

'Market' metaphor and the economics of climate change

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Abstract This investigation adds to existing research supporting the view that the 'market' mindset plays a controversial role in devising feasible policy recommendations and complements it with factual data based on the search for market solutions in the economics of climate change. Sympathetic with similar concerns raised by academics outside the economics realm as well, the paper suggests that the application of economic principles centred on the "market" mechanism reveals a poor understanding of the actual organisation of economic life and its constituents (i.e. economies, populations, and organisations).

Key words market mechanism; methodology and neoclassical economics; economics of climate change

Introduction: epistemological consequences of the 'market' metaphor

The neo-classical economist is proud to delineate in precise terms his/her object of study along the key concepts of scarcity—trade-offs are necessary given a limited quantity of economic means, efficiency—there is a choice among available alternatives based on opportunity costs, and trade—efficiency is optimized through exchanges of goods and services. The central tenet of this model is that all its ingredients—trade-offs, choices, and trade—develop into a self-regulatory mechanism through the marketplace. The "market" is thus seen as a metaphor of an idealized social network that integrates individually divergent valuations about commodities' utility.

This stylized mindset has been found controversial for the actual depiction of the economic activity from its very inception. W. T. Thornton was probably first to argue in 1869 that "there could be no such thing as generic laws of The Market, but only regularities of certain classes of market formats" (quoted in Mirowski 2004, 33). In his turn, Joseph Schumpeter (quoted by *The Economist*, March 11th, 2006) wanted to dislodge the price mechanism from its dominant position, "in the real world, the competitive weapon that counts is not lower prices, but new commodities and techniques." Schools of economic thought like the German historicism and the American institutionalism, for which genetic explanations and institutions, respectively, made up the study of economics, continued to bear rule until the definitive dominance of the neoclassical economics in the 1930s. From then on, the representation of "market" has left a definitive imprint on the economics establishment. The *market economy* philosophy has in fact become an expression of the way *economists* think about the principles of *economics*. Economics, at least in its neo-classical variant, consists of the study of "how markets can achieve a high degree of coordination without central planning" (Milgrom and Roberts 1992, 57).

It is beyond the scope of this material to gauge the explanatory power of the "market" theoretical perspective against rival epistemologies. Contemporary debates as reflected for instance in Fullbrook (2004) offer a plethora of pros and cons *vis-à-vis* an economist' methodological choices to explain the phenomena under observation. What is instead central to this analysis consists in the practical consequences of the *ethical void* in the analytical

treatment based on *market* representations. The benefits and costs of market transactions are valued in terms of "questions of equity apart" (Coase 1988, 119) and there is seemingly no other option left so that the market optimality be preserved: "the efficiency criterion can never be applied to resolve ethical questions about when it is justified or worthwhile to help one person at another's expense. Instead, appeals to other criteria that explicitly trade off one individual's welfare against another's are needed." (Milgrom and Roberts 1992, 22)

Some studies (e.g. Wilber 2004) show that the logic of this model may engender policy options from ludicrous—"couples choose between a new car and a new baby"—to incoherent or completely wrong. The widespread belief in the cognitive power of the "market" representation has eventually led to analytical frameworks for exotic fields of study as diverse as family, crimes and drugs, water and sanitation, workings of the central nervous system, publication of scientific works, or disease prevention.

The present inquiry takes on this conspicuous feature of standard economics the more so this mindset is *increasingly* applied to matters which predominantly involve *moral choices*. In some cases, the analysis barely falls short of proselytizing euthanasia. When Gary Becker (*Crime and Punishment: An Economic Approach*, 1968) sees criminal behaviour no different from any other profit-seeking behaviour, weighing up the gains and losses of murder reasonably leads to the conclusion that if the dead victim had been sick, dying, or mentally retarded, "the murderer has in fact increased the net wealth of society" (North 1992, 74). In other cases, the analysis conceals the contribution of key indeterminate factors like political clout or institutional inertia in shaping certain economic outcomes. The standard solution proclaims pricing and trading, next to the legal aspects of definition of rights and the responsibility of government in the provision of a public good, as the inescapable approach to put an end to the miserable conditions of economic growth in water-deficit economies. The discussion however misunderstands vital non-market factors such that water is embedded in staple grains and other food commodities and traded as "virtual water" to the extent that, according to Tony Allan from King's College Water Research Group (quoted in *The Economist*, August 9th, 2003), about 20% of the water used to raise crops is "traded" internationally this way. The result of political decisions—in this case, the heavily subsidized export agricultural crops of the big exporters, the U.S. and the EU, which keep prices persistently low—leads to irresponsible use of a scarce resource—water—and makes irrelevant the economic reasoning based on the hypothetical characteristic of "water" markets to reach a state of equilibrium. This discussion reinforces the analytical role history, institutions, and power which "many economists believe...are central to economic analysis" (Mayhew 1996).

