# The impact of trade and automation on jobs Extract 5: Trade in the balance

Economists tend to argue that trade does far more good than harm. Yet new research reveals that for many, the short-term costs and benefits are more finely balanced than textbooks assume.

David Autor of MIT, David Dorn of the University of Zurich and Gordon Hanson of the University of California, San Diego, provide convincing evidence that workers in the rich world suffered much more from the rise of China than economists thought was possible. In their most recent paper, published in January, they write that sudden exposure to foreign competition can depress wages and employment for at least a decade.

Trade is beneficial in all sorts of ways. It boosts variety: Americans can shop for Volvos and Subarus in addition to Fords. Yet its biggest boon, economists have argued, is that it makes countries richer. Trade creates larger markets, which allows for greater specialisation, lower costs and higher incomes.

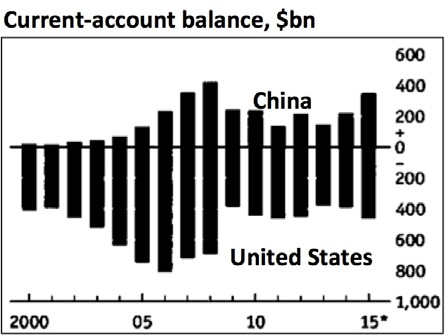
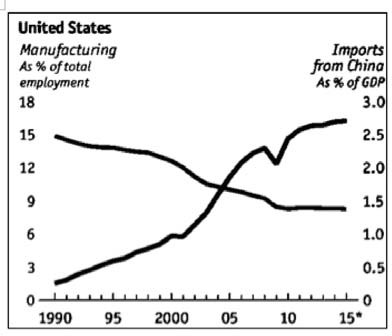
Economists have long accepted that this overall boost to prosperity might not be evenly spread. Some research papers pointed out that trade between an economy in which labour was relatively scarce (like America) and one in which labour was relatively abundant (like China) could cause wages to fall in the place that was short of workers. Yet many were sceptical that such losses would crop up much in practice. Workers in industries affected by trade, they assumed, would find new jobs in other fields.

For a long time, they appeared to be right. In the decades following the second world war, rich countries mostly traded with each other, and workers prospered. Even after emerging economies began playing a larger role in global trade, in the 1980s, most research concluded that trade’s effects on workers were benign. But China’s subsequent incorporation into the global economy was of a different magnitude. From 1991 to 2013 its share of global exports of manufactured goods rocketed from 2.3% to 18.8%. For some categories of goods in America, Chinese import penetration – the share of domestic consumption met through Chinese imports – was near total.

The gain to China from this opening up has been enormous. Hundreds of millions of Chinese have moved out of poverty thanks to trade. A recent NBER working paper suggests Americans will benefit too: over the long run trade with China is projected to raise American incomes. In parts of the economy less susceptible to competition from cheap Chinese imports, the authors argue, firms profit from a larger global market and reduced supply costs, and should also gain – eventually – from the reallocation of labour away from shrinking manufacturing to more productive industries.

But those benefits are only visible after decades. In the short run, the same study found, America’s gains from trade with China are extremely small. The heavy costs to those dependent on industries exposed to Chinese imports offset most of the benefits to consumers and to firms in less vulnerable industries. Competition from Chinese imports accounted for a significant of the decline in employment in manufacturing in America between 1990 and 2007.

The costs of Chinese trade seem to have been exacerbated by China’s large current account surpluses: China’s imports from other countries did not grow by nearly as much as its exports to other countries. China’s trade with America was especially unbalanced. Between 1992 and 2008, trade with China accounted for 20-40% of America’s massive current-account deficit; China imported fewer goods from America than vice versa.



**Figure 2 Figure 3**

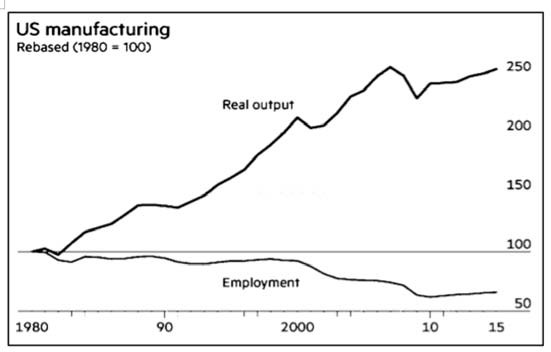
Source: *The Economist*, 06 Feb 2016

# Extract 6: Most US manufacturing jobs lost to technology, not trade

A focal point of president-elect Donald Trump’s campaign, that manufacturing jobs have left the US in droves as a result of bad trade deals, could be based on a faulty premise.

