

# Cultivating Productivity and Long-run Growth: The Fiscal Dimension

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*Research for new economic policies*

# Technical progress and economic change

- The stories of economic growth and human history are the stories of technological change and changing beliefs and ideas.
  - New ideas and technologies are the fodder for economic growth
  - Diminishing returns to capital and labour make it impossible to sustain economic growth in the absence of productivity improvements. (Solow and Swan, 1956/57)
- Arrow (1962, 1991)
  - Learning by doing raises the marginal productivity of capital over time
  - *“While the cost of acquiring knowledge is independent of the scale on which it is eventually used, the benefit obtained from the knowledge very much depends on the scale at which it is eventually used.”*
- The cost of knowledge (its creation and diffusion) is the main determinant of the rate of technological change (Rosenberg, 1974).
  - Romer (1990): *‘influencing the cost of finding new ideas’* is the key to economic growth.
  - Technology diffusion (National System of Innovation, proximity to people, network analysis, knowledge flows and system density)

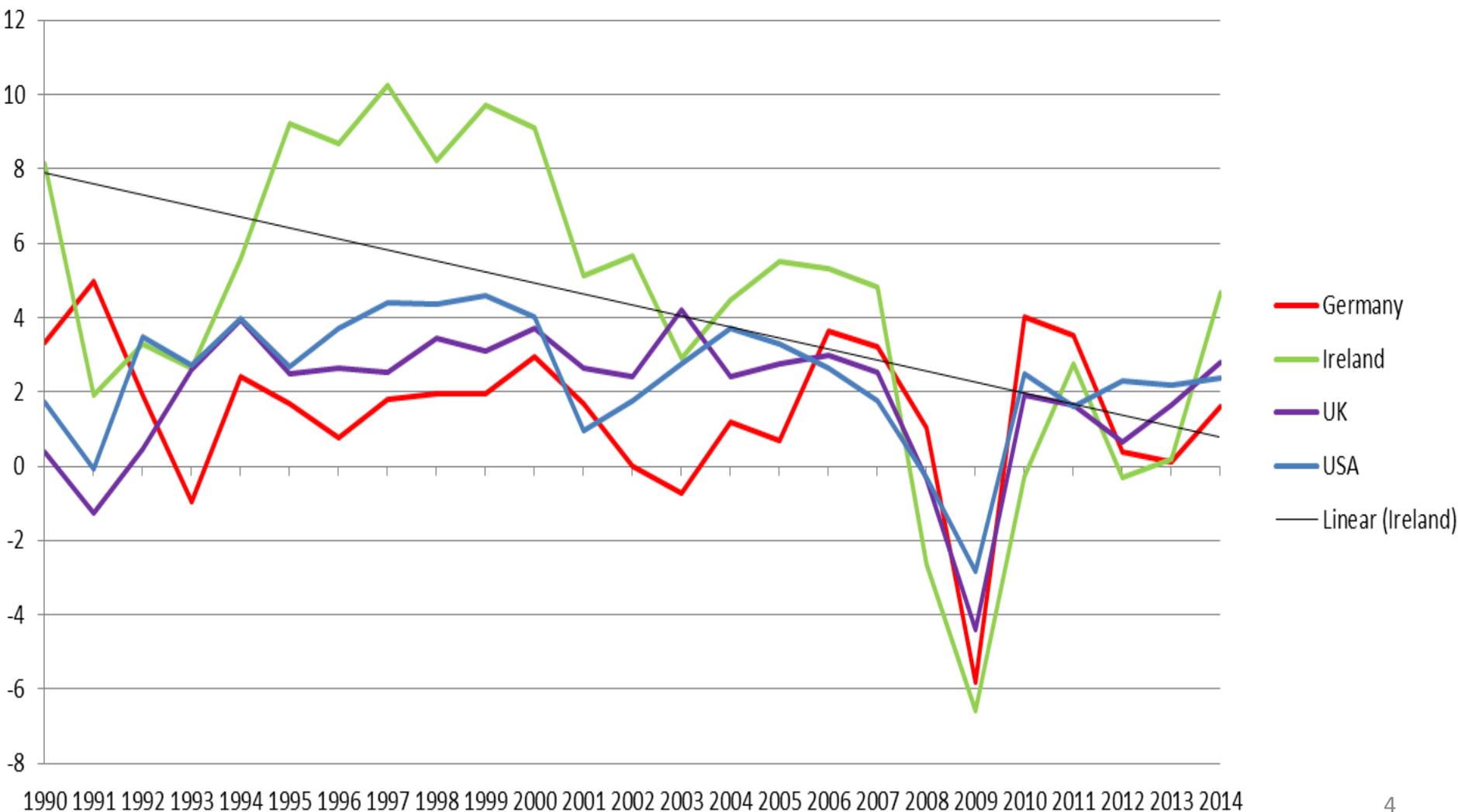
# Modern growth theory (selected)

