

The Nordic model of economic development and welfare: recent developments and future prospects

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This research provides an overview of the recent developments as regards 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 the public spending in the Nordic economies.

The conceptual framework

The current paper defines the “Nordic model” by borrowing the main lines of the framework presented in Barth et al. (2014)¹. 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 (Calmfors, 1993²; Erixon, 2010³, 2016⁴; Esping-Andersen, 1990⁵; Lindbeck, 1997⁶). The three distinct but interconnected features of the Nordic model listed in Barth et al. (2014), can be summarized as follows:

- (I) **Compression of wage differentials.** Centralized wage bargaining leads to low wage dispersion in the labor market and hence to low pre-tax labor income inequality.
- (II) **Creative destruction.** High degree of compression of wage differentials from (I) fosters creative destruction leading to a higher share of highly productive enterprises and in turn higher average labor productivity; see Moene and Wallerstein (1997)⁷.
- (III) **Public welfare spending.** High degree of compression of wage differentials from (I) leads to individual preferences for high public welfare spending; see Barth et al. (2015)⁸ and Barth and Moene (2016)⁹.

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

² Calmfors, L. (1993). Lessons from the Macroeconomic Experience of Sweden, *European Journal of Political Economy*, 9 (1): 25–72.

³ Erixon, L. (2010). The Rehn-Meidner Model in Sweden: Its Rise, Challenges and Survival, *Journal of Economic Issues*, 44 (3): 677–715.

⁴ Erixon L. (2016). 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, 2016:3.

⁵ Esping-Andersen, G. (1990). *The three worlds of welfare capitalism*. Polity Press, Cambridge.

⁶ Lindbeck, A. (1997). The Swedish Experiment, *Journal of Economic Literature*, 35 (3): 1273–1319.

⁷ Moene, K.O., Wallerstein, M. (1997). Pay inequality, *Journal of Labor Economics*, 15(3): 403-430.

⁸ Barth, E., Finseraas H., Moene K.O. (2015). Political reinforcement: how rising inequality curbs manifested welfare generosity, *American Journal of Political Science*, 59(3): 565-577.

⁹ Barth, E. and Moene, K. O. (2016). The Equality Multiplier: How Wage Compression and Welfare Empowerment Interact, *Journal of the European Economic Association*, 14(5): 1011–1037.

Let us start by explaining the feature described in (I) with the support of stylized empirical evidence. Figure 1 shows the average of the ICTWSS index of coordination of wage setting, plotted against the average of the OECD gross earnings interdecile ratio P90/P10, for all OECD countries in the period 1970-2013.

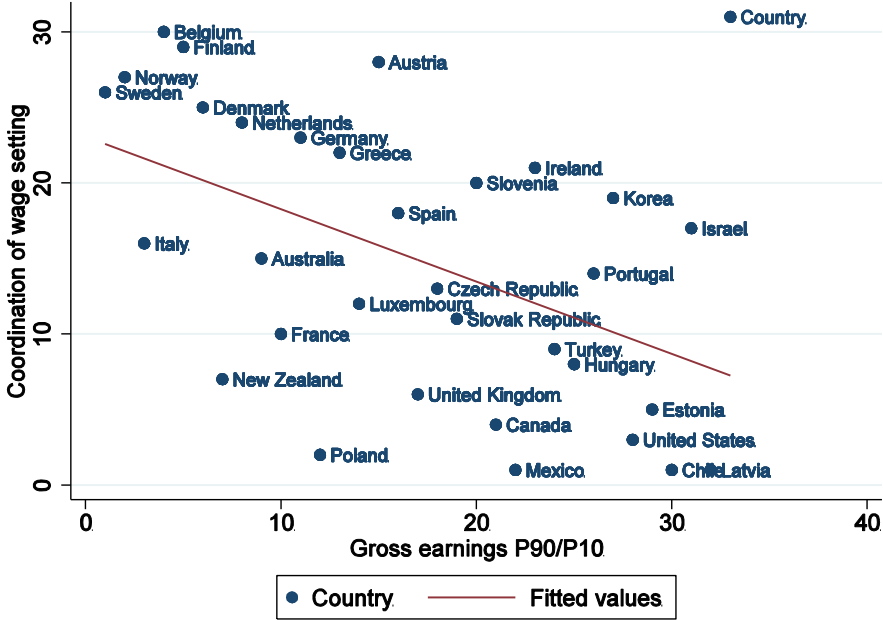


FIGURE 1. COORDINATION OF WAGE-SETTING AND WAGE DISPERSION

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

Source: (1) Data Base on Institutional Characteristics of Trade Unions, Wage Setting, State Intervention and Social Pacts, 1960-2014 (ICTWSS). Version 5.0. (2) OECD.Stat.

