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A Journal of Solidarity and Sustainability

Vol. 8, No. 8, August 2012
Luis T. Gutiérrez, Editor

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Complex and Man-made Markets:
Are We Currently Approaching Sustainability in a Backward and More Chaotic Way in Terms of Economic Thinking?

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Submitted 3 April 2012 - Revised 6 July 2012 - Accepted 15 July 2012

In reality, economic systems are not externality neutral, and original economic models should have reflected this reality, but that was not the case. From the beginning, economic models assumed total externality neutrality, which was done without much concern about the social and environmental consequences that could come along in case those assumptions were inappropriate. First, it was assumed that social and environmental externalities were not relevant or were minimal(the traditional economic model), and now we know it was totally wrong to assume so.

Then, recently there have been environmental adjustments made to economic systems(the eco-economic model) while assuming social externality neutrality or minimality, but we know today that social sustainability matters; and therefore, there cannot be true sustainability if eco-economic models are not adjusted and made socially friendly.

It is highlighted in this paper a) that assuming externality neutrality is leading us to a backward and more chaotic path towards sustainability in terms of economic thinking; b) that if we had incorporated the existence of externals concerns in economic modeling from the beginning to reflect the true nature of complex markets that would have led to a forward looking, technology driven, smooth path towards sustainability; and c) that a current sustainability price framework can be used as a blue print to see how externality issues can be internalized to correct current market flaws.

Introduction

Models, including economic models, are representations of reality. Complex models can be seen as fully expressed models of reality. Simpler models can be seen as partially indicated views of reality. In this paper, a fully stated model of reality will be called a complex market and any simplification of it will be called a man-made market. Below is a general overview of the nature of these two types of markets.

a) Complex markets

In reality, complexity is at the heart of markets. And when fully including this complexity in our economic models, we generate complex markets. These markets can be considered the original sustainability markets, markets where all economic, social, and environmental factors are accounted for. In other words, original sustainability markets are complex markets where there is no externality neutrality as all factors are actively acting in a conjunctural fashion. And to induce proper behavior, prices in original sustainability markets are cleared by right market prices, prices that reflect all the economic, social, and environmental costs of production.

In other words, right market prices are expected to encourage more friendly social and environmental behavior. For example, when internalizing environmental costs a) tools to promote responsible environmental behavior are created(Panayotou 1994); b) better predictions in terms of sustainable development and growth reflecting the role of water in local and global markets can be made(UNESCO 2012); and c) indicators such as GNP are transformed into green GNP to make them more realistic policy tools(Hamilton and Lutz 1996). Just recently, a formal call was made to address head on the social and environmental issues known to be associated with development programs(GHDF 2012) to make even current views on human development reflect sustainability boundaries(UNCSD 2012a; UNCSD 2012b).

Full pricing plus economic, social, and environmental inefficiencies and knowledge gaps in the past would have made original sustainability markets to be cleared by high right market prices to reflect higher production costs. Notice that since all externalities are accounted for in the pricing mechanism of original sustainability markets, then any changes in prices, production, and consumption that would have taken place due to technological innovations and efficiency gains would have been optimal changes. When there are no externalities, market outcomes are optimal. And under these conditions there is little to no rationale or justification for government intervention (Labonte 2010).

b) Man-made markets

When complexity is assumed away we create simpler models so simplification is at the heart of man-made markets. Depending of what components are assumed away, we can have different types of man-made markets.

i) <u>Man-made markets I</u>

It can be said the pure economic market or traditional economic market is the first man-made market, which came to exist when assuming social and environmental externality neutrality; and creating so an optimality gap. Because of this gap, social and environmental externalities are not reflected in the traditional market price, making it lower that the right market price clearing original sustainability markets; and therefore, inducing more production and consumption. It has recently been indicated that because of these externality assumptions market prices may have always been distorted(Muñoz 2010a). And the race to produce at the lowest price leads to over production, over consumption, market flooding, pollution, and waste. The economic market is cleared by the traditional market price.

Today, we know it was wrong to assume full externality neutral markets as the social and environmental issues associated with the working of the pure economic market do matter(WCED 1987). For example, environmental externalities create deep ecological problems or inequalities that needs to be addressed with efficient environmental management tools(Panayotou 1994); that justify

a growth model that eliminates poverty and inequity(Cosbey 2009 P. 6); and which can be promoted as one that is low in ecological impacts(USDS 2010;CPI 2012; USAID 2012).

ii) Man-made markets II

It can be said that the green economy market or the eco-economic market is the second man-made market, which came to exist when accepting that assuming environmental externality neutrality was wrong and making environmental issues endogenous issues within economic thinking. Today, the concept of green growth is being championed as traditional development without environmental externalities(OECD 2011 P. 28). Now environmental externalities are accounted for by adjusting the traditional market price to reflect green margins leading to a green market price. The structure and implications of green markets resulting from correcting traditional general markets and traditional agricultural markets to reflect environmental issues was recently highlighted(Muñoz 2010b).

