



## Business as unusual: The implications of fossil divestment and green bonds for financial flows, economic growth and energy market



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### ABSTRACT

Green bonds and fossil divestment has emerged as a bottom-up approach to climate action within the business community. Recent pledges by large banks and institutional investors have reached levels that have the potential to contribute markedly to a low carbon transition. We find that in a green finance scenario reflecting a reasonable upscaling of current level of pledges towards 2030, green finance leads to somewhat higher GDP while shifting income from capital owners to wage earners. Although effects differ among regions the green finance reduces global coal consumption to 2.5% below BAU in 2030, raising the share of non-fossil electricity from 42 to 46% at the global level. Over the period towards 2030, green finance avoids global CO<sub>2</sub> emissions corresponding to total emissions of the European Union and Japan in a recent year.

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### Introduction

Climate change has been on the political agenda for decades but not been prominent among the ethical concerns and responsible investments in the society, partly because of lack of confidence in scientific documentation, partly because of the strong economic position and political influence of the energy sectors. However, this is changing. The IPCC 5th Assessment Report concluded that human influence on the climate system is clear and that recent climate change has had widespread impact on human and natural systems, also warning that climate change will amplify existing risks (IPCC, 2014). Increasingly people around the world perceive that the climate is changing and the challenge of climate change has reached the minds of both investors and consumers. Politicians have been negotiating with a meagre result, although the Paris Agreement might represent a change as the Parties confirmed their commitments to a maximum temperature rise of 2 °C above pre-industrial levels, and pledged to strive for lowering maximum warming to 1.5 °C (UNFCCC, 2017).

The business community already shows willingness to act. Global warming is a threat of a magnitude that might disrupt the global economy and political stability (Carney, 2015; TCFD, 2017) exposing business as well as society at large to transition risk and physical risk. Transition risk is associated with structural changes required to achieve a low-carbon economy, whereas physical risk relates to exposure to

costs of global warming and extreme weather events (Aaheim et al., 2017; Roson & Sartori, 2016). Considering the mounting evidence of global warming, corporations and large institutional investors in particular now mobilize for a controlled phase-out of CO<sub>2</sub> emissions (Arabella Advisors, 2015). The trend among investors towards responsible finance targeting climate change has surfaced as pledges to invest in green projects or to abstain from investments in fossil industries, in particular coal.

Besides being exposed to divestment driven by environmental priorities and economic stability concerns of investors, fossil industries are also vulnerable to future tightening of climate policy, adding to the risk of overinvesting in capital intensive fossil energy and turn productive assets into industrial ghosts. The risk of stranded assets in fossil industries is increasingly seen as a real and non-negligible threat even in the medium term (Climate Bonds Initiative, 2017). This applies not only to coal industries as petroleum companies are also exposed to high risk of overinvestment if the 2 °C target is to be met (Carbon Tracker initiative, 2017). A Citigroup report warns that the 2 °C target might involve stranded assets of USD100tr by 2050 (Citigroup, 2015).

In view of the 2008 financial crisis the G20 countries asked the Financial Stability Board (FSB) to review how the financial sector can incorporate climate related issues in reporting to avoid sudden loss of assets. A Task Force on Climate-related Financial Disclosure was established with the mandate to provide clear, comparable and consistent information about risks and opportunities of climate change, submitting its recommendations in June 2017 (TCFD, 2017).

Whereas financial disclosure of carbon related risk is in its early phase, business already influence the financial market through selective

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lending and investment. Two parallel pathways to climate friendly investments are dominating: divestment in fossil industries and finance earmarked for low carbon projects, e.g. labeled green bonds (Climate Bonds Initiative, 2017). Fossil divestment restricts finance from entering projects that extract, transform or refine fossil energy. Coal divestment is the dominating element, however, there are funds that also pledge to keep out of oil and natural gas. Further, there is green funding exclusively for renewable energy or other activities that strengthens sustainability, among them increased resilience towards climate change. As a result there is no longer a single market for finance, but various segments representing accessible finance for non-coal industries, for non-fossil industries and for industries without any responsibility label.

The idea of green finance is frequently met with the argument that financial flows will fill the gap in supply to the polluting industries, leaving the market unaffected. This is reasonable when the pledges represent a marginal share of the financial flows in an otherwise flexible financial market. On the other extreme, if no investment finance was available to coal, the industry would wither. Less drastic constraints on investment flows will also eventually affect the fossil industry, driving a wedge between the cost of finance for fossil versus other industries. Dedicated green finance plays a similar role by restricting funding from entering other industries than the preferred one. The financial flows are no longer roaming freely and the market is split in distinctive segments.

