

## Chapter 3

# Pro-growth structural reforms, the environment and environmental policies

*This chapter examines the environmental pressures related to economic growth, and how these may feed back to future growth and wellbeing. It discusses the role of structural reforms and environmental policies in this respect, and presents recent evidence on the importance of adequate design of environmental policies as well as on their impact on productivity growth.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## Main findings

- Economic growth usually comes with higher pressures on the environment.
- At some point, environmental degradation starts feeding back negatively on future gross domestic product (GDP) and well-being, for instance because of poorer health, water shortages, land degradation, or extreme weather events.
- The relationship between growth and the environment is influenced both by environmental policies and the structural policy framework against which they are implemented.
- Rising incomes and mounting environmental pressures will increase the demand for environmental protection, though likely not enough to fully account for the adverse feedbacks on growth and well-being.
- The stringency of environmental policies can be increased without harming economy-wide productivity.
- This requires environmental policies that are flexible and neutral with respect to technological choices and that minimise barriers to competition.
- Still, a tightening of environmental policies affects firms differently: the most technologically-advanced firms benefit, while the least advanced ones further lose on productivity.
- Some growth-enhancing reforms can also be good for the environment, such as increasing environmental taxes, introducing road pricing or removing harmful subsidies.
- Other growth-enhancing reforms enhance the effectiveness of environmental policies. This is the case of improving the rule of law or competition policies.
- However, most growth-enhancing policies have little or no impact on the relationship between GDP and the environment.

## Introduction

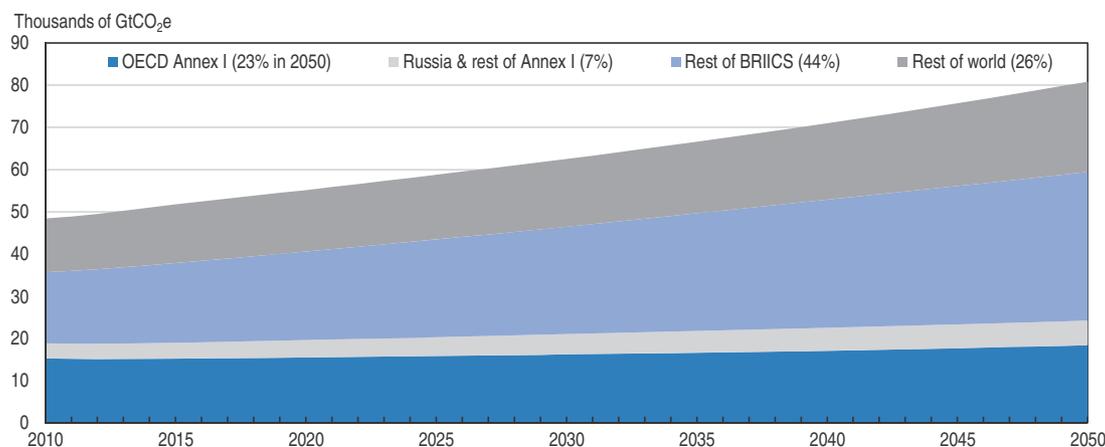
Environmental services are both direct determinants of the wellbeing of citizens and inputs into economic activity. However, they are often not priced efficiently (or not priced at all), and economic activity can hence undermine the ability of the environment to provide services in the future – putting the sustainability of growth and wellbeing at risk. This motivates an increasing attention to the interplay between growth and the environment.

In a dedicated chapter, *Going for Growth 2013* reviewed the potential effects of growth-enhancing policies on the environment. The overall conclusion was that it is difficult to assess the effects of reforms *per se* – more growth is likely to increase pressures on environment, but most recommended reforms should not have major environmental consequences. The environmental consequences would rather be linked to the environmental policies in place and the details in the design and implementation of the pro-growth reform. This chapter takes the analysis a step further, drawing on new evidence on the economic effects of environmental damage and of environmental policies – stringency, instrument choice and design.

## Economic growth is likely to put further pressure on the environment

Other things being equal, economic growth is likely to lead to higher emissions, pollution levels and environmental degradation. For instance, OECD projections show global greenhouse gas emissions rising by over 50% by 2050 in a business-as-usual scenario (Figure 3.1). Over the same period, primary forests are projected to shrink by 13%, leading to a significant loss in terrestrial biodiversity, especially in parts of Asia, Europe and Southern Africa, as well as to concurrent losses in freshwater biodiversity (OECD, 2012). The global demand for freshwater is expected to rise rapidly, straining water availability in many regions: by 2050, some 3.9 billion people – 40% of global population – are likely to be living in areas subject to severe water stress. Air pollution is projected to affect more and more people around the world, driving up mortality and morbidity (OECD, 2014a).

