



# Investing in the Care Economy

Simulating employment effects by gender  
in countries in emerging economies

JANUARY 2017



ITUC CSI IGB International Trade Union Confederation

A report by the Women's Budget Group for the International Trade Union Confederation  
and UN Women Commissioned by the International Trade Union Confederation

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# Table of contents

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Foreword .....	5
Executive summary .....	7
Introduction .....	9
The economic rationale for public investment in contemporary times .....	11
Economic and social contributions of health and care industries .....	14
Simulating direct, indirect and induced employment effects of public investment .....	22
Conclusion .....	31
References .....	33
Appendix 1 - Simulation methodology .....	35
Appendix 2 - Sources and definitions used in the simulation .....	38
Appendix 3 - Additional tables .....	41



# Foreword

The G20 has committed to invest in quality jobs and to raise women's participation in the workforce by 25% by 2025.

This second ITUC care economy report, which follows a first report on investing in the care economy in 7 OECD countries, shows that increasing public investment in emerging economies would boost employment and contribute to economic growth and, depending on the form and location of the investment, contribute to enhancing human development and realising key Sustainable Development Goals.

Investing in either the health and care sector or in the construction sector would generate substantial increases in employment in all of the countries in this study (Brazil, Costa Rica, China (People's Republic), India, Indonesia and South Africa). If two per cent of GDP were invested in the health and care sector, it would generate increases in overall employment ranging from 1.2% to 3.2%, depending on the country.

This would mean that nearly 24 million new jobs would be created in China, 11 million in India, nearly 2.8 million in Indonesia, 4.2 million in Brazil, just over 400,000 in South Africa and 63,000 in Costa Rica.

A similar level of investment in construction would also generate a substantial number of new jobs, with the increase in overall employment ranging between 1.3% and 2.6% depending on country variables.

The ITUC advocates for investment both in care and in physical infrastructure.

While public investment in either of these sectors would have a large positive employment effect, if policies aim to create employment for women and reduce the gender employment gap overall, investment in health and care would be the more effective.

It is critical that the investments made are subject to gender mainstreaming and gender impact analysis to ensure that these benefits are realised.

In addition to creating new jobs, public investment in social infrastructure, specifically in health and care, has the potential to tackle some of the central economic and social problems confronting countries in emerging economies. These include the under-provision of affordable and high quality healthcare overall, especially for low-income people and those living in remote regions; problems linked to demographic changes including population ageing, typically associated with growing health needs; urbanisation and the erosion of extended families and family care leading to growing needs for more formal provision of child and elder care; and continuing gender inequality in paid and unpaid work. Some specific types of physical infrastructure, particularly transport, communications and safe water provision, would also be of value in tackling these problems.

**Gender bias in economic thinking:** Under the UN-mandated System of National Accounts, investment in physical infrastructure counts as capital stock, whereas investment in social infrastructure is considered as government annual current spending. While expenditure on predominantly-male construction sector is counted as investment, support for the mainly-female care economy is seen as a cost.

Public investment in social infrastructure also has the potential to reduce the burden of unpaid domestic work, if structured appropriately. It could therefore reduce many barriers to women's participation in the labour market and thus eventually rebalance the gender employment gap. Such investment could assist countries in their efforts to achieve Sustainable Development Goals (SDGs), particularly those relating to ensuring healthy lives (Goal 3); achieving gender equality and empowering all women and girls (Goal 5); management of water and sanitation (Goal 6); and decent work (Goal 8).

The SEWA water project in Gujarat, India, is an example of a gender-responsive policy-making. SEWA secured the involvement of women in the participatory irrigation management of water supply in Gujarat in order to ensure that their gender specific needs were met. For example, prior to their intervention women's need for water for food crops was often subordinated to men's use for cash crops.

Informal employment varies from about a third of all employment in South Africa, China and Costa Rica, to almost three quarters in Indonesia and more than four fifths in India, two countries characterised with high levels of self-employment and family help. In all countries, women are more often found in informal jobs than men.

Formal provision of high quality childcare and long-term care for the elderly is virtually non-existent in any of the countries studied, including Costa Rica despite its more developed healthcare provision.

Family members, and especially female members, are expected to look after the needs of dependent relatives. In South Africa, the lack of provision of formal care puts an enormous burden on elderly members of the community

as the high prevalence of HIV/AIDS and an ageing population leads a growing number of elders having not only to look after their sick and/or unemployed adult family members but also their (often orphaned) grandchildren, as well as being in need of care themselves.

Estimations by the ILO using OECD data for 2013 show that in order to reach levels of formal long-term care provision for elderly people found in higher-income countries, the number of formal workers required would be 626,000 in Brazil and 2.7 million in India (both up from close to nil); 3.6 million in China (almost three times as current workforce) and 86,000 in South Africa (five times the current LTC workforce)

Thus investment in care – childcare, elder care, health and education – is critical both for jobs and enabling services to raise women's participation in direct employment. Unlocking the potential offered by many millions of women joining the formal workforce builds stronger economies and wealthier households.

Sharan Burrow  
General Secretary, ITUC



# Executive summary

Increasing public investment in emerging economies would boost employment and contribute to economic growth and, depending on the form and location of the investment, contribute to enhancing human development and realising some of the Sustainable Development Goals.

This report makes a case for public investment in social as well as physical infrastructure. By social infrastructure we mean education, care and health provision, where this refers to services as well as the buildings and facilities in which these are delivered. By physical infrastructure we are referring to physical assets, such as the provision of water supply, housing, roads and other means of transport and communication. It is usually investments in physical infrastructure that are pursued where development and employment outcomes are sought.

The report provides a theoretical argument for investing in social as well as physical infrastructure and presents the results of an empirical analysis that estimates the employment impact of investing two per cent of GDP in social infrastructure, specifically health and care services, and in physical infrastructure, specifically construction, for six countries in emerging economies: Brazil, Costa Rica, China (People's Republic), India, Indonesia and South Africa. It follows on from a previous study carried out by the UK Women's Budget Group (WBG) for the International Trade Union Confederation (ITUC) of seven high-income OECD countries (De Henau et al., 2016). In the current empirical analysis, Germany has been added as a benchmark for comparison with the previous study.<sup>1</sup>

Our analysis looks at three employment effects stemming from an initial investment in a given sector of infrastructure: the direct effect, that is job creation in the sector itself; the indirect effect, that is increased employment in the sectors further up the supply chain; and induced effects, that is increased demand due to additional consumption by the newly employed people leading to increased employment overall. Our results show that investing in either the health and care sector or in the construction sector would gener-

ate substantial increases in employment in all of the countries in this study. If two per cent of GDP were invested in the health and care sector, it would generate increases in overall employment ranging from 1.2% to 3.2%, depending on the country. This would mean that nearly 24 million new jobs would be created in China, 11 million in India, nearly 2.8 million in Indonesia, 4.2 million in Brazil, just over 400,000 in South Africa and 63,000 in Costa Rica (see Table 11).

A similar level of investment in construction would also generate a substantial number of new jobs, with the increase in overall employment ranging between 1.3% and 2.6% depending on country variables (see Table 11). This equates to nearly 18 million new jobs in China, 13.5 million in India, 3.4 million in Brazil, 2.1 million in Indonesia, 511,000 in South Africa and 62,000 in Costa Rica.

While both forms of investment would generate a substantial volume of employment, the distribution of that employment differs for the two sectors. In India and South Africa over 20% more jobs would be generated by investment in construction than by investment in health and care. However, in the other countries under study, the opposite is the case. In Indonesia and China close to 25% more jobs, and in Brazil close to 20% more jobs, would be created as a consequence of investment in health and care than by an equivalent level of investment in construction. Only in Costa Rica would the number of jobs created be similar, with just a few more being created by investment in health and care.<sup>2</sup>

There are also important gender differences arising from investment in the different sectors. These vary between the different countries depending on the degree of gender segregation in employment in these and other sectors in each country. In the construction investment scenario, only between 22.5% (Brazil) and 36.8% (China) of all the jobs created go to women. In the health and care scenario, on the other hand, between 32.5% (India) and 56.8% (Brazil) of jobs go to women.

<sup>1</sup> Tunisia was initially part of the study but had to be dropped, as we were unable to obtain employment data at the level of detail necessary for the analysis.

<sup>2</sup> The precise figures, calculated from Table 5a, are Brazil +19.17%, Costa Rica +1.58%, China +25.34%, India -22.1% Indonesia, 24.79 and South Africa - 23.43%.

Overall, across all the countries in this study, the direct effect of public investment in the health and care sector would lead to a greater number of the newly created jobs going to women than if the same level of investment were made in construction. Thus while public investment in either of these sectors would have a large positive employment effect, if policies aim to create employment for women and reduce the gender employment gap overall, investment in health and care would be the more effective. However, apart from Brazil and China where, respectively, 56.8% and 51.5% of all the jobs created from investing in health and care go to women, the majority of jobs created would still go to men (see Table 12 and Figure 2). This is an effect of the methodology used in this research that takes the gender proportions in each sector to remain unchanged. In practice large investment in a sector is likely to shift its structure of employment in many respects.

In this respect the findings differ from our previous study of seven OECD high-income countries (De Henau et al., 2016) where the gender impact of investment in the caring industries was much more pronounced. We suspect that the main reason for this relates to having to use the health and care sector as a whole (in which healthcare predominates), rather than the more specific childcare and elder care sector used in the previous study. The different size and gender effects are due to the higher relative wages and the higher proportion of men employed in healthcare than in social care on average across all the countries, as well as lower female employment rates overall in the countries of this study.

In addition to creating new jobs, public investment in social infrastructure, specifically in health and care, has the potential to tackle some of the central economic and social problems confronting countries in emerging economies.

Such problems include the under-provision of affordable and high quality healthcare overall, especially for low-income people and those living in remote regions; problems linked to demographic changes including population ageing, typically associated with growing health needs; urbanisation and the erosion of extended families and family care leading to growing needs for more formal provision of child and elder care and continuing gender inequality in paid and unpaid work. Some specific types of physical infrastructure, particularly transport, communications and safe water provision, would also be of value in tackling these problems.

Public investment in the social infrastructure also has the potential to reduce the burden of unpaid domestic work, if structured appropriately. It could therefore reduce many barriers to women's participation in the labour market and thus eventually rebalance the gender employment gap. Such investment could assist countries in their efforts to achieve Sustainable Development Goals (SDGs), particularly those relating to ensuring healthy lives (Goal 3); achieving gender equality and empowering all women and girls (Goal 5); management of water and sanitation (Goal 6); and decent work (Goal 8). It could contribute to "build resilient infrastructure, promote inclusive and sustainable industries and foster innovation". However, we would suggest that "resilient infrastructure" in practice should relate to social infrastructure as well rather than just physical infrastructure, on which all targets currently focus (United Nations, 2016). Such policies would contribute towards creating a more inclusive model of development.



# Introduction

Increasing public investment would boost employment and contribute to economic growth. Depending on the form and location of the development, it could also contribute to enhancing human development and realising some of the Sustainable Development Goals.

This report makes a case for public investment in social as well as physical infrastructure. By social infrastructure we mean investment in education, care and health services, and in this report our focus is on health and care. Social infrastructure includes the labour force that produces health and care services as well as the buildings and facilities in which they take place. By physical infrastructure we are referring to publicly used physical resources such as the water supply, housing, roads and other means of transport and communication, which is the more usual focus of public investment called upon to boost development and generate employment.

