

The climate impact of quantitative easing

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Presentation based on policy brief *'The Climate Impact of Quantitative Easing'*

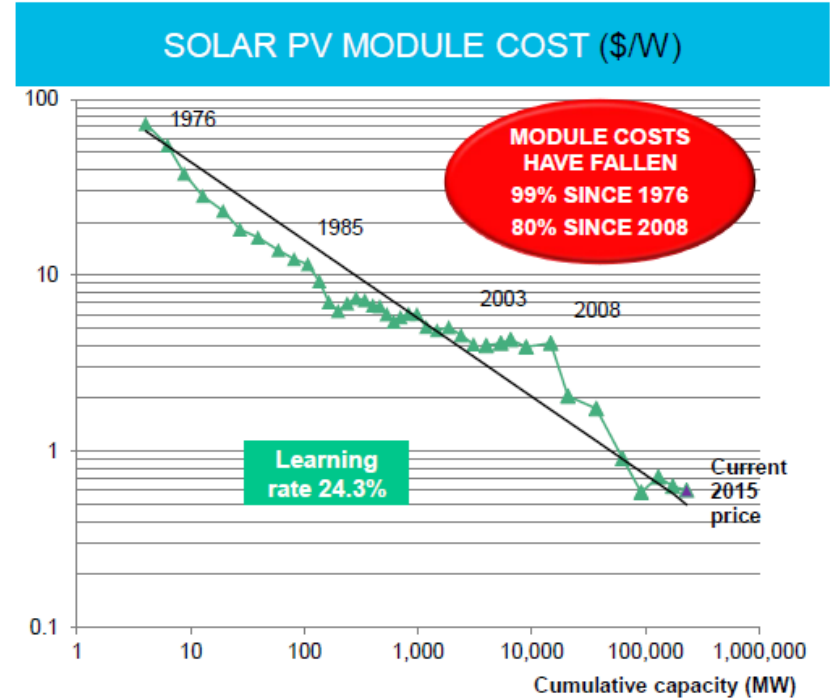
20 November, 2017 University of Helsinki

Outline

1. Background: climate change risk
2. Reaction of supervisory authorities and central banks
3. Sectoral impacts of QE
4. Analysis: ECB and Bank of England corporate bond purchases
5. Conclusions and next steps

Background: climate change risk

- Physical damages
- Liability
- Transitional
 - Policy changes
 - Technological change
 - Consumer demand
- Potentially affecting the value of:
 - Commodities (oil, gas, coal)
 - Long term infrastructure
 - Firms (extraction, refining, distribution)
 - Sovereigns
 - Investors and wider financial system



Note: Prices are in real (2015) USD. 'Current price' is \$0.61/W Source: Bloomberg New Energy Finance, Maycock

Source: BNEF (2016)

Response from central banks and supervisory authorities

- Increasing amount of attention
- Largely focusing on:
 - disclosure requirements
 - stress testing

Institutions (partial list)

G20 (Green Finance Study Group)
Bank of England
Banque de France
Dutch National Bank
European Systemic Risk Board
Financial Stability Board
Banca d'Italia
Finansinspektionen (Sweden)
Lebanese Central Bank
People's Bank of China
European Commission (High Level
Expert Group on Sustainable Finance)

Why should the ECB consider climate change?

- Mandate:
 - According to Article 127 of the Treaty of the Functioning of the European Union (2012): '*...without prejudice to the objective of price stability, the ESCB shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union*'
 - which are defined in Article 3 as including: 'social progress, and **a high level of protection and improvement of the quality of the environment**'.
- Financial stability
- Academic and practical interest: what are the effects of monetary policy instruments and implications for macroprudential policy?

What is the ECB purchasing?

Changes of holdings	Asset Backed Securities Purchase Programme (ABSPP)	Covered Bond Purchase Programme 3 (CBPP3)	Corporate Sector Purchase Programme (CSPP)	Public Sector Purchase Programme (PSPP)	Asset Purchase Programme (APP) Total
Holdings Sept 2017*	24,076	231,314	114,658	1,748,063	2,118,111
Monthly net purchases	605	4,686	6,949	50,174	62,414
Holdings Oct 2017*	24,682	236,000	121,607	1,798,237	2,180,526

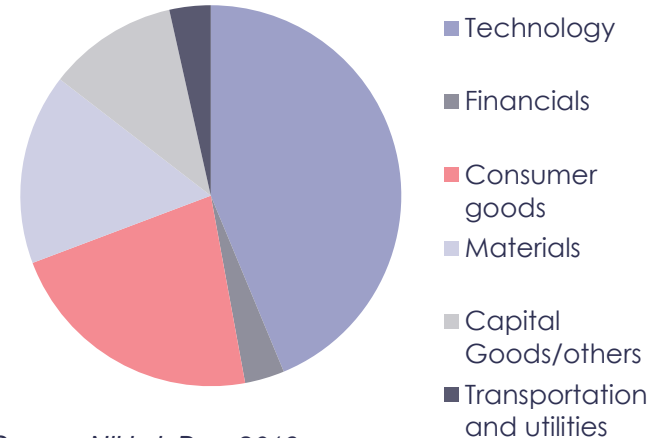
*Note: At amortised cost, in million euros, at month end. Figures may not add up due to rounding. Figures are preliminary and subject to change.

