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Linking Climate Targets and Investment Portfolios

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Content

Executive Summary

At the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) in 2010, held in Cancún, Mexico, it was agreed to limit global warming to 2°C (UNFCCC, 2010) relative to pre-industrial levels until 2100. A shift in investment pattern is increasingly seen as a core challenge in meeting this goal.

This paper explores the viability of emission intensity thresholds in enhancing the consistency of individual investment decisions with global climate targets expressed as CO_2 emission budgets. It compares historic global emission intensity levels of investments to levels consistent with climate targets and to current levels typical for selected technologies and sectors. The authors discuss the practical application of indicative portfolio emission intensity thresholds for financial institutions and governments in promoting the global transformation to low-carbon development. In taking the investor's perspective the paper points at a number of critical uncertainties and shortcomings of emission intensity based investment criteria.

It is shown that only a fraction of global investment flows to emission relevant sectors. For KfW Development Bank larger shares of commitments go to these sectors, however, the vast majority to low-carbon technologies, in particular renewable energy and energy efficiency. Sectorial data on the carbon intensity of investment are very limited. For the global scale, the paper establishes that recent emission intensities of investment are likely to lead to a global warming of 4°C rather than a 2°C.

It is found that while the financial sector in general and development banks in particular do play a decisive supporting role in driving the transformation to a low-carbon economy (e.g. Gupta et al., 2014; Harnisch and Enting, 2013), they cannot stop legal and profitable investments with acceptable risks in emissions intensive sectors.

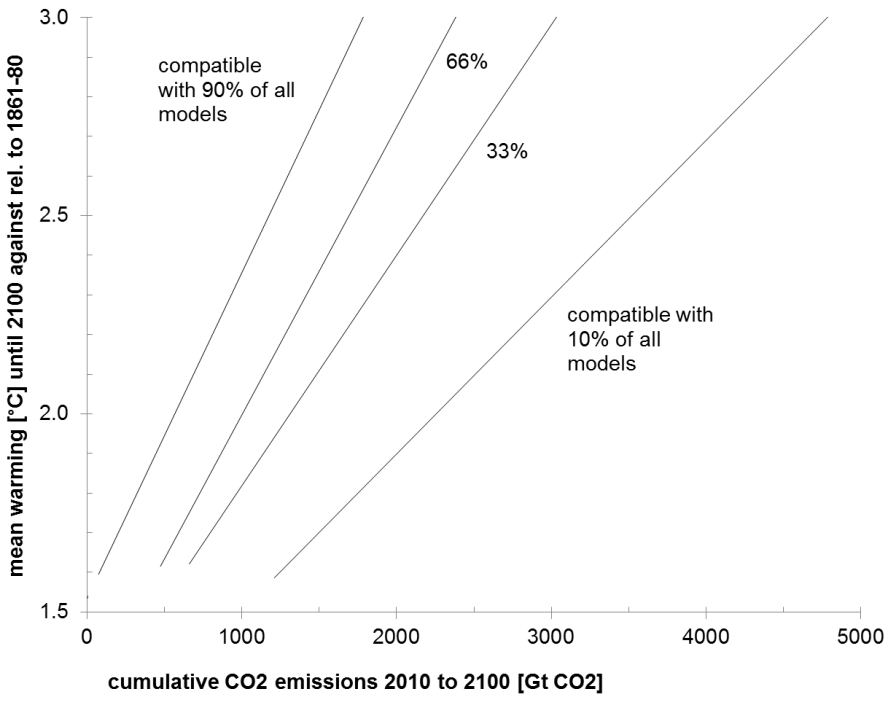
A low-carbon transformation requires a sectorial focus on energy intensive parts of the economy (i.e. to rapidly expand the share of low carbon technologies and practices in selected high emitting sectors (e.g. transport, energy supply and manufacturing) which together amount to less than 10 % of total global investment). Carbon taxes, emission trading systems or the use of technical standards for new plants imposed by regulation seem particularly suitable to induce change in these sectors. CO_2-product benchmarks can have a critical role in all three approaches e.g. by setting a threshold for tax exemptions, by providing the basis for a free allocation of emission allowances in emission trading systems or by defining the maximum acceptable emission levels for new installations..

CO_2-budgets and climate objectives

Many decision-makers would like to have a single, accurate and robust value for the greenhouse gas emission budget in line with an agreed climate objective available for the period of time they oversee and can influence their investment decisions. The estimates of global carbon budgets available for the remaining 21st century provided by IPCC WG III (Collins et al., 2013) are based on assumptions and distributions of model results from a comprehensive model comparison.

