

## Key Messages on: The Impact of Robots on Productivity, Employment and Jobs

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### 1. **Robots increase productivity and competitiveness.**

- **Robots enable companies to become or remain competitive.** This is particularly important for small-to-medium sized (SME) businesses that are the backbone of both developed and developing country economies.
  - *A recent study found that investment in robots contributed 10% of growth in GDP per capita in OECD countries from 1993 to 2016.<sup>1</sup>*
  - *The same study found that a one-unit increase in robotics density (which the study defines as the number of robots per million hours worked) is associated with a 0.04% increase in labour productivity.*
  - *A separate study shows that use of robots contributed to 10% of total GDP growth in 17 European countries between 1993 and 2007<sup>2</sup>.*
  - *Robots increased productivity over those 14 years in 17 European countries by the same amount as steam technology in the UK – but in one quarter of the time<sup>3</sup>.*
  - *The McKinsey Global Institute predicts that up to half of the total productivity growth needed to ensure a 2.8% growth in GDP over the next 50 years will be driven by automation.<sup>4</sup>*
- **Overall, the greatest threat to employment is not automation but an inability to remain competitive**
  - *Companies that employ technology innovations effectively are between 2 and 10 times more productive than those that do not, according to research by the OECD<sup>5</sup>.*
- **Increased productivity through automation enables large companies to ‘reshore’** or bring back to their domestic base parts of the supply chain that they have previously outsourced to sources of cheaper labour.
  - *Whirlpool, Caterpillar and Ford Motor in the US and Adidas in Germany are examples of this trend*
  - *250,000 jobs have been brought back to the US by reshoring and foreign direct investment since 2010<sup>6</sup>*
  - *70% of survey respondents in a survey by Citigroup believe that automation would encourage companies to move their manufacturing closer to home<sup>7</sup>*
  - *Reshoring brings jobs, but it also increases overall expertise in a sector, which in turn has positive impacts on sector productivity and competitiveness*

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<sup>1</sup> Centre for Economics and Business Research. *The Impact of Automation* 2017

<sup>2</sup> Study by Georg Graetz and Guy Michaels for the Centre for Economic Performance at the London School of Economics,

<sup>3</sup> Ibid

<sup>4</sup> McKinsey Global Institute. 2017. “A Future That Works: Automation, Employment and Productivity”

<sup>5</sup> OECD. 2015. *The Future of Productivity*

<sup>6</sup> Reshoring Initiative Data Report 2015

<sup>7</sup> Citi and Oxford Martin School. 2016. *Technology at Work V2.0*

- **Increased productivity can lead to increased demand, creating new job opportunities.** These ‘spillovers’ can also apply within an individual organisation, but also within a given sector, to different parts of the value chain and in completely different industry sectors.

## **2. Automation has created jobs and increased wages**

- **Robots have a positive impact on labour demand**
  - *Automation has driven a net increase of over 10 million jobs in the EU 27 between 1999 and 2010<sup>8</sup>*
  - *Robots have increased wages without reducing hours worked<sup>9</sup>*
  - *Jobs have grown faster in occupations using automation<sup>10</sup>*
  - *Countries that invested more in robots lost fewer manufacturing jobs than those that did not<sup>11</sup>*
  - *There is either already a skills shortage in US manufacturing or will be within the next three years according to over half of US manufacturers in a survey<sup>12</sup>*
  - *Countries with the highest robot density, notably Germany and Korea, have among the lowest unemployment rates*
- **Robots have increased wages.** Robots are driving an increase in demand for higher-skilled workers with a positive impact on wages.
  - *In the UK, the higher-skilled jobs that have replaced lower-skilled ones pay on average £10,000 more per annum, adding £140 billion to the UK’s economy<sup>13</sup>*

## **3. Robots complement and augment labour: The future will be robots and humans working together**

- **Robots substitute labour but not jobs**
  - *Less than 10% of jobs are fully automatable<sup>14</sup>*
  - *Automation of tasks within a job do not lead to a decrease in workers with that job: The introduction of ATM machines in the US did not lead to a decrease in bank tellers<sup>15</sup>*
- **Robots improve the quality of work and create new, higher income job types**
  - *Robots at BMW in the US fit doors with insulation, a task that used to cause wrist-strain for workers*
  - *Paradigm Electronics in Canada has seen a 50% increase in productivity with no job losses, by promoting machine operators to robot programmers and using robots for polishing loud speakers, but with humans conducting final polish and quality check.*
  - *Robots and robotic devices such as exoskeletons, combined with virtual technology technologies can enable workers with physical impairments to carry out the same work as people without those impairments, and also enable all workers to carry out heavy or dangerous work safely.*
  - *According to analysis by PwC of data from the U.S. Bureau of Labor Statistics, the most robotics-intensive manufacturing sectors in the US as a proportion of the total workforce—i.e., automotive, electronics and metals—employ about 20% more mechanical and industrial engineers and nearly twice the number of*

<sup>8</sup> Zierahn, Ulrich, Terry Gregory, and Melanie Arntz. 2016. *Racing With or Against the Machine? Evidence from Europe. Discussion Paper No. 16-053, ZEW Centre for European Economic Research.*

<sup>9</sup> Study by Georg Graetz and Guy Michaels for the Centre for Economic Performance at the London School of Economics

<sup>10</sup> ‘Computers Don’t Kill Jobs but Do Increase Inequality’, Harvard Business Review, 2016

<sup>11</sup> *Robots Seem to Be Improving Productivity, Not Costing Jobs.* Harvard Business Review 2015

<sup>12</sup> PwC. 2016. *Upskilling manufacturing: How technology is disrupting America’s industrial labor force.* Price Waterhouse Coopers in conjunction with the Manufacturing Institute

<sup>13</sup> Deloitte LLP. 2015. ‘*From Brawn to Brains: The Impact of Technology on Jobs in the UK*’

<sup>14</sup> McKinsey Global Institute. 2017. “*A Future That Works: Automation, Employment and Productivity*” and ‘*The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis*’ OECD

<sup>15</sup> James Bessen ‘*Toil and Technology*’ Finance and Development 2015

*installation maintenance and repair workers than do less robotics-intensive manufacturing sectors and pay higher wages than other manufacturing sectors. These sectors also tend to have a higher proportion of production-line workers—and these workers earn higher wages than sectors that are less robotics-intensive.<sup>16</sup>*

- *Wages of workers in new job types created by technology are around 30% higher than for existing job types<sup>17</sup>*

- **Demand for personalised, ecologically-sustainable products will drive the use of collaborative robots**

4. **Governments and companies must focus on providing the right skills to current and future workers** to continue positive impact of robots on employment, job quality and wages.

- **Governments must invest in robotics research and development** to reap the employment benefits of this rapidly growing sector.
- **Governments must also provide the policy incentives and education systems to support the acquisition of skills** necessary to secure and thrive in jobs that are created or changed by the deployment of robots and automation.
- **Companies must engage actively in appropriate retraining programmes** for employees to equip them with appropriate skills
- **These goals will** not be easy to achieve and **require coordinated public-private sector collaboration.**

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<sup>16</sup> *The New Hire How a New Generation of Robots is Transforming Manufacturing*, PwC 2014

<sup>17</sup> *Technological Adaptation, Cities, and New Work*. Working Paper 09-17, Federal Reserve Bank of Philadelphia