Source: ECB (2017)

How green are these asset purchases?

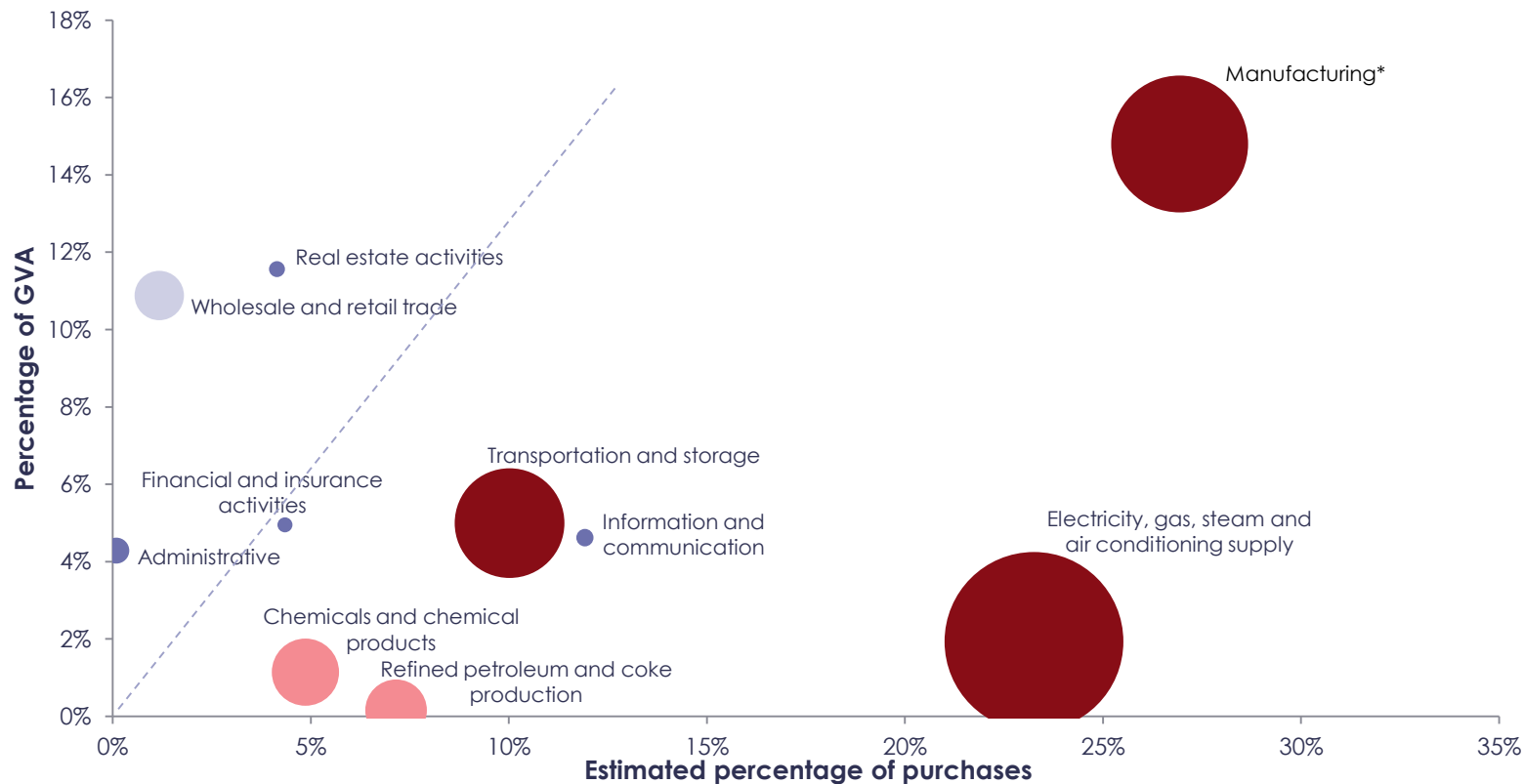
- Public sector purchases
 - Depends on government support for low-carbon activities
- Equities
 - Different sectoral distribution from bond market (debt vs. equity financing)
- Asset-backed securities
 - Lack of transparency
 - Depends on underlying (E.g., Volkswagen)
- Covered bonds
 - Constrained in issuance
 - Excludes renewable energy loans (Damerow, 2014)

Nikkei 225 sector weight



Source: *Nikkei*, Dec. 2016

Carbon intensity of (estimated) purchases (ECB)

