Sustainability thoughts 153: How does a general perfect green market paradigm evolution model is expected to work? The cases of expanding green markets, of saving green markets from collapse, and of the fall of green markets due to binding social externality pressures.

By

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Abstract

If we place a general perfect market evolution model under externality neutrality assumptions, we can extract the environment under which a dominant component perfect markets operate, which allows for the possibility of forever growth and no collapse. However, if we place it under a framework of no externality neutrality assumption, then the model shows limits to growth and the possibility of collapse. And if the risk of collapse is real, the dominant component market model can either be saved or it can collapse if it cannot be saved. The saving mechanism allows for either a full fix or just a patch, but it all depends on whether or not there are paradigm shift knowledge gaps as well as political and academic will. If the market cannot be saved, it will flipped perfectly or imperfectly to opposite and inverse opposite forms, and if possible they will flip towards a market form that still allows them to keep at least some of the core values they had before the flip. The above holds true for any dominant component based market, and this paper focus its attention on the perfect green market model, which makes the following questions relevant: How does a general perfect green market paradigm evolution model is expected to work? The cases of expanding green markets, of saving green markets from collapse, and the case of the fall of green markets due to binding social sustainability pressures.

Key concepts

Perfect markets, imperfect markets, perfect green markets, imperfect green markets, externality neutrality assumption, binding social sustainability gaps, paradigm evolution, dominant paradigm, market expansion, market collapse, fully fixing markets, partially fixing markets, paradigm shift, paradigm flip, perfect paradigm shift, perfect paradigm flip, imperfect paradigm shift, imperfect paradigm flip

Introduction

1) The general perfect market evolutions model

If we have a dominant component based perfect market of the form $M = X_y$, where X is the dominant component driving the market; and "y" is the passive component, then all possible evolutions routes if under externality pressures available to this market M can be summarized as previously indicated(Muñoz 2021) as it is done in Figure 1 below:

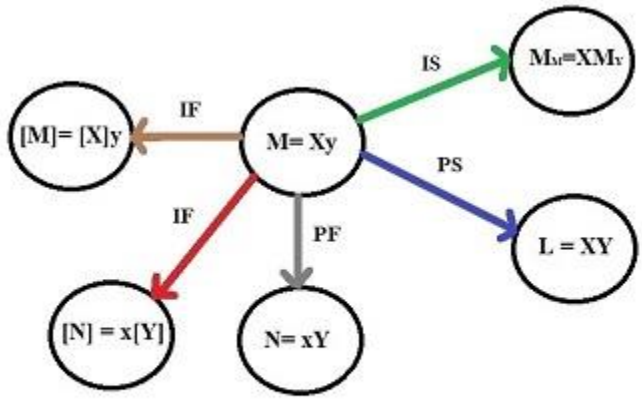

Figure 1 Paradigm M under all types of pressures provides the structure of the general paradigm evolution model under sustainability gap pressures pressures(SGv)

We can appreciate the following based on Figure 1 above about the perfect model M = Xy: i) Model M is the dominant component X perfect market; ii) Model L is a two dominant component based market; iii) Model M_M is the externality "y" based externality management market; iv) Model N is the perfect inverse opposite market to M, a dominant component Y perfect market; v) Model [N] is a dominant component Y based dictatorship market, and the imperfect inverse opposite model to M; and vi) Model [M] is a dominant component X based dictatorship market and the opposite model to M.

Therefore, Figure 1 above summarizes all possible paradigm evolution routes for all possible dominant component based perfect markets. In other words, the paradigm evolution routes for perfect market M in Figure 1 above hold for any dominant component based perfect market such as the perfect social market or the perfect economic market or the perfect green market or the perfect red market, and so on. It is well-known that the traditional market model given to the world by Adam Smith(Smith 1776) has a dominant economy structure consistent with the perfect structure in Figure 1 above under equality neutrality assumptions.

2) The structure of the perfect green market model

A market where the economy(B) and environment(C) are the dominant components at the same time and where society(a) is a passive component is known as the perfect green market(GM)(Muñoz 2016a), which can be stated analytically as follows:

GM = BCa

Hence a perfect green market(GM) is the market where there is eco-economic(BC) growth or green growth without producing social externalities(a).

