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GLOBUS WORKING PAPER NO. 2011-3

THE USE AND USEFULNESS OF OECD's "GREEN GROWTH DIAGNOSTICS"

Harald Sander

1st Draft: 24.12.2011
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THE USE AND USEFULNESS OF OECD's "GREEN GROWTH DIAGNOSTICS"

by

Prof. Dr. Harald Sander*
Professor of Economics and International Economics, Faculty of Economics and Business Administration, Cologne University of Applied Sciences, Claudiusstr.1, 50678 Köln, Germany.

Abstract:
On 25 May 2011, the OECD launched a "Green Growth Strategy" and proposed a "Green Growth Diagnostics" approach to identify the binding constraints on green growth. This paper discusses the potential use and usefulness of this approach as a means to identify those binding constraints. It is argued that the approach is best used at the meso level for industries and certain environmental challenges. The paper proposes a modified green growth diagnostics approach for eco-innovations at the meso level that can be useful for informing and organising a rational policy dialogue amongst all stakeholders.

Keywords: green growth, growth diagnostics, externalities, sustainability, policy dialogue
JEL Classification: H23, O44, Q56

* Author contact: Tel.: +49-221-8275-3431, Fax: +49-221-8275-3135, E-mail: harald.sander@fh-koeln.de (Harald Sander)

1. Introduction

On 25 May 2011, the OECD launched a "Green Growth Strategy". In OECD (2011a) a "Green Growth Diagnostics" approach, a variant of the "growth diagnostics approach" advocated by Hausman et al. (2008), was proposed. As a methodology used to identify the binding constraints on growth in developing economies, its central idea has been appropriated by the green growth diagnostics approach, namely, that not all constraints to (green) growth are equally binding. It thus becomes economically efficient to identify the most binding constraint and address this problem first. In so doing, one may be able to identify the policy areas and actions that have the greatest impact on greening growth while at the same time ensuring cost-benefit efficiency of policy instruments.

This paper discusses the use and the usefulness of the power of this approach to identify binding constraints to green growth. It argues that the approach is best applied not at the economy-wide level but at the level of industry and for particular environmental challenges; in this way, it can help unravel the factors that hold back eco-innovations (OECD, 2009: 40). This concept of eco-innovation is rather broad and covers everything from technological improvement in resource efficiency to societal innovations. This paper demonstrates that with just a few modifications a green growth diagnostics approach can serve as a useful instrument to identify binding constraints on the 'greening' of a broad array of economic activities. However, the paper also contends that the main value of a modified green growth diagnostics approach is its usefulness as an instrument for informing and organising a rational policy dialogue amongst all stakeholders by helping to clearly identify all the policy alternatives and their opportunity costs.

The paper is organised as follows: section 2 offers an introduction to the green growth diagnostics approach and discusses it critically. Section 3 presents a green growth diagnostic for eco-innovations. Section 4 is the conclusion.

2. The OECD's Green Growth Diagnostics Approach

2.1 Green Growth, Sustainability and Externalities

Before discussing what green growth diagnostics aims to diagnose, I will briefly review OECD's green growth concept and its relation to the concepts of sustainability and external effects.[1] According to the OECD's main report, *Towards Green Growth*, "[G]reen growth means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies" (OECD, 2011b: 9). This definition immediately calls to mind the notion of sustainable development. OECD (2011b: 11) offers a clarification of the relationship between green growth and sustainability:

> "Green growth has not been conceived as a replacement for sustainable development, but rather should be considered a subset of it. It is narrower in scope, entailing an operational policy agenda that can help achieve concrete, measurable progress at the interface between the economy and the environment. It provides a strong focus on fostering the necessary conditions for innovation, investment and competition that can give rise to new sources of economic growth – consistent with resilient ecosystems."

The concept of green growth is therefore, on the one hand, much narrower in scope than the concept of sustainability in as much as it concentrates on the environmental and economic pillars of the sustainable development but leaves out the social dimension. Moreover, — and if we accept this narrower focus, even in its so-called weak definition — sustainability demands maintenance of overall (global) economic and natural capital.[2] In contrast, according to the strategy of the OECD, green growth entails everything that compromises the "ability of future generations" to a lesser extent than "business as usual". Even as it emphasises fostering economic growth, the OECD concept requires "progress" in, rather than the absolute decoupling of, environmental damage from economic growth; any such progress is understood as green growth. On the other hand, however, the sustainability concept is narrower than green growth if it is understood only as a concept for inter-generational

[1] There has been an important and extensive debate on the relationship between the concepts externalities and sustainability and whether the internationalization of externalities is sufficient to ensure sustainability. Major contributors to the debate in *Ecological Economics* are Baumgärtner and Quaas (2010a, 2010b), Bartelmus (2010), van den Bergh (2010), Bithas (2011) and Ballet et al. (2011).