It is the purpose of this paper to see how this sort of arguments unfolds in the case of global warming, another ethics-laden issue as the implications usually result from the role of discounting in explaining intergenerational equity. By assuming that "climate change is the most all-embracing problem humanity faces today" (Dasgupta quoted by *The Economist*, December 16th, 2006), economists find a sense of dutiful obligation to apply the *market* mindset in order to provide the society they live in with practical policy recommendations. As a rule, the findings come in monetary costs and benefits which this phenomenon is expected to inflict on the economic activity and humankind in general over the years. The analytical setting follows the standard route: both production—greenhouse-gas (GHG) (e.g. carbon dioxide) emissions inherent to most industrial processes—and consumption—environmental good of climate stability as a result thereof—have to respond to economic and market signals. Setting prices for GHG emissions to cover costs and provide incentives to use alternative

energies efficiently represents the solution that would make optimally use of the given resources.

Against this background, the following two sections develop the main argument along the representations of the "market" metaphor in its perfect—market-clearing—and imperfect—market failure—variants. First, the analytical framework for addressing climate change is presented as an optimizing economic problem of alternative social arrangements. The preferred normative benchmark—cost-benefit analysis (CBA)—solves the methodological query of assessing rival hypotheses given presumptive behaviours of the variables in order to explain causation and hence prediction (i.e. What are the costs in terms of lost output and welfare losses if greenhouse-gas emissions continue on their current path?). Then, the identification of 'pollution' with a negative externality introduces additional reflections on the "market" mechanism. The failure of market to provide an optimal social outcome justifies governmental intervention to set a proper market functioning. This discussion tackles the issue of public policy responses and their revealed consequences in compliance with the recommended recipe for action. Finally, the paper concludes with some lessons on the relevance of reasoning on the basis of 'market' representations.

'Market' functioning (I): the net social benefit of market transactions

In dealing with evolutions—economic or natural—which have harmful effects on people, policy-makers are confronted with the problem of a social cost. The case is strong: individual countries suffer "the tragedy of the commons"—they capture the benefits of behaving mischievously while the costs are inflicted on common goods like environment or tranquillity.

For Coase, the methodological choice as to this economic problem is reduced to two options. First, in the Pigovian tradition (*The Economics of Welfare* 1932), it would be desirable to restrain the activity of and extract a monetary equivalent from the polluter varying with the amount of the damaged caused; or, second, the question is to weigh up the gains that would accrue from eliminating the harmful effects against the gains that accrue from allowing them to continue and choose the appropriate social arrangement—i.e. the alternative with the lowest opportunity cost—for dealing with the harmful effects. In deciding for the right method to pursue, it is more realistic, Coase argues, to assume that the operations of a pricing system do not function smoothly, costless, but implies costs, *transaction costs*; so, instead of compensating those who suffer damage and thus obliterating those costs, the policy response should consider the total social product under different market arrangements and attempt to maximize its net value, that is the difference between the value of what is obtained and the value of what is sacrificed to obtain it.

This way of thinking probably was never so publicly manifest and outspokenly ambitious than in the so-called Copenhagen Consensus process (CC) under the aegis of the Environmental Assessment Institute (Denmark). The process, which achieved its first round in 2004 and is due to resume in May 2008, banks on the judgment of "some of the smartest economists in the world" to provide "the first explicit global priority list ever" with regard to a wide set of global concerns identified by the United Nations. The economists were put a single question—"If the world would come together and be willing to spend, say, \$50 billion extra over the next five years on improving the state of the world, which projects would yield the greatest net benefits?"—and asked to provide an assessment of the costs and benefits of solutions to problems such as malnutrition (underweight), HIV/AIDS, indoor and outdoor air

pollution, or lack of clean drinking water. Although climate change was also considered one of the world's great challenges, it came at the bottom of the ranking, well below priorities like control of HIV/AIDS, providing micro nutrients, trade liberalisation, or control of malaria which met the consensus as the most promising opportunities "for each dollar spent".

