



The effects of social infrastructure and gender equality on output and employment: The case of South Korea

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ABSTRACT

This paper examines the short-run and medium-run impact of spending in social infrastructure, defined as expenditure in education, childcare, health and social care, wages and gender pay gap on output and employment of men and women for the case of South Korea. Based on a gendered post-Kaleckian feminist macroeconomic theoretical model, we estimate the macroeconomic effects of social expenditure, wages and gender pay gap using a structural vector autoregression (SVAR) analysis for the period of 1970–2012. The results show that an increase in the public social infrastructure significantly increases the total non-agricultural output and employment in South Korea both in the short and medium run. Moreover, we find that higher social infrastructure expenditure increases female employment more than male employment in the short run and raises both male and female employment in the medium run due to increasing output. Finally, the results show that South Korean economy is gender equality-led in the medium run, although the effects are economically small in comparison to the strong effects of increases social infrastructure spending. The results indicate that sustainable equitable development and a substantial increase in employment requires a mix of both labour market and fiscal policies.

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1. Introduction

This paper aims at analysing the effects of social infrastructure, defined as spending in education, childcare, health and social care, and gender pay gap in South Korea on aggregate output and employment of men and women based on a Post-Kaleckian feminist macroeconomic model. According to the Global Gender Gap Index of the *World Economic Forum* (2018), South Korea is one of the lowest ranked countries in the world in terms of “Economic Participation and Opportunity” (124th out of 149 countries) as of 2018. Global Gender Gap Index also shows that South Korea ranks 88th in terms of female labour force participation and 121st in terms of gender wage equality for similar work. The average wages of women in South Korea are on average 36.7% lower than average male wages (as of 2012, own calculations based on *World Klems* (2014) database). These statistics reflect that there is a significant economic gender gap in South Korea despite the fact that the country is now classified as a high-income economy. Moreover, the underdeveloped care infrastructure and reliance on unpaid care labour of women is posing serious demographic and social sustainability challenges in an aging society. The majority of the unpaid

care work is carried out by women within the household, which limits women’s employment opportunities and leads to an interruption in their careers (Yeo and Kim, 2014; Hong, 2020).

Empirical research finds a strong positive effect of public spending in social care and education on female employment as well as total employment (Antonopoulos et al., 2010; İlkkaracan, Kim, & Kaya, 2015; İlkkaracan & Kim, 2018; İlkkaracan et al., 2021; De Henau et al., 2016; Onaran, Oyvatt, & Fotopoulou, 2022a). These employment effects have further effects on the economy and the wellbeing of the society, as microeconomic studies show that a larger share of women’s income compared to that of men’s is spent on the needs of the household (Blumberg, 1991; Antonopoulos et al., 2010; Pahl, 2000) and an increase in women’s income leads to increased spending on children’s education and wellbeing (Vogler & Pahl, 1994; Lundberg, Pollak, & Wales, 1997; Cappellini, Marilli, & Parsons, 2014). These have further demand and supply side effects on output, productivity and employment (Onaran et al., 2022a, Onaran et al., 2022b; Seguino, 2017).

With respect to the effect of gender equality on output, there are potentially both positive effects on consumption and investment, and negative effects on net exports and investment due to both demand and supply side effects; and the effects differ in the short and medium run and crucially depend on the structure of the economy (Onaran et al., 2022a, Onaran et al., 2022b;

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Braunstein, Bouhia, & Seguino, 2020; Seguino, 2010, 2012, 2017; Braunstein, van Staveren, & Tavani, 2011).¹

These theoretical macroeconomic models can be used to analyse the effects of gender equality on output and employment, since they allow for differences in both the wage rates and consumption patterns between women and men. In post-Kaleckian models, higher profit share and lower wages could either increase or decrease aggregate output and the demand regime is classified as profit-led in the former and wage-led in the latter case (e.g. Bhaduri and Marglin, 1990; Bowles and Boyer, 1995; Hein and Vogel, 2008; Onaran and Galanis, 2014; Oyvatt, Öztunalı & Elgin, 2020; Blecker, Kim, Cauvel, 2020). Based on a feminist post-Kaleckian model, Onaran et al. (2022a) analyse the impact of rising female wages on aggregate output and define the demand regime as *female wage-led/gender equality-led (gender inequality-led)* if higher female wages with a constant male wage increases (decreases) aggregate output. The demand regime is defined as *equality-led* if it is both wage-led and female wage-led/gender equality-led (Onaran et al., 2022a).

In the case of South Korea, Seguino (1997) finds that higher gender pay gap increases the exports in manufacturing by lowering unit labour costs of export goods. Seguino (2000) estimates that gender pay gaps positively contributed to the economic growth in nine Asian economies including South Korea during the period of 1975–95. In contrast, Onaran et al. (2022a) find that gender equality leads to higher output in the UK in both the short and the medium run. Empirical research based on post-Kaleckian models on the impact of the share of wages in national income indicate that a higher wage share leads to higher output in the case of South Korea (Onaran & Stockhammer, 2005; Onaran & Galanis, 2014; Oyvatt et al., 2020; Joo et al., 2020); however, these studies do not analyse the effects of gender distribution of wage income.

We introduce a post-Kaleckian feminist model to analyse the effects of public and private social expenditure and gender gaps on output and employment building on Onaran, Oyvatt and Fotopoulou (2022a,b), and extending it with endogenous changes in labour supply, wage bargaining and occupational segregation. Empirically, we use a structural vector autoregression (SVAR) analysis to estimate the impact of an increase in social infrastructure spending, female and male wages and closing the gender pay gap on aggregate output and employment of men and women in South Korea based on data provided by World Klems (2014) for the period of 1970–2012.

The SVAR methodology allows us to extend the theoretical model by Onaran et al. (2022a,b) with endogenous wages, labour supply and occupational segregation, and apply it to a developing country context that experiences rapid structural transformation during the period of analysis. Different from Onaran, Oyvatt and Fotopoulou, the analysis in this paper focuses on non-agricultural sector accounting for the effects of structural transformation in South Korea on female and male employment and wages during the estimation period. Moreover, SVAR methodology allows us to integrate the effects of social infrastructure, specifically spending in care on occupational segregation, female employment and wages in the rest of economy.

Our results show that social infrastructure spending has a positive effect on aggregate non-agricultural output both in the short run and medium run in South Korea and it contributes to closing the gender employment gap in the short run through generating substantial employment for women. Moreover, an increase in the

wages of women stimulate aggregate demand in the medium run, and South Korea is overall female wage-led/gender equality-led in the medium run. However, the effects of higher wages and gender equality are economically small in comparison to the strong effects of social infrastructure spending. The results point at the importance of using more than one policy tool combining wage and fiscal policies to create a substantial increase in decent jobs for both men and women with decent wages and higher equality.

Section two discusses the developments in social expenditure, labour market and the growth regime in South Korea. Section three presents a theoretical framework and estimation methodology to analyse the effects of an increase in social expenditure through increasing employment or closing the gender pay gap via increasing the wages of women in the social sector. Section four presents the data and estimation results and the final section concludes.

2. Social expenditures, labour markets and gender equality in South Korea

2.1. The growth and social expenditures in South Korea

South Korea is often referred to as an important case of “East Asian miracle” due to its high growth rates in the post-1960s period (World Bank, 1993; Page, 1994). In 1960 South Korea had lower income per capita than today’s lower and lower-middle income countries such as Cameroon, Bolivia, Haiti and Democratic Republic of the Congo, and in 1995 became a high-income country according to the World Bank classification (World Bank, 2019b). As can be seen in Table 1, in 1970 South Korea was poorer than Argentina, Brazil, Mexico, South Africa, or Turkey and significantly surpassed them since the late 1980s.

The high growth rates in South Korea are explained by several channels. Until the 1990s, the South Korean state implemented developmental policies² (Amsden, 1989; Chang, 1993; Chang, Andreoni, & Kuan, 2013), which contributed to the rapid structural transformation from light to heavy and chemical industries and hence to the rise of South Korea. In the 1990s and after the 1997–98 economic crisis, the developmental state policies providing support on strategic industries significantly weakened; however, they continued at a lower key (Chang, Andreoni, & Kuan, 2013).

In addition to interventionist developmental policies, the effect of “human capital” on the industrialisation of South Korea is also highlighted substantially. World Bank (1993) and Birdsall, Ross and Sabot (1995) estimate that high enrolment rates in South Korea significantly contributed the growth rates in 1960–1985. Dornbusch and Park (1987) point that unlike many emerging economies South Korea suffered little from shortages of skilled and educated labour. Similarly, Amsden argues that South Korea had a surplus of middle and high skilled workers in some periods, and highlights that “the relationship between education and industrialization in Korea can be said to have obeyed a kind of Say’s Law, the supply of educated personnel creating its own demand,” (1989, p.216) i.e. the supply of high-skilled workers pushed the growth of skilled jobs.

Table 1 shows that the level of education was significantly higher in South Korea than today’s large emerging economies. Although GDP per capita in South Korea was one-third of Argentina’s in 1974, net secondary school enrolment rate in South Korea was larger than that in Argentina. Net secondary school enrolment

¹ We use 1–2 year lags of variables in the Structural Vector Autoregression (SVAR) analysis following Final Prediction Error (FPE) criterion. The limited number of observations do not allow us to conduct an analysis with a large number of lags. Therefore, our empirical analysis only reflects the long-run effects of social infrastructure expenditures that are through short- and medium-run effects.

² These policies included export subsidies, subsidised credit, targeted tariffs and quotas in selected industries (Amsden, 1989; Chang, 1993; Chang, Andreoni, & Kuan, 2013). However, South Korea experienced a significant dismantling of financial regulations and industrial policy in 1990s – a process which ended up with the economic crisis in 1997–98 (Chang, Park, & Yoo, 1998; Crotty & Lee, 2005).

Table 1
GDP per capita, secondary school enrolment, and infant mortality rate in South Korea and selected middle-income countries (1970–2012).

	GDP per capita (USD constant, 2010)	Average growth in GDP per capita (% , 1970–2012)					
	1970	1974	1980	1989	2000	2012	
South Korea	1815	2509	3700	7785	15,105	23,124	6.2
Argentina	7084	7741	7908	6497	8224	10,650	1.0
Brazil	4704	6623	8349	8390	8803	11,746	2.2
Mexico	5524	6288	8017	7549	9254	9691	1.3
South Africa	6244	6602	6722	6226	5938	7500	0.4
Turkey	4221	4744	4987	6309	8238	12,039	2.5
	Secondary school enrolment (% , net)						
	1970	1974	1980	1989	2000	2012	
South Korea	–	45.6	68.6	84.6	92.6	96.4	
Argentina	–	40.5	–	–	78.5	85.9	
Brazil	–	–	–	–	–	76.4	
Mexico	–	–	–	45.9	56.1	71.8	
South Africa	–	–	–	–	58.9	–	
Turkey	–	24.2	–	43.2	64.5	81.2	
	Infant mortality rate (per 1,000 live births)						
	1970	1974	1980	1989	2000	2012	
South Korea	47.1	38.0	29.4	14.4	6.4	3.3	
Argentina	59.0	54.7	37.0	25.5	17.5	11.8	
Brazil	101.8	92.5	76.6	54.6	30.4	15.4	
Mexico	76.9	67.6	54.9	37.5	22.2	14.1	
South Africa	–	89.3	66.9	47.0	49.0	35.3	
Turkey	127.1	113.0	90.1	58.2	30.9	13.1	

Source: World Bank (2019a).

Note: Net secondary school enrolment rate is “the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age” according to the World Bank’s (2019a) definition.

rate in South Korea in 1980 was larger than that in Mexico, South Africa and Turkey in 2000, although South Korea was poorer than all three countries in 1980. The average years of schooling was also larger in South Korea than that in Brazil and Turkey in 1974 (Oyvatt, 2014).

The educational success of South Korea was partially an outcome of high public education expenditure as a share of GDP (Amsden, 1989; Birdsall, Ross, & Sabot, 1995) compared to countries like Mexico and Turkey,³ but it was also due to the relatively equal distribution of education expenditures (Oyvatt, 2014). The average education Gini coefficient (for population over 15, measured by years of schooling) was 0.25 in South Korea as opposed to 0.47 in Turkey, 0.46 in Brazil, 0.40 in Mexico, and 0.37 in South Africa between 1970 and 2010.⁴

In addition, income inequality in South Korea was lower than most other developing economies, partly as an outcome of South Korea’s successful progressive land reforms in 1945–1954 (Griffin, Khan, & Ickowitz, 2002; Oyvatt, 2016). This allowed a larger proportion of South Korean households to further privately spend in education and healthcare (Birdsall, Ross, & Sabot, 1995; Kim, Shim, & Kim, 1995).

Table 1 also shows that the infant mortality rate in South Korea was significantly lower than Argentina, Brazil, Mexico, South Africa, and Turkey in 1970–2012, which indicates better access to healthcare. In South Korea, the share of public healthcare expenditure in GDP steadily increased from 0.27 % in 1970 to 1.32 % in 1994, and even more remarkably to 3.74 % in 2012 and to 4.41 % in 2016.⁵ The share of private out-of-pocket spending in total healthcare expenditure declined from 89.5 % in 1970 to 57.3 % in 1994, 34.5 % in 2012 and further to 33.0 % in 2016⁶ following this growth in public healthcare expenditure.

