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Inequality and Redistribution among OECD Countries

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Abstract

Many have long believed that inequality in democracy would pressure society into more redistribution. Alesina and Rodrik (1994), Meltzer and Richard (1981), Persson and Tabellini (1994), for instance, model a positive relationship between income inequality and redistributive tax rates. OECD's *Society at a Glance 2011*, on the other hand, reports that countries with a more equal income distribution, measured by the Gini coefficient, tended to have higher social spending (pp. 74-75; EQ 5.2). Why do we have such a mismatch between theory and empirical findings?

In this report, we study the relationship between inequality and redistribution among OECD countries using a political economy approach, and argue that the relationship between inequality and redistribution in democratic society is *non-monotonic*. In particular, we show that the relationship is *contingent upon* the type of the political parties that govern.

A large body of literature written by political scientists and social historians has long emphasized the role of political parties in shaping redistribution policies in welfare states. The theoretical core of this voluminous literature is that there are significant party differences in welfare state policies (Schmidt, 2010).

In this report, we employ two 'partisan' models of political competition – the Wittman-Roemer model and what we call the ideological party model – to study the relationship between inequality and redistribution. We show that 'political parties do matter' in explaining how redistribution changes in response to changes in inequality. As inequality rises, the Left party tends to increase the size of redistribution, while the Right party tends to decrease it.

The argument that the Left and the Right parties may respond differently to changes in inequality first appeared in Lee and Roemer (2005) as a subsidiary argument, when they mainly studied the inverse U-shaped relationship between inequality and the support for the unionized labor market regime.

We improve upon Lee and Roemer's (2005) analysis. First, their result is based upon numerical calculations. In this paper, we provide an analytically tractable model, and produce a closed form solution for the model. Second, there was an interaction between political parties and

the labor union in Lee and Roemer (2005), and thus it was not clear whether the result is purely driven by partisan politics or to its interaction with the union. We show that the result is a generic feature of partisan politics. Third, we made improvements upon empirical testing of the hypothesis.

1. Introduction

With economic inequality rising in almost all advanced industrial democracies (OECD, 2009, 2011a), the question of how economic and social inequalities affect politics has become an important concern of many political economists. There is also renewed interest in the question of how political processes and institutions determine the distribution of resources in society.

From Aristotle to modern political economists, many have long believed that democratic political processes have an equalizing effect. Indeed there is a plethora of papers in the new political economy literature arguing that increasing inequality in democracy would engender increasing tax rates and more redistribution. Based upon the Hotelling-Downs model of political competition, Alesina and Rodrik (1994), Meltzer and Richard (1981), Persson and Tabellini (1994), for instance, model a positive relationship between (pre-fisc) income inequality and redistributive tax rates.

The underlying logic behind these models is fairly simple. Since actual income distributions are skewed to the right, median income is always less than the mean. Thus, if all citizens have the vote, and the gap between median income and the mean becomes larger as inequality rises, then a majority of voters (namely, those whose income is less than the mean) would call for a higher tax rate in democracy.

A large body of empirical literature, however, shows that this does not hold in reality (Forbes, 2000; Milanovic, 2000; Perotti, 1996; Rodriguez, 1999). A typical empirical pattern seems exactly opposite to what this theory predicts; in contrast with the conventional wisdom, there appears to be a *negative* relationship between (pre-fisc) income inequality and redistribution. Compare Sweden and the US, for instance. Observe also that in the past twenty-five years, a period of sharply rising inequality in the US and the UK, the effective marginal income tax rate has fallen. OECD's *Society at a Glance 2011* also reports that countries with a more equal income distribution, measured by the Gini coefficient, tended to have higher social spending (pp. 74-75; EQ 5.2).

Lindert (2002) calls the mismatch between theoretical predictions of the Hotelling-Downs model and empirical findings a 'Robinhood paradox': redistribution from rich to poor is least present when and where it seems to be most needed.

When one plots social spending in percentage of GDP against Gini coefficients for market income among working-age households, however, there is *no* cross-national association at all between inequality and redistribution (Kenworthy and Pontusson, 2005). Furthermore, fixed effects regression models show that market income inequality is *positively* and significantly associated with redistribution (Milanovic, 2000). It seems that anything can happen to the relationship between inequality and redistribution. What is going on?

In this report, we argue that the relationship between inequality and redistribution in democratic society is indeed *non-monotonic*. In particular, we show that the relationship is *contingent upon* the type of the political parties that govern.

The new political economy literature relies heavily upon the Hotelling-Downs model of political competition, where parties do *not* matter in shaping policies. In contrast, a large body of literature written by political scientists and social historians has long emphasized the role of political parties in shaping the welfare state policies. The theoretical core of this voluminous literature is that there are significant party differences in welfare state policies (Schmidt, 2010).

In this research, we study the relationship between inequality and redistribution using two ‘partisan’ models of political competition – the Wittman-Roemer version of partisan model and what we call the ideological party model – and argue that political parties matter in explaining how redistribution changes in response to changes in inequality. In contrast with the Hotelling-Downs model of political competition, where ‘parties do not matter’ at the equilibrium, the partisan models of political competition that the current paper employs implies more nuanced results.

We find that (1) the Left party proposes a higher tax rate than the Right party at the equilibrium; and (2) as inequality rises, the Left party proposes more redistribution, while the Right party proposes less redistribution. Thus, not only do the two parties propose different redistributive tax rates at the equilibrium, but their proposals move in different directions as inequality changes.

The argument that the Left and the Right parties respond differently to changes in inequality first appeared in Lee and Roemer (2005) as a subsidiary argument, when they studied the inverse U-shaped relationship between inequality and the support for the unionized labor

market regime. The current research improves upon Lee and Roemer's (2005) analysis in several ways.

First, their result is based upon numerical calculations. In this paper, we provide an analytically tractable model, which produces a closed form solution. Our formal analysis clarifies the underlying mechanism that drives our 'nonconventional' result.

Second, because there was an interaction between political parties and the labor union in Lee and Roemer (2005), it was not clear whether the result is purely driven by partisan politics or to the presence of the union. We show that the result is a generic feature of partisan politics.

Third, we made improvements upon empirical testing of the hypothesis.

The idea that poor voters (such as the median voter) whose wealth is less than the mean would call for high redistributive taxes is indeed a revival of the 19th century liberal idea that the poor would expropriate the wealth of the rich if suffrage is extended to the poor. Indeed nineteenth century conservatives and Marxists alike joined in the belief that extension of suffrage and capitalism would be incompatible; universal suffrage, in the age of class cleavage, would inevitably deliver more votes to the Left. The framers of the US Constitution extended suffrage only to (male) property holders because they believed that, were the poor to be given the vote, they would soon expropriate the wealth of the rich.

Universal suffrage has not engendered the expropriation of the rich through the tax system, and a variety of reasons have been offered in explanation for why poor voters do not expropriate the wealth of the rich.

First, the citizenry, including the median voter, might recognize that there would be adverse dynamic effects to expropriating the rich, who have scarce productive talents which would cease to be supplied were their holders taxed too harshly, and all would consequently suffer.

Second, the median voter whose wealth lies below the mean might entertain the hope that his/her children will someday become richer than the mean, and he/she shuns high tax rates for fear of hurting his/her future selves or children. Benabou and Ok (2001) modeled this idea and call their model's prediction the 'prospect of upward mobility' (POUM) hypothesis.

Third, the citizenry might believe that the rich person – and indeed everyone – deserves the wealth he/she receives, and hence high tax rates would be unethical.

Fourth, even if there would be few adverse dynamic or social mobility effects from high taxation, as described above, the rich might convince the citizenry that there would be, with propaganda disseminated through the media, which they control.

Our analysis does not rely upon any of these explanations. In this research, we emphasize the role of political competition between parties that represent different constituencies.

The ‘parties matter’ literature argues that:

(1) The social constituencies of political parties have distinctive social policy preferences;
(2) The social policy orientation of political parties mirrors the distinctive preferences of their social constituencies; and

(3) The Left tend to propose more redistribution than the Right.

We add the following proposition to the above:

(4) The response of redistribution to inequality is different between parties. As inequality rises, the Left party tends to increase the redistributive tax rate, whereas the Right party tends to decrease it.

For our purpose, we adopt the generalized Wittman-Roemer model of two-party competition as a unified model of political competition. The generalized Wittman-Roemer model covers various models of political competition as its special cases. It thus allows us to study the consequence of changing inequality on the equilibrium of various political models in a unified framework.

We will study three special cases of the generalized Wittman-Roemer model of political competition, which have received much attention among students of political economy. One is the well-known Hotelling-Downs model in which parties maximize their probabilities of victory, and another is the classical Wittman-Roemer model (Roemer, 1997) in which parties maximize the expected utilities of their key constituents. The third is the one, which we call the ideological party model, in which each party sets its policy that is equal to the ideal tax rate of its endogenously-determined average member.

Instead of viewing political competition as occurring between two parties each of which is a unitary actor that maximizes a certain payoff function, the generalized Wittman-Roemer model views political equilibrium as the one obtained from competition between parties with factions that have different goals and Nash-bargain with one another to set the policy. Following Roemer

(2001), we assume that there are two factions in each party: the opportunists whose goal is to win the election and the militants whose objective is to maximize the average well-being of their party members.¹

In the remaining part of this report, we proceed as follows.

In section 2, we present a brief literature review on some problems in measuring redistribution and the relationship between income inequality and the size of the welfare state.

Section 3 then provides a general theoretical framework of party competition. In this framework, we will portray political competition as one between partisan parties. We will compare the outcomes for Hotelling-Downs model, Wittman-Roemer model, and the ideological party model. The model suggests that in partisan models the Left party proposes higher redistributive taxes than the Right party and that as inequality rises, the Left party proposes more redistribution, while the Right party proposes less redistribution.

Section 4 assesses our hypotheses empirically using an unbalanced panel of 20 OECD countries during the period of 1980 and 2001. The 20 OECD countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the UK, and the US. The data strongly supports the implications of the models we introduced.

The appendix collects miscellaneous figures of individual countries, focusing on movements of inequality in individual countries, movements of redistributive tax rates and its components in individual countries, and movements of party strength in individual countries.

¹A generalized Wittman-Roemer equilibrium, where bargaining power is fixed, can be considered a special case of Roemer's (2001) party unanimity Nash equilibrium, where bargaining power is not specified a priori.

2. Literature review: On the relationship between income inequality and the size of redistribution²

2.1. Introduction

In this section we review different approaches to evaluating the relationship between inequality and redistribution. Many argue that an increase in inequality would lead to an increase in the tax rate and thus more redistribution. In reality, however, there is plenty of evidence suggesting that this is not the case (Forbes, 2000; Lee, 2003; Milanovic, 2000; Perotti, 1996; Rodriguez, 1999). The effective marginal income tax rate in the US, for example, has fallen when it experienced a sharp rise in inequality (Lee, 2007). The intricate relationship between inequality and redistribution has been explored through different methodologies and analytical approaches.

While some theories mentioned in this section assert that increase in inequality leads to an increase in redistribution, there are other theories that argue differently. Careful analysis is needed to address these discrepancies and explain the limitations of each approach.

The second part of this section discusses some difficulties in measuring redistribution. We discuss various approaches to tackling such problems. The third part of this section discusses the so-called welfare state regimes. The fourth part then discusses theories on the relationship between inequality and redistribution based on the Hotelling-Downs model of political competition. The fifth section then discusses partisan theories of political competition. The last part of this section is then devoted to explaining factors other than voters' income that influence their beliefs in redistribution. Individual preferences may be affected by one's religion, race, and social affinities. They make an impact on the political system through acting as a group that shares the same belief system.

²This section is mainly prepared by our research assistant, Stacey Jiyeon Kim of Korea University. The discussion in this section draws heavily on Esping-Andersen and Myles (2009) and McCarty and Pontusson (2009).

2.2. Problems in measuring redistribution

There is a large literature that tries to explain over-time as well as cross-country variation in the size of the welfare state or the degree of redistribution. A natural question arises: What is a good measure of redistribution? How do we measure the size of the welfare state?

Many studies in the literature typically take some measure of 'social spending' expressed as a percentage of GDP.

Among many measures of social spending, 'gross' measures of social spending, which cover direct social spending by government, remain standard. These measures usually include old-age and disability pensions, unemployment insurance, sick pay and parental leave insurance, family allowances, social assistance, housing subsidies, health care, child care, care for the elderly and disabled, and active labor market programs.

Gross measures, however, create some distortion. First, gross figures do not adjust for the taxation of benefits that flows back into the government treasury. Second, gross figures do not take into account tax expenditures.

Because of these problems that gross measures of social spending have, some people prefer 'net' measures of government and government-mandated social spending. These measures include private social expenditures mandated by government as well as the value of tax credits that serve social policy purposes (treating foregone tax revenues as equivalent to government expenditures), and also take account of direct and indirect taxation of cash benefits received from the government.

Although social spending is mainly for redistribution, the degree to which this is associated with more equality is an open empirical question. Thus some authors prefer to use the percentage change in inequality indices (such as Gini coefficients) or poverty ratios that we observe as we move from market income (before taxes and transfers) to disposable income (after taxes and transfers). The range of variation among advanced countries on such measures is wider than the range of variation on measures of social spending. At the low end of the spectrum is Switzerland in 2000; taxes and transfers reduced the Gini coefficient for household income by 22%. At the other end of the spectrum lies Denmark; the corresponding figure for Denmark was 47% in 2000.

But measuring the redistributive effects of the welfare state by the difference between market income and disposable income inequality ignores the possibility that market income itself is influenced by tax-benefit policies. This is what Beramendi et al. (2001) call the second-order effects of redistribution. For example, welfare states provide social services (e.g. education) that would ultimately affect one's earnings. Also welfare state policies may generate inequality in market incomes through social programs such as pensions or maternity leaves. An elderly expecting to receive generous pension benefits may have little incentive to save money and thus have produced low income in the market. Just comparing the pre- and post-tax incomes may not always be accurate in evaluating the redistributive effort of a welfare state.

It is also well known that macroeconomic policies, such as trade, industrial policies, and government regulations that are often omitted in evaluating the welfare state, also play an important role in influencing redistribution of income.

To really estimate redistribution, we need to invent a counter-factual 'virgin' distribution that was not affected by government policies at all. Unfortunately, such a 'virgin' distribution that is not affected by the government policies mentioned above is impossible to find in reality.

Finally we mention that the redistributive effect of social services is difficult to measure, and thus studying the issue of redistribution based exclusively on money incomes provide an incomplete picture of how much equality the welfare state creates.

2.3. Welfare state regimes

Given that finding a virgin distribution is very difficult, some people suggest that we can find some important effects from the institutional design rather than sheer size of welfare states. This is the approach taken by advocates of the welfare state regimes.

According to Esping-Andersen (1990), countries could be classified into one of three welfare regimes: liberal, social-democratic, and conservative regimes. The classification is based upon the following criteria: (a) the importance of cash benefits relative to services (in-kind benefits); (b) the extent to which means-testing is used to determine benefits eligibility; (c) organization of social insurance schemes based on a universalistic basis or on an occupation basis; and (d) the implications of social policies for women.

The first is the ‘liberal’ regime, where minimal and targeted public intervention is more popular than universalistic government programs. Anglo-Saxon countries represent this regime. Through tax deductions and credits, these countries favor private welfare system. Their policies attempt to minimize inequality through provision of targeted subsidies to the neediest.

The second regime is the ‘social-democratic’ regime; the Nordic countries represent this regime. It provides benefits to the whole population and stresses the role of the welfare state reducing the burden of individual and family responsibilities, in particular with regard to child and elderly care. Most benefits in this regime are universal, and thus it may be difficult to predict accurately the net equalizing effect of benefit policies; the progressive tax system in this regime, however, would reinforce vertical redistribution.

The third regime is conservative and comprises of many of the Continental European countries. These countries are conservative in the sense that the welfare state policies in these countries are designed along the traditional family roles of men and women. The welfare state foundations of this regime are built around mandatory social insurance. The social insurance provides generous coverage mainly for the employed, which are typically male “bread-winners.” The strong emphasis on social insurance programs implies prominence of horizontal redistribution in this regime.

Generally, the ‘liberal’ regime of Anglo-Saxon countries is less redistributive than the regimes of Nordic and Continental European countries. There is, however, no clear connection between these institutional features and the size of the welfare state.

Table 1, reproduced from Esping-Andersen and Myles (2009), shows the relationship between spending on public services and inequality reduction. The first column presents data on the level of public service expenditure as a percentage of disposable income. The second column shows the percentage reduction of post-tax income inequality attributable to public services, measured with the Gini coefficient. The third column assesses the redistributive effect when health and education services are excluded from public services.

According to Table 1, the largest reduction of inequality of disposable income occurred in the Nordic countries, with the means of 37% (all services) and 16% (categories other than health and education). On the other hand, both in terms of spending and redistributive incidence, the

Anglo-Saxon and Continental European countries look very similar. The latter is service lean beyond the conventional health and education services.

Table 1. The impact of services on household inequality reduction

| | Spending on public services (% disposable income) | Percent inequality reduction of disposable income (all services) | Percent reduction when health and education are excluded |
|--------------------|---|--|--|
| Denmark | 37 | 41 | 18 |
| Finland | 27 | 28 | 8 |
| Norway | 34 | 36 | 16 |
| Sweden | 40 | 42 | 21 |
| Regime mean | 35 | 37 | 16 |
| Australia | 28 | 30 | 7 |
| Canada | 26 | 21 | 3 |
| Ireland | 23 | 23 | 3 |
| N. Zealand | 25 | 24 | 3 |
| UK | 20 | 21 | 3 |
| USA | 22 | 22 | 2 |
| Regime mean | 24 | 24 | 4 |
| Austria | 26 | 24 | 0 |
| France | 33 | 30 | 7 |
| Germany | 28 | 26 | 4 |
| Italy | 25 | 24 | 0 |
| Netherlands | 20 | 20 | 4 |
| Spain | 23 | 22 | 0 |
| Regime mean | 26 | 24 | 3 |

Source: Table 1 is reproduced from Esping-Andersen and Myles (2009, Table 25.2).

Redistribution policies reduce inequality but they also reduce poverty. Virtually all studies conclude similarly that poverty reduction, in particular, among families with children, is closely associated with levels of social expenditure. Table 2 shows the effects of social expenditure on poverty reduction.

Table 2 shows that in Nordic countries, where redistributive policies are the most extensive, the post-redistribution poverty rate is only 5%. On the other hand, it is 19% on average in Anglo-Saxon countries. It is worth noting that the pre-redistribution poverty rate for the three

welfare state regimes is similar: 29% for Nordic countries and 32% for Anglo-Saxon and Continental European countries. Presence of extensive welfare state policies thus contributes significantly to the reduction in poverty.

Table 2. Poverty reduction in families with children, mid-1990s¹

| | Market poverty | Post-redistribution of poverty | Percent reduction |
|--------------------|----------------|--------------------------------|-------------------|
| Denmark | 30 | 6 | 80 |
| Finland | 18 | 3 | 83 |
| Norway | 29 | 5 | 83 |
| Sweden | 39 | 4 | 90 |
| Regime mean | 29 | 5 | 84 |
| Australia | 32 | 17 | 47 |
| Canada | 29 | 16 | 45 |
| Ireland | 28 | 15 | 46 |
| UK | 39 | 21 | 46 |
| USA | 31 | 26 | 16 |
| Regime mean | 32 | 19 | 40 |
| Belgium | 31 | 6 | 81 |
| France | 40 | 10 | 75 |
| Germany | 31 | 12 | 61 |
| Italy | 37 | 21 | 43 |
| Netherlands | 25 | 8 | 68 |
| Spain | 30 | 13 | 57 |
| Regime mean | 32 | 12 | 64 |

Note: ¹Poverty is less than 50% of median equivalent income

Source: LIS-based estimates, from Bradbury and Jäntti (2001); Table 2 is reproduced from Esping-Andersen and Myles (2009).

2.4. Political economy and the welfare state

In previous subsections, we discussed several difficulties in measuring redistribution. We also presented empirical evidence that welfare state expansion, particularly an increase in social spending, leads to a decrease in income inequality and poverty. In the following subsections we

will review several theories that explain the relationship between inequality and income redistribution in democratic welfare states.

We will review three different strands of political economy approach: (1) the non-partisan models that emphasizes the role of the median voter; (2) partisan theories that emphasizes differentiated policy positions of policy motivated parties; and (3) institutionalist theories that emphasizes the role of political institutions in determining political outcomes.

The oldest, and probably the most popular, approach evaluates the voter's response to inequality by relying upon the Hotelling-Downs model of political competition, where the median voter is pivotal in determining a political equilibrium. According to Meltzer and Richard (1981: MR model hereafter), demand for redistribution will increase as inequality rises. This is because the median voter becomes poorer as inequality rises.

As we said, however, empirical findings are not favorable to the prediction of the MR model. Facing the mismatch between theoretical prediction and empirical evidence, a number of authors developed models that use the Hotelling-Down model but produce different predictions than that of the MR model.

Moene and Wallerstein (2001, 2003: MW model hereafter), for instance, introduce insurance into the model. Voters not only recognize the role of social spending as redistributing income but also decide on the amount of income transfer for unemployment insurance and the tax needed to cover that insurance. As mean income remains constant in the MW model, the income of the unemployed and that of below-mean income earners converge, leading to a decrease in demand for unemployment insurance. Hence, more inequality influences the median voter to demand less redistribution in the MW model. This is an opposite result from the MR model.

Both MR and MW models posit that voters are only concerned with maximizing their expected utility of consumption and other factors do not influence their political dispositions. Contemporary partisan theories provide a plausible response to the limitations of MR and MW models. Another limitation of the MR and MW models is the assumption that the result of an election is determined by the median voters and that the elected party will carry on to satisfy the needs of the median voters even after the election (McCarty et al., 2009).

Contemporary partisan theories argue that political parties are not only office-seeking but also policy seeking. Parties choose different policy positions due to their uncertainty about the

median voters (Wittman, 1977; Calvert, 1985). The partisan theories are closely related to the power resources theory of Korpi (1983, 2006). According to the power resources theory, unionization and the power of left parties would be an important determining factor for the extent of income redistribution and social insurance policies. The partisan theories will be treated in more detail in section 2.5.

Another important perspective in examining redistributive politics is the role of political institutions. The two views of the institutionalist argument are the following: first, institutions shape voter preferences; second, institutions affect the behavior of political actors. According to empirical studies, federalism is related to a less redistributive government (Huber and Stephens, 2001). Moreover, countries that hold parliamentary elections with proportional representation tend to have a larger welfare state compared to countries with single-member district elections. While the previous subsections emphasize the role of individual income and market risk as a factor in determining one's preferences, the following discussion focuses on the role of parties in shaping voters' preferences towards welfare states.

2.5. Partisan theory and the welfare state

According to 'partisan theories' of public policy (Hibbs, 1987, 1992; **cite others**), the party composition of governments influences the welfare state significantly. Partisan theories are diverse, but perhaps these theories share the following assumptions:

- (1) Political parties have multiple goals. They are policy-seeking as well as office-seeking.
- (2) The social constituencies of parties have distinctive social policy preferences.
- (3) The policy orientation of political parties mirrors the distinctive preferences of their social constituencies.
- (4) Governments are capable of implementing the policies adopted and implementation of these policies results in distinctive welfare state outputs and outcomes.
- (5) The extent to which party differences matter in social policy is contingent upon a wide variety of factors. Particularly large party effects are generated for instance where the government has a large majority, where a coalition government is relatively

homogeneous, where a relatively small number of veto players exists, where the opposition parties are divided, and where there is a substantial room to maneuver for domestic policy.