A timely question is therefore how green bonds and divestment in fossil industries will affect the economy at large and contribute to climate mitigation in particular. In this article we report from a study of how dedicated green finance and divestment in fossil industries might impact the economy, the financial flows, energy trends and CO<sub>2</sub> emissions. For this purpose we use the multiple region, multiple industry computable general equilibrium (CGE) model GRACE, where supply of finance is modified to reflect the constraints imposed by the various green segments in the global market for investment finance reflecting the constraints on funding for coal, fossil or green finance.

### Modeling green investment finance in GRACE

In the GRACE model households and companies are compensated for their contributions of labour and capital. A share of this income is being saved and invested, partly managed by banks and institutional investors like pension funds, faith based foundations, and university funds. Governments manage their savings as sovereign wealth funds, usually based on income from natural resources or trade surpluses. Flows of finance from these organizations are allocated to investors as loans, bonds or as purchase of equity, directly or via commercial asset managers.

In GRACE, available investment funding in a specific year equals savings from the previous year, which is merged into a global pool of funding, assumed to be flexible concerning allocation by industry and region. We modify this approach by introducing funding allocation constraints, in line with the following categories of investment flows in the global market for finance:

**Flexible finance:** Financial flows without constraints on target industries.

**Pledges to invest in green solutions:** Investments in green solutions can be bonds, commitment to invest in renewable energy or belong to a large variety of other investments that reduce the environmental footprint. Green bonds, used to finance climate benign or other green projects, fall into this category. The majority are labeled green in common understanding between the bond issuer and the project owner, however, some have been exposed to an external review or independent 2nd opinion of their green profile (CICERO, 2017; Climate Bonds Initiative, 2017).

There is also a class of bonds called climate-aligned bonds without explicit green obligations, but nevertheless clearly promoting a transition to a low carbon economy (Climate Bonds Initiative, 2017). Bonds issued to finance climate friendly transportation and renewable energy are dominating the unlabeled climate-aligned bonds. We do not include climate aligned bonds in our study. In our category of funding for green solutions we only include the explicitly labeled green bonds. Our scenarios assume a rapid increase in labeled green bond issues, partly reflecting that climate-aligned bonds issues will increasingly be replaced by labeled Green Bonds. We do not direct finance for green solutions to their specific target activity, but assume all green targets are non-fossil.

**Pledges not to invest in any fossil based activity:** So far this category of pledges are of limited scale, but can be expected to increase in the future as the climate challenge increasingly is seen as urgent.

**Pledges not to invest in coal** has emerged as a substantial trend within climate finance. The focus is not on the assets in coal industries removed from investors' portfolios, but on the pledges to keep coal out of their portfolios for the future.

When we model divestment we assume that the whole coal or all fossil industrial activity is excluded by the divestment pledges, as our model cannot distinguish between single product and mixed product companies with a minor fossil division. Initially this represents a bias, laying too strict constraints on fossil based activities in our approach. However, over time pledges by investors can be expected to impose stricter constraints on the fossil engagement, thus reducing the bias. Over time, corporations might also split to ensure that their non-fossil activities do not suffer from financial constraints. In GRACE, the supply of renewable energy is endogenously determined, competing for the access to investment funding in line with fossil and other industries. No green funding is specifically targeting renewable energy, as our green finance categories only contain degrees of fossil divestment. Hence, no double counting of pledges takes place.

When green finance enters the financial market, it interferes with the access to new real investments in fossil and environmental-friendly industries. Fig. 1 illustrates the set of constraints that green finance imposes on the financial flows on their way to fund investments. Rather than a perfectly flexible global market there are now 3 segments of the financial markets. Flexible finance without any target constraints can go anywhere, whereas funding under coal divestment can go to "Non-coal fossil industries" (oil and gas extraction and refineries) or to "Other industries". Green Bonds are assumed to be fossil free with "Other industries" as the only option. The results of the constraints is to increase the supply of funding for flexible activities while forcing the fossil industry to settle at lower level of investments at a higher cost of finance.

By assumption we let the green finance flow to regions proportional to their share in climate-aligned bonds (Climate Bonds Initiative, 2017), assuming that these shares reflect the regional emphasis on the low carbon transition.

The constraints on the green finance create a wedge between the cost of finance of fossil and other industries. This wedge reflects the risk of stranded assets and/or damage from climate change as perceived by the pledging investors, not the actual risk awaiting in an uncertain surrounding of a warmer climate regime.

The total supply of finance is fixed, determined by the level of saving in the previous year, hence the intervention shifts capital from fossil to non-fossil industries.

### The GRACE model

Our study uses the multi-sector, multi-regional, recursively dynamic global computable general equilibrium (CGE) model GRACE (Aaheim & Rive, 2005). GRACE stands for the Global Responses to Anthropogenic

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