[2] "Weak sustainability" allows for the depletion of natural resources provided future generations are compensated for the loss in natural capital, e.g., by a higher stock of physical capital or technological know-how. By contrast "strong sustainability" demands that the stock of natural capital be maintained. Depending on one's point of view, this can range from a demand to maintain a broad based "aggregate natural capital" to a very strict view on each subset of natural capital.

equity. Green growth must also take into account intra-generational equity and should not lose sight of the "needs of the present generation" because much of the environmental damage often occurs at the expense (and the health) of the present generation.

Because green growth is intrinsically tied to the costs/expenses of present and future generations, it may be appropriate to choose the economic concept of external effects as a point of reference for green(-ing) growth. Externalities simply refer to the fact that the utility of one or several actors is affected by the actions of somebody else. As a static concept, a negative externality means that somebody harms someone else without compensation. As a result, the economic incentives favour such behaviour and lead to a misallocation of resources and thus welfare losses. As a dynamic concept, inter-temporal externalities basically reflect the concept of sustainability. As argued by van den Bergh (2010: 2048), "…without such externalities the problem of unsustainability vanishes, unless sustainability is defined to cover resources or environmental stocks that bear no relation whatsoever to human welfare." Thus, greening growth will always imply addressing externalities. As far as inter-temporal externalities are concerned, greening growth also addresses the problem of sustainability – though only partially and only as much as it gives "…rise to new sources of economic growth consistent with resilient ecosystems."

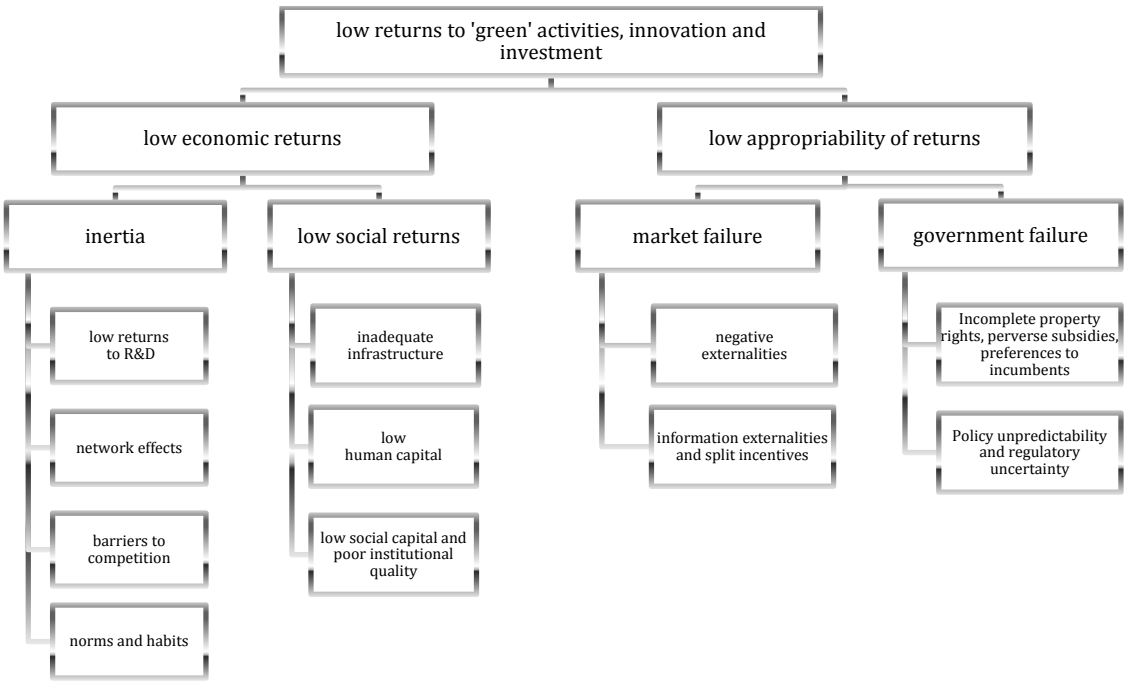
As such, the concept of sustainability suggests that economic growth and resilient ecosystems are not in opposition and that win-win solutions are possible, provided that we can identify the right policy agenda. This idea is closely related to the green economy approach launched by UNEP (2011), which is also based on the idea that achieving sustainability "rests almost entirely on getting the economy right."

