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**Article**

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Roberto Iacono

## The Nordic Model of Economic Development and Welfare: Recent Developments and Future Prospects

This research provides an overview of the recent developments in the functioning of the Nordic model of economic development and welfare. In order to provide a tractable conceptual framework, the paper starts by introducing the key mechanisms of the Nordic economies, as framed in the most recent economic and political economy literature. The three distinct but interrelated features of the Nordic model are a high degree of compression of wage differentials, a dynamic process of creative destruction and innovation, and a high level of public welfare spending. This framework is then used to interpret recent developments and future prospects, mostly related to the implications of population ageing and automation for the future sustainability of public spending in the Nordic economies.

### The conceptual framework

I define the “Nordic model” by borrowing the main lines of the framework presented in Barth et al.<sup>1</sup> This choice is based on analytical tractability, and should not be interpreted as a claim of the superiority of the chosen framework with respect to alternative frameworks of the Nordic model in the economic and political economy literature.<sup>2</sup> The three distinct but interconnected features of the Nordic model can be summarised as follows:

(i) Compression of wage differentials. Centralised wage bargaining leads to low wage dispersion in the labour market and hence to low pre-tax labour income inequality.

(ii) Creative destruction. A high degree of compression of wage differentials fosters creative destruction, leading to a larger share of highly productive enterprises and, in turn, higher average labour productivity.<sup>3</sup>

(iii) Public welfare spending. A high degree of wage differential compression leads to individual preferences for high public welfare spending.<sup>4</sup>

Let us start by explaining the feature described in (i) with the support of stylised empirical evidence. Figure 1 shows the average of the ICTWSS index of coordination of wage dispersion,<sup>5</sup> plotted against the average of the OECD gross earnings interdecile ratio P90/P10, for all OECD countries in the period 1970–2013.

In Figure 1, the Nordic countries appear in the upper left, indicating low pre-tax wage dispersion and a high average index of centralised wage bargaining. Only Belgium, Germany and the Netherlands obtain a combined score that can be described as the “Nordic type”, while Italy and Austria resemble the Nordic countries in only one dimension, namely low wage dispersion in Italy and a high degree of centralised wage-setting in Austria. In other words, Figure 1 conveys a static picture of the first feature of the Nordic model, showing that a higher degree of wage coordination through collective bargaining correlates with a more compressed wage distribution in Nordic countries. This stylised fact is the rather conventional result of economic theory. It confirms that when unions negotiate wages at the national level, the result is a lower overall degree of pre-tax wage dispersion.<sup>6</sup> An updated overview of this literature is available in Salverda and Checchi’s survey of labour market institutions.<sup>7</sup>

1 E. Barth, K.O. Moene, F. Willumsen: The Scandinavian model – An interpretation, in: *Journal of Public Economics*, Vol. 117, 2014, pp. 60–72.

2 See e.g. L. Calmfors: Lessons from the Macroeconomic Experience of Sweden, in: *European Journal of Political Economy*, Vol. 9, No. 1, 1993, pp. 25–72; L. Erixon: The Rehn-Meidner Model in Sweden: Its Rise, Challenges and Survival, in: *Journal of Economic Issues*, Vol. 44, No. 3, 2010, pp. 677–715; L. Erixon: Building a path of equality to economic progress and macroeconomic stability – the economic theory of the Swedish model, *Research Papers in Economics*, Department of Economics, Stockholm University, 2016, p. 3; G. Esping-Andersen: *The three worlds of welfare capitalism*, Cambridge 1990, Polity Press; and A. Lindbeck: The Swedish Experiment, in: *Journal of Economic Literature*, Vol. 35, No. 3, 1997, pp. 1273–1319.

3 K.O. Moene, M. Wallerstein: Pay inequality, in: *Journal of Labor Economics*, Vol. 15, No. 3, pp. 403–430.

4 E. Barth, H. Finseraas, K.O. Moene: Political reinforcement: how rising inequality curbs manifested welfare generosity, in: *American Journal of Political Science*, Vol. 59, No. 3, 2015, pp. 565–577; E. Barth, K.O. Moene: The Equality Multiplier: How Wage Compression and Welfare Empowerment Interact, in: *Journal of the European Economic Association*, Vol. 14, No. 5, 2016, pp. 1011–1037.