We begin by reviewing the theoretical arguments for increased public investment, paying particular attention to investment in social infrastructure as well as physical infrastructure. This provides the rationale for empirically analysing the effect of such public investment on employment, which follows the theoretical section.

Our empirical investigation is of six countries identified by the UNDP (2015) as either High Human Development (Costa Rica and Brazil) or Medium Human Development (China, Indonesia, South Africa and India). These contrast with the Very High Development OECD countries which were the focus of a previous study (De Henau et al., 2016). The countries in this study were chosen from those with suitably available data to reflect a variety of systems of economic and social regulation.<sup>3</sup> Germany has been added as a benchmark for comparison with the previous study.

We use input-output tables and official statistics to estimate the direct, indirect and induced employment effects of an increase in public investment for physical and social infrastructure. In this report the main focus is on investment in construction as an example of physical infrastructure and health and care as an example of social infrastructure. The health and care sector is represented within the industry classification by the division “health and social work”. The term “social work” includes residential care for elderly as well as children in need (orphans, etc.), various daycare services for children and/or disabled and elderly people, as well as social services for families in need, all important aspects of social infrastructure (see Appendix 2 for details). However, in the countries studied, employment within this industrial classification is dominated by healthcare services, far more so than in higher income countries such as Germany (see Table 5).

In the earlier study we used social care (i.e. childcare and long-term care) as our example of a sector that builds social infrastructure (De Henau et al., 2016). Unfortunately for the countries studied in this report, we had to rely for our analysis on OECD input-output tables that do not distinguish social care from the broader health and care sector. So in this report we have used the “health and social work” industrial division, that is the health and care sector as a whole as our example of social infrastructure investment. However, we also add some comments on the effects of having focused on the health and care sector as a whole rather than the social care sector as we did in the earlier report. We speculate that if spending on the health and care sector were specifically concentrated on social care, then direct employment effects would be somewhat larger and favour women more.

<sup>3</sup> We were hoping to include Tunisia as well but could not find reliable detailed employment data by industry to carry out the simulations.



# The Economic Rationale for Public Investment in Contemporary Times

*The third duty of the Sovereign is the erection and maintenance of those public works and institutions which are useful but not capable of bringing in a profit to the individuals (Adam Smith, 1776 (1976: 244)<sup>4</sup>*

There are a number of economic arguments that make the case for public investment. These date back to Adam Smith writing in the 18th Century who argued that the state had a duty to provide public works that are useful for commerce, such as bridges and roads, which bring widespread and long-term benefits to society, but are unlikely to bring profit to an individual investor. For similar reasons, Smith also recognised the importance of state investment in educating young people, which is a form of social rather than physical infrastructure. So there is a longstanding recognition in economic theory that not all of the goods and services that are necessary for economic development and human well-being will be provided through the market.

The case for public investment in physical infrastructure is more widely recognised than the case for social infrastructure, perhaps because it is manifestly required for commerce. The need for a skilled, healthy and productive labour force, as well as the need to address public health problems for the good of all (especially with respect to infectious diseases), is acknowledged. However, this form of public investment is generally counted as current expenditure in the national accounts, and is often cut in times of austerity, as it was through the structural adjustment programmes of the 1980s and 1990s and in the conditionality criteria applied to loans from international institutions, which generally insist on fiscal frugality and cutbacks in



Photo: AP

state expenditure. This way of thinking is short sighted, as the use of state funds to finance social infrastructure can be justified not only in terms of social justice but, drawing on Adam Smith's argument above and Keynesian macro-economics analysis discussed below, in terms of economic benefits.<sup>5</sup>

<sup>4</sup> The first two duties were the defence of the state and the defence of justice.

<sup>5</sup> A further economic argument for public investment comes from Harold Minski (2013) writing initially with respect to the US poverty programme in the mid-1960s, making a case for the state to be the employer of last resort when labour is in excess supply. Subsequent work (Tcheineva, 2012) has shown, with respect to Argentina, that people tend to prefer employment to the cash transfers schemes that have expanded in recent times especially in Latin America. This policy is being followed in Greece in the context of the economic recession (Antonopoulos et al., 2014).

## The Keynesian case for public investment

Keynes developed his analysis at the time of the Great Depression in the UK, a period of high unemployment and low economic growth. These conditions match the present day Brazilian economy, where since 2014 growth has been negative and unemployment has been rising rapidly as the current recession deepens.<sup>6</sup> South Africa faces similar problems of low economic growth (0.4% per annum); very high unemployment at over 25%<sup>7</sup> as well as a low overall employment rate for both women and men (less than 50% for the population of working age). The other countries in this study record higher and in some cases very high rates of economic growth, with over 6% per annum for both India and China.<sup>8</sup> Even so, the employment rates for women of working age are less than 50%, apart from Brazil at 52.7% and China at 68% (see Table 2) and there remains a need for public investment if the Sustainable Development Goals (SDGs) are to be realised.

The central argument of the Keynesian approach is that high unemployment/low employment are due to a lack of effective demand in the economy which deters private investment, as there is no market for products. The government should therefore fill this gap and invest directly in the economy to boost employment and aid economic recovery.

When public investment occurs, it leads to an expansion of employment in the sectors where it takes place. These are the **direct employment effects** of that investment. However, there is also a **multiplier effect**, whereby additional jobs are created in sectors which supply the sector/s where the initial investment occurred. Both the demand and employment effects will ripple down the supply chain, generating employment in many industries (possibly including further employment in the industry/ies in which the original investment was made). These jobs created by supplying necessary inputs, such as raw materials and services, are known as the **indirect employment effects**. In addition, further employment is created in the sectors that supply the goods and services purchased by the higher incomes of the households of the newly employed workers; these are known as the **induced employment effects**. So as a consequence of the initial investment, new demand is created for a whole range of goods and services such as food, clothing, caring and leisure that enter household consumption. Thus the overall level

of demand and amount of employment generated from the initial investment will be larger than the immediate or direct employment effect of the initial investment project.

In short, the injection of demand into the economy by government investment will generate employment directly in the sectors where it takes place and have an expansionary impact on overall demand arising from the **multiplier** or knock-on effect on supplying industries and on the consumer goods sector – so raising employment and contributing to increasing the rate of economic growth or lifting economies out of recession.

In time the initial investment may well pay for itself as a consequence of the demand generated elsewhere in the economy. There will be savings in public expenditure from the reduction in unemployment or social security payments that otherwise might have to be made; the newly employed people will pay tax and in the longer term there will be returns from the investments themselves. For example, in the case of bridges or hospitals, these returns would arise from shorter journey times or from a healthier, more productive population. If there are concerns that these returns will take too long to materialise and that the immediate impact of government investment will be to increase government debt by too great an amount, then a government-sponsored investment bank could be set up to directly encourage private investment.<sup>9</sup> However, the theoretical and empirical analysis from our previous study (De Henau et al., 2016) provides some support for expanding debt if necessary to fund investment, by showing that, for the countries considered in that report at least, costs can eventually be repaid and people will be healthier and more productive than would otherwise have been the case.

## Gender bias in economic thinking

The multiplier effect will operate no matter where the initial investment takes place, though its size and impact may vary between sectors as our findings below indicate. Keynes (1936) himself is renowned for saying that the kind of public investment does not matter. He argued that even if people were employed to dig holes and then to fill them it would have a beneficial effect on the economy as a consequence of the multiplier effects as explained above.<sup>10</sup>

<sup>6</sup> World Bank data records a negative growth rate for Brazil of -4.6% in 2015 and according to Reuters (2016) news agency, the current level of unemployment stands at 11.3% having risen sharply from 6.5% at the end of 2014.

<sup>7</sup> World Bank Data Base and IMF (2016).

<sup>8</sup> Costa Rica 1.7%; Indonesia 3.5% India 6.3% and China 6.4% from 2015 World Bank Data Base (2016).

<sup>9</sup> Robert Skidelsky and Felix Martin (2012) suggest government sponsored banks along the lines of the European Investment Bank, the Nordic Investment Bank or the German Kreditanstalt für Wiederaufbau. The difference between this strategy and quantitative easing is that the funds would all be spent (and on approved projects).

<sup>10</sup> For more detail see De Henau et al. (2016).



More recently, in a similar vein, Robert Skidelsky and Felix Martin (2012) recognise the validity of Keynes's argument but suggest that:

*from any long-term point of view, increasing aggregate demand by capital investment is better, because it creates identifiable future assets that promise to fund themselves and improve growth potential. (Skidelsky and Martin, 2012)*

In their view capital investment should take place in infrastructure projects which are ones that generate benefits to society as a whole as well as for their direct users; these benefits will be enduring so the projects will generate positive benefits into the future.

The idea that public investment should fund projects with enduring and widespread benefits is reflected in regulations set by states or by international institutions that are concerned by the level of public debt, but are more tolerant if the expenditure is for capital investment rather than current expenditure. The distinction between the two types of expenditure is made in the System of National Accounts (SNA). However, within the SNA, investment in physical infrastructure counts as capital stock, whereas investment in social infrastructure is considered as government annual current spending. This distinction results in investment in physical infrastructure such as in building bridges, schools, hospitals or nurseries (including the costs of paying the wages of the builders) being seen as a permissible reason for borrowing, while funding for running the schools, hospitals and nurseries (and thus for paying the wages of teachers, doctors, nurses and childcare workers) is not. The SNA classification fails to recognise the long-term productive contribution that employment in the teaching, health and caring industries makes by building a stock of human capital. The classification also reflects a gender bias in economic thinking and accounting. Everyone gains from having a better educated, healthier and better cared for population and society and the economy will continue to benefit from today's spending on health, education and childcare well into the future. This is why we term this form of expenditure "social infrastructure". Governments began to recognise, from the mid-2000s, that spending on education, health and to a lesser extent, childcare, could be seen as social investment, as it was improving the productive capacity of the economy, but they did

not consider changing the accounting rules that would allow such expenditure to be counted as capital. Nor did they see long-term care services in the same way, where the link between spending and (re)building productive capacity is less obvious than in the case of education or childcare.

This neglect of social infrastructure projects reflects gender bias in economic thinking. Employment segregation by gender means men are more likely to be employed in construction and women in health, education and care work. Male employment is often seen as a higher priority than female employment meaning that the projects that tend to be funded are those that are more likely to employ men than women. Further social infrastructure projects often benefit women specifically, by reducing their unpaid domestic work, and thus enabling them to participate in the paid economy.

Photo: AP



# Economic and social contributions of health and care industries

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Public investment in both physical and social infrastructure makes economic sense, as it generates employment and also contributes significantly to human development. Although the countries in this study contain some of the most modern physical and social infrastructural facilities to be found anywhere in the world in the major cities, access to their benefits is very unequal, and rural and more remote regions are generally much less well provided for.

In these remoter locations and in some of the dense urban settlements, especially in Brazil and South Africa, there is a clear need for upgrading of physical infrastructure. Much needs to be done with respect to water supply, sanitation, drainage and solid waste management services, improving and supplying public lighting, providing better transport infrastructure, increasing the provision of ICTs, as well as providing more facilities for education and especially for health and social care.

On a number of measures including access to improved drinking water and sanitation facilities, which have a profound influence over health, significant improvements have been made since 2000, but some countries, especially in their rural parts, still lag behind. As Table 1 shows, in 2015, in India only 40% of the population had access to improved sanitation facilities (only 28.5% of its rural population had such access). In Brazil and Indonesia, higher figures at 83% and 61% overall mask a rural/urban divide with

only about half of the rural population having access to improved sanitation in both countries. By contrast in Costa Rica the rural/urban distinction is much less marked and the vast majority of people (over 94%) had such access. In addition, there are many challenges posed by climate change and environmental degradation, especially in the west of China and parts of India which require infrastructural investment.

