom for choice over time, there would be no differentiation between the present and the future—thus resulting in outcomes that are sustainable.

Chichilnisky (2012: 294) then asks the central question: should a society committed to sustainability disregard markets, drop them, or should one try to overcome any market-based bias against the future (i.e., in the form of discounting)? She arrives at the latter. Disregarding markets will not solve the overarching problem as posed; doing away with them "would be a major change [as] markets are a widespread form of organization" (Chichilnisky 2012: 294) and, therefore, not really an option. She further expounds that sustainable markets differ from Arrow–Debreu markets, which do require adherence to the theory of Koopmans, as the traders have sustainable preferences and no bounds on short sales (i.e., a situation where traders speculate on a decline in prices) but with limited possibilities for arbitrage (in the sense developed in Chichilnisky 1994). Sustainable preferences are sensitive to the basic needs of the present without sacrificing the needs of future generations. These sustainable preferences ensure the existence of a sustainable market equilibrium where the invisible hand delivers sustainable as well as efficient solutions. Thus, traders take bounded positions with respect to each other. In sustainable markets, the prices thus have dual roles, where they reflect both the value of instantaneous consumption and the value of the long-run future (Chichilnisky 1996).

While this might seem at quite some remove from real-world markets, it is a coherent framework. It indicates that by shifting the focus away from the market to the trade and traders, it would, at least in principle, be possible to solve the problem of bias in favor of the present. Although it is not self-evident what an attempt to relax the assumptions that "traders have infinite horizons [. . .] and sustainable preferences over time" (Chichilnisky 2012: 297) would yield in terms of changed model results or in terms of realism (or, for that matter, tractability), her line of reasoning opens for two fundamental questions. First, why and how does exchange take place? Second, how do markets for new products develop?

The latter question can be approached from the angle of market design (Roth 2007) or the literature on market shaping (e.g., Callon 1998; Kjellberg and Helgesson 2006; Nenonen et al. 2019). For our present purposes, suffice it to note that markets typically follow the priorities of the traders, and this can be expected also as the assumption of limited arbitrage that has a restrictive impact on "the utility that can be achieved by the traders when trading with each other" (Chichilnisky 2012: 300). On the positive side of the ledger, if businesses are to move toward sustainable development, as indeed they must if the SDGs and climate change mitigation goals are to be met, trade or exchange of goods and services must internalize in their exchange the better part of all externality costs irrespective of source and not just that of a presentism bias. Chichilnisky's set-up allows for that.

Consider new products, the production of which takes place in anticipation of opportunities of trade, not only as a consequence of trade itself (e.g., following prices on existing goods rising on the heels of increased sales). In short, there must be demand for the product or service offered to the market, or at least an actionable expectation that demand will materialize. This is not quite the same as identifying the conditions under which new products can be developed with a view to replacing existing ones, thereby potentially undermining trading in unsustainable goods and services that create negative environmental impacts. Incentives and risks must be balanced, as would investment costs against projected revenues. Is it the case that, by focusing on trade (exchange) instead of markets *per se*, we will be able to address this key aspect of meeting the environmental challenges? Yes, in principle, at the aggregate level. As already noted, externalities impose costs on a non-participating third party due to action of others trading in goods and services. If traders do, indeed, have stable sustainable preferences, as by definition they have in Chichilnisky's framework, this should be taken care of.

However, trying to work out the real-world equivalent, it does beg the question of how conflicting sustainability demands are internalized or managed, trade-offs being a problem often raised in discussions on sustainability, including in the case of the SDGs (e.g., Le Blanc 2015; Spaiser et al. 2016; Pradhan et al. 2017; Barbier and Burgess 2019; Moyer and Bohl 2019; Bali Swain and Ranganathan 2021). Trade-offs may imply uncomfortable compromises or making equally painful priorities. This is not taken care of in the Chichilnisky framework, where sustainable preferences are treated as if they were unitary, synergistic, and unproblematic to aggregate.

Similarly, where do these preferences come from? They are not formed endogenously in the framework (and there is no discussion of any intrinsic value that traders might derive from adopting them). Hence, they appear to originate somewhere else. For instance, consistent demand from customers could be such a source. Moreover, by understanding the motivations, choices, and preferences of the economic agents in trade, policymakers could try to influence the behavior or implement policies to remove the discrepancy between the private and the social costs at the source of the trade creating the externality. However, the question then arises: how can that be attained? Nudging is one possibility, but it is neither foolproof nor a particularly democratic approach (it having been identified, including by Thaler and Sunstein [2004: 4–6], as libertarian paternalism). After all, it is not only market failure that is a well-established phenomenon in this world but so