Since the green market price is higher than the traditional market price, we should expect less production and less consumption within the green economy than within the traditional market economy. But notice that since green prices are still lower than the right market price in original sustainability markets, we will expect to see more production and more consumption within the green economy than within original sustainability markets. Hence, the eco-economic market is cleared by the green price. See that the view of having the green economy as a driver of sustainable development is one of the current views agreed as Rio +20(UNCSD 2012a).

c) Current sustainability markets

Today, we know it is wrong to assume partial externality neutral markets as social issues associated with the working of the eco-economic market or green market do matter and need to be addressed. Ideas on how to redirect eco-economic thinking towards sustainability have been stressed before(Muñoz 2003). When correcting eco-economic markets to reflect social externalities, we create current sustainability markets, markets with conditions approaching those found in original sustainability markets, but with lower prices due to recent technological innovations and efficiency gains. The structure and implications of sustainability markets resulting from correcting green general and green agricultural markets to reflect social concerns was recently pointed out(Muñoz 2011). And recently, even making human development models consistent with sustainability and equity rules is getting momentum(UNDP 2011; UNCSD 2012b).

d) Forward and backward sustainability paths

Not much is written about alternative theoretical paths towards sustainability and their smoothness and about how externalities can be incorporated to approach sustainability. The discussion above makes the following questions relevant: Are we approaching sustainability backwards in terms of economic thinking? Is this path more chaotic in environmental and social sustainability terms? How a forward looking path towards sustainability would look like?; and Is this path smoother in social and environmental sustainability terms? How externalities can be internalized in sustainability pricing?. This paper aims at providing answers to these questions.

Goals of this paper

- To show that we are currently approaching sustainability backwards in terms of economic thinking, which makes the process chaotic;

- To point out that if we had not made externality neutrality assumptions when first stating our economic models we could have approached sustainability through a forward looking, technologically driven smooth process; and
- To introduce a current sustainability pricing mechanism that can be used to show how externality issues can be internalized.

Methodology

First, the terminology used in this paper and some operational concepts are listed. Second, the structure of the original sustainability market and its analytical and graphical implications are highlighted. Third, the structure of the traditional economic model and its analytical and graphical implications are introduced. Fourth, the structure of the eco-economic model and its analytical and graphical implications are listed.

Fifth, the structure of the current sustainability market and its analytical and graphical implications are described. Sixth, the structures above are used to point out that currently we are approaching sustainability backwards in terms of economic thinking as we are in a process of correcting step by step previously stated externality assumptions now known to be inappropriate. Seventh, the structures above are used to show that there could have been a forward looking and smooth path to sustainability if we had not assumed complexity away when we first stated our economic models. Eight, a current sustainability pricing framework is presented to show how externality issues can be internalized. And finally, some specific and general conclusions are provided.

Terminology

The terminology used in this paper is listed below:

OSM = Original sustainability market	**RMP** = Right market price
P = pure market price	**FMP** = Full market
TEM = Traditional economic model	**D** = Demand
TMP = Traditional market price	**TM** = Traditional market
FDMP = Fully distorted market price	**GM** = Green margin
EEM = Eco-economic model	**SM** = Social margin
PDMP = Partially distorted market price	**GP** = Green price
PCMP = Partially corrected market price	**Si** = Supply "i"
ESG = Environmental sustainability gap	**Qi** = Quantity "i"
SSG = Social sustainability gap	**CSM** = Current sustainability market

FCMP = Fully corrected market price	**DMP** = Distorted market price
CMP = Corrected market price	**SG** = Sustainability gap
FSG = Full sustainability gap	**PSG** = Partial sustainability gap
OP = Optimality path	**CSP** = Current sustaimability price

Operational concepts

i) Social margin(SM): to cover the extra cost of making business socially friendly

ii) Green margin(GM): to cover the extra cost of making the business environmentally friendly.

iii) Right market price(RMP): the market price that also reflect all externality margins. It is a full market price(FMP).

iv) Distorted market price(DMP): the market price that does not includes some or all externality margins. It can be a fully distorted market price(FDMP) if it leaves out all externality margins(e.g. full externality assumption) or it can be a partially distorted market price(PDMP) if it leaves out at least one margin(e.g. Partial externality neutrality assumption).

v) Traditional market price(P), general market economic only price. It is a fully distorted market price(FDMP).

vi) Green price(GP), the price that reflects both the economic and the environmental cost of production. It is a partially distorted market price(PDMP).

vii) Corrected market price(CMP): the market price that aims at being socially and/or environmentally friendly. It can be fully corrected market price(FCMP) if it adds all missing margins at the same time(e.g. full correction) or it could be partially corrected market price(PCMP) if it leaves out at least one of the missing margin(e.g. partial correction).

viii) Current sustainability market price(CSP), the price that reflects the economic, social, and the environmental cost of production. It is a fully corrected market price(FCMP).

ix) Sustainability gap(SG): the externality resulting from leaving all or some externality margins outside the pricing mechanism. It can be a full sustainability gap(FSG) if no externalities are reflected in the pricing(e.g. Socio-environmental sustainability gap in the pure economic model) or it can be a partial sustainability gap(PSG) when at least one margin is not included in the pricing(e.g. social sustainability gap in the eco-economic model).