³ Between 1981 and 1995 and 2001–2009, the share of public education expenditures in GDP in South Korea was respectively 1.7 and 1.3 percentage points higher than that in Turkey (Oyvatt, 2014). In 1970 the share of basic (primary and secondary) public education expenditures in GNP in South Korea was 3.1%, and 1.6% in Mexico; in 1985 this ratio increased to 3.8% in South Korea and to 2.0% in Mexico (Birdsall, Ross, & Sabot, 1995).

⁴ Authors’ calculations based on Benaabdelaali, Hanchane and Kamal (2012).

⁵ Authors’ calculations based on OECD (2019).

⁶ Authors’ calculations based on OECD (2019).

The Korean government started to implement policies that would promote formal paid childcare mainly in the post-1980 period. Until 1980s, the care work was predominantly carried out by women unpaid in the domestic sphere with little formal paid care provision (Won & Pascall, 2004). The Ministry of Education developed a national kindergarten curriculum in 1969 and established the first public kindergarten in 1976 (Na and Moon, 2003). However, the more significant improvement in childcare was the introduction of Early Childhood Education Promotion Act in 1982, which increased the number of kindergartens from 2,958 in 1981 to 8,294 in 2007 (Peng, 2011). Following the Child Care Act of 1991, the total number of childcare centres increased from 1,919 to 29,823 between 1990 and 2007. As an outcome, the number of children enrolled in childcare centres increased by more than 20 times in 1990–2017 (Peng, 2012). Moreover, the South Korean government introduced free pre-school education for all 5-year old children in 1997 (Peng, 2011). In addition, following the 2004 Early Childhood Education and the 2005 Child Care Acts targeting expansion and development of early childcare education and care, the government increased its early childcare budget by five times between 2002 and 2006.

South Korea has also introduced a new mandatory long-term care insurance (LTCI) system in 2008 targeting the elderly care (Peng, 2012; Jeon & Kwon, 2017). In South Korea, the share of population aged 64 and over in total population increased from 5.0 % in 1990 to 11.1 % in 2010 and is projected rise to 23.4 % in 2030 and to 37.4 % in 2050 (Rhee, Done, & Anderson, 2015). The reform in elderly care aimed to address the rapidly rising needs of the aging population. LTCI provides benefits to households both for institutional as well as home-based care.

The reforms targeting child and elderly care were aimed to reduce the care burden of women in South Korea (Peng, 2012) and contribute to increasing female employment, which we will discuss in Section 2.2.

As an outcome of high public expenditure in social infrastructure and lower income inequality that allowed South Korean households to increase expenditure in private education and healthcare, the share of the social sector in GDP was as high as 12.9 % in 1970 (16.3 % of the non-agricultural sector), and grew rapidly by 5.9 % per year on average between 1971 and 1997 (Fig-

ure 1). The growth rate of the social sector (measured by real value added) slowed down starting from 1982. This could partially be explained by the declining school age population. The population aged 5–24 grew at an annual rate of 1.3 % during 1970–1982, but then decreased by 1.1 % during 1982–1997 and by 1.4 % in 1997–2012. The relative increase in the price index in the social sector also played a significant role in this development, as the annual rate of increase in the price index in the social sector exceeded that in the non-agricultural sector as a whole by 3.4 percentage points.⁷

Following the 1997–98 economic crisis, the value added in the social sector decreased by 2.7 % in 1998, and its average annual growth slowed down to 2.9 % during the period of 1998–2012. The average annual growth in health and social care sectors increased from 2.2 % in 1997–2002 to 5.3 % in 2002–2012 in line with the social care reforms and policies discussed above.

During this period, women in South Korea were increasingly more employed in higher paying jobs. The ratio of the average hourly wage rate of men to that of women declined significantly from 1.82 in 1970 to 1.36 in 1997, and increased to 1.38 in 2012.⁸ The changing composition of women's employment towards the social sector from the rest of the non-agricultural sector (Table 2) and rising share of social sector in total non-agricultural employment (Appendix 1) played an important role in reducing the gender pay gap as the hourly wage rates in the social sector are on average 2.03 times the hourly wage rates in the rest of the non-agricultural sector. In addition, the share of women in hours of work increased from 30.0 % to 35.2 %. The ratio of the labour force participation rate of women to that of men went up from 58.7 % in 1977 to 65.4 % in 2012 and to 71.6 % in 2017 thanks to the increase in care expenditures and other social infrastructure investment (World Bank, 2022).

Since 2017, there has been renewed interest in public social infrastructure spending with the new administration implementing an *income-led growth* policy that included enlarging the coverage of healthcare insurance, reducing hospital expenses for poorer households, and expanding childcare provision by increasing the number of public day-care centres and kindergartens and expanding the after school programmes in elementary schools as well as significant increases in minimum wages (Joo et al, 2020). However the future of these policies are yet to be seen as the new president, Yoon Suk-yeol, elected in 2022 aims to minimize government intervention and ease regulations (Yi, 2022).

2.2. Labour markets, income distribution and gender inequality in South Korea

South Korea has distributional characteristics comparable to those of European countries, e.g. Gini coefficient has remained around 0.30 (Oyvat, 2014), which is low compared to developing economies. This is seemingly counterintuitive, since income redistribution policies in Korea have been very limited until the 1990s (Amsden, 1989). Moreover, South Korean economy historically has an oligopolistic structure (Chang, 1993), which could poten-

⁷ Authors' calculations based on World Klems (2014). The annual average increase in the price index in the social sector was only 0.8%-point higher in 1970–1982. Although the share of the social sector in nominal value added in non-agricultural sector increased from 7.5% to 10.3% between 1982 and 2012; the real value added in social sector on average grew by 4.1% in 1982–2012, i.e. at a lower rate than the average annual growth rate in the non-agricultural sector, which was 6.4% during the same period.

⁸ Authors' calculations based on World Klems (2014). Indeed, ratio of average hourly wage rate of men to women were 1.54 and 1.47 respectively in the social sector and the rest of the non-agricultural sector in 1997. However, this ratio in the whole economy in 1997 was 1.36, lower than the ratio in both sectors, since the average wages in the social sector (which employed greater share of women) was larger.

tially lead to a high profit share. In addition, trade union activities were extremely restricted until the end of the military regime in 1987 (Kang, 2002).

The low income inequality in South Korea is partially an outcome of the successful progressive land reform in 1945–1954 (Griffin, Khan, & Ickowitz, 2002; Oyvat, 2016).⁹ Moreover, although trade union activities were restricted, labour laws were rigid prior to 1990s, which along with high growth rates led to employment rates near full employment for men (Peng, 2011).

Despite these developments, the wage share (adjusted for self-employment) steadily declined between 1970 and 2012, as can be seen in Figure 2. In 1987, South Korea experienced democratization, which led to a significant increase in the number of trade unions and strikes. As an outcome, adjusted wage share temporarily increased from 71.5 % in 1987 to 73.1 % in 1989. Following the economic crisis of 1997/98, the wage share declined from 70.5 % in 1997 to 65.4 % in 2000. The post-crisis reforms deregulated the labour market (Yang, 2006), which might have contributed to the decline in the wage share. Following the Global Economic Crisis in 2008–09, the wage share declined further from 63.6 % in 2008 to 59.5 % in 2010.

Several studies find that an increase in the wage share (a decline in the profit share) led to an increase in aggregate demand in South Korea; i.e. South Korea is a wage-led economy (Onaran & Stockhammer, 2005; Onaran & Galanis, 2014; Oyvat, Elgin, & Öztunalı, 2020; Joo et al, 2020). The positive effects of a higher wage share on household consumption are substantially high and more than offset any potential negative effects on net exports (Onaran & Galanis, 2014; Joo et al., 2020). Against these empirical findings, the decline in the wage share in South Korea since the late 1990s could potentially lead to negative effects on demand and output.

The labour market in South Korea has been subject to gendered segregation both across and within industries. Table 2 shows the share of women in hours of work in different sectors. Social sector includes education, childcare, healthcare, and social care, the rest of the economy includes all other non-agricultural sectors. As can be seen in Table 2, the share of women in employment in the social sector has been greater than in the rest of the economy during the period of 1970–2012, and the social sector is the most female dominated industry compared to any other sector in the post 1997–98 period. According to data presented by Hwang (2014), 99.1 % kindergarten teachers and 98.5 % of domestic childcare helpers in South Korea are women as of 2010. Hence, given the current occupational segregation, an increase in public investment in the social sector, especially in the care sector, can lead to a substantial increase in the share of female employment in South Korea.

In the rest of the economy, some of the sectors are almost entirely male dominated with female employment shares lower than 10–20 %. While the sectors “food, beverages, tobacco, textiles, leather and footwear” and “electrical and optical equipment and machinery” had very high female employment shares in 1970–1997, the female employment share has been steadily decreasing in these industries. Hence, the segregation between women and men within the rest of the economy (in non-agricultural sector) declined, whereas the gap between women's share in employment in the social sector compared to the rest of the economy increased during 1970–2012.

Moreover, structural transformation in the economy also affected the female share of employment. The employment share of “food, beverages, tobacco, textiles, leather and footwear”, which was the sector with largest share of female employment between 1970 and 2012 in non-agricultural sector declined from 16.3 % in

⁹ According to Amsden (1989), the land reform led to a more egalitarian rural sector and a sharp increase in agricultural productivity, which also reduced rural-urban migration. As a result, the pressure on manufacturing wages was reduced.

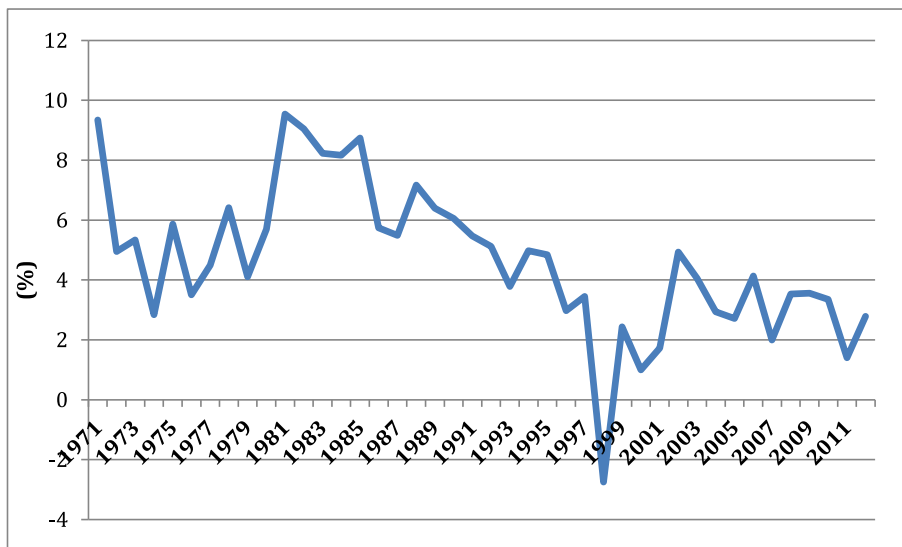


Figure 1. Annual growth in social sector (real value added; education, childcare, healthcare, social care) in South Korea (%; 1971–2012). Source: Authors' own calculations from [World Klems \(2014\)](#).

Table 2
The share of female employment in total employment (%; period averages, 1970 – 2012).

	1970–79	1980–1987	1988–1997	1998–2007	2008–2012	1970–2012
Total non-agricultural	31.68	30.35	28.00	30.33	32.63	30.37
Education, childcare, health, social work	32.71	36.92	47.42	58.25	63.19	45.41
Rest of the economy (in non-agricultural sector)	31.61	29.96	26.70	27.71	28.42	28.88
Sectors with the largest share of female employment (other than education, health, social work)						
Food, beverages, tobacco, textiles, leather and footwear	64.25	59.73	53.62	47.10	43.68	54.56
Electrical and optical equipment and machinery	42.49	38.84	33.26	30.00	23.06	34.50
Financial intermediation	31.72	32.78	28.48	29.36	30.12	30.43
Sectors with the smallest share of female employment						
Basic metal and fabricated metal; other non-metallic minerals	15.96	17.20	17.43	15.46	14.17	16.21
Construction; electricity, water and gas supply	7.30	9.68	11.32	13.25	11.79	10.58
Mining and quarrying	5.18	6.20	7.01	7.89	8.67	6.83

Source: Author's calculations based on [World Klems \(2014\)](#).

Note: The shares in each sector are based on hourly employment.