In Figure 1, the Nordic countries appear in the upper left, indicating low pre-tax wage dispersion and a high average index of centralized wage bargaining. Only Belgium, Germany and the Netherlands obtain a combined score that can be described as of the “Nordic type”, whilst Italy and Austria can be associated with the Nordic countries for one only dimension each, namely low wage dispersion in Italy and high degree of centralized wage setting in Austria. In other words, Figure 1 conveys a static picture of mechanism (I), showing that a higher degree of

wage coordination through collective bargaining correlates with a more compressed wage distribution for the Nordic countries. This stylized fact is a rather conventional result of economic theory, confirming that whenever unions negotiate wages at the national level, this leads to a lower overall degree of pre-tax wage dispersion (Barth and Moene, 2012¹⁰). An updated overview of this literature is available in the survey of labor market institutions by Salverda and Checchi, 2014¹¹.

Feature (II) of the Nordic model is explained as follows. Barth et al. (2014) develop a theory of creative destruction and wage compression, based in essence on the Rehn-Meidner model (as in Erixon, 2010, 2016). Briefly, this theory emphasizes 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 labor, which in turn leads to a higher average level of labor 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.

¹⁰ Barth, E. and Moene, K. O. (2012). Employment as a Price or a Prize of Equality: A Descriptive Analysis, Nordic Journal of Working Life Studies.

¹¹ Salverda W. & Checchi D. (2014). Labour-Market Institutions and the Dispersion of Wage Earnings, IZA Discussion Papers 8220.

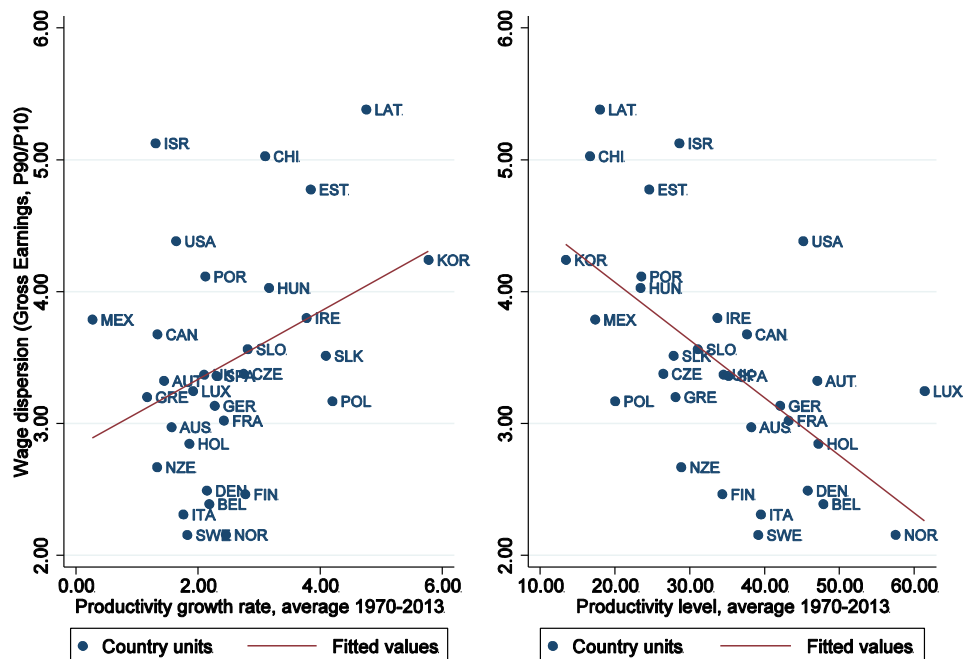


FIGURE 2. WAGE DISPERSION AND LABOR PRODUCTIVITY

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.