"Smart" though this result may seem, other CBA applications on the economics of climate change, while not necessarily challenging its calculus, radically differ as to the degree of urgency and, hence, to the message policy-makers should take heed of. The *Stern Review* (Stern 2006) is such an authoritative text that commends attention because of its author's credentials—a distinguished academic, its political support—the British Prime Minister endorsed its conclusions, and the respectful consideration for "having put the economics squarely back into the climate debate." (Lomborg 2007)

The evidence gathered by the *Stern Review* leads to a simple conclusion: the benefits of strong and early action far outweigh the economic costs of not acting. Several economists express doubts as to the realism of its calculations. For example, Dasgupta (2006) reckons that if one followed the model's assumptions the rate of investment should reach 97.5 percent of what we produce today to increase the standard of living of future generations. Such a hypothetical scenario would be "patently absurd" under the current conditions of an aggregate savings ratio in the UK of about 15% of GDP. Its unconvincing mathematics would not be however the most serious problem although it might be nevertheless explained by this kind of models' resort to "a variety of computer models of economic activity that have been developed for other purposes and adapted to climate policy analysis." (CBO, 53) It is the problems it eschews that trouble an observer trying to make sense of its practical relevance. An indifferent order of those problems refers to (1) the seemingly impossible task of taking stock of all pertinent social costs and benefits of *local* or *global* concern; (2) the neglect of social processes, which by their nature are less amenable to quantitative analysis; and (3) manipulation of scientific data which consist for the most part of crude if not unproven estimates. A concise discussion pertaining thereof is provided in the remainder of this section.

(1) Does the valuation of the social product accurately express a society's needs?

Although the methodological approach is devoid of any ethical prerequisites as shown, the problem *per se* may be completely constructed on ethical scaffolding. This is in fact the case with the *Stern Review* that attracts the most thoughtful criticism (e.g. Nordhaus 2006; Dasgupta 2006) on two 'ethical' parameters—*delta* and *eta*—which it uses as measures of intergenerational tradeoffs between the well-beings of future and present generations (discounted with *delta*), as well as between the well-beings of rich and poor people (discounted with *eta*). The *Review* makes two crucial assumptions. First, it assigns *delta* a value equal to 0.1% per year to discount future utility or welfare; a near-zero discount rate means that future generations are treated equally with present generations, while a positive rate would have been relevant, the *Review* posits, "only to account for the exogenous possibility of extinction" (Stern 2006, 52). Second, it assigns *eta* a value of one that implies a dollar consumption is worth ten times more to someone ten times poorer (a value of 2 implied a dollar consumption is worth one hundred times more).

On these premises, the *Review* reached the conclusion that the benefit (avoided cost of global warming) is 20% (cut in the world consumption) at a cost (annual expenditure) of just about 1% of global GDP. The society's needs are strait-jacketed in the *Review's* numerical assumptions in a way several reviewers claim to be biased and incomplete so that, on the

whole—and ignoring other baffling issues such as uncertainty, demographics or technological change—what is unearthed values much less that what is obscured.

The analysis becomes biased because it has to make some fundamental choices, about the most reliable predictions as regards global warming, and about the value of the two discounting parameters. In both cases, "we have little intuitive feel for the numerical weights that should be placed on normative parameters" and the "huge computer runs" do not help either, "because it is usually not possible to track what's influencing what in a sharp way." (Dasgupta 2006) If one agrees with this judgment, it matters little here on whose side lies the truth in this debate; that depends much on the advancement of the scientific dialogue on climate change. The fact is that the choice of parameters is highly subjective and the *Review* just happens to have made such one that it renders more worrying conclusions than parallel but not all reviews would warrant. The *Review* supports a view in which the damages from climate change (the benefits of action) are vastly overemphasized by recourse to sympathetic references it makes to the existing literature (Nordhaus 2006; Lomborg 2007). On the other hand, the simple logic of discounting shows that giving preference to low rates magnifies distant harmful effects and causation so becomes circular. At the same time, the *unitary* value of *eta* or any other magnitude as those proposed by its critiques (Dasgupta 2006) conspicuously defy the rich scholarship on the theory of justice the more so its core implication favours large costs now to address very little in the future. Seemingly, the only hope is that, "because of improvements in computers and software", it will possible some day to "easily calibrate alternative utility functions." (Nordhaus 2006) The confidence in the quantitative appraisals of the social context remains immortal.