Figure 3.1. **Greenhouse gas emissions are projected to continue increasing around the world**  
Regional projections in a business-as-usual scenario



Note: "OECD Annex I" stands for the group of OECD countries that are also part of Annex I of the Kyoto Protocol.

GtCO<sub>2</sub>e = Gigatonnes of CO<sub>2</sub> equivalent.

Source: OECD (2012), *OECD Environmental Outlook to 2050: The Consequences of Inaction*, <http://dx.doi.org/10.1787/9789264122246-en>.

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At the same time, as incomes and populations grow and environmental pressures mount, demand for a better quality of the natural environment may rise, leading increasingly wealthy societies to adopt more stringent environmental protection measures (see for example Grossman and Kruger, 1995). This can help slow the pace of pollution emissions relative to output growth (relative decoupling) or even lead to an absolute decline (absolute decoupling). Still, several key types of failures (e.g. public good nature of the environment, path-dependency, and international co-ordination issues) and uncertainties concerning environmental effects and the perceptions that environmental policies can harm economic activities can imply that environmental policies may remain insufficiently stringent.

### **Environmental damage can feed back into lower growth and welfare**

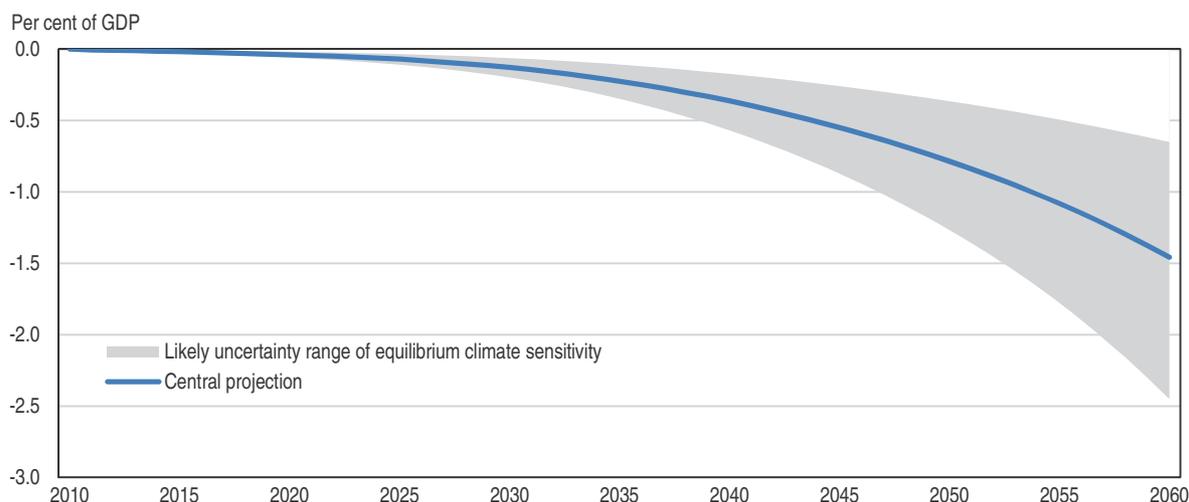
Environmental degradation has substantial costs, affecting current and future wellbeing. In looking at the cost of environmental degradation, several dimensions of wellbeing need to be taken into consideration. One is the impact of the environmental externalities on current and future GDP arising from a range of factors such as reduced crop yields, health-related productivity losses, increased pollution related to road congestion, water shortages, land

degradation and other constraints on the availability and use of natural resources. Large scale systemic environmental disruptions, such as climate change, could lead to much larger GDP impacts. While estimates of such disruptions are subject to high uncertainty, there are numerous attempts to quantify the cost of environmental damage.

OECD modelling work projects sizeable effects of climate change on future GDP growth (OECD CIRCLE project, Dellink et al., 2014; OECD, 2014b). Analysis of the feedback loop from rising environmental impacts to GDP is still at an early stage, and focuses mainly on effects of greenhouse gas emissions. Nevertheless, projections show, under unchanged policies, GDP losses of 0.7% to 2.5% globally, coming largely from lower agricultural productivity and rising sea levels (Figure 3.2). While these partial effects may not appear huge overall, and are expected to materialise in a fairly distant future, they are problematic due to long-term persistence, and the risk of getting locked in a costly path. The estimated effects do not yet include rising health costs and productivity losses related to air pollution in many countries, water scarcity or land degradation. They also do not incorporate effects of biodiversity loss, extreme weather events which climate change is likely to bring about or increasing risks of irreversible large-scale disruptions to the climate system.