Many empirical studies confirm that parties actually do matter in influencing the welfare state.

The partisan theorists adopt two approaches in showing partisan effects. One way is through comparing the different policies adopted by political parties and the other is through analyzing the relationship between parties and welfare states.

The first approach evaluates a political party's policy in taxes and public services. Benoit and Laver (2006) collect data from 21 countries and explore the cross-country similarities in party characteristics and their stance on the welfare state. They identify positions of the largest leftist and largest centrist or rightist party, ascribing a number from a scale of 1 through 20. A scale of 1, for example, represents the party's support for increase in taxes in order to improve public services while a party with a scale of 20 believes in cutting taxes.

They find that parties with similar political inclinations share their beliefs towards taxation and public services. While social democratic parties and most center parties maintain a position that supports raising taxes for a better public services, liberal and secular conservative parties aspire to lower taxes and welfare state retrenchment. That political parties have clear stance on their public policy is crucial in explaining partisan effects.

Table 3. Policy positions of political parties on expansion of the welfare state versus retrenchment (early 21st century)

| Country | Pair of largest leftist party and largest center or rightist party | Position of the largest party of the left | Position of the largest center or rightist party | Party difference (left minus right or center) |
|-------------|---|---|--|---|
| Australia | Australian Labor Party vs. Liberal Party | 8.7 | 12.9 | -4.2 |
| Austria | Sozialdemokratische Partei Österreichs vs. Österreichische Volkspartei | 7.5 | 14.7 | -7.2 |
| Belgium | Cartel Sociaal Progressief Alternatief-Spirit vs. Centre Démocrate Humaniste | 7.3 | 14.3 | -7.0 |
| Britain | Labour Party vs. Conservative Party | 8.1 | 15.3 | -7.2 |
| Canada | Liberal Party vs. Progressive Conservative Party | 11.2 | 14.2 | -3.0 |
| Denmark | Socialdemokratiet vs. Venstre, Danmarks liberale parti | 7.4 | 14.8 | -7.4 |
| Finland | Suomen Sosialidemokraattinen Puolue vs. Suomen Keskusta | 8.4 | 9.5 | -1.1 |
| France | Parti Socialist vs. Rassemblement pour la République | 7.1 | 14.3 | -7.2 |
| Germany | Sozialdemokratische Partei Deutschlands vs. Christlich Demokratische Union and Christian Social Union | 9.3 | 14.4 | -5.1 |
| Greece | PASOK vs. Nea Dimokratia | 10.9 | 14.8 | -3.9 |
| Ireland | Labour Party vs. Fianna Fail | 6.6 | 13.8 | -7.2 |
| Italy | Democratic di sinistra vs. Forza Italia | 6.6 | 17.5 | -10.8 |
| Japan | Communist Party vs. Liberal Democratic Party | 8.7 | 10.1 | -1.4 |
| Netherlands | Partij van de Arbeid vs. Christen Democratisch Appel | 8.1 | 13.3 | -5.2 |
| New Zealand | Labour Party vs. National Party | 8.6 | 14.7 | -6.1 |
| Norway | Det Norske Arbeiderparti vs. Fremskrittspartiet | 6.6 | 15.3 | -8.7 |
| Portugal | Partido Socialista vs. Partido Social Democrata | 8.6 | 14.5 | -5.9 |
| Spain | Partido Socialista Obrero Español vs. Partido Popular | 7.4 | 16.7 | -9.3 |
| Sweden | Sveriges Socialdemokratiska Arbetarepartiet vs. Moderata Samlingspartiet | 7.1 | 17.7 | -10.6 |
| Switzerland | Sozialdemokratische Partei der Schweiz vs. | 4.3 | 18.0 | -13.7 |

| | | | | |
|---------------|---------------------------------------|-----|------|-------|
| | Schweizerische Volkspartei | | | |
| United States | Democratic Party vs. Republican Party | 6.3 | 16.8 | -10.5 |
| N = 21 | Mean | 7.9 | 13.7 | -6.2 |

Note: Scale from ‘promotes raising taxes to increase public services’ (1) to ‘promotes cutting public services to cut taxes’ (20).

Source: Table 3 is reproduced from Schmidt (2010).

The second approach shows that political parties have influence over expansion or retrenchment of welfare states. According to Obinger and Wagschal (2000), Western European countries, where their major governments comprise of social democratic or Christian democratic parties, have strong and stable welfare states. On the other hand, governments in which market-oriented conservative parties hold power (the US, Australia, New Zealand, Japan) have limited or weak welfare states. Studies done by Castles (1982, 1988) also complement the view that a government with a strong right party has difficulties advancing welfare state expansion agendas whereas presence of weak rightist party leads to a dramatic expansion of the welfare state.

There are, however, some limitations to partisan theories. While many studies conclude that political parties do affect the development of welfare state, they are not the only determining factor of welfare states (Obinger et al. 2003; Schmidt et al. 2007; Leibfried and Mau 2008). Moreover, the degree of political maneuverability varies across countries. While partisan theories are effective in explaining the relationship between political parties and the welfare state in majoritarian democracies, it is less applicable to non-majoritarian governments (Schmidt, 2010).

Despite these difficulties, partisan theories proves to be an effective approach in explaining the relationship between political parties and welfare state expansion or retrenchment. Our research is along the line proposed by the partisan perspective of explaining the relationship between inequality and redistribution. We will formally develop the relationship in sections 3 and 4.

A summary of social policy positions of political parties is reproduced here from Manfred G. Schmidt’s paper on partisan theory.

Table 4. Social policy positions of major families of parties since the mid-1950s

| Issue / Family of political party | Promoter/ opponent of ambitious social protection | Preferred source of financing the welfare state | Position towards public-private mix in social security | Position towards decommodification | Promoter / opponent of welfare state retrenchment | Other welfare state topics |
|---|--|--|---|---|--|---|
| 1. Radical socialist or communist parties | Promoter | (Progressive) taxes on income and wealth | Promotes state-centered varieties | Strong promoter | Opponent | Promotes guarantee of job security and protectionist foreign economic policy |
| 2. Social democratic parties | Promoter | Taxes and social insurance contributions | Promotes state-centered varieties; private social policy conceivable as third or fourth pillar of social security | Strong promoter | Mainly opponent, promoter only under exceptional circumstances | Favors extensive employment and job protection policies, favors (in most countries) investment in education |
| 3. Religious centre parties | Promoter (especially in periods of higher economic growth) | Social insurance contributions and (voluntary and mandatory) private funds | In favor of a balanced public-private mix | Promoter for social insurance members | Partly promoter, partly opponent | Promoter of subsidiarity and upper limits for social policy |
| 4. Nationalist-populist parties | Promoter | Taxes | In favor of state-centered varieties | Promoter (for national labor) | Mainly opponent | Favor social protection and protectionist foreign economic policy |
| 5. Agrarian parties | Promoter-if costs are externalized | Taxation mainly of urban tax | Indifferent-if externalization of costs | Promoter | Opponent | Favor social protection and protectionist foreign |

| | | payers | feasible | | | economic policy |
|---------------------------------|--------------------------------|--|---|---------------------------------|-------------|---|
| 6. Secular conservative parties | Opponent | (Voluntary and mandatory) private funds and tax-based liberal welfare state regime | Promote strong private social policy and a parsimonious welfare state | Opponent | Promoter | Oppose trade unions and rigid job protection |
| 7. Liberal parties | Opponent | Promoter of private, capital-funded social security arrangements | Promote strong private social policy and a parsimonious welfare state | Opponent | Promoter | Oppose trade unions; favor equal opportunity policy |
| 8. Green parties | Partly in favor, party against | Taxation | Promote generous social protection; accept moderate role of private social policy | Promoter of basic social income | Indifferent | Promote permissive social policy; favor marginal groups and anti-discrimination |

Note on Sources: The policy positions in Table 4 are reproduced from Schmidt (2010).

So far, we reviewed political economy perspectives, covering both partisan and non-partisan approaches. In the following subsection, we will explore other factors that influence individual preferences towards redistributive policies.

2.6. Individual preferences and the welfare state

People's support for the welfare state relies on their belief system. If they trust that luck (vs. effort) plays an important role in generating economic opportunities, they would support redistribution (Fong, 2001). Bartels' research (2007) also shows that people who believe in egalitarian values incline towards expansion of welfare states, after controlling for income, education, and other material factors. According to a study done by Alesina and La Ferrara (2005), voters who expect their incomes to reach the 70% percentile of income distribution tend to be against redistributive policies. Hence, people's perception of their income influences their stance on redistributive policies.

Inefficiencies may arise from lack of information when forming one's belief system. In Bartels' work (2007), he gives an example where misinformed voters strongly supported Bush tax cuts, believing that they would receive substantial amount of personal tax reductions. Voters later realize that they overestimated their personal tax cuts. Moreover, voters may abuse the welfare system when they come to realize the relationship between income and effort. According to some studies, voters learn that as levels of taxes and transfers increase, there is less association between individual effort and income (Piketty, 1995; Benabou and Tirole, 2006). Voters believe that income is randomly assigned and that they can get away with exerting less effort when working. As a result, voters would continue to support high taxation and transfers.

One's religion may also play an important role in influencing a voter's opinion towards redistributive policies. This perspective asserts that religion advertises poor people's attention away from voting for their economic interests or forming an organization to represent their views. According to a study conducted by Scheve and Stasavage (2006), religious countries are far less likely to support social spending compared to non-religious countries. They argue that religious people turn to their religion when faced with difficulties, thus, reducing the need for social spending. Benabou and Tirole's study also supports this view, arguing that the after-life rewards

promised in religion allows people to work hard in real life while displaying lower support for redistribution. Religion not only shows psychological effect but also provides material aid for people. For example, transfers from congregations may also substitute the welfare state redistribution and social insurance (Huber and Stanig, 2007).

In addition, a voter's view on race and ethnicity influences his opinion towards redistributive policies. Roemer et al. (2007) argues that anti-solidarity effect of racism and xenophobia causes voters to vote against redistribution. The sentiment of racism and xenophobia would hinder majority of voters from supporting redistributive policies that would benefit the minority. Another study shows that white voters in the USA incorrectly believe that the majority of the poor population is African-American as opposed to many blacks being poor (Gillens 1999). This incorrect belief leads to unsupportive welfare state and negative impression towards the poor people.

An interesting aspect of racial politics is that different class-based groups can form a coalition with other ethnic groups to push for anti-welfare policy agendas (Fernandaz and Levy, 2005). Similarly, high-skilled, high-wage earning whites and blacks can form a coalition against the group consisting of low-skilled, low-income blacks and whites (Austen-Smith and Wallerstein, 2006). The high wage earners would be less supportive in redistributive policies and against high taxation for social insurance. A main obstacle for racial politics perspective is that there are still many unexplainable variations in racially homogeneous countries (Pontusson, 2005).

As discussed above, there are other mediating factors that influence individual's preferences towards income redistribution. Religion and presence of racist tendencies are only a few of the many variables that affect voters' belief in welfare state. While Meltzer-Richard and Moene-Wallerstein models emphasize income distribution as an important determinant of voter behavior, Roemer (1998) develops a two-dimensional electoral competition model that represents not only redistributive policy preferences of the voters but also their preferences in another non-economic issue. This is an example of issue bundling. When the wage for median voter is higher than the mean income in the non-economic dimension, the party representative of low-income voters would propose a zero tax rate. On the other hand, if the median voter is poorer than overall median in the other non-economic dimension, the party would increase redistribution. Therefore, Roemer asserts that both economic and non-economic dimension of voters should be examined

when evaluating a party's redistributive tendencies. The main criticism of Roemer's argument is that it is a two-party model and that with multiparty systems, there may be more than two issues, resulting in the formation of a coalition government.

Another approach in explaining individual preferences towards redistribution is through assessing one's social affinities. Kristov et al. (1992) argue that policy preferences of a median voter should be evaluated according to the distance between her income, and that of the rich and the poor. If the voter finds her income to be close to the income of the poor, she will support redistributive policies while if she identifies with the rich, then she will vote against expansion of welfare state. The social affinities perspective differ from the MR and MW models in that it focuses on an individual's relative distance from the rich or the poor while the other models compare the median voter income to the objective median income.

To a certain degree, individual preferences for redistributive policies are embedded in welfare-state institutions as well. In evaluating the extent of the governmental role in decreasing income inequality, researchers found a positive correlation between trust in the federal government and support for redistributive policies (Hetherington, 2004). Moreover, the organization of public welfare system affects individual opinion towards redistribution. For example, personal experience with the social assistance programs leads to a decrease in trust for political institutions, and ultimately, less support for welfare state programs in Sweden and USA (Kumlin, 2004). In other words, the public welfare provision plays an important role in determining the tax rate preferred by the median voter.

2.7. Conclusion

Redistributive effects of the welfare state are usually estimated through a comparison between market income and disposable income. The problem associated with this method is that it ignores the welfare state effect on pre-tax market income.

The second half of this section discusses various theories on the effects of inequality on redistribution. While Meltzer and Richard model and Moene and Wellerstein model yield different results, they are similar in that they assume median voters act in order to maximize their expected utility of consumption.

According to partisan theories of political competition, the party composition of a government matters in determining the welfare state redistribution. There is compelling evidence to support that policy positions of political parties are different and that they influence the expansion or retrenchment of welfare states.

Not only political parties but individual preferences affect income redistribution. One's belief in future income, luck as determining factor of economic opportunity, and religion affiliations are among the many factors that lead to development of welfare state.

While it is a common belief that there is a positive correlation between the size of the welfare state, measured by social spending as a percentage of GDP, and its income redistributive effects, it is extremely difficult to examine the relationship between inequality and redistribution. Many approaches suggest that the increase in inequality would result in increase in demand for redistribution. Empirical findings, however, do not coincide with the predictions of these theories.

Through further evaluation of partisan tradition in the following sections, we propose that the Left party supports higher redistributive taxes than the Right party and that as inequality rises, the Left party supports more redistribution, while the Right party supports less redistribution. The model introduced in the following section provides logic behind these hypotheses while section 4 supplies the empirical evidence.

3. The model

3.1. Generalized Wittman-Roemer model of political competition

Throughout this section, we will maintain that there are two political parties (or candidates representing them), L and R. If there are more than two parties, as in many European countries, we assume that they can be properly classified into the two party system.

In our model, the policy space is a subset of the unit interval: $T \subset [0,1]$. We are studying political competition over a uni-dimensional policy space. A generic element of T will be denoted by t , which we call a tax rate or a size of redistribution. We assume that the party that wins the election implements its announced tax rate.

Because we are modeling an election in large polities, we assume a continuum of voters distributed by a one-dimensional characteristic, $w \in H \subset \mathbb{R}_+$. We call w an income; its mean is denoted by μ . We assume that its distribution is described by a strictly increasing and continuous function, $F(\cdot)$. The associated probability measure will be denoted by $P(\cdot)$.

Suppose $(t_L, t_R) \in T \times T$ is a pair of policy positions of the two parties. Given t_j , where $j = L, R$, we assume that voter preferences are given by

$$(1 - t_j)w + h(t_j\mu), \quad (1)$$

where $h : T \rightarrow \mathbb{R}$ is a strictly increasing, strictly concave, and finite-valued function on T .

Our model postulates a perfectly representative democracy where: (1) every voter belongs to one and only one party; (2) each party member receives an equal weight in the determination of the party's von Neumann-Morgenstern utility function; and (3) each voter votes for the party of which he/she is a member.

Facing (t_L, t_R) , voter w (weakly) prefers L to R if

$$(t_L - t_R)w \leq (h(t_L\mu) - h(t_R\mu)). \quad (2)$$

Thus, given (t_L, t_R) , the set of voters who prefer L to R is

$$\Omega(t_L, t_R) = \begin{cases} \{w \in \mathbb{R}_+ \mid w \leq w(t_L, t_R)\} & \text{if } t_L > t_R \\ \{w \in \mathbb{R}_+ \mid w \geq w(t_L, t_R)\} & \text{if } t_L < t_R, \\ \text{a random half subset of } \mathbb{R}_+ & \text{if } t_L = t_R \end{cases} \quad (3)$$

where $w(t_L, t_R) \equiv \max\left[\frac{h(t_L, \mu) - h(t_R, \mu)}{t_L - t_R}, 0\right]$. We are assuming that indifferent voters decide their

party membership by flipping a fair coin. This means that the two random half-subsets of \mathbb{R}_+ will have exactly the same distributions of voters as $F(\cdot)$.

The membership share of party L is then

$$P(\Omega(t_L, t_R)) = \begin{cases} F(w(t_L, t_R)) & \text{if } t_L > t_R \\ 1 - F(w(t_L, t_R)) & \text{if } t_L < t_R \\ \frac{1}{2} & \text{if } t_L = t_R \end{cases}. \quad (4)$$

We now introduce the two factions that Nash-bargain one another in setting the party policy. As in Roemer (2001), the two factions in each party are the opportunists and the militants.

We define the payoff function of the opportunists in party L to be

$$\pi(t_L, t_R) = \Phi\left(P(\Omega(t_L, t_R))\right), \quad (5)$$

where $\Phi : [0, 1] \rightarrow [0, 1]$ is a strictly increasing function such that $\Phi\left(\frac{1}{2}\right) = \frac{1}{2}$ and

$\Phi(x) = 1 - \Phi(1 - x)$. In like manner, the payoff function of party R's opportunists is defined by:

$$1 - \pi(t_L, t_R) = 1 - \Phi\left(P(\Omega(t_L, t_R))\right) = \Phi\left(1 - P(\Omega(t_L, t_R))\right). \quad (6)$$

Although our formulation is flexible enough to cover various specifications in the literature on political economy, we will simply call $\pi(t_L, t_R)$ and $1 - \pi(t_L, t_R)$ probabilities of victory. These are the objective functions of the opportunists in the two parties.

We now describe the objective function of the militants. Consider an arbitrary partition of the polity into two sets of party members, H_L and H_R , such that $H_L \cup H_R = \mathbb{R}_+$ and $H_L \cap H_R = \emptyset$. Assume that a party's von Neumann-Morgenstern utility function is the average of its members' utility functions. Thus, for an arbitrary policy $t \in T$ and party memberships H_L and H_R , they are:

$$V(t; H_L) = \begin{cases} \frac{1}{P(H_L)} \int_{w \in H_L} ((1-t)w + h(t\mu)) dP(w) & \text{if } P(H_L) \neq 0 \\ 0 & \text{if } P(H_L) = 0 \end{cases}, \quad (7)$$

and

$$V(t; H_R) = \begin{cases} \frac{1}{P(H_R)} \int_{w \in H_R} ((1-t)w + h(t\mu)) dP(w) & \text{if } P(H_R) \neq 0 \\ 0 & \text{if } P(H_R) = 0 \end{cases}. \quad (8)$$

In our model, these are the objective functions that the militants would like to maximize.

Because voter's utility function is quasi-linear, each party's von Neumann-Morgenstern utility function, defined as the average well-being of its members, is identical to the utility function of the voter whose income equals the mean income of its members; for

$$\frac{1}{P(H_L)} \int_{w \in H_L} ((1-t)w + h(t\mu)) dP(w) = (1-t)w_L + h(t\mu), \quad (9)$$

and

$$\frac{1}{P(H_R)} \int_{w \in H_R} ((1-t)w + h(t\mu)) dP(w) = (1-t)w_R + h(t\mu), \quad (10)$$

where $w_L = \frac{1}{P(H_L)} \int_{w \in H_L} w dP(w)$ and $w_R = \frac{1}{P(H_R)} \int_{w \in H_R} w dP(w)$.

If party L's factions fail to come to an agreement, party R wins the election by default; the probability of victory for party L is zero and party R's policy will be implemented. Thus, given (t_R, H_L) , the Nash-bargaining solution between the two factions of party L is the policy t_L that maximizes a Nash product:

$$(\pi(t, t_R) - 0)^{\gamma_L} (V(t; H_L) - V(t_R; H_L))^{1-\gamma_L}, \quad (11)$$

for some $\gamma_L \in [0, 1]$. Similarly, given (t_L, H_R) , party R's factions Nash-bargain to a policy t_R that maximizes:

$$(1 - \pi(t_L, t) - 0)^{\gamma_R} (V(t; H_R) - V(t_L; H_R))^{1-\gamma_R}, \quad (12)$$

for some $\gamma_R \in [0, 1]$.

We now define our equilibrium concept.

Definition 1: For given $\gamma_L, \gamma_R \in [0, 1]$, a generalized Wittman-Roemer political equilibrium is a partition of the polity into H_L^* and H_R^* and a pair (t_L^*, t_R^*) such that:

- (1) $t_L^* \in \arg \max(\pi(t, t_R^*))^{\gamma_L} (V(t; H_L^*) - V(t_R^*; H_L^*))^{1-\gamma_L}$;
- (2) $t_R^* \in \arg \max(1 - \pi(t_L^*, t))^{\gamma_R} (V(t; H_R^*) - V(t_L^*; H_R^*))^{1-\gamma_R}$;
- (3) $w \in H_L^* \Rightarrow w \in \Omega(t_L^*, t_R^*)$,
 $w \in H_R^* \Rightarrow w \in \mathbb{R}_+ \setminus \Omega(t_L^*, t_R^*)$;

The first two conditions in Definition 1 require that given (H_L^*, H_R^*) , (t_L^*, t_R^*) be a Nash equilibrium of the game in which each party's payoff function is a weighted Nash product of the payoff functions of its two factions. Thus a generalized Wittman-Roemer equilibrium is 'doubly Nash.' Each party plays a best-response to the opponent while holding (H_L^*, H_R^*) constant, and the best-response is an outcome of a within-party Nash-bargaining process.

The third condition endogenizes party membership; it states that no member of either party is better represented by the other party at the equilibrium. Baron (1993) first uses the idea here ('voting with feet') in the context of political competition, although our formulation is closer to those of Ortuno-Ortin and Roemer (1998) and Roemer (2001: page 92).

Some remarks are in order.

First, if we set $\gamma_L = \gamma_R = 1$, we have the Hotelling-Downs model. In this model, the militants have no bargaining power in both parties.

Second, if we set $\gamma_L = \gamma_R = 0$, we have the model of political competition between two purely ideological parties in which the opportunists have no say in determining party policies. We call a political equilibrium in this case an ideological-party equilibrium.

Finally, if $\gamma_L = \gamma_R = \frac{1}{2}$, then we have the classical Wittman-Roemer model, adapted for endogenous party membership, where the two factions have equal bargaining power in both parties. (For details of the classical Wittman-Roemer model, see Roemer (2001: Chapter 3).)

3.2. Inequality and redistribution

So far we described our model in its full generality. To study the effect of changing inequality on the equilibrium tax rates, we now specialize to the case where:

$$(1) \ w \text{ is uniformly distributed over } H \equiv \left[\frac{1}{2} - a, \frac{1}{2} + a\right] \text{ with mean } \mu = \frac{1}{2};$$

$$(2) \ h(t\mu) = -2(t\mu - \mu)^2 = -2\mu^2(t - 1)^2;$$

and

$$(3) \ \Phi(x) = \frac{1}{2\beta}\left(x - \frac{1}{2}\right) + \frac{1}{2}.$$

Parameter a captures the degree of inequality in the current model; a larger value of a corresponds to a greater level of inequality. Specifically, for a' and a'' such that $a'' > a'$, the income distribution with parameter a'' is a mean-preserving spread of the income distribution with parameter a' ; the distribution with a' Lorenz-dominates the distribution with a'' .