- **New growth models:** treat technological change as endogenous
  - Growth process driven by purposive accumulation of human and physical capital together with the production of new knowledge, often created through R&D activities, and the diffusion of that knowledge.
  - Inability of knowledge producers to fully internalise the benefits of investing in R&D, as well as uncertainty of production, reduces incentive to undertake such activity.
  
- **Evolutionary models:** economic change occurs as part of a historically grounded path-dependent process
  - Innovation is blind.
  - Individuals and organisations with bounded rationality learn and search experimentally in uncertain and permanently changing environments and with uncertain outcomes
  
- **Complexity models:** economic change occurs through exploitation of increasing returns from new innovations
  - Complex adaptive system with emergent properties.
  - Optimal outcomes cannot be guaranteed; new possibilities are continuously emerging as part of a dynamic process within the system
  
- **Neo Schumpeterian models** elements of the new growth framework; technological change as path-dependent process and economy as complex system.
  - Competition between innovations, rather than between firms, is central force propelling economic growth.
  - Process of economic upheaval and change seen as perpetual. Create gales of destruction. Transformative technologies generate periods of radical change.

# Real GDP Growth, 1990-2014

Ireland = 4.3%; Unweighted Western Europe/North America/Oceania = 2.2%

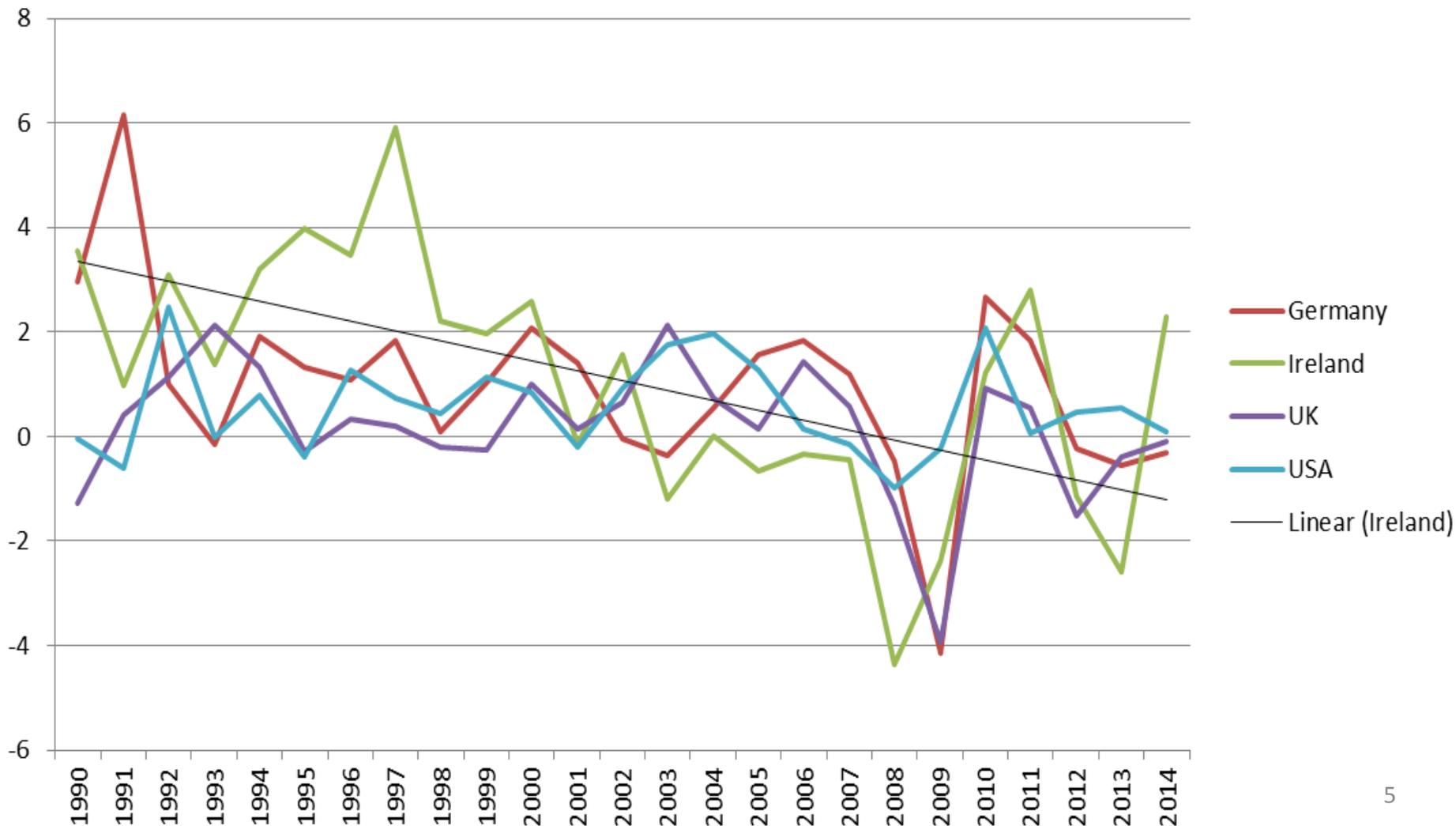
Source: The Conference Board (May 2015)



# Total Factor Productivity, 1990 – 2014

Contribution to GDP growth (Source: The Conference Board)

Ireland = 1.1; Unweighted Western Europe/North America/Oceania = 0.2



# Growth Accounting: 1990-2014

Average annual GDP growth and average annual factor contributions

Source: Conference Board, Total Economy Database (May 2015)