The form investment takes can significantly influence the extent to which it facilitates people's livelihoods and reduces women's unpaid work burdens (Elson and Fontana, 2014). For example, local roads, in contrast to major highways, can increase the connectedness between settlements and facilitate access to water supplies, schools and clinics, increase safety, as well as assist people in taking their goods to relevant markets. In addition, such investments can have unintended positive effects such as allowing ideas to spread more quickly including knowledge about rights (Kabeer et al., 2013). Similarly, in the case of refuse facilities and solid waste management, smaller more widespread locations are often preferred to major dumps, as people – generally women – have to take their waste on foot. So it is critical that the investments made are subject to gender mainstreaming and gender impact analysis to ensure that these benefits are realised.<sup>11</sup> Gender mainstreaming policies exist in all these countries, but following the policy through to practice can be a significant challenge.

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<sup>11</sup> The SEWA water project in Gujarat, India, is an example of a gender-responsive policy-making. SEWA secured the involvement of women in the participatory irrigation management of water supply in Gujarat in order to ensure that their gender specific needs were met. For example, prior to their intervention women's need for water for food crops was often subordinated to men's use for cash crops (Ahmed, 2002).



Table 1 Selected health indicators

	Brazil	Costa Rica	China	India	Indonesia	South Africa	Germany
<b>Life expectancy at birth (years) - 2011</b>							
<b>Both</b>	74.1	79.0	75.2	66.8	68.3	58.9	80.5
<b>Female</b>	77.7	81.4	76.8	68.2	70.4	61.4	82.9
<b>Male</b>	70.5	76.6	73.7	65.6	66.3	56.1	77.9
<b>Pop. using improved drinking-water sources (%) - 2015</b>	98.1	97.8	95.5	94.1	87.4	93.2	100.0
<b>Pop. using improved sanitation facilities (%) - 2015</b>	82.8	94.5	76.5	39.6	60.8	66.4	99.2
<b>Child mortality rate (per 1000 live births) - 2011</b>							
under-five	16.2	10.1	14.5	57.2	31.7	49.8	4.1
neonatal	10.8	6.5	7.5	31.6	15.7	11.5	2.3
<b>Skilled health prof. density (per 10,000 pop.) - circa 2011</b>	94.9	18.8	31.5	24.1	15.9	58.9	136.1
Physicians	18.9	11.1	14.9	7.4	2.0	7.8	38.9
Nurses and midwives	76.0	7.7	16.6	17.1	13.8	51.1	97.2
<b>Total exp. on health (% GDP) - 2011</b>	8.09	9.73	5.03	4.33	2.71	8.61	10.93
<b>General gov. exp. on health (as a % of total exp. on health) - 2011</b>	45.2	73.5	55.9	27.1	37.9	48.0	76.0

Source: Global Health Observatory data repository (World Health Organization, 2016 <http://apps.who.int/gho/data/node.home>)

When it comes to health and care, many changes are taking place in these countries, as most have experienced periods of rapid economic growth in the last two decades (WHO, 2016). While there have been some improvements with respect to reducing child and neonatal mortality, India and Indonesia still need to make a lot of progress to meet the SDG (3) targets of reducing the child and neonatal mortality rate (to 25 and 12 per 1000 live births respectively) as Table 1 shows. Likewise, the number of skilled health professionals relative to the population varies; even in Brazil, the density of skilled health professionals, the highest amongst the countries in this study, is significantly lower than in Germany, our benchmark from the countries in our previous study. Similarly, the number of physicians per 10,000 population in all countries studied in this report is far below that of Germany. It is also important to note that these are average figures, so the figures for rural regions and in low income neighbourhoods can be much lower.

Recent economic growth and high and increasing inequality levels<sup>12</sup> also mean that parts of the population have become extremely affluent, giving rise to diseases such as obesity<sup>13</sup> and alcohol misuse, and to the expansion of private healthcare, leading to a very uneven provision of health services for different sectors of the population. And when formal care provision is lacking, it is women in particular who have to take on the unpaid work of looking after their relatives and the community (Elson and Fontana, 2014). It is critical therefore that the public investment in health and social care that we recommend is subject to gender auditing as well as a more general equality impact analysis to ensure that its potentially positive impacts both on well-being and development and on employment are realised throughout the population and benefit currently disadvantaged groups in particular.

<sup>12</sup> World Bank Databank (2016) shows that the GINI coefficient ranged from 33.9 in India to 63.4 in South Africa, the years for the data (the latest available) vary from 2009-2013 but all countries showed an increase compared to previous years. An index of 0 would indicate total equality and an index of 100 total inequalities.

<sup>13</sup> 47.3% of men in state capitals are reported as being overweight (Paim et al., 2013).

Table 1 also shows that overall health expenditure has a close and positive relationship to health outcomes. One exception worth noting is South Africa with relatively poor health indicators despite relatively high level of spending on health as a percentage of GDP. This may be due in part to higher rates of HIV in South Africa than in the other countries.<sup>14</sup>

Public spending on healthcare as a proportion of total health spending also varies across these countries. It is highest in Germany and Costa Rica where total spending on healthcare as a percentage of GDP is highest. It is lowest in India and Indonesia, where total spending is lowest too. However, China spends a larger share of its total spending on healthcare on public rather than private healthcare but less overall on health as a percentage of GDP than Brazil does, while Brazil spends relatively more on private health than on public health services, but less overall on healthcare.

In Brazil in 1988, healthcare was established as a citizen's right and the state's duty, resulting in a Unified Health System. This led to many positive achievements including a large reduction in child mortality and in undernourished children, extensive vaccination and prenatal services as well as improved access to primary and emergency care for everyone. However, the extent of provision is highly uneven with resources being concentrated in the major cities in the South (Paim et al., 2013). This means that the state's duty to provide comprehensive and universal preventative and curative care with full community participation at the municipal level has not been realised throughout the country.

In Costa Rica priority, especially in the past, was given to the development of a strong welfare state, and the standing army was disbanded in 1948 in favour of spending on healthcare (Engles, 2011). A public health system was established called Caja<sup>15</sup>, which has resulted in life expectancy being on a par with the Very High Development countries. Indeed, Table 1 shows that the level of expenditure on healthcare is close to that of Germany and the government accounts for a large proportion of this expenditure (75%). In turn, public health expenditure accounts for a high 26.5% of the government's overall budget, reflecting the priority given to healthcare (WHO, 2016).

The figures for these two Latin American countries are markedly different from those of others, for example, Indonesia where only 2.71% of GDP is spent on health, the gov-

ernment's contribution to this is only 37%, and only 5.8% of the overall government's budget is spent on health (WHO, 2016). A similar picture applies to India. This means that in these countries people have to finance healthcare directly "out of pocket", which can have a devastating impact on overall household well-being. Even in Costa Rica, it has been argued that since the economy has become more open since joining the Central American Free Trade Area (CAFTA), economic pressures to public spending are growing at the same time as the private healthcare system is expanding (Engles, 2011). Today the technology and medical knowledge are available to secure the sustainable development goals with respect to health, so the question is largely one of politics and distribution.

A case can also be made on the same lines for investing in child and elder care. Formal provision of high quality childcare and long-term care for the elderly is virtually non-existent in any of the countries studied, including Costa Rica despite its more developed healthcare provision (Scheil-Adlung, 2015). Family members, and especially female members, are expected to look after the needs of dependent relatives. In China and India, this is enshrined in law so that the (nuclear) family is financially and legally responsible to provide for its members and the State does not offer assistance towards this. The State (often regional authorities) only intervenes to help those amongst the poorest without any family ties left. In Brazil the legal responsibility of the family to provide care only applies to care for elderly relatives as access to pre-primary childcare has become a constitutional right, although in practice services are seriously lacking in most municipalities (Paes de Barros et al., 2011). In other countries, the responsibility of the family is also prominent either by default through lack of affordable external care provision or by design, through small financial incentives in the form of modest cash benefits (as in South Africa). For elder care, stringent means-testing exists for those who cannot rely on their family to receive care, and most of the provision is done in institutions rather than at home and limited to those with severe needs only (Scheil-Adlung, 2015).

In South Africa, the lack of provision of formal care puts an enormous burden on elderly members of the community as the high prevalence of HIV/AIDS and an ageing population leads a growing number of elders having not only to look after their sick and/or unemployed adult family members but also their (often orphaned) grandchildren, as well as being in need of care themselves (Scheil-Adlung, 2015).

In China, the combined effect of the previous one-child policy and urban migration has been to sever family ties,

<sup>14</sup> Around 20% in South Africa compared to well under 1% in all the other countries in this report (UNAIDS, 2016).

<sup>15</sup> Caja means a special Box in which funds are gathered and spent collectively (Engles, 2011).

forcing the State to increase its provision of services, although they remain targeted at the poorest lonely elders (Gideon, 2016). In urban areas, private long-term care services have developed with a system of expensive private insurance encouraged by the State that remains largely unaffordable for low- and medium-income families (Scheil-Adlung, 2015).<sup>16</sup>

Although India did not adopt a one-child policy, in other respects it faces a similar situation to China. Faced with urban migration and pressures on households, the State is slowly implementing plans to complement family care with formal provision (Scheil-Adlung, 2015).

As for childcare, it is also primarily provided unpaid within families in most of the countries studied, although some universal pre-school provision is concentrated on older children, usually in the year prior to entering primary school. The very few younger children who are looked after in subsidised daycare centres are usually those coming from very poor families (Sauma, 2012).

For wealthier families in all countries, care can also be provided by the employment of domestic workers (often informally) in the absence of formal (private) services. Typically, these family members or domestic workers do both care and housework (as in the case of Brazil). However, domestic work has rarely been a first choice of employment; in Brazil for example, prior to the current economic crisis, women had been leaving this sector as other working opportunities became available. Concerns about shortages led to higher wages and more formalised working practices for those who continued to work in the sector (Acciari, forthcoming).

Estimations by the ILO using OECD data for 2013 show that in order to reach levels of formal long-term care provision for elderly people found in higher-income countries, the number of formal workers required would be 626,000 in Brazil and 2.7 million in India (both up from close to nil); 3.6 million in China (almost three times as current workforce) and 86,000 in South Africa (five times the current LTC workforce) (Scheil-Adlung, 2015).

Thus investment in the caring industries – childcare and elder care – is likely to become more necessary in the future. Such investment would not only have a direct effect on expanding women's employment – but through

the multiplier effect would create additional jobs in other sectors. Furthermore, it would enable more women to enter the paid labour market. Domestic work and childcare is heavily gendered with women still carrying out the majority of this work, both paid and unpaid. If women are to take up new employment opportunities, then collectivised provision may be necessary.<sup>17</sup> Investment in care is therefore a key element in achieving SDG 5 (gender equality).

While we were unable to estimate the impact of investment specifically in childcare and long-term care in this study, results from our previous study (De Henau et al., 2016) suggest a strong case for investment in this sector and one that is likely to become even stronger in the future.<sup>18</sup> The analysis below shows there is a clear economic case for more public investment overall in social as well as physical infrastructure. In the following sections we discuss our results in more detail.

## Employment in health and construction

This section gives an overview of the countries' employment situation, in particular employment and wages in the health and care sectors and the construction sector, so as to provide the background for interpreting the employment effects.