Because of assumptions (1) and (2), the policy preference of voter type $w \in H$ is:

$$v(t, w) = (1 - t)w - \frac{1}{2}(t - 1)^2. \quad (13)$$

Therefore, assuming that $t_L > t_R$ and that equilibrium exists in the interior of H , we compute the set of voters who prefer L to R as

$$\Omega(t_L, t_R) = \{w \in H \mid v(t_L, w) > v(t_R, w)\} = \left\{w \in H \mid w < \left(1 - \frac{t_L + t_R}{2}\right)\right\}, \quad (14)$$

and the membership share of party L as

$$P(\Omega(t_L, t_R)) = F\left(1 - \frac{t_L + t_R}{2}\right) = \frac{1}{2a}\left(1 - \frac{t_L + t_R}{2} - \frac{1}{2}\right) + \frac{1}{2} = \frac{1}{4a}(1 - t_L - t_R) + \frac{1}{2}. \quad (15)$$

Because of assumption (3), we then have:

$$\pi(t_L, t_R) = \frac{1}{2\beta}\left(P(\Omega(t_L, t_R)) - \frac{1}{2}\right) + \frac{1}{2} = \frac{1}{4a\beta}\left(2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2}\right). \quad (16)$$

Ideological party equilibrium

Political parties in the ideological party model are not strategic; each party simply chooses the ideal policy of its average member. Without endogenous party membership, this model would be trivial. With endogenous party membership, however, the model is no longer trivial. Although each party puts forth the ideal policy of its average member, the membership is endogenously determined; this in turn changes the policy of the two parties.

Because the distribution of w is symmetric, we start with a reasonable conjecture of equilibrium partition of constituency; $H_L = [\frac{1}{2} - a, \frac{1}{2}]$ and $H_R = [\frac{1}{2}, \frac{1}{2} + a]$. (We will confirm later that this is indeed an equilibrium partition supported by equilibrium tax rates.) Also we conjecture that w_L and w_R take the following form at the equilibrium: $w_L = \frac{1}{2} - \varepsilon$ and $w_R = \frac{1}{2} + \varepsilon$, where $0 < \varepsilon < a$. The payoff functions of the militants under these specializations are given by:

$$V(t, H_L) = (1-t)\left(\frac{1}{2} - \varepsilon\right) - \frac{1}{2}(t-1)^2 \text{ for party L;}$$

and

$$V(t, H_R) = (1-t)\left(\frac{1}{2} + \varepsilon\right) - \frac{1}{2}(t-1)^2 \text{ for party R.}$$

Differentiating $V(t_L, H_L)$ with respect to t_L and setting the equation equal to zero yields $t_L^* = \frac{1}{2} + \varepsilon$. Likewise, differentiating $V(t_R, H_R)$ with respect to t_R and setting the equation equal to zero yields $t_R^* = \frac{1}{2} - \varepsilon$.

Because $H_L = [\frac{1}{2} - a, \frac{1}{2}]$ and $H_R = [\frac{1}{2}, \frac{1}{2} + a]$, the average income in each party is $w_L = \frac{1}{2} - \frac{a}{2}$ and $w_R = \frac{1}{2} + \frac{a}{2}$; thus $\varepsilon = \frac{a}{2}$. The ideological equilibrium with endogenous party membership is (t_L^*, t_R^*) such that $t_L^* = \frac{1}{2} + \varepsilon = \frac{1}{2} + \frac{a}{2}$ and $t_R^* = \frac{1}{2} - \varepsilon = \frac{1}{2} - \frac{a}{2}$.

We now verify that the equilibrium partition of constituency is precisely equal to the one we started the analysis with. Note that $\Omega(t_L, t_R) = \{w \mid w < (1 - \frac{t_L + t_R}{2})\}$. Thus

$$H_L^* = \Omega(t_L^*, t_R^*) = [\frac{1}{2} - a, \frac{1}{2}).$$

Note that $t_L^* > t_R^*$; party L's tax rate is bigger than party R's tax rate at the equilibrium. Also an increase in the value of a increases t_L^* but decreases t_R^* .

Wittman-Roemer equilibrium

This is the case where $\gamma_L = \gamma_R = \frac{1}{2}$. As in the ideological party model, we will start with $H_L = [\frac{1}{2} - a, \frac{1}{2})$ and $H_R = [\frac{1}{2}, \frac{1}{2} + a]$ as a correct conjecture of the partition of constituency. We

also conjecture that w_L and w_R take the following form at the equilibrium: $w_L = \frac{1}{2} - \varepsilon$ and

$w_R = \frac{1}{2} + \varepsilon$, where $0 < \varepsilon < a$. (Again we confirm later that they are correct conjectures.)

We first compute that:

$$V(t_L; H_L) - V(t_R; H_L) = (t_L - t_R)(\frac{1}{2} + \varepsilon - \frac{t_1 + t_2}{2});$$

and

$$V(t_R; H_R) - V(t_L; H_R) = (t_R - t_L)(\frac{1}{2} - \varepsilon - \frac{t_1 + t_2}{2}).$$

Thus party L's payoff function becomes

$$\pi(t_L, t_R)(V(t_L; H_L) - V(t_R; H_L)) = \frac{1}{4a\beta}(2a\beta + \frac{1}{2} - \frac{t_1 + t_2}{2})(t_L - t_R)(\frac{1}{2} + \varepsilon - \frac{t_1 + t_2}{2}).$$

Differentiating it with respect to t_L yields

$$-\frac{1}{2}(t_L - t_R)(\frac{1}{2} + \varepsilon - \frac{t_L + t_R}{2}) + (2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2})(\frac{1}{2} + \varepsilon - \frac{t_L + t_R}{2}) + (2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2})(t_L - t_R)(-\frac{1}{2}) = 0$$

Merging the second and the third terms, you may reduce it to:

$$(t_L - t_R)(-\frac{1}{2} + \varepsilon + \frac{t_L + t_R}{2}) = 2(2a\beta + \frac{1}{2} - \frac{t_L + t_R}{2})(-\frac{1}{2} + \varepsilon + t_L).$$

In like manner, you may compute that the first order condition for party R reduces to:

$$(t_L - t_R)(-\frac{1}{2} - \varepsilon + \frac{t_L + t_R}{2}) = 2(2a\beta - \frac{1}{2} + \frac{t_L + t_R}{2})(-\frac{1}{2} - \varepsilon + t_R).$$

Symmetric structure of the model suggests that we try for a solution of the form

$t_L = \frac{1}{2} + \delta$ and $t_R = \frac{1}{2} - \delta$. Substituting these values into the first order conditions yields a

solution of $\delta = \frac{2a\beta\varepsilon}{2a\beta + \varepsilon}$. As in the case of the ideological party equilibrium, $\varepsilon = \frac{a}{2}$. Thus the

Wittman-Roemer equilibrium with endogenous party is (t_L^{**}, t_R^{**}) such that:

$$t_L^{**} = \frac{1}{2} + \frac{2a\beta\varepsilon}{2a\beta + \varepsilon} = \frac{1}{2} + \frac{a\beta}{2\beta + \frac{1}{2}};$$

and

$$t_R^{**} = \frac{1}{2} - \frac{2a\beta\varepsilon}{2a\beta + \varepsilon} = \frac{1}{2} - \frac{a\beta}{2\beta + \frac{1}{2}}.$$

Note that the policies at the Wittman-Roemer equilibrium are more moderate than the policies at the ideological party equilibrium; $t_R^* < t_R^{**} < t_L^{**} < t_L^*$. Still, rising inequality makes the two parties respond differently; an increase in the value of a increases t_L^{**} but decreases t_R^{**} .

Hotelling-Downs equilibrium

The Hotelling-Downs model is also a special case of the generalized Wittman-Roemer model. In the Hotelling-Downs model, a pair of Condorcet winners constitutes a political equilibrium. Because the unique Condorcet winner in this model is the policy preferred by the voter with median income, the Hotelling-Downs equilibrium is $(t_L^0, t_R^0) = (\frac{1}{2}, \frac{1}{2})$.

Note that the Hotelling-Downs equilibrium in our model does not change with respect to changes in inequality. This is because we postulated a symmetric distribution in which the median is always identical to the mean. In the case where the median is less than the mean, however, both parties will increase the tax rate as inequality rises.

4. Empirical assessment of the implications of the various models

The main results of our model studied in section 3 imply the following two propositions:

First, the Left party proposes higher redistributive taxes than the Right party at the equilibrium.

Second, as inequality rises, the Left party increases redistribution, while the Right party decreases it.

Mathematically, the aforementioned two propositions can be summarized as follows. Let t_j^* be the equilibrium redistributive tax rate of party $j = L, R$ and θ the variable capturing inequality. Then the first proposition says that $t_L^* > t_R^*$. The second proposition, on the other hand, says that $\frac{\partial t_L^*}{\partial \theta} > 0$ and $\frac{\partial t_R^*}{\partial \theta} < 0$.

In this section, we test these two implications of our model using an unbalanced panel of 20 OECD countries during the period of 1980-2001. The 20 OECD countries include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, the UK, and the US. The average time period covered by each country is approximately 20 years, which implies that there are on average 2-3 missing observations for each country.

4.1. Data

We employ social transfers (as a percentage of GDP) as a measure of redistributive tax rates. We use the social transfers database compiled by Peter Lindert,³ who constructs it using the OECD social expenditure database. The social transfers variable includes the following: non-contributory public pensions, public health expenditure, the sum of family cash benefits, family service expenditures and expenditures on active labor market policies, and the sum of

³We downloaded the database from Peter Lindert's homepage, <http://lindert.econ.ucdavis.edu/>.

unemployment compensation and early retirement for labor market reasons and severance pay.⁴ This will become the dependent variable in the following regressions.

Regarding inequality, we use two inequality indices compiled by the University of Texas Inequality Project (UTIP): the estimated household income inequality (EHII) index and the Theil index. The EHII index is a Gini coefficient estimated in a consistent manner.⁵

The databases for these two indices provide the largest sample size. The EHII database has a slightly larger sample size than the Theil index database; the total sample size is 406 for the EHII and 389 for the Theil.

We measure the strength of the Left party by the Left party strength in cabinets and parliaments. We constructed our measure of the strength of political parties based upon the political parties dataset compiled by Duane Swank.⁶ Swank (1999) classifies various political parties in OECD countries into three categories –the leftist, the centrist, and the rightist parties – and reports each party’s cabinet portfolios (as a percentage of all cabinet portfolios) and its legislative seats (as a percentage of all legislative seats). We take the average of the cabinet portfolio percentage and the legislative seats percentage as a measure of party’s strength. Since there are only two parties (Left and Right) in our model, we allocate the centrist party’s strength equally to the leftist and rightist parties.

We cannot expect policy switches to occur immediately with a change in the party governance. Thus we use a cumulative measure of Left party strength, denoted by $LCUM_{i,t}$, rather than an instantaneous measure of Left party strength. The cumulative measure of Left party strength is defined as the sum of the strengths of Left party from 1977 until time t .⁷

⁴We have also tried total social transfers, which include additionally housing subsidies and other compensations, but the main results are not sensitive to the choice of social transfers.

⁵ Many studies have used the Gini coefficients in the Deininger and Squire (DS) database uncritically. As the UTIP argues, however, the records of the Gini coefficients in the DS database are too sparse at the level of individual country. Furthermore, the way the Gini coefficients are constructed is not consistent across countries. For example, some countries have used before-tax income in reporting Gini coefficients whereas others have used after-tax income.

⁶The web address of Duane Swank’s homepage is http://www.marquette.edu/polisci/faculty_swank.shtml.

⁷The choice of 1977 is entirely due to data availability. Swank’s data for Spain starts from 1977.

In addition to the variables capturing inequality and Left party strength, we include the following additional variables as regressors.

(1) Trade openness: We include trade openness (which is the sum of import and export as a percent of GDP) as a regressor. Some previous studies such as Cameron (1978), Katzenstein (1985), Garrett (2001), Garrett and Mitchell (2001), and Rodrik (1998) find the importance of openness on welfare state regimes and the size of redistribution.

(2) Country size: Alesina and Wacziarg (1998) argue that the correlation between openness and redistribution observed by some authors may be a spurious one. They show that the relationship is not robust when country size is appropriately controlled for. Their explanation is that trade openness can easily take on a negative correlation with country size because small countries can achieve the same economies of scale as large countries by engaging in foreign trade. Likewise, a small country tends to have a bigger government due to the fixed costs in establishing a set of institutions. We use total population size (POP) as a proxy for country size.

(3) Size of the labor force: It is measured by the population size between 15 and 64 years old.

(4) Dependency ratio: It is measured by the sum of the percentage of total population over 65 years and the percentage of total population under 15 years. Some authors argue that it is one of major determinants of social spending (Lindert, 1996).

(5) per capita GDP: The so-called Wagner's law argues a positive correlation between social expenditure and a country's level of per capita GDP. We use the real GDP per capita calculated using the chain index method (RGDPC).

The data for these variables are taken from Peter Lindert's homepage.

4.2. A bird's eye view of inequality, redistribution, and party strength

This subsection provides a bird's eye view of inequality, redistribution, and party strength. We report how the average of inequality, the redistributive tax rate and the left party strength across the 20 OECD countries have evolved over time. A more rigorous, multi-variate regression analysis for the models presented in the previous sections will be conducted in the next subsection.

The 20 countries we study cover almost two thirds of the entire OECD member countries; we believe that our analysis is suggestive of overall movements of these variables among the entire OECD member countries. We also examine the cross-sectional relations between individual country's average inequality and average redistributive tax rates, between individual country's average inequality and the most recent $LCUM_{i,t}$, and between individual country's average redistributive tax rates and the most recent $LCUM_{i,t}$.

Movements of these variables at the individual country level are provided in the appendix.

Inequality

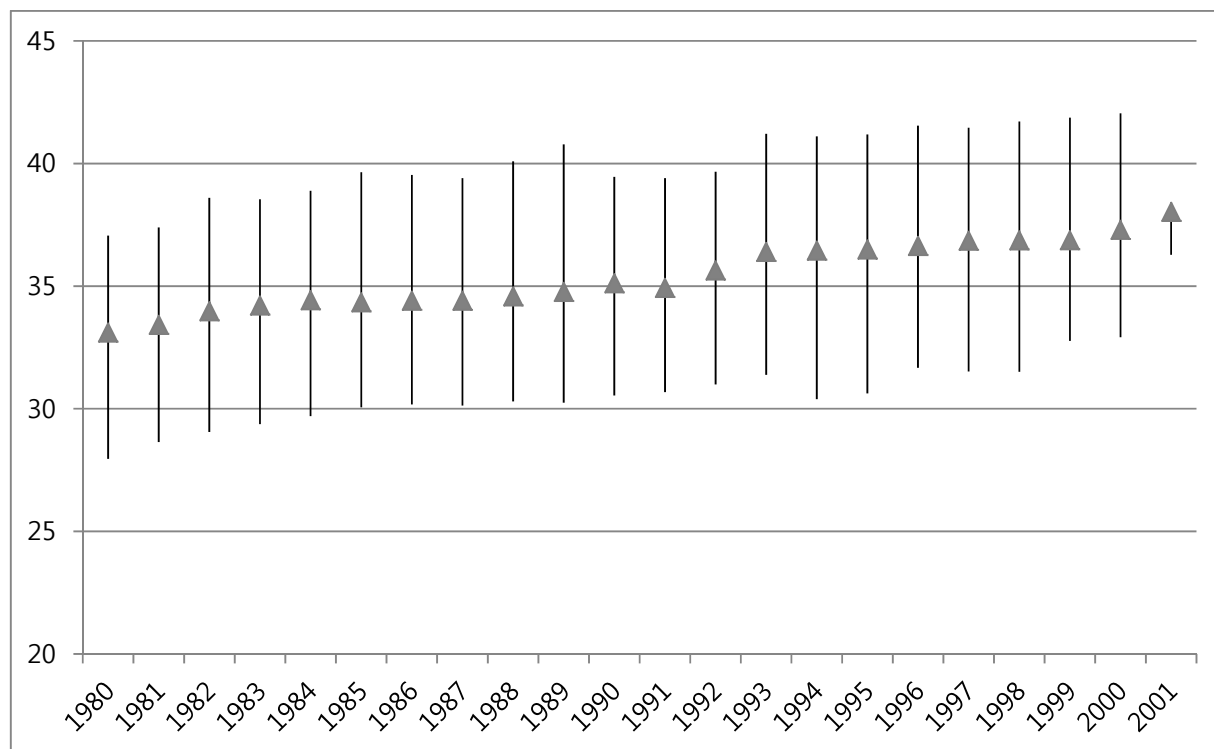
Whether income inequality among nations has risen over time or not for the last 60 years has been an important source of debates among economists. Economists have not reached a consensus on this issue.

Milanovic (2005) demonstrates that the differences between rich and poor countries have increased over the last 50 years; a few countries were able to catch up with rich countries but they are exceptions rather than rules. Gurria (2010) also reports that inequality among OECD countries has risen since the 1980s. Sala-i-Martin (2006), on the other hand, argues that global inequality has been reduced during the 1980s and the 1990s.

As the UTIP argues, the discrepancy in the results across studies seems to stem mainly from sparse and inconsistent inequality measures across countries. To avoid this problem, we need a dataset of inequality indices constructed using a consistent estimation method. We use the EHII dataset and the Theil index, which are consistently estimated by the UTIP.

Figure 1 presents the time-series movement of the EHII indices averaged over countries and its 90% interval over time. Figure 1 clearly shows a gradual increase in the average of the EHII since 1980.

Figure 1. Movements of Average EHII and its 90% Interval

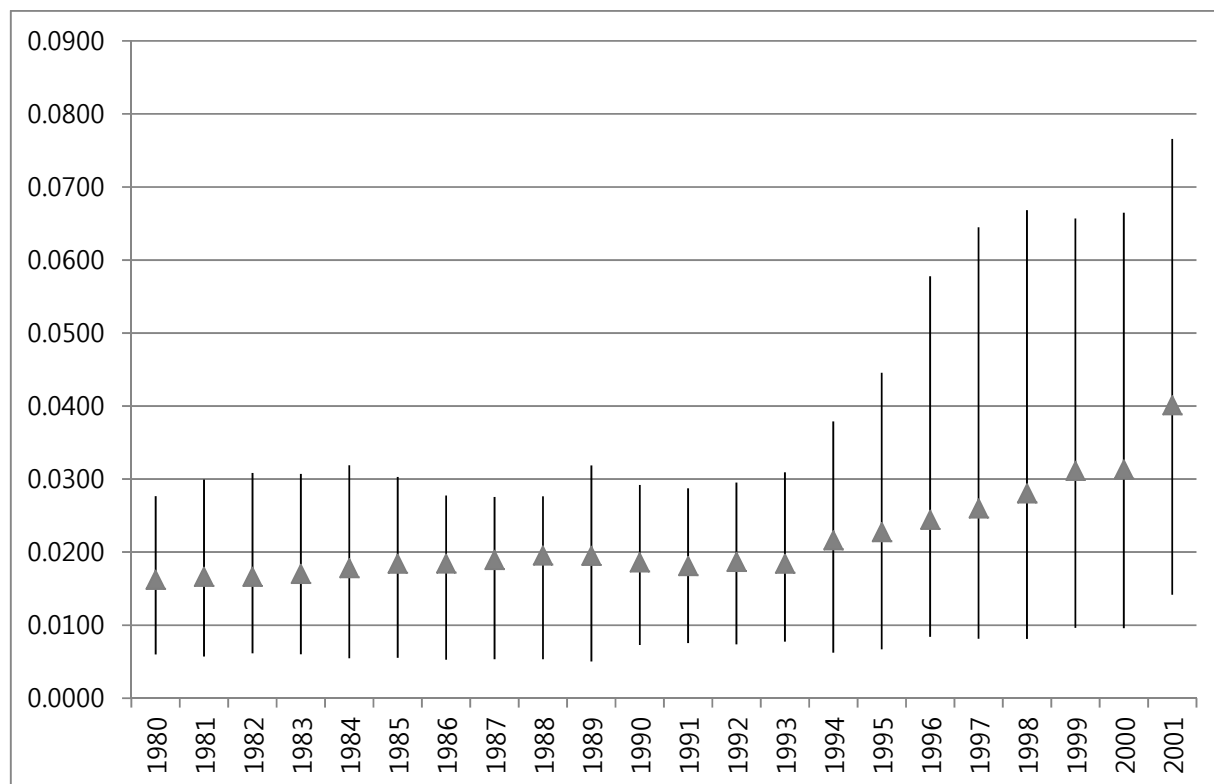


Note: This figure shows movements of average EHII and 90% interval across countries between 1980 and 2001.

Data source: EHII data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

Figure 2 presents the time-series movement of the cross-country average Theil indices. Consistent with Figure 1, Figure 2 also suggests a rise in income inequality across countries, especially since the mid-1990s.

Figure 2. Movements of Average Theil Index and its 90% Interval



Note: This figure shows movements of average Theil index and 90% interval across countries between 1980 and 2001.

Data source: The Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

The results shown in Figures 1 and 2 imply that inequality has risen over time in the OECD countries. Our results are consistent with those of Milanovic (2005) and Gurria (2010) rather than those of Sala-i-Martin (2006).

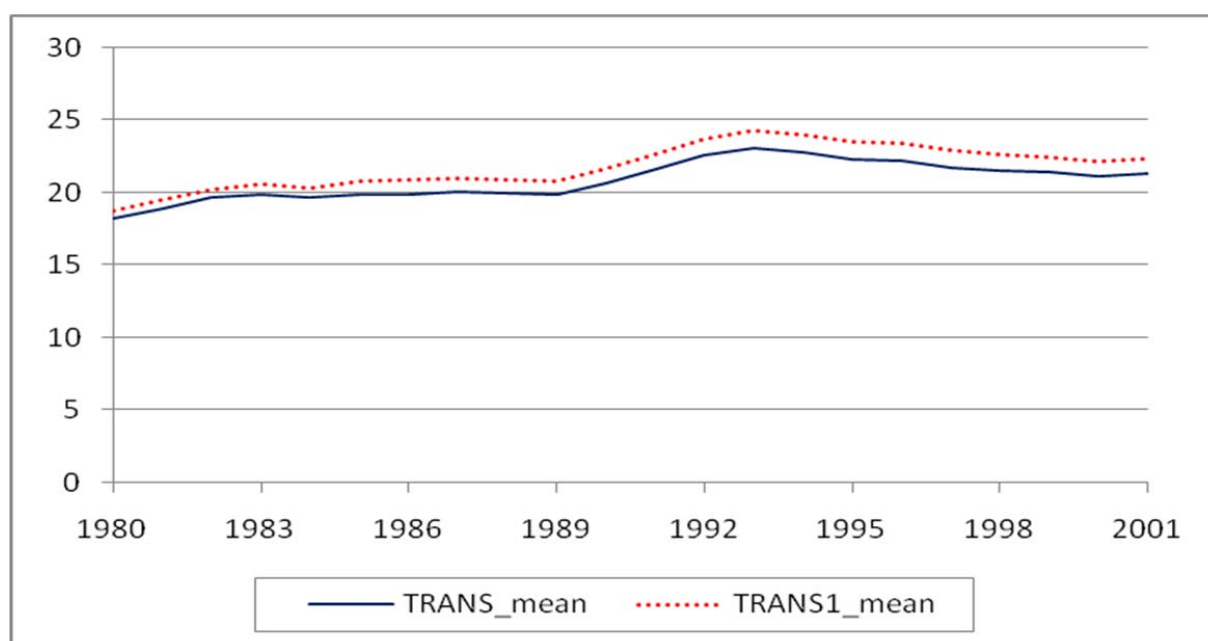
Redistributive Tax Rates

Figure 3 presents the time-series movement of the cross-country average redistributive tax rates. Redistributive tax rates are social transfers, which include non-contributory public pensions, public health expenditure, family cash benefits, family service expenditures, expenditures on

active labor market policies, unemployment compensation, early retirement for labor market reasons and severance pay, as a percentage of GDP.