**Figure 3.2. Climate change is projected to reduce future GDP**

Global GDP impact based on temperature rise of 1.5°C-4.5°C

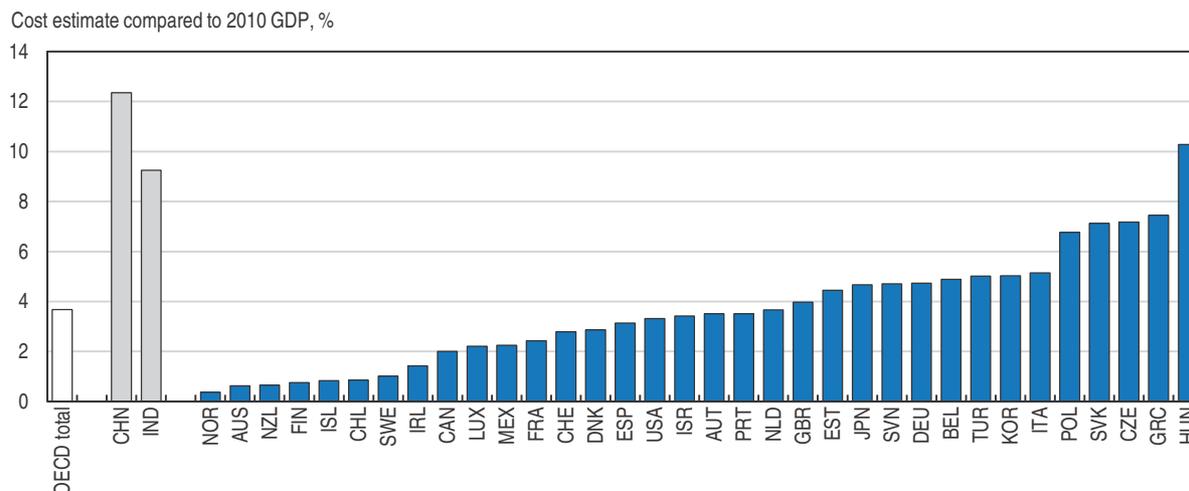


Source: Simulations from OECD ENV Linkages model, Dellink, R. et al. (2014), "Consequences of Climate Change Damages for Economic Growth: A Dynamic Quantitative Assessment", OECD Economics Department Working Papers, No. 1135, <http://dx.doi.org/10.1787/5jz2bxb8kmf3-en>.

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The wellbeing impact of environmental degradation extends beyond climate change and GDP, to other dimensions of the quality of life, not least through health outcomes. Estimates of total costs focus primarily on mortality and morbidity. For instance, the health cost of air pollution in OECD countries (including deaths and illnesses) is estimated to total the equivalent of almost 4% of GDP in 2010 (Figure 3.3), half of which is due to road transport. The wellbeing cost, broadly defined, was estimated at 12% of GDP for China, and at 9% of GDP for India (2005) (OECD, 2014a). The actual effects on GDP may be nuanced – a large part of these effects fall on the non-working population, and health effects may even increase demand, for example, for health services. Still, damage to health affects GDP, through higher absenteeism as well as lower labour productivity and human capital (see Isen et al., 2014; Graff Zivin and Neidell, 2012, 2014).

Figure 3.3. **Estimated costs of air pollution**  
Expressed relative to GDP for comparative purposes



Note: Estimates are derived by multiplying the “value of statistical life” (derived by aggregating individuals’ willingness to pay to secure a small reduction in the risk of premature death) by the number of deaths attributable to outdoor air pollution, as released by the World Health Organisation (WHO) in 2010. Data refer to 2005 for India.

Source: OECD (2014), *The Cost of Air Pollution: Health Impacts of Road Transport*, <http://dx.doi.org/10.1787/9789264210448-en>.

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## Most pro-growth reforms will not substantially affect environmental pressures

The direct effects of most pro-growth recommendations on the environment are unlikely to be substantial. The majority of reforms identified will not affect the environment directly; any effects being due to increased economic activity. More growth will likely lead to a higher use of environmental inputs, but the magnitude of such effects will largely depend on the country context, in particular on the environmental policies in place. Following *Going for Growth 2013*, the country-specific recommendations that are likely to have some environmental effects beyond that solely due to growth are listed in Table 3.1.

None of the reform priorities identified have clear and outright negative consequences for the environment while some can actually reduce the pressures posed by economic growth. The latter is the case for policies that *de facto* strengthen the stringency and enforcement of environmental policies, thereby making polluting and damaging the environment more costly to firms and households. For instance, the recommendation to shift tax structures away from income to environmental taxes would likely result in curbing some types of pollution. Similar effects can be expected from recommendations to implement road pricing and congestion charges, phase-out or reduce fossil fuel subsidies and producer support to agriculture as well as to improve the rule of law. However, even in these cases, the exact environmental consequences are difficult to evaluate, as they will depend on the reform details and the context in which it is implemented (Box 3.1).

