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Is Environmental Externality Management a Correction of Adam Smith's Model to Make It Environmentally Friendly and Shift it Towards Green Markets or Is It a Distortion on Top of Another Distortion?

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Abstract

When Adam Smith gave us the theory of the perfect market in 1776 he gave us a model with two embedded distortions, one social and one environmental, because he assumed that economic activity works under social and environmental externality neutrality or it had minimal social and environmental impacts making them external factors to the economic model. In 1987 the Bruntland Commission said in "Our Common Future" that evidence existed indicating that social and environmental impacts are relevant and needed to be incorporated or included in our development models. In essence, the Bruntland Commission called for the fixing of Adam Smith's traditional market model. From 1987 to 2012 a process of testing different sustainable development models took place and in 2012 Rio +20 it was decided that development now was going green market, green growth and green economy through a win-win partnership environment and the economy to make the economy an environmentally friendly entity. To correct the environmental distortion embedded in Adam Smith's model the only thing that needed to be done was to internalize the cost of being environmentally friendly in the pricing mechanism of traditional markets to shift them to green markets, green producers and green consumers, but instead they went the way of environmental externality management (e.g. carbon pricing) as they took the environmental distortion embedded in Adam Smith's model as an environmental externality led market failure.

Hence, instead of correcting Adam Smith's model to eliminate the environmental distortion by reflecting environmental costs in the pricing mechanism and making that way environmental issues endogenous issues as they should have been from the beginning had Adam

Smith proposed green markets instead of the traditional market they are treating an embedding distortion in Adam Smith's model that before was irrelevant, but now it is relevant, as an environmental externality led market failure. And this raises the question: Is environmental externality management a correction of Adam Smith's model to make it environmentally friendly and shift it to green markets or is it a distortion on top of another distortion? Among the goals of this paper are: a) to show analytically and graphically that the proper correction of Adam Smith's model to eliminate the embedded environmental distortion in it and shift it to green markets is environmental cost internalization; and b) to point out analytically and graphically that environmental externality management is a distortion on top of an embedded environmental distortion in Adam Smith's model; and therefore it is unconnected to perfect green market thinking.

Key concepts

Externality, Market Failure, Environment, Green Markets, Traditional Market, Market Distortion, Carbon Price, Markets, Environmental Margin, Economic Margin, Profit, Dwarf Market, Adam Smith, Externality Management, Cost Internalization, Environmental cost.

The traditional market(TM)

i) The model

When only the economy(B) matters we have the traditional market of Adam Smith(TM), which can be expressed as follows:

1) $TM = aBc$

The expression in formula 1) above says that in the traditional market(TM), the society(a) and environment(c) exist only to meet the needs of the traditional market(TM) as both social issues(a) and environmental issues(c) are considered externalities or factors exogenous to the traditional market model(TM); and therefore, only the economy(B) is the dominant and endogenous component here. Development only needs to be economy friendly to be implemented.

In other words, the traditional market(TM) is a deep paradigm based model that operates under social and environmental neutrality assumptions; and which works under independent preference or choice structures. Here microeconomics theory and macroeconomic theory and growth theory are the proper tools to deal with traditional market issues. And therefore, this is the world of the economic man, the invisible hand, and economic growth.

ii) The production price structure of the traditional market(TM)

Since the traditional market(TM) is a for profit model where only the economic costs (ECM) at profits(i) matters, then its price structure can be expressed as follows:

$$2) \text{ TMP} = P = \text{ECM} + i$$

Where P = the traditional market price(TMP), ECM = the economic margin, and i = profits.

Formula 2) above simply says that the economic cost margin(ECM) at a profit(i) only determines the traditional market price(P).

iii) The nature of the traditional market model

Hence the traditional market model(TM) is a deep development model, but it is a for profit economy only model as it covers only the economic cost of production at a profit.

iv) The perfect traditional market model graphically

We know the traditional market price(TMP) is determined by the interaction of traditional supply(S) and traditional demand(D), which can be represented as follows:

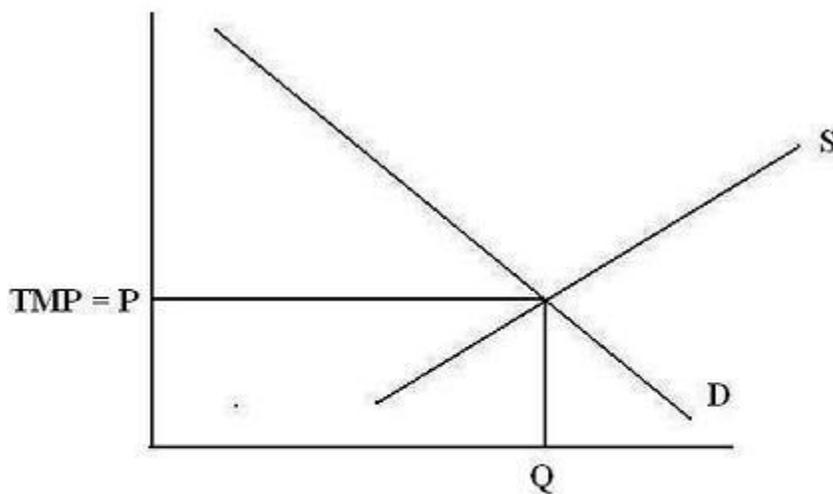


Figure 1 The structure of the perfect traditional market (TM)
The traditional supply(S) and the traditional demand(D) are cleared by the traditional price(P) at the traditional quantity(Q).