The US did indeed lose about 5.6m manufacturing jobs between 2000 and 2010. But according to a study by the Center for Business and Economic Research at Ball State University, 85 per cent of these jobs losses are actually attributable to technological change — largely automation — rather than international trade. The think-tank found that although there has been a steep decline in factory jobs, the manufacturing sector has become more productive and industrial output has been growing.

The Americans are producing more with fewer people. US factories have been achieving this by gradually replacing human labour with robots. Automation has transformed the American factory, rendering millions of low-skilled jobs redundant. Fast-spreading technologies like robotics and 3D printing will exacerbate this trend. The Boston Consulting Group has estimated that while “a human welder today earns around $25 per hour, including benefits, the equivalent operating cost per hour for a robot is around $8. The extra cost of maintaining a robotics system — installation, maintenance and the operating costs — should be amortised, according to the group, over a five- year period.



**Figure 4**

Nevertheless, trade with China and other countries did contribute to job losses to some extent. Research by the Ball State University found that 13 per cent of the overall job losses in

manufacturing had resulted from trade. Another, more recent, MIT study estimated that rising Chinese imports from 1999 to 2011 cost up to 2.4m American jobs. Overall though, what this suggests is that one of the new administration’s main policy aims, increasing trade protectionism, is unlikely to override the larger forces of automation and the transition to a digital economy.

Source: *FT.com*, December 03, 2016

# Extract 7: In Japan, the rise of machines solves labor shortage

The rise of the machines in the workplace has U.S. and European experts predicting massive unemployment and tumbling wages. Not in Japan, where robots are welcomed by the Government as a way to handle the country’s aging populace, shrinking workforce and public aversion to immigration. Japan is already a robotics powerhouse. The Government launched a five-year push to deepen the use of intelligent machines in manufacturing, supply chains, construction and health care, while expanding the robotics markets from ¥660 billion to ¥2.4 trillion by 2020. The labour shortage is such an acute issue that companies have no choice but to boost efficiency. By 2025, robots could shave 25 percent off of factory labour costs in Japan, says the consulting firm.

Source: *Bloomberg*, 14 September 2015

**Extract 8: Automation the future of Singapore economy**

With automation, Singapore's economy can maintain a Singaporean core in the face of a local workforce on the verge of shrinking, while not relying on foreign labour for growth. Automation provides crucial interim alleviation for the negative effects of the manpower crunch. Automation can also help to raise productivity in the long run. But, it is still crucial for workers to upgrade their skills to keep up with this automation in industries. Singaporean workers increasingly need to learn to be able to handle automated technology, so that automation can serve its purpose – to benefit productivity.

Source: *The Straits Times*, 30 April 2016

# Extract 9: Singapore Budget 2016: Robots and start-ups - to transform Singapore Inc

Finance Minister Heng Swee Keat announced a slew of measures under the Industry Transformation Programme that will help companies and industries automate, innovate, expand overseas and procure financing. Some of these measures are:

* Support for automation: A new Automation Support Package will be introduced for a period of three years. It will cover (i) Grant support for the roll-out or scaling up of automation projects at up to 50 per cent of project cost, with a maximum grant of $1 million (ii) Investment allowance of 100 per cent for automation equipment, in addition to the existing capital allowance.
* More robots at work: The National Robotics programme - more than $450 million has been set aside in the next three years for the development and adoption of robots. These robots will be used in sectors such as healthcare, construction, manufacturing and logistics.
* Help workers ‘adapt and grow’: will help Singaporeans adapt to changing job demands and grow their skills. Separately, the Government will set up TechSkills Accelerator, a new skills development and job placement hub, to help workers in the information and communications technology sector learn new skills quickly.
* Deepening innovation capabilities: Up to $4 billion under the Research, Innovation and Enterprise 2020 Plan will be directed to industry-research collaboration. The Government will provide a top-up of $1.5 billion to the National Research Fund in 2016 to support these initiatives.

Source: *The Straits Times*, March 24 2016

Questions:

(a) (i) State the relationship between manufacturing employment (as a % of total employment) and imports from China (as a % of GDP). [1]

(ii) Explain how changes in imports from China have contributed to the change in manufacturing employment. [3]

(b) Compare the change in China’s current balance between 2010 and 2015 with that of the US over the same period. [2]

(c) Explain whether an increase in trade between China and the US would result in higher standard of living in the US. [6]

(d) Assess the extent to which automation is the main cause of unemployment in an economy.