## Environmental policies can be good for growth

The negative impacts of growth on the environment can be mitigated by environmental policies. More stringent environmental policies raise the cost of polluting or environmentally damaging behaviour, encouraging mitigation efforts and cleaner production and consumption. They are therefore intended to secure benefits of longer term wellbeing and the sustainability of growth. An immediate question is whether this

**Table 3.1. The effects of Going for Growth recommendations on the environment**

The 2015 <i>Going for Growth</i> priorities (countries concerned)	Potential effect on the environment
<i>Reforms likely to improve environmental quality</i>	
Shifting tax burden from direct to indirect taxes, in particular environment taxes (AUT, BEL, CAN, CHE, COL, CZE, EST, FRA, HUN, ITA, KOR, LVA, POL, USA).	Introduction or increased use of environment taxation discourages environmentally harmful activities via the pricing of externalities.
Introducing/increasing price signals and user fee in public infrastructure (e.g. congestion charges) (AUS, CHE, EST, GBR, NZL, POL).	Adequate use of road and energy infrastructure reduces related emissions and local pollution.
Reducing energy (fossil fuel, etc.) subsidies (IDN).	Curbing excessive energy consumption reduces greenhouse gas emissions and local pollution.
Improving the rule of law (CHN, MEX, IDN, RUS, SVK) and enhancing the efficiency of public administration (GRC, HUN).	Would improve the enforcement of environmental regulations.
<i>Reforms with ambiguous or potentially negative effect on the environment</i>	
Enhancing the efficiency of the tax system by broadening tax bases and reducing tax expenditures (AUS, AUT, CAN, CHE, COL, DNK, DEU, FIN, FRA, GRC, ITA, JPN, LVA, NLD, NOR, SWE, TUR, USA).	Favourable effects as long as the tax preferences encouraging polluting behaviour (e.g. coal heating) are scrapped while those on cleaner activities (e.g. commuting by public transport) are maintained.
Reducing the barriers to competition and FDI in network sectors (AUT, BEL, BRA, CHL, CHN, CAN, DEU, ESP, EST, EU, FIN, FRA, GRC, HUN, ISL, IDN, IRL, ISR, JPN, MEX, NOR, NZL, POL, PRT, SVK, SVN, TUR, ZAF).	Competition may promote entry of more energy-efficient suppliers and use of cleaner technologies, provided that appropriate environmental regulation and pricing are in place. However, lower prices due to competition can increase energy consumption and use of network services (rebound effect).
Increasing capacity and quality of public infrastructure (AUS, BRA, COL, EST, EU, GBR, IND, IDN, LVA, NZL, POL).	Better infrastructure eases congestion and can reduce transport-related emissions, improve energy efficiency, environmental performance and quality of utility services (e.g. better water quality, lower network losses, improved waste management). However, provision of new infrastructure can increase demand, resulting in higher emissions. Infrastructure construction can cause the deterioration of landscapes such as deforestation.
Reducing producer support to agriculture (CHE, EU, ISL, ISR, JPN, KOR, NOR, TUR, USA).	Reducing intensive land use for agriculture and use of fertiliser/pesticide improves the eco system and reduces emissions of greenhouse gasses. However, scrapping support to eco-farming may discourage cleaner agriculture.
Reform land, zoning and planning restrictions (DNK, FIN, GBR, IND, IRL, LUX, NLD, POL, SWE).	Less strict zoning regulation (e.g. for retailers) can improve traffic patterns, reducing congestion. However, de-regulation of land-use can result in degradation of the environment such as deforestation or destruction of eco-systems.
Reduce rent regulation and housing subsidies (DNK, LUX, NLD, NOR, POL, SWE, USA).	Can reduce or increase car commuting and resulting emissions, e.g. depending on people's preferences in residential location (near workplace or far).

needs to be done at the expense of growth itself, particularly in the short to medium term. In this respect, there is no consensus (see Ambec et al., 2013; Kozluk and Zipperer, 2014). On the one hand, environmental policies are often thought to hinder economic growth by imposing additional costs and restricting output, inputs and technologies. On the other hand, well-designed environmental policies can actually boost growth and competitiveness, by making use of previously overlooked opportunities to raise efficiency (Porter, 1991; Porter and van der Linde, 1995).

Recent OECD evidence linking multifactor productivity growth to changes in environmental policy stringency (EPS) suggests no harm to aggregate productivity growth from tighter environmental policies (Albrizio et al., 2014).<sup>1</sup> Macro, industry and firm-level results using newly developed, internationally comparable indicators of EPS show that effects of incremental tightening of environmental policies on productivity are likely to be incurred through small and short-term adjustments. None of the effects seem to last beyond three years.