Table 2 shows the variation in the labour market across the six countries studied and Germany.

Employment is high in China, Germany and Indonesia overall, but the latter has a large employment gap between men and women, as do India and Costa Rica. In South Africa, the employment gap is smaller, but both men and women have very low employment rates. South Africa has high levels of unemployment; the lowest level of unemployment is in China.

In most countries, employees are the largest type of employment status (Data for China do not exist or are not comparable). However, in India and Indonesia this is not the case, as self-employed people dominate, especially among men. Family helpers are also widespread in these two countries among women and the largest type in Indonesia.

<sup>16</sup> In late 2015 China ended the one-child policy – so allowing all couples to have two children. The policy, which started in the late 1970s, was changed owing to concerns about population ageing and the potential impact of a smaller population on economic growth. A further concern was the impact of the policy on the gender population ratio owing to the continuation of the son preference. Interestingly, young predominantly urban well-educated women, products of the one-child policy, are raising concerns about the impact of this policy on their careers, reflecting the continued gendered responsibility for childcare and absence of widely available, accessible and affordable childcare (Huang, 2016).

<sup>17</sup> In our previous study we explain the efficiency gains that can arise from the provision of caring industries (De Henau et al., 2016).

<sup>18</sup> For a further elaboration of this rationale see De Henau et al. (2016)

Table 2 Employment indicators (2011)

	Brazil	Costa Rica	China	India	Indonesia	South Africa	Germany
<b>Employment to population ratio (age 15-64y)</b>							
<b>All</b>	63.2%	55.8%	82.0%	76.3%	63.0%	38.9%	72.7%
<b>Men</b>	77.7	74.3%	76.8	68.2	78.0%	44.9%	77.6%
<b>Women</b>	52.7%	38.3%	68.0%	34.6%	48.0%	33.2%	67.8%
<b>Gender empl. gap (15-64)</b>	21.5%	36.0%	14.0%	41.7%	30.0%	11.7%	9.8%
<b>Unemployment rate (15+)</b>							
<b>All</b>	7.5%	3.4%	2.9%	10.3%	8.1%	29.6%	5.8%
<b>Men</b>	5.6%	3.6%	2.6%	9.1%	7.7%	25.4%	6.1%
<b>Women</b>	10.1%	3.1%	3.2%	12.8%	8.8%	34.4%	5.6%
<b>Employment status All</b>							
<b>Employees</b>	70.8%	71.8%	n/a	18.0%	32.1%	84.0%	88.3%
<b>Own account / employer</b>	23.4%	27.1%	n/a	64.6%	47.2%	15.2%	11.1%
<b>Family help</b>	1.7%	1.0%	n/a	17.3%	20.7%	0.7%	0.6%
<b>Men</b>							
<b>Employees</b>	68.1%	67.8%	n/a	19.4%	35.9%	83.0%	85.6%
<b>Own account / employer</b>	26.9%	31.2%	n/a	69.6%	54.3%	16.7%	14.1%
<b>Family help</b>	1.1%	1.0%	n/a	11.0%	9.8%	0.4%	0.3%
<b>Women</b>							
<b>Employees</b>	74.6%	79.4%	n/a	14.5%	26.5%	85.5%	91.5%
<b>Own account / employer</b>	18.8%	19.5%	n/a	51.5%	36.5%	13.3%	7.6%
<b>Family help</b>	2.5%	1.2%	n/a	33.9%	37.0%	1.2%	0.9%

Source: UN Stats, national statistical offices (Labour Force Survey or Census). For China, working-age population is 16-64. "Own account" stands for self-employed people without employees and "employer" stands for self-employed people with paid employees (formal or informal sectors).

Table 3 shows data on informal employment as an important aspect of these economies. Informal employment is employment that is not subject to employment, social security and taxation laws (see Appendix 2 for details). Table 3 shows that its prevalence in non-agricultural sectors varies considerably between countries, from about a third of all employment in South Africa, China and Costa Rica, to almost three quarters in Indonesia and more than four fifths in India, two countries characterised with high levels of self-employment and family help. In all countries, women are more often found in informal jobs than men.

**Table 3 Informal employment in the economy**

	Year	Scope	Number (000s)			% of total employment		
			Total	Men	Women	Total	Men	Women
<b>Brazil</b>	2011	non-agri	30,249	16,116	14,132	38.4	36.8	40.4
<b>China</b>	2010	non-agri	360,200			32.6		
<b>Costa Rica</b>	2011	non-agri	574	294	281	33.6	29.8	38.8
<b>India</b>	2012	non-agri	206,961	165,307	41,654	84.7	84.3	86.4
	2012	total	429,473	309,354	120,119	91.8	90.7	94.8
<b>Indonesia</b>	2009	non-agri	3,157	1,977	1,180	72.5	72.3	72.9
<b>South Africa</b>	2010	non-agri	4,089	2,071	2,018	32.7	29.5	36.8

Source: ILOSTAT database. Note: "non-agri" refers to non-agricultural sectors of the economy which the data refer to. See Appendix 2 for a definition of categories included as informal employment.

Table 4 shows that the share of construction in total employment varies from 4.8% in Indonesia to almost twice as much in India. Employment in health and care services is much less developed in India and Indonesia than in Brazil or Costa Rica (or indeed than in Germany). This shows the potential for employment creation from public investment in these countries, especially those with medium levels of development such as India and Indonesia. The table also shows that the two industries follow a typical pattern of gender segregation with construction being male dominated and health and care being female dominated (except in India, although in this country health and care still employs a far higher proportion of women than construction does). However, it is worth noting that construction is far more male dominated in all countries than health and care is female dominated.

**Table 4 Employment in construction and in health and care**

	All sectors	Construction			Health and care		
	Number (000s)	Number (000s)	% of total	% women	Number (000s)	% of total	% women
<b>Brazil</b>	99,582	6,773	6.8%	3.5%	4,972	5.0%	74.2%
<b>Costa Rica</b>	1,654	97	5.9%	5.0%	75	4.5%	62.1%
<b>China</b>	763,612	59,673	7.8%	14.4%	16,679	2.2%	59.8%
<b>India</b>	464,527	44,163	9.5%	15.9%	4,569	1.0%	42.6%
<b>Indonesia</b>	110,584	5,284	4.8%	2.9%	773	0.7%	63.3%
<b>South Africa</b>	13,319	1,050	7.9%	29.6%	213	1.6%	61.4%
<b>Germany</b>	41,447	2,299	5.5%	12.8%	4,637	11.2%	77.0%

Source: OECD input-output tables and national data (See Appendix 2 for details)

Table 5, which includes informal as well as formal employment, shows that in all the countries studied for which we had such data, only a small share of employment in health care is in either residential or non-residential care/social work – in most countries around 10% and less than 20% in all countries. So most of the observed effects from the simulation are to do with the structure of healthcare rather than social care. This is not the case in Germany, our comparator OECD country, where social care, residential and non-residential combined, accounts for more than 40% of all health and care sector employment. In practice, this difference is in large part due to a greater proportion of care work being undertaken as unpaid family care in developing countries.

Table 5 also shows that while employment in health in all countries, except India, is female dominated, social care is even more female dominated. The only exception is Germany, where social care is slightly less female dominated than the health sector as a whole.

**Table 5 Employment in health and care services (selected countries – number of persons, 2011)**

	All	Men	Women	% Women
<b>Costa Rica</b>				
Healthcare services	69,104	27,223	41,881	60.6%
Residential care	3,547	948	2,599	73.3%
Non-residential care /social work	2,413	258	2,155	89.3%
Share of healthcare*	92.1%	95.8%	89.8%	
<b>Brazil</b>				
Healthcare services	2,982,382	776,957	2,205,425	73.9%
Residential care	244,390	54,615	189,775	77.7%
Non-residential care /social work	27,322	9,014	18,308	67.0%
Share of healthcare	91.7%	92.4%	91.4%	
<b>South Africa</b>				
Human health activities	634,690	219,793	414,897	65.4%
Social work activities	150,476	46,391	104,085	69.2%
Share of healthcare	80.8%	82.6%	79.9%	
<b>India</b>				
Healthcare services	3,363,609	2,099,789	1,289,085	38.3%
Residential care	168,180	30,432	116,134	69.1%
Non-residential care /social work	336,361	91,295	232,268	69.1%
Share of healthcare	87.0%	94.5%	78.7%	
<b>Germany</b>				
Healthcare services	2,803,700	615,000	2,188,700	78.1%
Residential care	1,087,000	254,900	832,000	76.5%
Non-residential care /social work	875,800	228,500	647,300	73.9%
Share of healthcare	58.8%	56.0%	59.7%	

Source: Census data from National Statistical offices and Eurostat for Germany (See Appendix 2)

\*shows employment in healthcare as a % of the total employment in the health and social care sector.



Table 6 compares wage levels in each sector and shows that health and care workers are paid more than average wages, except in Germany where the sector includes a substantial component of (lower-paid) social care workers. Also, health and care workers are paid more than construction workers everywhere. This is a substantial difference from the previous study (De Henau et al., 2016), which focused on social care and for which compensation of employees was generally lower than on average, and lower than that of construction workers. Assuming wage differentials within the health and care sector to be roughly the same as they are in Germany (due to the lower level of qualifications in social care, at least for direct care providers) then social care workers would be paid less than health care workers in all countries, and probably less than construction workers in some.

**Table 6 Relative wage levels in construction and health and care sectors (2011)**

% aver. earnings	Brazil	Costa Rica	China (urban)	India	Indonesia	South Africa	Germany
<b>All sectors</b>	100	100	100	100	100	100	100
<b>Construction</b>	85	74	75	71	98	63	81
<b>Health and care</b>	127	187	110	177	126	155	95
<b>Relative wage</b>	1.5	2.5	1.5	2.5	1.3	2.4	1.2

Source: ILOSTAT database and National Bureau of Statistics China

Table 7 shows a similar picture by gender (no gendered data for China). Men are paid less than average in construction in all countries. In contrast, women working in construction are paid more than average in some countries and less than average in others. In countries with very low numbers of women in construction (Brazil, Costa Rica and Indonesia), the women who do work in the sector are paid higher than average wages for women, perhaps because they are in practice non-manual workers. Countries where women in construction are paid less than average wages have higher levels of female employment in the sector (India, South Africa and Germany). The positive wage differential between health and construction is more pronounced in all countries for men than women, mainly because men are much better paid than on average in the health sector and less well paid in the construction sector (presumably because they are more likely to be in higher-paid healthcare jobs than in lower-paid social care jobs in the health and care sector, and in lower-paid manual jobs in the construction sector).

**Table 7 Wages by Industry and gender and gender wage gaps**

		Brazil	Costa Rica	India	Indonesia	South Africa	Germany
<b>Men</b>							
	All sectors	100.0	100.0	100.0	100.0	100.0	100.0
	Construction	75.1	70.2	69.3	89.0	59.8	75.8
	Health and care	165.2	217.5	195.9	118.4	155.1	109.4
<b>Women</b>							
	All sectors	100.0	100.0	100.0	100.0	100.0	100.0
	Construction	134.8	113.7	68.4	148.3	55.0	90.3
	Health and care	127.2	173.4	182.4	146.9	170.7	97.8
<b>Gender wage gaps</b>							
	All sectors	22.6%	6.6%	32.6%	22.1%	20.9%	20.3%
	Construction	-38.9%	-51.4%	33.5%	-29.9%	27.2%	5.1%
	Health and care	40.4%	25.5%	37.3%	3.4%	13.0%	28.7%

Source: ILOSTAT database

# Simulating direct, indirect and induced employment effects of public investment

The analysis that follows assesses the total employment generating effects of investing in particular types of physical and social infrastructure, and the gender breakdown of these effects. Using input-output tables and other official statistics, we calculate the direct, indirect and induced employment effects of a public investment equal to 2% of GDP made to either the health and care sector or the construction sector, taking these two sectors as our examples of where social and physical infrastructure investment is made, respectively.<sup>19</sup> We also look at the gendered breakdown of each of these employment effects.