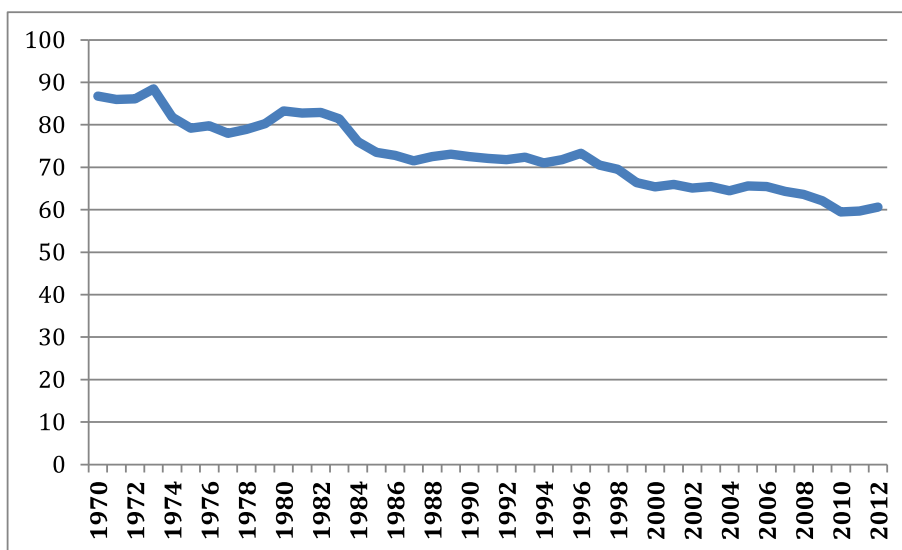


Figure 2. Adjusted wage share in South Korea (%; share in GDP at current factor cost, 1970–2012). Source: AMECO, [European Commission Economic and Financial Affairs \(2019\)](#).

1970s to 2.7 % in 2008–2012 (Appendix 1). On the other hand, the share of two sectors with lowest female employment shares, “basic metal and fabricated metal; other non-metallic minerals” and “construction; electricity, water and gas supply” in non-agricultural employment increased by 0.4 and 0.2 percentage points respectively between 1970 and 79 and 2008–12. These structural changes contributed to the decline in the female share of employment in the rest of the economy. Moreover, the share of the social sector in non-agricultural employment increased from 6.0 % in 1970–79 to 12.1 % in 2008–12, which positively contributed to the feminisation of labour. Further growth in the employment in the social sector would significantly increase the share of female employment considering, it is the sector with the largest female employment share according to data for our latest period (Table 2).

The share of female employment increased in the post 1997–98 in all sector groups. This increase coincided with increases in spending in childcare and eldercare and maternity leave policies implemented in 2001, 2005 and 2006 that extended paid maternity leave from 60 days to 90 days, and increased the public financial support for and the duration of parental leave to three years (Peng, 2011).

The improvements in care and maternity leave policies are crucial for the increasing female employment, since maternity and childcare have been important impediments on the labour force participation of South Korean women. In 2000, South Korea was one of the few economies that had an M–curve relationship between age and labour force participation (Hong, 2020). The women in their late 20s and early 30s, mainly during the early years of maternity, had lower labour force participation rates compared to women in their early 20s and 40s. The labour force participation rates significantly improved by over 10-percentage point for women aged between 25 and 34 by 2017. However, the M–curve relationship still exists as of 2017 and in 2016 56.4 % of women in South Korea, who interrupted their career, stated pregnancy, childbirth and/or childcare as reasons, according to a survey by the Ministry of Gender and Family and Statistics Korea (2016) (reported by Hong, 2020). These are consistent with Figure 3 which shows that over 80 % of the burden of unpaid care work in 1999, 2004, 2009 was on women, although the average daily minutes of unpaid care work was reduced by 5 % between 1999 and 2009. The decline in women’s unpaid care work is possibly an out-

come of the increase in spending in childcare and social care, as well as financial support for parents taking paternal leave and longer maternity leave (Peng, 2011).

Nam (1991) estimates that having children significantly reduced women’s labour force participation in Seoul. Based on Korea Welfare Panel data, Yeo and Kim (2014) find that care responsibilities for kids between 0 and 9, seniors and handicapped significantly reduced labour participation of women in South Korea in 2011. This is consistent with evidence from other OECD countries as shown by Jaumotte (2003) who estimate that public expenditures in childcare significantly increases participation rate of women especially for full-time jobs in 17 OECD countries. These studies indicate that further improvements in public care expenditures could increase both female labour force participation and employment.

The occupational gender segregation and gender wage gaps within the industries have also been significant. Seguino (1997) shows that the earnings ratio between female and male workers was between 40 % and 60 % in the key female-dominated industries like textiles, wearing apparel and electronics and in a male-dominated industry like transport during 1977–1990. Moreover, only 1.9 % of the members of corporate boards in private and public firms in South Korea are women as of 2013 (Kim, Lee, & Shin, 2018). Table 3 also shows that in 1970–2012 average hourly male wages/average hourly female wages in the social sector and in the rest of the economy were respectively 1.66 and 1.57. Although the ratio has been decreasing in the rest of the economy, it remains high both the social sector and the rest of the economy.

The lower average wages could partially be an outcome of female domestic and childcare workers who are predominantly employed informally and are relatively poorly paid (Hwang, 2014). Only 6.2 % of female domestic and childcare workers had social insurance as of 2011. Ham and Kwon (2017) estimate that care workers’ wages are approximately 30 % lower compared to other workers with similar education levels. Hong and Kim (2014) and Lee and Yoon (2015) also find that care workers experience a wage penalty and are underpaid compared to other jobs.

The occupational segregation has been an important reason behind gender wage gaps in South Korea (Seguino, 1997). 65 % of job advertisements stated a gender preference for workers and the share of firms that hire both women and men for the same job was only 5.5 % in 1989 (Nam 1991, cited in Seguino, 1997).

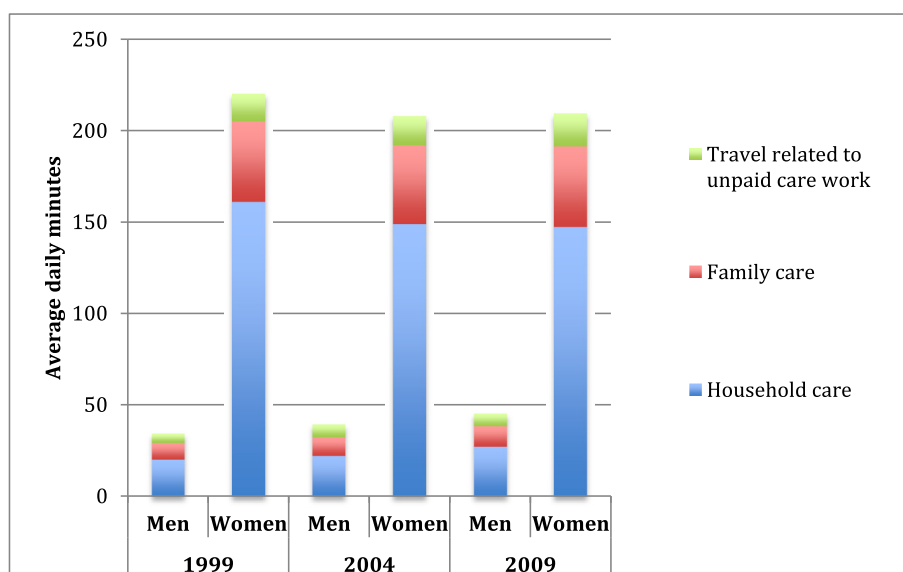


Figure 3. Average daily minutes of care work for women and men (1999, 2004, 2009). Source: Statistics Korea (2021).

Table 3
Average hourly real male wages and female wage rate (period average, Wons, 2010 = 100).

	1970–1979	1980–1987	1988–1997	1998–2007	2008–2012	1970–2012
A: Male wages in education, childcare, health, social work	6271	7855	11,404	14,925	16,723	10,987
B: Female wages in education, childcare, health, social work	3593	4483	6747	9272	10,503	6616
A/B	1.75	1.75	1.69	1.61	1.59	1.66
C: Male wages in the rest of the economy	2864	3533	5602	7471	9645	5485
D: Female wages in the rest of the economy	1468	1919	3359	5098	7096	3490
C/D	1.95	1.84	1.67	1.47	1.36	1.57

Source: Authors' calculations based on World Klems (2014).

Notes: The average wages are hourly wage rates. The average wage income also includes the income of the self-employed in the non-agricultural sector.

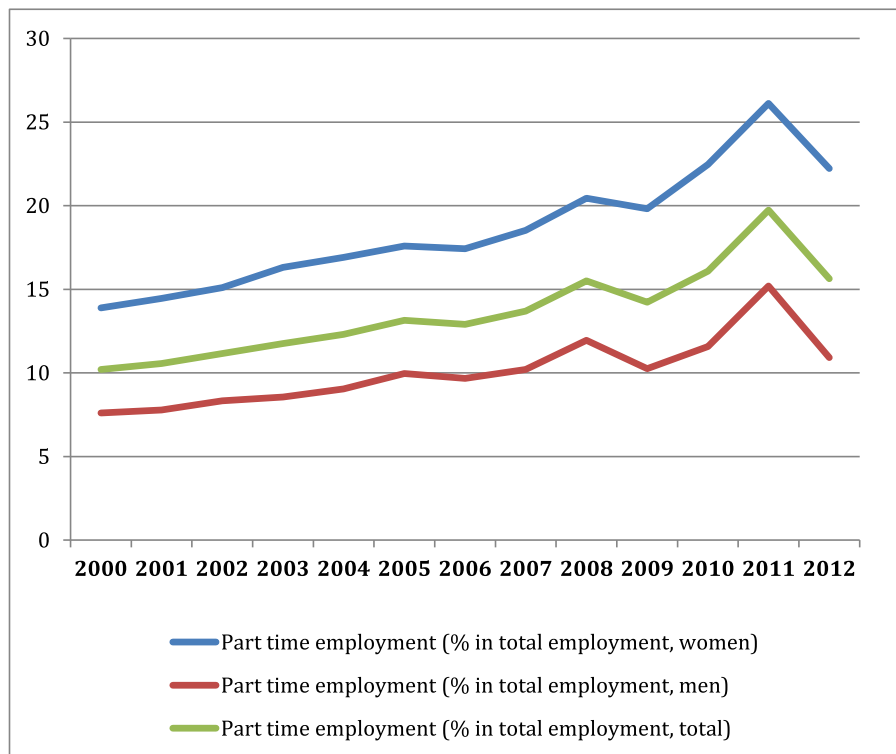


Figure 4. Part time employment in South Korea as a share of total employment (%), 1970–2012). Source: ILO (2021).

The job market limiting women’s job opportunities allowed large chaebols to hire female workers with lower wages and helped them to meet their export targets qualifying them for economic support from the government (Seguino, 1997).

Finally, job insecurity increased significantly specifically for women in the 2000s since the crisis. The share of part-time employment in total employment increased from 13.9 % in 2000 to 22.2 % in 2012 (Figure 4). The increase in part-time employment is less pronounced among men with the share of part-time in total male employment increasing from 7.6 % in 2000 to 10.9 % in 2012. The crisis seems to have exacerbated the unpaid care burden on women (Figure 3) limiting women’s ability to take up full-time employment and/or decreased the availability of full-time jobs for women.

3. Theoretical framework and estimation methodology

In this section, we present the theoretical framework to analyse the impact of social infrastructure expenditure, wages and gender pay gap on output and employment of men and women as well as

the estimation methodology to bring the analysis of these multi-dimensional endogenous relationships into empirical terrain.

Our theoretical framework builds on and extends the **feminist post-Kaleckian** theoretical model by Onaran et al. (2022a,b), which synthesizes and furthers the models by Braunstein, van Staveren and Tavani (2011) and Seguino (2010, 2012), incorporating explicit analysis of both the components of demand and supply side analysis, the government sector and employment. Unlike standard neoclassical growth models that assume full employment, post-Kaleckian models consider demand-side constraints, which would lead to excess capacity and involuntary unemployment (Onaran, 2016). In post-Kaleckian models, wages are considered as both a cost and source of demand. The distribution between capitalists and workers have an important effect on demand. Feminist post-Kaleckian models extend post-Kaleckian analysis by integrating the effects of gender gaps in wages and employment, occupational segregation, public spending in social infrastructure, behavioural differences between men and women in household consumption in the social sector vs the rest of the economy, the reproductive sector and the contribution of unpaid care to social infrastructure.

The model by Onaran et al. (2022a,b) examines the effects of social expenditures (in education, childcare, health and social care) and gender equality on the demand side depending on the structural features of the economy and incorporates their positive effects on productivity on the supply side. The distribution of income between the wages of female and male workers and the profits of the capitalists have both demand and supply side effects. The model has three sectors, public social sector, which consists of the expenditure of the government in education, childcare, health, and social care (i.e. contributing to the development of human capabilities using paid labour, as defined by Braunstein, van Staveren, & Tavani, 2011, denoted with script H), the rest of the market economy (denoted with script N), and the unpaid care sector.