5 Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICWSS).

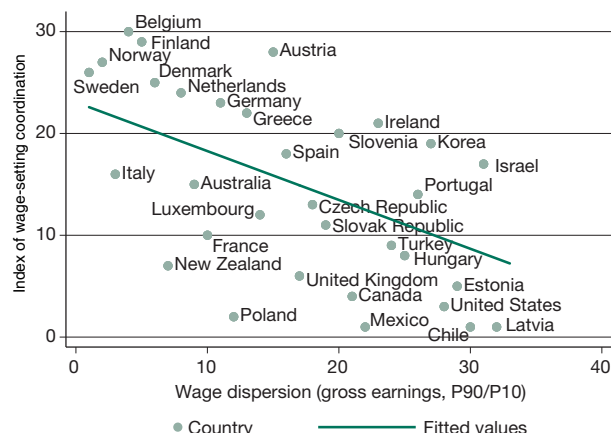
6 E. Barth, K.O. Moene: Employment as a Price or a Prize of Equality: A Descriptive Analysis, in: *Nordic Journal of Working Life Studies*, Vol. 2, No. 2, 2012, pp. 5–33.

7 W. Salverda, D. Checchi: Labour-Market Institutions and the Dispersion of Wage Earnings, IZA Discussion Paper No. 8220, 2014.

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Figure 1

## Coordination of wage-setting and wage dispersion



Note: Figure 1 plots the average of the ICTWSS index of wage-setting coordination against the average OECD gross earnings interdecile ratio P90/P10 in the period 1970–2013.

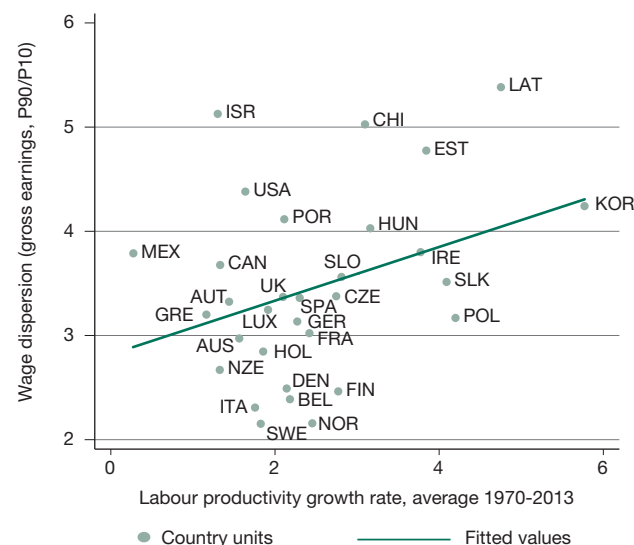
Sources: Database on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts (ICTWSS), 1960–2014, Version 5.0, Amsterdam Institute for Advanced Labour Studies AIAS, 2015; OECD.Stat earnings database, available at <http://stats.oecd.org/>.

The second feature of the Nordic model is explained as follows. Barth et al. developed a theory of creative destruction and wage compression.<sup>8</sup> This theory emphasises

8 E. Barth et al.: The Scandinavian..., op. cit. This is based in essence on the Rehn-Meidner models; see L. Erixon: The Rehn-Meidner..., op. cit.; and L. Erixon: Building a path..., op. cit.