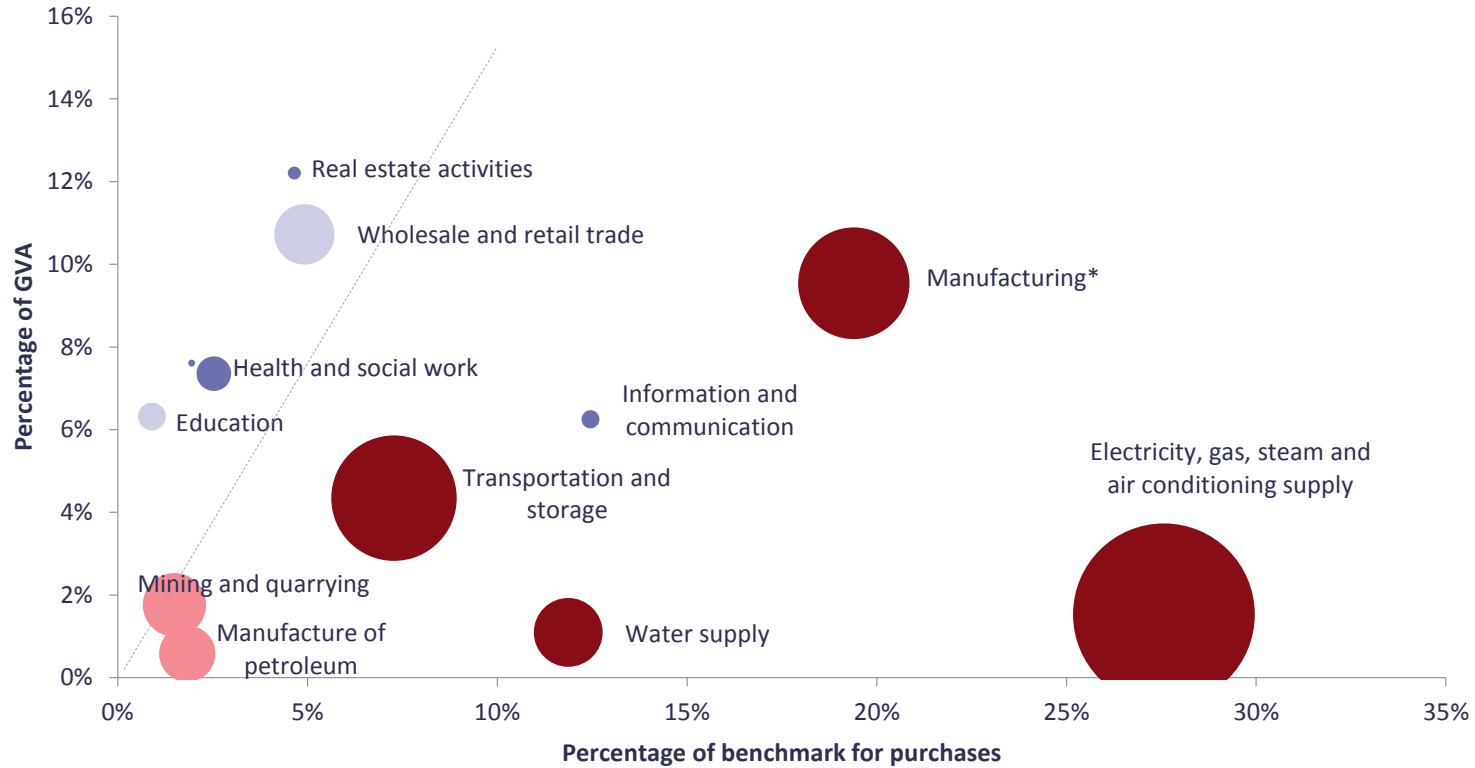


Carbon intensity of Euro corporate bond markets

1: BICS* sector classification name	2: All Euro corporate bonds (%)	3: All corporate bonds except finance (%)	4: Corporate bonds of eligible maturity (%)	5: Investment grade corporate bonds of eligible maturity (%)	6: CSPP eligible (%)	7: Estimated purchases (%)
Communications	4.38	13.10	12.81	10.78	11.54	11.11
Consumer discretionary	5.08	15.20	15.34	12.52	14.37	11.07
Automobiles manufacturing	2.16	6.47	6.19	7.98	9.85	6.84
Consumer staples	2.35	7.02	7.43	8.43	7.71	8.57
Food & beverage	1.52	4.55	4.94	5.97	7.00	6.97
Energy	2.55	7.64	7.29	8.25	8.63	9.54
Integrated oils	1.71	5.11	4.68	6.03	7.58	8.40
Renewable energy	0.18	0.55	0.54	0.26	0.02	0.00
Financials**	70.72	12.35	11.13	12.30	8.64	8.36
Government***	0.00	0.00	0.00	0.00	0.00	2.62
Health care	1.76	5.26	5.29	5.98	4.31	4.26
Industrials	3.99	11.93	12.72	11.10	11.16	10.63
Materials	3.57	10.69	11.16	8.55	7.62	7.39
Technology	0.64	1.92	1.96	1.64	1.58	1.78
Utilities	4.97	14.89	14.87	20.45	24.45	24.67

Notes: *BICS = Bloomberg Industrial Classification System. **Financial institutions under supervision are excluded from purchase; however, other financial actors such as real estate and financial services are eligible. *** As detailed in Appendix 1, Columns 1–6 are based on a search of ECB-eligible bonds from Bloomberg Terminal, which excludes 'government' bonds as ineligible (using BICS sector classification). Column 7 is based on the list of international securities identification numbers (ISINs) provided by the ECB, in which four government-backed entities appear: Deutsche Bahn, SNCF, Sagess and RATP group.
Sources: Bloomberg (2017); ECB (2017), authors' own calculations.