The average redistributive tax rates have been stable during the 1980s, risen during the early 1990s, and declined slightly since the mid 1990s. Unlike inequality measures, we do not see any upward or downward trend from redistributive tax rates. A qualitatively identical plot is obtained even if we add housing subsidies and other compensations to the social transfers.

Figure 3. Movements of Average Redistributive Tax Rates

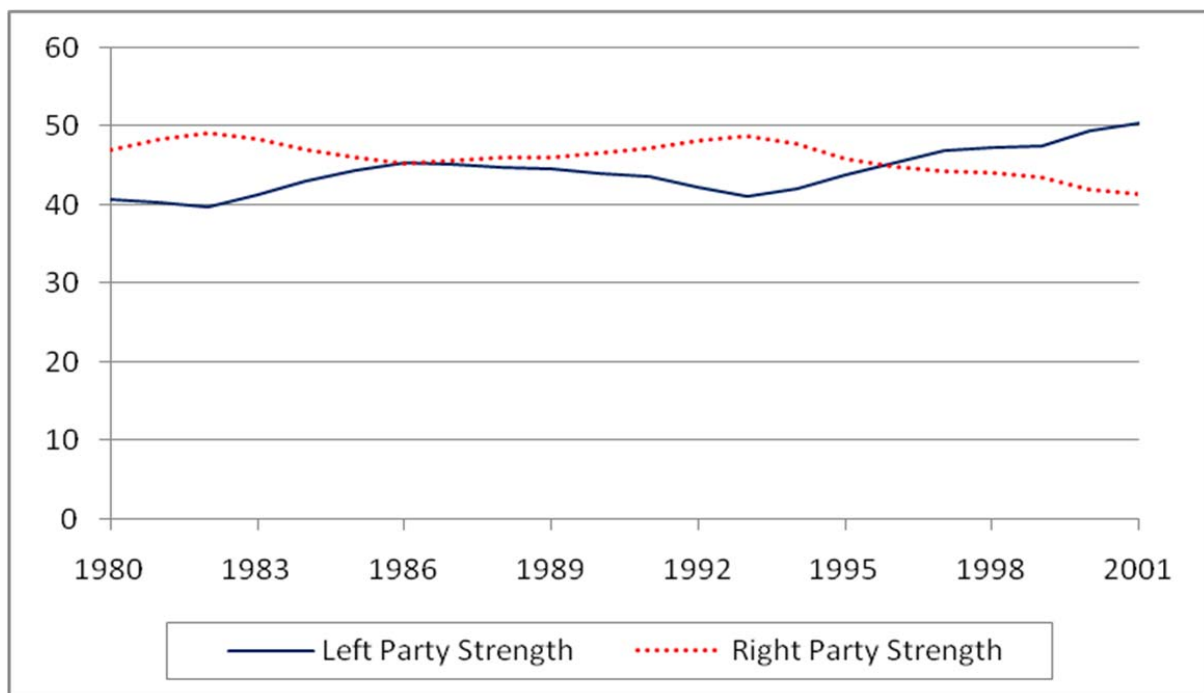


Notes: This figure shows movements of average redistributive tax rates across sample countries between 1980 and 2001. ‘Trans_mean’ denotes social transfers, which include non-contributory public pensions, public health expenditure, family cash benefits, family service expenditures, expenditures on active labor market policies, unemployment compensation, early retirement for labor market reasons and severance pay, as a percentage of GDP. ‘Trans1_mean’ includes housing subsidies and other compensations in addition to ‘Trans_mean’.

Party strength

Figure 4 shows the time-series movement of the cross-country average party strength. The average of the cabinet portfolio percentage and the legislative seats percentage is used as a measure of party's strength, and the three-year moving average is taken for this time series of average party strength. As shown in Figure 4, rightist party has been slightly stronger from 1980 until 1995, but leftist party has become stronger since 1996.

Figure 4. Movements of Average Party Strength



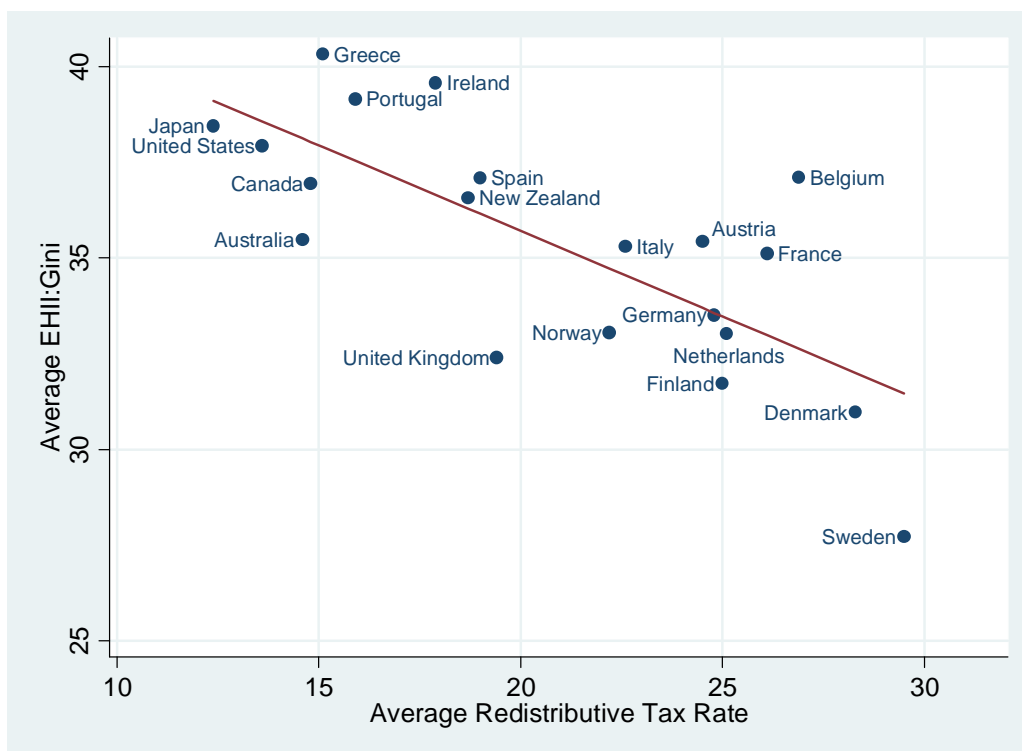
Note: This figure shows movements of average party strength across 20 countries. We take the average of the cabinet portfolio percentage and the legislative seats percentage as a measure of a party's strength. We allocate the centrist party's strength equally to the leftist and rightist parties. The cross-sectional average of party strength is computed every year and then three-year moving average is taken for this time series of average party strength.

Cross-sectional Relation between Inequality and Redistributive Tax Rates

Figure 5 shows the cross-sectional relationship between the over-time average of EHII index and the over-time average of the redistributive tax rate among the 20 OECD countries. That is, we plot each country's average level of inequality and average redistributive tax rate. The downward sloping straight line represents the fitted line obtained from the OLS regression of average EHII values on average redistributive tax rates.

Figure 5. Inequality and Redistributive Tax Rates

Inequality = EHII

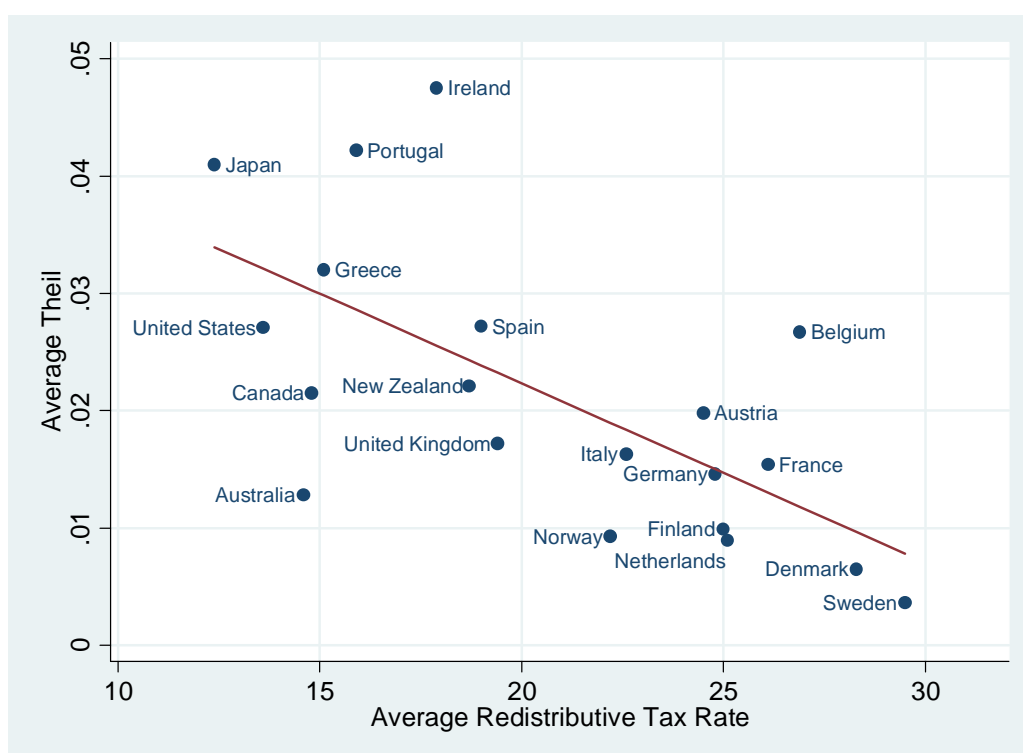


Note: This figure shows average redistributive tax rates and average inequality by each country. Inequality is measured by EHII.

A negative relationship between average EHII values and redistributive tax rates is clearly seen in Figure 5; a country with a low value of inequality seems to have a high level of redistribution on average. The negative cross-sectional relation is robust even when we replace the inequality measure with the Theil index, as shown in Figure 6. In both cases, the coefficients of average redistributive tax rates are significant at the 1% level.

Figure 6. Inequality and Redistributive Tax Rates

Inequality = Theil



Note: This figure shows average redistributive tax rates and average inequality by each country. Inequality is measured by the Theil index.

These figures do not establish any causality. One could argue from the negative relationship shown in Figures 5 and 6 that a more unequal country tends to redistribute less, and

take it as clear evidence against the prediction of the Hotelling-Downs model.⁸ One can, however, equally argue that a more redistributing country tends to have a lower level of inequality.

Cross-sectional Relation between Redistributive Tax Rates and Left Party Strength

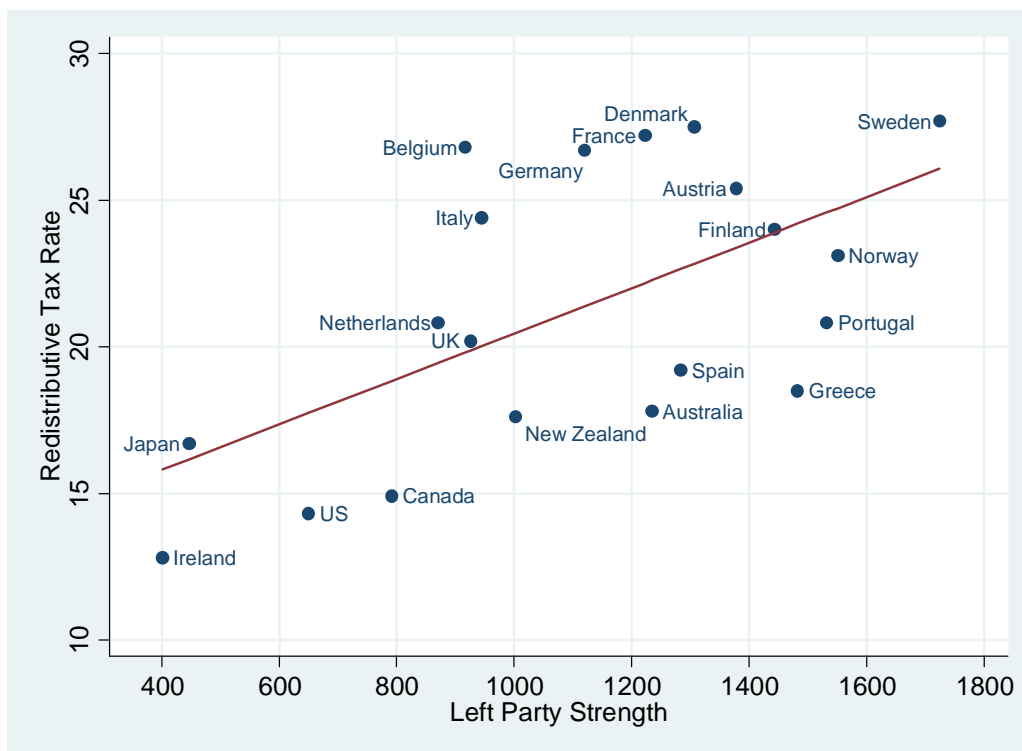
Figure 7 plots each country's average redistributive tax rate and the value of $LCUM_{i,t}$ at year 2001, together with the fitted value from the OLS regression of over-time average redistributive tax rates on the values of $LCUM_{i,t}$ in 2001. The value of $LCUM_{i,t}$ in Figure 7 is the sum of the share of the Left party in cabinets and its share in parliaments from 1977 until 2001.

Figure 7 clearly establishes a positive relationship between the two variables. The relation is robust even when the over-time average redistributive tax rates is replaced with the redistributive tax rates as of 2001, as shown in Figure 8. In both cases, the coefficients of $LCUM_{i,t}$ are significant at the 5% level.

Two interpretations are possible for the positive relationship between the level of redistribution and the left party strength: (1) countries with stronger leftist parties tend to redistribute more; or (2) more redistributing countries tend to have stronger leftist parties.

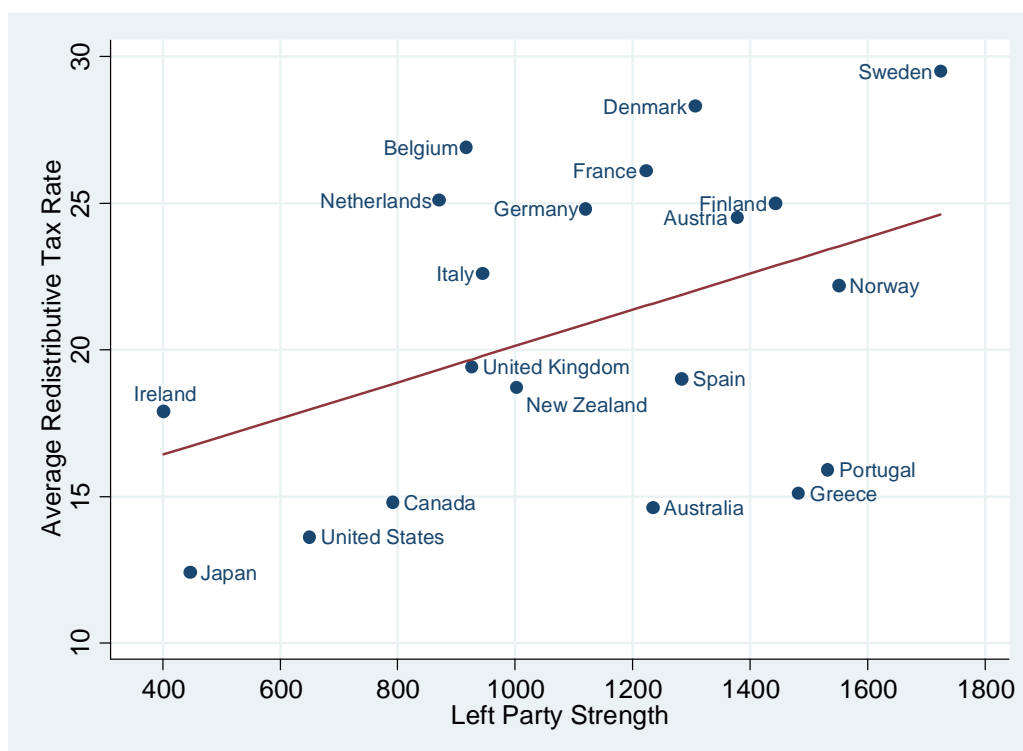
⁸The Hotelling-Downs model would predict a positive relation between inequality and redistributive tax rates.

Figure 7. Redistributive Tax Rates and Left Party Strength in 2001



Note: This figure shows redistributive tax rates in 2001 and Left party strength measured by $LCUM_{i,t}$ in 2001 across countries.

Figure 8. Redistributive Tax Rates and Left Party Strength



Note: This figure shows average redistributive tax rates and Left party strength (measured by $LCUM_{i,t}$ in 2001) by each country.

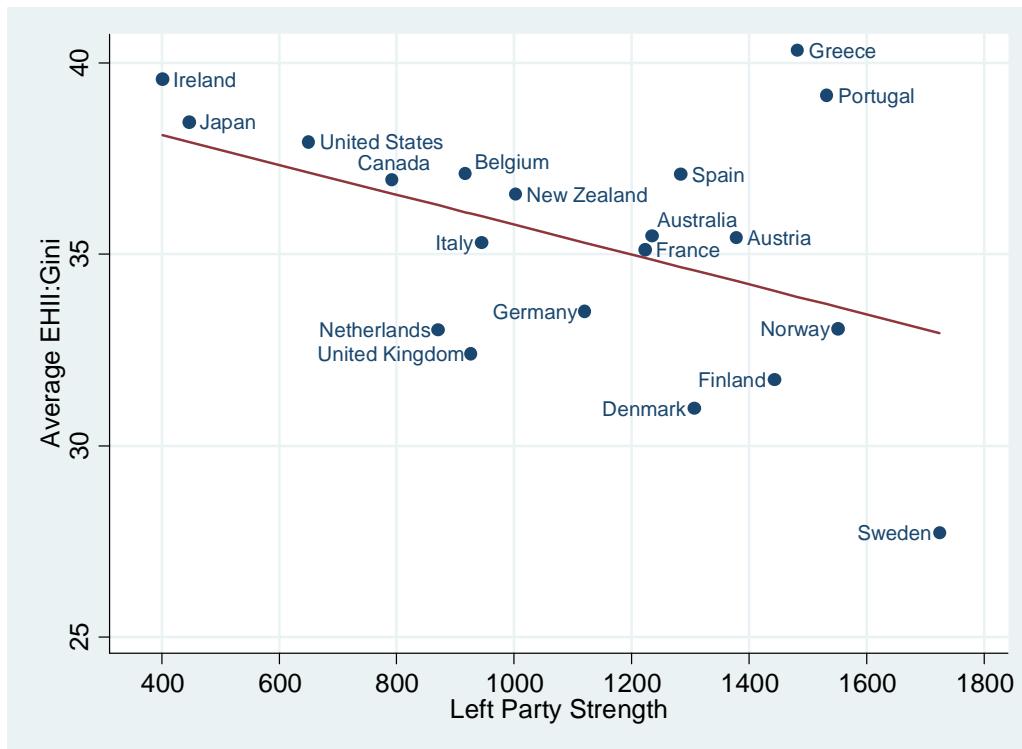
Cross-sectional Relation between Inequality and Left Party Strength

Figure 9 plots the over-time average values of the EHII index and the values of $LCUM_{i,t}$ at 2001 among the 20 OECD countries, together with the fitted value from the OLS regression of average EHII values on values of $LCUM_{i,t}$ in 2001.

A strong negative relationship between the two variables is estimated. The relationship is robust even when the Theil index is used for the inequality index; see Figure 10. In both cases, the coefficients of $LCUM_{i,t}$ are significant at the 5% level.

Figure 9. Left Party Strength and Inequality

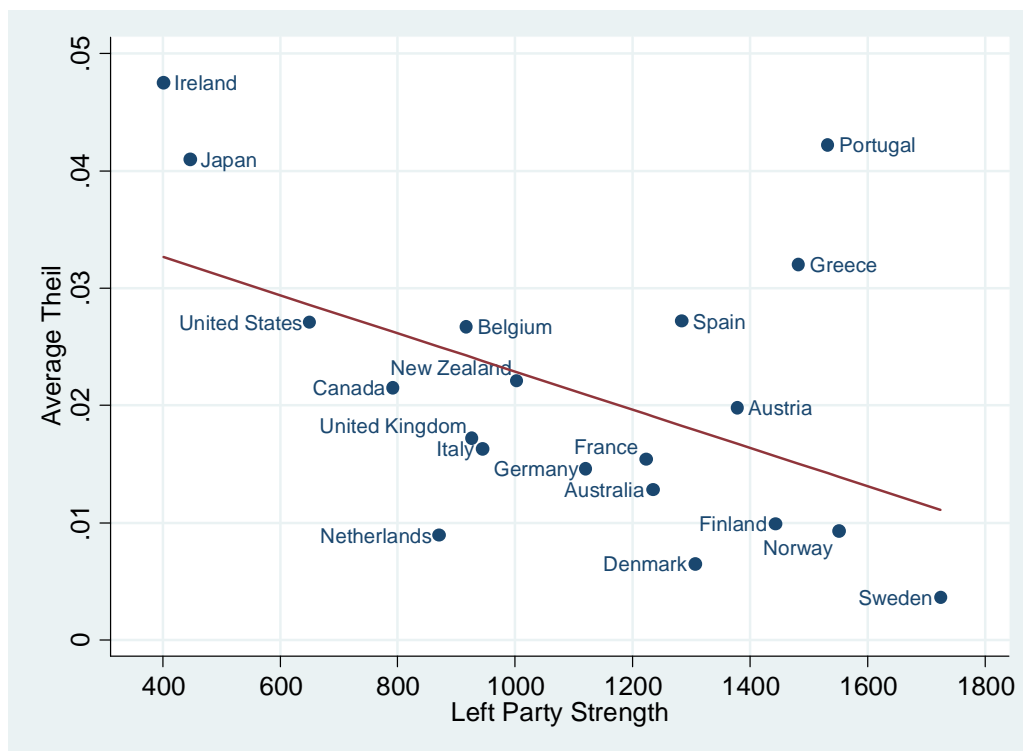
Inequality = EHII



Note: This figure shows average inequality (measured by EHII) and Left party strength (measured by $LCUM_{i,t}$ in 2001) by each country.

Figure 10. Left Party Strength and Inequality

Inequality = Theil



Note: This figure shows average inequality (measured by the Theil index) and Left party strength (measured by $LCUM_{i,t}$ in 2001) by each country.

4.3. Model specification

The previous section examined simple correlation between inequality, redistribution, and party strength. We now carry out multi-variate regression analysis.

Recall that two main implications from our theoretical model are the following:

(1) the Left party's redistributive tax rate is higher than the Right party's redistributive tax rate; and

(2) as inequality rises, the Left party increases redistribution, while the Right party decreases it.

From them, we deduce the following testable hypotheses:

- (1) the overall impact of Left party strength on redistributive tax rates is positive;
- (2) the response of redistributive tax rates to inequality is conditional on the strength of Left or Right parties.