Figure 1 presents the distribution of model results (CMIP5) assessed by Stocker et al. (2013) (using linear regression through the 90 %, 66 %, 33 % and 10 % values for the temperature thresholds in TFE.8 Figure 1c, therein). It should be noted that there is lively scientific debate as to whether or not some model results from CMIP5 with higher expected temperature increases are outside physically constrained ("possible") boundaries (Ring et al., 2012, Stott et al. 2013; Otto et al. 2013). Due to a lack of consensus in mainstream climate science, decision-makers and investors have no firm basis on which to assume that significantly larger carbon budgets than those calculated by Stocker et al. (2013) would still be commensurate with a 2°C climate objective.

Figure 1: Range of CO_2-budgets and temperature limits relative to 1861 to 1880 temperature levels from coordinated model runs



Source: based on Stocker et al. (2013)

This shows that the choice of the carbon budget ranging from 500 to 4000 GT CO_2 is an economically and politically highly relevant decision. Therefore this paper explores a wider corridor of CO_2 budgets.

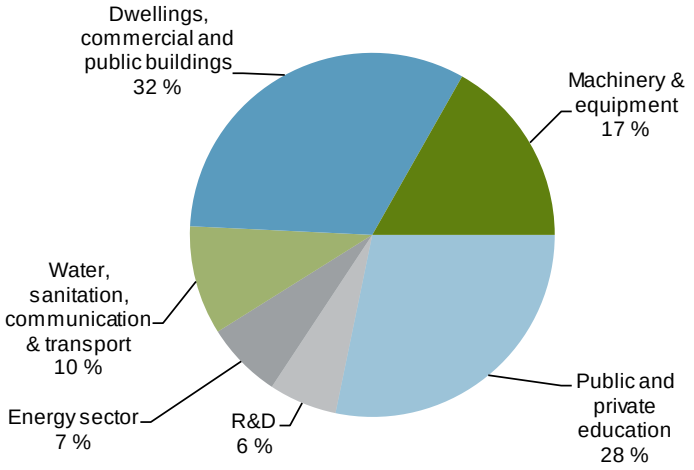
Emissions and investment

Coal-fired power plants are a very prominent example of investments linked to mankind's current emission-intensive lifestyle. Investments in refineries, drilling-platforms and pipelines for oil and gas, ore mines and processing, aluminium and steel plants, container ships, airplanes and cruise liners could also be added. While attracting only a moderate share of global investment they are responsible for a high proportion of global greenhouse gas emissions.

Given a fixed emissions budget, there are many ways to allocate emissions to activity data, all of them requiring value judgements. For this, indicators such as current or future levels of population or gross domestic product or cumulated historical emission levels are used (see den Elzen and Höhne (2010) for an overview). However, this paper will not discuss different ways of allocating emissions budgets between countries but attempts to allocate emissions budgets between the two macro-economic dimensions of investment and consumption. There are three widely accepted alternative approaches to calculating the gross domestic product (GDP) of a country: a) the production-based approach, b) the income-based approach and c) the expenditure-based approach. Under c) GDP (Y) is the sum of final consumption expenditure (FCE), gross capital formation (GCF), and net exports (X – M) i.e. Y = FCE + GCF+ (X − M)). At the global level, exports equal imports. World GDP can thus be calculated as the sum of final consumption expenditure (FCE) and gross capital formation (GCF), whereby GCF can be expressed as the investment employed to generate the capital. This paper then focuses on the link between investment (GCF) and greenhouse gas emissions.