Carbon intensity of eligible assets (BoE)



Carbon intensity of UK corporate bond markets

1: BICS* sector classification name	2: All sterling corporate bonds (%)	3: All corporate bonds except finance (%)	4: All corporate bonds of eligible maturity (%)	5: Investment grade corporate bonds of eligible maturity (%)	5: CBPP eligible (%)	7: Bank of England benchmark list of eligible bonds (%)
Communications	8.64	14.29	13.15	12.48	12.89	12.23
Consumer discretionary	11.31	18.71	18.49	13.10	13.32	10.83
<i>Automobiles manufacturing</i>	2.55	4.22	3.44	3.37	3.46	3.42
Consumer staples	5.42	8.96	8.88	7.98	8.09	10.50
<i>Food & beverage</i>	1.67	2.76	2.62	2.38	2.30	1.72
Energy	2.23	3.70	3.59	3.68	3.81	2.95
<i>Integrated oils</i>	1.35	2.24	2.28	2.33	2.42	1.83
<i>Renewable energy</i>	0.02	0.03	0.03	0.00	0.00	0.00
Financials**	46.89	12.11	12.55	11.13	11.06	6.60
Government***	0.00	0.00	0.00	0.00	0.00	2.80
Health care	2.48	4.10	4.30	4.48	4.54	5.85
Industrials	5.02	8.31	8.58	9.71	9.71	6.15
Materials	1.26	2.08	1.86	2.31	2.40	1.20
Technology	0.51	0.85	0.87	1.14	1.18	1.46
Utilities	16.25	26.89	27.73	33.99	33.00	39.44

Notes: *BICS = Bloomberg Industrial Classification System. **Financial institutions under supervision are excluded from purchase; however, other financial actors such as real estate and financial services are eligible. *** As detailed in Appendix 1, Columns 1–6 are based on a search of BoE-eligible bonds from Bloomberg Terminal, which excludes 'government' bonds as ineligible (using BICS sector classification). Column 7 is based on the list of international securities identification numbers (ISINs) provided by the BoE, in which four government-backed entities appear: Deutsche Bahn, SNCF, Sagess and RATP group.

Sources: Bloomberg (2017); Bank of England (2017), authors' own calculations.

Carbon intensity of purchases: main points

- Manufacturing and electricity production:
 - 62.1% of purchases, 58.5% of Eurozone area emissions, but only 18% of GVA.
- Chemical and petroleum products:
 - also emissions-intensive (especially when considering emission accounting)
 - contribute less than 1% of Eurozone GVA
- Wholesale and retail trade, real estate:
 - Relatively small percentage of purchases, though they contribute a relatively large amount to GVA and relatively little to emissions.
- Reflects the bond market (high capital intensity of manufacturing and utilities, use of debt financing) and eligibility criteria

Effects of corporate bond purchases

- Additional debt issuance and lower borrowing costs (Buell, 2016; Yap, 2016).
- Widening yield spreads between:
 - purchased and unpurchased assets
 - eligible and ineligible bonds (Keohane, 2016)

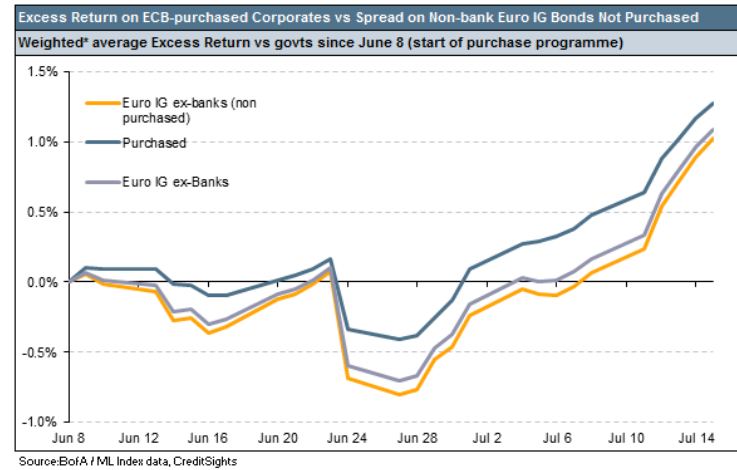
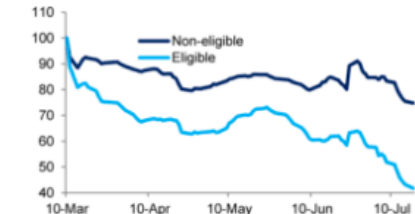


Figure 4. CSPP-eligible bonds, spread performance of those bought so far vs. those that haven't, Indexed