Figure 1 above tells us that the traditional quantity(Q) produced and consumed is the one at the traditional market price P. Details about the structure of the perfect traditional market model from the sustainability point of view have been recently shared(Muñoz 2015).

In summary: The perfect traditional market(TM) is the market where traditional market supply(S) and traditional market demand(D) are cleared at market price P. It is a world driven by economic growth, traditional trickledown expectations, and Adam Smith's invisible hands. . Here traditional micro-economics and macro-economics are the appropriate tools to deal with traditional market issues.

The world of green markets(GM)

i) The model

It is a world ruled by the partnership between the economy and the environment. Analytically the green market(GM) world can be expressed as follows:

3) GM = aBC

The expression in formula 3) above says that in the green market(GM), society(a) exists only to meet the needs of the green market(GM) as social issues(a) are considered externalities or factors exogenous to the green market model; and only the economy(B) and the environment(C) are dominant and endogenous components. In other words, green markets(GM) are partial partnership based models that work under partial codependent choice structure: development needs to be both environmentally and economically friendly at the same time to be implemented.

Here green microeconomic theory, green macroeconomic theory, and green growth theory are the proper tools to deal with green market issues. And therefore, this is the world of the green economic man, the green invisible hand, and green economic growth.

ii) The production price structure of green markets

Since green markets(GM) are for profits markets that reflect both the environmental(EM) and economic cost(ECM) cost of production at a profit(i) its price structure can be indicated as follows:

4) GMP = EM + ECM + i

Formula 4) above simply says that the green market price(GMP) accounts for the environmental margin(EM), the economic margin(ECM), and profits(i).

Notice that since the traditional market price is $P = ECM + i$ the following is true:

5) GMP = EM + P

Formula 5) above tells us that the green market price(GMP) reflects the traditional market price(P) plus the environmental margin(EM).

iii) The nature of the green market model

Hence, green markets(GM) are for profit environment-economy partnership models that accounts for the environmental and economic cost of production at a profit

iv) The perfect green market model graphically

The price structure of the perfect green market(GM) is found at the point where green market demand(GD) clears green market supply(GS) as shown in Figure 2 below:

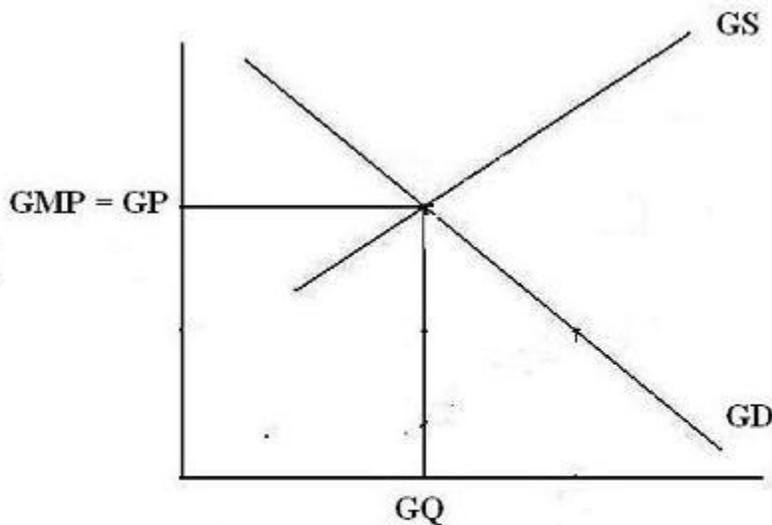


Figure 2 The structure of the perfect green market(GM)
The green market supply(GS) and the green market demand(GD) are cleared by the green market price(GP) at the green quantity(GQ).

Figure 2 above clearly shows that the green market price(GP) is found at the point where green market supply(GS) meets green market demand(GD) and the efficient green market quantity consumed is GQ. Therefore, the perfect green market(GM) is the one where green market supply(GS) and green market demand(GD) determine the green production price GP and the green market quantity GQ to be produced and consumed. Details about the structure of the perfect green markets from the sustainability point of view have been recently pointed out(Muñoz 2016a).

In summary: The perfect green market(GM) is the market where green market supply(GS) and green market demand(GD) are cleared at green market price GP. It is a world

driven by green growth, green trickledown expectations, and green invisible hands. . Here green micro-economics and green macro-economics are the appropriate tools. And therefore, a green market is a world beyond traditional market thinking.