3) Transforming the general perfect market evolution model in Figure 1 into a general perfect green market evolution model

If we make the perfect green market GM = BCa equal to the perfect market M = Xy in Figure 1 above, then GM = M and BC = X and y = a. With this information we can find the corresponding market structures of the perfect green market under social sustainability pressures consistent with all those structures in Figure 1 above as shown in the Table below:

Table 1

General market structures	Corresponding market structure	Name of market structure
M = Xy	**M = BCa = GM**	**The perfect green market**
L = XY	**L = BCA = S**	**The perfect sustainability market**
$M_M = XM_Y$	**$M_M = BCM_A = GM_M$**	**Green market under externality management**
N = xY	**N = bcA = PS**	**The perfect social market**
[N] = x[Y]	**[N] = bc[A] = [PS]**	**The imperfect social market**
[M] =[X]y	**[M] = [BC]a = [GM]**	**Green market under dictatorship**

Notice that here B = dominant economy, C = dominant environment, A = Dominant society, b = passive economy, c = passive environment, and a = passive society, where passive components can be externalities and dominant components are drivers of growth. Also notice for example that the green market is a two dominant component based perfect model(GM = BCa) and that the perfect social market is a one dominant component based perfect model(PS = bcA).

The structure of the general green market paradigm evolution model under social sustainability gap pressures can be put together using the information obtained in Table 1 above as indicated in Figure 2 below:

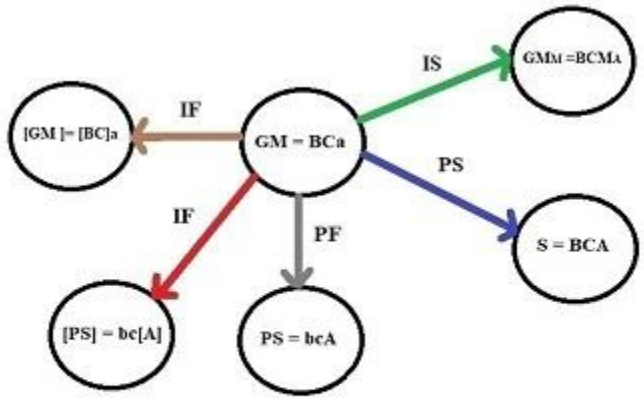

Figure 2 The perfect green market(GM) under all types of pressures provides the structure of the general perfect green market paradigm evolution model under social sustainability gap pressures (SG_A)

We can say the following based on Figure 2 above about the green perfect model GM = BCa: i) The green market model(GM = BCa) at the center is a two dominant component(BC) perfect market as both the economy(B) and the environment(C) are in dominant form at the same time; ii) The perfect sustainability market model(S = ABC) is a three dominant component based perfect market as all, the economy(B), the environment(C) and the society(A) are in dominant form at the same time; iii) The green market model under social externality management(GM_M = BCM_A) is the social externality management based imperfect market; iv) The perfect social market(PS = bcA) is the perfect inverse opposite market to the green market GM, a society dominant component A perfect market; v) The imperfect social market model([PS] = bc[A]) is a society dominant component [A] based social dictatorship market and the imperfect inverse opposite model to the green market GM; and vi) The imperfect green market model ([GM] = [BC]a) is a two dominant component BC based green dictatorship market and the opposite model to the green market(GM). Notice that in this type of thinking even the existence of authoritarian based markets is consistent with paradigm flip theory under social externality pressures.

Hence, Figure 2 above summarizes all possible paradigm evolution routes available to perfect green markets when under social sustainability gap pressures.

4) The need to understand how the general perfect green market evolution model is expected to work when under social externality neutrality assumptions and when under binding social externality assumptions

As shown above, if we transform a general perfect market evolution model under externality neutrality assumptions in Figure 1 into a general perfect green market evolution model as in Figure 2, we can extract the environment under which perfect green markets operate, which allows for the possibility of forever growth and no collapse. However, if we place this perfect green market under a framework of no externality neutrality assumption, then the green market model shows limits to growth and the possibility of collapse. And if the risk of collapse is real, the two dominant component based perfect green market model can either be saved or it can collapse if it cannot be saved. The saving mechanism allows for either a full social fix or just a social patch, but it all depends on whether or not there are social externality market based and sustainability market based paradigm shift knowledge gaps together with political will and academic will. The key role that paradigm shift knowledge gaps have in either supporting efforts to save a paradigm from collapse or in leading to its collapse have been recently pointed out(Muñoz 2020).