The left-hand side of Figure 2 plots wage dispersion (using the same variable as in Figure 1) against the average of the *growth rates* of GDP per hour worked (constant prices, 1970-2013). The right-hand side of Figure 2 instead plots wage dispersion against the average in *levels* of the same labor productivity measure, for the same countries and the same period. Figure 2 shows some interesting stylized facts. At first, the Nordic countries confirm their similarities by appearing in the same areas in both plots. Second and more importantly, the feature (II) does not appear to be fully supported by the evidence provided in both sides of Figure 2, when focusing on the cluster of the Nordic countries. When it comes to the country average of *levels* of GDP per hour worked, higher compression of wage differentials correlates with higher labor

productivity for the Nordic countries as compared to the rest of the OECD economies, in line with the theory of creative destruction in Barth et al. (2014). On the other hand, when labor productivity is measured by the average of the *growth rates* for GDP per hour worked in the period 1970-2013, the Nordic countries (with growth rates of slightly above 2%) perform neither better nor worse than the large majority of the other OECD economies. This puzzling empirical evidence for the Nordic countries as compared to the other OECD economies 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 Acemoglu et al. (2014)¹² and Stiglitz (2015)¹³.

The feature (III) of the conceptual framework concerns the explanation of why the Nordic economies, on top of the high equality in labor 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 labor 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. (2014) emphasize 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). Specifically, as workers receive higher wages, the income loss associated with a less generous welfare state gets larger, whilst the utility cost (or disutility) necessary to finance social insurance programs shrinks. Hence, the *more equal* the pre-tax wage distribution, the

¹² Acemoglu, D., Robinson, J. A., & Verdier, T. (2017). Asymmetric growth and institutions in an interdependent world, *Journal of Political Economy* 125, no. 5 (October 2017): 1245-1305.

¹³ Stiglitz J. (2015). Leaders and followers: Perspectives on the Nordic model and the economics of innovation, *Journal of Public Economics*, 127: 3–16.

higher the amount of social insurance goods demanded by the median voter. This implies that already equal allocations will determine higher public welfare spending which reduces inequality even further, whilst unequal allocation of wages call for less redistribution and in turn more inequality; it has therefore been labeled 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 Comparative Welfare Entitlements Data Set (CWED) in Scruggs et al. (2014)¹⁴. The CWED contains annual country data (1971-2010) on the replacement rates, program coverage and overall program generosity for each of the three main social insurance programs: (1) unemployment insurance, (2) sickness insurance and (3) public pensions. Scruggs (2014)¹⁵ computes the combined welfare generosity index by summing up the three single program indices (each of them with a score from 0 to 25; the maximum theoretical score for the combined generosity index is 75).

¹⁴ Scruggs, Lyle, Detlef Jahn and Kati Kuitto (2014). Comparative Welfare Entitlements Dataset 2 Codebook, Version 2014-03, University of Connecticut & University of Greifswald.

¹⁵ Scruggs L. (2014). Social Welfare Generosity Scores in CWED 2: A Methodological Genealogy, CWED working paper series no.1, University of Connecticut & University of Greifswald.