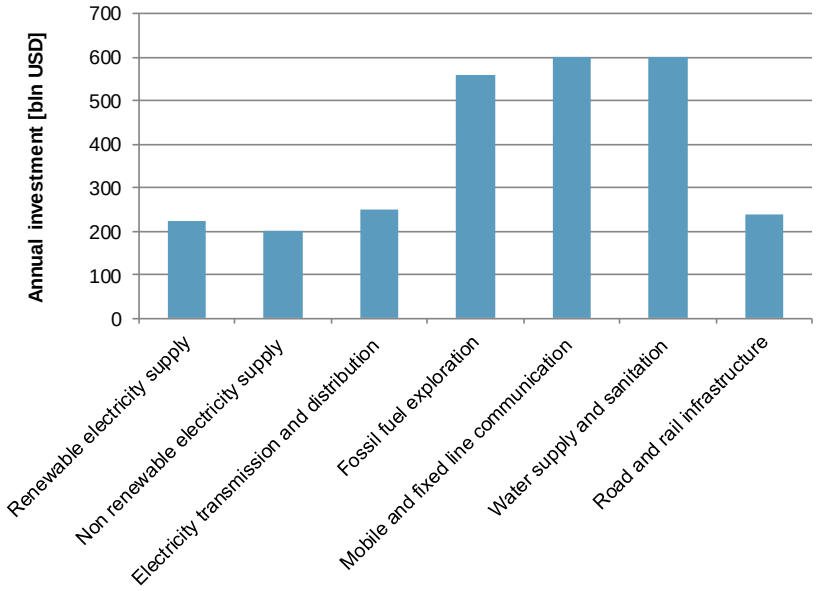
In 2012 global (total) annual investment amounted to about USD 15 trillion. Figure 2 shows an estimated breakdown of total annual investment for the year 2012 based on data from the World Bank (2013), IEA (2014), Allianz (2012), Gupta et al. (2014) and Global Construction Perspectives (2013). Less than 10 % of this falls into emissions-relevant parts of the energy and transport sectors, while more than 90 % relates to different private, commercial and public buildings, basic infrastructure, machinery and equipment, research and development and education with no immediate and pronounced link to greenhouse gas emissions. Figure 3 provides a more detailed breakdown of those 10 % emission-relevant sectors showing that only a fraction of their subsectors contain high-emitting activities.

Figure 2: Estimate of total global investment in 2012



Source: World Bank (2013), IEA (2014), Allianz (2012), Gupta et al. (2014) and Global Construction Perspectives (2013)

Figure 3: Estimate of selected components of total investment in 2012



Source: World Bank (2013), IEA (2014), Allianz (2012), Gupta et al. (2014) and Global Construction Perspectives (2013)

The portfolio of KfW Development Bank does not fully mirror sectorial patterns of global investment as a whole due to its specific mandate, namely promoting sustainable development in developing countries mostly as part of German official development assistance. Financial support for infrastructure investment typically contains a high share of electricity generation and distribution as well as transport. These potentially high-emitting sectors constituted up to 32 % of total new commitments in 2013 but related mainly to energy efficiency measures in these sectors (see table 1 below).

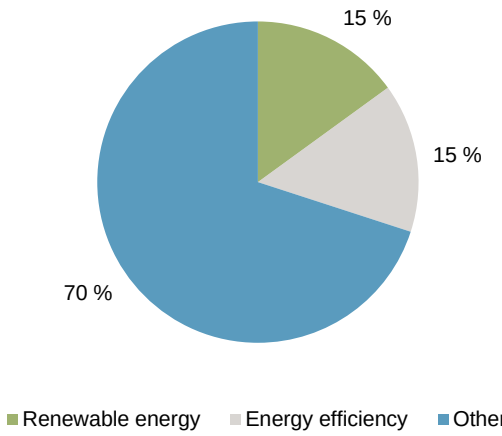
Table 1: KfW Development Bank's new commitments in 2013 by OECD/DAC development sector

Sectors*	in EUR million	%
Social infrastructure and services	**1,609**	**31**
Education	257	5
Health	297	6
Population policy/Programmes and reproductive health	110	2
Water supply and sanitation/waste disposal	726	14
Government and civil society	176	3
Other social infrastructure and services	43	1
Economic infrastructure and services	**2,906**	**55**
Transport and storage	202	4
Energy generation/distribution	1,461	28
Finance	1,243	24
Business and other services	0	0
Production sectors	**161**	**3**
Agriculture, forestry and fishing	160	3
Industry, construction, mineral resources and mining	1	0
Other	**592**	**11**
Total	**5,268**	**100**

Source: KfW (2014a)

However, taking a closer look at these commitments reveals a more differentiated picture. An total of EUR 1,648 billion of commitments in the energy and transport sector has be classified as relevant to the climate and environment (promoting mitigation of and adaptation to climate change and environmental protection) representing 99 % of the total commitments in these sectors. More specifically, EUR 1,166 billion have been classified as having mitigation of greenhouse gas emissions as its principle objective, representing 70 % of total new commitments in these sectors in 2013. Thus although potentially high-emitting sectors represent a considerable share of KfW portfolio the vast majority of projects are actually committed to mitigation activities.