[8]

(e) Discuss the most appropriate policies that the US and Singapore should adopt to tackle unemployment. [10]

[Total: 30]

Suggested Answer

(a) (i) State the relationship between manufacturing employment (as a % of total employment) and imports from China (as a % of GDP). [1]

Suggested answer:

There is an inverse relationship between manufacturing employment (as a % of total employment) and imports from China (as a % of GDP).

(ii) Explain how changes in imports from China have contributed to the change in manufacturing employment. [3]

Suggested answer:

As China has an abundance of low cost labour, it has a comparative advantage (1) in the production of low cost, labour intensive consumption goods and this has resulted in the replacement of US domestic production of these goods with imported goods from China. This has caused a fall in the manufacturing employment in the US as imports from China increases. (2) (As show in Figure 1)

(b) Compare the change in China’s current balance between 2010 and 2015 with that of the US over the same period. [2]

Suggested answer:

From 2010 to 2015,

1) Between 2010 to 2015, China Current accounts were always in surplus whereas US Current accounts were always in deficit. (1)

2) China Current accounts surplus has increased while US Current accounts deficit was relatively constant / has increased slightly. (1)

(c) Explain whether an increase in trade between China and the US would result in higher standard of living in the US. [6]

Suggested answer:

With an increase in trade between China and USA there would be an increase in imports and exports between the two countries. US firms are able to enlarge its global market and increase its total revenue and hence profits by exporting to China. With an increase exports, there would be an increase in AD and via the multiplier effect, there would be a larger increase in real output and hence real national income (NY). With an increase in real NY, there would be an increase in income per capita (assuming that the rate of population increase in USA is slower than the rate of increase in real NY) and an increase in purchasing power and hence an increase in SOL.

And with an increase in export and real output, there would be an increase in demand for labour. This would result in an increase in the wage rate for labour. Income of workers would increase and hence purchasing power increase and hence increasing the SOL of US workers.

An increase in trade would also imply increase competition and hence increased variety of goods and services at lower prices available for consumers. This would increase consumer surplus and hence consumer welfare and an increase in SOL for USA.

However, on the other hand, with increased trade and increased competition, firms which are not competitive may be driven out of the market. As shown in Figure 3, the US is facing a trade deficit with China which imply that the US is importing more from China than its exports to China. This may imply that the US does not have a comparative advantage in the production of certain goods and services, such as labour intensive goods. It may result in the fall in demand for the US goods and a fall in

demand for labour the US. This may worsen the SOL in the US. And if these lower skilled workers are unable to find jobs in other sectors of the economy due to a lack of the necessary skills, it may result in income inequality among the workers who possess the necessary skills and those who do not.

In conclusion, whether an increase in trade between China and USA would result in higher SOL in the USA would depend on how it could contribute to the economic growth of USA and its possible impact on employment opportunities for consumers in the USA.

(d) Assess the extent to which automation is the main cause of unemployment in an economy. [8]

Suggested answer:

Automation is the main cause of unemployment in the economy.

Automation of industries has resulted in the replacement of human labour with machinery and robots. This has not only resulted in the retrenchment of the excess workers, it has also resulted in a decrease in demand for labour. Hence, causing unemployment to increase. This is shown in Figure 2 where there was an increase in output but there is a fall in employment in the US manufacturing sector.

Furthermore, automation results in structural unemployment. Due to the adoption of new technology, high-skill workers are highly demanded. Those who have been made redundant do not have the skills and knowledge that match the requirements of jobs available. Hence, they become structurally unemployment.

But automation can also help to boost employment. With automation, for example, has enabled US firms to be more productive and has increased industrial output. With the increase in productivity, it would result in an increase in real GDP and national income and hence purchasing power. This would result in an increase in consumption and an increase in demand for goods and services and more goods and services would need to be produced. This would result in an increase in investment and the demand for labour, especially in the services sector to service the increase demand for goods and services. In addition, with automation, there would be an increase in demand for higher skilled workers to enable the automation and to service and maintain the machinery. Hence, automation may result in the redundancy of the lower skilled workers but it would also create employment opportunities for the higher skilled workers. This would result in an increase in the type of unemployment, that is, structural unemployment rather than an overall increase in unemployment rate.

On the other hand, automation has been seen as a solution to countries such as Japan and Singapore to resolving the problem of an aging population and a shrinking workforce and its dependence on foreign labour and at the same time as a means to increase its productivity and the competitiveness of its economy.