In order to test these hypotheses, we set the following panel regression model with an interaction term:

$$REDIST_{i,t+h} = b_0 + b_1 INEQ_{i,t} + b_2 (INEQ_{i,t} \times LCUM_{i,t}) + b_3 LCUM_{i,t} + \sum b_k CONTROLS_{i,k,t} + \sum b_i COUNTRY_{i,t} + \sum b_j YEAR_t + \varepsilon_{i,t+h}$$

where $REDIST_{i,t+h}$ denotes the redistributive tax rate for country i at time t , $INEQ_{i,t}$ denotes the inequality index for country i at time t , $LCUM_{i,t}$ denotes the measure of Left party strength for country i at time t , and $CONTROLS_{i,k,t}$ denotes other control variables such as trade openness, real per capita GDP, population size, labor force size and the dependency ratio. In addition to these control variables, we included country dummies, to control for factors specific to each country, and year dummies, to capture shocks specific to year t but common to all countries (e.g. global business cycles or changes in oil prices).

Because we do not know the exact timing from which the effect of Left party strength on redistributive tax rates becomes significant, we tried four different values for the lag in the regression. That is, we examine all cases of $h=0$, $h=1$, $h=2$, and $h=3$. However, the results are remarkably similar across different values of lags considered in this study.

4.4. Estimation Results

Before running the full regression model, we ran a regression equation without the interaction term. The results are shown in Table 5. The first two columns present the results when the EHII is used as a measure of inequality, and the next two columns show the results when the Theil is used.

Table 5. Regression Results on the Determinant of Redistributive Tax Rates

| | Inequality=EHII | | Inequality=THEIL | |
|---------------------------|-----------------------|-----------------------|----------------------|-----------------------|
| | H=0 | H=2 | H=0 | H=2 |
| <i>INEQ_{i,t}</i> | 0.1178 (0.0936) | 0.0267 (0.1013) | 46.4269 (25.6315) | 46.8348 (28.7261) |
| RGDP | -0.0005** (0.0002) | -0.0001 (0.0002) | -0.0006* (0.0002) | -0.0002 (0.0002) |
| Open | -0.0833* (0.0336) | -0.1233** (0.0320) | -0.0834* (0.0323) | -0.1290** (0.0333) |
| POP | 0.0002 (0.0002) | 0.0001 (0.0002) | -0.0000 (0.0002) | 0.0001 (0.0002) |
| Dependency Ratio | 0.0651 (0.3186) | 0.1348 (0.3035) | 0.2905 (0.3520) | 0.3386 (0.3332) |
| Labor force size | -0.0002 (0.0003) | -0.0002 (0.0003) | 0.0001 (0.0003) | -0.0001 (0.0003) |
| <i>LCUM_{i,t}</i> | 0.0045* (0.0018) | 0.0052* (0.0018) | 0.0053* (0.0019) | 0.0058** (0.0019) |
| No.obs | 406 | 424 | 389 | 406 |

Notes: Numbers in parentheses are robust standard errors. ‘*’ and ‘**’ denote that coefficients are significantly different from zero at the 5% level and 1% level, respectively. All regressions include country dummies and year dummies but coefficients for these dummies are suppressed.

Recall that Figures 5 and 6 establish a strong negative simple correlation between inequality and redistribution. When we use a multi-variate regression model, such a strong correlation disappears; the coefficient of inequality is positive, although it is insignificant.

It is possible to interpret the coefficient of inequality obtained from zero lag (h=0) as measuring the effect of redistribution on inequality rather than the effect of inequality on redistribution: reverse causality. To tackle the issue of reverse causality, we varied the value of

the lag; the results are almost identical for different values of h. We present only the results for h=2.

Summarizing, when the interaction term is not introduced, the effect of inequality on redistribution appears to be insignificantly positive.

We now enter the interaction term into the regression model. The results for the regression model with the interaction term are presented in Table 6. Table 6 shows the results with two different values of the lag: h=0 and h=2. The goodness of fit is reasonably high for our regression models, with the values of adjusted R^2 in the range of 0.67 – 0.68.

Table 6. Regression Results on the Determinant of Redistributive Tax Rates

| | Inequality=EHI | | Inequality=THEIL | |
|--------------------------------|----------------------|-----------------------|----------------------|-----------------------|
| | h=0 | h=2 | h=0 | h=2 |
| $INEQ_{i,t}$ | -0.0412 (0.1122) | -0.1936 (0.1095) | 15.0913 (30.4026) | -18.8654 (31.1489) |
| RGDP | -0.0003 (0.0002) | 0.0001 (0.0001) | -0.0005* (0.0002) | 0.0000 (0.0002) |
| Open | -0.0720* (0.0287) | -0.1090** (0.0240) | -0.0734* (0.0281) | -0.1128** (0.0259) |
| POP | 0.0001 (0.0002) | 4.05e-06 (0.0002) | -0.0001 (0.0002) | -0.0000 (0.0002) |
| Dependence Ratio | 0.3725 (0.2710) | 0.5866* (0.2371) | 0.4926 (0.2926) | 0.7016* (0.2549) |
| Labor force size | -0.0001 (0.0003) | -0.0000 (0.0003) | 0.0002 (0.0003) | 0.0000 (0.0003) |
| $LCUM_{i,t}$ | -0.0073 (0.0046) | -0.0124** (0.0033) | 0.0043 (0.0021) | 0.0035* (0.0017) |
| $INEQ_{i,t} \times LCUM_{i,t}$ | 0.0003** (0.0001) | 0.0005** (0.0001) | 0.0623 (0.0343) | 0.1305** (0.0315) |
| No.obs | 406 | 424 | 389 | 406 |

Notes: Numbers in parentheses are robust standard errors. '*' and '**' denote that coefficients are significantly different from zero at the 5% level and 1% level, respectively. All regressions include country dummies and year dummies but coefficients for these dummies are suppressed.

We observe several interesting facts from Table 6.

First, the coefficient for the interaction term is significant at the 1% level in the first, second, and fourth columns, and marginally significant in the third column. These results imply that the previous regression without the interaction term is subject to the problem of misspecification. The significant interaction terms suggest that relationship between inequality, redistributive tax rates, and left party strength is non-linear.

Second, the coefficient for the inequality term is not significant at all while the coefficient for the interaction term ($INEQ_{i,t} \times LCUM_{i,t}$) is mostly significantly positive. These results contradict the implication of the Hotelling-Downs models. Were the prediction of the Hotelling-Downs model correct, the overall sign of the coefficient for inequality would have been negative regardless of the size of Left party strength.

With these two points in mind, we now test our two main hypotheses.

First, we test the first implication of our model – that the overall impact of Left party strength on redistributive tax rates is positive – by examining the sign of the coefficient for $LCUM_{i,t}$, which is equal to $b_2(INEQ_{i,t}) + b_3$. Since b_3 is negative in some cases while b_2 is positive in all cases, we compute $b_2(INEQ_{i,t}) + b_3$ for different values of $INEQ_{i,t}$.

Table 7 reports values of $b_2(INEQ_{i,t}) + b_3$ for three different values of $INEQ_{i,t}$: the minimum value of $INEQ_{i,t}$, the mean value of $INEQ_{i,t}$, and the maximum value of $INEQ_{i,t}$. The results in Table 3 are consistent with our model; $b_2(INEQ_{i,t}) + b_3$, the overall coefficient of $LCUM_{i,t}$, is positive for practically all possible values of the inequality index. Furthermore, the coefficients are significant in almost all cases in Table 3.

The results in Table 7 are consistent with a stable positive relationship between $LCUM_{i,t}$ and the redistributive tax rates in 2001 shown in Figure 7.

Table 7. The Conditional Relationship between Left Party Strength and Redistribution

| $b_2(INEQ_{i,t}) + b_3$ | | | | |
|-------------------------|----------------------|----------------------|----------------------|----------------------|
| | Inequality=EHI | | Inequality=THEIL | |
| | h=0 | h=2 | h=0 | h=2 |
| Min($INEQ_{i,t}$) | 0.0017 (0.0018) | 0.0009 (0.0012) | 0.0045** (0.0020) | 0.0035* (0.0017) |
| Mean($INEQ_{i,t}$) | 0.0049** (0.0014) | 0.0055** (0.0012) | 0.0056** (0.0017) | 0.0061** (0.0015) |
| Max($INEQ_{i,t}$) | 0.0087** (0.0018) | 0.0113** (0.0020) | 0.0126** (0.0034) | 0.0210** (0.0038) |

Notes: This table examines the overall impact of Left party strength on redistributive tax rates. The impact depends on inequality level. Numbers in parentheses are robust standard errors.

Second, another implication of our model was that the impact of inequality on redistributive tax rates depends on which party governs. More specifically, our model implies that the overall coefficient of inequality $b_1 + b_2(LCUM_{i,t})$ is negative when Left party strength is low, it increases with $LCUM_{i,t}$, and becomes positive for high values of $LCUM_{i,t}$. Since b_1 is mostly negative and b_2 is always positive in Table 6, our prediction appears to be supported by data. In order to check this more clearly, we compute $b_1 + b_2(LCUM_{i,t})$ for different values of $LCUM_{i,t}$. Table 8 reports values of $b_1 + b_2(LCUM_{i,t})$ for the minimum value of $LCUM_{i,t}$, the mean value of $LCUM_{i,t}$, and the maximum value of $LCUM_{i,t}$.

It turns out that $b_1 + b_2(LCUM_{i,t})$ is always negative for the minimum value of $LCUM_{i,t}$. Since $b_1 + b_2(LCUM_{i,t})$ increases with $LCUM_{i,t}$, it becomes positive for the mean value of $LCUM_{i,t}$, and the maximum value of $LCUM_{i,t}$. These results are consistent with the implication of our theoretical model that when the Left party is politically weak, the response of redistributive tax rates to inequality will be negative, but the response increases with the strength of Left party and becomes positive for large values of $LCUM_{i,t}$.

Table 8. The Conditional Relationship between Inequality and Redistribution

| $b_1 + b_2(LCUM_{i,t})$ | | | | |
|-------------------------|----------------------|----------------------|----------------------|----------------------|
| | Inequality=EHII | | Inequality=THEIL | |
| | h=0 | h=2 | h=0 | h=2 |
| Min($LCUM_{i,t}$) | -0.0200 (0.1081) | -0.1798 (0.1080) | -0.0200 (0.1081) | -0.1798 (0.1080) |
| Mean($LCUM_{i,t}$) | 0.1738 (0.0926) | 0.0803 (0.0926) | 0.1738 (0.0926) | 0.0803 (0.0926) |
| Max($LCUM_{i,t}$) | 0.5530** (0.1715) | 0.6083** (0.1384) | 0.5530** (0.1715) | 0.6083** (0.1384) |

Notes: This table examines the relation between inequality and redistributive tax rates. The impact depends on the level of Left Party strength. Numbers in parentheses are robust standard errors.

The results in Tables 8 and 9 are robust to the choice of h and to the choice of the inequality index (between the EHII and the Theil).

4.5. Empirical Analysis for Korea

This section presents empirical analysis for Korea. The main reason for why we did not include Korea in our original sample is that the sample period for most variables in Korea starts from about 1990. For example, political variables before the 1990s in Korea do not have any suggestive information due to the military dictatorship in Korea during the 1980s. Various components of social transfers in Korea began to be reported to the OECD only after 1990. In addition, some variables such as active labor market program expenditures, expenditures on active labor market policies, and housing subsidies were used in constructing social transfers in Lindert's dataset but are not available for Korea.⁹ It is not possible to construct redistributive tax rates in Korea consistently with other OECD countries. Considering these limits in data for Korea, we have decided to present a brief analysis for Korea separately in this section.

Inequality: Gini Coefficient in Korea

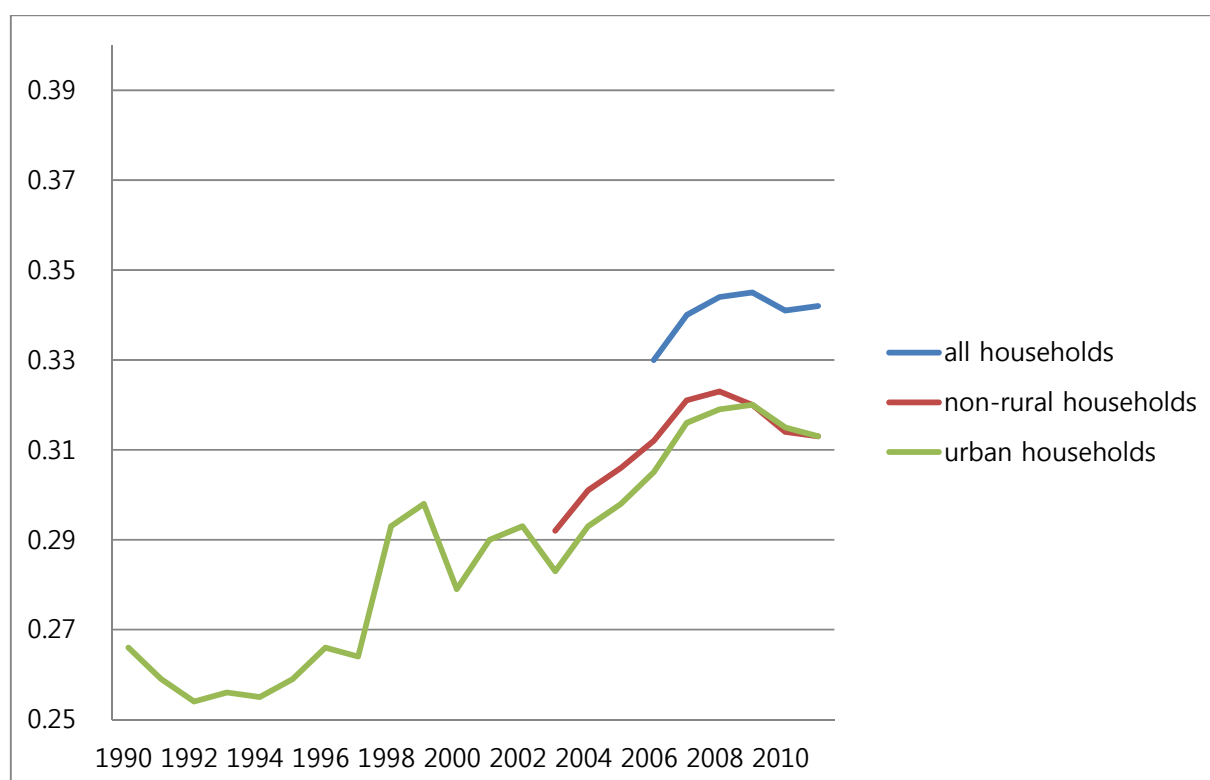
⁹At this moment, we are not sure whether these expenditures have been zero in Korea or were not reported to the OECD.

Figure 11 shows movements of Gini coefficients based on market incomes in Korea. Three different Gini coefficients are plotted in Figure 11. The longest time coverage is obtained from the Gini coefficients constructed from incomes of urban households with two or more household members. The second longest time coverage is obtained from those constructed from non-rural households with two or more household members. The Gini coefficients constructed from all households in Korea have the shortest time coverage.

Regardless of types of Gini coefficients, inequality has risen quite rapidly since 1992.

Market income is used for the construction of Gini coefficients in Figure 11. Figure 12 shows the trend of Gini coefficients constructed from disposable incomes; we observe a very similar trend.

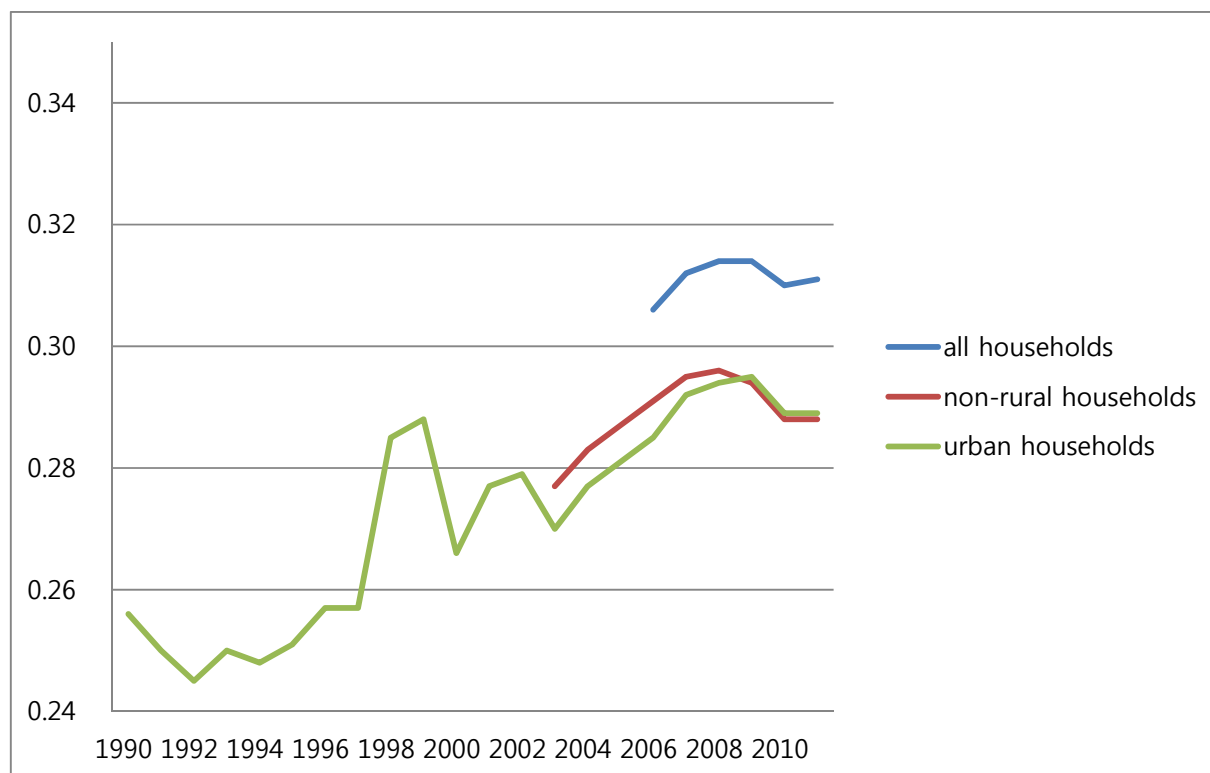
Figure 11. Movements of Gini Coefficient Based on Market Income in Korea



Note: This figure shows movements of Gini coefficients based on market income in Korea.

Data source: National Statistical Office at http://kosis.kr/abroad/abroad_01List.jsp?parentId=A.

Figure 12. Movements of Gini Coefficient Based on Disposable Income in Korea

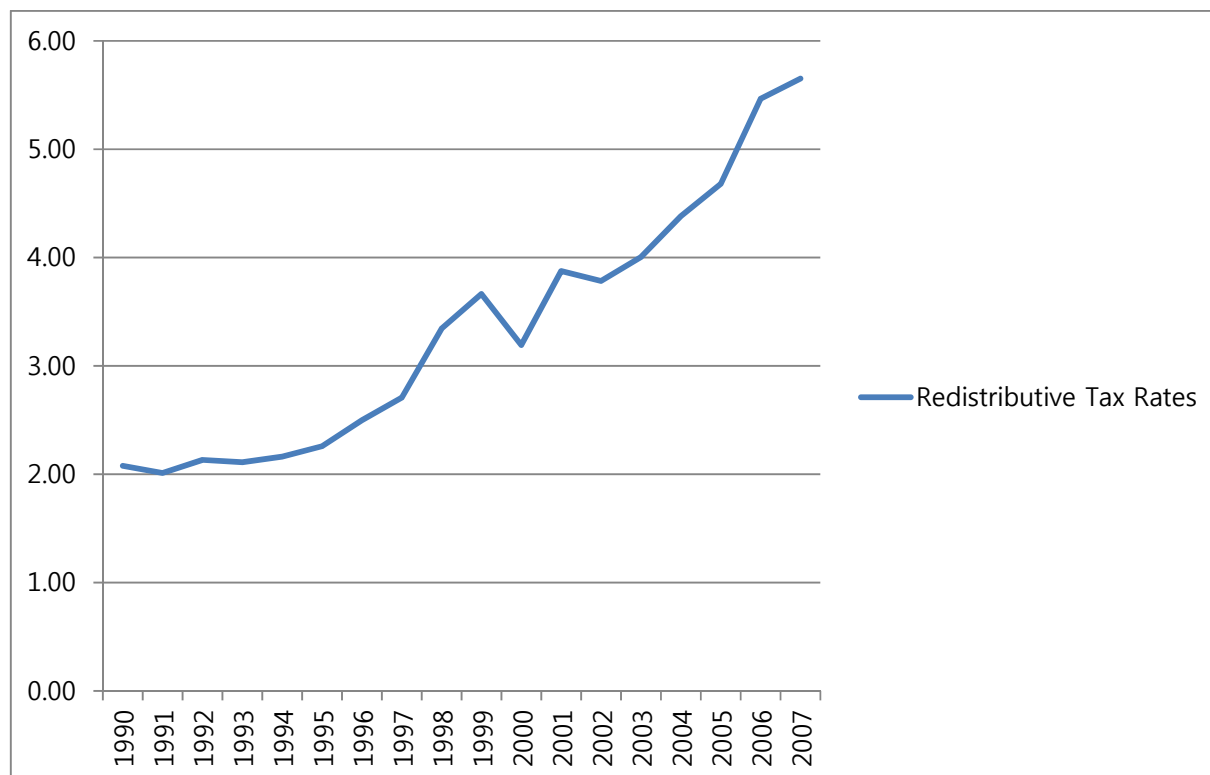


Note: This figure shows movements of Gini coefficients based on disposable income in Korea. Data source: National Statistical Office at http://kosis.kr/abroad/abroad_01List.jsp?parentId=A.

Redistributive Tax Rates in Korea

Figure 13 shows the trend of social transfers (as a percentage of real GDP) in Korea since 1990. Social transfers are calculated as the sum of non-contributory public pensions, public health expenditures, family cash benefits, family services expenditures, and unemployment compensation. Unlike other countries from Lindert's dataset analyzed in the previous section, expenditures on active labor market policies and active labor market program expenditures are not available in Korea. As shown in Figure 13, the redistributive tax rates in Korea have grown from 2.08% in 1990 to 5.65% in 2007.

Figure 13. Movements of Redistributive Tax Rates in Korea



Note: This figure shows movements of redistributive tax rates in Korea. Redistributive tax rates are social transfers as a percentage of real GDP. Social transfers include non-contributory public pensions, public health expenditures, family cash benefits, family services expenditures, and unemployment compensation.

Data source: OECD Social Expenditure Database. The web address is

http://www.oecd.org/document/9/0,3746,en_2649_33933_38141385_1_1_1_1,00.html.

Korean GDP data are taken from Penn World Tables at

http://pwt.econ.upenn.edu/php_site/pwt61_form.php.