Figure 5: KfW Development Bank's new commitments in renewable energy and energy efficiency in 2013



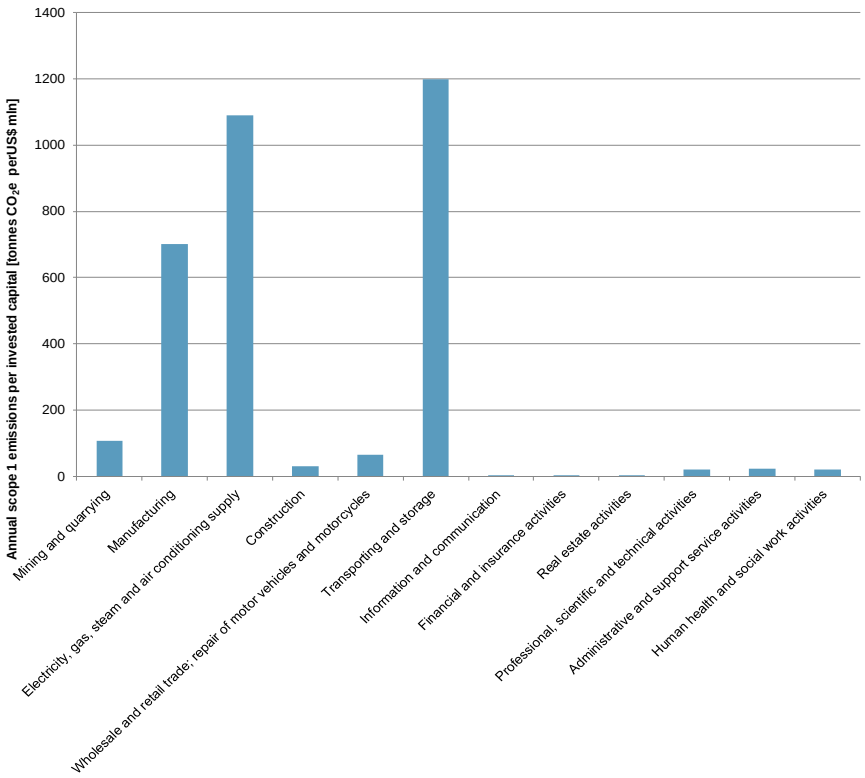
Source: KfW (2014b)

In general, KfW Development Bank has a very strong focus on climate and environmentally friendly finance which can hardly be found in any development institution, and even less so among commercial financiers that generally do not have an explicit climate and environment quota. Overall, 64 % of KfW Development Bank's commitments in 2014 have been classified as climate and environment relevant, of which more than half was dedicated to the mitigation of climate change. Renewable energy and energy efficiency investments alone amounted to a share of 30 % as shown in figure 5.

Emission intensity of investment

There is very limited published data available on the carbon intensity of investment across sectors. To obtain indicative estimates, data aggregated and extrapolated for sectors using information from reports disclosed by German companies were purchased by KfW from TruCost[1]. The results for scope 1 direct emissions of those sectors for which sufficiently robust data could be derived are presented in Figure 6.

Figure 6: Greenhouse gas emission intensity (Scope 1) of investment in different sectors in Germany



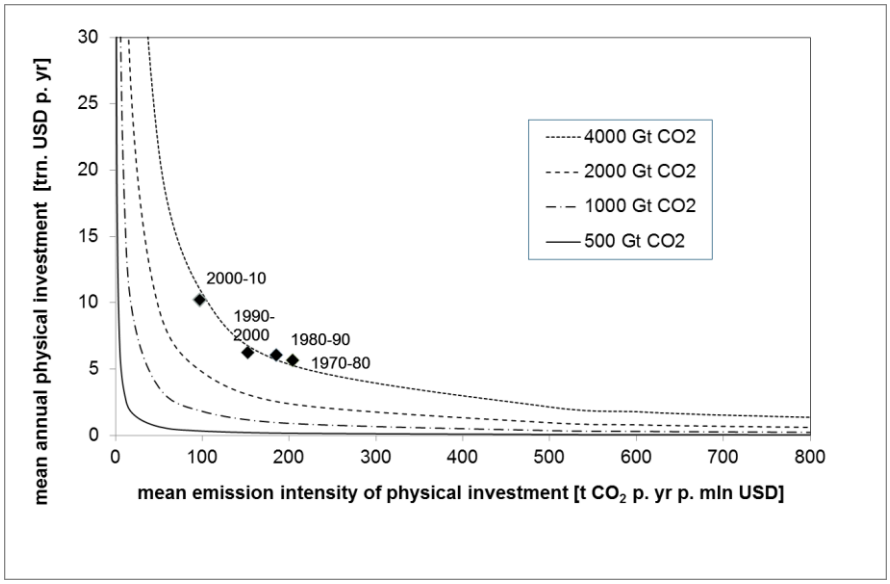
Source: TruCost data set for KfW (2014) and own calculations