Calculating total employment effects that include indirect and induced effects can be done by using input-output tables provided by national statistical offices. These tables show how industries are linked in the supply chain of goods and services that eventually meet final household, government and export demand. Input-output tables show how much output of each other industry (and how much of its own output) each industry's production process uses as inputs. We can add information on how much labour is used in the production process of each industry, and express all information as input requirements per unit of each industry's output. (Note that the way this is used assumes that these requirements do not change with the scale of demand for an industry's output.)

How much direct employment can be created by investment in a given industry depends on how much labour its production process requires and on the costs of employing that labour (employee remuneration, employers' social security contributions and other costs). Indirect effects are calculated for each industry by using the I-O tables to calculate total input requirements down the supply chain (accounting for imported components) for the production of one unit of output of that industry. Total (direct and indirect) employment (also known as Type I) effects are then

the total of these inputs, each multiplied by employment per unit of output in its production process. We then obtain the indirect employment effect for each industry, by subtracting its direct employment effect, as calculated above.

Calculating the induced employment effect follows a similar method, only that the input-output tables are augmented in a different way, this time with information about household expenditure patterns. Households are effectively treated as another industry, using inputs produced by all industries but producing no output, whose level of expenditure depends on total household income, which is in turn determined by the total level of employment. Any additional employment then generates increased household income and thus induced demand which itself travels through the supply chain generating direct and indirect employment effects. This gives for any additional investment total (direct, indirect and induced) employment (also known as Type II) effects, from which the induced effects can be isolated by subtracting the direct and indirect (Type I) effects, as calculated above.

Deriving employment effects by gender is achieved by applying the proportions of men and women in each industry found in the latest employment surveys. As at all steps in this analysis, this makes the assumption that current proportions do not change as a result of such investments.

A more detailed explanation of the method used for our analysis is outlined in Appendix 1. The reference year of the input-output tables is 2011.

<sup>19</sup> For more details on the methodology, see Appendix 1; for statistical sources and definitions of industries: see Appendix 2.

## Direct employment effects

Table 8 shows that an investment worth 2% of GDP would have different scale effects on each of the two industries across countries, due to the differing existing levels of outputs of each industry. As reflected in the previous data on health spending, India and Indonesia spend proportionately relatively little on their health sectors, so that an investment of 2% of GDP results in much greater growth in health spending than in Costa Rica or Germany, where more is already spent on health and the sector is more developed.

One factor that determines the scale of the direct employment effect is the direct labour requirement of each industry, the amount of labour directly employed to produce \$1m output of that industry. This in turn depends on labour productivity in that industry's production process, with lower productivity (higher labour intensity) leading to a higher direct labour requirement. Wage levels in the industry affect the prices at which an industry's output is sold and so also indirectly affect its direct labour requirement, because with lower wages and thus lower prices, \$1m buys more output from that industry and therefore

generates more employment. Table 8 shows that the direct labour requirement is larger in both sectors in China and India than in other countries, and larger in health and care than in construction in Brazil, China, Indonesia and Germany, similar in the two sectors in Costa Rica and smaller in health and care than in construction in India and South Africa.

However, the other factor that determines the size of the resulting direct employment effects is the amount invested. Although, for comparability of spending, this simulation has chosen to examine the effects of investing 2% of GDP across different industries, we need to recognise that the amount of output this constitutes is very different across countries. How much will depend on the level of productivity of workers in that country overall and what proportion of its population is currently employed (both factors affecting the level of GDP). Investing 2% of GDP in any sector will generate lower increases in the level of employment in countries with lower productivity or a lower current level of employment (due to lower GDP) than in countries with the same direct labour requirement for that sector but higher productivity or a higher current level of employment (due to higher GDP).





**Table 8 Productivity and labour intensity indicators in construction and in health and care**

	Brazil	Costa Rica	China	India	Indonesia	South Africa	Germany
Initial direct public investment of 2% GDP (USDm)	52,304	825	148,840	37,848	17,859	8,332	75,154
as % of construction output	23%	19%	8%	9%	8%	18%	22%
as % of health and care output	36%	24%	58%	77%	98%	65%	20%
Direct labour requirement: construction	29.5	22.0	31.4	105.9	22.5	22.8	6.6
Direct labour requirement: health and care	34.0	21.8	65.3	93.2	42.3	16.5	12.6
GDP / worker (USD)	26,262	24,684	9,746	4,074	8,075	31,279	90,664
GDP / capita (USD)	13,042	8,965	5,520	1,517	3,648	7,975	46,723

Source: UN Stats and OECD input-output tables (see Appendix 2)

Note: Direct labour requirement = labour directly employed (number of persons) to produce \$1m output of an industry

Table 9 gives the direct employment effects by country, that is, the number of new jobs directly generated by an equivalent investment in the construction or the health and care industries. We also give these numbers for each country as a percentage of its working-age population (15-64 years), that is, the percentage points by which its employment rate rises.

Differences between countries in the rise in their employment rate directly generated by investment in a sector reflect differences in the direct labour requirement of that sector across countries and each country's level of GDP. The first of these is determined by the levels of productivity and wages in that sector compared with other countries, and the latter by that country's level of productivity and its current employment rate.<sup>20</sup> Within the same country, the relative size of the direct employment effects of each sector depends on the sector's direct labour requirements, that is, what proportion of resources invested in each sector is spent on labour and how well paid those workers are.

Comparing the effects of an investment in health and care with an equivalent investment in construction, it can be easily seen from Table 9 that the direct employment effects are in most countries somewhat larger for an investment in health and care than in construction, though not in India or South Africa, and in Costa Rica they are the same. As explained earlier, this follows the pattern of differences in direct labour requirements shown in Table 8 above. The biggest differential between the two indus-

tries in the rise in employment generated is in Germany, where health and care workers earn only 20% on average more than construction workers, a smaller differential between sectors than in any of the other countries in this study (Table 6), and a larger proportion of the former are in social care (Table 5), where relatively little equipment and raw materials are needed, and wages tend to be relatively low (see De Henau et al., 2016). This gives the health and care sector particularly high direct labour requirements and suggests that an investment focused on social care should have higher direct employment generating effects than investment in the health and care sector more generally in our other countries too.



Photo: AP

<sup>20</sup> For the countries in this study, we do not have data on employment hours, so unlike in the previous study, we cannot translate the numbers of jobs generated into full-time equivalent jobs (FTEs).

**Table 9 Direct employment effects**

	Construction		Health and care	
	Number of jobs generated	Rise in employment rate (% points)	Number of jobs generated	Rise in employment rate (% points)
<b>Brazil</b>	1,545,000	1.2%	1,778,000	1.4%
<b>Costa Rica</b>	18,000	0.6%	18,000	0.6%
<b>China</b>	4,680,000	0.5%	9,717,000	1.0%
<b>India</b>	4,007,000	0.5%	3,528,000	0.5%
<b>Indonesia</b>	403,000	0.3%	755,000	0.5%
<b>South Africa</b>	190,000	0.6%	138,000	0.4%
<b>Germany</b>	498,000	1.0%	948,000	2.0%

Source: authors' calculations

In all countries workers in health and care are paid more than in construction. In India, South Africa and Costa Rica the relative wage of health and care workers to construction workers is particularly high (see Table 6) with health and care workers earning more than twice as much as construction workers. These are also, as would be expected, countries where the direct employment effects of investing in health and care are lower than or equal to those of investing in construction. On the other hand, in Brazil, China, and Indonesia the direct employment effects of investment in health and care are greater than those of investment in construction, despite the former paying higher wages, because in these countries the labour intensity of the health and care sector outweighs its higher wage levels to give it a higher direct labour requirement than construction (see Table 8). The impact would be still greater if any new investment was concentrated on developing social care, generating even greater direct employment effects.

India stands out for having relatively high direct labour requirements in both construction and health compared to other countries, but also quite weak direct employment effects in either sector. This is mainly due to India's low employment and productivity rates in the economy overall compared to other countries (see Table 8) which mean that the amount invested (2% of GDP) is comparatively low, creating comparatively few jobs relative to the size of the population. In Indonesia a combination of both relatively low direct labour requirements in both sectors and

low employment and productivity rates in the economy as a whole, reducing the amount invested, means that direct effects on the employment rate are also lower than in other countries, especially in construction.

Table 10 shows that the direct gender employment effects of investment in the two industries are quite different. Both industries are heavily gender segregated, particularly construction. As a result well under 20% of the jobs directly generated by investment in construction would go to women in all countries except South Africa (29.6%). In Brazil, Costa Rica and Indonesia 5% or less of the jobs directly generated would go to women. Note, however, that the simulation assumes that the under-representation of women in the construction industry is not challenged in the course of increasing investment in it (see Appendix 1). Any government looking to reduce gender inequalities could attempt to encourage greater numbers of women into construction in the course of making such an investment. Without doing so successfully, the gender gap in employment for the economy as a whole would increase with an investment in construction. This can be seen from Table 10 where the investment in construction results in a direct rise in men's employment rate of between 0.5 and 2.3 percentage points, while for women a direct rise of between 0.1 and 0.3 percentage points is all that can be expected.

**Table 10 Gendered direct employment effects**

	Construction			Health and care		
	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)
<b>Brazil</b>	3.5%	0.1%	2.3%	74.2%	2.0%	0.7%
<b>Costa Rica</b>	5.0%	0.1%	1.2%	62.1%	0.7%	0.5%
<b>China</b>	14.4%	0.1%	0.8%	59.8%	1.2%	0.8%
<b>India</b>	15.9%	0.2%	0.9%	42.6%	0.4%	0.5%
<b>Indonesia</b>	2.9%	0.0%	0.5%	63.3%	0.6%	0.4%
<b>South Africa</b>	29.6%	0.3%	0.8%	61.4%	0.5%	0.3%
<b>Germany</b>	12.8%	0.3%	1.8%	77.0%	3.0%	0.9%

Source: authors' calculations

The health and care industry is also gender segregated but in the opposite direction in all countries except India, where slightly more men than women are employed in health and care overall (see Tables 4 and 5). Except in India, the direct effect of investing in health and care would therefore be to reduce the gender gap in employment for the economy as a whole. Such an investment would reduce every country's gender employment gap by increasing the employment rate of women by between 0.5 and 3.0 percentage points, while increasing the employment rate for men by a smaller amount (between 0.3 and 0.9 percentage points). However, in nearly all countries the increase for men as a result of investment in health and care is still larger than the increase for women of investing in construction. If the investment were in social care, not only would the total employment directly generated be expected to be higher, but the proportion going to women would also be greater.<sup>21</sup>

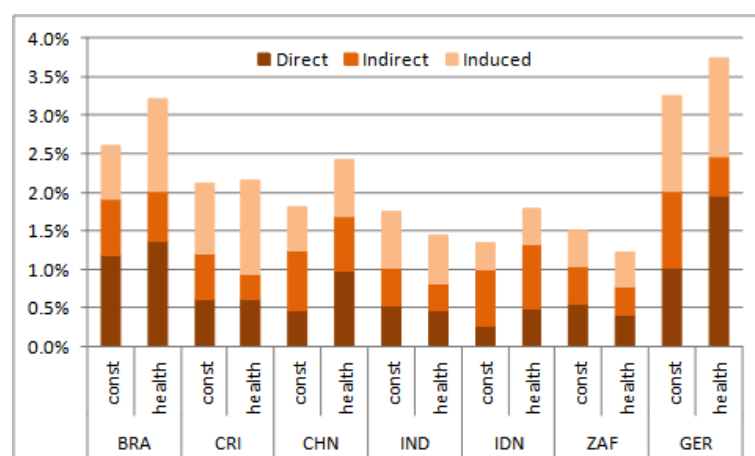
### Total employment effects accounting for indirect and induced effects

Investment in any industry will generate additional indirect employment effects as demand is increased for the products of its suppliers. Such demand and employment effects will ripple down the supply chain, generating indirect employment effects in many industries (including within the industry/ies in which the original investment was made).