2.2 Green Growth Diagnostics

Green growth diagnostics is a tool proposed by OECD (2011a) to identify binding constraints to green growth. As such – and in analogy to its role model "growth diagnostics" – it should be understood as an exercise to derive policy priorities. The green growth diagnostics approach follows the view developed by Hausman et al. (2008) that we should particularly strive to identify the binding constraints to economic growth in developing economies. This approach is grounded on three basic

ideas. First, the resources for promoting growth are limited. Hence, they should be used where the growth effect is highest. This involves not only economic resources but also – and in many cases even more so – political resources for reforms. Second, not all growth constraints are (equally) binding. For instance, many developing countries do have bad infrastructure, low human capital, and weak governance structures, but not all of these factors must be binding constraints. If, for instance, corruption holds a country back, investment in human capital may eventually result in higher migration rather than higher growth. Thus, growth diagnostics, by identifying binding constraints, can help devise a growth strategy with a clear sense of priorities. Third, and as a result of the first two ideas, the approach argues strongly for a country-specific policy approach as constraints are not equally binding under all circumstances and at all levels of development. Figure 1 presents the green growth diagnostics approach.

Figure 1: OECD (2011a) Green Growth Diagnostics



The OECD approach identifies two causes of "low returns to 'green' activities, innovation and investment" and thus too low a level of economic activity in relation to a socially optimal level. The first reason identified is that these returns are indeed low - either because of low social returns or because of some kind of inertia. If this is not the case, low appropriability of these returns is identified

as the problem, which results either because of government failure (such as incomplete property rights) or because of market failures, in particular negative externalities.

An important aspect of the proposed diagnostics model is the breadth of the green growth constraints listed in Figure 1. In particular, it is very constructive that the list of green growth constraints is extended beyond the usual reference to negative (environmental) externalities because it draws attention to the fact that green growth can be constrained by the path dependencies of R&D activities, slow-changing norms and values, and insufficient complementary resources, such as inadequate infrastructure and low human capital. Additionally, if the figure is read in the spirit of the growth diagnostics approach, the authors seem to infer that this could happen even if one would correct for negative environmental externalities, e.g., by internalising them into the prices. This would mean that the internalisation of external effects is at best a necessary but not a sufficient condition for greening economic growth. This is a very important and valuable addition to both the theory of externalities and the sustainability approach. In section 3.2, I will elaborate more on this.

Closely related to this point — and again in the spirit of growth diagnostics — the proposed diagnostics model recognises that a country-by-country approach is needed. The OECD highlights the crucial role of a country's level of development:

> "The importance of constraints to green growth will vary according to level of development, socio-economic context, and existing economic and environmental policy settings. Low human capital or inadequate infrastructure will tend to be associated with lower levels of economic development (though not exclusively). Rectifying these constraints will be of high priority and perhaps a precondition to resolving many other constraints. Where human capital is relatively abundant and infrastructure relatively well-supplied, the focus should first be on resolving government and market failure." (OECD, 2011a: 6)

While I believe that this approach does make some valuable contributions, my first encounter with the approach – at least as it has been presented to the public – has led me to believe that there will be some difficulties when it is applied in practice. Recall that the main idea of the (green) growth diagnostics approach is to identify binding constraints. I have three points here. First, the potential for greening growth differs greatly across industries. Thus, focusing on these industries should already be part of the green growth diagnostics exercise. Second, identifying green activity constraints cannot be reasonably performed at the macro-economic level but only at the meso level, i.e., at the level of

particular industries and environmental challenges (e.g., CO_2 emissions). Third, the present organisation of the decision tree may not be optimal for identifying policy priorities that are dependent on specific circumstances.