Figure 2

## Wage dispersion and labour productivity

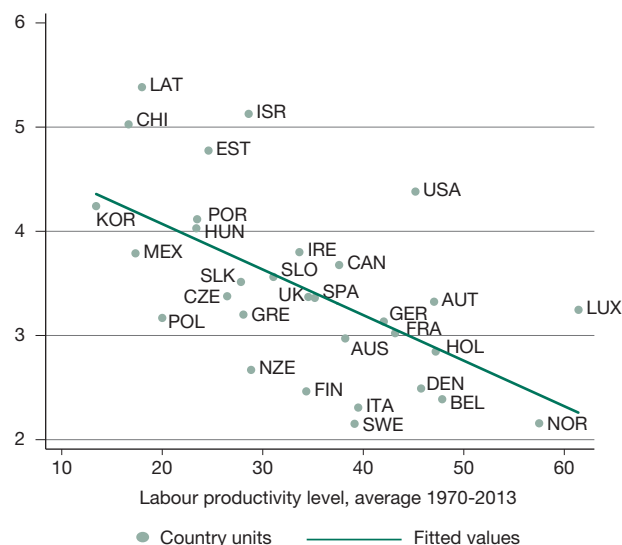


Note: Left-hand side of Figure 2 plots the country average (1970–2013) for the OECD gross earnings interdecile ratio P90/P10 against the country average (1970–2013) of the growth rates of GDP per hour worked (constant prices). On the right-hand side, gross earnings are plotted against the country average of GDP per hour worked in levels (constant prices, 1970–2013).

Source: OECD.Stat earnings and productivity database, available at <http://stats.oecd.org/>.

es that a high initial level of wage compression functions as a “tax” on low-productivity enterprises (raising the bar for access to low-skilled human capital), whilst high-productivity enterprises receive an indirect “subsidy” (due to the lower wages for high-skilled human capital). *Ceteris paribus*, this translates into increased investments and higher expected profits for the most productive firms, leaving behind the least productive firms. In other words, wage compression fosters a dynamic process of “constructive” creative destruction, leading to higher demand for labour, which in turn leads to a higher average level of labour productivity and correspondingly higher wages (for a constant employment level). The essence of the Rehn-Meidner model is purely dynamic; however, Figure 2 gives an overall static view of the long-run correlation between wage compression and productivity.

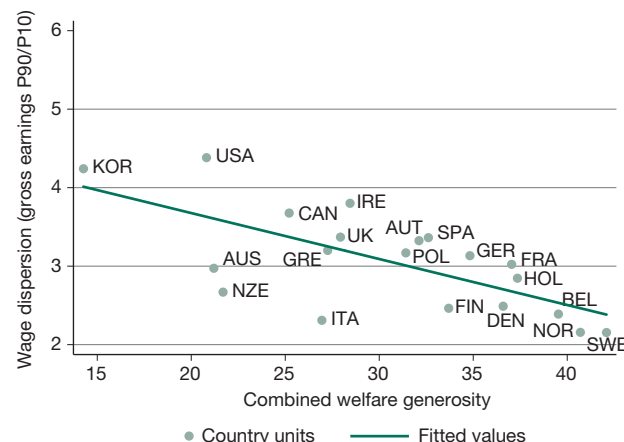
The left-hand side of Figure 2 plots wage dispersion (using the same data as in Figure 1) against the average of the growth rates of GDP per hour worked (in constant prices, 1970–2013). The right-hand side of Figure 2 plots wage dispersion against the average level of labour productivity for the same countries and the same period. Figure 2 shows some interesting stylised facts. First, the Nordic countries appear to have experienced similar results, as they are found in the same areas in both plots. Second and more importantly, the second distinct feature of the Nordic model, creative destruction, does not appear to be fully supported by the evidence in Figure 2. When it comes to the country average of levels of GDP per hour worked,



i.e. the right-hand side of Figure 2, higher compression of wage differentials correlates with higher labour productivity levels for the Nordic countries as compared to the rest of the OECD economies, in line with the theory of creative destruction.<sup>9</sup> On the other hand, when labour productivity is measured by the average of the growth rates for GDP per hour worked in the period 1970–2013, i.e. the left-hand side, the Nordic countries (with growth rates of slightly above two per cent) perform neither better nor worse than the majority of OECD economies. This puzzling empirical evidence calls for a deeper analysis at the country level of the comparative causal effect of wage compression on innovation, productivity dynamics and economic growth, which have been only partly addressed in recent studies.<sup>10</sup>