The environmental distortion embedded in Adam Smith's traditional market model

By placing together the structure of the perfect green market(GM) and the structure of the perfect traditional market(TM) and implementing the environmental externality neutrality assumption made by Adam Smith we can graphically and analytically highlight the environmental distortion embedded in its traditional market model(TM) as shown in Figure 3 below:

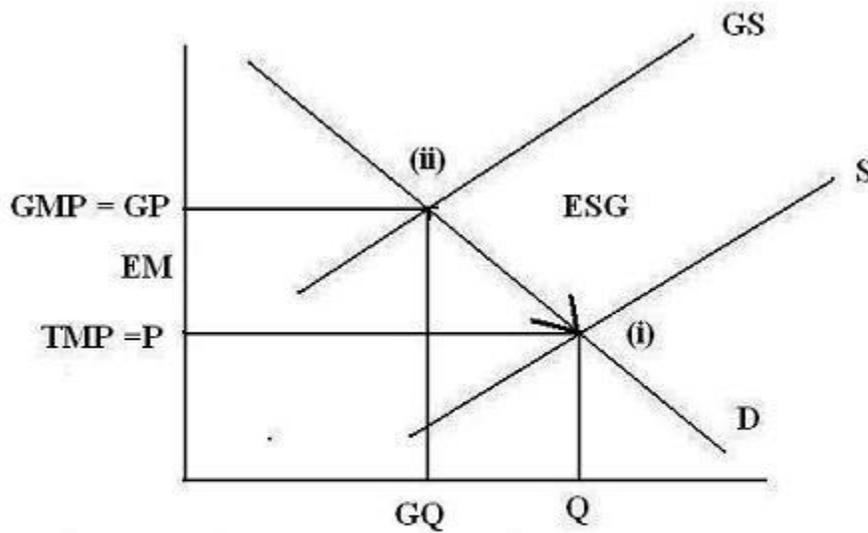


Figure 3 The environmental distortion embedded in Adam Smith's perfect market
 When he assumed environmental externality neutrality he created an environmental sustainability gap(ESG) going from point (ii) to point (i).

Had Adam Smith proposed green markets in 1776 it would have been located at point (ii) in Figure 3 above as the pricing mechanism would have reflected both economic and environmental cost of production, a market ruled by green prices(GP). Since Adam Smith assumed environmental externality neutrality he left out the environmental cost of production(EM) from the traditional market pricing mechanism to be able to create markets producing at lower prices(P) introducing for ever an environmental distortion in traditional market thinking reflected in the environmental sustainability gap(ESG) that works along economic activity accumulating environmental deficits in the process. Notice that we can

visualize from Figure 3 above that as economic activity expands to the right of point (i) the environmental sustainability gap(ESG) would expand too.

Analytically the price structure of the perfect green market(GM) located at point (ii) in Figure 3 above can be stated as follows:

$$6) \text{ GP} = \text{P} + \text{EM}$$

Therefore, environmental costs(EM) plus the for profit price(P) determine the green market price(GP).

Notice that since $P = \text{ECM} + i$; then the following is true:

$$7) \text{ GP} = \text{ECM} + i + \text{EM}$$

The expression above says that the green market price(GP) reflects an economic margin(ECM) plus an environmental margin(EM) at a profit(i).

And the price structure of the perfect traditional market(TM) at point (i) in Figure 3 above can be stated as:

$$8) \text{ TMP} = \text{P} = \text{ECM} + i$$

Figure 3 or Formula 6) above helps us to link the green market price(GP) and the traditional market price(TMP) as follows:

$$9) \text{ P} = \text{GP} - \text{EM} = \text{TMP}$$

Therefore, the traditional market price P is a distorted price in environmental terms as it does not reflect the environmental cost of production(EM) in its pricing mechanism fuelling the environmental sustainability gap(ESG). So the environmental externality exists and has always existed because the traditional market(TM) was set to be environmentally unfriendly from the beginning as environmental costs(EM) are not reflected in the traditional market pricing mechanism; and therefore, the traditional market price(TMP) cannot send green market signals, just traditional for profit economic activity signals.

The need to correct Adam Smith's model to make it environmentally friendly

Therefore, when Adam Smith gave us the theory of the perfect market in 1776 he gave us a model with two embedded distortions, one social and one environmental, because he assumed that economic activity works under social and environmental externality neutrality or it had minimal social and environmental impacts making them external factors to the economic model(Muñoz 2015). In 1987 the Bruntland Commission(WCED 1987) said in "Our Common Future" that evidence existed indicating that social and environmental impacts are relevant and

needed to be incorporated or included in our development models. In essence, the Bruntland Commission called for the fixing of Adam Smith's traditional market model (Muñoz 2016b) as social and environmental externalities are there because the pricing mechanism does not reflect social and environmental cost of production (Muñoz 2010), which is pushing us to approach sustainability backwards in terms of economic thinking (Muñoz 2012). From 1987 to 2012 a process of testing different sustainable development models took place and in 2012 Rio +20 (UNCSD 2012a; 2012b) it was decided that development now was going green market, green growth and green economy through a win-win partnership environment and the economy to make the economy an environmentally friendly entity. We are supposed to be living in a green economy based world since 2012 (UNDESA 2012; WB 2012; OECD 2014; WB 2015; UNEP 2016).