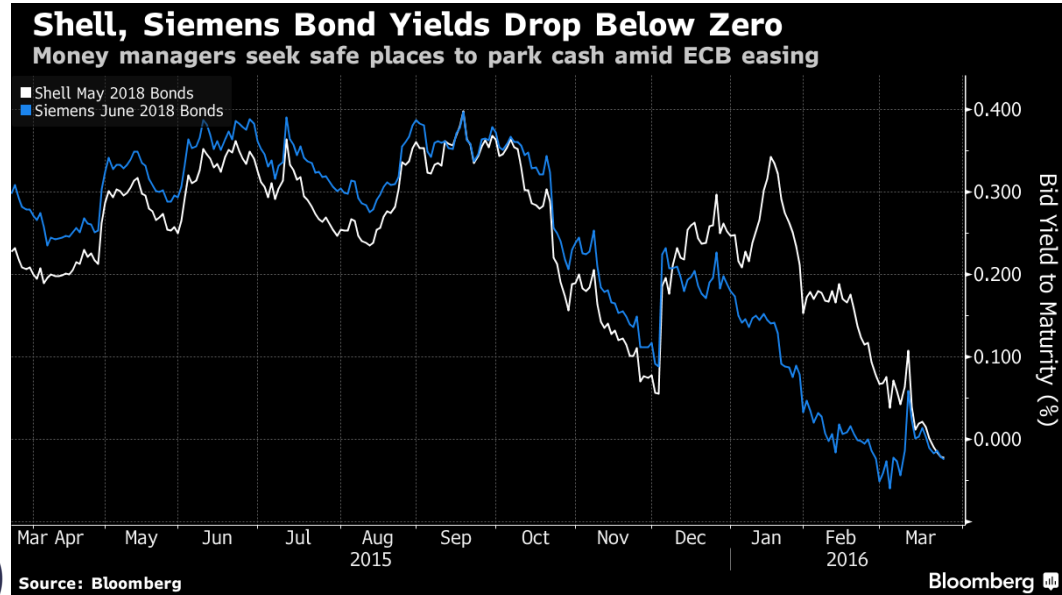
Figure 5. € iBoxx Corp, CSPP-eligible vs ineligible constituents, Indexed,



Source: Keohane (2016)

Energy sector: oil and gas

- ECB: Apetra, ENI, OMV, Petrol, Shell, Repsol, Sagess, Schlumberger, Total, Transport ET and Vier Gas
- Debt financing used for investment in long-term infrastructure, potentially contributing to carbon lock-in(Unruh, 2000).
- Oil and gas sector is already heavily indebted, with concerns about credit default (particularly for emerging markets and smaller American producers) (Blas, 2016; Crooks, 2016; Loder et al., 2016; Domanski et al. 2015)

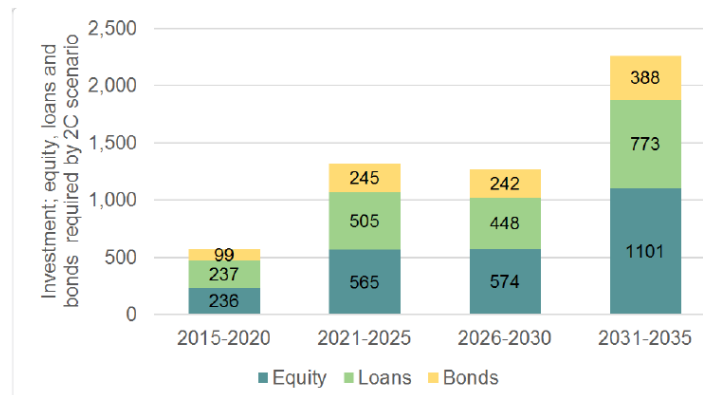


Source: Bakewell, 2016

Energy sector: renewables

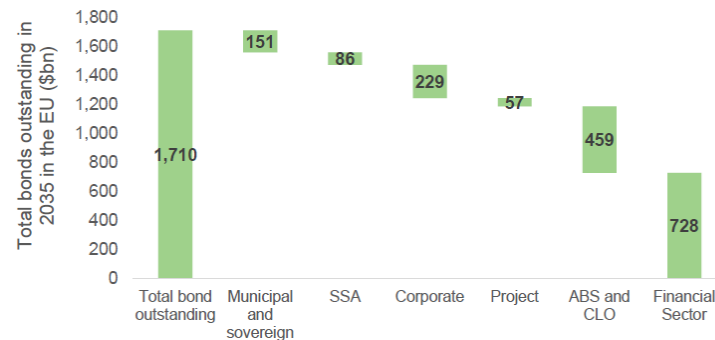
- No renewable energy bonds purchased (according to Bloomberg classification)
- Why?
 - Different financing structure (equity and loans)
 - Investment grade status
 - Other barriers to eligibility, e.g. as ABS?
- Importance of understanding funding channels: corporates, investment funds, development banks, project bonds, etc.