Notice that the coming in green market thinking in 2012(UNCSD 2012a; UNCSD 2012b) was a way of addressing partially the issues with development as usual pointed out by the Brundtland Commission in "Our Common Future" in 1987(WCED 1987) as it addresses only the environmental issue; going beyond green markets by addressing too the social issue through a perfect shift from green markets to sustainability markets to move to a world of perfect sustainability markets(Muñoz 2016b) would complete the 1987 Brundtland Commission call for socially and environmentally responsible development models. If the perfect green market cannot be saved because there are social externality management based and sustainability market based paradigm shift knowledge gaps at the same time, then it will flip perfectly or imperfectly to opposite or inverse opposite forms, and if possible it will flip towards a market form that still allows it to keep at least some of the core values it had before the flip. The discussion above makes the following question relevant: How does a general perfect green market paradigm evolution model is expected to work? The cases of expanding green markets, of saving green markets from collapse, and the case of the fall of green markets due to binding social sustainability pressures. Among the goals of this paper is to provide a detailed answer, both analytically and graphically, to this question.

Goals of this paper

a) To point out how the perfect green market model GM is expected to work under social externality neutrality assumptions; b) To indicate how the perfect green market model GM under binding social externality assumptions can be saved from collapse by a full social fix or by a

social patch; and c) To highlight how the perfect green market model GM under binding social externality assumptions will evolve if it cannot be saved and collapses.

Methodology

First, the terminology used in this paper is introduced. Second, the operational concepts and typology of paradigms and paradigm evolution rules are shared. Third, the structure of the perfect green market model GM when under unlimited growth is pointed out, analytically and graphically. Fourth, the structure of the perfect green market model GM when under full social fix and under partial social fix or saving options is highlighted, analytically and graphically. Fifth, the structure of the perfect green market model GM when it collapses as it cannot be fixed is shared analytically and graphically to point out available evolution routes. And finally sixth, some food for thoughts and relevant conclusions are provided.

Terminology

M1 = Perfect market M1 [M1] = Imperfect market M

[M1] = Authoritarian market M1 $M1_M$ = M1 under externality management

PS = Perfect shift IS = Imperfect shift

PF = Perfect paradigm flip IF = Imperfect paradigm flip

M = Perfect lower level market M N = Perfect lower level market N

L = Perfect higher level market L [ ] = Authoritarianism

[M] = Market M under authoritarianism [N] = Market N under authoritarianism

GM = Perfect green market [GM] = Green market under dictatorship

GM_M = Green market under externality management PS = Perfect social market

[PS] = Imperfect social market S = Perfect sustainability market

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Operational concepts, types of market structures and model evolution rules

a) Operational concepts

1) Perfect market, *a market where there is dominant component equality and freedom*

2) Imperfect market, *a market where there is component equality, but not freedom*

3) Perfect paradigm shift, *a shift from a perfect market to a higher level perfect market*

4) Paradigm management, *the handling of cost externalization through externality management*

5) Paradigm flip, *a flip to the opposite paradigm or a flip to the inverse opposite paradigm*

6) Perfect paradigm flip, *a flip to the perfect inverse opposite paradigm or a flip to the imperfect inverse opposite paradigm*

7) Imperfect paradigm flip, *a flip to the imperfect inverse opposite paradigm or a flip to the perfect inverse opposite paradigm*

8) Authoritarian market, *an imperfect market*

9) Sustainability market, *the perfect market where there is full co-component equality and freedom*

10) Externality management market, *the market where there is partial co-component equality, but no freedom.*

b) Type of market structures

Given the dummy market models M_1= Xy and M_2= xY, the following can be said about different market structures:

1) Perfect markets

There is dominant component equality and freedom

M_1 = Xy = A dominant component X perfect market

M_2 = xY = A dominant component Y perfect market

2) Imperfect markets

There is dominant component equality, but no freedom, they are dictatorship based markets