To correct the environmental distortion embedded in Adam Smith's model as clearly indicated in Figure 3 and the discussion above the only thing that needed to be done since 2012 was to internalize the cost of being environmentally friendly in the pricing mechanism of traditional markets to shift them to green markets, green producers and green consumers, but instead of doing that they went the way of environmental externality management (e.g. carbon pricing) as they took the environmental distortion embedded in Adam Smith's model as an environmental externality led market failure. Which is like saying "there was no problem with the way the traditional market was stated, the environmental externality is the problem" or like saying "it is not the cause the problem (the embedded environmental distortion), it is the consequence (the environmental externality)". If because of the green paradigm shift knowledge gap created when the shift from traditional market to green markets took place in 2012 mainstream decision-makers and economists they went the dwarf green market action way instead of the green market way it is a justifiable academic blindness as that is a normal expectation under paradigm shift as Thomas Kuhn (Kuhn 1970) told us that those inside the box may not see the shift or are slow to react to paradigm shifts. However, if knowing that you are in green market theory you implement non-green market tools then that is purposive academic blindness, which undermines the credibility of the scientific method.

Therefore, knowingly or not mainstream decision makers and economists have already gone the environmental management way taking an embedded distortion on as an environmental externality led market failure. For example, Canada has now placed a federal minimum carbon tax of \$10 per ton effective 2018 (TTS 2016), about 33 countries and 18 sub-national levels of government had or were planning to have a carbon tax by 2015 (SBS 2015), and now that the 2015 Paris agreement has been signed (UNFCCC 2015) carbon tax systems will be implemented in all signature countries and therefore, all these markets are set to work under the dwarf green market banner (Muñoz 2016c) or environmental externality management framework without addressing the environmental externality distortion embedded in the pricing mechanism of Adam Smith's model.

Hence, instead of correcting Adam Smith's model to eliminate the environmental distortion by reflecting environmental costs in the pricing mechanism and making that way environmental issues endogenous issues as they should have been from the beginning had Adam Smith proposed green markets instead of the traditional market as shown in Figure 3 and the discussion above they are treating an embedded distortion in Adam Smith's model that before was irrelevant, but now it is relevant, as an environmental externality led market failure. For example, some see pollution as a result market failure to account for environmental impacts(OECD 2011), some see taxes as the best way to correct market failures and raise revenues(Gale 2013), and others see global warming as a market failure(GRI 2014). And this raises the question: Is environmental externality management a correction of Adam Smith's model to make it environmentally friendly and shift it to green markets or is it a distortion on top of another distortion? Among the goals of this paper are: a) to show analytically and graphically that the proper correction of Adam Smith's model to eliminate the embedded environmental distortion in it and shift it to green markets is environmental cost internalization; and b) to point out analytically and graphically that environmental externality management is a distortion on top of an embedded environmental distortion in Adam Smith's model; and therefore it is unconnected to perfect green market thinking.

Objectives

a) To show analytically and graphically that the proper correction of Adam Smith's model to eliminate the embedded environmental distortion in it and shift it to green markets is environmental cost internalization; b) to point out analytically and graphically that environmental externality management is a distortion on top of an embedded environmental distortion in Adam Smith's model; and therefore it is unconnected to perfect green market thinking; c) To compare the structure of green markets with externality management based markets, and with traditional markets to highlight their similarities and differences; and d) to use the above discussion to highlight the implications of using the wrong tool to deal with the environmental crisis

Methodology

First, the terminology used in this paper is listed. Second, some operational concepts are provided. Third, the structure of Adam Smith's model operating at full environmental externality distortion is shared. Fourth, the structure of the paradigm shift from the perfect traditional market to green market is given showing clearly that environmental cost internalization is the proper correction to eliminate the environmental distortion in Adam Smith's model. Fifth, the environmental externality management framework is highlighted indicating that it is not a green market based framework and it is a distortion on top of another distortion as

environmental cost in this framework is not internalized taking the environmental distortion as an externality led market failure. Sixth, the structure of green markets and that of externality management based markets are compared to highlight their differences. Seventh, the structure of green markets and that of traditional markets are compared to point out their similarities and differences. Eights, some of the main implications of using the wrong tool to deal with the environmental crisis are stated. And finally some food for thoughts and conclusions are given.

Terminology

A = Dominant/active society	a = Dominated/passive society
B = Dominant/active economy	b = Dominated/passive economy
C = Dominant/active environment	c = Dominated/passive environment
S = Traditional supply	D = Traditional demand
P = Traditional market price	Q = Traditional market quantity
GS = Green market supply	GD = Green market demand
GP = Green market price	GQ = Green market quantity
ESG = Environmental sustainability gap	EM = Environmental margin
ECM = Economic margin	i = Profits
PGMP = Perfect green market price	PTMP = Perfect traditional market price
DWM = Dwarf Market	DWP = Dwarf market price