Figure 1.4. Synthetic investment breakdown for the IEA 2DS by type of finance needed to 2035 (annual basis, USD 2012)



Source: OECD analysis based on IEA (2014, 2012)

Note: Financial sector bonds that raise proceeds for on-lending not shown but represented in loan figures



Source: OECD, 2016

Next steps: research, disclosure, collaboration

- Research
 - How central bank operations are affected by, but also could affect, transition risk
 - Working with relevant supervisory authorities on scenario analysis and stress testing
- Disclosure
 - Selection process, amounts purchased, and underlying assets (covered bonds and ABS)
 - Supporting the work of the FSB's Task Force on Climate-Related Financial Disclosure
- Collaboration
 - Working with other relevant authorities such as EIB to address e.g. barriers to eligibility
 - Supporting the European Commission's High Level Expert Group in Sustainable Finance

Possible future policy options

- Though QE will begin tapering in 2018, ECB will keep reinvesting proceeds of maturing bonds
- Revise risk criteria in purchasing decisions
 - Possible discrepancies in how credit ratings agencies assess climate risk
- Revise purchasing strategy
 - 'Green' bond market is small but expected to increase
 - Constraints in purchasing bonds from development banks
- Adjusting macro-prudential policy

Thank you!

Full paper available from:
<http://www.lse.ac.uk/GranthamInstitute/publication/the-climate-impact-of-quantitative-easing/>

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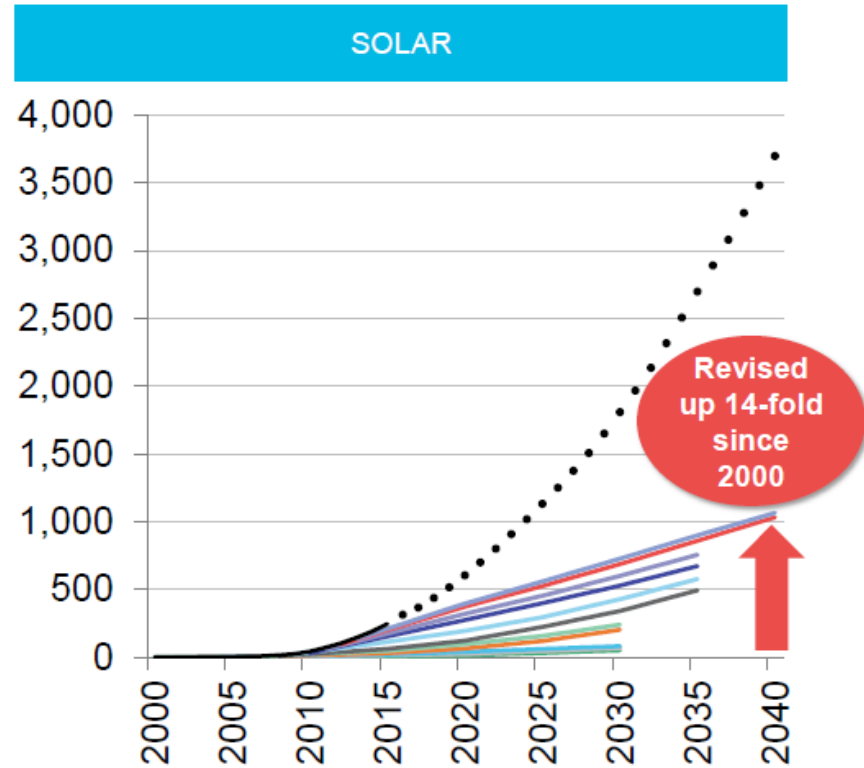
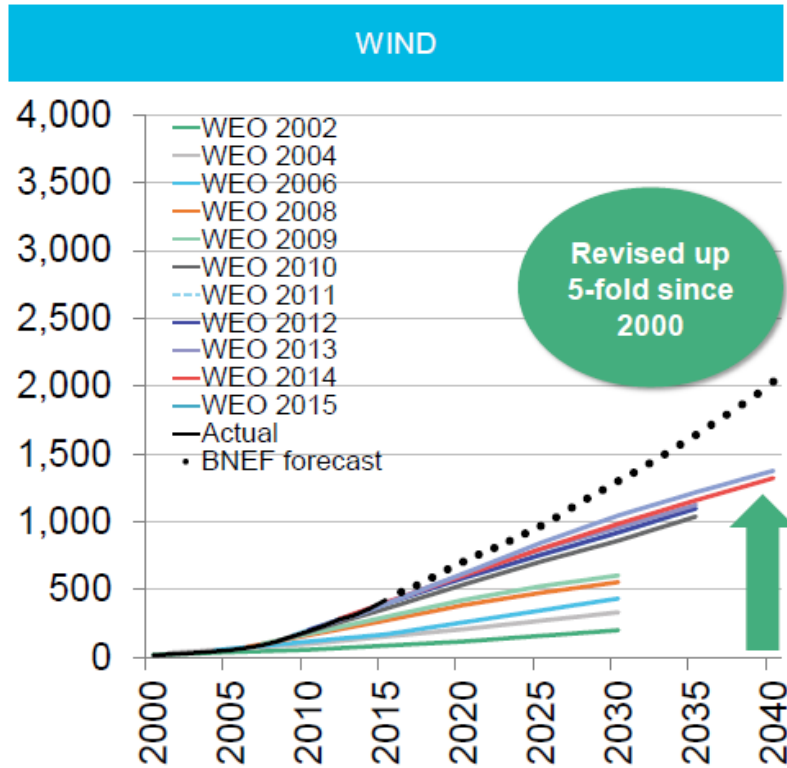
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Background slides