With respect to the first issue, the approach focuses on greening national economic growth. If it is overall growth that is supposed to be "greened," one must use a composite index of the **overall** environmental impact of **all** economic activities within a country. Clearly, the OECD approach addresses national policymakers; thus its focus is national, and there is nothing wrong with policymakers as a target. However, at the national level (depending on the level of development), it is well known that the constraints to greener growth vary considerably across industries. Greening growth in a well-targeted manner must recognise this, and it should, therefore, focus on industries, as it is well documented that they vary drastically in their environmental impact. When identifying binding constraints on green growth, one should therefore target industries with the highest potential for greening growth. As such, working through the growth diagnostics tree would then only be the second step in the process, namely, after the problem sectors of the economy have been identified.[3]

Second, green growth diagnostics can only be meaningfully performed when they conducted at the industry level or at the level of certain environmental challenges, e.g., pollutants. It is very clear that each industry will face very different binding constraints. A similar point can be made for certain pollutants. Here, the empirical relationship between development level and environmental damage by category has been extensively documented by the estimates of the so-called "Environmental Kuznets Curve" (EKC). Whereas, for example, sulphur dioxide (SO_2) emissions tend to decrease after surpassing a middle per capita income level of round about 5-6000 US-$, the search for an EKC for CO_2 has only recently brought results for very high per-capita levels (Frankel and Rose, 2005; Frankel, 2009). When the green growth diagnostics are focussed on certain pollutants, rather than on greener growth per se, it becomes easier to identify binding constraints at a national level with an explicit consideration of the country's level of development. In fact, OECD (2011b: 129) provides such an

[3] For example, in an important, recent empirical study, Muller, Mendelsohn and Nordhaus (2011) have developed a methodology to calculate the "gross environmental damage" (GED) of sectors and industries, both in absolute values as well as in percent of value added. It is striking that the GED in some industries, e.g., in coal-fired electric power generation, even exceeds the value added produced in that industry.

analysis. However, it is striking that here almost all the constraints listed in the decision tree are listed again as constraints for green growth with respect to climate change.

Third, the organisation of the decision tree itself. To start with, consider the first decision node in the growth diagnostics decision tree in Hausman et al. (2008). The distinction between the two sides of the decision tree is obvious: If you have a good project with positive returns, it could be held back by a lack of finance – hence finance would be the binding constraint. If finance is not the binding constraint, e.g., as evidenced by low real interest rates, low rates of investment may have their source in low returns on these investments – for a variety of reasons that have to be explored in later steps. In OECD's green growth diagnostics, however, this is not that clear-cut. Even OECD (2011a: 6) acknowledges that "[T]he categories of constraints described in Figure 1 are not entirely separable". However, the question is then whether the categories chosen are really useful for the diagnostics and whether the whole exercise would then be useful at all. If not, the approach in its presented form would only result in just another collection of environmental indicators rather than an aid to identify binding constraints. [4]

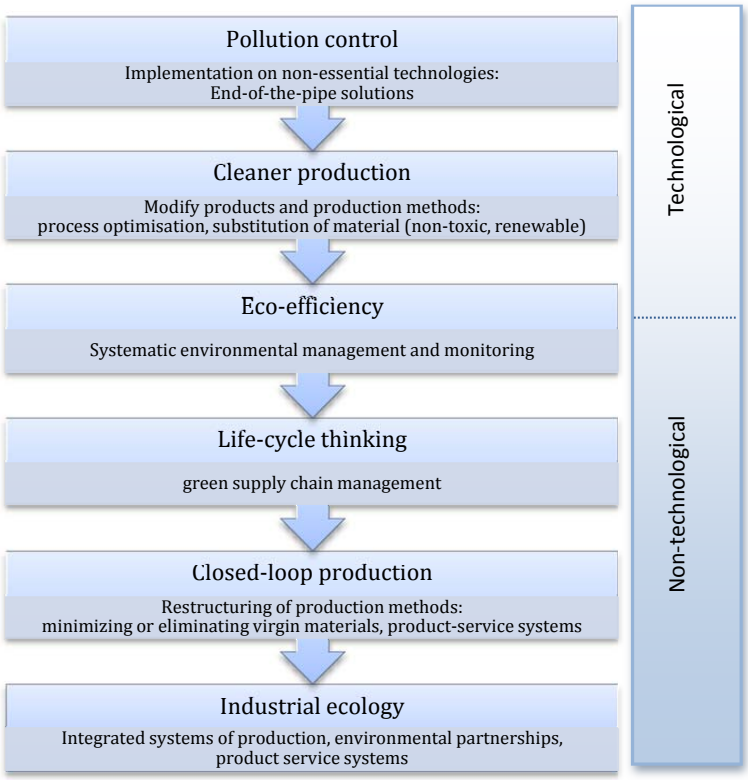
3. A Green Growth Diagnostics Approach for Eco-Innovation