The theoretical novelty of this paper is to extend the model by Onaran et al. (2022a,b) with endogenous labour supply, wage bargaining and occupational segregation, which were all assumed to be exogenous in previous research. While the wage rates in the social sector are exogenously determined by the government as a policy decision, different from previous models, we allow the wage rates for men and women in the rest of the economy to be determined endogenously as an outcome of a bargaining process between employers and workers. The bargaining power of female and male workers depend on the changes in labour demand in each sector and labour supply of men and women as well as exogenous factors determined by labour market institutions and legislation, social wage (determined by public social expenditure), social norms, and occupational segregation effected by these norms, as well as personal characteristics such as education which in turn are affected by social norms. For simplicity, we assume expected prices are equal to actual prices. Hence, the real wage rates in the rest of the economy are functions of employment (or unemployment rate) for men and women, spill-over effects from wages in the social sector and across genders, and a set of exogenous factors effecting the bargaining relations. The spill-over effects of wage setting in the social sector are two folds: Wage setting in the public sector affects the wage norm and negotiations in the rest of the economy too. Moreover, public spending in the social sector provides the social wage and improves the bargaining power of the workers in the rest of the economy.

A second theoretical extension relates to the labour supply. Female and male labour force participation rates (labour force as a ratio to population) are positive functions of average wages, in work benefits and social infrastructure and negative functions of unpaid domestic care labour and unemployment benefits. For simplicity we assume that male and female population are exogenously determined as changes in fertility and mortality take a much longer time period than our medium-term theoretical and empirical analysis in this paper. If employment grows faster than the labour force for a particular type of worker, unemployment rate decreases, and vice versa. If demand for employment for a particular type of worker is not met by an increase in labour supply due to constraints in supply, e.g. a low female labour supply due to lack of provision of public social infrastructure for care, either there will be an exogenous increase in labour supply due to migration, or gender norms and occupational segregation coefficients will change or wages will adjust. It is realistic to assume that changes in labour demand vs labour supply can lead to changes in wages.

Similarly a rise in wages in a particular sector, e.g. in the social sector as an outcome of higher public social infrastructure, or a faster increase in wages in the social sector compared to wages in the rest of the economy is likely to lead to higher labour supply of both men and women, leading to also changes in the sectoral segregation ratios in the social sector and the rest of the economy, as well as a change in social gender norms and the distribution of unpaid domestic labour.

In order to tackle the multi-dimensional complex endogenous relations between wages, output, productivity and social expenditures, we use SVAR as the estimation methodology. SVAR as a methodology to estimate the effect of functional income distribution or wages on output have been previously used by Stockhammer and Onaran (2004), Onaran and Stockhammer (2005), Barbosa-Filho and Taylor (2006), Kiefer and Rada (2015), and Jump and Mendieta-Muñoz (2017). The advantage of this approach is that the interaction between the variables can be incorporated and it allows for tracing the effects through an entire system rather than analysing one equation at a time. Also, it is more suitable to deal with the endogeneity issues. However, using this approach requires a focus on a sub-set of the variables in the theoretical model, since degrees of freedom in the estimations could quickly erode with extra variables due to use of multiple lags (Enders, 2015).¹⁰

We estimate the SVAR model based on the following specification:

$$AX_t = A_0 + A_1X_{t-1} + A_2X_{t-2} + e_t \quad (1)$$

which can be written in reduced form as.

$$X_t = C_0 + C_1X_{t-1} + C_2X_{t-2} + u_t \quad (2)$$

where.

$$X_t = \begin{bmatrix} \Delta \log(Y_t^H) \\ \Delta \log(E_t^F) \\ \Delta \log(E_t^M) \\ \Delta \log(w_t^F) \\ \Delta \log(w_t^M) \\ \Delta \log(Y_t) \end{bmatrix} \quad (3)$$

X_t is a 6x1 vector of six variables consisting of the logarithmic change in the total social expenditure, (Y^H), female employment (E^F), male employment (E^M), average real female wage rate (w^F), average real male wage rate (w^M), real value added (Y) (all in the non-agricultural sector).

We use the total social expenditure (in real terms) rather than only the public social expenditure in line with data availability. Total social expenditure is the sum of public social expenditure, C^H , and the private household consumption in education, childcare, health and social care, C^H , both contributing to the development of human capabilities using paid labour, as defined by Braunstein, van Staveren, & Tavani (2011), thereby denoted with script H.

The average female and male wages used in the SVAR specification are hourly real wage rates, and employment is measured as hours of work.

Our analysis focuses on the value added, wages and employment in the non-agricultural economy only, as a large part of the agricultural sector might be subsistence farming and highly dominated by self-employed and unpaid family workers.¹¹ South Korea could be considered as a developing economy for most of the early years of our estimation period and experienced a significant struc-

¹⁰ We did not include population changes in our SVAR model, as extra variables could reduce the degrees of freedom in our estimations. Population changes would have been a variable that might have influenced social infrastructure expenditures through education, healthcare, childcare and elderly care expenditures. Moreover, population changes could influence female and male wages. However, including population changes should not significantly change our results as our estimations already control for average female and male wages and total social expenditures.

¹¹ According to our calculations based on World Klems (2014), the share of the agriculture in GDP was on average 9.4% for the period of 1970–2012. It declined steadily from 20.7% in 1970 to 3.2% in 2012. The share of agriculture in employment declined from 49.3% in 1970 to 6.0% in 2012.

tural transformation during this period, finally becoming a high-income economy (Oyvatt, 2014). By focusing on the non-agricultural sector, we aim at reducing the biases due to transformation from the subsistence to capitalist sector, considering that extra hours worked (or reported) in the subsistence sector might not contribute to extra income for the female and male self-employed.

We use the logarithmic differences of the variables as the Augmented Dickey Fuller tests show that our variables are non-stationary and integrated of order one. We use two lags of the variables based on Final Prediction Error (FPE) criterion.

From (1) and (2), $Au_t = e_t$:

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & a_{26} \\ a_{31} & 0 & 1 & 0 & 0 & a_{36} \\ 0 & a_{42} & 0 & 1 & a_{45} & 0 \\ 0 & 0 & a_{53} & 0 & a_{54} & 1 \\ a_{61} & a_{62} & a_{63} & a_{64} & a_{65} & a_{66} \end{pmatrix} \begin{pmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \\ u_5 \\ u_6 \end{pmatrix} = \begin{pmatrix} e_1 \\ e_2 \\ e_3 \\ e_4 \\ e_5 \\ e_6 \end{pmatrix} \quad (4)$$

where e_t are structural shocks. Equation (4) defines the contemporaneous effects. Furthermore, any change in a variable affects the other variables in the model with lagged effects of one and two years. In the rest of this section, we discuss the effects of changes in social expenditures, wages and gender pay gap on output and employment of women and men.

The share of women in hours of work in the social sector is greater than their share in the rest of the economy in all years except a few years before 1977 during the estimation period and has been increasing in time (Table 2). The hours of work of male workers is greater than the hours of work of female workers in N in all the years. As of 2012, the share of women in hours of work in N and H in South Korea are respectively 30.5 % and 68.0 % (own calculations based on World Klems, 2014). Therefore, we expect a rise in the share of social sector in output to increase the share of women in employment. The value added of the social sector can increase through higher employment and/or higher wages in private or public social sector.

An increase in social expenditures providing public or private childcare or elderly care can furthermore increase female labour force participation and female employment in the rest of the economy, if matched with labour demand. Unpaid care needs is reported to be an important obstacle to women’s labour force participation in South Korea (Hong, 2020) and increase in care provision is found to liberate women from unpaid care work and increase their employment, especially in full-time jobs (Peng, 2011; Jaumotte, 2003).

We expect an increase in social expenditures to affect output in the short run through three main channels, as summarised in Table 4:

- i) The increase in social expenditures has a direct positive effect on total output through increasing the government expenditures and due to its multiplier effects, as it generates female and male employment in the social sector, and increase household consumption as well as private investment due to demand effects.
- ii) It changes consumption patterns and average marginal propensity to consume, since social sector has greater share of female employment compared to the rest of the economy. Several studies show that the marginal propensity to consume in different sectors of the economy is different for male and female workers (Onaran et al., 2022a,b; Seguino & Floro, 2003; Morrison, Raju, & Sinha, 2007). Lee and Pocock (2007) estimate that a higher income share of women in the household lead to higher savings for the household in South Korea. The magnitude of the effect of higher social expenditure depends on the differences in the marginal propensity to consume for female and male workers in different sectors.

- iii) Higher social expenditures through rising public social expenditure with constant tax rates could increase the public debt as a ratio to GDP, which might lead to an increase in the interest rate and thereby negative crowding out effects on private investment, depending on the interest elasticity of investment. However, this effect might be small for the case of South Korea, since during our estimation period (1970–2012) the central government debt/GDP was 30.8 % at its peak (IMF, 2020) and 18.0 % on average.¹² The recession in 1980 and the crisis in 1997–98 are considered to be related to either private business debt (Palma, 2000) or household debt (Crotty & Kee, 2005) rather than public debt.

The model allows for endogenous changes in labour productivity (output/hour of work) in the rest of the economy in the medium run in response to an increase in output, wages, private and public investment in both the social sector and the rest of the economy and unpaid care. An increase in social expenditure is likely to have a direct positive impact on labour productivity in the medium run through its contributions to human capabilities. This could be due to the positive impact of education and childcare on skills and/or healthcare on health outcomes. The effect of social care on productivity could be more indirect by improving the social fabric, social security and welfare and unleashing the full productive potential of women, who would otherwise have to provide the domestic unpaid social care as full-time career or along with a paid job in the rest of the economy. This latter indirect effect applies also to the other forms of social infrastructure spending. The increase in labour productivity further affects output because with constant wage rates higher labour productivity increases the profit share in the rest of the economy, which in turn stimulates private investment; however, this effect could be small and/or statistically insignificant as estimated by Onaran and Galanis (2014) for the case of South Korea as well as other emerging economies. Higher productivity is also expected to increase exports and decrease imports due to low the unit labour costs, as it increases the international competitiveness of the companies.

The change in labour productivity could also influence consumption through changing the distribution of income between workers and capitalists. This is because capitalists’ marginal propensity to consume is smaller than that of workers’ as shown by previous empirical research for the case of South Korea (Onaran & Galanis, 2014) and various other countries (Alarco, 2016; Hein & Vogel, 2008; Onaran & Galanis, 2014). Hence, higher labour productivity could potentially reduce aggregate consumption unless it leads to sufficient increase in aggregate output and/or wages.

As discussed above, an increase in public social expenditure can lead to change in public debt/GDP, and further affect private investments. However, as public social expenditure also affects the labour productivity in the medium run, the possible crowding out effects may be eased or reversed in the medium run.

In the medium run, higher output also leads to higher labour productivity, because as greater scale can lead to more efficient allocation of resources, also known as the Verdoorn effect (Naastepad, 2006; Hein & Tarassow, 2010). Moreover, we expect households’ consumption in social services to increase with greater income, which also would increase labour productivity in the medium run.

The ultimate effect on employment depends on the relative size of the increase in output and labour productivity.

Following Marx (1867), we also consider that higher female and male wages in the rest of the economy leads to capitalists’ preference towards labour-saving technologies in the medium run, which increases the labour productivity, which would also

¹² Authors’ calculations based on IMF (2020).

Table 4
The impact of an increase in social expenditures (Y^H) on aggregate output.

	Direct effect of social expenditures in the short run	Direct effect of social expenditures in the medium run
Consumption in N	Rising employment in H (+)	Rising productivity and profit share (?)
Consumption in H	Direct positive effect (+) Rising employment in H (+)	Rising productivity and profit share (?)
Private investment	Possible crowding out effects due to rising public debt/ GDP if the increase in Y^H is through public expenditure (-/0)	Rising productivity and profit share (?) Change in public debt/GDP if the increase in Y^H is through public expenditures (?)
Government expenditures	Direct positive effect if the increase in Y^H is through public expenditures (+)	
Net exports		Lower unit labour costs (+)

Note: There are also further multiplier effects not discussed in the table.

decrease employment unless it has a larger positive impact on aggregate output. This is consistent with [Seguino \(1999\)](#), who states that the selective subsidies and import allowances used by the South Korean governments pushed the domestic firms to respond effectively to the increases in unit labour costs by shifting towards labour-saving technologies and increasing their productivity. From the perspective of the workers, [Amsden \(1989\)](#) claims that higher wages incentivized workers in South Korea to adapt to the new technologies consistent with the New Keynesian efficiency wage theories ([Shapiro & Stiglitz, 1984](#); [Campbell III, 1993](#)). Higher output and higher wages have also a lagged effect, since the change in technology and/or techniques would require time.

The impact of higher female and male wages on output depends on the demand regime. Higher female wages with a constant male wage would raise (reduce) aggregate output if the demand regime is female wage-led/gender equality-led (gender inequality-led) and an increase in both the female and male wages would increase (decrease) aggregate output if the demand regime is wage-led (profit led). The regime depends on the relative magnitude of the partial positive effects of wages on consumption vs partial negative effects on private investment and net exports.

