

Finance and Climate Change

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Climate risk is arguably the most important long-term risk faced by investors worldwide. The most obvious source of risk are losses caused by extreme climate events, which according to Allianz – a multinational insurance company – could grow by 30% per year in the next 10 years, reaching an annual average cost of \$1 trillion. The second largest source of risk relates to stranded assets, namely assets that are destined to lose value during the transition to the low-carbon economy that is necessary to meet the 2C target specified in the Paris Agreement. This includes the assets of fossil fuel companies, whose reserves need to be left untapped if we are to remain within the carbon budget compatible with the 2C target, but also countless other companies whose future revenues depend on a “carbon bubble”.

On the other hand, the amount of financing that is needed to achieve the low-carbon transition remains well above current financial flows to green projects. According to one estimate provided by the Global Commission on the Economy and Climate, the required low-carbon infrastructure investment ranges from 5% to 15% of global infrastructure investment, estimated to be around \$6 trillion per year. This does not include the cost of adaptation, which are estimated to range from \$150 to \$300 billion per year by 2030. When this \$450 to \$1,200 billion range is compared with the current annual financial flow of \$400 billion directed towards green investment, we see that current flows need to be tripled in order to cover the funding gap for the low-carbon transition.

The two sides of this problem – enormous risks and great need of funds – present a formidable challenge to the financial industry, but also unparalleled opportunities. In these lectures, I will review state-of-the-art integrated assessment models (IMA) for climate and macroeconomics, including the DICE model for which William Nordhaus won the 2018 Nobel Prize in Economics, and use to evaluate the impact of financial innovations such as green bonds

and carbon derivatives, as well as policy tools such as carbon taxes, green central banking, subsidies, and the Green New Deal.