3.1 Greening Growth by Means of Eco-Innovation

In the following section, I will modify the green growth diagnostics with a view towards providing a useful instrument for the identification of binding constraints with respect to environmental challenges and industries. To cover both, it is useful to link the growth diagnostics with the concept of eco-innovation. OECD (2009: 40) suggests that eco-innovation can be described as "the implementation of new, or significantly improved, products (goods and services), processes, marketing methods, organisational structures and institutional arrangements which, with or without intent, lead to environmental improvements compared to relevant alternatives." The concept of eco-innovation is rather broad and covers everything from technological improvements in resource efficiency to societal innovations in the mobility concept and work-life balance. Figure 2 illustrates the concepts.

[4] In fact, Chapter 4 of *Towards Green Growth* (OECD, 2011b) introduces a set of indicators that is based on the green growth diagnostics exercise.

Figure 2: Levels of Eco-innovation



Source: Based on OECD (2009: 37, 47)

Pollution control addresses product level while "cleaner production" also involves production processes. Both concepts are technological in nature while the other concepts increasingly rely on non-technological organisational and societal innovations, including changes in values and norms. In particular, product-service systems (PSS) that focus on delivering product functionality rather than the product itself can significantly change the way we use resources and the level of efficiency with which we use them. For example, instead of relying on PCs with huge memory storage, cloud computing can reduce resource use. The automobile industry is increasingly – at least partly – focusing on supplying mobility. Leasing systems are another example where the customer is provided with the product service but the ownership of the product is retained by the producer – thus allowing for a (more) closed-loop production. Mobile phones may be another case in point given the value and scarcity of the input materials, such as gold and rare earth metals – not to mention the damaging effects to the health of the environment of the informal recycling of electronic waste in several poor regions of the world. It is clear that the more we break with the purely technological point of view and adopt a systems perspective, the more important inertia factors can be seen as constraints to green(-er) growth.

Conversely, changing societal values and norms along with developing greater openness to innovation, various organisational structures and (R&D-) networks can reduce inertia and thus promote effective eco-innovation.

Transcending the narrow limits of technological eco-innovations and lessening both behavioural and societal binding constraints have therefore the potential to unleash enormous positive environmental effects. The task of green growth diagnostics may thus be to identify to what extent these factors are indeed binding constraints for a particular industries at various levels of eco-innovations – and eventually address them.

3.2 A Green Growth Diagnostics Decision Tree for Eco-Innovation

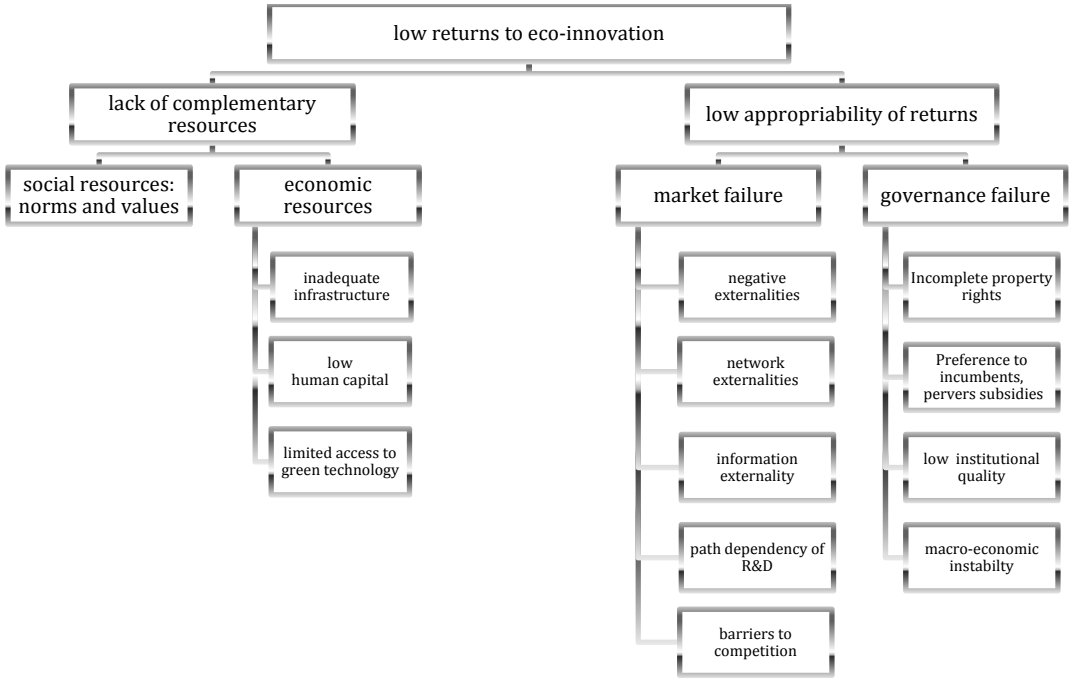
To redesign the decision tree, I start from the observation that eco-innovation for different pollutants and/or environmental challenges as well as different industries have their own greening problem that needs to be diagnosed separately. The green growth diagnostics should therefore identify what holds back eco-innovations that could have a less severe environmental impact of either a particular industry or with respect to a certain pollutant or environmental challenge. The researcher would therefore also have to identify the level of eco-innovation he or she is addressing clear.