In summary, in our SVAR model, social expenditure (Y^H) is the most exogenous variable, since the majority of social expenditure is public spending as part of a policy decision in South Korea. An increase in social expenditure generates employment in the social sector for men and women contemporaneously. Female (male) employment has a contemporaneous effect on average female (male) wage rate due to both its effect on bargaining power as well as changes in the sectoral composition of female (male) employment in the social sector and the rest of the economy. Aggregate output (non-agricultural value added, Y) has a contemporaneous effect on female and male employment. Female and male wages have a lagged impact on employment, which is due to changes in productivity discussed above.¹³ Average female (male) wage rate also has a contemporaneous effect on average male (female) wage rate unless the gender pay gap changes. Finally, social expenditure, employment and wage rate of men and women affect output (Y , non-agricultural value added) contemporaneously. As SVAR specification allows limited number of contemporaneous effects, the rest of the interactions in the SVAR specification are through lagged effects of all the variables affecting each other. The contemporaneous effects in the SVAR model are summarised in [Figure 5](#).

One limitation of our SVAR specification is that we cannot quantify the impact of unpaid labour due to lack of annual time series data on unpaid labour. However, the effects of social expenditures on female and male employment and aggregate non-agricultural output in the SVAR analysis incorporate the possible effects

through changes in unpaid labour ([Figure 6](#)). Higher social (mainly care, but also education and healthcare) expenditures are expected to reduce particular types of unpaid care needs in the household, in particular related to supervisory unpaid labour if not emotional labour ([Folbre, 2006](#)). This could especially increase women's labour force participation and therefore employment of women, since more than 80 % of unpaid care work is done by women according to Korean Time Use Surveys (see [Figure 3 in Section 2](#)). Both paid and unpaid care improves productive capabilities/skills of recipients ([England, 2005](#); [Folbre, 2006](#); [Folbre and Heintz, 2017](#)). This could increase productivity-enhancing knowledge as discussed by [Folbre and Heintz, \(2019\)](#) and would be reflected in changes in labour productivity in the medium run according to the analysis by [Onaran et al. \(2022a,b\)](#). In summary, an increase in social expenditure is expected to increase labour productivity and accordingly output and employment (assuming that the proportionate increase in output is larger than that in productivity) in the medium run; however, it could lead to a decline in unpaid work, which could slightly reduce the positive effect of labour social expenditure on labour productivity.

4. Data and estimation results

We use data from the [World Klems \(2014\)](#) database for South Korea, which is available for the period of 1970–2012. The total non-agricultural output (Y) is the total real value added (in millions of Korean Won) in all sectors excluding agriculture, forestry and fishing. The total social expenditure (Y^H) is the sum of real value added in education, health and social work sectors, and corresponds to both public expenditure and private household consumption in H.

The female and male employment are defined as total number of hours worked by women and men engaged in the non-agricultural sector (all sectors excluding agriculture, forestry and fishing). Average female wage rate (w^F), average male wage rate (w^M) and average wage rate (w) are average hourly real wage rate in the non-agricultural sector calculated using the total non-agricultural labour compensation (in millions of Korean Won, deflated by the price index for the non-agricultural sector) and hours of employment for female and male workers in the World Klems database. Both labour compensation and hours of employment data are adjusted by the Klems database to account for the labour income and hours of work of the self-employed women and men in the non-agricultural sector.

We estimate the impact of social infrastructure expenditure, and female and male wage rates using the SVAR specification following the restrictions defined in [Figure 5](#). [Figure 7](#) shows the impact of a one standard deviation increase in social infrastructure expenditure, or female and male wage rates, respectively, on non-agricultural output and employment of men and women over a period of 10 years.

¹³ In the theoretical model, an increase in social sector wages (w^H) could also contemporaneously reduce the employment in H (E^H) for a constant public social expenditure. To satisfy the number of required constraints in the SVAR specification, we exclude this possible contemporaneous effect on employment.

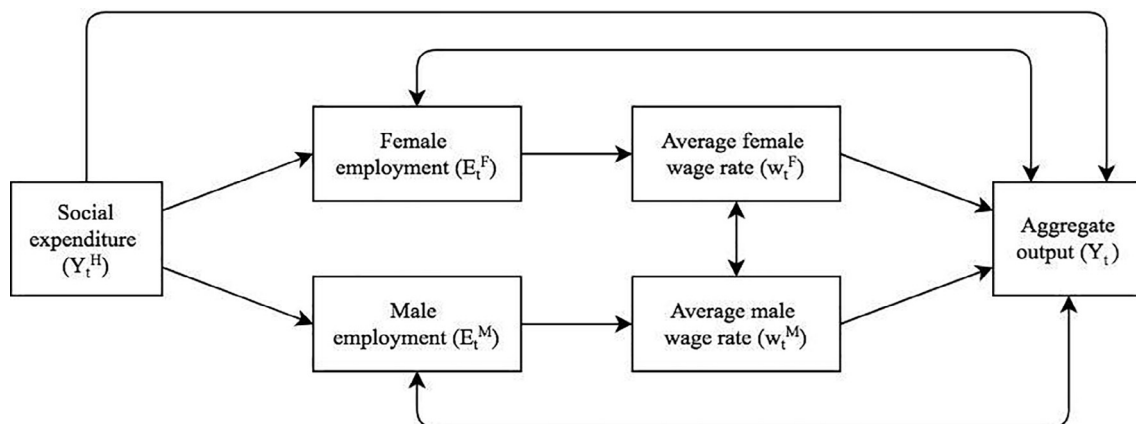


Figure 5. The contemporaneous effects in the Structural Vector Autoregression (SVAR) specification.

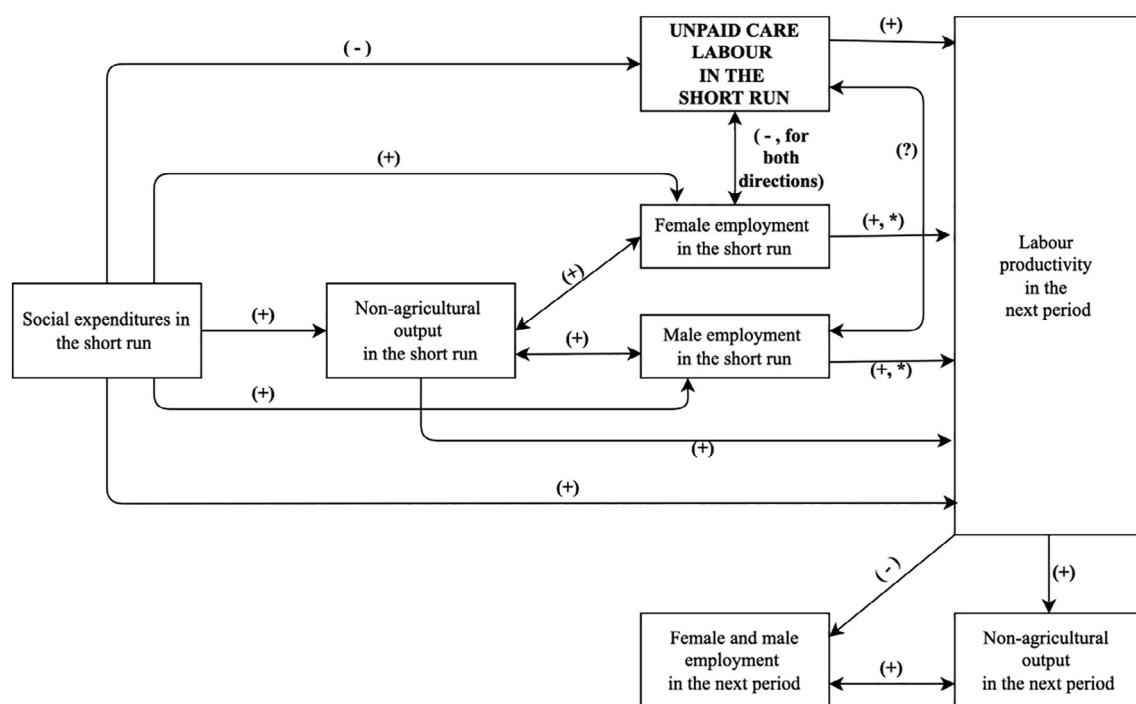


Figure 6. The relationship between social expenditures, unpaid care labour, paid employment and labour productivity. Note: *The medium-run positive effect of employment on labour productivity is through rising wages.

An increase in social expenditure increases output significantly in the short run as well as over the 10 years, with significant positive effects in years 2–6. The contemporaneous short-run impact of an increase in the social expenditure on female employment is positive; however, the effect on male employment is insignificant albeit positive. The impact of social expenditure on female employment is also significantly positive in year 3 and the effect on male employment is also significantly positive in years 1–2 and 4–5.

Next, we estimate the cumulative effects of a 1% increase in social expenditure and their economic significance.¹⁴ Based on Figure 7, Figure 8–Figure 9 show the cumulative impact of a 1% increase in social expenditure (Y^H) on aggregate non-agricultural output (Y) and female and male employment. A 1% increase in social expendi-

ture increases non-agricultural output by 0.5% contemporaneously, and in total by 2.3% over six years and 2.9% over ten years.¹⁵ A 1% increase in social expenditure increases female and male employment contemporaneously by 0.7% and 0.1% respectively. The short-run impact is larger for female employment as the share of women is substantially higher in the social sector compared to the rest of the non-agricultural sector. A 1% increase in social expendi-

¹⁴ Following Ziliak and McCloskey's (2004, 2008) critiques on the dismissal of statistically insignificant variables, in calculating the cumulative effects we take into account the effects of variables that are statistically insignificant in the econometric regressions.

¹⁵ This is not the multiplier, which measures the change in GDP in local currency (Won) as a ratio to a change in social spending by one Won. We rather report the impact of 1% (not percentage point) increase in the social expenditure on aggregate non-agricultural output (Y) and female and male employment. Both non-agricultural and social sector value added are real value added and World Klems (2014) uses different price indices in each sector for converting the value added values from nominal to real. Furthermore, expressing the impact of a 1% increase in social spending on value added (non-agricultural) in terms of % change helps us to discuss the impact on public debt/GDP, because higher GDP both has a direct effect on public debt/GDP and could reduce public debt through rising tax revenues.

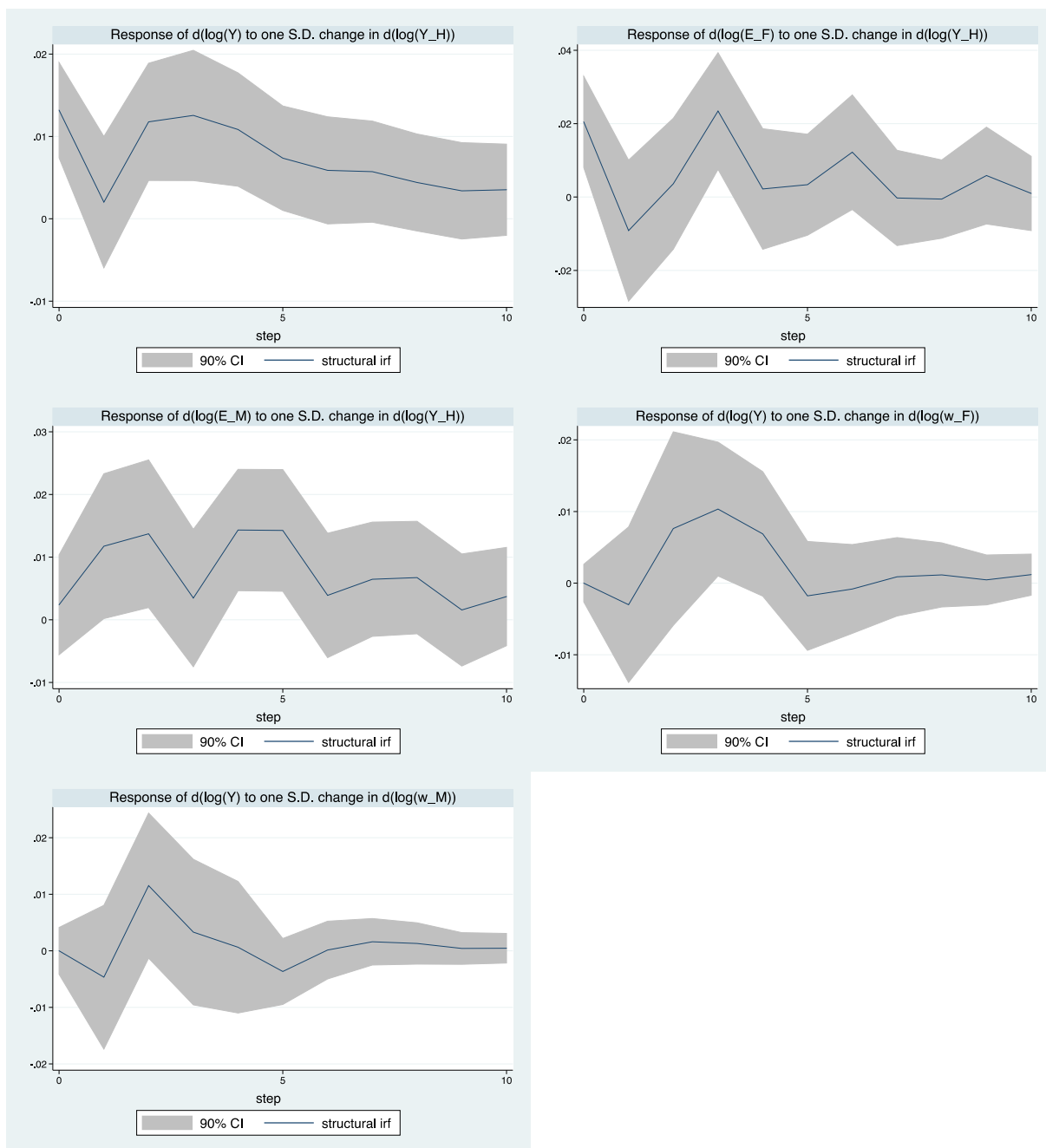


Figure 7. Structural impulse response functions (SIRF) (impact of a standard deviation increase in social expenditure (Y^H), average female wage rate (w^F) and average male wage rate (w^M)). Note: Estimation period: 1970–2012.

ture increases female and male employment over the ten years by 2.2 % and 2.9 % respectively.