[M_1] = [X]y = A dominant component X imperfect market

[M_2] = x[Y] = A dominant component Y imperfect market

3) Externality management market

They are ongoing government intervention based markets

$M_{M1} = XY_M$ = A dominant component X externality Y management market

$M_{M2} = X_MY$ = A dominant component Y externality X management market

4) The sustainability market

The perfect market where there is full co-component equality and freedom

$S = M_1.M_2 = (Xy)(xY) = XY$

Details about paradigm merging rules and paradigm shift rules can be found in the publication about paradigm evolution and sustainability thinking(Muñoz 2019).

c) Model evolution rules

i) Perfect paradigm shift

The externality gap affecting the market, y or x, is fully closed and internalized, in perfect markets and imperfect markets

PS

$M_1 = Xy$----------→ $M_3 = XY$

PS

$M_2 = xY$----------→ $M_3 = XY$

PS

$[M_2] = x[Y]$----------→ $[M_3] = [XY]$

ii) Imperfect paradigm shift

The externality gap affecting the market, y or x, is patched and managed as an externality problem, in perfect markets and imperfect markets

IS

$M_1 = Xy$----------→ $M_4 = XM_Y$

IS

$M_2 = xY$----------→ $M_5 = M_XY$

IS

$[M_2] = x[Y]$----------→ $[M_5] = [M_XY]$

iii) Perfect paradigm flip

Paradigms flip to the perfect inverse opposite model, in perfect markets and in imperfect markets

PF

$M_1 = Xy$----------→ $M_2 = Xy$

PF

$M_2 = xY$----------→ $M_1 = Xy$

PF

$[M_2] = x[Y]$----------→ $[M_1] = [X]y$

iv) Imperfect paradigm flip

Paradigms flip to the imperfect inverse opposite model, in perfect markets and in imperfect markets

IF

$M_1 = Xy$----------→ $M_6 = x[Y]$

IF

$M_2 = xY$----------→ $M_7 = [X]y$

IF

$M_7 = [X]y$----------→ $M_2 = xY$

The perfect dominant component based green market GM under externality neutrality assumptions

If the perfect green market model GM = BCa in Figure 2 above operates under social externality neutrality assumptions, then the pressures from the social externality "a" it generates when expanding are irrelevant as indicated by all the broken arrows; and therefore, there is no need to evolve as by assumption it is not under sustainability threats from social externality 'a', a situation that can be indicated as in Figure 3 below:

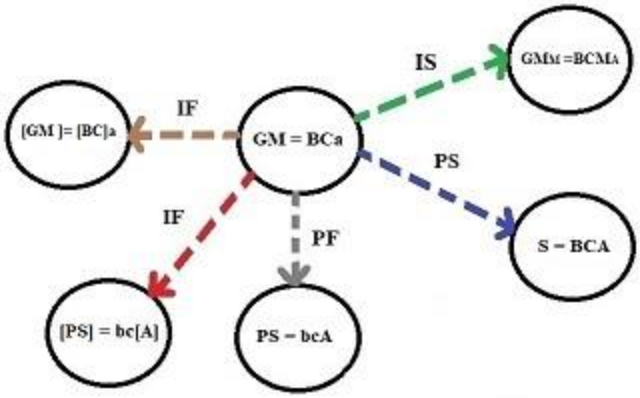

Figure 3 The perfect green market(GM) under no social externality 'a' pressures provides the structure of a market without limits to growth and no fear of collapse

The broken arrows in Figure 3 above indicate the idea that under social externality neutrality assumptions there is no need to fix the paradigm nor there is a need to flip to other paradigm forms as the paradigm cannot collapse since growth is unlimited or it has no social limits.

In other words, under social externality neutrality assumptions the perfect green model GM can expand for ever without generating social externalities such as 'a', which allow it to operate outside the pressures of sustainability gaps(SG_A) from passive social component "a" as indicated in Figure 4 below:

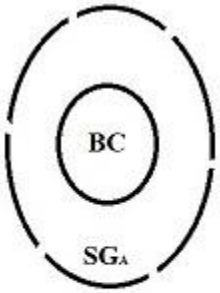

Figure 4 The perfect green market(GM) under no limits to growth as the social externality driven sustainability gap SG_A is non-binding since GM = BCa

We can see based on Figure 4 above that without social sustainability gap pressures $SG_A = 0$ by assumption, the perfect green market model GM driven by dominant components BC displays unlimited growth as it could expand for ever without social sustainability gap's restrains. In other words a perfect market like the green market GM can expand for ever under social externality neutrality assumptions.