The original sustainability market(OSM)

As mentioned in the introduction, original sustainability markets(OSM) should reflect all externalities at work within their environment and they are ruled by the right market price(RMP), which has the

following analytical and graphical implications

i) The right market price(RMP): Analytically

When we add green margins(GM) and social margins(SM) to the traditional market price(P) we have the right market price(RMP) as shown below:

1) RMP = P + GM + SM

Hence, the right market price(RMP) is the price that reflects all costs associated with production, economic, environmental, and social. In other words, the right market price(RMP) is a full market price(FMP).

ii) The right market price(RMP): Graphically

Figure 1 below shows the right market price(RMP) is the price that clears the original sustainability market(OSM) at the point where supply(S0) meets demand(D) and where production is Q0.

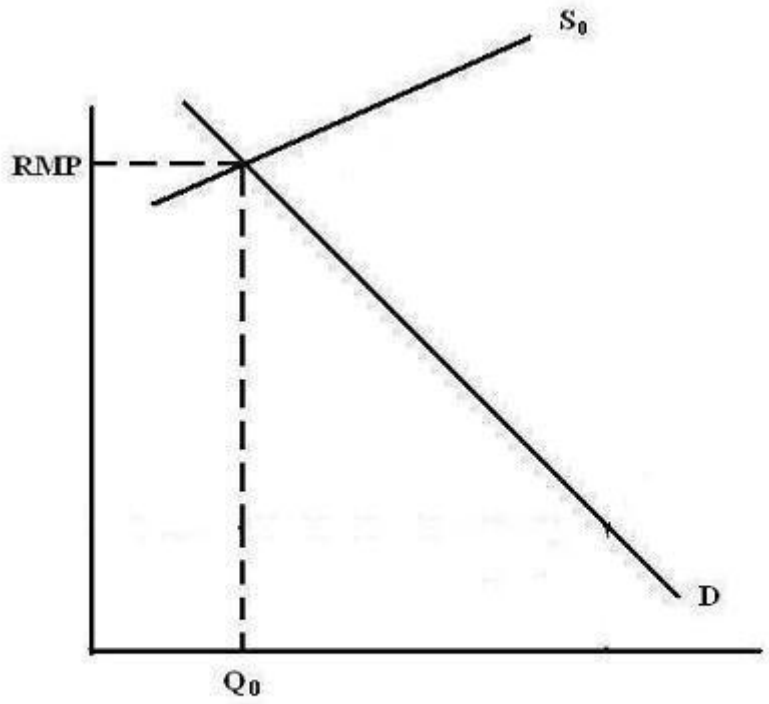

Figure 1 The original sustainability market(OSM) is ruled by the right market price(RMP). Consumption and production at Q_0 is optimal.

We can see in Figure 1 above that if there are technological innovations, the original sustainability market supply S0 is expected to shift downwards as right markets prices(RMP) would then decline

increasing production and consumption to levels to the right of Q0. Note that right market prices(RMP) in original sustainability markets(OSM) would be have been high due to full pricing and the inefficiencies and knowledge gaps existing in the past. And notice too that Q0 in Figure 1 is an optimal level of production and consumption as there are no externality neutrality assumptions in the original sustainability market(OSM).

iii) In summary:

In original sustainability markets(OSM), there is no externality neutrality as all costs of production are reflected in the right market price(RMP); and therefore, at the right market price(RMP) production and consumption and shifts in production and consumption are optimal.

The traditional economic model(TEM)

As indicated in the introduction, it can be said that the first simplification of market complexity and the most extreme one as it assumed total externality neutrality led to the traditional economic model(TEM). And this market is ruled by the traditional market price(TMP), which has the following analytical and graphical implications:

i) The pure market price(TMP): Analytically

The traditional market price(TMP) is the pure or bear market price(p) as there are no externalities(GM = SM = 0) in the traditional economic model(TEM) as stated below:

2) TMP = P

Hence, the traditional market price(TMP) is the price that reflects only the economic costs associated with production. In other words, the traditional market price(TMP) is a fully distorted market price(FDMP) as it does not reflect all externality margins.

ii) The pure market price(TMP): Graphically

Figure 2 below lets us see that the traditional market price(TMP) clears the traditional market(TM) at the point where supply S3 meets demand(D) and production is Q3.