The third feature of the conceptual framework concerns the explanation of why the Nordic economies, on top of the high equality in labour market outcomes, also redistribute extensively via public welfare spending. For instance, how can high-skilled human capital agents have preferences for a model in which their labour incomes are lower than they would be with higher wage dispersion, and in which their tax wedge is higher than in countries with lower welfare spending? Barth et al. emphasise that if social insurance goods are normal goods and the skill distribution entails a majority of low-skilled workers, higher wage compression will then imply a jump in wages for the majority of workers, who will in turn demand more social insurance goods because they can now afford more of them (for a given distribution of risk of income loss).<sup>11</sup> Specifically, as workers receive higher wages, the income loss associated with a less generous welfare state gets larger, while the utility cost (or disutility) necessary to finance social insurance programmes shrinks. Hence, the more equal the pre-tax wage distribution, the higher the amount of social insurance goods demanded by the median voter. This implies that more equal income allocations will lead to higher public welfare spending, which will further reduce inequality. Conversely, an unequal allocation of wages calls for less redistribution and in turn more inequality – it has therefore been labelled as the “equality multiplier”. This multiplier is shown in Figure 3, in which wage dispersion is plotted against the average value of the combined welfare generosity index from the

**Figure 3**  
**Wage dispersion and combined welfare generosity**



Note: Figure 3 plots the country average (1970–2013) for the OECD gross earnings interdecile ratio P90/P10 against the average value of the combined welfare generosity index from the Comparative Welfare Entitlements Dataset.

Sources: L. Scruggs, D. Jahn, K. Kuitto: Comparative Welfare Entitlements Dataset 2 Codebook, Version 2014-03, 2014; OECD.Stat earnings database, available at <http://stats.oecd.org/>.

Comparative Welfare Entitlements Data Set (CWED).<sup>12</sup> The CWED contains annual country data (1971–2010) on the replacement rates, programme coverage and overall programme generosity for each of the three main social insurance programmes: unemployment insurance, health insurance and public pensions. Scruggs computes the combined welfare generosity index by summing up the three single programme indices (each of them with a score from 0 to 25; the maximum theoretical score for the combined generosity index is 75).<sup>13</sup>

Figure 3 shows that a low level of wage dispersion correlates with a high index of combined welfare generosity for the Nordic countries compared to the other OECD economies, regardless of the underlying direction of causality. In conclusion, this justifies the relevance of high public welfare spending as one of the key characteristics of the Nordic model of economic development and welfare. The next section will introduce recent developments and future prospects for the framework of the Nordic model.

<sup>9</sup> E. Barth et al.: The Scandinavian..., op. cit.

<sup>10</sup> D. Acemoglu, J.A. Robinson, T. Verdier: Asymmetric growth and institutions in an interdependent world, in: *Journal of Political Economy*, Vol. 125, No. 5, 2017, pp. 1245–1305; J. Stiglitz: Leaders and followers: Perspectives on the Nordic model and the economics of innovation, in: *Journal of Public Economics*, Vol. 127, 2015, pp. 3–16.

<sup>11</sup> E. Barth et al.: The Scandinavian..., op. cit.

<sup>12</sup> L. Scruggs, D. Jahn, K. Kuitto: Comparative Welfare Entitlements Dataset 2 Codebook, Version 2014-03, 2014.

<sup>13</sup> L. Scruggs: Social Welfare Generosity Scores in CWED 2: A Methodological Genealogy, CWED Working Paper Series No. 1, 2014.