The perfect dominant component based green market model GM under binding social externality assumptions

When there is no social externality neutrality assumptions there are sustainability gap pressures(SG_A = a) so that when social externalities become binding(BSG_A = a), they place limits to the growth of the perfect green market model GM as shown in Figure 5 below:

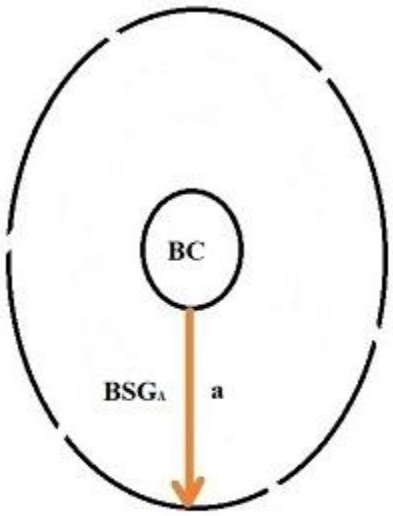

Figure 5 The perfect green market(GM) under binding social sustainability gap pressures BSG_A so GM = BCa

Figure 5 above points out that social externality "a" can become a binding externality BSG_A capable of even forcing the collapse of the perfect green market model GM if no action is taken to save it. In other words, when the social externally "a" becomes a binding externality(BSG_A) it forces stakeholders to fix it, fully or partially, to save it to maintain the core values of the perfect green market GM or it forces them to accept that the perfect green market GM as it is known will collapse and flip to take the form of other paradigms with different core values. Hence, we should expect that stakeholders who support the perfect green market model GM will first try to take actions to save it; and only and only when they cannot save the perfect green market paradigm they will accept the collapse and flip options.

i) The options available to save the perfect green market model GM from collapse under binding social sustainability gap pressures

To avoid the collapse of the perfect green market GM under binding social sustainability gap pressures(BSG_A) from externality "a", we have two options: i) a full social fix by shifting it to perfect sustainability model "S" where there are no longer pressures from externality 'a" and ii) a partial social fix by placing the perfect green market model GM under social externality "a" management frameworks GM_M, as it can be appreciated in Figure 6 below:

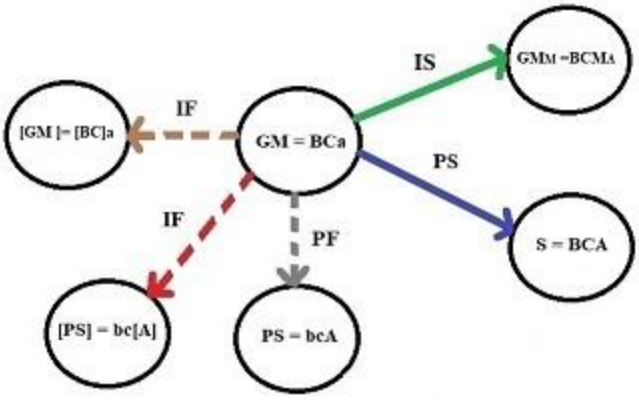

Figure 6 **The perfect green market(GM) under binding social externality presssures and the ways to avoid collapse provides the structure of a full social fix and of a partial social fix**

The continuous arrows in Figure 6 above indicate the two options available to save the green market GM from collapse; and the broken arrows indicate that if the green market paradigm can be saved there will be no collapse; and therefore, there will be no paradigm flips to opposing views paradigms. The blue arrow in Figure 6 above shows the perfect shift(PS) from the perfect green market model GM to a higher level perfect market model S or sustainability market; and the green arrow indicates the imperfect shift(IS) from the green market model GM to externality management based green market model GM_M, those shifts are addressed analytically below.