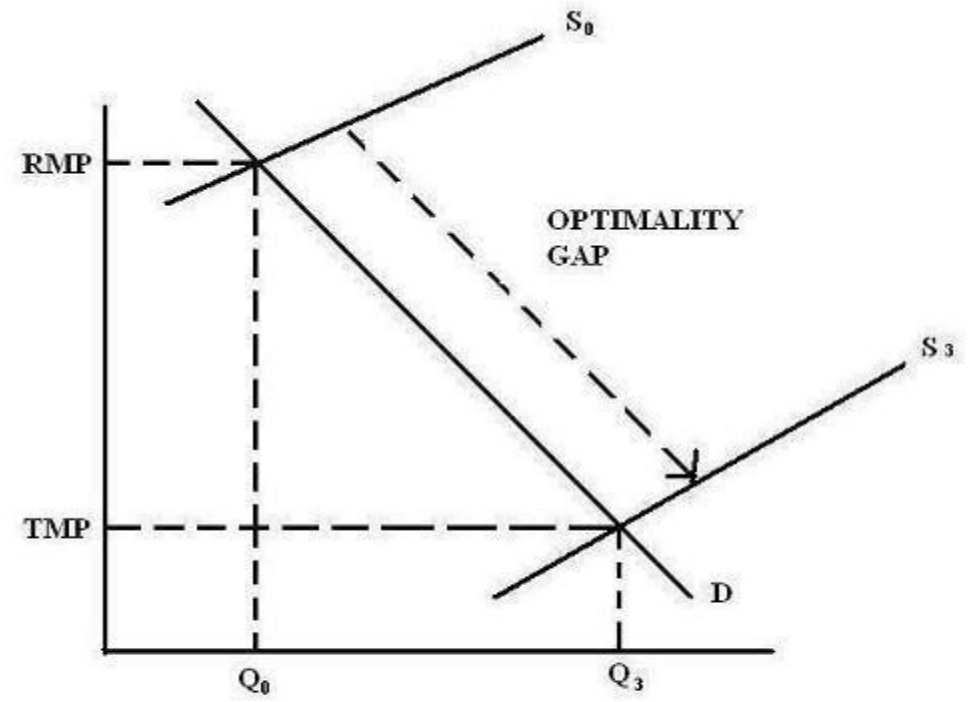

Figure 2 The traditional market(TM) is ruled by the traditional market price(TMP). When social and environmental externality neutrality is assumed an optimality gap is created.

Figure 2 above also shows that there is an optimality gap made up of social and environmental externalities and innovation gaps between original sustainability market supply S0 and traditional market supply S3. This externality gap is associated with the traditional market price(TMP) as a consequence of its assumption of total externality neutrality. As the TMP < RMP, Figure 2 also indicates there is far more production and consumption in the traditional market(TM) than in the original sustainability market(OSM). For this reason, Q3 > Q0.

See that as technological innovations and efficiency gains takes place, the traditional supply S3 will shift downwards in Figure 2 making the traditional price(TMP) lower and lower and pushing production and consumption to the right of Q3 and towards over production and over consumption; and as this happens the optimality gap expands. Notice that Q3 is not an optimal level of production and consumption as it takes place in the shadow of the optimality gap as shown in Figure 2.

iii) In summary:

The lower the traditional market price(TMP), the more production and consumption should be expected to take place as compared to that within the original sustainability market(OSM); and the race to produce at the lowest price within the traditional market(TM) should be expected to lead to social and environmental local and global races to the bottom, to over production, over consumption and therefore, to market flooding, pollution, and waste.

The eco-economic model(EEM)

As indicated in the introduction, it can be said that the first correction back towards market complexity is the adjustment of the traditional economic model(TEM) to reflect environmental concerns and creating this way the eco-economic market(EEM) or green market. And this market is ruled by the green price(GP), which has the following analytical and graphical implications:

i) The green market price(GP): Analytically

When we correct the traditional market price(TMP) to reflect environmental concerns by adding a green margin(GM) we get the green price(GP) as indicated below:

3) GP = TMP + GM = P + GM

Hence, the green price(GP) is the price that reflects only the eco-economic costs associated with production. In other words, the green market price(GP) is a partially distorted market price(PDMP) because it does not reflect social externality margins(SM = 0) or a partially corrected market price(PCMP) because it only reflects environmental externality margins(GM > 0). See that if the green margin(GM) is too high, green production may not take place.

ii) The green market price(GP): Graphically

Figure 3 below shows that the green market price(GP) clears the eco-economic market(EEM) at the point where supply S2 meets demand(D) and production is Q2.