The second step involves setting up the green growth diagnostics in a way that it can help the researcher identify the binding constraint. To do so, consider the following set-up: Assume a world without governance and market failure (e.g., because the latter would have been properly addressed). Even in this world, a lack of complementary resources, such as infrastructure, human capital or access to technology, could impede eco-innovation. To state this the other way around, addressing market failures or assigning property rights would hardly bring about any greening of innovation if these complementary resources were lacking. A similar point could be made for social resources, namely, norms and values. They can be viewed as behaviour in opposition to eco-innovation, such that it results in non-acceptance of eco-product innovations and a continuation of traditional behaviour even after the proper internalisation of externalities, e.g., the consumption of traditional fuels would not change with increasing fuel prices or the rejection of less resource-intensive products, processes, PSSs,

organisations and institutions. As a result of this behaviour, eco-innovations would be effectively constrained.

If we therefore reorganise the OECD growth diagnostics along these lines, we can obtain a much clearer distinction between the left-hand side (LHS) and the right-hand side (RHS) of the diagnostics tree and thereby in fact generate a different decision tree.[5] I will therefore move all the constraints mentioned by OECD (2011a) on the left-hand side – except norms and habits, infrastructure and low human capital - to the right-hand side. I do so partly because they do represent failures of the market (e.g., network effects, inertia in R&D, barriers to competition) and partly because they are a failure of governance (low social capital and poor institutional quality). More importantly, the LHS of the decision tree allows for a much stricter control of country-specific (development) factors. To the LHS, I also add "access to green technologies", a category that is missing in the OECD green growth diagnostics.

Figure 3: Green growth diagnostics for eco-innovation



[5] To compare with the OECD diagnostic, just assume that appropriability would be the problem of a negative environmental externality in the very classical sense. In such a case, private returns would be lower than social returns. How can the OECD diagnostics then exclude the possibility that low economic returns are at the root of low green investments? The existence of a non-internalized externality can go hand in hand with too low returns. Thus, we have no clear indicators that can help us identify the binding constraints along the lines of the proposed decision tree unless we assume that all the factors listed on the left-hand side are constraining the factors that override the externality problem. This seems not to be the view of OECD (2011a), as it allows for a plethora of factors constraining green growth simultaneously, thus contradicting the idea of a binding constraint.

Given this re-organisation of constraints, it becomes possible to run some tests to determine which ones actually are binding. If indeed complementary resources are binding, then the economy should be on the left-hand side of the EKC, indicating that low per capita income (and hence the highly correlated variables infrastructure, human capital and access to green technology) are potentially binding constraints. Additionally, all the indicators of infrastructure, human capital, level of technology and access, both potential as well as those currently existing, and new surveys on "binding constraints," help in judging whether or not the left-hand side is binding. Of course, some additional differential diagnostics are needed to make sure that the right-hand side of the decision tree is not the binding one. Such tests could consider improvements in governance and policies that address the market failures, such as environmental policies, and determine their relation with the outcome. If changes in these areas do not result into major improvements on greening economic activities, it is most likely that complementary economic resources are the major binding constraint.[6] Of course, if the lack of complementary resources is identified as the binding constraint, green growth policies should prioritise these areas rather than, e.g., launching a costly system of financial incentives to set up business networks.