The analysis is also prejudicially incomplete because it ignores some other needs and challenges, probably more urgent, which the society confronts. The CC is a case in point as it confidently shows that climate change comes last on any prioritized list because the existing disbursements can save and help more people, quicker and at a lesser cost. Another suggestive counter-argument, and presumably not the last one, is raised by Lomborg (2007) who turns upside-down the whole CBA arithmetic by providing evidence that global warming in fact would reduce cold-related deaths to the tune that "for the US, the net lower death count from global warming in 2050 is estimated at 174,000 per year."

(2) Does the valuation of the social product accurately include a society's cultural imprints?

An inherent weakness of any quantitative assessment however sophisticated is that it eludes historically established habits. These imprints have the capacity to snowball to the scale of a social tipping point that renders an indeterminate part of economic predictions futile.

The evaluations of costs and benefits seem fundamentally affected by societal factors rather than climate policies, at least for some geographical areas, if one follows the plausible scenario presented by Lomborg (2007). In essence, he asserts that "if climate stays the same – no more warming – but more people build more and more expensive buildings closer to the sea, as they have done in the past, we will see an almost 500% increase in hurricane damages ... in 50 years time. If society stays the same – no more people living close to the coast, no more costly and densely built neighbourhoods – and climate warms causing somewhat stronger hurricanes, the total effect will be less than a 10% increase in hurricane damages ... in 50 years time." Even if his final message does not invite to inactivity but to moderate action plans to curb GHGs emissions, data of that sort justify a cautious approach to draw

conclusions from iterative modelling processes alone even if it is about the impact of *natural* phenomena on humankind.

(3) *Does the valuation of the social product accurately prefigure a society's natural environment's evolution?*

The problem of valuation is further compounded when uncertainty dents into the supposedly *exact* character of the natural science. The most reliable assessments about the climatic pattern advance one unambiguous finding—"global warming is real and man-made"—beyond which the margins of error seem to become ever wider. An up-to-date stocktaking of the climatologists' research reveals counterintuitive mechanisms: as temperatures warm, they set off feedback effects that may increase or decrease warming. Predictions may become less, rather more certain and engender "plenty of scope for argument about whether it is worth trying to do anything about climate change" (The Economist 2007c) the more so "scientists ... are uncertain about how much of the observed warming is due to greenhouse gas emissions." (CBO 2003, 11)

It is this ambiguity that makes some noted analysts (e.g. Lomborg 2007; Varian 2006; Nordhaus 2006) think that the solution comes only in piecemeal fashion, through continuing exploration of feasible opportunities and fair consideration of present capabilities.

'Market' functioning (II): adjustment to equilibrium through arbitrage

The climate change issue illustrates the textbook prescription intended for *missing markets*: the external effect (i.e. GHG emissions) associated with a transaction—a "bad" or a "good" whose costs and benefits an organization does not voluntarily internalize—justifies *a visible hand*, that is policy interventions, in order to set up competitive markets able to guide the resource allocation using prices for coordination and motivation of the participants. Based on that rationale, the governmental authority ought to intervene to make markets gradually level at margin the social cost of pollution abatement and the marginal social damage from pollution toward an optimal amount of pollution.

The previous discussion on cost-benefit comparison suggests that economists do produce estimates of the *optimal* level towards which the market equilibrium settles even if the staunchest adherent to the 'market' mindset admitted that the value of social damage is set at a figure "determined in a rather arbitrary hunch manner" (Meade 1973, 60). However, the knowledge of the monetized costs is a precondition for devising policy interventions to correct environmental damage through market mechanisms. The basic choice—though not necessarily dichotomized—is between a quantitative regulation which would let the market adjust to the corresponding equilibrium price and a price-based instrument which would let the participants choose the *optimal* level of emissions. Despite undecided arguments about the desirability of either approach (Goulder and Pizer 2006), authoritative initiatives related to the risk of global climate change such as the United Nations' Kyoto protocol or the American Economic Association's Statement (DeCanio 1997) do not discriminate between them and advocate both revenue-raising (e.g. carbon taxes, auctioned tradable allowance systems) and quantity-based (e.g. emissions quotas, freely distributed tradable emissions allowances) instruments in the belief that these provide financial incentives for people to find the cheapest way to reduce or eliminate emissions.