Figure 7 shows the results of the calculations of the average emission intensity for different carbon budgets. The model takes into account that about 390 Gt CO_2 emissions are already committed over the next 25 years from investments taken in the past, unless prematurely retired. The higher the levels of mean physical investment, the lower the emission intensity levels commensurate with CO_2 budgets studied in this paper. Estimates of decadal emission intensities (see figure 7) for the last four decades show a reduction of the emission intensity of physical in-

[1] See details on the models, databases and approaches of TruCost: http://www.trucost.com

vestment from about 200 to 100 t CO_2 per million USD (2005) invested[2]. Observed emission intensities estimated for investment during the last four decades would be compatible with a CO_2 budget of 4000 GT CO_2 which Stocker et al. (2013) estimate to most likely lead to a temperature increase of roughly 4°C relative to 1861-1980.

Figure 7: Calculated acceptable emission intensities of global investment for average levels of annual global physical investment for different carbon budgets until 2100 plus historical data points (USD 2005)



Source: Own calculations

[2] Using the GDP deflators from the IMF (2014) for high income countries for the 1980s and 1990s and the US-BEA (2014) for the USA for the 1970s for inflation correction.

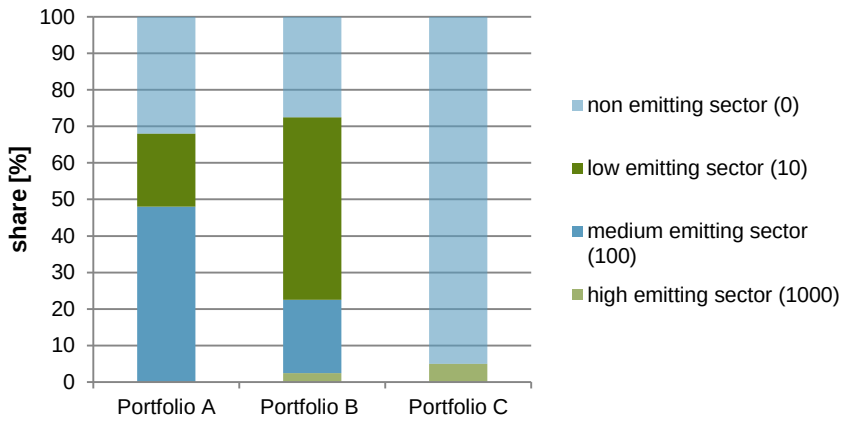
Low-carbon investment portfolios

At first sight, the mean emission intensity of portfolios seems to be an attractive tool to check for emissions. By setting maximum intensity limits for financial institutions, the highly carbon-intensive sectors would be forced to transform or simply collapse as a result of capital starvation. However taking a closer look, there are some technical issues as well as several feasibility and effectiveness concerns with this approach.

The consistent use of these intensity values requires a stringent separation of direct emissions (Scope 1) of the projects from indirect emissions arising from the consumption of electricity and heat imported across the project boundaries (scope 2) and from other indirect emissions associated with the supply chain, building phase and end-of-life emissions (Scope 3). Otherwise double-counting would occur. Clearly, projects with high electricity consumption or projects associated with the production of energy-intensive goods do not get counted with their full lifecycle “carbon footprint”.

In practice, high shares of low or non-emitting investments are needed to compensate for the quantitative impact of very low shares of highly emitting investments. Figure 8 illustrates how different portfolios with an emission intensity of 50 t CO_2 per million USD invested can be created comprising shares of lending into high emitting (here 1000 t CO_2 per million USD), medium emitting (here 100 t CO_2 per million USD), low emitting (here 10 t CO_2 per million USD) and non-emitting portfolios (0 t CO_2 per million USD).