E) Operational concepts

i) Traditional market, *the economy only market*

ii) Green market, *the environmentally friendly market*

iii) Red market, *the socially friendly market*

iv) Sustainability market, *the socially and environmentally friendly market*

- v) Environmental or green margin**, to cover the extra cost of making the business environmentally friendly or to cover only the environmental cost of environmentally friendly production or to cover the environmental cost of red market production
- vi) Social margin**, to cover the extra cost of making the business socially friendly or to cover only the social cost of socially friendly production or to cover the cost of making green markets socially friendly or to cover the cost of making environment only models socially friendly.
- vii) Economic margin**, to cover only the economic cost of production
- viii) Economic profit(i)**, the incentive to encourage economic activity
- ix) Traditional market price**, general market for profit price($TMP = ECM + i = P$)
- x) Green market price**, the for profit price that reflects both the economic and the environmental cost of production or the price that covers the cost of environmentally friendly production at a profit($GP = ECM + i + EM = P + EM$)
- xi) Red market price**, the for profit price that reflects both the economic and the social cost of production or price that covers the cost of socially friendly production at a profit($RP = ECM + i + SM = P + SM$)
- xii) Sustainability market price**, the for profit price that reflects the economic, social, and the environmental cost of production or the price that covers the cost of socially and environmentally friendly production at a profit($SP = ECM + i + SM + EM = P + SM + EM$)
- xiii) Green market knowledge gap**, the knowledge gap created by the paradigm shift from traditional markets to green markets or when correcting Adam Smith's model to reflect environmental concerns..
- xiv) Red market knowledge gap**, the knowledge gap created by the paradigm shift from red socialism to red markets or the knowledge gap created by correcting Adam Smith's traditional market to reflect social concerns
- xv) Sustainability market knowledge gap**, the knowledge gap created when any paradigm shifts towards sustainability, at once or step by step.
- xvi) Micro-economics**, the theory of the traditional firm and consumer.
- xvii) Macro-economics**, the theory of the traditional economy.
- xviii) Green micro-economics**, the theory of the environmentally responsible firm and consumer.
- xix) Green macroeconomics**, the theory of the environmentally responsible economy.

- xx) Red micro-economics**, *the theory of the socially responsible firm and consumer*
- xxi) Red macro-economics**, *the theory of the socially responsible economy.*
- xxii) Sustainability market based micro-economics**, *the theory of the socially and environmentally responsible firm and consumer.*
- xxiii) Sustainability based macro-economics**, *the theory of the socially and environmentally responsible economy*
- xxiv) Trickle-down effect**, *the expectation that traditional markets and growth will sooner or later benefit the poor*
- xxv) Green trickle-down effect**, *the expectation that green markets and green growth will sooner or later benefit the poor.*
- xxvi) Red trickle-down effect**, *the expectation that red markets and red growth will sooner or later benefit the environment*
- xxvii) Deep paradigm**, *a fully exclusive model(e.g. the traditional market).*
- xxviii) Partial partnership paradigm**, *a partially inclusive model(e.g. the green market, the red market).*
- xxix) Full partnership paradigms**, *a fully inclusive model(e.g. the sustainability market).*
- xxx) Externalities**, *factors assumed exogenous to a model*
- xxxi) Full externality assumption**, *only one factor is the endogenous factor in the model, the others are exogenous factors.*
- xxxii) Partial externality assumption**, *not all factors are endogenous factors at the same time in the model.*
- xxxiii) No externality assumption**, *all factors are endogenous factors at the same time in the model.*
- xxxiv) Sustainability market cost margin(SMCM)**, *the sum of all cost margins in the sustainability market \price*
- xxxv) Red market cost margin(RMCM)**, *the sum of all margins in the red market price*
- xxxvi) Green market cost margin(GMCM)**, *the sum of all margins in the green market price*
- xxxvii) Socio-environmental model cost margin(SENCM)**, *the sum of all margins in the socio-environmental model price*

Adam Smith's model producing at full environmental distortion

Since Adam Smith's perfect market model was not priced to be environmentally friendly it is not a surprise or it should not be a surprise that it has led to critical environmental problems. The fact that Adam Smith's model has been operating at full environmental distortion since 1776 can be expressed graphically as indicated in the structure in Figure 4 below:

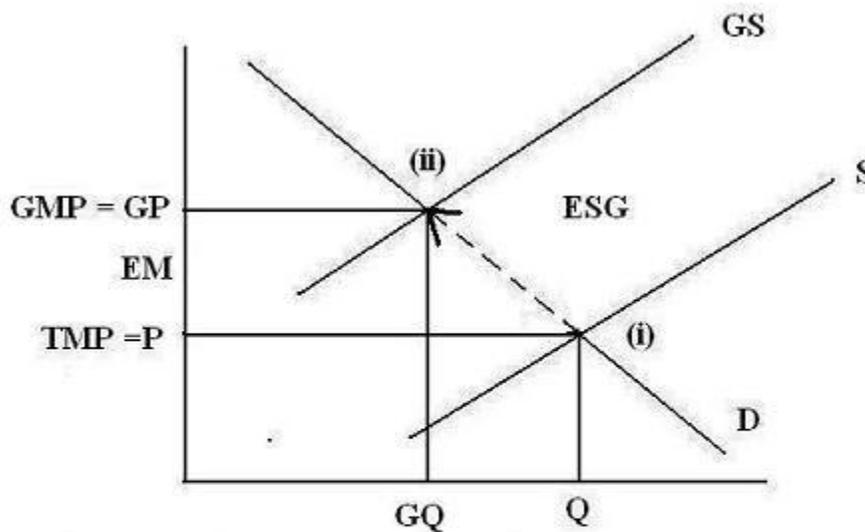


Figure 4 Operating under the environmental distortion embedded in Adam Smith's perfect market
As economic activity takes place and expands the sustainability gap also is at work and expands as the pricing leaves out environmental costs allowing production and consumption at lower prices.