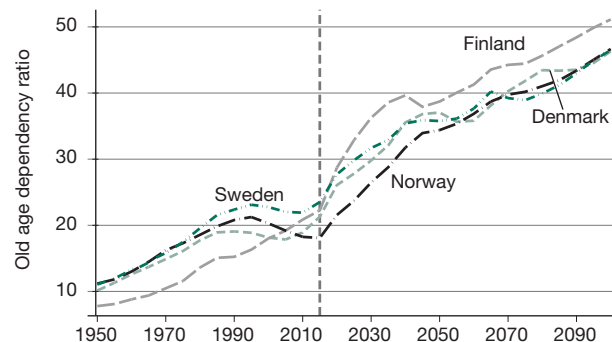
## Ageing, automation and the sustainability of the Nordic model

This section focuses on the issue of the sustainability of the Nordic model of economic development and welfare, in light of recent trends related to population ageing and automation technologies. The sustainability of the generous Nordic model of welfare, with its high level of public spending, is the subject of vigorous debate.

The more optimistic authors highlight the potential of future productivity gains from technological change in combination with the Nordic electorate's stable and sustained willingness to finance public expenditures through taxation. A recent contribution in this vein is the empirical study by Holmøy and Strøm.<sup>14</sup> The authors analyse the long-run macroeconomic performance of the Norwegian economy, finding that the present welfare schemes can be maintained throughout 2060, with only a slight increase (from 37% to 40%) in the share of gross income devoted by households to taxes on income and wealth and despite a significant reduction in daily working hours (from 7.5 hours to six). This is made possible via annual labour productivity growth of two per cent in the private sector and 0.5% in the public sector. In addition, recent studies have shown that the rising share of the labour force in industrialised economies employed in the provision of services (one of the consequences of the Baumol effect<sup>15</sup>) might not be at all detrimental to the sustainability of large welfare states. Taking into account individual responses to tax-financed service provision, Andersen<sup>16</sup> and Andersen and Kreiner<sup>17</sup> show that under standard assumptions on preferences and labour supply, the Baumol effect will lead to neither a higher share of GDP devoted to public expenditure nor to a higher optimal tax rate.

On the other hand, less optimistic contributions by Lindbeck and Van der Ploeg claim that an ever-increasing share of GDP devoted to public spending will lead either to unsustainable welfare states (for given tax rates) or to necessarily higher tax rates in conflict with the Laffer

Figure 4  
Old age dependency ratios, 1950-2100



Note: The dotted line at 2015 marks the beginning of projections.

Source: United Nations, Department of Economic and Social Affairs, Population Division: World Population Prospects: The 2015 Revision, Working Paper No. ESA/P/WP.241, 2015.

bound.<sup>18</sup> In addition, authors who advocate for a retrenchment of the welfare states in the Nordic countries due to the ageing population often refer to the projected increases of the old age dependency ratios in the Nordic countries, i.e. the ratio of the population aged 70 years and older to the population aged 25-69 years. In Figure 4, we examine this ratio more closely for the four Nordic countries by plotting probabilistic projections of the old age dependency ratios.

Figure 4 shows the exponentially increasing old age dependency ratios for all four Nordic countries. The ratios rose from approximately ten to 20 in the Nordic countries over the last 60 years, and the data predict another doubling (from 20 to approximately 40) over the next 60 years. The current study aims at enriching this debate by showing descriptive empirical evidence from an alternative ratio.

Define the Welfare State Sustainability (WSS) ratio for country  $i$  at time  $t$  as follows:

$$(1) \quad WSS_{i,t}(PSR, SE) = f\left(\frac{PSR_{i,t}}{SE_{i,t}}\right).$$

in which  $PSR_{i,t}$  is the potential support ratio for country  $i$  at time  $t$ , given by the ratio of the 25-69 year old population and the population 70+ years old (i.e. the inverse

14 E. Holmøy, B. Strøm: Må vi jobbe mer? Konsekvenser av mindre materialistisk vekst, Statistics Norway, report 2014/13, 2014 (available only in Norwegian).

15 W.J. Baumol: Macroeconomics of unbalanced growth: the anatomy of urban crisis, in: *American Economic Review*, Vol. 57, No. 3, 1967, pp. 415-426; W.J. Baumol: Health care, education and the cost disease: a looming crisis for public choice, in: *Public Choice*, Vol. 77, No. 1, 1993, pp. 17-28.