The findings regarding the medium-run effect of social expenditures on employment is consistent with their strong positive medium-run effect on aggregate output. Higher social expenditures and aggregate output increase labour productivity in the medium run, which have further positive effects on private investment and net exports and generate additional employment. This increase in employment feeds back to aggregate output, which in turn increases labour productivity and generate a virtuous cycle of increasing output and employment. Moreover, given that a one percent increase in social expenditures leads to an increase in aggregate output that is larger than one percent in the medium

run, public debt/GDP could decrease due to rising tax revenues and GDP, which is expected to have further positive effects on investments in the medium run.

Figure 10 shows the cumulative impact of a 1 % increase in social expenditure (Y^H) on average labour productivity in the non-agricultural sector. A 1 % increase in social expenditure increases labour productivity by 0.19 % in the same period and by 0.22 % over four years.

Next, we examine the economic significance of the impact of female and wage wages on output. For comparison with the effects of social expenditures, we examine the effect of an increase in female wages by 1.302 % and an increase in male wages by 1.253 % because the percentage difference between the third and

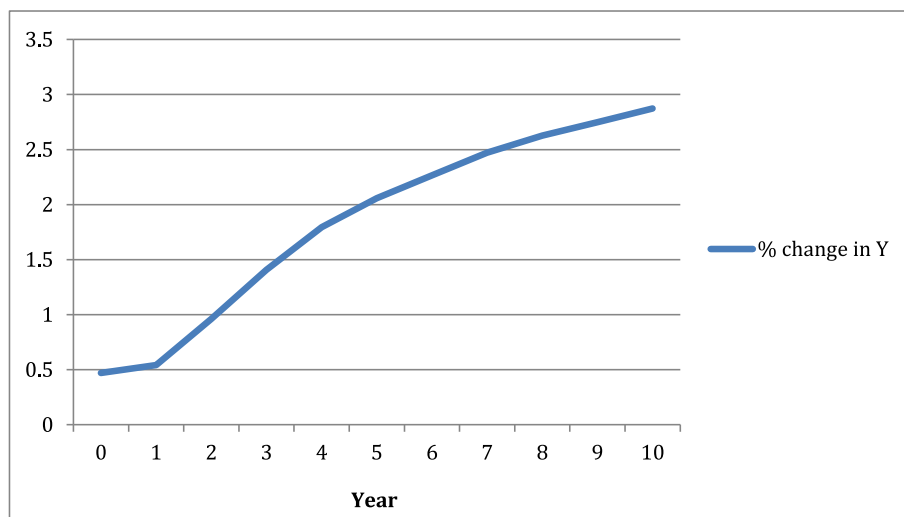


Figure 8. The cumulative impact of a 1% increase in social expenditure (Y^H) on aggregate non-agricultural output (Y). Note: Calculated based on the SIRFs reported in Figure 7.

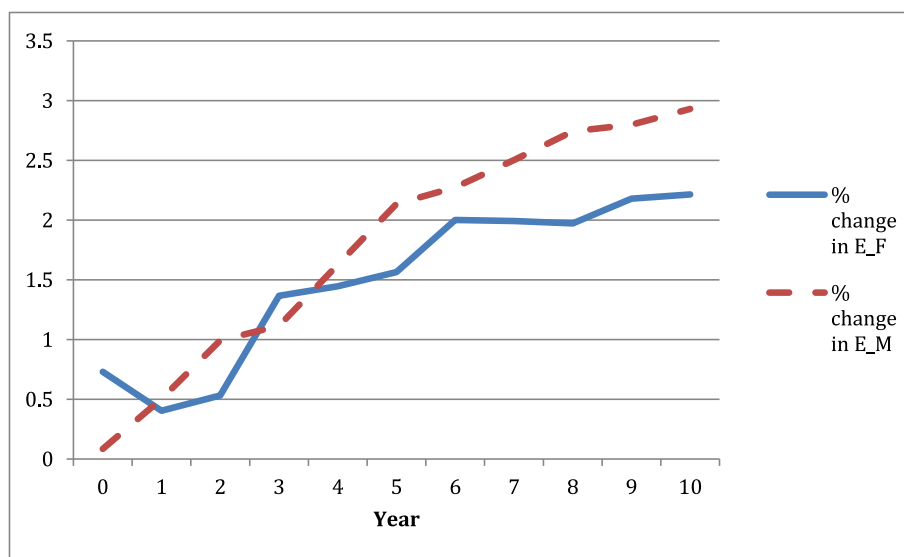


Figure 9. The cumulative impact of a 1% increase in social expenditure (Y^H) on female (E^F) and male employment (E^M). Note: Calculated based on the SIRFs reported in Figure 7.

first quartiles in the growth of female and male wages are respectively 130.2 % and 1.253 % of the percentage difference between the third and first quartiles of the growth in social expenditures.¹⁶

The results in Figure 7 also show that an increase in female wage rate has a significant positive effect on output in year 3. Our calculations based on Figure 7 show that a 1.302 % increase in female wages leads to a cumulative increase in output by 0.27 % in year 3 and by 0.41 % over 10 years. This shows that the South Korean economy is *female wage-led/gender equality-led in the medium-run* following the terminology developed in Onaran et al. (2022a,b). An increase in the average male wage rate does not have a significant effect on output in any of the periods, albeit

¹⁶ The third and first quartile values for annual growth in average wages are respectively 6.4% and 1.8% for average female wages and are respectively 5.6% and 1.2% for average male wages in our data. The third and first quartile values for annual growth in social expenditures are 7.2% and 3.6%. Hence, the differences between the third and first quartile values is 3.6% for growth in social expenditures, 4.6% for growth in female wages and 4.5% for growth in male wages.

the effect is positive in most periods. The cumulative impact of a 1.253 % increase in the male wage rate on output is 0.31 % over 10 years. It is also important to emphasize that higher male wages are not an impediment to growth in South Korea.

The increase in female wages (by 1.302 %) has almost no impact (-0.0000008 %) on female employment in the same period but leads to a contemporaneous negative effect on male employment (by -0.28 %). However, the increase in female wages eventually lead to increases in both female and male employment by 0.71 % and 0.13 % respectively in year 3 and by 0.75 % and 0.36 % respectively over 10 years. An increase in women’s wages do not lead to negative effects on women’s or men’s employment in the medium run. The more positive effect of the increase in women’s wages on women’s employment might be an outcome of the fact that women tend to spend a greater share of their income in the social sector, which in turn create higher employment in the social sector with a higher share for women.

The results also indicate the importance of improving gender equality as part of an equality-led development policy. These

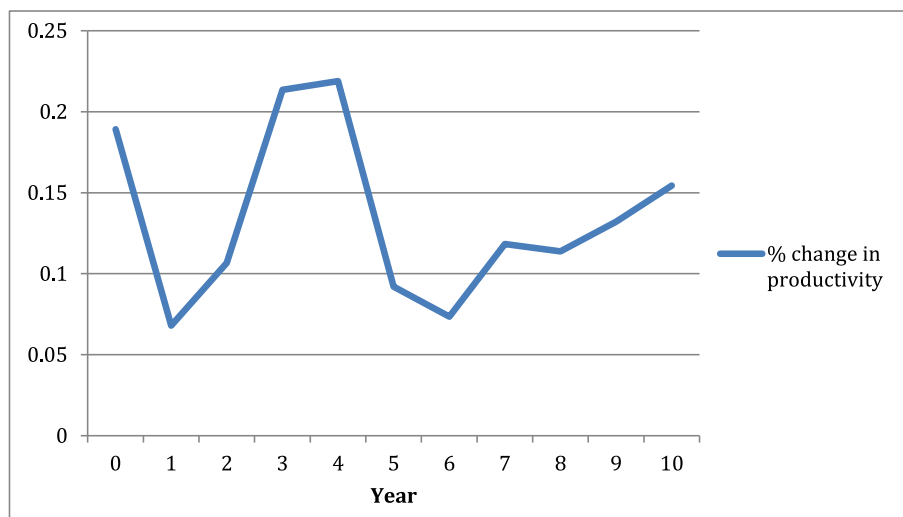


Figure 10. The cumulative impact of a 1% increase in social expenditure (Y^H) on labour productivity (T). Notes: Calculated based on the SIRFs reported in Figure 7. Average values of aggregate non-agricultural output, female and male employment are used for calculations.

results are consistent with previous empirical estimations on the effect of functional income distribution on output in South Korea (Onaran & Stockhammer, 2005; Onaran & Galanis, 2014; Oyvatt et al., 2020; Joo et al., 2020).

Last, as a robustness check we estimate the SVAR model defined in equations (1)–(4) by controlling for the GDP of the two largest export markets of South Korea, China and the US as an exogenous variable effecting exports^{17,18}. The results are largely robust. As can be seen in Figure 11, social infrastructure investment has positive significant effects on non-agricultural output in the short run as well as in years 2–6.

Social infrastructure investment has also significantly positive effects on female employment in year 3 and on male employment in years 1–2 and 4–5. A 1 % increase in social infrastructure investment leads to an increase in non-agricultural output by 0.5 %, female employment by 0.8 % and male employment by 0.04 % in the short run and it increases non-agricultural output by 3.0 %, female employment by 2.0 % and male employment by 3.5 % in 10 years.

However, in this alternative specification the effects of female and/or male wages on output is not statistically significant, albeit still positive.

5. Conclusion

In this paper, we analyse the impact of an increase in social infrastructure expenditure, wages and gender equality on output and employment of men and women in South Korea using a post-Kaleckian feminist model, which we estimate using a SVAR model for the period of 1970–2012. We find that higher social infrastructure expenditure has a positive cumulative effect on output as well as female and male employment (hours of work) in the non-agricultural sector in South Korea both in the short run and medium run.

The positive effects of higher public spending in education, childcare, health and social care due to higher demand and productivity appear to offset any potentially negative impact due to

higher borrowing. The results also show that higher social expenditure leads to significant productivity gains in South Korea.

The results show that an equitable development path in which both average wages increase and gender gaps close via an upward convergence in the wages of men and women is possible in South Korea. South Korean economy is *female wage-led/gender equality-led* in the medium-run. Hence overall the economy is equality-led, although the effects are economically small in comparison to the strong effects of social spending, and become insignificant in the medium run. The results indicate that sustainable equitable development and a substantial increase in employment requires a mix of both labour market and fiscal policies. The econometric results of this paper hint at the potential positive effects of the income-led growth policies in South Korea on output and productivity, while emphasizing the need to complement wage policies by expansionary fiscal policy, in particular in social infrastructure in order to improve both income, equality and employment in the presence of strong productivity effects originating from higher wages.

The results are consistent with the previous research that find very strong positive effects of social infrastructure spending on output and/or employment of women and men in the UK (Onaran et al. (2022a) and South Africa (Antonopoulos, 2008) and in Turkey (Ilkcaracan et al., 2015; Ilkcaracan et al. 2021). Onaran et al. (2022b) shows that the share of women in employment in the social sector (education, health and social care) is significantly larger than in the rest of the economy in 38 developing economies, which highlights the importance of social infrastructure investment to increase women's employment in the emerging economies. to the theoretical framework and empirical methodology of the paper could be used to test the impact of public policy in closing gender gaps in income and employment in other emerging economies.

This paper uses World Klems (2014) database which provides detailed data on sectoral value added, hourly wage rate and hours of work of women and men for South Korea for the period of 1970–2012.¹⁹ As of 2019, the share of female employment in the social sector was as high as 64.7 %, and much larger than in the rest of economy where the share of female employment was 37.0 % (ILO,

¹⁷ According to Observatory of Economic Complexity (2021), South Korea's largest export markets are China and the US in 1970–2012. Exports to these two countries constitute 35.7% of South Korea's exports during this period.

¹⁸ GDP (constant USD, 2010) for the US and China are based on World Bank (2022).

¹⁹ World Klems (2014) data for South Korea ends in 2012 and has not yet been updated.