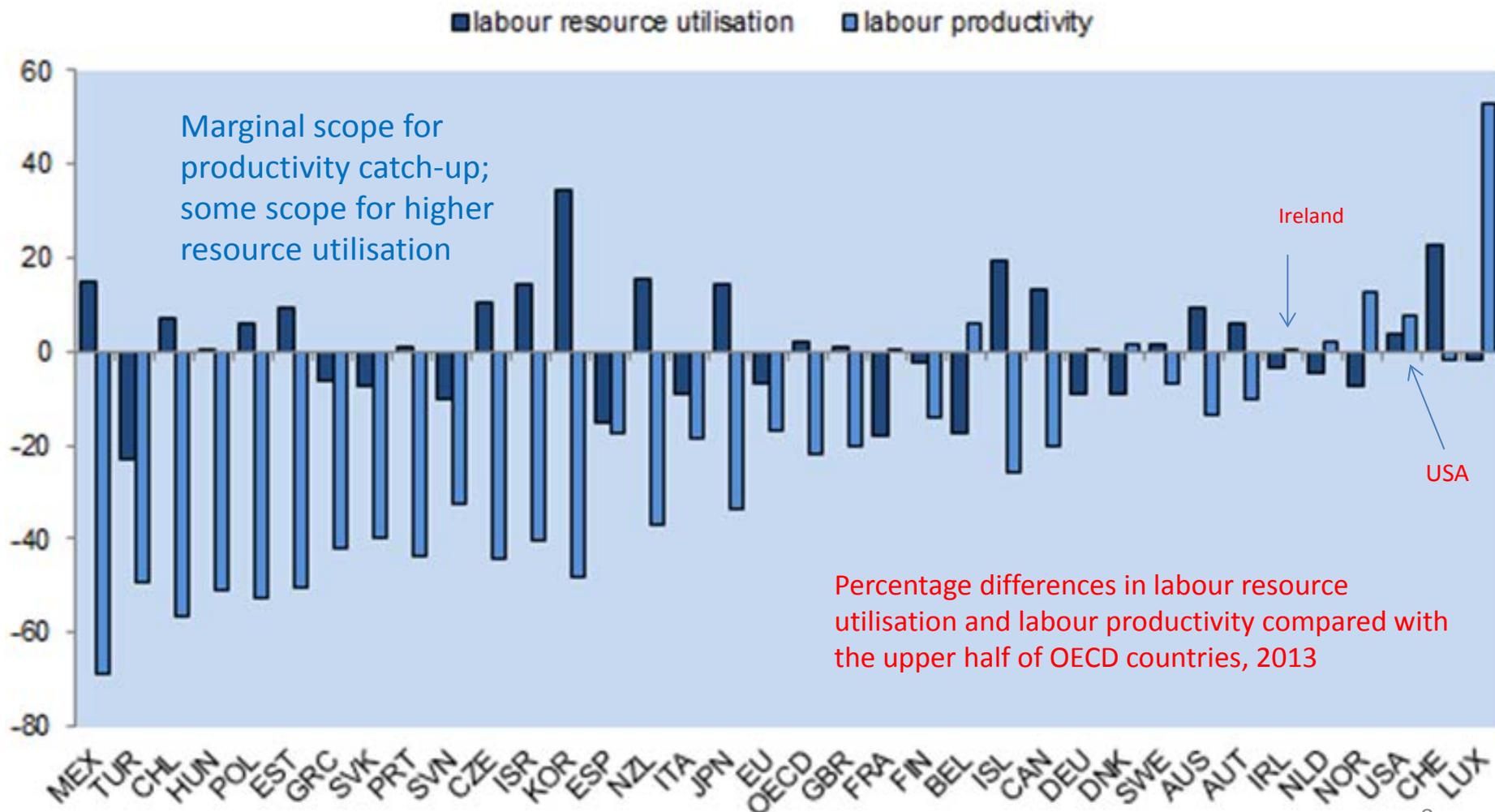
	GDP Growth	Labour Quantity	Labour Quality	Capital ICT	Capital Non-ICT	TFP	Labour prod.
Ireland	4.3	0.8	0.3	0.8	1.4	1.1	3.5
<b>G7 (unweighted)</b>	<b>1.6</b>	<b>0.1</b>	<b>0.2</b>	<b>0.4</b>	<b>0.6</b>	<b>0.3</b>	<b>1.5</b>
UK	1.9	0.2	0.4	0.6	0.6	0.2	1.7
Germany	1.5	-0.2	0.1	0.4	0.3	1.0	1.7
France	1.5	0.1	0.3	0.3	0.7	0.1	1.4
Italy	0.7	0.0	0.1	0.2	0.4	-0.1	0.7
USA	2.4	0.4	0.2	0.6	0.6	0.6	2.0
Canada	2.3	0.6	0.3	0.6	0.9	-0.2	1.7
Japan	1.1	-0.4	0.2	0.3	0.6	0.3	1.5
China	8.6	0.4	0.1	0.9	4.7	2.5	8.2
Ireland (2000-14)	2.7	0.3	0.3	0.8	1.6	-0.2	2.4
G7 (2000-14) Unweighted	1.3	0.2	0.2	0.4	0.5	0.1	1.1