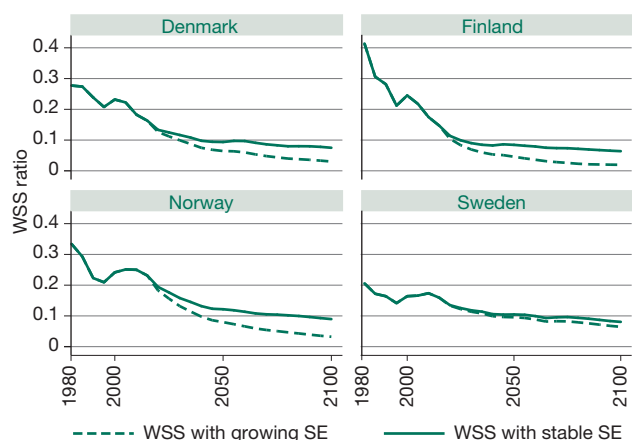
16 T.M. Andersen: Does the public sector implode from Baumol's cost disease?, in: *Economic Inquiry*, Vol. 54, No. 2, 2016, pp. 810-818.

17 T.M. Andersen, C.T. Kreiner: Baumol's Cost Disease and the Sustainability of the Welfare State, in: *Economica*, Vol. 84, No. 335, 2017, pp. 417-429.

18 A. Lindbeck: Sustainable Social Spending, in: *International Tax and Public Finance*, Vol. 13, No. 4, 2006, pp. 303-324; and F. Van der Ploeg: Sustainable social spending and stagnant public services: Baumol's cost disease revisited, in: *FinanzArchiv: Public Finance Analysis*, Vol. 63, No. 4, 2007, pp. 519-547.



Figure 5  
Welfare state sustainability (WSS) ratios, 1980-2100



Note: The solid line shows the 1980-2100 series of the WSS ratio by assuming a stable aggregate public social expenditure level as a percentage of GDP. The dotted line shows the 1980-2100 series for the WSS in which the growth rate of the public social expenditure as a fraction of GDP in the period 2020-2100 equals the average growth rate for each of the Nordic countries from 1980-2015.

Source: United Nations, Department of Economic and Social Affairs, Population Division: World Population Prospects: The 2015 Revision, Working Paper No. ESA/P/WP.241, 2015; OECD: Social Expenditure Database (SOCX).

of the old age dependency ratio) and  $SE_{i,t}$  is the aggregate public social expenditure as a percentage of GDP for country  $i$  at time  $t$ . The WSS ratio increases when the demographic trends, summarised in the PSRs, signal an increase in the proportion of the working-age population; but it decreases when a higher denominator implies that a given amount of working-age agents will have to finance a higher share of aggregate public social expenditure. The WSS ratio for the four Nordic countries in the period 1980-2100 is plotted in Figure 5, relying on actual data for the period 1980-2015 and on projections for the period 2020-2100.

In Figure 5, the solid line (WSS with stable SE) assumes that the aggregate public social expenditure level as a percentage of GDP in each of the Nordic countries stays constant at the 2015 level for the period 2020-2100. The dotted line (WSS with growing SE) shows a scenario in which the growth rate of public social expenditure as a fraction of GDP in the period 2020-2100 equals the average growth rate for each of the Nordic countries in the 1980-2015 period. Regardless of which of the two WSS ratios is chosen, the predictions in Figure 5 imply a steady reduction in the post-2015 value of the WSS ratios for each of the four Nordic countries (with the exception of a slightly growing WSS with stable SE in Denmark and Fin-

land in the period 2050-2060). The economic interpretation of the evidence in Figure 5 is unambiguous: when only demographics and public social expenditure trends are taken into account, the financing prospects of the welfare states in the Nordic countries do not appear to be on a of higher sustainable path.