<sup>21</sup> Especially Costa Rica and India as Table 5 showed that the proportion of women employed in social care is much larger than that employed in healthcare in these two countries (and slightly larger in Brazil and South Africa too).

Besides indirect effects there are also induced employment effects as a result of the additional household income generated by the additional employment. Some of this income will be spent and become a further source of increased demand within the economy, generating jobs in the sectors in which households spend their income.

These two effects can be added to the direct effects to provide a picture of total employment effects, as shown in Figure 1 below. It is the total employment effects that matter in understanding how investment can be used to generate employment.

**Figure 1 Contribution of direct, indirect and induced effects to the rise in employment rates by industry and country**

Source: authors' calculations



Indirect employment effects are a larger proportion of the direct effects in the countries considered in this study than in the earlier study (See Appendix 3, Tables A.1 and A.2 for details). This is to be expected, since this study covers the whole health and social care sector rather than social care alone; healthcare uses many more inputs in addition to labour thus creating demand along the supply chain for these inputs. We can only speculate that the lower ratio of direct to indirect employment effects in the construction industry compared to the previous study might be due to a greater undercounting of direct employment in economies that use a great deal of informal employment (see Table 3) and/or a less integrated supply chain in economies with many own account workers (see Table 2). This might also apply to the health and care sector.

Figure 1 also shows the contribution of induced effects. Note that these effects are more controversial and some national statistical offices do not calculate them. We have included them because when calculated they often turn out to be substantial; but they are given here with the proviso that their magnitude must be taken as indicative only.<sup>22</sup>

Table 11 gives the overall employment effects by summing the jobs generated by the direct, indirect and induced employment effects. We can see that in most countries the total quantity of employment generated by investment in health and care is greater than that of an equivalent investment in construction. Only in India and South Africa is slightly more employment generated by an investment in construction. For reasons given in the discussion of direct effects above, directing investment in health and care specifically at social care would be likely to generate more direct employment, so as to produce total employment effects that are greater still. This suggests that when investment projects are being considered for employment stimulation purposes, investment in health and care, and specifically in social care, should be considered alongside the more traditionally favoured construction sector.

**Table 11 Total employment effects**

	Construction		Health and care	
	Number of jobs generated	Rise in employment rate (% points)	Number of jobs generated	Rise in employment rate (% points)
<b>Brazil</b>	3,394,000	2.6%	4,198,600	3.2%
<b>Costa Rica</b>	61,500	2.1%	62,900	2.2%
<b>China</b>	17,884,300	1.8%	23,954,500	2.4%
<b>India</b>	13,466,400	1.8%	11,028,300	1.4%
<b>Indonesia</b>	2,105,200	1.3%	2,799,300	1.8%
<b>South Africa</b>	511,000	1.5%	414,300	1.2%
<b>Germany</b>	1,581,600	3.3%	1,813,900	3.7%

Source: authors' calculations

<sup>22</sup> Induced effects, as calculated here, are simply proportional to the total additional wage bill paid through the direct and indirect employment effects. The only difference in induced effects that our methodology can pick up is one of scale. See Appendix 3 Tables A3 and A.4 for detailed figures of induced employment effects.

Table 12 shows that the total employment effects of construction favour men's employment in all countries. In Brazil, China and Germany, investing in health and care would reduce the gender employment gap by increasing women's employment rate more than men's. In the other countries, investing in the health and care sectors as a whole generates more jobs for men than women because, although the direct effect of investing in health and care generates more jobs for women, the indirect and induced effects favour men, owing to the low level of women's employment in other sectors. However, the number of jobs for women generated is greater for investment in health and care than for construction in all countries. And while the number of jobs generated for men through investment in construction is usually greater, the difference is not always large. In China and Indonesia the number of jobs generated for men through investment in health and care is actually slightly greater than the number of jobs generated through investment in construction.

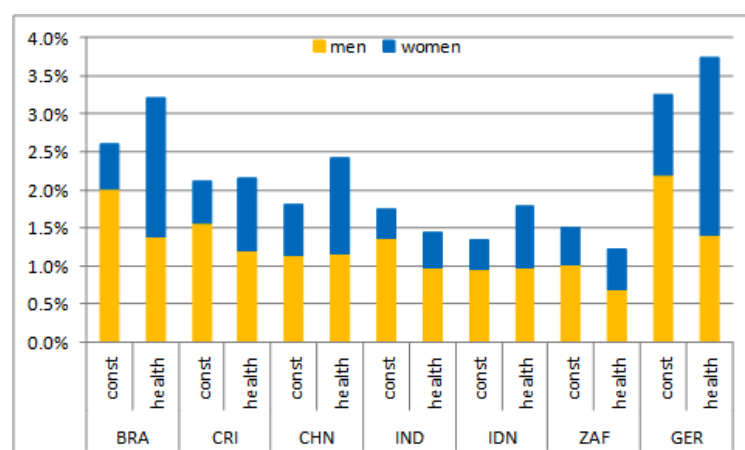
**Table 12 Gendered total employment effects**

	Construction			Health and care		
	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)
<b>Brazil</b>	22.5%	1.1%	4.1%	56.8%	3.6%	2.8%
<b>Costa Rica</b>	25.5%	1.0%	3.2%	44.0%	1.8%	2.5%
<b>China</b>	36.8%	1.4%	2.2%	51.5%	2.5%	2.3%
<b>India</b>	22.3%	0.8%	2.7%	32.5%	1.0%	1.9%
<b>Indonesia</b>	29.0%	0.8%	1.9%	44.9%	1.6%	2.0%
<b>South Africa</b>	32.2%	0.9%	2.1%	43.4%	1.0%	1.4%
<b>Germany</b>	32.8%	2.1%	4.4%	62.6%	4.6%	2.8%

Source: authors' calculations

Figure 2 illustrates these results by showing contributions to the rise in overall employment rates broken down by gender. This confirms that women's employment increases far more when the investment is directed at health and care. However, men's employment also rises substantially through investment in health and care, sometimes by almost as much as through investment in construction.

**Figure 2 Contribution of men's and women's employment to the rise in employment rates by industry and country**



Source: authors' calculations

Table 13 shows how large the gender employment gap is in each country and by how much it would be reduced or increased by each type of investment.

**Table 13 Gender employment gap and effects on it of investment of 2% of GDP in construction or health and care industries**

	Existing gender employment gap	Construction		Health and care	
		Percentage point change in gender employment gap	As % of existing gender employment gap	Percentage point change in gender employment gap	As % of existing gender employment gap
<b>Brazil</b>	21.5%	3.0%	14%	-0.7%	-3%
<b>Costa Rica</b>	36.0%	2.2%	6%	0.6%	2%
<b>China</b>	14.0%	0.9%	6%	-0.2%	-2%
<b>India</b>	41.7%	1.8%	4%	0.9%	2%
<b>Indonesia</b>	30.0%	1.1%	4%	0.3%	1%
<b>South Africa</b>	11.7%	1.2%	10%	0.4%	3%
<b>Germany</b>	9.8%	2.3%	24%	-1.8%	-18%

Source: authors' calculations

Investment in construction increases the gender employment gap in all countries. However, investment in health and care reduces the gender employment gap in Brazil, China and Germany and increases it much less than investment in construction in Costa Rica, India, Indonesia and South Africa. For reasons given above, it is likely that more countries would show a reduction in the gender employment gap for an investment in health and care that was specifically directed towards social care. This is why the reduction in the gender employment gap shown in Table 15 is so much greater for Germany, the only country where social care currently makes up a significant proportion of its health and care sector.

Costa Rica and India are good examples of this, as the proportion of women working in the health sector is much lower than that working in the social care sector (Table 5). Although it is not possible to estimate the full employment effect of investing in social care specifically using the available data, we can make some estimate of the difference it would make to the gender proportions of the employment generated to direct the investment in health and care towards social care.

We can do this by assuming the direct labour requirement and all inputs used to be the same across the health and care sector, so that the total number of jobs generated by

investment in the sector will not vary according to where that investment is directed.<sup>23</sup>

But to estimate the gender breakdown of this employment, we can use the proportion of women working in social care rather than in health and care overall. The direct employment effect would then be greater for women, with 69% of directly generated jobs going to women in India instead of 42.5%, and 80% instead of 62% in Costa Rica (as in Table 10). The indirect and induced employment effects are assumed not to change and temper the gender-equalising direct impact through the gender gap in paid employment overall in the countries studied. Nevertheless, taking account of the gendered direct employment effect of investment in social care as opposed to health and care overall makes the gendered total employment effect (as in Table 12) jump from women taking 44% of the newly generated jobs to 50% in Costa Rica and from 32% to 41% in India.

However, another important gender-equalising effect that is not modelled in this analysis is the impact of the investment itself on labour market opportunities for women. Consideration should be given to the supply-side of the labour market and in particular how investing in care ser-

<sup>23</sup> This is undoubtedly an underestimate of the direct labour requirement because wages are generally lower in social care than in healthcare, so can expect a higher direct labour requirement. However, that might be counterbalanced by lower indirect employment generated.

vices can alleviate many barriers to paid employment for women as primary carers (through replacing their unpaid labour). If this was modelled in our empirical analysis, we would expect the newly created jobs (in the health and care sector but especially elsewhere in the economy) to be taken up by a larger proportion of women than assumed in this current simulation, thereby further reducing gender inequalities in a way that investing in construction would not.

These results point very clearly to the need to assess the gender employment equality effects of any investment stimulus, whether it is designed mainly to create jobs or for other purposes. In particular, the more traditional forms of investment stimulus which tend to be in construction can exacerbate the gender employment gap considerably. In any case, successful efforts to tackle the male domination of the construction industry’s suppliers, as well as that of the construction industry itself, would be necessary to mitigate these effects.

This analysis does not per se undermine the case for investment in construction. Rather it makes the case that, since better effects on employment inequalities can be generated by investment in health and care along with comparable or greater total employment stimulus, investment decisions should take into consideration not just the employment effects but also the wider benefits of each investment to society. The analysis clearly shows that investing in physical infrastructure is not the only way to stimulate employment.