# Future Growth prospects

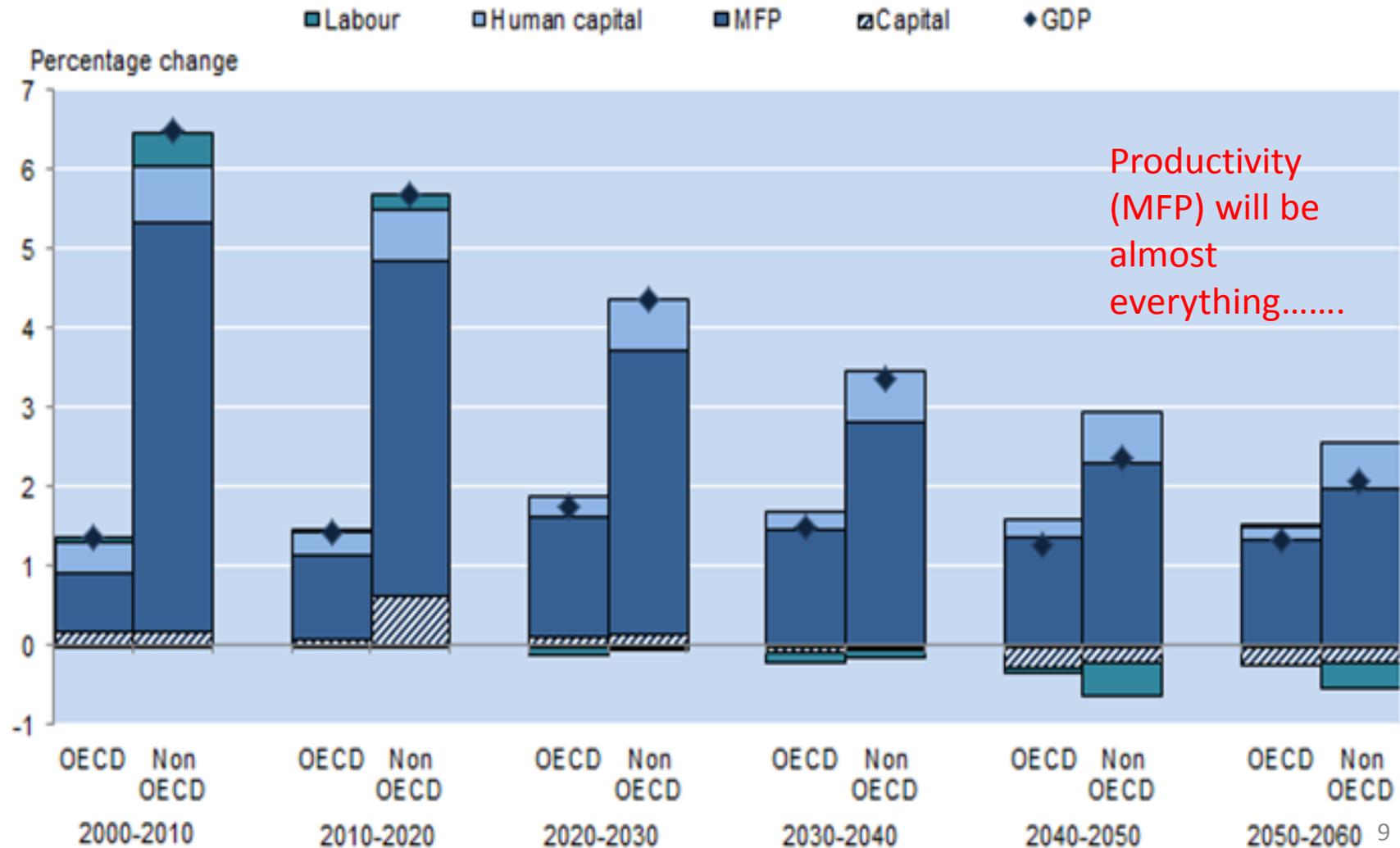
- The key parameters underlying future prospects for the Irish economy are:
  - The investment rate
  - Demographic changes
  - Participation and unemployment rates
  - Total Factor Productivity
  
- Ireland is now a high productivity economy with GDP per worker close to US levels. This suggests that opportunities for catch-up productivity gains may be lower in the future.
  