Targeted use of monetary policy instruments

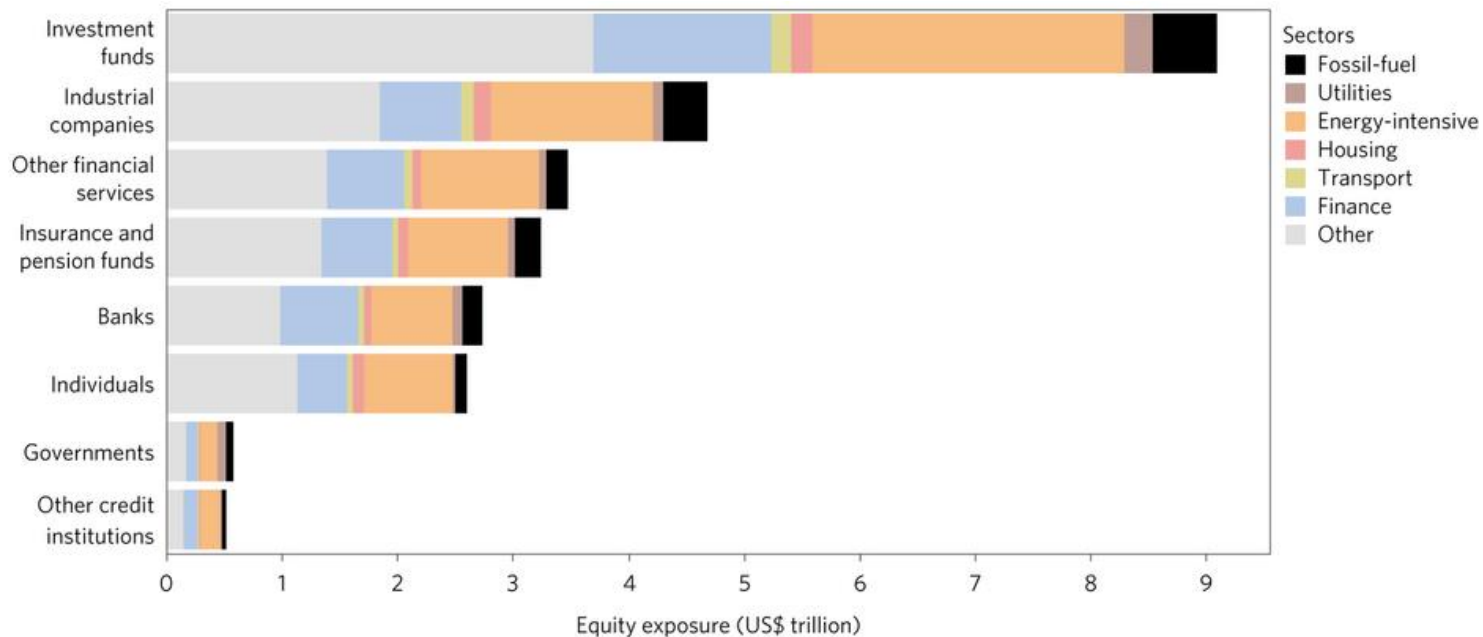
- **Federal Reserve:** purchases of mortgage-backed securities in its first round of QE from 2008 to 2010
 - Cleaned up banks' balance sheets from underperforming and illiquid assets
 - Freed them to extend more credit to the larger economy and helped to lower mortgage rates (Khemraj and Yu, 2016; Krishnamurthy and Vissing-Jorgensen, 2011; Ryan-Collins, 2013).
 - Analysis suggests a wider macroeconomic impact than the second round of QE in 2011, which focused on Treasury bonds only (Krishnamurthy and Vissing-Jorgensen, 2011).
- **ECB:** Long-term refinancing operations to encourage lending to real economy
- **Bank of England's** Funding for Lending Scheme has targeted household lending (until November 2013) and lending to SMEs
- **Bank of Canada:** Purchased bonds issued by the Canadian Industrial Development Bank to support loans to SMEs (Ryan-Collins (2013)).