Figure 8: Composition of three sample investment portfolios with equal average emission intensity of 50 t CO_2 per million USD investment



Source: Own compilation

Different parts of the financial sector would be affected unequally by reporting obligation or intensity investment thresholds. Financial institutions are frequently specialised in a certain sector e.g. consumer or student loans, credit card debt,

government debts, house mortgages, car loans, corporate finance, infrastructure and project finance. Some of them (e.g. corporate and infrastructure lending) would be impacted heavily while others have a traditional focus on low emission intensity loans (e.g. credit card loans). Banks with sector know-how are important for sector transformation and in their intermediation between capital supply and capital demand decisive for the use of funds in financially sustainable and at the same time climate friendly investments.

Financial investors who want to avoid committing their capital to these assets as equity or loans will find convenient products for doing so. At the same time other investors will continue to provide funding into these assets if profitable. Decisive for the investor´s choice is the risk- return profile of the respective investment opportunities. A simplistic imposition on parts of the financial sector of a maximum emission intensity value on investment portfolios is therefore unlikely to induce sustainable transformational change. Instead, leakage from monitored portfolios may occur with balance sheet finance, offshore finance, sovereign wealth funds and hedge funds picking up what more heavily regulated and transparent financial institutions might discontinue funding.

It has been argued that, for investors, high greenhouse gas emission intensity could be a useful proxy for high risk exposure. While this is certainly plausible it should be seen in the wider context of investment exposure to regulatory risk, which is well understood by investors from other contexts such as the pharmaceutical and chemical industries, the banking and insurance sectors or communications and energy, and will not prevent them from investing in these assets but rather encourage them to develop respective risk management strategies.

Finally, there is no empirical evidence from open economies for sector transformations induced by capital starvation of otherwise profitable and legal activities. On the other hand, examples abound where an inflow of cheap capital made unprofitable activities viable for a certain period of time (e.g. as repeatedly seen in various asset bubbles of the past). This suggests that while the financial sector in general and development banks in particular do play a decisive supporting role in driving the transformation to a low-carbon economy (e.g. Gupta et al., 2014; Harnisch and Enting, 2013), they cannot stop legal and profitable investments with acceptable risks in emissions intensive sectors.

A low-carbon transformation requires a sectorial focus on energy intensive parts of the economy, i.e. to rapidly expand the share of low carbon technologies and practices in selected high emitting sectors (e.g. transport, energy supply and manufacturing) which together amount to less than 10 % of total global investment. Carbon taxes, emission trading systems or the use of technical standards for new plants imposed by regulation seem much more suitable to induce change in these sectors. CO_2-product benchmarks can have a critical role in all three approaches e.g. by setting a threshold for tax exemptions by providing the basis for a free allocation of emission allowances in emission trading systems or by defining the maximum acceptable emission levels for new installations. Land-use and land-use change related greenhouse emissions are less suitable for these performance based benchmarks.

Conclusion

This paper has explored ways to link a climate temperature objective like the 2°C-target to the average emission intensity of investment and associated loan portfolios. Mean emission intensity levels for future investments commensurate with the 2°C objective are well below historical emission intensities of global physical investment found over the period 1970 to 2010. These emission intensity values depend on a number of assumptions but in particular on the trend of global physical investments until the end of the 21st century.

While the calculation of these cross-sectorial emission intensities is technically feasible and conceptually sound, there are a number of limitations including:

- Methodologically sound approaches to portfolio emission intensity need to focus on direct (scope 1) emissions to avoid double counting, though doing so will provide a highly incomplete picture of linkages in emission patterns.
- Target values of carbon intensity are dynamic and depend on the level of overall investment which varies strongly from year to year and tends to increase over time. Carbon intensity values need to be corrected for exchange rate variations and inflation on an annual basis.
- Only a few sub-sectors of total investment are key drivers of emissions growth and portfolio emissions intensity, aggregated intensity values would drive high emission intensity investment into less exposed and/or more opaque financial institutions.
- Despite regulatory restrictions for financial institutions investors would find ways to further invest in legal and profitable high carbon-intensive activities. In open economies capital starvation does not occur for profitable and legal investments with acceptable risks.

We have shown that cross-sectorial investment portfolio emission intensity indicators are not a suitable substitute for national or international regulatory or carbon pricing measures. To foster low-carbon development, the application of dedicated sectorial approaches that take a perspective on critical emission-intensive sectors like electricity supply, industry, transport, buildings, waste, agriculture and forestry are recommended.

A carbon price also allows for an economically efficient integration of different sectorial approaches to be achieved at the level of national economies. In critical sectors a carbon price will allow investors to factor in climate policy in the one metric which is most familiar to them.

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