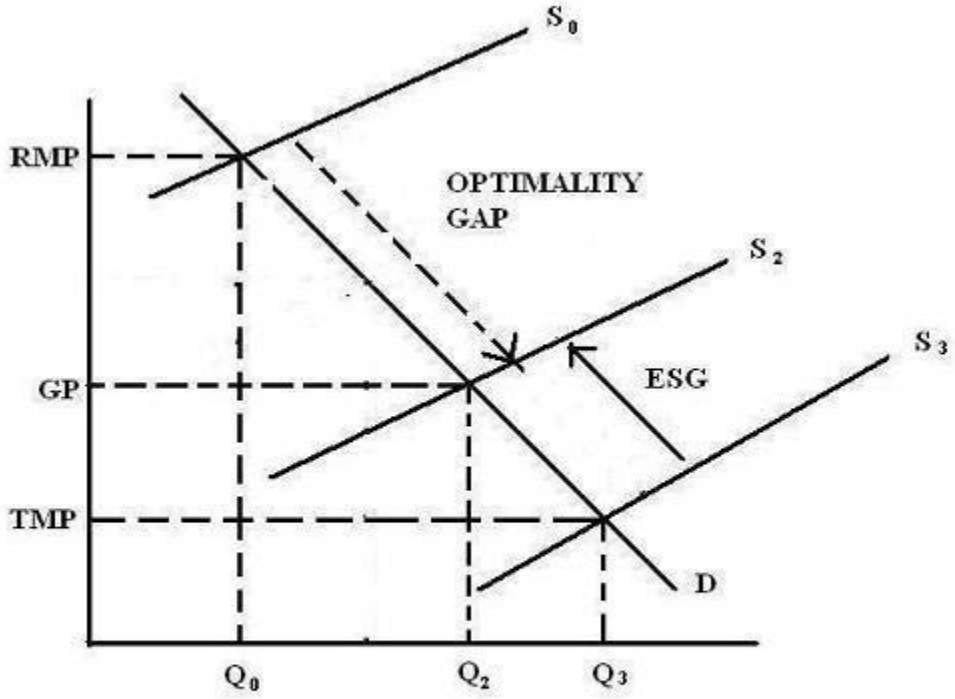

Figure 3 The eco-economic market(EEM) is ruled by the green price(GP). When the environmental sustainability gap(ESG) is closed, then the traditional market model(TEM) is transformed into the eco-economic model(EEM).

Figure 3 above also indicates that there is an optimality gap between original sustainability market supply S0 and the eco-economic supply S2, made up of social externalities and innovations gaps only as there is no environmental sustainability gap(ESG) in the eco-economic model(EEM). This optimality gap is associated with the green market price(GP) as a consequence of its assumption of social externality neutrality. As the TMP < GP < RMP, Figure 3 lets us see too that there is less production and consumption in the eco-economic market(EEM) than in the traditional market(TM), but far more production and consumption than in original sustainability markets(OSM). For this reason, Q3 > Q2 > Q0.

Moreover, we can see in Figure 3 that when we close the environmental sustainability gap(ESG), the traditional supply S3 shifts upwards to the green supply S2 determining the green price(GP). Finally Figure 3 above shows a) that the inclusion of the green margin(GM) to close the environmental sustainability gap(ESG) signals the end of business as usual in economic thinking; and b) that any eco-economic technical innovation or efficiency gain would lead to a shift of the green supply S2 downwards decreasing the green price(GP), increasing green production and consumption, and increasing the remaining optimality gap. Notice that Q2 is not an optimal level of production and consumption as it takes place in the shadow of the optimality gap as shown in Figure 3.

iii) In summary:

A higher green price(GP) means less production and consumption in the eco-economic model(EEM) than in the traditional one(TEM), but still more production and consumption than in the original sustainability market(OSM).

The current sustainability market model(CSM)

It is accepted today that true sustainability is found in a development system where all externalities, including social externalities are accounted for. So when correcting the eco-economic model(EEM) to account for social externalities the current sustainability model(CSM) is created. The current sustainability market(CSM) is ruled by the current sustainability price(CSP), which has the following analytical and graphical implications:

i) The current sustainability price(CSP): Analytically

When we correct the green price(GP) to reflect social concerns by adding a social margin(SM) we get the current sustainability price(CSP) as stated below:

4) CSP = GP + SM

Hence, the current sustainability price(CSP) is the price that reflects all costs associated with production. In other words, the current sustainability price(CSP) is a fully corrected market price(FCMP) because there is no externality neutrality as all externality margins are now accounted for(GM >0 and SM > 0). See that if the social margin(SM) is too high, current sustainability market production may not take place.

See that the current sustainability market(CSM) in Formula 4 above has a similar structure than the original sustainability market(OSM) in formula 1, but the current sustainability market(CSM) came from correcting the traditional market price(TMP) twice to reflect both environmental margins(GM) and social margins(SM). In other words, the original sustainability market(OSM) was ruled by the right market price, a full market price(FMP); and the current sustainability market(CSM) is ruled by the current sustainability price(CSP), a fully corrected market price(FCMP) as it was pointed out before.

ii) The current sustainability price(CSP): Graphically

Figure 4 below shows that the current sustainability price(CSP) clears the current sustainability market(CSM) at the point where supply S1 meets demand(D) and production is Q1.