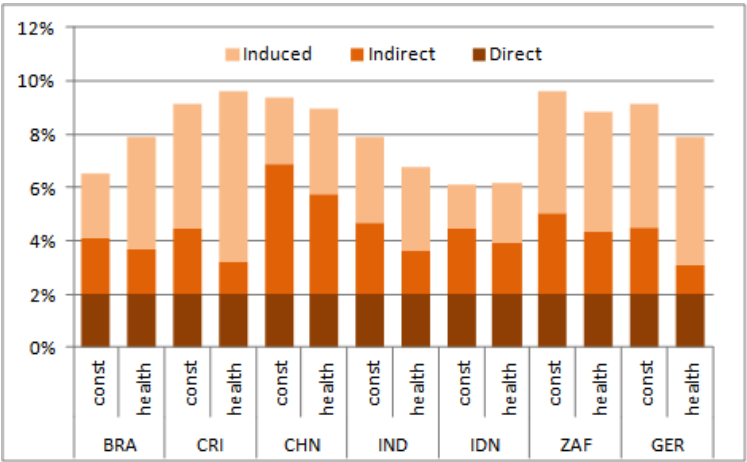
The direct benefits to society of investment in health and care in itself, and in social care in particular, are considered elsewhere in this report. That in itself makes a strong case for such an investment. But the employment effects are considerable too and their effects on gender inequalities reinforce that argument, at least in comparison with more traditional forms of employment stimulus. If investment in physical infrastructure is to be justified, it also should be in terms of the need for its results, and its adverse gender effects then mitigated by other types of investment. In terms of employment generation and its effects on gender inequalities, investment in care tends to be the more effective.

Effects on economic growth

It is not just the effect on employment that is worth analysing but the overall effect on GDP, that is the output multiplier effect due to the additional indirect and induced demand created following an investment of 2% of GDP.

Figure 3 shows mixed results. Investing in health and care produces smaller multiplier effects on output than an equivalent investment in construction in China, India, South Africa and Germany, but larger ones in Brazil, Costa Rica and Indonesia. In all countries indirect effects are larger for construction than for health and care, for reasons discussed above, but it is the other way round for induced demand owing partly to wage levels being larger in health care than in construction (in countries with relatively large direct effects). Overall, investing in either sector will produce multipliers varying between just over 3 (in Indonesia) and almost 5 in Costa Rica (for health and care) and South Africa (for construction).

Figure 3 GDP direct, indirect and induced effects



Source: authors' calculations

# Conclusion

This report has made the case that policies that are effective in promoting economic growth and employment are likely to be those that include public investment in infrastructure. However, it is necessary to see infrastructure from a broader point of view than usually portrayed in accounts of Keynesian intervention plans. Social infrastructure, the activities that provide health care, education, childcare and adult long-term care are vital to maintaining and growing the productive capacity of an economy, as well as being essential ways of developing people's quality of life. Current levels of public investment in such services in the countries studied in this report, in particular in health and care, still lag behind those found in OECD countries.

In the short-term, our simulations have shown that investing the equivalent of 2% of GDP either in the health and care industry or in the construction industry generates substantial positive employment and output effects. Differences between countries in the magnitude of such effects were linked to differences in productivity levels and the structure of their economies. Investing in health and care produces larger total employment effects in Brazil, China and Indonesia and to a lesser extent, Costa Rica. In South Africa and India, the investment produces slightly smaller employment effects than comparable investment in construction. However, in all countries but India, more jobs are generated for women if the investment is in health and care activities, thereby reducing gender inequalities in employment.

Although the data did not make it possible for the analysis to derive employment effects from investing in social care (childcare and long-term care) specifically, the results showed that given lower levels of wages and greater female presence in social care than in health care services, it was expected that direct employment effects would be somewhat larger than investing in the health and care industry overall. However, social care requires fewer outputs and workers in the sector tend to earn less, so the effect on indirect and induced demand is less clear cut, al-

though if the pattern observed in higher-income countries in our previous study were applicable here, the overall employment effect would indeed be larger from investing in social care specifically.

This simulation has made countries comparable by investing a similar proportion of each country's GDP in either sector. Another type of comparability could be examined by estimating the effects of matching the levels of spending on health and care of more developed countries. For example, as Table 1 shows, using Germany as a benchmark, the additional health investment required as a percentage of GDP to match Germany's 11% would range from 2% in Costa Rica (as simulated), 2.5% in South Africa, 3% in Brazil, 6% in China, 6.5% in India to 8% in Indonesia (4 times the simulation used in this report). Employment effects in India and Indonesia would then be magnified accordingly. Because current levels of spending and employment in health and care leave access to affordable and high quality healthcare and social care services well below those observed in high income OECD countries, the case can easily be made for investment in those services, alongside improvement in vital physical infrastructure such as clean water, sanitation systems and transport facilities for remote communities.

Moreover, investing in care services is more likely to alleviate barriers to employment for women and thus increase their labour supply overall. With more women taking up the newly created jobs, especially in other sectors through indirect and induced effects, the equalising employment effect of investing in care would be more pronounced than currently observed in our simulations, especially in countries with large gender employment gaps such as India, Costa Rica and Indonesia.

Ultimately the argument must be that the benefits of investing in both social infrastructure and sustainable and environmentally-friendly physical infrastructure reach beyond their economic and employment effects. Providing

high quality health and social care is a feature of a civilised and healthy society and that in itself is a sufficient condition to advocate for public investment in high quality care services. Moreover, both investing in care services and in construction projects satisfying renewable and environmentally-friendly criteria are vital steps in enabling societies to become sustainable. The two types of investment should be considered together. This report suggests that the urgent need to solve the health and care lacunae and address gender inequalities makes investment in social infrastructure a priority. The results of this analysis and other studies show that, as an effective alternative to austerity and structural adjustment, investment in physical infrastructure cannot be presented as the only form of investment that would stimulate employment and economic activity.



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# Appendix 1 - Simulation methodology

## General method

This analysis uses official input-output tables produced by national statistical offices to calculate the full employment effects of additional demand, created for example by government spending, for the products of a particular industry. The methodology used is well-known. In this analysis we have followed closely the methods used by the Scottish government's statistical office – see Scottish Government (2015), referred to below as the “Scottish methodology notes”.

This is how the different ways in which employment is generated is explained:

If there is an increase in final demand for a particular product, we can assume that there will be an increase in the output of that product, as producers react to meet the increased demand; this is the **direct effect**. As these producers increase their output, there will also be an increase in demand on their suppliers and so on down the supply chain; this is the **indirect effect** (also called Type I). As a result of the direct and indirect effects the level of household income throughout the economy will increase as a result of increased employment. A proportion of this increased income will be re-spent on final goods and services: this is the **induced effect** (also called Type II).

[<http://www.gov.scot/Topics/Statistics/Browse/Economy/Input-Output/Multipliers>](emphasis added)

In this research we are interested in **employment effects** and we find these by calculating the total direct, indirect and induced employment changes due to a unit increase in final demand. We also calculate the direct, indirect and induced employment effects separately. We can then multiply any suggested additional demand by the total employment effect, or any component of it, to calculate the amount of additional employment generated.

## Type I employment effects (indirect)

1) The process starts with published symmetric tables, giving the quantity of output of industry  $i$  used directly in industry  $j$  (where  $i$  and  $j$  are industry rows and columns respectively, with rows showing supply and columns use):

1. These tables also include rows for imports and for gross value added by industry, so that the column totals give the total output of each industry.
2. They also include columns for the composition of final demand, from government, consumers (households), gross capital formation and exports.
3. Such tables are produced by national statistical offices, but some provide product by product tables ( $P \times P$ ) instead of industry by industry ( $I \times I$ ). The methodology used subsequently is unchanged, with the results needing to be interpreted in terms of products rather than industries.
4. See Scottish methodological notes for an explanation of how they derive symmetric tables, which is not entirely straightforward. Slightly different assumptions are made by each statistical office.

2) Calculate from the symmetric table, or find also from the statistical office, the direct requirements matrix,  $\mathbf{A}$ , whose cells gives the amount of the product of industry  $i$  needed **directly** to produce a unit of the product of industry  $j$ .

- $W_j$ , the total output of industry  $j$ , is calculated as the total of the  $j$ th column of the symmetric table.
- The direct requirements matrix,  $\mathbf{A}$ , is calculated from the symmetric table by dividing each cell by its column total.

3) Calculate from the direct requirements matrix, or find also from the statistical office, the Leontief inverse matrix or “total requirement” matrix,  $\mathbf{A}$ , whose elements capture the whole supply chain and give the total amount of the product of industry needed **directly and indirectly** to produce a unit of the product of industry.

- The total requirement matrix,  $\mathbf{L}$ , is calculated from the direct requirement matrix, by  $\mathbf{L} = \mathbf{I} + \mathbf{A} + \mathbf{A}^2 + \mathbf{A}^3 \dots = (\mathbf{I} - \mathbf{A})^{-1}$  where  $\mathbf{I}$  is the identity matrix.
- The Type I output multiplier for industry  $j$  is equal to  $\sum_i \mathbf{L}_{ij}$ .

4) From published figures on employment by industry, calculate the direct employment vector,  $\mathbf{w}$ , whose components  $w_j$  give the **employment directly** required to produce a unit of the product of industry  $j$ .

- $w_j$  is calculated as employment in industry  $j$  divided by its total output  $Y_j$ . This can be headcount or FTE.
- Similarly, a vector recording gender-specific employment by industry can be calculated we used the proportion of women employed). Again, this can be headcount or FTE.
- Note that FTE numbers and the gender breakdown of employment were not always available for industries categorised as in the I-O tables. If the employment data were less disaggregated, e.g., in Australia, the same gender breakdown was applied to all sub-divisions. Where the employment data were more or differently disaggregated, e.g., for government sectors of the US, the gender breakdown was fine-tuned for each industry by using other sources on a case-by-case basis.

5) Employment effects (and corresponding gendered employment effects) for each industry  $j$  are calculated as follows:

- The **direct effect** is  $w_j$ , the direct labour needed to produce a unit of output of industry  $j$ .
- The **total Type I effect** (direct plus indirect) is  $\sum_i \mathbf{L}_{ij}$ , the sum of all the labour required directly and indirectly to produce an additional unit of output of industry  $j$ .

- The **indirect effect** is calculated as the difference between the total Type I and the direct effect  $\sum_i \mathbf{L}_{ij} - w_j$ , which gives the labour required indirectly to produce a unit of output of industry  $j$ .

6) The employment multiplier(s), the ratio of indirect to direct effects, can then be calculated (including by gender, FTE etc.).

7) Effects on employment rate(s) can also be calculated.

- The percentage points rise in the employment rate (by gender) equals the total employment effect divided by the working age population (of that gender).

## Type II employment effects (induced)

1) For type II effects, we augment the direct requirements matrix  $\mathbf{A}$  by adding the household sector. Using data from the symmetric table, we add a column to matrix  $\mathbf{A}$  that gives the composition of consumer demand by industry per unit of household income and a row that gives compensation of employees (and ideally also including income from self-employment but not profits) per unit of output of each industry.

2) The additional column of consumer demand by industry is derived from the corresponding column of the symmetric table divided by total household income. The latter can usually be found in the National Accounts (household sector) data. Where household income is not directly available, we used the total household expenditure divided by (1 - gross saving ratio).

- The sector of households usually includes non-profit institutions serving households (unless separated) and no adjustment has been made to account for this category.