Figure 4 above can be used to highlight the following: a) pricing production at point (i) leaves environmental issues outside the traditional market pricing mechanism created the environmental distortion represented by the broken arrow from point (i) to point (ii) associated with the environmental sustainability gap(ESG); b) if production is priced as at point (ii) there is no environmental distortion and there is not environmental sustainability gap(ESG); and c) production and consumption at point (i) is higher than at point (ii) as the environmental distortion allows the traditional market to produce at lower prices($P < GP$).

The proper correction of Adam Smith's model is environmental cost internalization

Therefore, the proper correction of Adam Smith's model to make it environmentally friendly and shift it to green markets is environmental cost internalization which when implemented leads to the closing the environmental sustainability gap(ESG) making environmental issues endogenous issues and eliminating the environmental distortion. This thought is summarized in Figure 5 below:

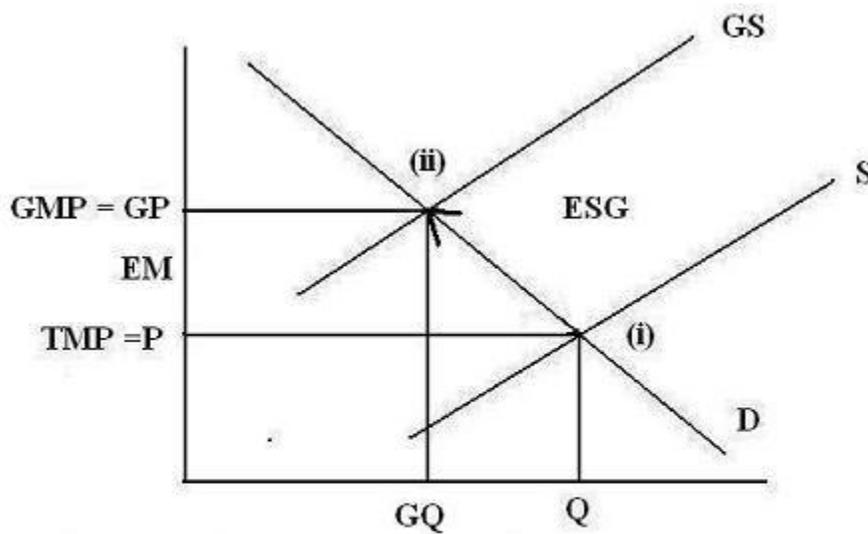


Figure 5 Environmental cost internalization is the proper correction To close the environmental sustainability gap(ESG) we add the externality margin(EM) to the traditional market price(P) to shift it to green markets(GM) and operate at the green market price(GP) eliminating the environmental distortion.

Figure 5 above can be used to point out the following aspects: a) there is an environmental distortion embedded in Adam Smith's model at point (i) as it leaves the environmental margin(EM) out of the traditional market pricing mechanism allowing it to produce at lower prices(P) and in environmentally unfriendly manners; b) internalizing the environmental cost(EM) in the pricing mechanism of the traditional market shifts it from point (i) to point (ii) as indicated by the continuous arrow eliminating the environmental sustainability gap(ESG) as now environmental issues are endogenous issues and the externality distortion is eliminated; and c) production and consumption at point (ii) are lower as the green market price(GP) or the environmentally friendly market price is higher than the traditional market price or environmentally unfriendly price($GP > P$).

In summary, the internalization of the environmental margin(EM) leads to the paradigm shift from the traditional market[point (i)] to the green market, green growth and the green economy[point (ii)] eliminating the environmental distortion as now environmental issues are endogenous issues and the environmental sustainability gap(ESG) is closed. Hence, environmental cost internalization means no more environmental externality distortions in the pricing mechanism ; and therefore, it leaves no room to claim that there is an environmental externality led market failure.

The environmental externality management framework

The environmental externality management framework(EEMF) does not reflect a market shift to green markets, it is a dwarf green market. And therefore the EEMF framework operates still under an environmental sustainability gap(ESG) as it still takes environmental issues as exogenous issues. In other words the EEMF framework takes the embedded environmental distortion in Adam Smith's model as an environmental externality led market failure. This thought is summarized in Figure 6 below:

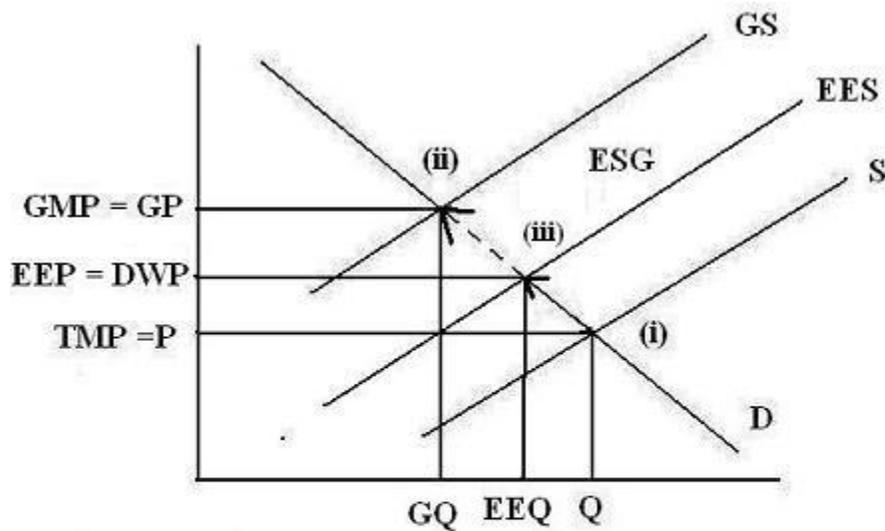


Figure 6 The environmental externality management framework (EEMF) takes the environmental distortion in Adam Smith's perfect market as an environmental externality market failure placing the externality management supply(EES) above the perfect traditional market(TM) and below the perfect green market(GM) as it produced less but still under the environmental sustainability gap(ESG).

We can see in Figure 6 above the following: a) the environmental externality management framework(EEMF) is placed at point (iii) between the traditional market(TM) and the green market(GM) at the point where the environmental externality management supply(EES) is; b) we know that at point (i) there is an environmental distortion associated with the traditional perfect market model at the point where the traditional supply(S) is; c) we can see that the environmental externality management framework(EEMF) operates under an environmental distortion too as indicated by the broken arrow going from point (iii) to point (ii) which fuels its environmental sustainability gap(ESG); and d) therefore, the environmental management framework(EEMF) is not a shift to green markets: it is a distortion to top of another distortion still operating under environmental sustainability gaps(ESG) since it takes the environmental distortion at point (i) as an environmental externality led market failure.

Figure 6 can also be used to highlight the following aspects: a) at point (i) we have a perfect market, the traditional market(TM) with an embedded environmental distortion; b) at point (ii) we have a perfect market too, the green market(GM) with no environmental distortion; and c) at point (iii) we have a dwarf green market, a non-perfect market cleared by the environmental externality management price(EEP), which is a dwarf market price(DWP): an environmentally distorted market price.

And Figure 6 can be also be helpful to stress that production and consumption under the environmental externality framework(EEMF) at point (iii) is less than that in traditional markets at point (i) and more than that in green markets at point (ii) since $GP > EEP > P$; and therefore, they are inefficient in green market terms.

In summary, the environmental externality management framework(EEMF) does not represent a shift to green markets and it still operates under an environmental sustainability gap(ESG) making it a distortion on top of an existing distortion; and due to these distortions environmental externality management prices(EEP) cannot sent green market signals.

Comparing the structure of green markets and environmental externality management based markets

Based on the structures in Figure 6 above the following can be said about green markets and environmental externality management based markets: a) green markets are based on perfect market thinking, the EEMF market is not; b) Green markets are markets of green producers and green consumers, the EEM F markets works with constrained producers and consumers; c) production in green markets is efficient/optimal, in the EEMF market is not; d) green markets send green signals, the EEMF markets do not; e) green markets do not need government intervention and are science based while the EEMF markets need ongoing government intervention and are non-science based; and f) green markets work under codependent choice,

the EEMF markets work under constrained choice. So green markets and EEMF markets are very different markets and these differences are summarized in Table 1 below:

Table 1

	Green Market	Environmental externality management based market
Type of market	Perfect, free market	Imperfect, non-free market
Types of producers	Green producers	Constrained traditional producers
Types of consumers	Green consumers	Constrained traditional consumers
Production efficiency	Efficient/optimal	Inefficient/non-optimal
Type of market signal	Green	Dwarf green
Need of intervention	No	heavy, ongoing
Science based	Yes	No
Choice	Free codependent choice	Constrained choice

Comparing the structure the traditional market and that of green markets.

Based on Figure 6 above the following similarities can be highlighted about traditional markets and green markets: a) both markets are based on perfect, free market theory; b) both operate under production efficiency/optimality, one economy only based and the other green economy based; c) both are science based and both do not need government intervention. And the following differences can also be pointed out: a) traditional markets need traditional producers and consumers; green markets need green producers and green consumers; b) traditional markets send economic signals, green markets send eco-economic or green signals; c) Traditional markets are based on independent choice; green markets required codependent choice. These similarities and differences are summarized in Table 2 below:

Table 2

	Traditional Market	Green Market
Type of market	Perfect, free market	Perfect, free market
Types of producers	Traditional producers	Green producers
Types of consumers	Traditional consumers	Green consumers
Production efficiency	Efficient/optimal	Efficient/optimal
Type of market signal	Economic	Green/Eco-economic
Need of intervention	No	No
Science based	Yes	Yes

Choice

Free independent choice

Free codependent choice

The implications of using the wrong tool to deal with the environmental crisis

The best way to deal with development issues, be it economic or eco-economic or environmental is through science based methods, methods that respect the theory-practice consistency principle and which provide science based free choice to society, to producers and consumers. And the author believes this is the reason why in 2012 the shift from the traditional market to green markets, green growth, green economy took place, respecting the theory-practice consistency principle: to shift from a perfect market(the traditional market) to another perfect market(the green market) is a shift from a science based market and action to another science based market and action. And therefore, to shift to a science based market(green markets) to deal with the environmental crisis; and then to implement non-science based tools(environmental externality management) is a huge theory-practice inconsistency. In other words, to implement a science based climate change action program through non-science based, non green market tools is a scientific inconsistency.