Installed capacity (GW): IEA forecast and actual



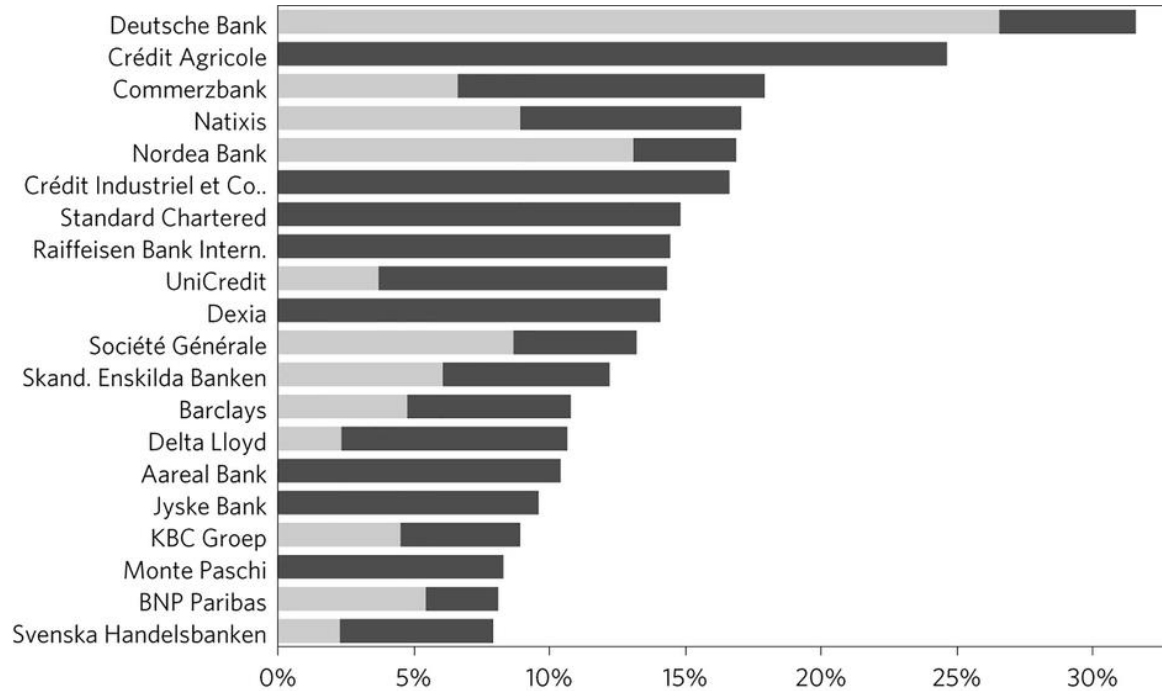
Source: IEA, Bloomberg New Energy Finance.

Equity holdings in EU and US listed companies in 2015



Source: Battiston et al. (2017)

Potential losses to European banks



Source: Battiston et al. (2017)

■ First round

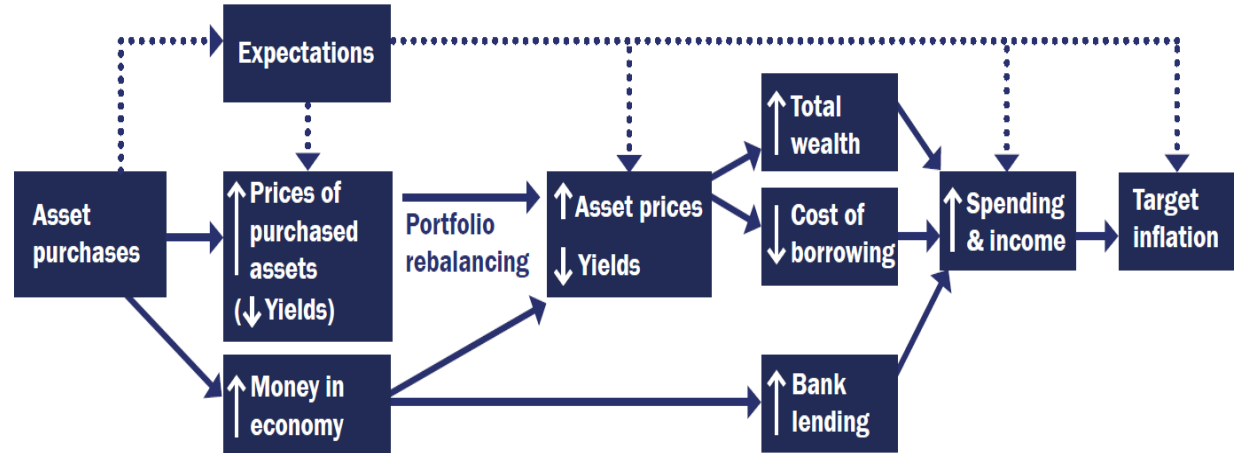
■ Second round

Are these risks priced in?

- Ongoing topic of research
- Efficient market hypothesis (Fama, 1970) suggests risks should be priced in, but:
 - investors may not find future climate policy credible, or underestimate the speed of technological change
 - may lack sufficient information to make the assessment (TCFD, 2016)
 - cognitive biases (Schiller, 2000; Kahnemann, 1975)
 - or face other institutional and normative barriers related to time horizons (Carney, 2015)
- Also depends on future of technological development (e.g. CCS) and renewable deployment
- Extent of mispricing is unknown, but could be significant

QE: stylized transmission mechanism

- Asset purchases used as unconventional monetary policy instrument
- Targeting broad-based growth
- Aiming for neutrality in the sense of avoiding market distortions



Source: Authors, based on Benford (2009)

Theoretical implications of choice of purchased asset

- Academic literature suggests frictions in transmission mechanism:
 - Impact of QE is easiest to demonstrate on asset being purchased, with impact on other assets is more difficult to separate from other influences (Joyce et al., 2010).
 - Assets with a similar risk profile benefit relatively more than higher-risk bonds (Krishnamurthy and Vissing-Jorgensen, 2011, 2012; Rogers, 2014).
 - In the UK, micro-analysis of institutional investors shows that the purchase of Gilts resulted in some portfolio rebalancing effects towards corporate bonds, but not equities (Joyce et al., 2015).
- Which suggests differential effects between purchased and unpurchased assets (Rogers 2014)