However, an external factor might foster the sustainability of the Nordic welfare states, namely higher productivity growth due to automation (reducing the proportion of working-age individuals needed to finance public social expenditure). This factor was not taken into account in the evidence provided by Figures 4 and 5. The last part of this section further enriches the debate in this direction and complements the above evidence by introducing the potential effects of demographic trends on automation and, in turn, on the key features of the Nordic model.

The stylised evidence of Figures 4 and 5 points in the same direction: the ageing process of the population in the Nordic countries is bound to continue and eventually increase its pace. However, what does ageing imply for the dynamics of technological progress and, more precisely, automation, which in turn might have significant effects on the pre-tax wage distribution and on productivity growth? By analysing novel data from the International Federation of Robotics (IFR) across 49 industrialised countries, Acemoglu and Restrepo provide one possible answer to the question of how ageing affects the adoption of robotic technology and automation.<sup>19</sup> Their results show a strong positive correlation between the increase in old age dependency ratios and the change in the number of robots at work in the industrialised economies observed. They further explain this evidence with a model whose intuition follows the theory that the scarcity of younger workers in ageing countries fosters higher adoption of robots and automation technologies. The line of reasoning in which we are interested in this study states that if ageing triggers automation, then the Nordic countries will experience an increase in automation technology in the coming decades. The resulting increase in productivity will also lift GDP and result in a less pessimistic scenario than that depicted by the projections in Figure 5, hence allowing high welfare spending to remain a key characteristic of the Nordic economies.

Returning to the first feature of the Nordic model, how would an increase in automation affect the distribution of pre-tax wages and hence the degree of compression of wage differentials? Asplund et al. provide a tentative

19 D. Acemoglu, P. Restrepo: Secular Stagnation? The Effect of Ageing on Economic Growth in the Age of Automation, in: *American Economic Review*, Vol. 107, No. 5, 2017, pp. 174-179.

answer to this question based on data on occupational employment patterns from 1995 to 2006,<sup>20</sup> showing that, for the Nordic countries, a shift from skill-biased to routine-biased technological change has led to a skills-polarising effect on the employment structure, as surveyed in Fernández-Macias and Hurley.<sup>21</sup> In turn, Asplund et al. claim that this process of job polarisation has gone hand-in-hand with a slight reduction in the compression of pre-tax wage differentials for the Nordic countries, with most of the increase in wage dispersion coming from the half of the distribution above the median wage.<sup>22</sup> Asplund et al. caution that their results need a deeper causal analysis, possibly at the in-country level.<sup>23</sup> It remains to see whether and how this evidence of higher pre-tax wage differentials for the Nordic countries will further affect the institutions and functioning of the Nordic model in the long run.

In sum, the robustness and sustainability of the generous public spending of the Nordic model of economic devel-

opment and welfare seems to be highly dependent on the higher productivity growth induced by increased automation; however, automation may trigger changes in the distribution of pre-tax wage incomes which could alter the functioning of the Nordic model as we know it.

## Conclusion

The aim of this research was to provide an up-to-date overview of the mechanisms that constitute the bulk of the Nordic model of economic development and welfare. In particular, the paper focused on the sustainability of the public spending of the Nordic model and the recent trends in population ageing and automation technologies. The stylised evidence from the Welfare State Sustainability (WSS) ratios points to a decrease in the future sustainability of public welfare spending in the Nordic countries. However, sustainability-enhancing productivity shocks can come from automation technologies, which have a positive relationship with population ageing according to recent economic research. If ageing fosters automation, which in turn fosters higher productivity growth, then the sustainability picture might change. Automation could, on the other hand, decrease the degree of compression of wage differentials in the Nordic countries, which is another of the key elements of the Nordic model.

20 R. Asplund, E. Barth, P. Lundborg, K. Misje Nilsen: Polarization of the Nordic Labour Markets, in: Finnish Economic Papers, Vol. 24, No. 2, 2011, pp. 87-100.

21 E. Fernández-Macías, J. Hurley: Routine-biased technical change and job polarization in Europe, in: Socio-economic Review, Vol. 15, No. 3, 2017, pp. 563-585.

22 R. Asplund et al., op. cit.

23 Ibid.