**Box 3.1. Challenges in assessing the environmental consequences of growth-enhancing structural reforms**

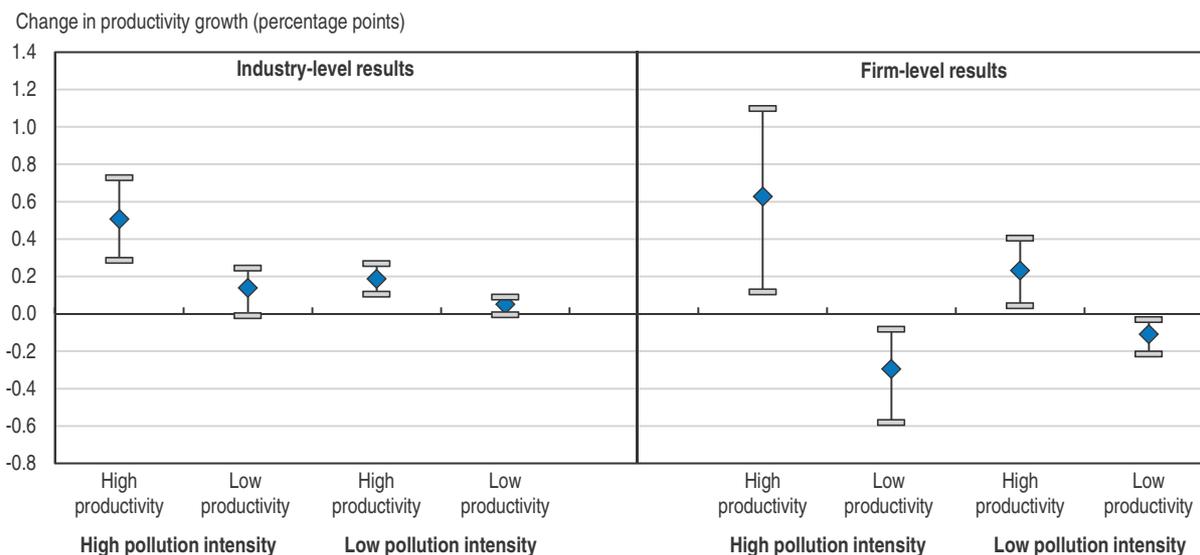
Numerous issues in assessing the potential environmental effects of pro-growth reforms were identified in *Going for Growth 2013*. These include:

- Reform design: environmental outcomes will likely depend on the design and implementation of the growth-enhancing reforms.
- Framework conditions (in particular for what concerns environmental policies): existing and future policies will often determine how a certain reform will impact the environment. For instance, liberalisation in the energy market can increase investment in generation capacity, but the environmental impacts will depend on the implementation of policies that put a limit or price on environmental externalities.
- Multi-dimensionality of environmental effects: there may be trade-offs among different types of environmental externalities, for instance recommendations on transport and on zoning regulation may see trade-offs between land use and air pollution.
- The national framework of structural reforms versus the spatial nature of environmental effects – environmental effects can be local, national or global, while the growth-enhancing recommendations focus on national policies.
- Long time horizons, uncertainty and knowledge gaps: environmental impacts can have very different and, in many cases, long-lasting effects, which raises issues of discounting the future. They are also often not very well understood or uncertain.

More importantly, productivity growth appears not to be affected by whether the country already has stringent policies or not. What matters for short-term effects on productivity growth, are changes in environmental policies. At the aggregate level, tightening is preceded by a slowdown in productivity growth prior to the policy change, likely due to investments and reorganisation in preparation for the new rules. A subsequent rebound cancels out the effect on productivity levels.

At the industry and firm levels, impacts depend on technological advancement – more productive firms tend to see a boost in productivity growth while less advanced ones are likely to see a temporary fall (Figure 3.4). Highly productive firms may be best suited to profit rapidly from changing conditions – through seizing new market opportunities, rapidly deploying new technologies or reaping previously overseen efficiency gains. The effects may also take place through outsourcing and relocating some of the production abroad, in response to the increased costs of activity. At the same time, the positive effect for the most productive firms is likely to be reinforced by their technological advancement, as they can draw on the most advanced technologies and are likely to have more resources to invest into R&D, for instance, in general anticipation of tightening. Less technologically-advanced firms may need higher investments to comply with the new regulation, for instance adopting cleaner technologies or exchanging equipment, implying a temporary fall in productivity growth. The results also suggest that part of the adjustment, particularly for less technologically-advanced firms, may take the form of firm exit. The exit of the least efficient firms would raise overall industry productivity, cancelling out the negative productivity effects observed in surviving less efficient firms.<sup>2</sup>