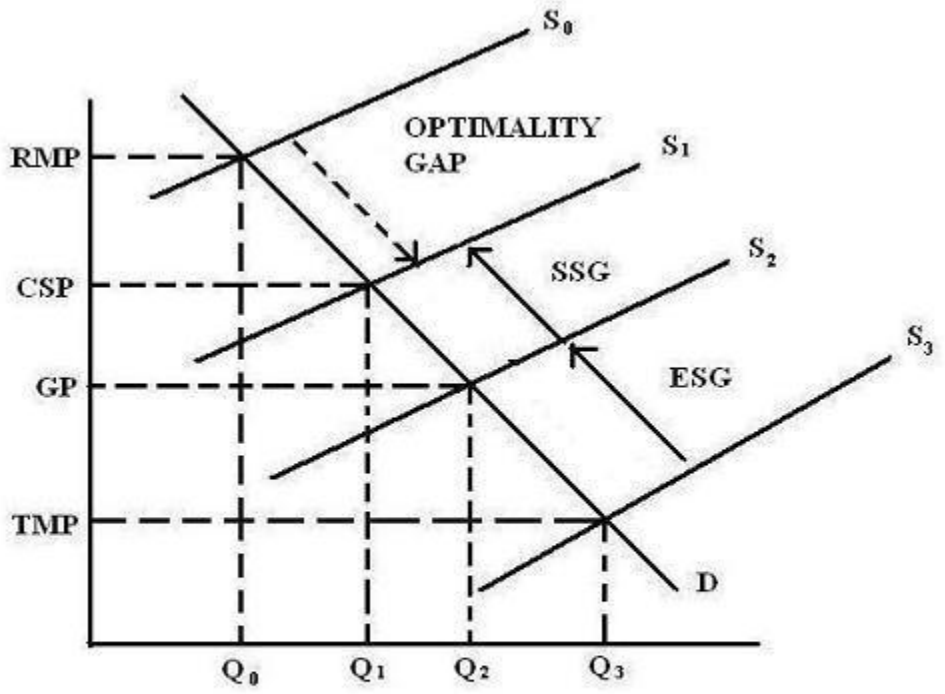

Figure 4 The current sustainability market(CSM) is ruled by the current sustainability price(CSP). When the social sustainability gap(SSG) is closed, the eco-economic model(EEM) is transformed into the current sustainabilty market model(CSM).

Figure 4 above also indicates the following about the current sustainability market(CSM): a) that there is an optimality gap between the original sustainability supply S0 and the current sustainability supply S1 made up by innovation gaps; b) that because of that innovation gap the right market price(RMP) is higher than the current sustainability price(CSP) and therefore, production and consumption levels are lower in the original sustainability market(Q0 < Q1); and c) that there are no longer social and environmental externality gaps as both the social sustainability gap(SSG) and the environmental sustainability gap(ESG) are now closed. Notice that Q0 and Q1 are both optimal levels of production and consumption that take place at two different optimal prices.

As the TMP < GP < CSP < RMP, Figure 4 above also tells us that there is less production and consumption in the current sustainability market(CSM) than in the green market(GM) and than in the traditional market(TM), but more than in the original sustainability market(OSM). For this reason, Q3 > Q2 > Q1 > Q0.

Moreover, we can see in Figure 4 that when we close the social sustainability gap(SSG), the eco-economic supply S2 shifts upwards towards the current sustainability supply S1 determining the current sustainability price(CSP). And any current sustainability market technological innovation would lead to a shift of the current sustainability market supply S1 downwards leading to a lower current sustainability price(CSP); and therefore, to more optimal production and consumption to the right of Q1.

iii) In summary:

An even higher current sustainability price(CSP) means even less production and consumption in the current sustainability market(CSM) model than in the eco-economic model(EEM) and traditional market model(TEM), but still more than in the original sustainability market(OSM).

Different paths towards sustainability

The presentation above indicates that there are at least two ways of approaching sustainability in terms of economic thinking, one that is backwards and chaotic; and one that would have been forward looking and smooth. Below the implications of the nature and structure of these two different approaches are detailed:

a) Approaching sustainability backwards

It can be said that currently we are approaching sustainability backwards through a process of correcting step by step the externality assumptions central to the traditional economic model(TEM) as they turned out to be wrong, a situation that is reflected in Figure 5 below:

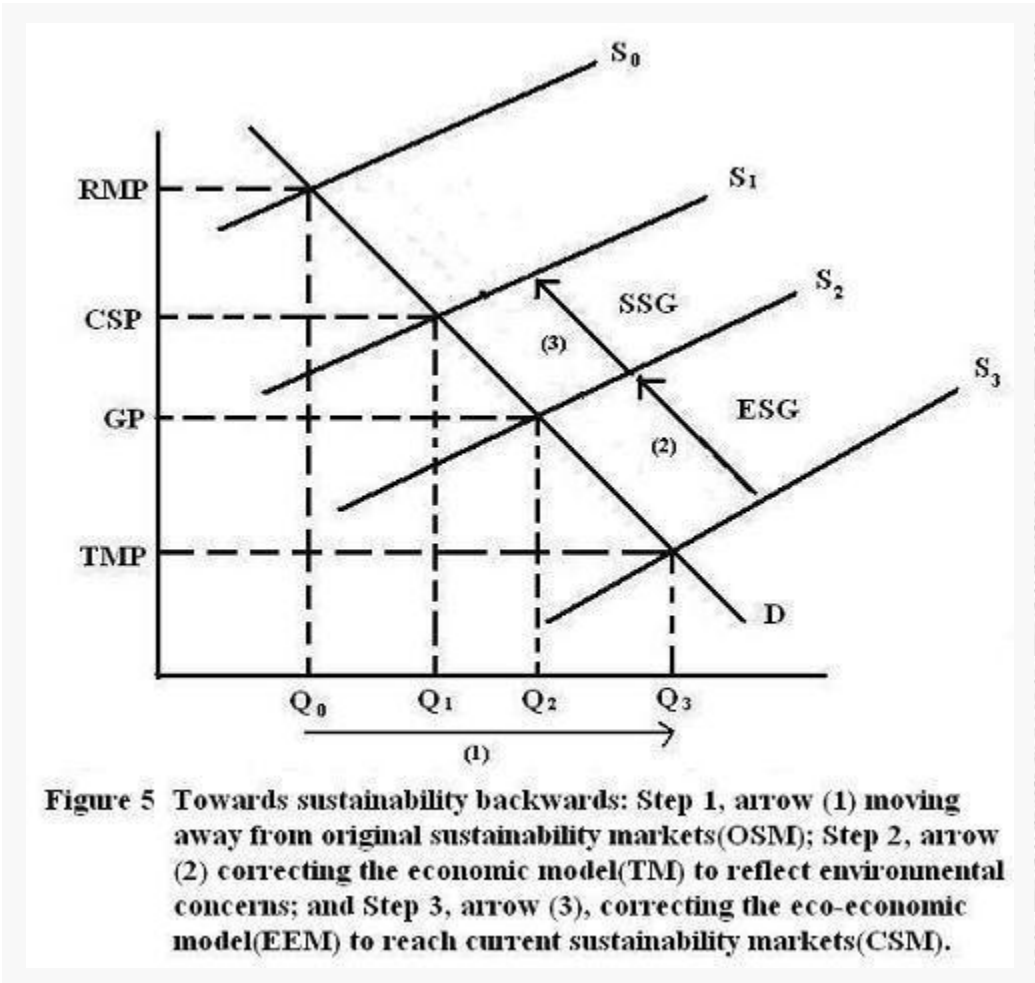

Figure 5 Towards sustainability backwards: Step 1, arrow (1) moving away from original sustainability markets(OSM); Step 2, arrow (2) correcting the economic model(TM) to reflect environmental concerns; and Step 3, arrow (3), correcting the eco-economic model(EEM) to reach current sustainability markets(CSM).

This backward approach towards sustainability can be summarized in three steps or periods as indicated below:

a) The full externality neutrality assumption period indicated by arrow "(1)" going from Q0 to Q3 in Figure 5 above: When assuming social and environmental neutrality the traditional economic model(TEM) was created together with the optimality gap shown in Figure 2 that helped it to flourish. Because of this optimality gap, it was able to avoid social and environmental responsibilities allowing it to produce at levels Q3 way beyond the optimal level of the original sustainability market(OSM) at Q0, creating in the process critical social and environmental problems. This model is then by its nature socially and environmentally unfriendly.

b) The partial neutrality assumption period shown by arrow "(2)" going from Q3 to Q2 in Figure 5 above: When correcting the traditional economic model(TEM) to reflect environmental concerns the environmental sustainability gap(ESG) is closed, creating in the process the eco-economic model(EEM). This model is socially unfriendly as it assumes social externality neutrality; and

c) The no externality assumption period indicated by arrow "(3)" going from Q2 to Q1 in Figure 5 above: When correcting the eco-economic model(EEM) to reflect social concerns the social sustainability gap(SSG) is closed creating in the process the current sustainability model(CSM). This model is a fully friendly system as all development concerns, economic, social, and environmental, are accounted for.

Notice that first we assumed complexity away to move away from the original sustainability model(OSM); and now we are adding complexity when correcting twice the pure economic model(TEM) to transform it into the current sustainability model(CSM); and this process of stating and then correcting assumptions after found to be inappropriate makes it a chaotic approach towards sustainability.

In summary, the discussion above shows that we are approaching sustainability backwards in terms of economic thinking as we are now forced to incrementally correct previously made externality assumptions, which makes it a chaotic process in terms of its social and/or environmental implications.

b) Forward looking approach towards sustainability

It can be said that we could have approached sustainability through a forward looking process, which could be seen as having two steps:

a) the full externality inclusion step: If we had incorporated all externality margins when first stating our economic models to capture the externality rich economic reality we would have created the original sustainability market(OSM) shown in point "(4)" in Figure 6 below, cleared by right market price and producing at Q0; and

b) the technological innovation period: When technological progress and efficiency gains take place, the innovation gap is closed driving the original sustainability model(OSM) towards the current sustainability model(CSM) through an optimality path(OP) indicated by the arrow that goes from point "(4)" to point "(3)" in Figure 6 below. Here the right market price(RMP) tends towards

the current sustainability market price(CSP) and production Q0 tending towards Q1.