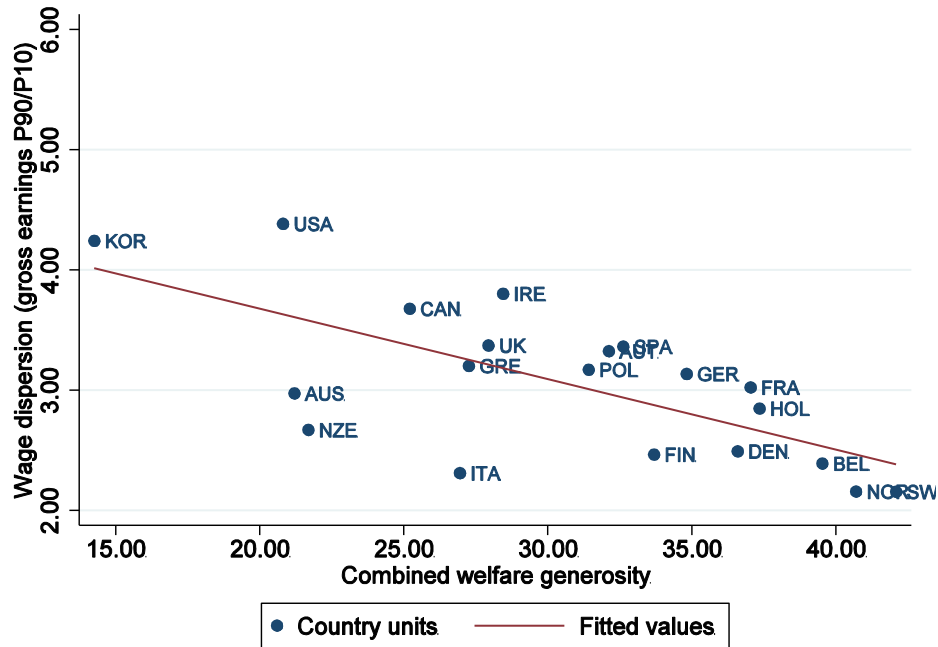


FIGURE 3. WAGE DISPERSION AND COMBINED WELFARE GENEROSITY

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 Data Set (CWED) in Scruggs et al. (2014).

Source: (1) The Comparative Welfare Entitlements Dataset 2 (CWED2). Version 2014-03. University of Connecticut & University of Greifswald. (2) OECD.Stat.

Figure 3 shows that, for the Nordic countries as compared to the other OECD economies, low wage dispersion correlates with a high index of combined welfare generosity, regardless of the underlying direction of causality. In conclusion, this justifies the relevance of feature (III) 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.

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 the recent trends related to population ageing and automation technologies. The debate on the sustainability of the generous Nordic model of welfare with high public spending (feature III of the conceptual framework of the Nordic model presented in the previous section) is summarized by the following counteracting views. The more optimistic authors highlight the redistribution of future productivity gains from technological change in addition to the Nordic electorate's stable and sustained willingness to finance public expenditures through taxation. A recent contribution on these lines is the empirical study by Holmøy and Strøm (2014)¹⁶. In their work, Holmøy and Strøm (2014) analyze the long run macroeconomic performances of the Norwegian economy, stating that the present welfare schemes can be maintained throughout the next decades and up to 2060, at the cost of a slight increase (from 37% to 40%) of the overall fraction of gross income devoted by households to taxes on income and wealth, and regardless of a significant reduction in daily working hours (from 7.5 hours to 6). This is made possible by simulating annual labor productivity growth of 2 % in private industries and of 0.5 % in the public sector. In addition, recent studies have shown that the observed empirical tendency in industrialized economies leading to a higher share of the labor force employed in the provision of services (one of the consequences of Baumol's effect, as in Baumol, 1967¹⁷, 1993¹⁸) might not be at all detrimental to the sustainability of large welfare states. In more detail, taking into account individual responses to tax-financed service provision,

¹⁶ Holmøy E. and B. Strøm (2014). *Må vi jobbe mer? Konsekvenser av mindre materialistisk vekst*, Statistics Norway, report 2014/13 (available only in Norwegian).

¹⁷ Baumol W. J. (1967). *Macroeconomics of unbalanced growth: the anatomy of urban crisis*, *American Economic Review*, 57(3), 415–26.

¹⁸ Baumol W.J. (1993). *Health care, education and the cost disease: a looming crisis for public choice*, *Public Choice*, 77: 17–28.

Andersen (2016)¹⁹ and Andersen and Kreiner (2017)²⁰ show that, under standard assumptions on preferences and labor supply, Baumol's effect will neither lead to 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 (2006)²¹ and Van der Ploeg (2007)²² 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 bound. 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 - for instance, an increase in the ratio of population aged 70+ years to population aged 25-69 years. Let us look more closely at this ratio for the four Nordic countries in Figure 4, by plotting probabilistic projections of the old-age dependency ratios.

¹⁹ Andersen, T.M., (2016). Does the public sector implode from Baumol's cost disease? *Economic Inquiry*, 54(2): 810–818.

²⁰ Andersen T.M. and C.T. Kreiner (2017). Baumol's Cost Disease and the Sustainability of the Welfare State, *Economica* 84: 417–429.

²¹ Lindbeck A. (2006). Sustainable Social Spending, *International Tax and Public Finance*, 13(4): 303–24.

²² Van der Ploeg, F. (2007). Sustainable social spending and stagnant public services: Baumol's cost disease revisited, *Finanzarchiv*, 63(4): 519–47.