Party Strength in Korea

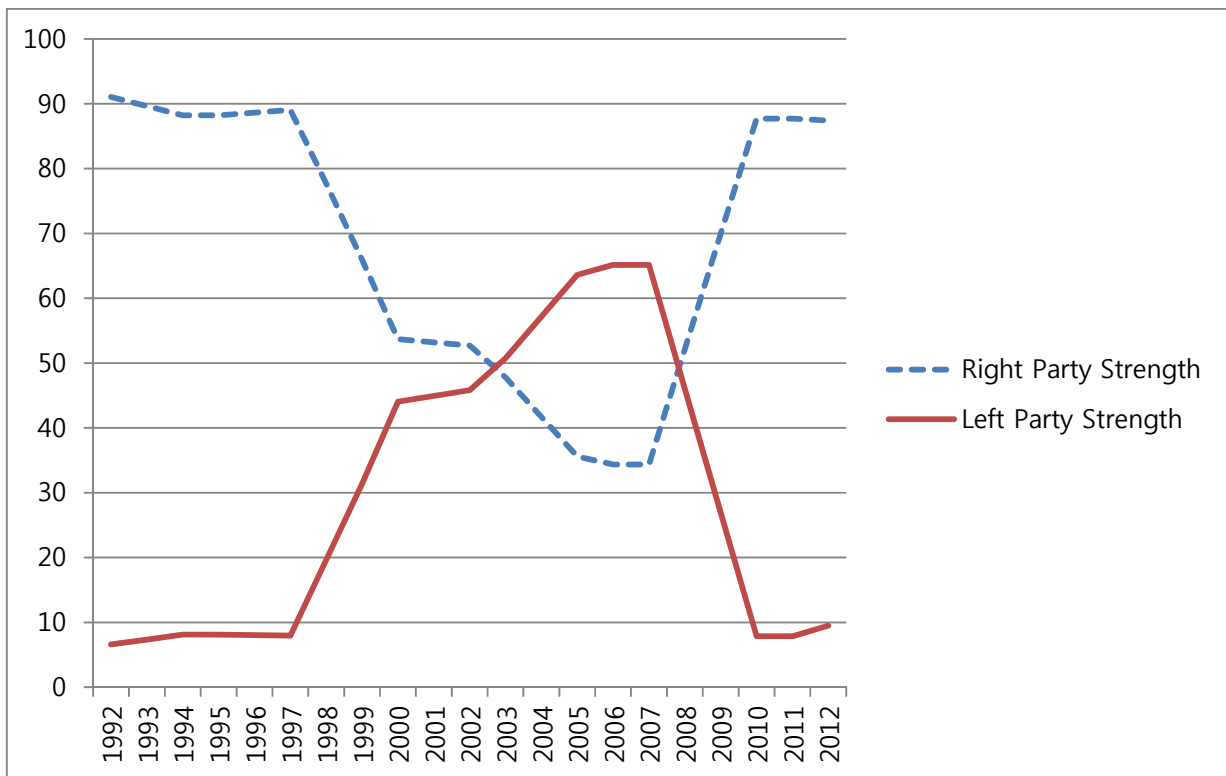
Democracy in Korea is still young, and parties in Korea have frequently changed their names and merged to form new parties. Ideological identification among parties is also murky. With these difficulties in mind, we classified the four major parties as follows: Saenuri Party (formerly Grand National Party) and the Liberty Forward Party as rightist, the Democratic United

Party as centrist, and the Unified Progressive Party as leftist. These parties' former counterparts are classified accordingly.

We take the average of the cabinet portfolio percentage and the legislative seats percentage as a measure of party's strength. As we have done to other OECD countries, we allocated the centrist party's strength equally to the leftist and rightist parties.

Figure 14 shows the three-year moving average of party strength in Korea since 1992. Rightist parties were overwhelmingly stronger than Leftist parties in the early 1990s, but Leftist parties gradually gained strength and became comparable between 2000 and 2008. Rightist parties became dominant again in Korea since 2008.

Figure 14. Movements of Party Strength in Korea



Notes: This figure shows movements of left party strength and right party strength in Korea. Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Saenuri party and the Liberty Forward Party (and their former ones) are classified as rightist party, the Democratic United Party and its former ones as centrist party, and the Unified

Progressive Party and its former ones as leftist party. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Data source: The National Election Commission at <http://elecinfo.nec.go.kr/>.

5. Conclusion

We have presented a model that portrays political competition as one between partisan parties, and showed that the relationship between inequality and redistribution takes on a completely different cast than what conventional wisdom, including the Hotelling-Downs one, predicts. The main results obtained from our theoretical analysis are the following:

First, the Left party proposes higher redistributive taxes than the Right party at the equilibrium.

Second, as inequality rises, the Left party increases redistribution, while the Right party decreases it.

According to our theoretical analysis, not only does politics matter in explaining inequality and redistribution, but also parties do matter. The Hotelling-Down model emphasizes the importance of politics, but neglects the importance of partisanship in real politics.

We also have empirically examined the relationship between inequality, redistribution, and political party competition in this report. Our regression results indicate that the conventional empirical assessments of politico-economic models may be open to more thorough and careful investigation.

We summarize our main findings as follows:

First, the average income inequality among the 20 OECD countries has risen steadily since the early 1990s, regardless of inequality indices used. This finding is consistent with Gurria (2010) and Milanovic (2005) rather than Sala-i-Martin (2006). Unlike the dynamics of inequality, however, we are not able to find a trend in redistributive tax rates or party strength. Both variables fluctuate around a mean.

Second, in contrast with the predictions of the Hotelling-Downs model, we were unable to find a positive relationship between inequality and redistribution from our panel data set of 20 OECD countries. A negative coefficient for redistributive tax rates has been estimated from cross-sectional regressions of inequality on redistributive tax rates, whereas a positive but insignificant coefficient has been obtained from panel regressions with interaction term between inequality and left party strength. Also, our results suggest a nonlinear relation between redistributive tax rates and inequality.

Finally, we observe rising inequality for Korea. We also observe a rising trend of redistribution in Korea. However, a large swing from right parties to left parties and then from left parties to right parties has been found in politics in Korea.

Empirical papers, to date, have derived contradictory results on the relationship between inequality and redistribution, depending on the data set used and time period covered. From this apparent lack of robustness, some authors have concluded that political economy approaches are not empirically sound.

But what these empirical papers tested is the Hotelling-Downs model, a model that is politically simplistic and unrealistic. We have proposed a politico-economic model that generates differentiated policies, and an econometric model specification that distinguishes the Hotelling-Downs model from a partisan political economic model.

Two main implications from our model are that left party proposes higher redistributive taxes than the right party, and that as inequality rises, the left party proposes more redistribution while the right party proposes less redistribution. These implications are supported by data from 20 OECD countries. The interaction term between left party strength and inequality has a significant coefficient, the overall impact of left party strength on redistributive tax rates is positive, and the overall impact of inequality on redistributive tax rates switches its sign from a negative one to a positive one as left party strength rises.

Some caveats should be filed against our model.

In this research, we model political competition as the one between Left and Right over a one-dimensional policy space. In reality, the policy space over which political parties compete is multi-dimensional and, consequently, the Left and Right parties are very diverse. Not only Left parties but also some Right parties, such as Christian democratic parties and nationalist-populist parties favor public social protection while accepting high levels of taxation. Non-economic issues, such as religion or nationalism, are important in modern politics, and elsewhere one of the authors of this paper studied the interaction between economic and non-economic issues and the effect of the latter on the former. We restricted our analysis to a one-dimensional policy space to emphasize the importance of political parties in the simplest setting.

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Appendix: Miscellaneous Tables and Figures

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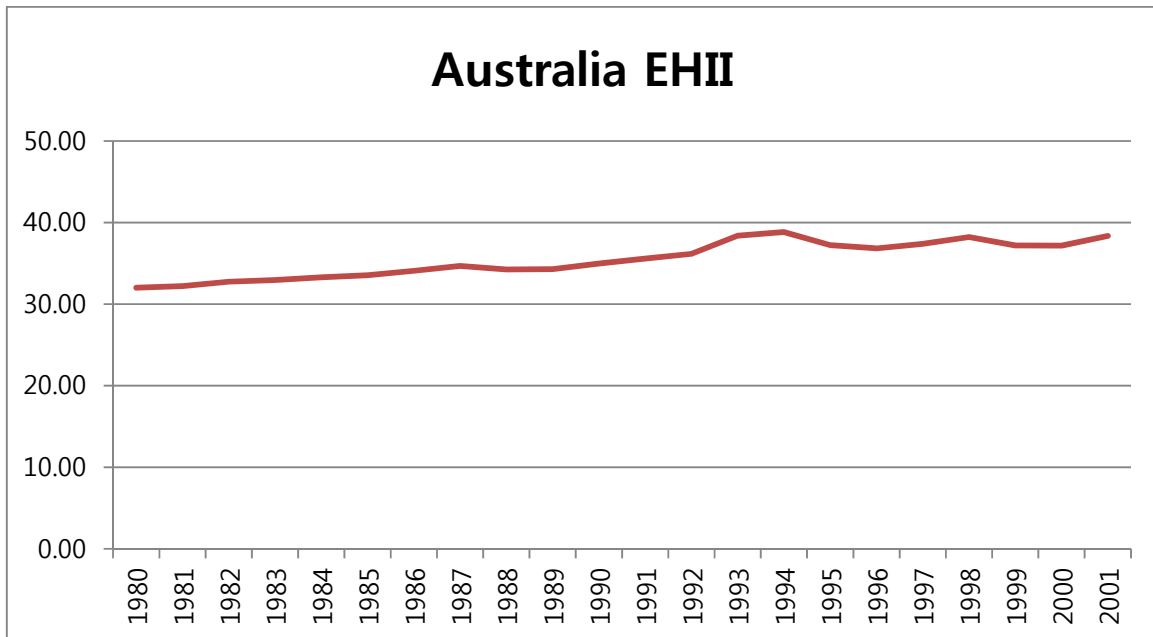
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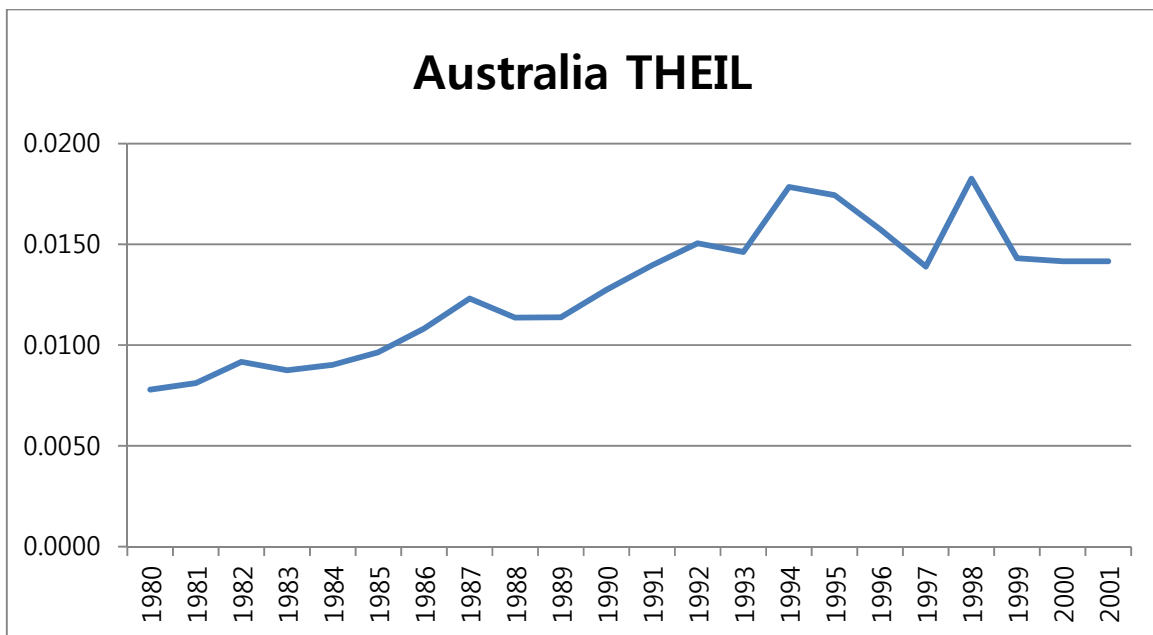
1. Movements of Inequality in Individual Countries

1) Australia

a. Movements of EHII



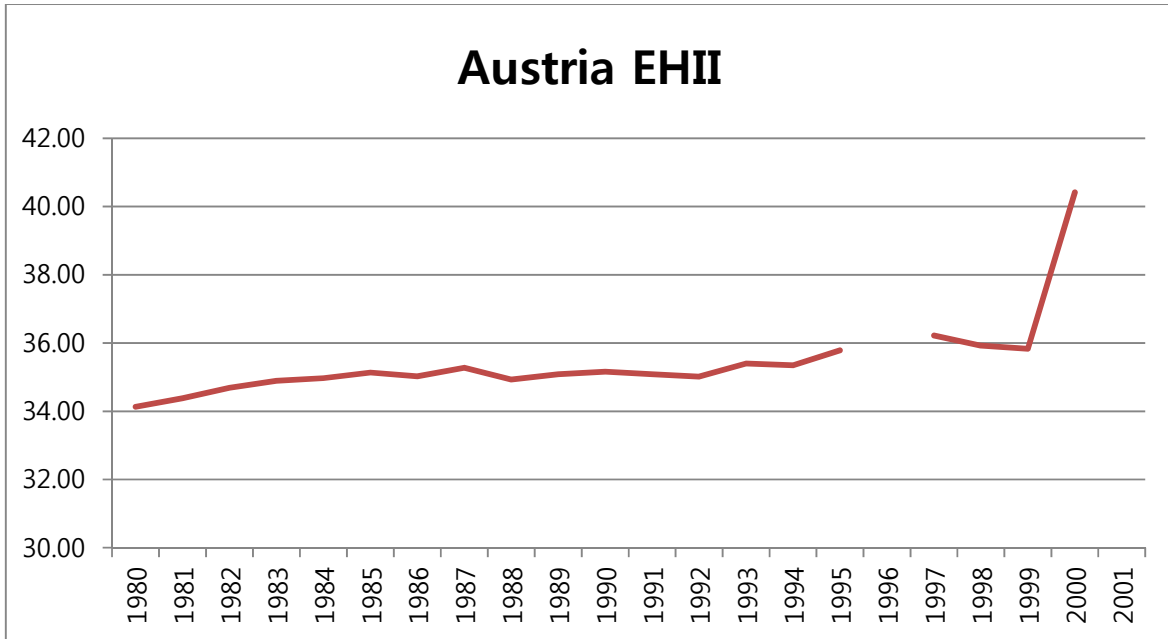
b. Movements of the Theil Index



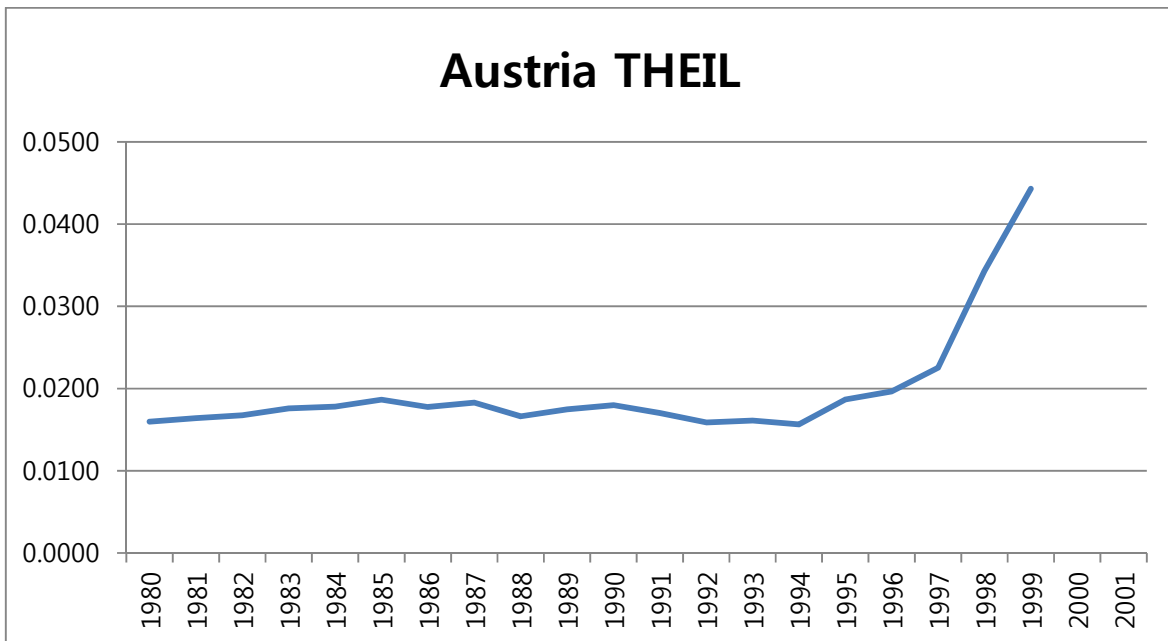
Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots. Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

2) Austria

a. Movements of EHII



b. Movements of the Theil Index

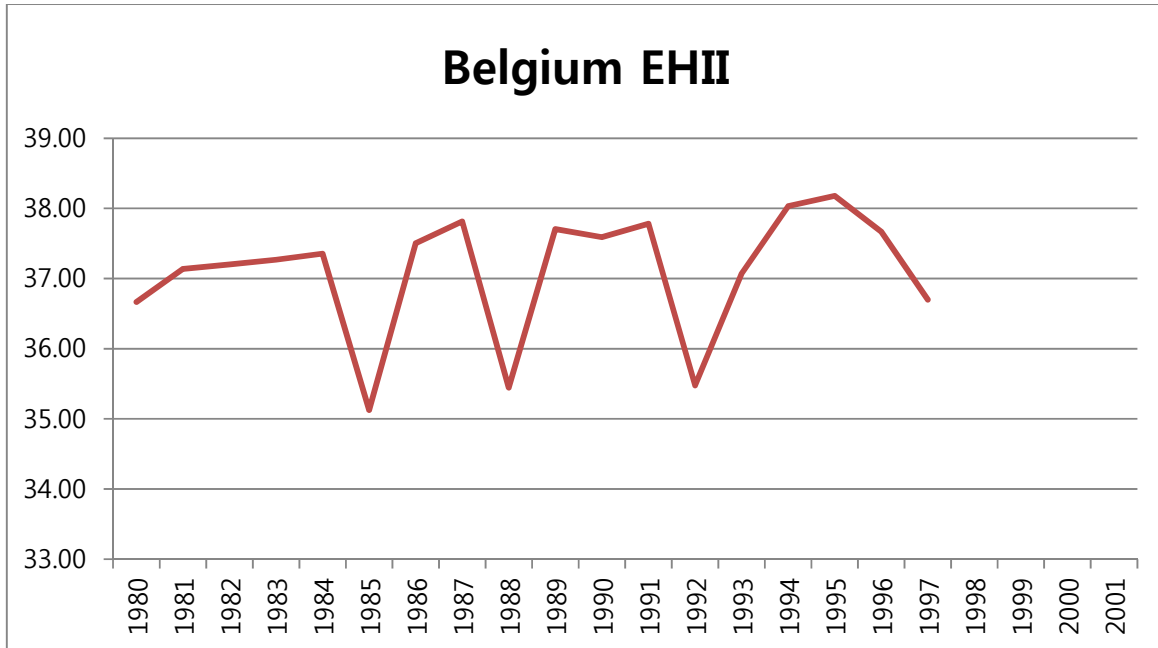


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

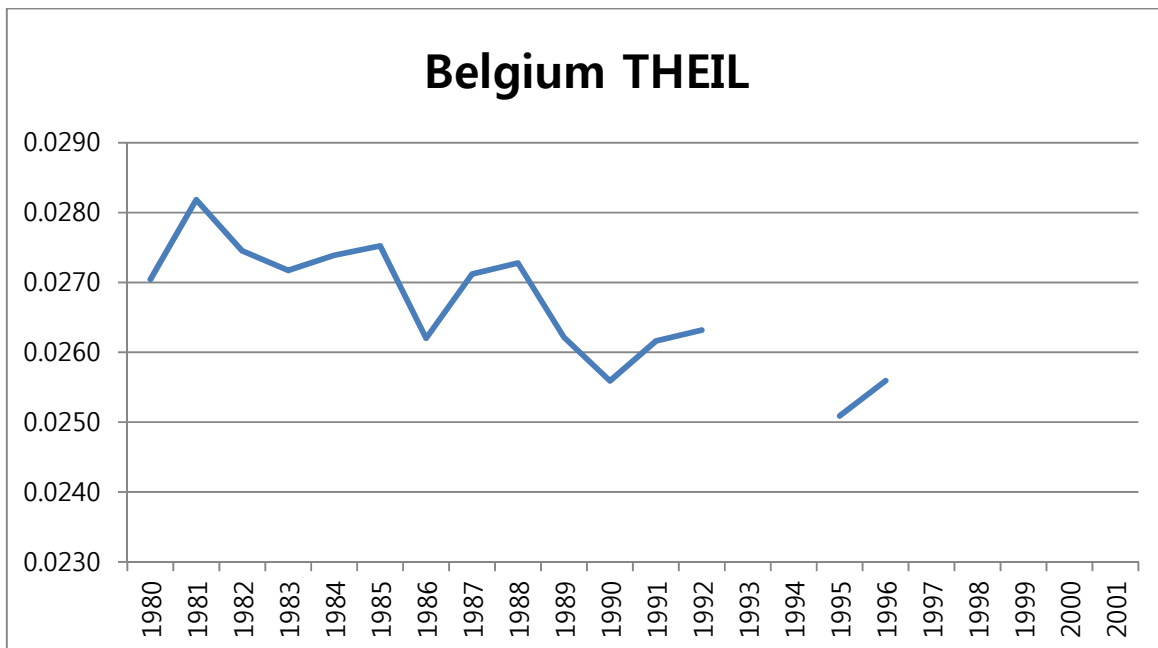
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