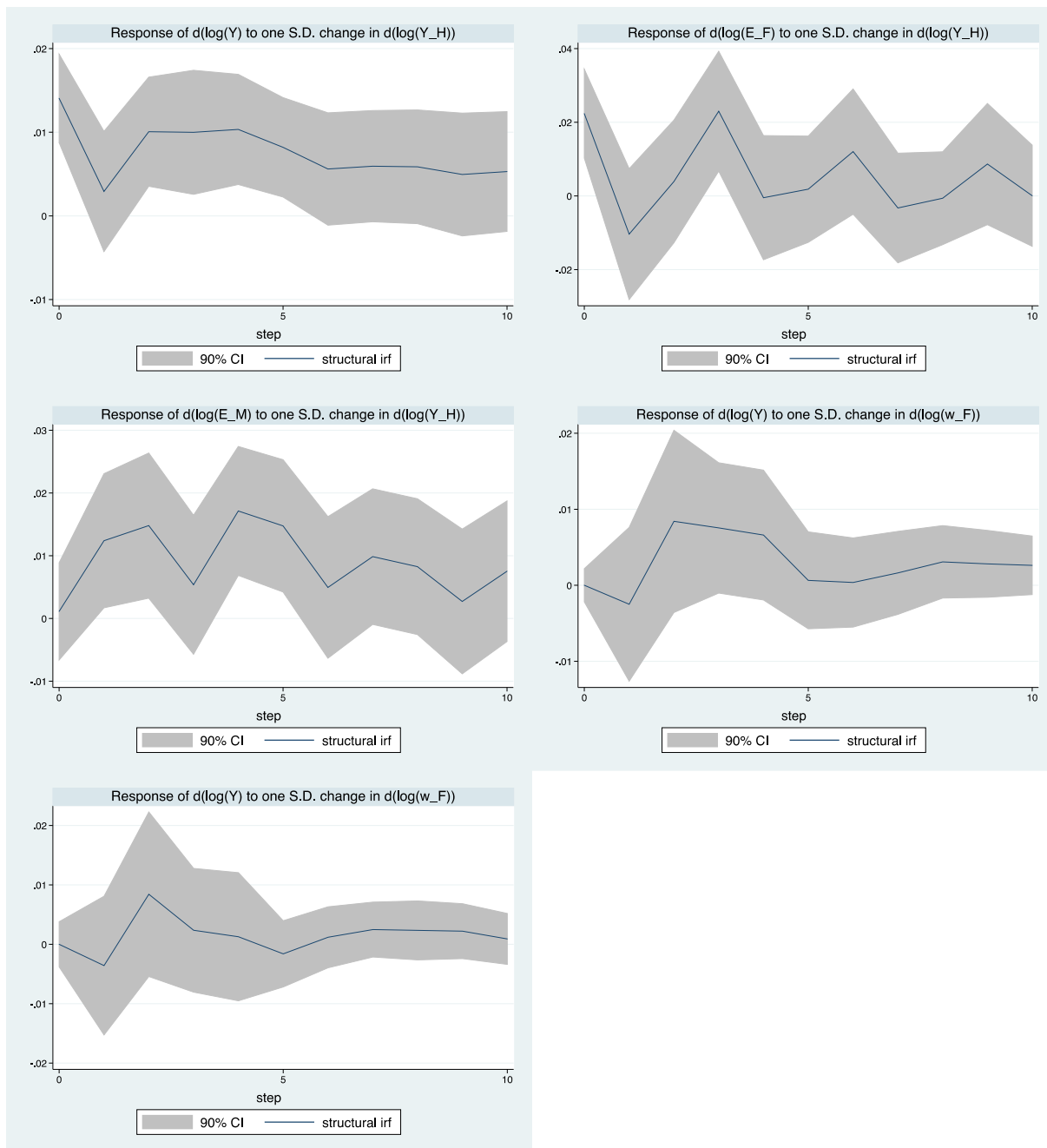


Figure 11. Structural impulse response functions (SIRF) (impact of a standard deviation increase in social expenditure (Y^H), average female wage rate (w^F) and average male wage rate (w^M)). Note: We control for the GDP of the two largest export markets of South Korea, the US and China as exogenous variables. Estimation period: 1970–2012.

2022). Education, health and social work constitutes 9.6 % of South Korea’s GDP as of 2022.²⁰ Investing in social infrastructure can play an important role in stimulating economic growth and employment of women and men in the current structure of the economy. Finally, another avenue for future research could analyse in more detail the impact of social infrastructure investment on unpaid care work and incorporate these indirect effects on output, productivity, and female and male employment.

CRedit authorship contribution statement

Cem Oyvatt: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft. **Özlem Onaran:** Conceptualization, Methodology, Writing – original draft.

Declaration of Competing Interest

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²⁰ Authors’ calculations based on data provided by the Bank of Korea (2022).

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Appendix 1. : The shares of selected sectors in GDP and total employment in South Korea.

Table A1.1

The shares of selected sectors in GDP in South Korea (% , period averages, 1970 – 2012).

	1970–79	1980–1987	1988–1997	1998–2007	2008–2012	1970–2012
Agriculture	18.1	11.6	6.7	4.4	3.6	9.4
Non-agriculture	81.9	88.4	93.3	95.6	96.4	90.6
Education, childcare, health, social work	11.8	11.2	9.5	7.6	7.0	9.6
Rest of the economy (in non-agricultural sector)	70.1	77.1	83.9	88.0	89.4	81.0
Sectors with the largest share of female employment in the rest of the economy other than education, health, social work						
Food, beverages, tobacco, textiles, leather and footwear	6.7	8.3	5.7	3.4	2.3	5.5
Electrical and optical equipment and machinery	0.7	2.1	4.6	11.5	19.7	6.6
Financial intermediation	1.5	2.8	4.8	4.8	5.3	3.7
Sectors with the smallest share of female employment						
Basic metal and fabricated metal; other non-metallic minerals	1.6	3.5	4.9	4.6	3.9	3.7
Construction; electricity, water and gas supply	8.2	10.9	13.3	11.2	9.2	10.7
Mining and quarrying	0.8	0.5	0.4	0.3	0.2	0.5

Source: Author's calculations based on [World Klems \(2014\)](#).

Table A1.2

The shares of selected sectors in total employment in South Korea (% , period averages, 1970 – 2012).

	1970–79	1980–1987	1988–1997	1998–2007	2008–2012	1970–2012
Agriculture	44.4	26.6	14.0	9.1	6.4	21.4
Non-agriculture	55.6	73.4	86.0	90.9	93.6	78.6
Education, childcare, health, social work	3.3	4.7	6.0	8.2	11.3	6.2
Rest of the economy (in non-agricultural sector)	52.3	68.7	80.1	82.7	82.3	72.4
Sectors with the largest share of female employment in the rest of the economy other than education, health, social work						
Food, beverages, tobacco, textiles, leather and footwear	9.1	10.4	8.0	4.0	2.6	7.1
Electrical and optical equipment and machinery	3.3	5.5	7.2	6.0	6.1	5.5
Financial intermediation	1.2	1.3	2.0	2.0	1.8	1.7
Sectors with the smallest share of female employment						
Basic metal and fabricated metal; other non-metallic minerals	1.8	3.2	3.9	3.1	3.4	3.0
Construction; electricity, water and gas supply	4.4	6.2	8.6	7.9	7.6	6.9
Mining and quarrying	0.1	0.2	0.1	0.1	0.1	0.1

Source: Author's calculations based on [World Klems \(2014\)](#).

Table A1.3

The shares of selected sectors in total non-agricultural employment in South Korea (% , period averages, 1970 – 2012).

	1970–79	1980–1987	1988–1997	1998–2007	2008–2012	1970–2012
Education, childcare, health, social work	6.0	6.3	7.0	9.0	12.1	7.7
Rest of the economy (in non-agricultural sector)	94.0	93.7	93.0	91.0	87.9	92.3
Sectors with the largest share of female employment in the rest of the economy other than education, health, social work						
Food, beverages, tobacco, textiles, leather and footwear	16.3	14.1	9.4	4.4	2.7	10.0
Electrical and optical equipment and machinery	5.8	7.5	8.4	6.6	6.5	7.0
Financial intermediation	2.2	1.8	2.3	2.2	1.9	2.1
Sectors with the smallest share of female employment						
Basic metal and fabricated metal; other non-metallic minerals	3.2	4.4	4.5	3.4	3.6	3.8
Construction; electricity, water and gas supply	7.9	8.5	10.0	8.7	8.1	8.7
Mining and quarrying	0.3	0.3	0.1	0.1	0.1	0.2

Appendix 2

Table A2.1
Summary statistics.

	Mean	Standard deviation	Number of observations
Aggregate output (Y , Million Wons)	339,634,191	237,015,058	43
Y^H (Million Wons)	40,937,014	23,738,881	43
Average hourly female wage rate (w^f , in Wons)	3,901.2	2,238.3	43
Average hourly male wage rate (w^m in Wons)	5,794.0	2,486.4	43
Ratio of male to female wages in the whole economy	1.620	0.256	43
Ratio of male to female wages in the rest of the economy	1.693	0.233	43
Ratio of male to female wages in the social sector	1.689	0.133	43
Total employment (E , hours of employment in millions)	35,922.2	13,082.1	43
Total female employment (E^f , hours of employment in millions)	10,863.2	4,059.9	43
Total male employment (E^m , hours of employment in millions)	25,059.0	9,193.1	43
Share of women in employment in the whole economy (in total hours of employment)	0.388	0.027	43
Share of women in employment in the rest of the economy (in total hours of employment)	0.289	0.024	43
Share of women in employment in the social sector (in total hours of employment)	0.454	0.116	43