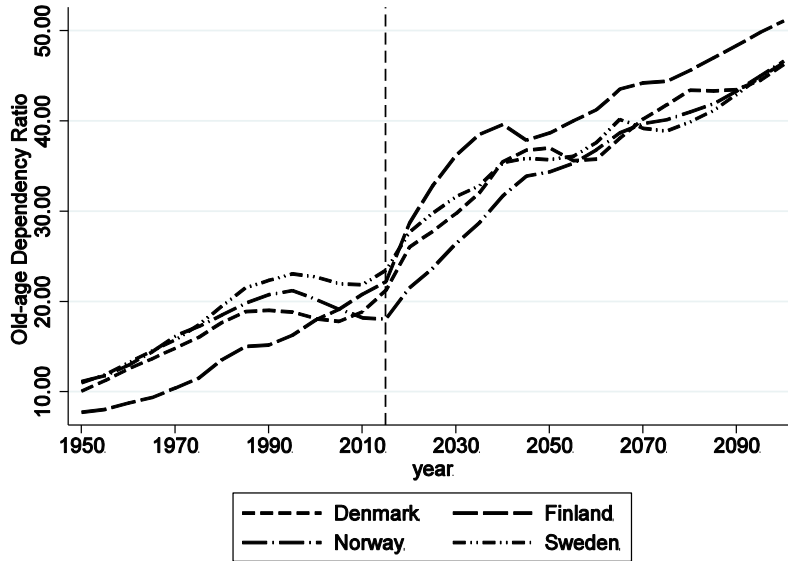


FIGURE 4. OLD-AGE DEPENDENCY RATIOS, 1950-2100

Note: This figure plots the Nordic countries' 1950-2100 projection series of the old-age dependency ratio (70+) / (25-69), in other words the ratio of population 70+ per 100 population 25-69. A reference x-line for the year 2015 marks the end of actual data.

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision.

Figure 4 shows the exponentially increasing series of the old-age dependency ratios for all four Nordic countries. The old-age dependency ratios rose from approximately 10 to 20 in the Nordic countries in the last 60 years (the reference year is 2015), whilst the data predict another 100% increase (from 20 to approximately 40) in 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:

$$(1) \text{WSS}_{i,t}(\text{PSR}, \text{SE}) = f\left(\frac{\text{PSR}_{i,t}}{\text{SE}_{i,t}}\right).$$

in which $\text{PSR}_{i,t}$ is the potential support ratio for country i at time t , given by the ratio between the 25-69 year old population and the population 70+ years old (i.e., the inverse 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 summarized 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 projection series for the period 2020-2100.

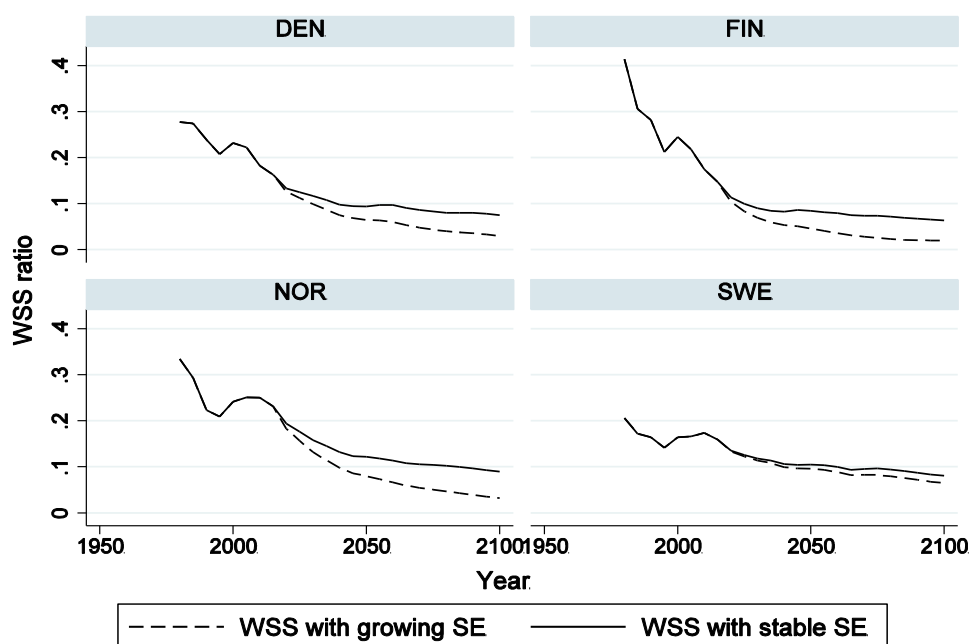


FIGURE 5. WELFARE STATE SUSTAINABILITY (WSS) RATIOS, 1950-2100

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 dashed 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 in the 1980-2015 period.