3) Belgium

a. Movements of EHII



b. Movements of the Theil Index

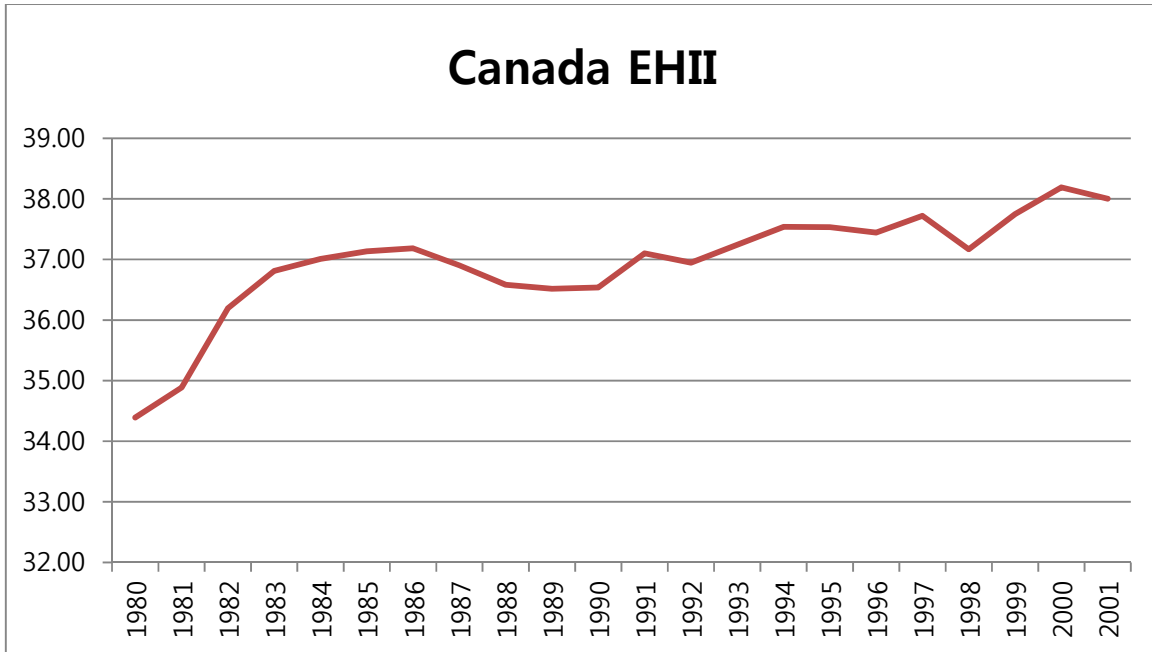


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

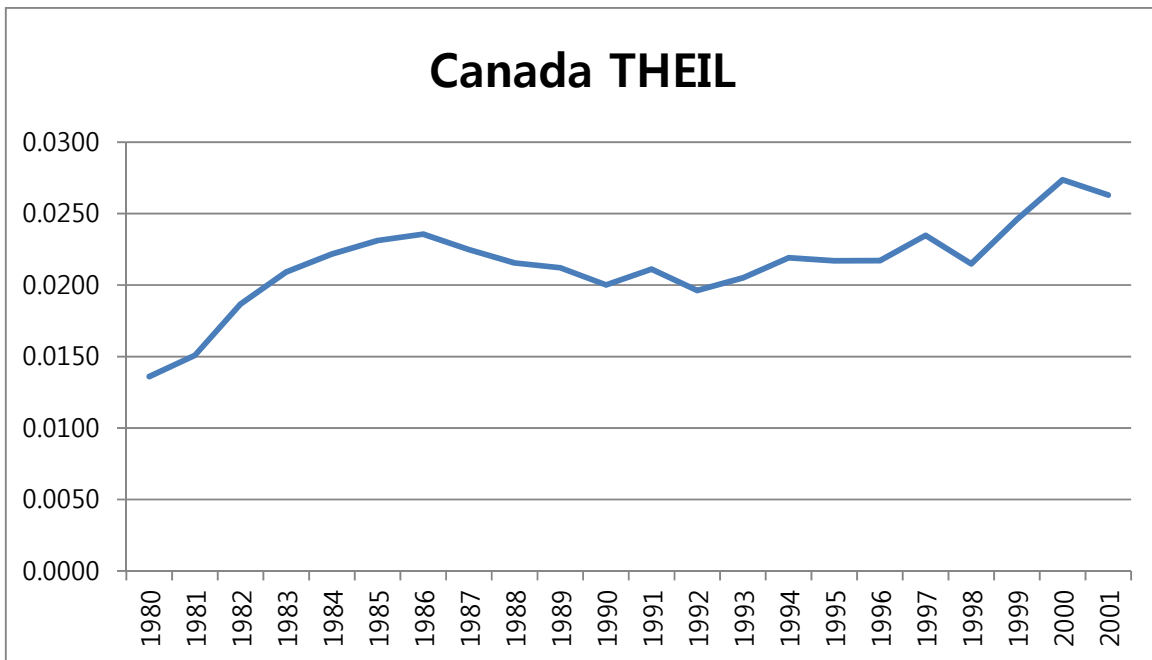
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

4) Canada

a. Movements of EHII



b. Movements of the Theil Index

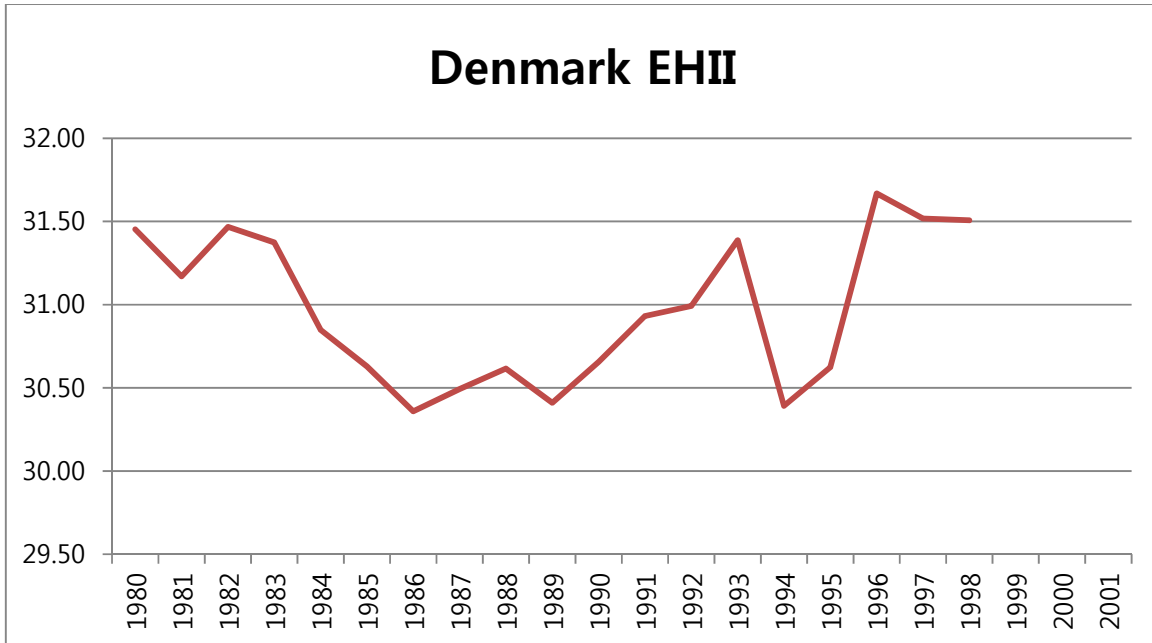


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

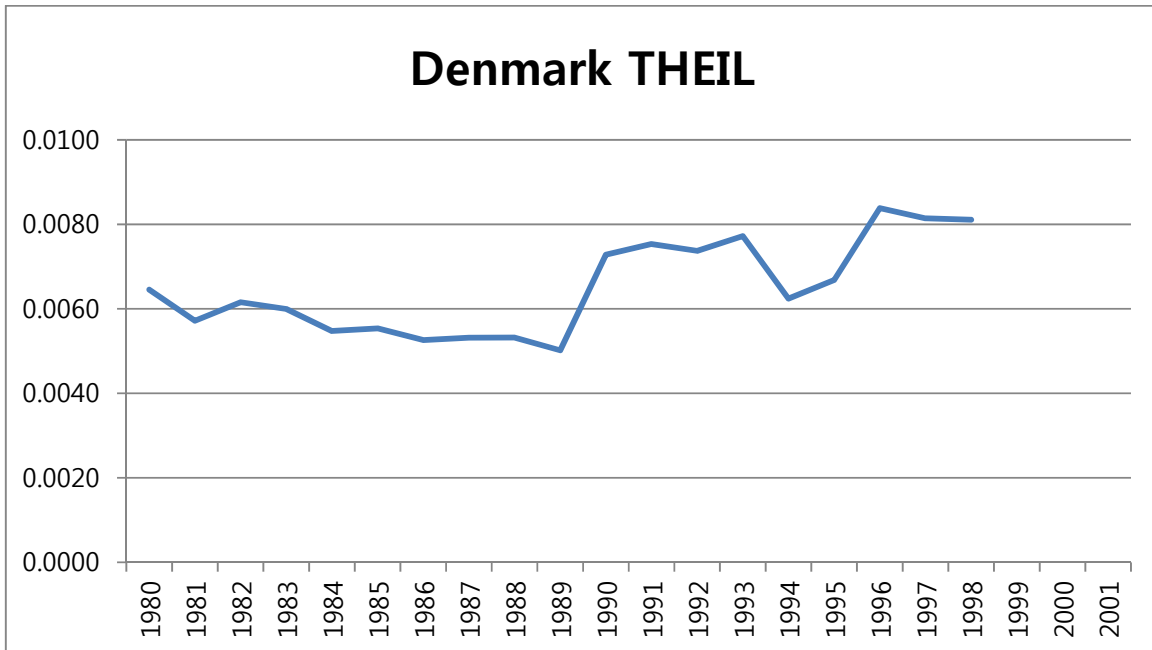
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

5) Denmark

a. Movements of EHII



b. Movements of the Theil Index

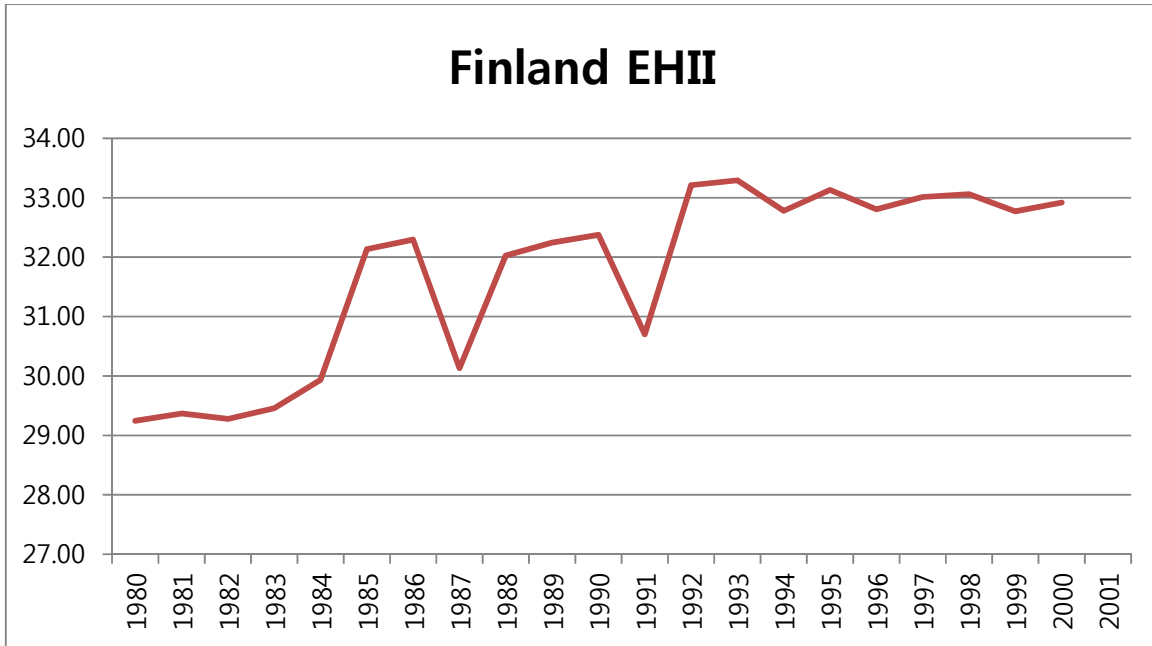


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

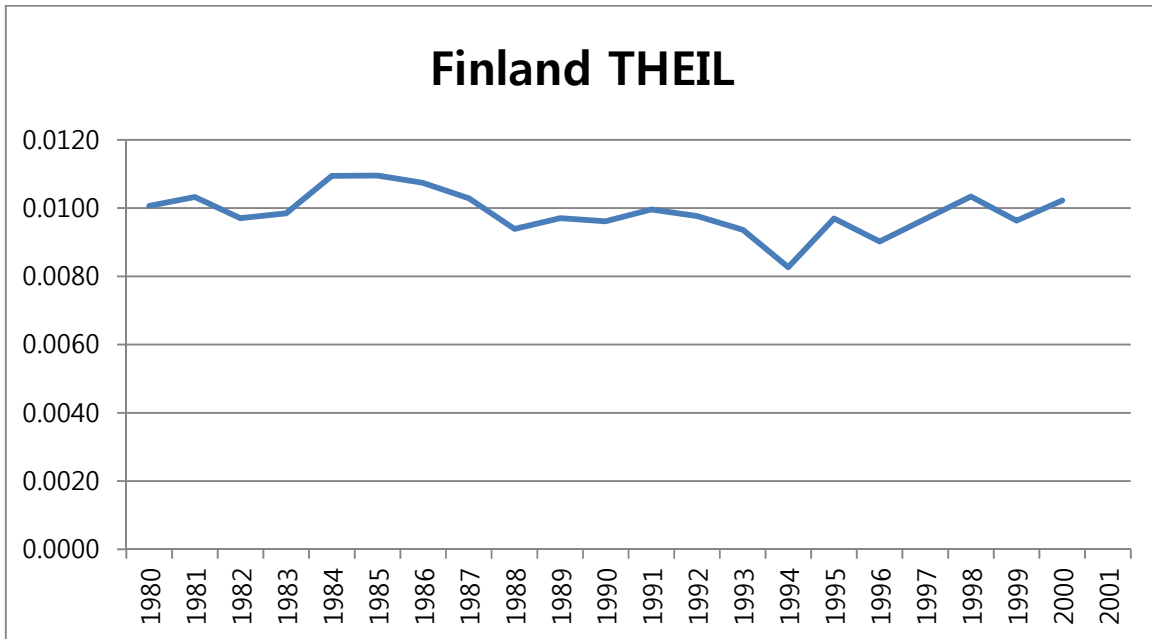
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

6) Finland

a. Movements of EHII



b. Movements of the Theil Index

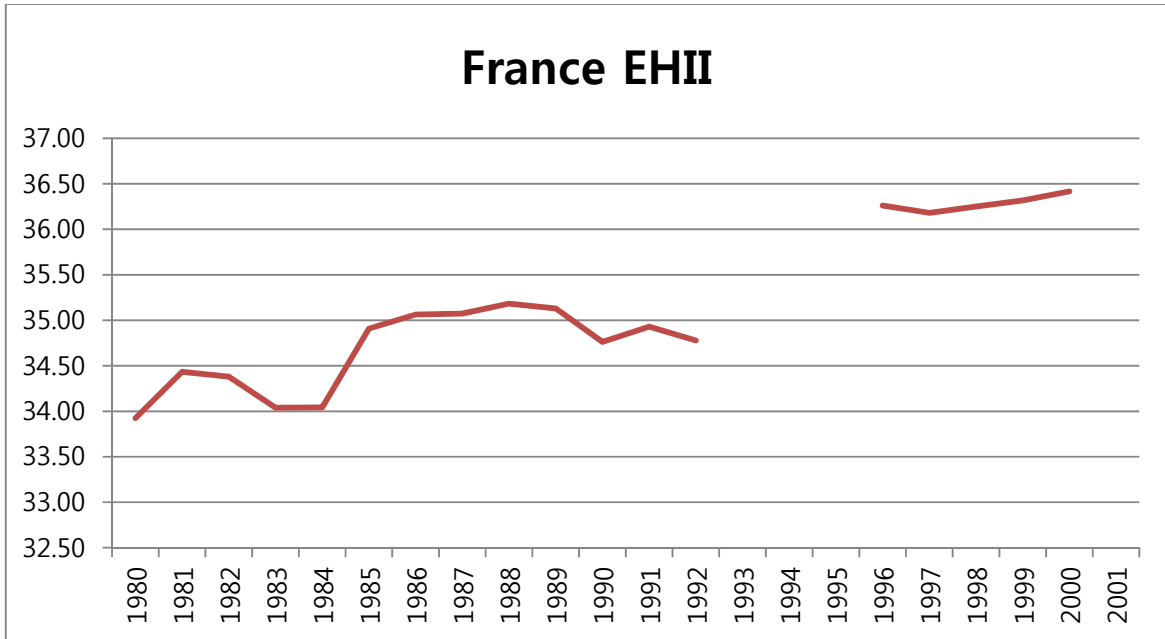


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

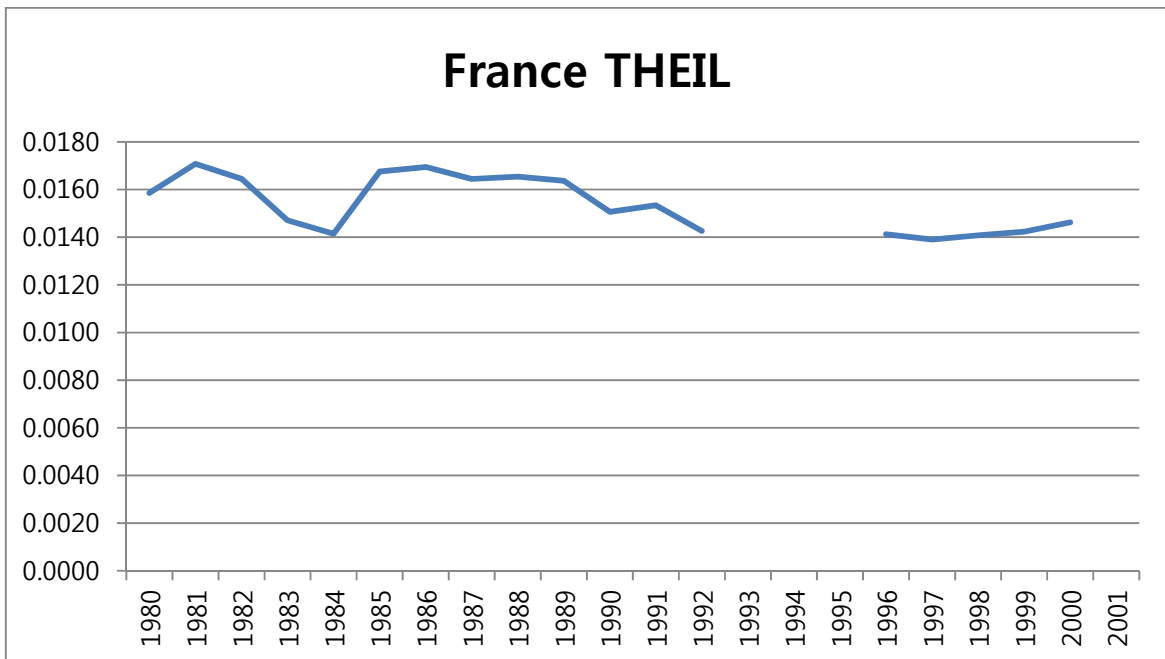
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

7) France

a. Movements of EHII



b. Movements of the Theil Index

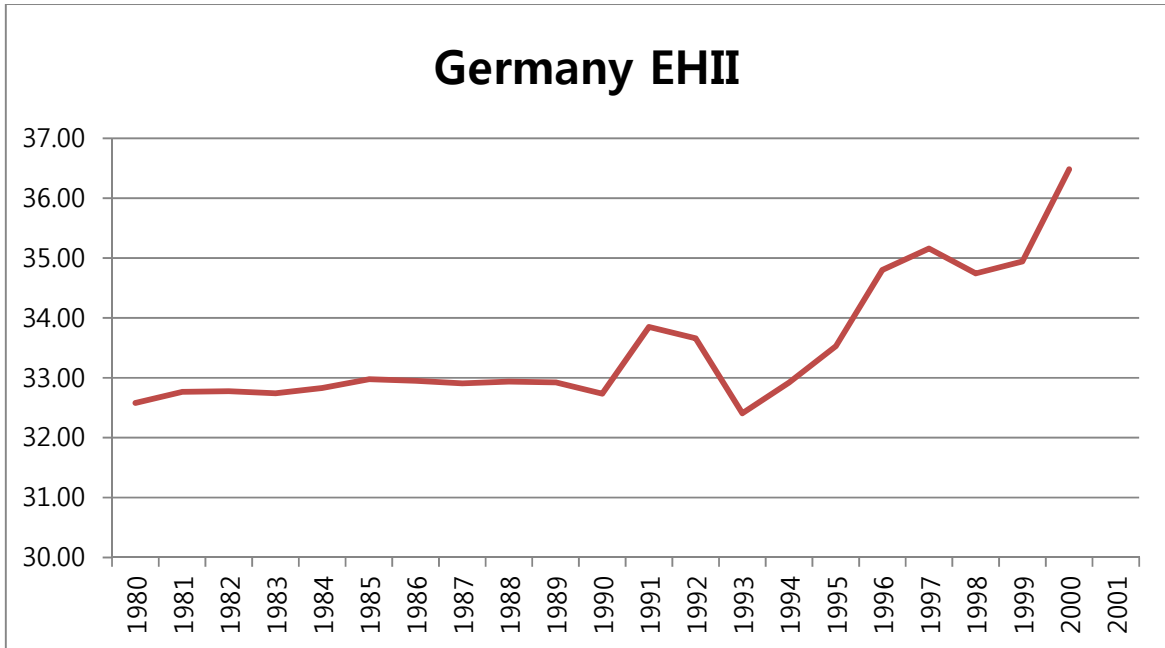


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

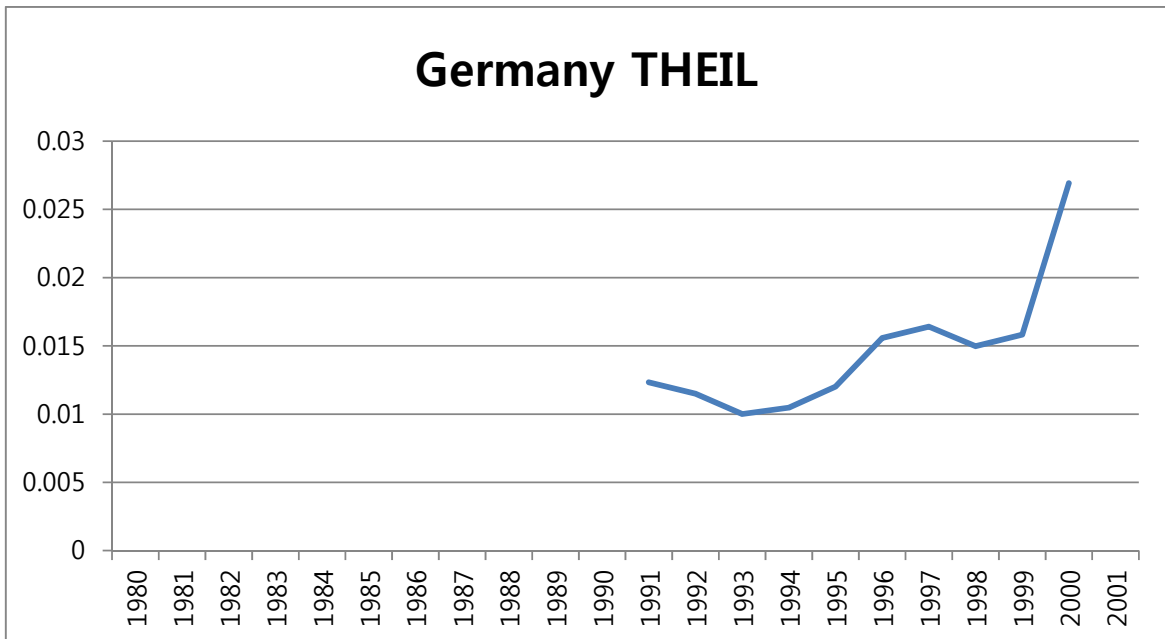
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