- The OECD (2013) projects a 3% real GDP growth rate through 2030 predicated on employment growth of 1.3% and labour productivity growth of 1.7%
  - Ireland may have more scope for ‘structural reforms’ as labour productivity measured in GDP terms is almost certainly overestimated (transfer pricing, GDP/GNP gap)
  
- There are a range of estimates for future TFP:
  - Byrne et al (2015) assume TFP converges to a steady-state of 1.8% by 2020
  - McQuinn and Whelan (2015) assume TFP growth of just 0.2% consistent with their estimates for TFP’s contribution to Euro area output growth between 2000 and 2013.
  - TFP growth of 1% per annum seems a reasonable baseline.....Dept. Finance assumes average TFP growth of 1.7% out to 2021

# Differences in income per capita mostly reflect labour productivity gaps

Source: OECD 2015, Going for Growth Database



# OECD forecasts for contribution to growth in GDP per capita; 2000-2060 (annual average)



# Seeding Productivity Growth

## (A) Labour quality/Education and Skills

- Labour productivity increases as learning and experience increase
- Human capital not only enhances labour productivity but is also a necessary input for innovation and technology adoption
- Strong education systems are empirically associated with increases in the long-run rate of per capita economic growth - OECD contends half of the growth achieved by OECD countries since WWII has been driven by progress in education

COFOG (Eurostat 2016)

### Education spending, % GDP, 2014

Ireland 4.3%

EU 4.9%

UK 5.2%

Switzerland 6.0%

Finland 6.4%

Sweden 6.6%

Denmark 7.2%

- 1 Increase teacher autonomy and accountability and reduce classroom sizes
- 2 Increase education budget for early years learning
- 3 Use fiscal policy to reduce economic inequality (income and wealth) and promote social and economic inclusion
- 4 Protect childcare, family and housing supports and healthcare services at sufficient levels to avert child poverty
- 5 Mismatch - Annually review the efficacy of activation programmes and training schemes and reallocate resources to well-performing programmes and schemes

# Human Capital

## Prioritising early years

- Human capital represents the knowledge, skills, competences and other attributes embodied in individuals that are relevant to economic activity
  - **A critical input for growth.** Enhances labour productivity and is a necessary input for innovation, technical progress and technology adoption
  - **Not just about schooling.** The child's home environment determines much of the early development in cognitive and non-cognitive skills.
  - **The early years are the most important for development.** External factors, like poverty, can have extremely damaging and lasting effects on human capital. It is for this reason that family supports and in-kind public health services are positively associated with long-run growth.
  - **Human capital development is a life-long process.** Training programmes providing market-relevant skills may generate economy-wide employment gains under conditions of skill shortages or mismatches.
- Heckman (2000): *“investing in learning in early childhood brings greater returns than at any other stage in life”*

# Seeding Productivity Growth

## (B) Innovative capacity

- R&D and innovation are key determinants of competitiveness, productivity and economic growth.
- Innovative capacity is a function of education levels, government policies that support R&D, the quality of capital markets etc.
- Ireland's combined government and higher education spending on R&D was 0.4% of GDP in 2014 compared to 0.7% for the EU and for the US.

GERD Eurostat (2016)

### R&D expenditure, % GDP, 2014

Ireland 1.5%

EU 2.0%

UK 1.7%

USA 2.8% (2012)

Germany 2.9%

Switzerland 3.0% (2012)

Denmark 3.1%

Japan 3.5% (2013)

- 1 Increase spending on basic and applied research as % of GDP as well as on seed funding for high potential start-ups
- 2 Incentivise (subsidise) take-up of science, technology, engineering and mathematics courses at undergraduate and postgraduate levels
- 3 Reform the patent system to promote innovation and the use of new technologies (shorten, weaken, use-it-or-lose-it)
- 4 Establish a state investment bank to raise affordable and patient funding for innovating enterprise
- 5 Provide grants to SMEs for adoption of new technology
- 6 Increase support for horizontal linkages between the state, higher level institutes and enterprise
- 7 Reform bankruptcy law to not overly penalise failure
- 8 Address market failures in the provision of high speed broadband