References

- Alarco, G. (2016). Factor income distribution and growth regimes in Latin America, 1950–2012. *International Labour Review*, 155(1), 73–95.
- Amsden, A. H. (1989). *Asia's Next Giant: South Korea and Late Industrialization*. Oxford University Press.
- Antonopoulos, R. (2008). 'Impact of Employment Guarantee Programmes on Gender Equality and Pro-poor Economic Development'. Policy Brief: Case Study on South Africa. Annandale-on-Hudson, N.Y.: Levy Economics Institute of Bard College. January.
- Antonopoulos, R., Kim, K., Masterson, T., & Zacharias, A. (2010). *Investing in Care: A Strategy for Effective and Equitable Job Creation*. Working Paper No.610. Levy Economics Institute.
- Bank of Korea (2022). Economic Statistics System Available at http://ecos.bok.or.kr/flex/EasySearch_e.jsp.
- Barbosa-Filho, N. H., & Taylor, L. (2006). Distributive and Demand Cycles in the US economy – A Structuralist Goodwin Model. *Metroeconomica*, 57(3), 389–411.
- Benaabdelaali, W., Hanchane, S., & Kamal, A. (2012). Chapter 13 Educational Inequality in the World, 1950–2010: Estimates from a New Dataset. In J. A. Bishop & R. Salas (Eds.), *Inequality, Mobility and Segregation: Essays in Honor of Jacques Silber* (pp. 337–366). Emerald Group Publishing Limited.
- Bhaduri, A., & Marglin, S. (1990). Unemployment and the real wage: The economic basis for contesting political ideologies. *Cambridge Journal of Economics*, 375–393.
- Birdsall, N., Ross, D., & Sabot, R. (1995). Inequality and growth reconsidered: Lessons from East Asia. *The World Bank Economic Review*, 9(3), 477–508.
- Blecker, R. A., Kim, Y., & Cauvel, M. (2020). Systems Estimation of a Structural Model of Distribution and Demand in the US Economy. Post-Keynesian Economics Society. Working Paper 2012.
- Blumberg, R. L. (1991). Income under female versus male control. In R. L. Blumberg (Ed.), *Gender, Family and the Economy: The Triple Overlap* (pp. 97–127). California, USA: Sage Publications Inc..
- Bowles, S., & Boyer, R. (1995). Wages, aggregate demand, and employment in an open economy. In G. A. Epstein & H. M. Gintis (Eds.), *Macroeconomic policy after the conservative era*. Cambridge, UK: Cambridge University Press.
- Braunstein, E., Bouhia, R., & Seguino, S. (2020). Social Reproduction, Gender Equality and Economic Growth. *Cambridge Journal of Economics*, 44(1), 129–156.
- Braunstein, E., van Staveren, I., & Tavani, D. (2011). Embedding Care and Unpaid Work in Macroeconomic Modelling: A Structuralist Approach. *Feminist Economics*, 17(4), 5–31.
- Campbell, C. M. III, (1993). Do firms pay efficiency wages? Evidence with data at the firm level. *Journal of Labor Economics*, 11(3), 442–470.
- Cappellini, B., Marilli, A., & Parsons, E. (2014). The hidden work of coping: Gender and the micro-politics of household consumption in times of austerity. *Journal of Marketing Management*, 30(15–16), 1597–1624.
- Chang, H. J. (1993). The political economy of industrial policy in Korea. *Cambridge Journal of Economics*, 17(2), 131–157.
- Chang, H. J., Andreoni, A., & Kuan, M. L. (2013). 'International Industrial Policy Experiences and the Lessons for the UK', policy report for the UK Foresight Future of Manufacturing Project, UK Government Office of Science.
- Chang, H. J., Park, H. J., & Yoo, C. G. (1998). Interpreting the Korean crisis: Financial liberalisation, industrial policy and corporate governance. *Cambridge Journal of Economics*, 22(6), 735–746.
- Crotty, J., & Lee, K. K. (2005). From East Asian "miracle" to neo-liberal "mediocrity": The effects of liberalization and financial opening on the post-crisis Korean economy. *Global Economic Review*, 34(4), 415–434.
- De Henau, J., Himmelweit, S., Łapniewska, Z., & Perrons, D., (2016) Investing in the Care Economy: A gender analysis of employment stimulus in seven OECD countries. Report by the UK Women's Budget Group for the International Trade Union Confederation, Brussels. Retrieved from https://wbg.org.uk/wp-content/uploads/2016/11/De_Henau_Perrons_WBG_CareEconomy_ITUC_briefing_final.pdf
- Dornbusch, R., & Park, Y. C. (1987). Korean growth policy. *Brookings Papers on Economic Activity*, 1987(2), 389–444.
- Enders, W. (2015). *Applied econometric time series* (fourth ed.). Wiley.
- England, P. (2005). Emerging theories of care work. *Annual Review of Sociology*, 31, 381–399.
- European Commission Economic and Financial Affairs (2019). AMECO database. Retrieved from https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/macro-economic-database-ameco/ameco-database_en
- Folbre, N. (2006). Measuring care: Gender, empowerment, and the care economy. *Journal of human development*, 7(2), 183–199.
- Folbre, N., & Heintz, J. (2017). Investment, consumption, or public good? Unpaid work and intra-family transfers in the macro-economy. *Ekonomia: Revista Vasca de Economía*, 91(1), 100–121.
- Folbre, N. & Heintz, J. (2019). Endogenous Growth, Population Dynamics, and Economic Structure: Long-Run Macroeconomics When Demography Matters. Care Work and the Economy CWE-GAM Working Paper Series: 19-01.
- Griffin, K., Khan, A. R., & Ickowitz, A. (2002). Poverty and the distribution of land. *Journal of Agrarian Change*, 2(3), 279–330.
- Ham, S., & Kwon, H. (2017). Care penalty: Devaluation and marketization of care. *Korean Journal of Labor Studies*, 23(3), 131–176.
- Hein, E., & Vogel, L. (2008). Distribution and growth reconsidered: Empirical results for six OECD countries. *Cambridge Journal of Economics*, 32(3), 479–511.
- Hein, E., & Tarassow, A. (2010). Distribution, aggregate demand and productivity growth: Theory and empirical results for six OECD countries based on a post-Kaleckian model. *Cambridge Journal of Economics*, 34(4), 727–754.
- Hong, K., & Kim, S. (2014). An empirical analysis of the care work in Korea. *Korean Journal of Social Welfare*, 66(3), 133–158.
- Hong, S. (2020). Gendered Politics of Work-life balance in South Korea. In J. Liu & J. Yamashita (Eds.), *The Routledge Handbook of East Asian Gender Studies*. New York: Routledge.
- Hwang, D. S. (2014). Study on working conditions and informal employment in the labor market for care workers. *Labor Issues in Korea 2012*. Seoul: Korea Labor Institute.
- İlkkaracan, İ., Kim, K., & Kaya, T. (2015). The Impact of Public Investment in Social Care Services on Employment, Gender Equality, and Poverty: The Turkish Case. Research Project Report, Istanbul Technical University Women's Studies Center in Science, Engineering and Technology and the Levy Economics Institute, in partnership with ILO and UNDP Turkey, and the UNDP and UN Women Regional Offices for Europe and Central Asia .
- İlkkaracan, İ., & Kim, K. (2018). *The employment generation impact of meeting SDG targets in early childhood care, education, health and long-term care in 45 countries*. Geneva: ILO.
- İlkkaracan, İ., Kim, K., Masterson, T., Memiş, E., & Zacharias, A. (2021). The impact of investing in social care on employment generation, time-, income-poverty by gender: A macro-micro policy simulation for Turkey. *World Development*, 144 105476.
- ILO (2021). ILOSTAT Database Available at <https://ilostat.ilo.org/data/>.
- ILO (2022). ILOSTAT Database Available at <https://ilostat.ilo.org/data/>.
- IMF (2020). Global Debt Database Retrieved from https://www.imf.org/external/datamapper/CG_DEBT_GDP@GDD/SWE/UVK/KOR.
- Jaumotte, F. (2003). Labour Force Participation of Women: Empirical Evidence on the Role of Policy and Other Determinants in OECD Countries. OECD Economic Studies No.37.

- Jeon, B., & Kwon, S. (2017). Health and long-term care systems for older people in the republic of Korea: Policy challenges and lessons. *Health Systems & Reform*, 3(3), 214–223.
- Joo, S., Lee, K., Nah, W. J., Jeon, S. M., & Joe, D. (2020). The income-led growth in Korea: Status, prospects and lessons for other countries. *Policy Analysis 20–01. Korea Institute for International Economic Policy (KIEP)*.
- Jump, R., & Mendieta-Muñoz, I. (2017). Wage led aggregate demand in the United Kingdom. *International Review of Applied Economics*, 31(5), 565–584.
- Kang, D. C. (2002). *Crony capitalism: Corruption and development in South Korea and the Philippines*. Cambridge University Press.
- Kiefer, D., & Rada, C. (2015). Profit maximising goes global: The race to the bottom. *Cambridge Journal of Economics*, 39(5), 1333–1350.
- Kim, J. K., Shim, S. D., & Kim, J. (1995). The Role of the Government in Promoting Industrialisation and Human Capital Accumulation in Korea. In T. Ito & A. Krueger (Eds.), *Growth Theories in Light of the East Asian Experience*, Chicago, IL and London: University of Chicago Press.
- Kim, J., Lee, J. W., & Shin, K. (2018). Gender inequality and economic growth in Korea. *Pacific Economic Review*, 23(4), 658–682.
- Lee, J. H., & Yoon, J. (2015). Wage penalty and decomposition of care employment. *Korean Journal of Social Welfare Studies*, 46(4), 33–57.
- Lee, J., & Pocock, M. L. (2007). Intrahousehold allocation of financial resources: Evidence from South Korean individual bank accounts. *Review of Economics of the Household*, 5(1), 41–58.
- Lundberg, S. J., Pollak, R. A., & Wales, T. J. (1997). Do husbands and wives pool their resources? Evidence from the United Kingdom child benefit. *Journal of Human Resources*, 463–480.
- Marx, K. (1867). *Capital: A Critique of Political Economy: Volume 1 - The Production Process of Capital*. New York: International Publishers.
- Morrison, A., Raju, D., & Sinha, N. (2007). 'Gender equality, poverty and economic growth'. Policy Research Working Paper 4349, The World Bank.
- Naastepad, C. W. M. (2006). Technology, demand and distribution: A cumulative growth model with an application to the Dutch productivity growth slowdown. *Cambridge Journal of Economics*, 30(3), 403–434.
- Nam, J. L. (1991). *Income inequality between the sexes and the role of the state: South Korea 1960–1990*, unpublished Ph.D. dissertation. Department of Sociology, Indiana University.
- Nam, S. (1991). Determinants of female labor force participation: A study of Seoul, South Korea, 1970–1980. *Sociological Forum*, 6(4), 641–659.
- Na, J., & Moon, M. (2003). Integrating policies and systems for early childhood education and care: The case of the Republic of Korea. *UNESCO, Early Childhood and Family Policy Series*, No. 7, June.
- Observatory of Economic Complexity (2021). OEC 4.0. Available at <https://oec.world/>.
- OECD (2019). Health spending data. Available at <https://data.oecd.org/healthres/health-spending.htm>.
- Onaran, Ö., & Galanis, G. (2014). Income distribution and growth: A global model. *Environment and Planning A*, 46(10), 2489–2513.
- Onaran, Ö., Oyvatt, C., & Fotopoulou, E. (2022). A macroeconomic analysis of the effects of gender inequality, wages, and public social infrastructure: The case of the UK. *Feminist Economics*, *Forthcoming*.
- Onaran, Ö., Oyvatt, C., & Fotopoulou, E. (2022b). Gendering macroeconomic analysis and development policy: a theoretical model. *Feminist Economics*, *Forthcoming*.
- Onaran, Ö., & Stockhammer, E. (2005). Two different export-oriented growth strategies: Accumulation and distribution in Turkey and South Korea. *Emerging Markets Finance and Trade*, 41, 65–89.
- Onaran, Ö. (2016). The role of gender equality in an equality-led sustainable development strategy. *Economics and Austerity in Europe: Gendered Impacts and Sustainable Alternatives*, eds. Hannah Bargawi, Giovanni Cozzi, Susan Himmelweit, Routledge, 40–56.
- Oyvatt, C. (2014). *Essays on the Evolution of Inequality*. (Unpublished doctoral dissertation), University of Massachusetts, Amherst. Available at: https://scholarworks.umass.edu/cgi/viewcontent.cgi?article=1004&context=dissertations_2.
- Oyvatt, C. (2016). Agrarian structures, urbanization, and inequality. *World Development*, 83, 207–230.
- Oyvatt, C., Öztunalı, O., & Elgin, C. (2020). Wage-led vs. profit-led demand: A comprehensive empirical analysis. *Metroeconomica*, 71(3), 458–486.
- Page, J. (1994). *The East Asian miracle: Four lessons for development policy*. NBER Macroeconomics Annual: MIT Press, Cambridge, MA.
- Pahl, J. (2000). The gendering of spending within households. *Radical Statistics*, 75, 38–48.
- Palma, G. (2000). The three routes to financial crises: The need for capital controls. *CEPA Working Paper Series III, No. 18*.
- Peng, I. (2011). The good, the bad and the confusing: The political economy of social care expansion in South Korea. *Development and Change*, 42(4), 905–923.
- Peng, I. (2012). Social and political economy of care in Japan and South Korea. *International Journal of Sociology and Social Policy*, 32(11/12), 636–649.
- Rhee, J. C., Done, N., & Anderson, G. F. (2015). Considering long-term care insurance for middle-income countries: Comparing South Korea with Japan and Germany. *Health Policy*, 119(10), 1319–1329.
- Seguino, S. (1997). Gender wage inequality and export-led growth in South Korea. *Journal of Development Studies*, 34(2), 102–132.
- Seguino, S. (1999). The investment function revisited: Disciplining capital in South Korea. *Journal of Post Keynesian Economics*, 22(2), 313–338.
- Seguino, S. (2000). Gender inequality and economic growth: A cross-country analysis. *World Development*, 28(7), 1211–1230.
- Seguino, S. (2010). Gender, Distribution, and Balance of Payments Constrained Growth in Developing Countries. *Review of Political Economy*, 22(3), 373–404.
- Seguino, S. (2012). Macroeconomics, Human Development, and Distribution. *Journal of Human Development and Capabilities*, 13(1), 59–81.
- Seguino, S. (2017). *Engendering Macroeconomic Theory and Policy*, The World Bank Report 121781, Washington, D.C.
- Seguino, S., & Floro, M. S. (2003). Does gender have any effect on aggregate saving? An empirical analysis. *International Review of Applied Economics*, 17(2), 147–166.
- Shapiro, C., & Stiglitz, J. E. (1984). Equilibrium unemployment as a worker discipline device. *American Economic Review*, 74(3), 433–444.
- Stockhammer, E., & Onaran, Ö. (2004). Accumulation, distribution and employment: A structural VAR approach to a Kaleckian macro model. *Structural Change and Economic Dynamics*, 15(4), 421–447.
- Vogler, C., & Pahl, J. (1994). Money, power and inequality within marriage. *The Sociological Review*, 42(2), 263–288.
- Won, S. Y., & Pascall, G. (2004). A Confucian war over childcare? Practice and policy in childcare and their implications for understanding the Korean gender regime. *Social Policy & Administration*, 38(3), 270–289.
- World Bank (1993). *The East Asian Miracle: Economic Growth and Public Policy*. Washington DC: Policy Research Report.
- World Bank (2019a). World Development Indicators Available at: <https://data.worldbank.org/indicator>.
- World Bank (2019b). World Bank GNI per capita Operational Guidelines & Analytical Classifications.
- World Bank (2022). World Development Indicators Available at: <https://data.worldbank.org/indicator>.
- World Economic Forum (2018). *The Global Gender Gap Report 2018*. Cologny/Geneva.
- World Klems (2014). World Klems data: Korea Available at: <http://www.worldklems.net/data.htm>.
- Yang, J. J. (2006). Corporate unionism and labor market flexibility in South Korea. *Journal of East Asian Studies*, 6(2), 205–231.
- Yeo, E., & Kim, E. (2014). Labour force participation in Korea: Past trends and main determinants. Korea Institute for Health and Social Affairs. Working Paper 2014-02.
- Yi, W. (2022). *Market-driven economy to gain momentum under Yoo*. Available: The Korea Times. at: https://www.koreatimes.co.kr/www/biz/2022/03/488_325295.html.
- Ziliak, S. T., & McCloskey, D. N. (2004). Size matters: The standard error of regressions in the American Economic Review. *The Journal of Socio-Economics*, 33(5), 527–546.
- Ziliak, S. T., & McCloskey, D. N. (2008). *The cult of statistical significance: How the standard error costs us jobs, justice, and lives*. University of Michigan Press.