Figure 3.4. **Simulated effects of environmental policy tightening on industry and firm level productivity growth**



Note: 1) One year effects of a median increase in environmental policy stringency, i.e. 0.12 change in the value of the EPS index in one single year (annual equivalent of tightening policies from the level in Italy or Greece to that of the Nordic countries). Effects are estimated to last for three years after the policy change and then fade away. No lead effect is found. 2) High (low) pollution intensity is defined as an industry with the highest (lowest) pollution intensity on seven selected key pollutants with respect to value added. 3) High productivity is defined as the country-industry pair (or firm) on or close to the estimated global industry (or firm) productivity frontier. Low productivity is defined as country-industry pair (or firm) at the 75th percentile of distance to the global industry (or firm) productivity frontier. 90% confidence intervals are reported.

Source: Albrizio, S. et al. (2014), "Do Environmental Policies Matter for Productivity Growth? Insights from New Cross-Country Measures of Environmental Policies", *OECD Economics Department Working Papers*, No. 1176, <http://dx.doi.org/10.1787/5jxrjncjrcxp-en>.

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### **The design and choice of environmental policy instruments is crucial**

Stringent environmental policies are necessary for achieving environmental objectives, but a number of specific features of environmental policies may affect economic outcomes (Johnstone and Hascic, 2009; de Serres et al., 2010):

- *Dynamic efficiency (or depth)* – the extent to which a policy instrument gives continued incentives to search for cheaper abatement options (e.g. via innovation).
- *Flexibility* – the extent to which the policy leaves room for the firm (or consumer) to choose how to reach the environmental objective, less prescriptive policy interventions being better suited to accommodate new ideas, innovation and technology adoption.
- *Predictability* – the consistency, credibility and clarity of the current and future policy signal can affect investment, innovation and eventually productivity growth. Certainty on future pricing of a particular externality provides stronger incentives to adopt long-term abatement strategies.
- The *competition-friendliness* aspects of environmental policies are less often recognised, but are potentially as important for overall economic outcomes as other product market regulations, such as those prevailing in network sectors or services. Competition is a key engine of growth and minimising the distortions stemming from the design and implementation of environmental policies can improve both economic and environmental outcomes. Lower barriers to entry and competition encourage innovation, adoption of cleaner technologies and entry of environmentally-friendly business models.

To a large extent, the importance of the design of environmental policies for economic outcomes has yet to be documented empirically. The flexibility and predictability arguments have hardly been assessed empirically, while issues of competition friendliness have possibly been given the least attention. Overall, the competition burdens of environmental policies can be expected to have similar effects as the well-documented general anti-competition regulation – such as that measured by the product market regulation indicators (Nicoletti and Scarpetta, 2003; Arnold et al., 2008).<sup>3</sup>

More flexible, market-based instruments are found to bring about a more robust rebound in MFP growth. This backs up the argument that market-based instruments should be preferred where possible. The finding is also well in line with the pro-growth recommendations on switching from highly distortive taxation (e.g. on labour) to a greater reliance on environmental taxes.

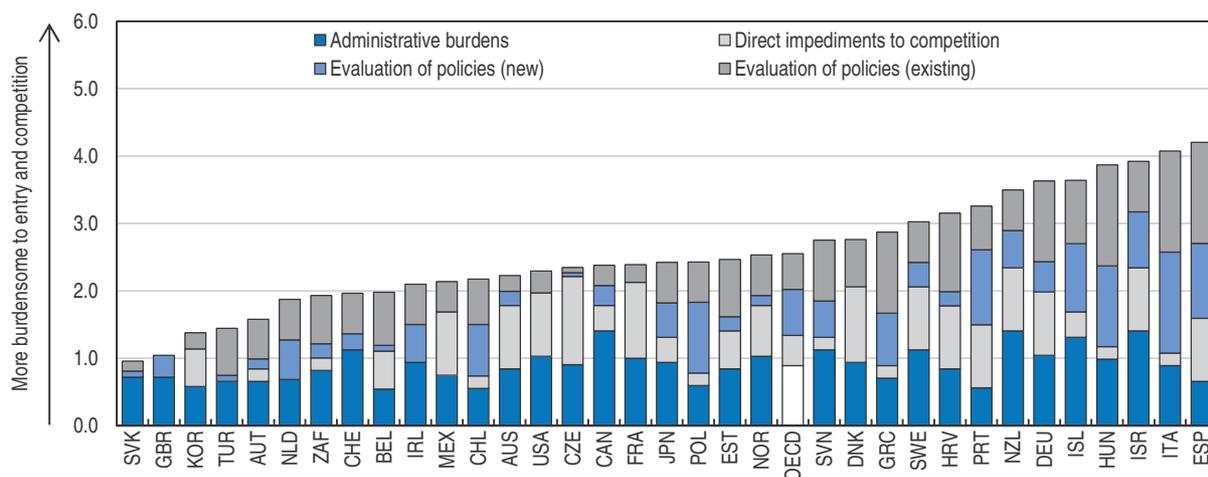
In contrast with more general entry and competition-inhibiting regulations, environmental policies have little direct impact on large swathes of the economy as the most burdensome procedures and designs are likely concentrated in the high-polluting sectors and industries. For example, in almost all surveyed countries environmental permit requirements are directly related to activities in designated sectors or dealing with particular substances. A major exception pertains to the direct and indirect environmental impacts of land use regulations such as zoning, which can affect a broad range of businesses directly.