If we find, however, that the LHS is not binding, then low appropriability of returns is the likely suspect. In such a case, it would be easiest to begin the diagnostics by analysing the failures of governance.[7] Data and analysis at the country level are readily available at internationally comparable levels, such as the World Bank's regularly published governance indicators and "doing business" surveys as well as the increasing number of growth diagnostics studies in the spirit of Hausman et al. (2008). Additionally, researchers can design their own studies that could cover the issues listed here more explicitly. Finally, "perverse subsidies" typically stand out and are indeed often an expression of favouring incumbents. However, here the devil may lie in the details, especially when many institutions at various levels (e.g., national, regional, and local) are involved that are often conducting contradicting policies. However, at least it should be possible to identify major governance constraints and their impact on "green" innovation. It should, however, be emphasised that some of the items

[6] For reasons of space, I will not discuss the whole process of (green) growth diagnostics here. The reader is referred to Hausman et al. (2008), who discuss the diagnosing process in detail.

[7] I use the term governance failure rather than government failure as is done by OECD (2011a) because I also include low institutional quality and macro-economic instability here.

listed under governance failure are indeed very general and could hinder both dirty and green innovation. What the researcher must demonstrate in green growth diagnostics is that these failures are detrimental to the greening of innovation. One should then seek to draw a distinction between governance failure and market failure, allowing for differential diagnostics.

With respect to market failure, it cannot be stressed enough that negative externalities are **always** at the heart of the problem of insufficient eco-innovation or a "not-green-enough" growth path. Without externalities, the problem would simply not exist. Externalities are a necessary condition for "dirty growth". However, it is not sufficient to internalise them to obtain green growth and an inter-temporal optimal allocation of resources. The point here is that even after proper internalisation eco-innovation will be restrained. This is rather clear for barriers to competition. I will therefore highlight this issue for the case of path dependencies of R&D.

Imagine that all the externalities of all CO_2 emissions are internalised and that bad governance is not the problem. Would we then obtain more eco-innovations? A recent study on automotive patents by Aghion et al. (2010) sheds light on this issue. The authors investigated the industry's patent history by distinguishing "clean" from "dirty" patents. The authors were able to establish a significant positive effect of fuel prices on cleaner innovation. Thus, internalisation would redirect innovation into a cleaner direction, just as one would expect from the theory. However, even after controlling for the price internalisation effects, the authors showed that companies with a dirty patent history are less engaged in clean patents, while a company with a clean patent history tends towards clean patents. The lesson is that internalisation may be not enough. If an industry shows strong path-dependence – especially when the industry has a history of dirty innovation – there is a strong case to be made for policies other than just price internalisation to redirect innovation towards eco-innovation.

While the reasons for path-dependence as outlined above have to do with knowledge spillovers within the company — a group of engineers with a history of dirty or clean patents pass down their knowledge to the younger generation — network externalities refer to co-ordination failures with respect to other companies in the industry or – in a broader context – with the remaining supply chain or (potential) product-service and closed-loop systems. In such cases, eco-innovations would be profitable for each economic agent if all – or at least a critical mass of – economic agents

would embark on a certain course of eco-innovation. Individual actions, however, would not be profitable. Again, it is clear that such a problem can occur even after internalisation, and the higher the level of eco-innovation is envisioned, the more likely they are to occur.

Of course, the modified green growth diagnostics advocated here are not completely free of overlap and, similar to the OECD's (2011a) version, also not entirely sequential. But, neither is the approach of Hausman et al. (2008). However, with eco-innovation as the point of reference, the approach should allow for a well-structured analysis and a well-founded identification of the binding constraints to eco-innovation and green growth with proper reference to country-specific circumstances.

The strength of the (green) growth diagnostics approach is that it provides a framework to analyse the alternative relevance of binding constraints over time. The particular value of the diagnostics approach is therefore not so much that it offers a new methodology, but rather that it provides a framework for a policy dialogue amongst all parties concerned with a view towards identifying the most binding constraints in a particular area and at a particular time.

5. Conclusion and Outlook

A green growth diagnostics is feasible, sensible and useful to identify binding constraints to greening growth through eco-innovation. However, it is neither something completely new nor a paradigm shift. Some researchers may look at it as just a new directory in the increasingly growing jungle of environmental indicators. But, its real value lies in its capacity to facilitate a dialogue among researchers, policy makers, the corporate sector and civil society. Once we realise that, like in many other economic policy areas, political and ecological reform capital is a scarce resource, then an informed policy dialogue becomes central for devising green growth strategies. A green growth diagnostics at the meso level, properly undertaken, can reveal the binding constraints to greening growth and the cost and benefits of removing these constraints.

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