1) The perfect social fix option

The blue arrow in Figure 6 above shows the full social fix option, the perfect shift(PS) from the perfect green market GM = BCa to the perfect sustainability market S = BCA, which is achieved by internalizing the social externality cost of "a" in the pricing mechanism of the perfect green market GM so it perfectly shifts, a situation that can be expressed analytically as follows:

PS

GM = BCa----------→S = BCA

The expression above tells us that if "a-------→A", then the perfect green market model GM will perfectly shift(PS) to the perfect sustainability model "S" as there are no longer externality gaps associated with the cost of social externality "a".

2) The partial social fix option

The green arrow in Figure 6 above indicates the partial social fix option, the imperfect shift(IS) from perfect green market GM = BCa to imperfect externality management based green market $GM_M = BCM_A$], which is achieved by managing the social externality cost of 'a' as "M_A"

so that $BSG_A = a > M_A$, which sets externally the new pricing mechanism of the imperfect social externality management based green market GM_M so it imperfectly shifts, a situation that can be expressed analytically as follows:

IS

$GM = BCa \dashrightarrow GM_M = BCM_A$

The expression above tells us that if "$a \dashrightarrow M_A$", then the perfect green market model GM will imperfectly shift(IS) to imperfect social externality management based green market model GM_M, a market where still there is a remaining social externality gap associated with externality "a" since $BSG_A = a > M_A$.

3) The role of paradigm shift knowledge gaps in terms of the best saving option to implement

If there are no sustainability market based paradigm shift knowledge gaps, then whether to implement a full social fix or a partial social fix to save the green market paradigm may depend on politics and academic will, not on science. If there are no sustainability market based paradigm knowledge gaps then the best solution to save the dominant perfect green market paradigm is the science based solution, which is the implementation of the full green market fix through full social externality cost internalization to induce a perfect shift. However, the science based solution may not be politically feasible so implementing a partial social fix through social externality management frameworks may be the politically feasible option as green market prices can then be kept lower. But implementing a non-science based solution when there are no sustainability market based paradigm shift knowledge gaps because it is more politically feasible requires the existence of willful academic blindness as when there are no sustainability market based paradigm shift knowledge gaps science leads to a full social fix, not to a partial social fix. If there are sustainability market paradigm shift knowledge gaps, but there are no knowledge gaps affecting the implementation of the partial social fix, then such a partial social fix to the green market may be used to gain time to close the sustainability market based paradigm shift knowledge gaps for a later transition to the perfect sustainability markets. Notice that a partial social fix of the green market model GM in the long term may collapse as the remaining social externality gap affecting the social externality management based green market is still active. If there were both, social externality management based knowledge gaps and sustainability market based knowledge gaps at the same time, then the green market cannot be fixed and it would collapse.

ii) The option of perfect green market model GM collapse when it cannot be saved from binding social externality pressures

If the perfect green market model GM is under binding social externality pressures(BSG_A) and there are sustainability market based paradigm shift knowledge gaps and there are social externality management market based paradigm shift knowledge gaps or the

partial social fix fails in the long term due to growing $a > M_A$, then the perfect green market cannot be saved, and this perfect green market will collapse. And hence, if the perfect green market cannot be saved, it will flip perfectly or imperfectly to opposite or inverse opposite forms, and if possible it will flip towards a market form that still allow it to keep some of the core values they had before the flip.

When a perfect market model like the green market model GM cannot be saved it will flip as shown in Figure 7 below:

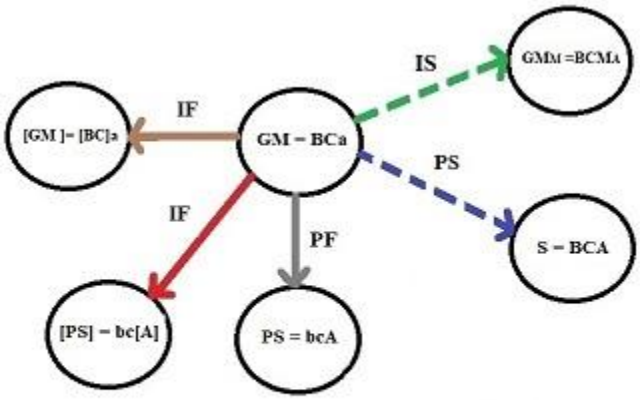

Figure 7 The perfect green market(GM) under binding social externality pressures when it can not be saved and collapses provides the structure of all possible paradigm flip routes