The indirect impact on the economy may, however, be significant: a large amount of inputs into other sectors come from industries and sectors that are associated with high-environmental impacts, for example energy and transport. Studies of regulatory impact show that regulations impacting on competition and entry in a specific sector tend to trickle through the entire economy (Barone and Cingano, 2011; Bourles et al., 2013). Moreover, a number of the high environmental impact sectors are open to international trade and thus concerned directly with international competitiveness (OECD, 2006).

Again, the importance of designing environmental policies in the most flexible and competition-friendly way goes well with country priorities on lowering barriers to entry, innovation and competition and improving the flexibility of the economy.

The competition friendliness aspect of environmental policies is captured by a new OECD questionnaire-based indicator of burdens on the economy due to environmental policies (BEEP).<sup>4</sup> Examples of common aspects of environmental policies that can provide advantages to incumbent firms include high administrative burdens to new entry; vintage differentiated regulations, where new firms are subject to stricter environmental limits; subsidies or other benefits (e.g. public procurement) for a historical environmental record or improvements (which new firms may not be able to show even if being cleaner than older firms); tax breaks for investments in improving environmental performance (which new firms, that do not yet have profits, may not be able to benefit from) and grandfathering of licenses and permits. Hence, the indicator summarises information on administrative burdens on entry, such as the complexity and design of environmental permit and licensing procedures; the use of environmental regulations that directly impede competition and favour incumbents over new entrants in various ways; and the extent to which economic considerations are (or are not) taken into account when designing, implementing and conducting environmental policies. The results show wide cross-country differences (Figure 3.5).

Figure 3.5. Indicators of burdens on the economy due to environmental policies (BEEP)



Note: Responses are scored and aggregated within each category and among categories. Equal weights are used at each level. The final scale is 0 to 6, where 0 is the most friendly to competition: lowest administrative burdens, least use of policies that directly impede competition (favouring incumbents), and well-established practices of evaluation of economic effects of environmental policies – both for new policy proposals as well as for the existing policy setup. For the United States, it was not possible to establish a value for the question on the maximum legal length of permitting procedures. A middle-range value was assumed to enable comparison on overall indicator values.