In conclusion, the extent to which automation is the main cause of unemployment would depend on the nature / condition of the economy. To some countries where the majority of workers are employed in the manufacturing sectors, automation would have a larger impact on unemployment. To other countries such as Japan and Singapore which are facing a shortage of labour, automation is seen as a means to increase productivity and hence competitiveness. (Evaluation) Also, it should be noted that although automation may reduce certain jobs in the manufacturing sector, it may also increase job opportunities as the need for skilled workers increases. (Evaluation)

(e) Discuss the most appropriate policies that the US and Singapore should adopt to tackle unemployment. [10]

Suggested answer:

US faces problem of unemployment due to the opening up of its economy to international trade as well as automation. Inflows of cheap imports into the US market and automation have both resulted in loss of jobs in the US manufacturing sector and structural unemployment. Similarly for Singapore, the rise in automation can lead to job loss in the manufacturing sector and structural unemployment. As such, the governments needs to identify the appropriate policies to deal with the root cause of unemployment. These can be demand side and supply side policies to create new jobs and increase the demand for labour and to upgrade the skills of workers to meet the needs of the automated and capital intensive industries for higher skilled workers as both countries develop new niches of comparative advantage to remain competitive.

With the opening up of the economies for international trade, the US and losses its comparative advantage and losses its competitiveness in the production of certain goods and services. As domestic consumption were being replaced with imports, this has resulted in the closure of domestic industries and a fall in demand for labour and an increase of unemployment as workers are being retrenched. As stated in Extract 3, MIT study estimated that rising Chinese imports from 1999 to 2011 cost up to 2.4 million American jobs.

With the losses of jobs due to imports, there is a need for government to adopt demand side policy such as fiscal policy (FP) to attract new investment so as to create new job opportunities and increase the demand for labour. This can be done via a reduction in corporate tax rate. With a fall in corporate tax rate, after tax profits of firms would increase and this would be more attractive for firms to increase investment. With an increase in investment, there would be an increase in aggregate demand (AD) and via the multiplier effect, real output and real national income (NY) would increase by a greater extent. In order to produce the increase in real output, there would be an increased in demand for labour. Hence, this would help to resolve the demand deficit unemployment problem.

However, depending on the type of investment that the country may attract, the increase in job opportunities may not be significant. This is especially so if the investment is of a capital intensive nature and if the firms continue to replacing human labour with robots (as stated in Extract 2). However, more job opportunities can be created if the investment is in the tertiary service oriented industries such as the financial and healthcare industries where the personal human services are still required.

Hence, merely adopting FP to encourage investment my not be sufficient to reduce unemployment, especially structural unemployment that resulted from automation.

(Note: Candidates can also discuss the use of protectionistic measures such as tariff to reduce the consumption of imports and increase domestic production to save domestic jobs)

To resolve the problem of structural unemployment resulting from automation with the replacement of human labour with robots (Extract 2) it would be appropriate for the government to adopt supply side policies to upgrade the skills of the workers.

Workers being retrenched due to automation may not have the necessary skills to work in the new industries where different set or higher level of skills is required. These would require the intervention of both the governments of the US and Singapore to provide incentive to encourage or persuade the firms or workers to continuously upgrade their skills to meet the requirement of the new industries.

In the case of Singapore, to encourage the development of new comparative advantages with a knowledge based economy, a host of incentive packages have been implemented to help firms to automate, innovate and expand overseas and at the same time, upgrading the skills of workers. These include the Automation Support Package and the National Robotics

Programme as stated in Extract 5 as well as the SkillsFuture where every Singaporean above the age of 21 years old are entitled to a credit of S$500 for training purposes. With the appropriate supply side policies, the economy would be able to develop new comparative advantages and it would also increase the occupational mobility of workers as workers upgrade or acquire new skills to enable them to make a career switch and remain gainfully employed in the highly automated or capital intensive industries.

However, supply side policies are basically a long term policies and which require strong commitment and financial support from the government. Countries such as Singapore which have the necessary financial resources with its budget surpluses would face lesser headwinds to provide incentives for workers to upgrade their skills. The success of these policies would also very much dependent on the workers educational level and attitude towards training and re-training.

Thus to resolve the problem of structural unemployment caused by the replacement of workers due to automation, supply side policies are appropriate policies that the government should adopt.

In conclusion, with increased competition as a result of international trade as well as increasing automation by firms, both the US and Singapore governments needs to adopt a mixture of complementary policies to encourage investment in order to create more jobs opportunities and at the same time, help workers upgrade their skills to meet the needs of the new industries and to remain employable