# National Innovative capacity

- The ability to generate original ideas and communicate and assimilate existing innovations.
  - A function of education levels, knowledge flows, the quality of capital markets and government policies that support R&D (the innovation system).
- The production and diffusion of innovations can be incentivised through measures to increase the productivity of R&D and other knowledge production activities.
  - E.g. reducing the cost of innovation inputs (subsidies/tax breaks) or improving the quality and efficiency of those inputs
- Increasing the productivity of knowledge production:
  - **Invest in human capital.** This is because human capital is a complement to the production and exploitation of ideas
  - Support and **invest in those technologies which themselves reduce the cost of knowledge search and the diffusion of useful ideas** (e.g. broadband)
- Mazzucato (2013): *“Germany’s competitiveness strategy has been driven by its ability to build a strong innovation system, with patient long-term finance (e.g. KfW), strong science industry links (Fraunhofer institutes) and above average R&D/GDP spending”*

# Seeding Productivity Growth

## (C) Infrastructure

- Investment in infrastructure is strongly related to long-run increases in productive capacity
- WEF (2015) places Ireland just 27<sup>th</sup> in the world in terms of the overall quality of infrastructure
- Not all investments are equally productive or even useful.
- Certain types of investment contribute to knowledge based growth (schools, broadband) and are therefore particularly beneficial in the long-run.

DG ECFIN (2016)

**Gross Fixed Capital Formation,  
general government, % GDP, 2015**

Ireland 1.8% (lowest in the EU)

EU 2.9%

UK 2.7%

United States 3.4%

Japan 3.2%

Sweden 4.4%

- 1 Multi-annual targets for independently evaluated public infrastructure projects (circa 3% to 4% of GDP)
- 2 Establish an infrastructure bank to facilitate the provision of stable, long-term finance for infrastructure and to engage in counter cyclical investment
- 3 Establish an expert group to independently evaluate infrastructure needs and co-ordinate ex ante and ex post evaluation of specific projects

# Investment in infrastructure

- Investment in infrastructure is strongly related to long-run increases in the economy's productive capacity (OECD, 2015).
  - Meta-analysis of 68 studies by Bom and Ligthart (2014) concludes public capital investment has positive long-run effects on output.
- IMF (2014):
  - Net benefits are particularly high during periods of economic slack and in a liquidity trap environment, where the cost of borrowing is low.
  - The net benefit hinges on the efficiency of the investment process. Public capital investment carries risks (e.g. electoral/political interference).
- Arguments for an independently run Strategic Investment Bank – 'is there an optimal public investment ratio?'
  - SIB could act counter cyclically; patient long-term finance
  - Model has worked well elsewhere (e.g. Germany's KfW)
- Can private investment do the job?
  - Ireland has historically had low rates of productive investment for a number of reasons. Irish banks have a poor record in providing capital for productive investment
  - Capital was systematically misallocated in the 2000s
  - Ireland ranks just 61<sup>st</sup> in the world for financial market development and 116<sup>th</sup> for ease of access to loans (WEF, 2015-16)

# Seeding Productivity Growth

## (D) Efficiency of use of Capital and Labour

- Productivity and technological progress are not the same things.
- Scale economies and improvements in efficiency of use also contribute to productivity growth.
- Lack of competition will lead to inefficiencies in the absence of robust regulatory measures. However, the relationship between competition and innovation is non-linear.
- Subsidies and tax breaks negatively affect growth by distorting allocative efficiency, by creating inefficiencies in production and consumption, and by diverting economic activity toward rent-seeking behaviour.
- Appropriate regulation (costs vs. benefits)

- 1 Phase out the system of tax expenditures (simplify the tax code) and ensure horizontal equity of tax treatment across all asset classes to the greatest extent possible (though see below)
- 2 Phase out most subsidies for home ownership, business and agriculture
- 3 Ensure independence and enforcement power for all regulators.
- 4 Establish independent regulators with enforcement powers for all professional bodies
- 5 Rebalance the tax system with increased taxes on land, property net wealth, inheritances, passive income and gifts
- 6 Increase financial market development and competition

### Jerzmanowski (2007)

Estimates that 69% of cross country variation in output per worker was attributable to TFP in 1995.