3) Calculations of employment are then the same as before, creating an augmented type II Leontief inverse matrix, and using that to calculate:

- The **total Type II effect** (direct plus indirect plus induced) is  $\mathbf{L}^I - \sum_i \mathbf{w}_i \mathbf{L}_{ij}$ , the sum of all the additional labour required, directly, indirectly and induced, when an additional unit of output of industry  $j$  is produced.
- The **induced effect** is calculated as  $\sum_i \mathbf{w}_i \mathbf{L}_{ij}' - \sum_i \mathbf{w}_i \mathbf{L}_{ij}$ , the difference between the total Type II and total Type I effects. This gives the employment induced by additional household consumption when an additional unit of output of industry  $j$  is produced.

## Some caveats

Some statistical offices calculate such employment effects themselves, but many do not, although they provide the input-output tables and other data needed for their calculation. One reason some do not is that the derivation of employment effects involves making some quite strong assumptions.

Below we list the assumptions that are most relevant to our analysis and, where we can, say the likely effects of them not holding:

1. **Available supply.** It is assumed that the economy has no supply-side constraints, that is, that any additional inputs required, including labour, can be found or produced without taking resources away from existing activities. If this is not the case, then employment effects will be overstated. Actual employment effects are likely to be dependent on the extent to which the economy is operating at or near full capacity or whether there is unemployment.
2. **No effects on wage or price levels.** If there are any constraints on the availability of inputs, such as skilled labour, wages and prices would be expected to rise, and therefore to reduce the quantity that any given amount of expenditure can purchase. Such “crowding out” effects are assumed not to occur. For this reason, especially where there are skill or other labour shortages, employment effects may be overestimated.
3. **No change in methods of production.** It is assumed that additional demand does not lead to a change in how industries produce their output and therefore their input requirements (and how these are sourced). This may not hold where there are fixed capital requirements, economies of scale or a range of ways of producing the same output. If this assumption does not hold, but the previous two assumptions still did, employment effects might be over or underestimated.

4. **All households spend in the same way and continue to do so.** In calculating induced effects, final demand from households is assumed to retain its existing composition and simply rise or fall in proportion to household income. If additional employment leads households to save more, this assumption does not hold and employment effects are likely to be slightly exaggerated. Further, this assumption will not hold if any additional income generated through employment goes to households whose spending patterns differ systematically from the average, though without investigating the spending patterns of different types of households, we cannot know whether this would lead to over or underestimation of employment effects.

See Paul Gretton (2013) for a more complete analysis of the assumptions and potential pitfalls of this sort of analysis.



# Appendix 2 - Sources and definitions used in the simulation

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## Main sources of the input-output simulation analysis

- The main data is sourced from the OECD input-output tables, available as part of its structural analysis database (<http://stats.oecd.org/>). The tables are industry by industry at basic prices and include the inverse Leontief matrices of Type I.
- The OECD database includes data on employment by industry for all countries except for Costa Rica for which we used Census data (2011) from its National Statistical Office (<http://www.inec.go.cr/>). Data on employment by industry is by headcount, for all paid employment (informal and formal, rural and urban, for all types of employment, i.e., employees, own account workers, employers as well as contributing family workers, as long as they are being paid).
- Data on the proportion of women in each industry is taken from various national statistical sources or the ILO employment database from ILOSTAT, as the OECD database does not provide such data:
  - o Brazil: Census 2010
  - o Costa Rica: Census 2011
  - o China: ILOSTAT (aggregated manufacturing sector)
  - o India: Census 2011
  - o Indonesia: ILOSTAT (aggregated manufacturing sector)
  - o South Africa: Census 2011
  - o Germany: Eurostat databank
- Other alternative sources include data from the United Nations Statistics Division (population, household disposable income and exchange rates) available at <http://unstats.un.org/unsd/default.htm>.
- Comparison and consistency checks have been carried out with other existing input-output tables for some countries:
  - o World Input-Output Database (WIOD) for India, Indonesia, China and Brazil ([http://www.wiod.org/new\\_site/home.htm](http://www.wiod.org/new_site/home.htm))
  - o National input-output table for South Africa from Statistics South Africa ([http://www.statssa.gov.za/?page\\_id=7944](http://www.statssa.gov.za/?page_id=7944)).

## Industry classification

The OECD input-output tables distinguish between 34 industries that are grouped according to the International Standard Industry Classification of the United Nations (ISIC rev 3.1), as follows:

C01T05: Agriculture, hunting, forestry and fishing	C40T41: Electricity, gas and water supply
C10T14: Mining and quarrying	C45: Construction
C15T16: Food products, beverages and tobacco	C50T52: Wholesale and retail trade; repairs
C17T19: Textiles, textile products, leather and footwear	C55: Hotels and restaurants
C20: Wood and products of wood and cork	C60T63: Transport and storage
C21T22: Pulp, paper, paper products, printing and publishing	C64: Post and telecommunications
C23: Coke, refined petroleum products and nuclear fuel	C65T67: Financial intermediation
C24: Chemicals and chemical products	C70: Real estate activities
C25: Rubber and plastics products	C71: Renting of machinery and equipment
C26: Other non-metallic mineral products	C72: Computer and related activities
C27: Basic metals	C73T74: R&D and other business activities
C28: Fabricated metal products	C75: Public admin. and defence; compulsory social security
C29: Machinery and equipment, nec	C80: Education
C30T33X: Computer, Electronic and optical equipment	C85: Health and social work
C31: Electrical machinery and apparatus, nec	C90T93: Other community, social and personal services
C34: Motor vehicles, trailers and semi-trailers	C95: Private households with employed persons
C35: Other transport equipment	
C36T37: Manufacturing nec; recycling	

The industries used in this study are “C45 construction” and “C85 health and social work”.

C45 is equivalent to Section F division 45 (construction) and includes the following activities, as per United Nations Statistics Division explanations:

“This division includes general construction and special trade construction for buildings and civil engineering, building installation and building completion. It includes new work, repair, additions and alterations, the erection of prefabricated buildings or structures on the site and also construction of a temporary nature.” (<http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=17&Lg=1&Co=45>)

C85 is taken from Section P division 85 (health and social work activities), which includes the groups 851 (human health activities), 852 (veterinary activities) and 853 (social work activities). However, the OECD input-output industry C85 excludes veterinary activities, which are grouped with industry C73T74 (R&D and other business activities which includes various other professions such as law, accounting and security services). The revised classification (ISIC rev 4) is more focused and includes only human health (division 86) and social work activities, residential (Division 87) or not (Division 88), in line with the previous study (De Henau et al., 2016).

The activities included in this industry are described as follows (excluding veterinary activities):

“This sector includes the provision of health care by diagnosis and treatment and the provision of residential care for medical and social reasons, as well as the provision of social assistance, such as counselling, welfare, child protection, community housing and food services, vocational rehabilitation and childcare to those requiring such assistance.”

(<http://unstats.un.org/unsd/cr/registry/regcs.asp?Cl=17&Lg=1&Co=85>)

## Informal employment

Data on informal employment comes from the International Labour Office employment database (see ILOSTAT in <http://www.ilo.org/global/statistics-and-databases/lang-en/index.htm>). The ILO definition of informal employment includes:

- Self-employed workers in the informal sector (i.e. not subject to social security and taxation laws);
- Own-account workers engaged in the production of goods exclusively for own final use by their household (e.g., subsistence farming or do-it-yourself construction of own dwellings);
- Contributing family workers, irrespective of whether they work in formal or informal sector enterprises. The informal nature of their jobs is due to the fact that contributing family workers usually do not have explicit, written contracts of employment, and that usually their employment is not subject to labour legislation, social security regulations, collective agreements, etc.;
- Employees holding informal jobs, whether employed by formal sector enterprises, informal sector enterprises, or as paid domestic workers by households. Employees are considered to have informal jobs if their employment relationship is, in law or in practice, not subject to national labour legislation, income taxation, social protection or entitlement to certain employment benefits (paid annual or sick leave, etc.) for reasons such as:

- non-declaration of the jobs or the employees;
- casual jobs or jobs of a limited short duration;
- jobs with hours of work or wages below a specified threshold (e.g., for social security contributions);
- employment by unincorporated enterprises or by persons in households;
- jobs where the employee's place of work is outside the premises of the employer's enterprise (e.g., outworkers without employment contract);
- or jobs, for which labour regulations are not applied, not enforced, or not complied with for any other reason.

Operational criteria used by countries to define informal jobs of employees include: lack of coverage by social security system; lack of entitlement to paid annual or sick leave; and lack of written employment contract.

# Appendix 3 - Additional tables

**Table A.1 Indirect employment effects through the supply chain**

	Construction		Health and care	
	Number of jobs generated	Rise in employment rate (% points)	Number of jobs generated	Rise in employment rate (% points)
<b>Brazil</b>	953,000	0.7%	851,000	0.7%
<b>Costa Rica</b>	17,000	0.6%	9,000	0.3%
<b>China</b>	7,609,000	0.8%	7,124,000	0.7%
<b>India</b>	3,783,000	0.5%	2,654,000	0.3%
<b>Indonesia</b>	1,169,000	0.7%	1,319,000	0.8%
<b>South Africa</b>	164,000	0.6%	121,000	0.4%
<b>Germany</b>	481,000	1.0%	249,000	0.5%

Source: authors' calculations

**Table A.2 Gendered indirect employment effects**

	Construction			Health and care		
	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)
<b>Brazil</b>	29.7%	0.4%	1.0%	37.5%	0.5%	0.8%
<b>Costa Rica</b>	28.1%	0.3%	0.9%	31.6%	0.2%	0.4%
<b>China</b>	42.8%	0.7%	0.9%	44.3%	0.6%	0.8%
<b>India</b>	18.0%	0.2%	0.8%	23.1%	0.2%	0.5%
<b>Indonesia</b>	33.4%	0.5%	1.0%	37.5%	0.6%	1.0%
<b>South Africa</b>	32.6%	0.3%	0.7%	33.7%	0.2%	0.5%
<b>Germany</b>	36.3%	0.7%	1.3%	47.6%	0.5%	0.5%

Source: authors' calculations

**Table A.3 Induced employment effects through household spending**

	Construction		Health and care	
	Number of jobs generated	Rise in employment rate (% points)	Number of jobs generated	Rise in employment rate (% points)
<b>Brazil</b>	895,800	0.7%	1,569,400	1.2%
<b>Costa Rica</b>	26,200	0.9%	35,500	1.2%
<b>China</b>	5,595,400	0.6%	7,113,400	0.7%
<b>India</b>	5,676,700	0.7%	4,846,700	0.6%
<b>Indonesia</b>	533,200	0.3%	724,800	0.5%
<b>South Africa</b>	156,900	0.5%	155,300	0.5%
<b>Germany</b>	602,600	1.2%	617,300	1.3%

Source: authors' calculations

**Table A.4 Gendered induced employment effects**

	Construction			Health and care		
	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)	% of jobs generated taken by women	Rise in employment rate of women (% points)	Rise in employment rate of men (% points)
<b>Brazil</b>	47.7%	0.6%	0.7%	47.7%	1.1%	1.3%
<b>Costa Rica</b>	38.1%	0.7%	1.1%	38.1%	0.9%	1.6%
<b>China</b>	47.5%	0.5%	0.6%	47.5%	0.7%	0.7%
<b>India</b>	29.8%	0.5%	1.0%	29.8%	0.4%	0.9%
<b>Indonesia</b>	39.0%	0.3%	0.4%	39.0%	0.4%	0.6%
<b>South Africa</b>	35.0%	0.3%	0.6%	35.0%	0.3%	0.6%
<b>Germany</b>	46.6%	1.1%	1.3%	46.6%	1.2%	1.4%

Source: authors' calculations





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