If the reason why mainstream decision-makers and economists took the non-science, non free market way since 2012 soon after the paradigm shift Rio +20 to deal with the environmental crisis is because of the green market paradigm shift knowledge gap associated with the paradigm shift to green markets, then this is justifiable academic blindness. Situations like these are expected in the face of paradigm shifts as from the inside the box you only see an externality led market failure, but from the outside the box you see the embedded environmental distortion as we know from Thomas Kuhn's 1970 observations that under paradigm shift revolutions outsiders are the ones better positioned to see that the theory does not match the practice and why.

However, if mainstream decision-makers and economists decided to address the environmental crisis after shifting to green market in 2012 through non-green market tools telling us we were in a green market, green economy, and green growth world, then that is or would be purposive academic blindness as they should have been able to see that they were moving away from the scientific method, leaving the free market world behind perfect green market thinking and moving towards a non-free market world under dwarf green market action. And therefore, if knowingly we use a non-scientific tool to deal with the environmental crisis because the scientific ones are too difficult to implement or for any other reason this action will erode in due time the respect society has for science based decision-making and action. Ignoring the scientific method is a bad idea. If this is the case, then we have to say goodbye to the scientific method in economics and in all the fields associated with economics as knowingly acting in violation of the theory-practice consistency principles push us outside the domain of

science based decision-making. And this is the dilemma that is coming before us right now as the use of non-green market tools becomes global as they seem to be under the cover of the 2015 Paris Agreement: Implementing a climate change action program achieved through scientific methods and consensus by means of using non-science, non-green market based markets is a scientific inconsistency.

Food for thoughts

a) If the environmental distortion embedded in Adam Smith's model needed correction, then does the social distortion in it needs correction too? I say yes, what do you think?

b) Does the green market have a social distortion embedded in it? I say yes, what do you think?

c) Do dwarf green markets provide incentives to firms and consumers to move towards a dominant renewable energy based economy or a minimum carbon based economy? I say no, what do you think?

d) Can a green economy exist without green markets? I say no, what do you think?

e) Is the use of non-science based markets like dwarf green markets to deal with the environmental crisis instead of green markets justified because they are easier to implement? I say no, what do you think?

Specific conclusions

First, it was shown that there is an environmental distortion embedded in Adam Smith's model that was created in 1776 when he assumed environmental externality neutrality. Second, it was pointed out that because of this environmental distortion traditional market prices are environmentally unfriendly. Third, it was stressed that in order to correct Adam Smith's model and shift it to green markets we need to correct this distortion by adding an environmental margin in the pricing mechanism of traditional markets closing that way the environmental sustainability gap as that makes environmental issues now endogenous issues. Fourth, it was shown that environmental cost internalization is the solution to eliminate the environmental distortion in Adam Smith's model and to close the environmental sustainability gap(ESG). Fifth, it was highlighted that environmental externality management is not a correction of Adam Smith environmental distortion, but a distortion on the top of another distortion as they are taking the embedded environmental distortion in Adam Smith's model as an environmental externality

led market failure in essence making the consequence(the environmental externality) the problem that needs to be fixed not the cause(the embedded environmental distortion), which reflects an inconsistency with perfect green market thinking.

Sixth, it was indicated how different green markets are from environmental externality management based markets, once science based and grounded in perfect green market theory, and the other non-science based and grounded on dwarf green market action. Seventh, it was described how similar green market and traditional markets are in some aspects and how different they are in others. And finally, it was mentioned that among the main implications of using the wrong tool to deal with green market issues is that we may damage the reputation of science based approaches as knowingly using non-green market approaches to deal with green market issues whether because they are easier to implement or for whatever reason sends the message that it is okay to use the scientific method only when it fits our purposes or to ignore it for as long as we need or want if that fits our goals.

General conclusions

First, it was shown that Adam Smith's model has been producing under a full environmental distortion that has given shape to the current environmental crisis as he assumed environmental externality neutrality. Second, it was stressed that environmental cost internalization is the proper correction to eliminate this environmental distortion. Third, it was highlighted that the environmental externality management framework far from being a correction of Adam Smith's model is a distortion on top of the embedded externality distortion in it as it take the distortion as the source of an environmental externality led market failure. And finally it was pointed out that the use of non-green market tools to deal with science based climate action programs are pushing economics and its related disciplines away from the scientific domain as acting in open violation of the theory-practice consistency principle is anti-science.

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