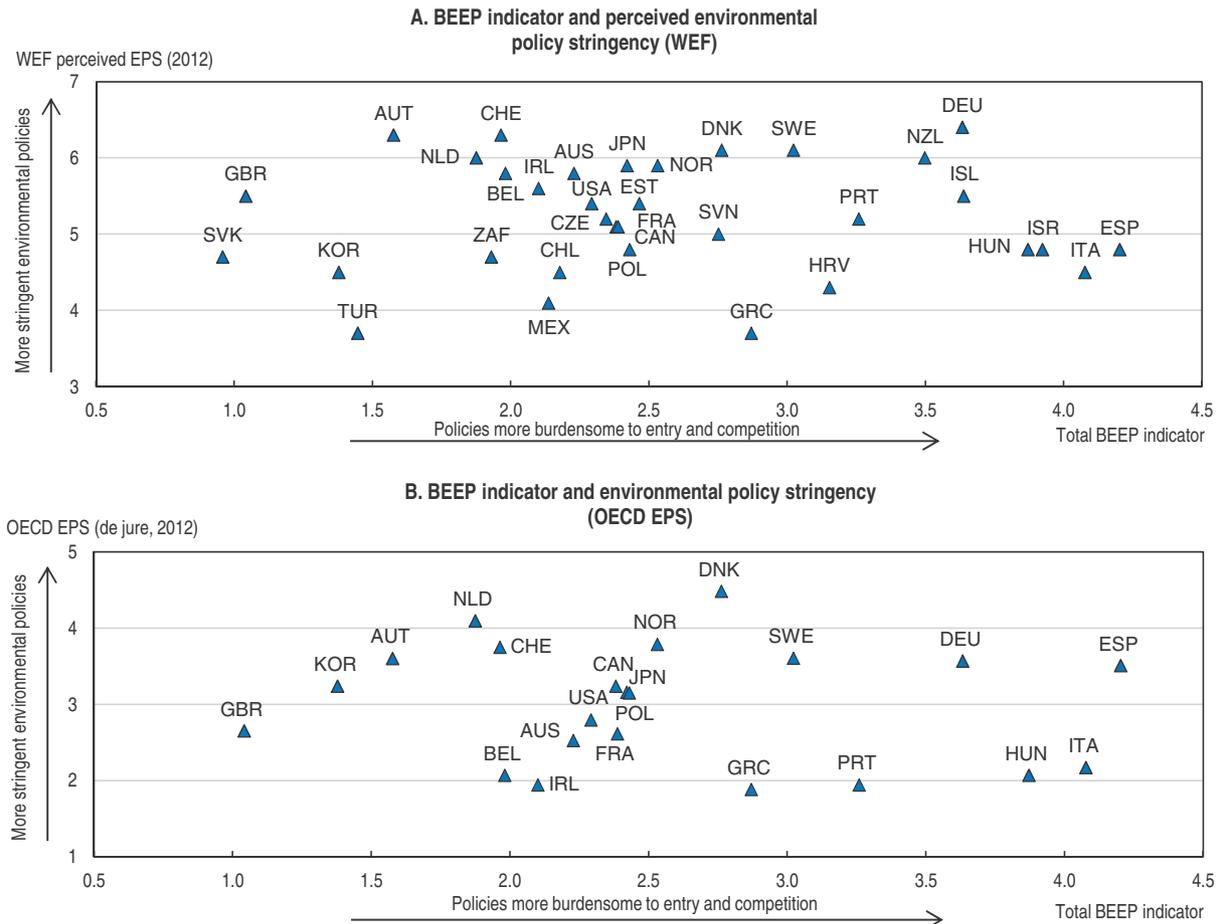
Source: Albrizio, S. et al. (2014), “Do Environmental Policies Matter for Productivity Growth? Insights from New Cross-Country Measures of Environmental Policies”, OECD Economics Department Working Papers, No. 1176, <http://dx.doi.org/10.1787/5jxrjncjrcxp-en>.

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High barriers to entry and competition, increased market concentration and risks of anti-competitive behaviour may be by-products of environmental policies, but appropriate policy design can minimise these adverse effects. An important finding from comparing the BEEP indicator with measures of EPS is that the competition dimension of environmental policies is not related to their stringency (Figure 3.6). Across OECD countries, there are examples of relatively stringent environmental policies coupled with low barriers to entry and competition (Austria, Belgium, the Netherlands, Switzerland and the United Kingdom), and examples of relatively low EPS but where environmental policies would benefit from being made more pro-competitive and flexible (Greece, Hungary, Israel, Italy, Portugal and Spain).

While more work is needed to better understand the effects, the evidence above makes a strong case for well-designed environmental policies. Stringent policies that are flexible and do not impose high barriers to entry, can and should be pursued to support both economic and environmental objectives. They can help ensure that pro-growth policy reforms do not boost short-term growth at the expense of environmental degradation which would potentially lead to subdued wellbeing and growth in the longer term.

Figure 3.6. **Stringent environmental policies do not need to imply high barriers to entry and competition**



Note: Panels show scatter plots between environmental policy stringency (EPS) and the burden that environmental policies pose to entry and competition (BEEP). Correlations between EPS and BEEP are not significant at 90% level in both cases.

Source: Albrizio, S. et al. (2014), "Do Environmental Policies Matter for Productivity Growth? Insights from New Cross-Country Measures of Environmental Policies", *OECD Economics Department Working Papers*, No. 1176, <http://dx.doi.org/10.1787/5jxrjncjrcxp-en>.

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## Notes

1. Evidence on the link between environmental policies and productivity growth (including the design aspects of environmental policies and the indicators of environmental policies) cited in this section is based on the joint work of the Economics Department and Environment Directorate (Albrizio et al., 2014).
2. The OECD results shed light on the effects on MFP growth, and work on other components of GDP, such as capital and labour, is currently underway to provide a fuller picture of the economic impact.
3. Product market regulation indicators generally omit the aspects related to environmental policies, such as environment-specific conditions embedded in licenses and permit procedures.
4. The BEEP indicator is based on a questionnaire and captures the state of implementation and design of environmental policies at the beginning of 2013. Since then, countries may have introduced reforms that could have affected their performance on the indicator. For example, Spain has reformed several laws (among them the Law on Environmental Assessment) aiming at reducing the burden for citizens and companies while maintaining environmental protection.

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