Source: (1) United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision. (2) OECD Social Expenditure Database (SOCX).

In Figure 5, the solid line (WSS with stable SE) shows the series of the WSS ratio by assuming 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 dashed line (WSS with growing SE) shows instead 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 Finland in the period 2050-2060). The economic interpretation of the evidence of Figure 5 is unambiguous: the financing prospects of the welfare states in the Nordic countries, when only demographics and public social expenditure trends are taken into account, do not indicate a path of higher sustainability.

An external factor that might foster sustainability of the Nordic welfare states is, however, future higher productivity growth due to automation (reducing the proportion of working-age individuals needed to finance public social expenditure), which 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 stylized 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 (feature I) and on productivity growth? By analyzing novel data from the International Federation of

Robotics (IFR) across 49 industrialized countries, Acemoglu and Restrepo (2017)²³ provide one possible answer to the first part of this question: how ageing affects the adoption of robotic technology and automation. 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 industrialized economies observed. Acemoglu and Restrepo (2017) further explain this evidence with a model whose intuition can be summarized as follows: it is precisely the scarcity of younger workers in ageing countries that fosters higher adoption of robots and automation technologies. The line of reasoning in which we are interested in this study goes as follows: if ageing (documented in the Nordic countries by Figures 4 and 5) triggers automation as shown by Acemoglu and Restrepo (2017), then the Nordic countries will experience an increase in automation technology in production in the next decades. The resulting increase in productivity of the work force will, given employment rates, increase GDP and deliver less pessimistic scenario of those depicted by the projections in Figure 5 (hence allowing feature III to remain a key characteristic of the Nordic economies).

Going back to feature (I) of the Nordic model, how would increase in automation affect the distribution of pre-tax wages and hence the degree of compression of wage differentials? Asplund et al. (2011)²⁴ provide a tentative answer to this question based on data on occupational employment patterns from 1995 to 2006, showing that, for the Nordic countries, a shift from skill-biased to routine-biased technological change has led to a skills-polarizing effect on the employment structure (as surveyed in Fernández-Macias and Hurley, 2017²⁵). In turn, Asplund et

²³ Acemoglu D. and Restrepo P. (2017). Secular Stagnation? The Effect of Aging on Economic Growth in the Age of Automation, *American Economic Review*, 107(5):174-79.

²⁴ Asplund R., E. Barth, P. Lundborg, K. Misje Nilsen (2011). Polarization of the Nordic Labour Markets. *Finnish Economic Papers*, 24(2): 87-100.

²⁵ Fernández-Macias E. and J. Hurley (2017). Routine-biased technical change and job polarization in Europe. *Socio-economic Review*, 15(3):563–585.

al. (2011) claim that this process of job polarization 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). Notice that Asplund et al. (2011) carefully claim that their results need a deeper causal analysis, possibly at the within-country level. 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 longer run (recall that both features II and III rely importantly on a high degree of compression of wage differentials).

In conclusion, on one side the robustness and sustainability of the generous public spending of the Nordic model of economic development and welfare (feature III) seems to be highly dependent on the higher productivity growth induced by increased automation, whilst on the other side automation might as well trigger changes in the distribution of pre-tax wage incomes which might alter the functioning of the Nordic model as we know it.

Concluding remarks

The aim of this research was to provide an up-to-date overview on 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 as regards population ageing and automation technologies. The stylized evidence from the Welfare State Sustainability (WSS) ratios point in the direction of a lower degree of future sustainability of public welfare spending in the Nordic countries. However, sustainability-enhancing productivity shocks can come from automation technologies, whose relationship with population ageing has been shown to be positive in the most recent economic research. If ageing fosters automation, which in turn fosters higher productivity growth, then the sustainability

picture might change. Automation might on the other hand decrease the degree of compression of wage differentials in the Nordic countries, which has been presented as one of the key elements of the Nordic model. In conclusion, this paper has attempted to contribute to the political economy and institutional economics literature on Nordic economies by providing an overview of the ongoing trends and changes that the Nordic model of economic development and welfare is currently undergoing.