The functioning of those instruments is conditional on the work of arbitrageurs like governmental institutions and private actors (e.g. investment banks or *climate* exchanges) to instil the market the alleged virtue of curbing emissions to a socially tolerable level. Again, cautionary acknowledgment that the sequential runs of arbitrage "police price consistency in a marketplace out of nothing more than venal self-interest" (Mirowski 2004, 174) do not preclude from policy recommendations on embracing the 'market' design as the most efficient, rational way to control emissions. A discussion on the European Emissions Trading Scheme (ETS), acclaimed as "the only international arrangement in the world" that uses markets to reduce emissions (The Economist 2006a), is chosen to help elucidate the practical meaning of the 'market' metaphor in this particular context.

The ETS is the European Union (EU)'s policy instrument designed for a twofold purpose: to discourage the production of greenhouse gases and to encourage investment in cleaner forms of energy ("Directive" 2003). It contains provisions that contain the level of pollution for four categories of activities by giving them mostly free tradable allowances—permits to pollute—covering their existing emissions and the right to buy permission to exceed those levels, either by purchasing allowances from other firms, or by buying permits from developing-country companies. Under the Kyoto protocol, rich-country companies can also earn certified emission reductions (CERS) by cleaning up emissions in developing countries.

Under the scheme, the EU acts as a regulator in deciding the way to mitigate pollution and setting the goals to be met as average across the club as a whole—to some officials, "like communist central planning"—but rests on its member governments to implement the "cap-and-trade" mechanism according to their assessments about the levels of emissions. As most of the permits—at a rate of 97% (2005-08), then reduced to 90% (2008-12)—is to be allocated free of charge, the design allows the polluting firms to capitalize on this environmental asset in several ways. Here it is a concise list of arguments based on evidence gathered by The Economist (2005, 2006, and 2007).

The self-regulatory mechanism of supply and demand seems to have worked indeed but in reaction to specific circumstances. The initial estimates about emissions "were not much more than guesswork" and eventually entitled the market participants with disguised rights to pollute. Some companies were happy to pocket the windfall by selling their permits, others felt free to pass the extra cost of production to their consumers. Companies in some countries (Germany, France and Poland) were granted permits in excess of their actual level and so were encouraged not only to think less about the social damage, but also to sell them to companies from other countries (Britain, Ireland, and Spain) where the grants were less generous.

It was only by mid-2006 that it turned out that most allocations were larger than actual emissions. By that time, the price of carbon allowances had touched approx. €30 per ton from just about €10 at the beginning, while CERS were changing hands for €7 or €8 in "relatively opaque" trades. The arbitrage between low-priced permits from developing countries—determined under the Kyoto protocol provisions— and the surging EU market endowed polluters with financial gains from environmental damage. A report by IPA Energy Consulting reckons that Britain's power companies alone have profited to the tune of around \$1.5 billion a year. The Economist concludes that, "what should have been an exercise in setting rules for a new market became a matter of horse-trading about pollution limits, with powerful companies lobbying for the largest possible allowances."

Had the permits been allocated with a price-tag attached, the implementation wouldn't have been more facilitated. The optimization models leave considerable margin about the CBA estimates from reduced climate change. For a 10 percent reduction in 2010, one recent study (Goulder and Pizer 2006) mentions cost estimates of between \$10 and \$212 per ton of carbon. To distribute auctioned-allowances instead, the premises do not look good either. For a large number of firms, the trades are out of reach because the allocation registries have not yet been set up, or because the capital market is not yet prepared to deliver credit ratings and credit lines to the small ones.

An additional instrument—voluntary-offsetting of carbon emissions—has been promoted to the same goal of transferring decisions in the marketplace. Originally, the concept was developed under the name of "the sale of indulgences" by the Catholic Church in the early 16th century, whereby people could purchase forgiveness of past sins by handing over enough money. In its modern incarnation, it allows a polluter to offset its own emissions by paying someone else not to emit that amount of carbon on its behalf. In a typical transaction, a "sinner" will buy/pay the right to pollute—like a person boarding on a plane or a company wishing to expand its industrial activity—from an intermediary selling emissions offsets. The trade-off itself is based on the promise to make the carbon dioxide disappear elsewhere, by planting trees or cutting other people's emissions. With the price of voluntary offsets ranging from €2 to €30 per ton of carbon dioxide, the market is by any standard flourishing, with an annual growth rate of 60% according to The Carbon Trust, a British government-funded organisation.