26% of the variation came from technology differences

while **43% of the cross country variation in output came from differences in efficiency of use.**

# Balancing Equity and Growth: Hierarchy of Fiscal Consolidation Instruments (OECD, 2013)

Generic Rank	Instrument	Generic Rank	Instrument	Generic Rank	Instrument
1	<b>Business and other subsidies</b>	4-8	Environmental taxes	13	Public investment
2-3	<b>Pensions*</b>	4-8	Unemployment benefits	14-15	SSCs
2-3	<b>Other property taxes</b>	9-10	Other government consumption	14-15	Health services (in-kind)
4-8	Recurrent taxes on immovable property	9-10	Sales of goods and services	16	<b>Childcare/family</b>
4-8	Personal income taxes	11-12	Sickness and disability payments	17	<b>Education</b>
4-8	Corporate income taxes	11-12	Consumption taxes (non-environment)	<b><u>The lower the ranking the more damaging the impact from cutting expenditure or increasing revenue</u></b>	

Thinking about that fiscal space.....

Reductions in public pension spending scores highly in the hierarchy of consolidation instruments. However this ranking refers to an increase in the retirement age which keeps productive workers in the labour force and increases output. Reducing the pension rate (payments to individuals) does not score highly from a welfare perspective mainly because such a measure would be highly regressive.

## Not just productivity...

### (E) Labour Quantity Growth and Labour Market Barriers

- Output depends on the level of employment and the average number of hours worked. One way to increase the number of hours worked is to remove barriers to labour market entry.
- The cost of childcare is one such barrier and Ireland has very high costs of childcare (as % of average wage) compared to other OECD countries.
- State subsidised childcare would incentivise the labour force participation of second earners and lone parents. This would increase the effective size and quality of the available workforce while retaining human capital within the workforce.
- More generally, employment can be incentivised by gradually tapering down housing and welfare supports along with increases in income, instead of removing these supports completely along with employment.
  - 1 Provide substantial state subsidies for childcare
  - 2 Gradually taper down housing and welfare supports with increases in income instead of making supports conditional on employment status
  - 3 Remove barriers to inward migration and migrants working legally in the economy
  - 4 Eliminate step-effects in the tax and social insurance system 18

# Conclusions

- Ireland's growth potential depends on the economy's ability to generate productivity gains year-on-year.
  - Productivity growth in Ireland has been on a downward trend for over 20 years.
  - Productivity is almost everything.... and policy can influence productivity. E.g. more basic research and stronger university-industry linkages in the case of Ireland
- We have criticised subsidies and tax expenditures but there are some areas where well-designed subsidies and tax expenditures can be appropriate (context dependent)
  - Good examples include tax breaks for genuine R&D and subsidies for childcare
- In general, the available fiscal space should prioritise education (in particular for early years), developing the innovation system and productivity enhancing infrastructure
- Other growth issues:
  - **(A)** Eliminating credit market imperfections; **(B)** Countercyclical fiscal policy (hysteresis effects on human capital); **(C)** Technology diffusion; **(D)** Institutions (generalised vs. particularised); **(E)** Product market efficiency; **(F)** Trade; **(G)** Culture; **(H)** Targeted growth (industrial policy); **(I)** Ease of market entry and exit; **(J)** Patents (software and business process patents); **(K)** Enterprise policy; **(L)** Inequality (inclusive growth) and sustainability; **(M)** Energy efficiency; **(N)** Innovation ecosystems