also is policy failure. This remains so irrespective of the interventions that are targeting the formation of motivations and preferences or that try to influence agents at the point of choice. Hence, there is no guarantee that intervention in favor of sustainable preferences will work. On the other hand, the literature on policy failure makes the point that "failure is rarely unequivocal and absolute [. . .] even policies that have become known as classic policy failures also produced small and modest successes" (McConnell 2015: 231). Perhaps unmitigated failure of both the policy and the market variety sits at the extreme end of the spectrum, with success of resolving it in full at the other. There are a multitude of possible outcomes in between that show partial success in rectifying the failures we are faced with in discussing the sources of and solutions to non-sustainable outcomes. Can we establish the conditions under which partial solutions are sufficiently good? Would it be worthwhile to go for something less than all-out success? These are questions that require further research and contemplation.

We have also noted that markets can be local, national, or international. However, trade or exchange is conducted on a particular good or service. This allows us to determine the impact of trade, depending on the scale of operation of the trade, without getting embroiled in identifying markets in various contexts, interesting as that might be for other reasons. But on our reading, Chichilnisky stays clear of this shoal. On the other hand, it is not equally clear that her framework allows for markets at different spatial ranges or at different geographical scales to be linked and thereby act as communicating vessels. We know, for instance, from the literature on externalities that the applicability of public policy to public goods may be local, and Ostrom (2012) argues that multiple smaller-scale polycentric efforts to mitigate climate change should be encouraged. Incidentally, this is especially relevant for the SDGs in general, not just number 13 (Climate Action), and also suggests that choices issuing from similar preferences might need to be differentiated. However, this is not the same as adding up to a sufficiently good outcome at higher levels of aggregation or at a global scale.

This leaves us with the question of technological development. Given the nature of existing technology, as seen from the vantage point of sustainability, much of it invested with undesirable properties, new products and services, especially clean energy and green technology, are critical to solving the environmental problems. While the ultimate and proximate causes of the arrival of new business models and markets are beyond the scope of this contribution, we note that novel ideas about value creation and ditto capture can actively shape both markets and the transactions that take place there. The fact that either may involve the development of, for instance, green technologies should not be neglected. As such, it should at least in principle be consonant with Chichilnisky's focus on sustainable preferences and how they might form.

Finally, turning to the role of preferences in shaping transactions, and possibly also business models and markets, Sen (1997) admonishes us to take the issue of choice seriously, as does Chichilnisky (1996). In effect, choice may take place against the background of preferences. Not all choices derive from an ability or willingness to act in accordance with the preferences held, though. As Sen notes, non-volitional choice implies a severe constraint on individual decision-making and may therefore come in conflict with pre-established preferences, including that for desirable sustainability outcomes. There are also other things that might interfere with the direct influence of preferences on choices made, such as inertia, routine, and a lack of reflection, a list to which we may perhaps also add fear as does (Chichilnisky 2009). Preferences, for their part, may reflect, for instance, objectives, values, and norms, in themselves necessary referents for any assessment of the consistency of choice over settings and time (Sen 1993).

The upshot of this, short of adding to the list of restrictive assumptions, is that there is no one-to-one correspondence between preferences and choice as expressed in anticipated or observed

behavior. This should be kept in mind, lest we lapse into thinking that trades reflect rational calculation taking place against a backdrop of crystal clear incentives provided by scarcity pricing alone. On the other hand, it implies that there are not just possibilities to influence preferences but also a potential for making market activities of economic agents align more effectively with desired or necessary sustainability outcomes precisely because the preferences for sustainability might already be in place. In short, we may note that the tools applied with a view to affecting the structure of incentives might not be limited to those that are conventionally employed to rectify market failures (taxes, subsidies, mandatory cap-and-trade mechanisms, etc.).

11.5 Concluding Remarks

To the extent that markets, in our quest to achieve sustainable outcomes, can help resolve the very problems—those of negative externalities—that they may cause, we may speak of sustainable markets. At a time when we are faced with a "market failure on the greatest scale the world has ever seen" (Stern 2007: 27), and as global carbon budgets to meet the Paris Agreement are fast running out (Friedlingstein et al. 2023), we must welcome any advance that can address the consequences of the environment suffering because of its unavoidable public good nature (Siebert 2008). One approach that merits attention is that of sustainable preferences suggested by Chichilnisky (2012). Such preferences ensure the existence of a sustainable market equilibrium where sustainable development could be achieved. It is not just an issue for the climate, though. Such markets can contribute to the meeting of several of the SDGs and their various targets. As noted by Bali Swain and Min (2023), besides SDG 13 (Climate Action), this also includes SDGs 8 (Decent Work and Economic Growth), 9 (Industry, Innovation, and Infrastructure), and 12 (Responsible Consumption and Production), all of which have been shown to have strong links to each other and to many of the other SDGs.