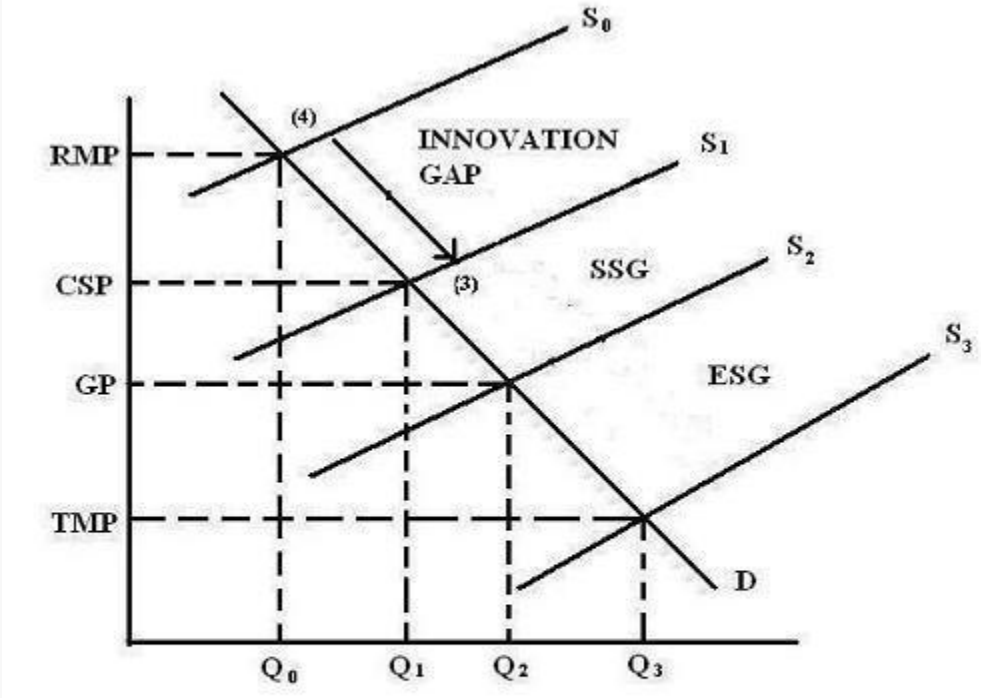

Figure 6 Forward path towards sustainability: When closing the innovation gap, the original sustainability market(OSM) would have been transformed into the current sustainability market(CSM) smoothly following the optimality path shown by arrow going from point (4) to point (3).

Also notice that Figure 6 allows us to see that the transition from the original sustainability market(OSM) to the current sustainability market(CSM) could have taken place without creating environmental and/or social sustainability gaps or critical crises; and therefore, this would have made for a smooth approach towards sustainability.

In summary, the discussion above suggests that if complexity would not have been assumed away, we could have started our economic modeling by stating original sustainability markets, which driven by technological innovations would have evolved into current sustainability markets in a smooth way and without creating social and/or environmental sustainability gaps.

c) The current sustainability price(CSP) as a blue print for externality corrections

It can be seen in Figure 5 and in Figure 6 that the current sustainability price(CSP) determines the optimal level of supply S1 and optimal level of demand Q1 as it incorporates social and environmental corrections. And therefore, it can be used to point out which types of externality corrections are needed in specific markets that may be associated with Rio +20 agenda or the Human Development agenda and sustainability issues mentioned in the introduction.

i) Correcting green markets

The discussion above shows that if we correct green markets to reflect social externalities, we reach the sustainability market, which is expressed as:

5) CSP = GP + SM

Hence, green markets need only social externality corrections to be cleared by the current sustainability price(CSP). See that without adding social margins(SM), the green price(GP) is not a current sustainability price(CSP); and it would lead to non-optimal outcomes.

ii) Correcting traditional markets

As shown above if we correct traditional markets to reflect social and environmental externalities, we also reach the sustainability market, which can be indicated as follows:

6) CSP = P + GM + SM

Therefore, traditional markets need both social and environmental externality corrections to be cleared by the current sustainability price(CSP). Also see that without green margins(GM) and/or social margins(SM), the traditional price(P) is not a current sustainability price(CSP); and it would lead to non-optimal positions.

Specific conclusions

Three specific conclusions are relevant: a) it was shown that currently we are approaching sustainability backwards through a step by step process of correcting the externality assumptions supporting the traditional economic model and now known to be wrong, which makes it chaotic in social and environmental sustainability terms; b) it was pointed out that if we had started our economic models with no externality neutrality assumptions, then a forward looking, technologically driven smooth process would have been put in place to later evolve through an optimal path into current sustainability markets; and c) it was indicated that the current sustainability price framework presented can be used as a blue print to indicate the types of corrections needed when dealing with green and traditional markets, including those related to the new Rio +20 agenda to bring them within the sustainability domain.

General conclusions

It was shown that there are two possible ways of approaching sustainability in terms of economic thinking, one that would have been forward looking, technology driven, smooth, and economic, social, and environmentally friendly; and the current one, which is backward looking and chaotic due the need to step by step correct previously made externality assumptions now known to be inappropriate. And it was pointed out that the current sustainability price framework can be used to show how externalities can be internalized to make green markets and traditional markets associated with Rio +20 programs reflect sustainability requirements.

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Joaquim Machado de Assis (Brazil, 1839 – 1908)

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