The broken arrows in Figure 7 above tell us that the perfect green market paradigm GM cannot be saved and that for this reason it has 3 paradigm evolution options: i) a perfect flip(PF) from perfect green market GM = BCa to the inverse opposite perfect social market PS = bcA as indicated by the gray arrow; ii) an imperfect flip(IF) from perfect green market GM to the inverse opposite imperfect social market [PS] = bc[A] as indicated by the red arrow; and iii) an imperfect flip(IF) from perfect green market GM to imperfect green market [GM] = [BC]a as indicated by the brown arrow. These paradigm flips are described in detailed below:

1) The perfect flip from perfect green market GM to perfect social market PS

The flip from perfect green market GM to perfect social market PS as indicated by the gray arrow can be stated as follows:

PF

GM = BCa----------→ PS = bcA

Notice that when perfect dominant components "BC" go perfectly to passive components "bc" so that BC----→bc, then the perfect green market model GM flips to the perfect social market model PS as then "a--------→A. It is a flip from a perfect market to the inverse opposite perfect market.

2) The imperfect flip from the perfect green market GM to perfect inverse opposite social market model [PS]

The flip from perfect green market GM to imperfect inverse opposite social market [PS] can be written as follows:

IF

GM = BCa----------→ [PS] = bc[A]

Notice that when perfect dominant components "BC" go to "bc" so that BC----→ bc and when a-----→[A] , then the perfect green market model GM flips to the imperfect social market [PS]. It is a flip from a perfect market to the imperfect inverse opposite dominant component market or dictatorship based social market.

3) The imperfect flip from perfect green market GM to the opposite green market

The flip from perfect green market GM to imperfect green market [GM] can be indicated as follows:

IF

GM = BCa----------→ [GM] = [BC]a

Notice that when perfect dominant components "BC" go imperfectly to '[BC]" so that BC-----→[BC] and passive component "a" stays passive, then perfect green market model GM flips to imperfect green market model [GM]. It is a flip from a perfect market to a dictatorship based market.

4) Political and legal loyalty structures and core values and paradigm flips after collapse

After paradigm collapse, the political and legal loyalty under which perfect green market GM operated flips to the political and legal loyalty structure under which the new paradigms operate. If stakeholders, take steps long before or just before the collapse to transition towards a preferred flip structure that allows them to keep some portion of the core values the collapsing model had before the collapse they will try to transition there. For example, a flip from green markets to either perfect or imperfect social markets means a total loss of their eco-economic based core values, but a flip to a green market under dictatorship still allows them to keep some of those core values so when stakeholders know that the green market is collapsing they will try or they should be expected to try to transition towards imperfect green markets or green markets under dictatorship.

Food for thoughts

a) Does the flip from perfect green markets to imperfect green markets means a flip in political and legal loyalties? I think yes, what do you think?; b) Are both, dictatorship based green markets and social externality management based green markets, imperfect markets? I think yes, what do you think?; and c) Is a dictatorship based green market a green market without eco-economic freedom? I think yes, what do you think?

Conclusions

1) It pointed out that under social externality neutrality assumptions the perfect green market model has no limits for growth; 2) It was indicated that the perfect green market paradigm can be saved from collapse when under binding social externality pressures, both through a full social fix or a partial social fix; 3) It was highlighted that if there are no sustainability market based paradigm shift knowledge gaps, then the full social fix is the science based solution, but it may be the less politically feasible option; 4) It was stressed that implementing the non-science based solution or partial social fix to save the perfect green market paradigm when there are not sustainability market paradigm shift knowledge gaps because it is a more politically amenable option needs the existence of willful academic blindness; 5) It was mentioned that if the perfect green market paradigm cannot be saved because of the existence of sustainability market based paradigm shift knowledge gaps and social externality management market based knowledge gaps or the partial social fix fails, then it will collapse and flip to either the opposite model or to the perfect inverse opposite model or to the imperfect inverse opposite model; and 6) It was said that if actions are taken to transition to a preferred paradigm flip when approaching paradigm collapse in order to maintain the some portion of the core values they had before the collapse like when flipping from perfect green markets to imperfect green markets they should be expected to transition there.

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