The rationale behind offsetting is that a transaction takes place only to the extent that the arbitrageur can find and sell somebody else's initiative to pollute less. So much esteemed becomes his/her entrepreneurial spirit, that this market is credited with the benefit of curbing emissions "more cheaply, and often more imaginatively." If a scientific implication justifies *imaginative* solutions, why should anyone rest on the virtues of a social optimum in the first place? However, getting out of impasse may not depend only on the entrepreneur's *bona fide*, but again is crucially contingent on the use of different methods to create offsets. Industry groups draw up as many voluntary standards when no reliable benchmark exists. For example, afforestation is particularly embraced as an inexpensive response to climate change—three-quarters of firms selling voluntary offsets base them on forestry—but its effectiveness remains unclear because trees both absorb CO₂, after being planted, and release it back into the atmosphere, after being cut down.

To sum up, the functioning of the scheme has made possible a preliminary view on the theoretical hypothesis associated with the emergence of a market construct. On the whole, it might be said that the two major assumptions—i.e. the possibility of accurate cost measurements and the working of socially-conscious arbitrageurs—upheld for a fine-tuned theoretical perspective raised valid impediments in practice. The transactions under the EU scheme facilitated a transfer of resources in favour of circumstantial interests instead of disciplining the market towards the common good. It must be however noted that ETS should be evaluated as such separately from its role in providing material for testing the 'market' metaphor. That was probably the rationale behind the EU's decision to envisage also "other types of Community, domestic and international action" to be taken into account in its strategy for climate change mitigation, "notwithstanding the multifaceted potential of market based mechanisms" ("Directive" 2003).

Concluding notes

Unless it were for externalities that induce sub-optimal transactions, the standard discussions on *existing* markets would have made the case for the controversial use of the 'market' metaphor less visible. Creating instead a marketplace when it is missing provides an excellent occasion to expose the vulnerabilities of that theoretical construct. The 'market' mindset operates on assumptions which usually receive scant attention in any theorizing endeavour but prove to be of crucial importance in the social context. This discussion has emphasized a multifarious market profile of transactions with environmental goods such as climate stability and showed that analytical concerns are systematically eluded by reference to ethical responsibility in such contextual matters as the capability to measure in any meaningful way the social cost/benefit or the possibility that personal forces of the marketplace inherently deviate from the technically-designed market-clearing mechanism.

Economics as an orderly thinking about the self-regulatory mechanism of market relations appears as a theoretical construct of unfounded belief in the blessing of the arbitrageur's *profit-seeking behaviour*. The belief that the workings of a market mechanism should be a faithful representation of economic evolutions is hardly ever better exposed than in the words of Daniel McFadden, the American Economic Association president: "the consumer may need to be coaxed and wheedled into responding to market choices with sufficient diligence." (quoted by *The Economist*)

It may be reasonably supposed that the moral ground of human decisions should find itself a place in the study of economics. In their search for being responsible, "green", people should take care for the environment, but not as a result of cold calculations about the welfare of future generations, but for its intrinsic values, like repugnance of waste and consumerism for example.

Market-clearing may lead to efficiency—in spite of all the underlying precarious assumptions—of a very particular market, as it allegedly does for innumerable other markets. Although "efficiency" seems a rational, natural benchmark of human activity, it should be noted that in socio-economic environments—that is in contexts devoid of deterministic behaviour—an "efficient mechanism" is not necessarily the best alternative from a social standpoint. The concentration of polluting emissions has risen by more than one-third since the start of the industrial revolution whereas humankind has made headway at least to the point it is able to manage better its environmental concerns. Equally, it is hard to assume that the emissions would be eliminated anyway in the absence of a market design. The point is that looking for *the most* (efficient, rational etc.) *thing* is rather misleading. The logic suggested by this material is that economic reality is essentially made up of social customs and values which conveniently disrupt or inflate historically shaped behaviors and attitudes.

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