As long as these interlinkages are positive and synergistic, that is, that they reinforce each other, we should be satisfied with the outcome, and our discussion could stop here. However, this does not always appear to be the case. As already noted, research on SDG interlinkages also implies the existence of trade-offs, in turn suggesting a need to balance various desiderata against each other. Still more challenging is the realization that the SDGs are based on weak sustainability reasoning (e.g., Haberl et al. 2020; Bonnedahl et al. 2022). Put differently, the ability of meeting the SDGs hinges on economic growth taking place.

This is problematic. For while it is easy to see that economic growth will make it much easier to meet the demands of most of the social SDGs, it runs counter to the imperative of preserving the integrity of the biosphere. Weak sustainability requires that the prescription of Hartwick (1977) be followed, namely, that rents reaped from natural capital be invested in other forms of capital, allowing the total capital stock to remain at least constant. Yet because of the discounting of future value (e.g., to consumers of the next generation), this will not be enough to ensure intergenerational equity. Add population growth and a sizeable "backlog" in the form of glaring present-day differences in consumption levels across various population groups and it becomes evident that economic growth is needed. SDG 8 recognizes as much, but it is thus likely to come at the expense of the environment and finite natural capital. This therefore not only provides ammunition for advocates of strong sustainability (Daly 1992: 250–252) but also is similarly reflected in the Resolution of the United Nations that launched Agenda 2030. Here, Target 8.4 admonishes signatories to enhance "global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation" (UN 2015: 19).

Haberl et al. (2020) maintain that absolute decoupling is necessary, not just decoupling, implying that greenhouse gas emissions and other adverse environmental impacts increase at a slower pace than does production. If successful, output growth will be accompanied by declining negative impacts.

However, to the extent that the Earth system is running up against absolute planetary boundaries—think CO_2 forcings in the atmosphere, where absolute (albeit approximate) concentrations define impacts in the form of particular projected levels of global warming—it is not quite sufficient. Indeed, as Ward et al. (2016) argue, this is a partial solution, allowing any gains made to dissipate (e.g., through rebound effects). Instead, complete decoupling will be needed: no further resource use or impact can be tolerated. Judging by Agenda 2030, the world community has arrived at an agreement that has not quite internalized this insight. Instead, as Lerpold and Sjöberg (2023: 30) put it, "economic growth is thus conceptually understood as a *sine qua non* for the realisation of the SDGs, [yet] it conveniently overlooks the observation that infinite growth sits uneasily with finite planetary resources."

Chichilnisky (2012) offers a path out of this. She does so by showing that there are ways of circumventing the problems caused by discounting the future. As she does so, she shifts the attention from markets as such to the preferences of traders in those markets: sustainable preferences allow for sustainable outcomes. Although preferences do not lead directly to outcomes—rather, preferences translate into choices, not all of which are straightforward, in turn impacting trades—it opens for discussion on not just the nature of those preferences but also how they are formed and translate into action.

Some further concluding observations on the usefulness of Chichilnisky's approach are warranted. One is the issue of how the lessons of an axiomatic exposition such as hers, logically and elegantly coherent as it is, map onto real-world action. Also, allowing her framework the benefit of the doubt, the presence of trade-offs still seems a problem. Sustainable preferences à la Chichilnisky are well placed to avoid a bias against the future, but can they also accommodate multiple sustainability goals? If sustainable preferences are an amalgam of a variety of worthwhile objectives, would they not be open to the risks that follow from compromises, such as opting for optimization, at the expense of the precautionary principle? This in particular as science cannot be expected to identify the precise thresholds for various outcomes; hence, there is still a need for an extra margin to ensure the safe operating space that the precautionary principle requires (Steffen et al. 2015). And if strict priorities are imposed, say, by setting climate change mitigation above all else, what about other dimensions of sustainability? After all, not just the SDGs include a large set of different goals that supposedly are "integrated and indivisible, global in nature and universally applicable" (UN 2015: 13). Other influential ways of reasoning about our use of finite resources also acknowledge that there are multiple goals worth pursuing. Thus, the current incarnation of the planetary boundaries' framework (Gupta et al. 2023; Rockström et al. 2023), as is also true of some applications of that line of thinking (such as the doughnut economy; Raworth 2017), includes social justice as an important component.

And at a time when because of the urgency of the matter (next to) immediate impact is of the essence—carbon budgets, in line with the objectives of the Paris Agreement, are, after all, running out—we may well ask about the ability of her suggested solution, even if implemented here and now, to meet any such deadline. But then, because of a general inability to incorporate calendar time, this is a more general problem of modelling efforts in the neoclassical economics tradition, not just one that can be noted relative to Chichilnisky's intellectually rewarding approach to the problem at hand.

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