8) Germany

a. Movements of EHII



b. Movements of the Theil Index

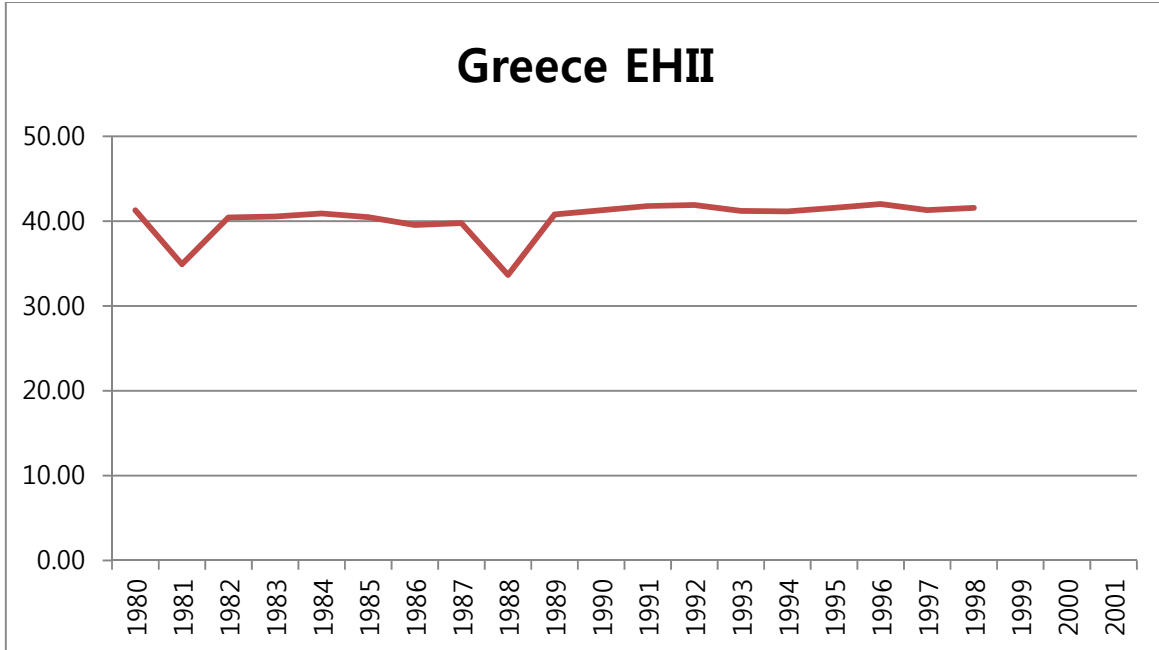


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

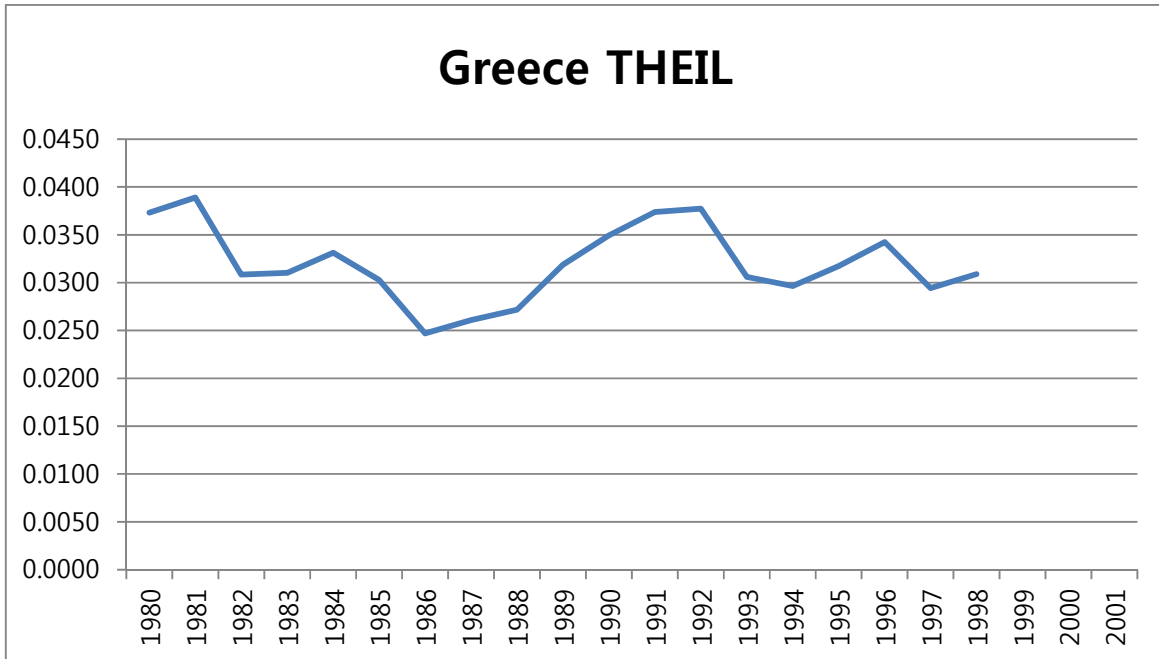
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

9) Greece

a. Movements of EHII



b. Movements of the Theil Index

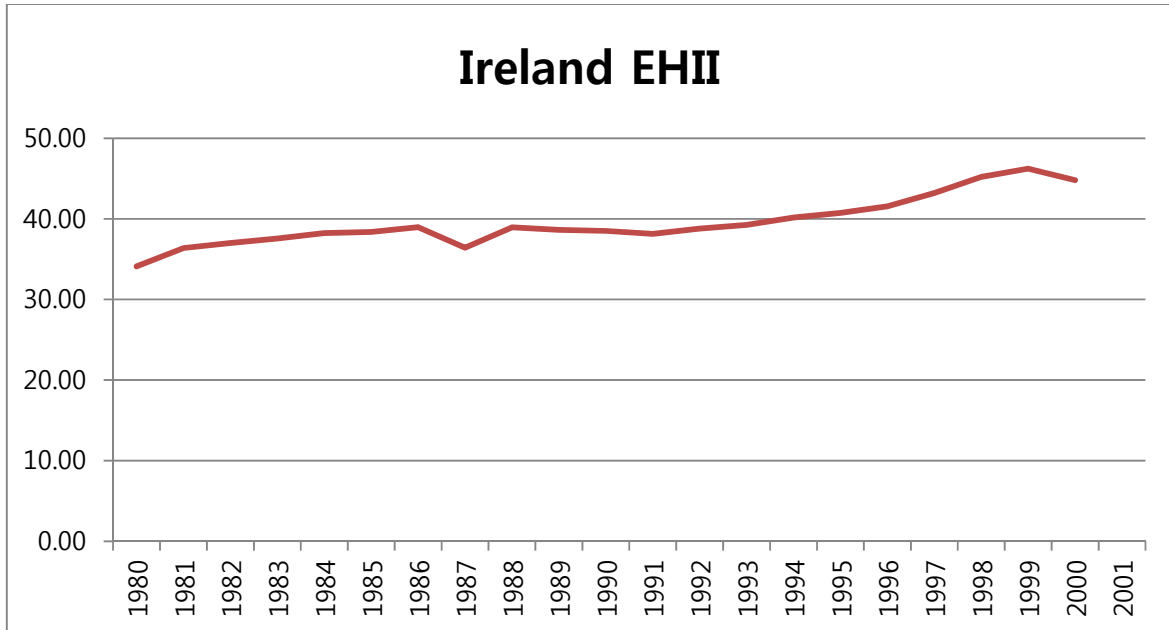


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

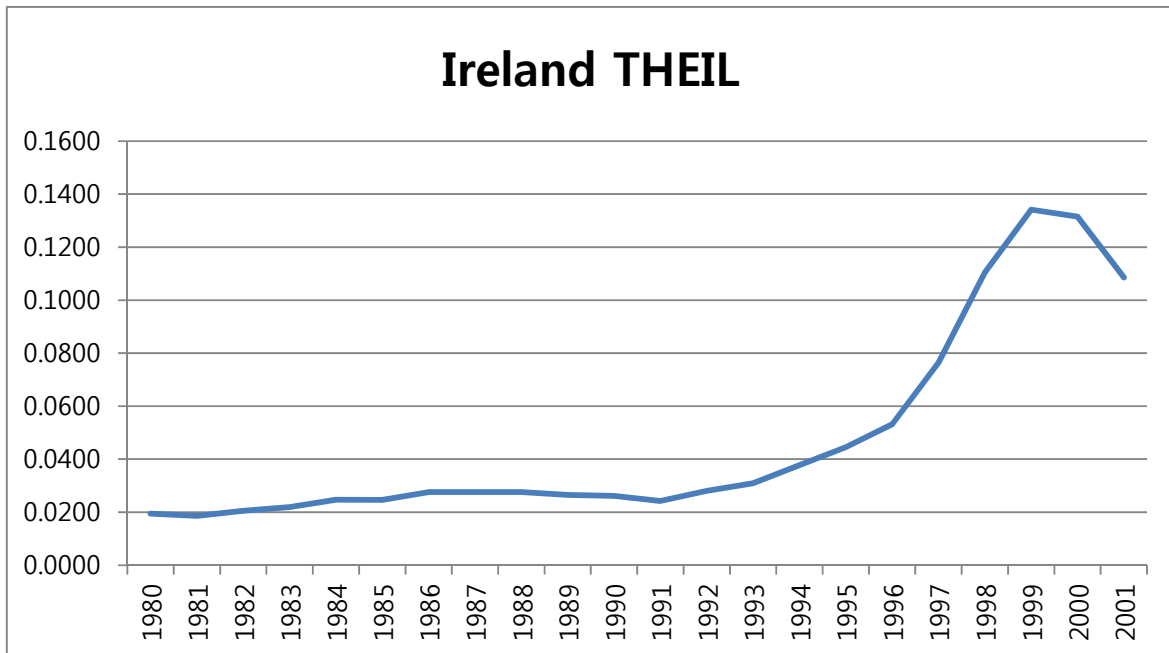
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

10) Ireland

a. Movements of EHII



b. Movements of the Theil Index

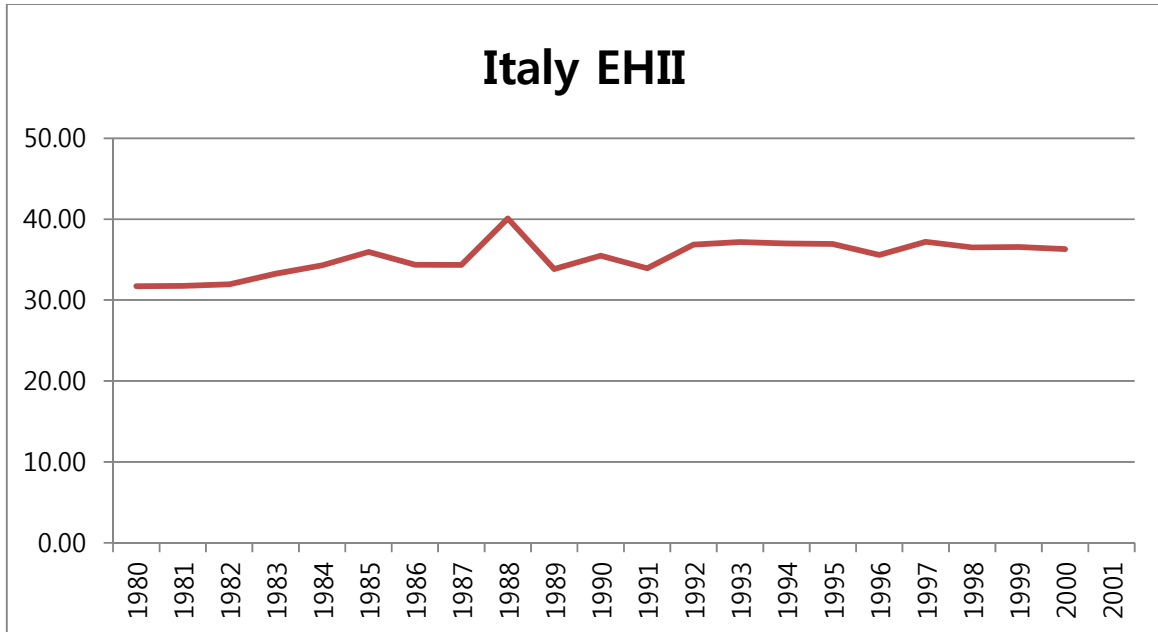


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

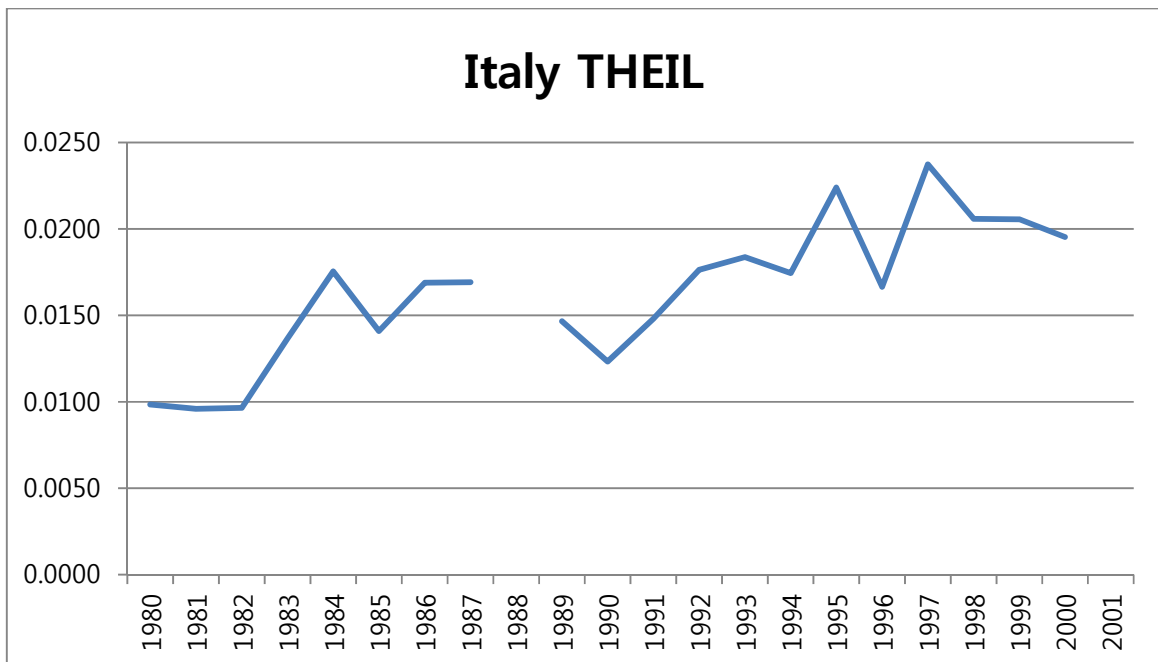
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

11) Italy

a. Movements of EHII



b. Movements of the Theil Index

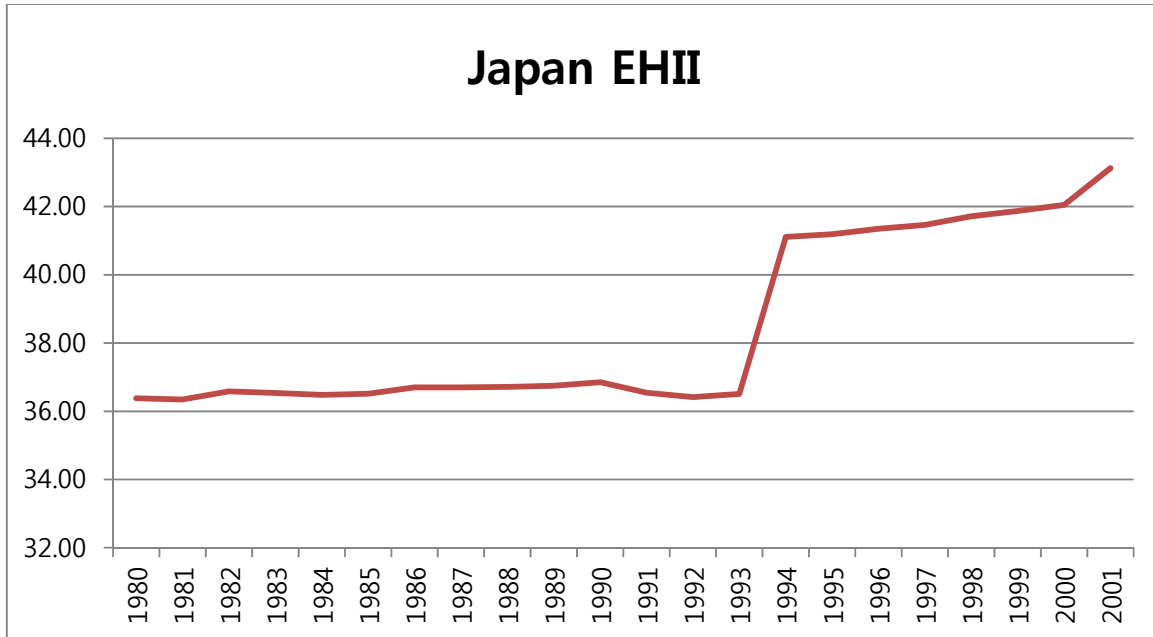


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

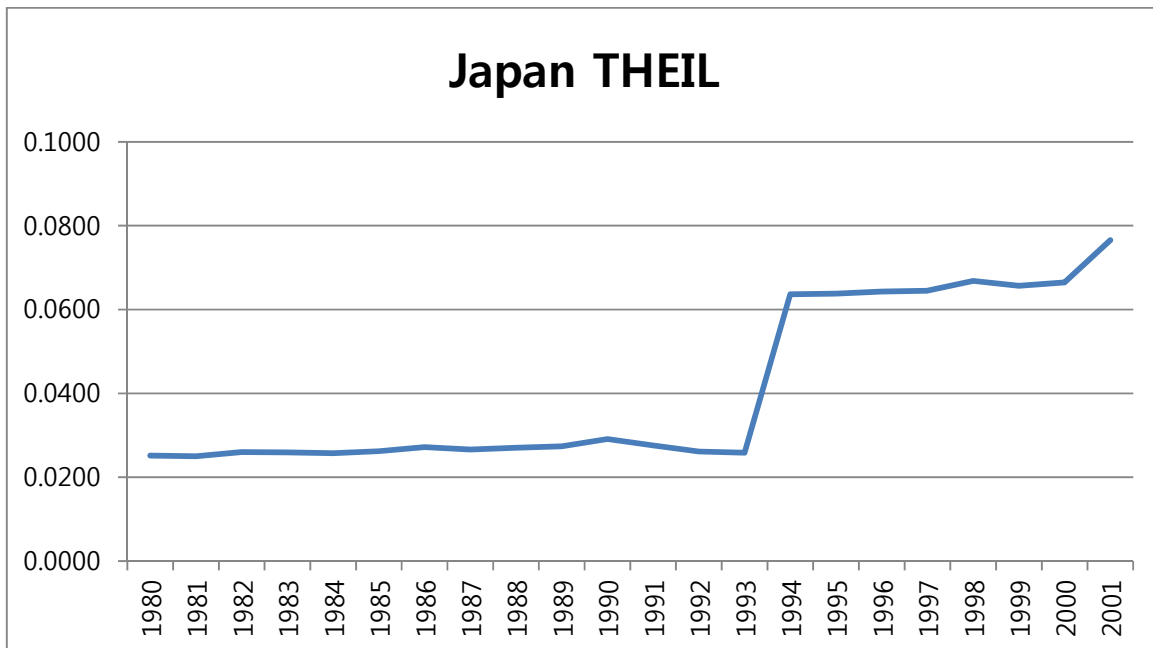
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

12) Japan

a. Movements of EHII



b. Movements of the Theil Index

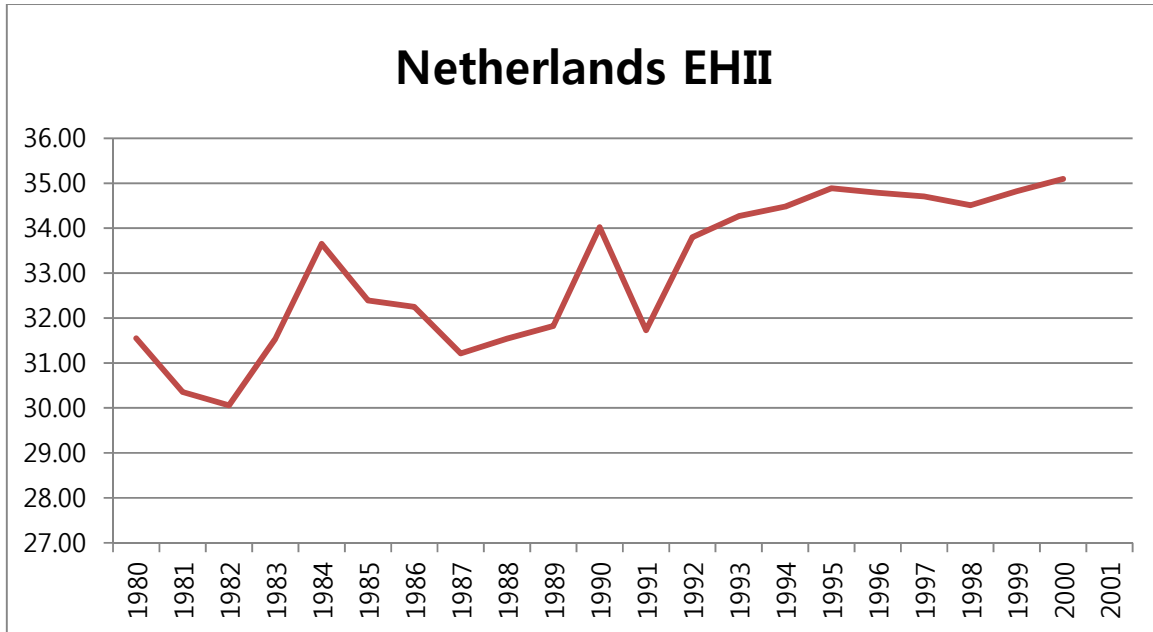


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

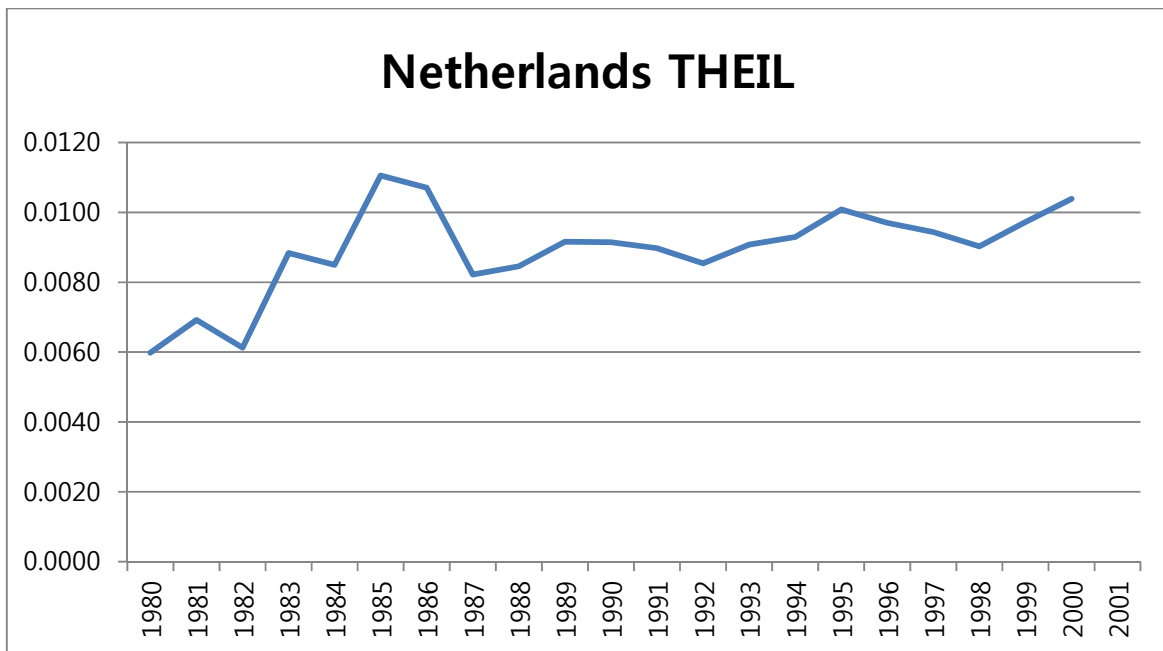
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

13) Netherlands

a. Movements of EHII



b. Movements of the Theil Index

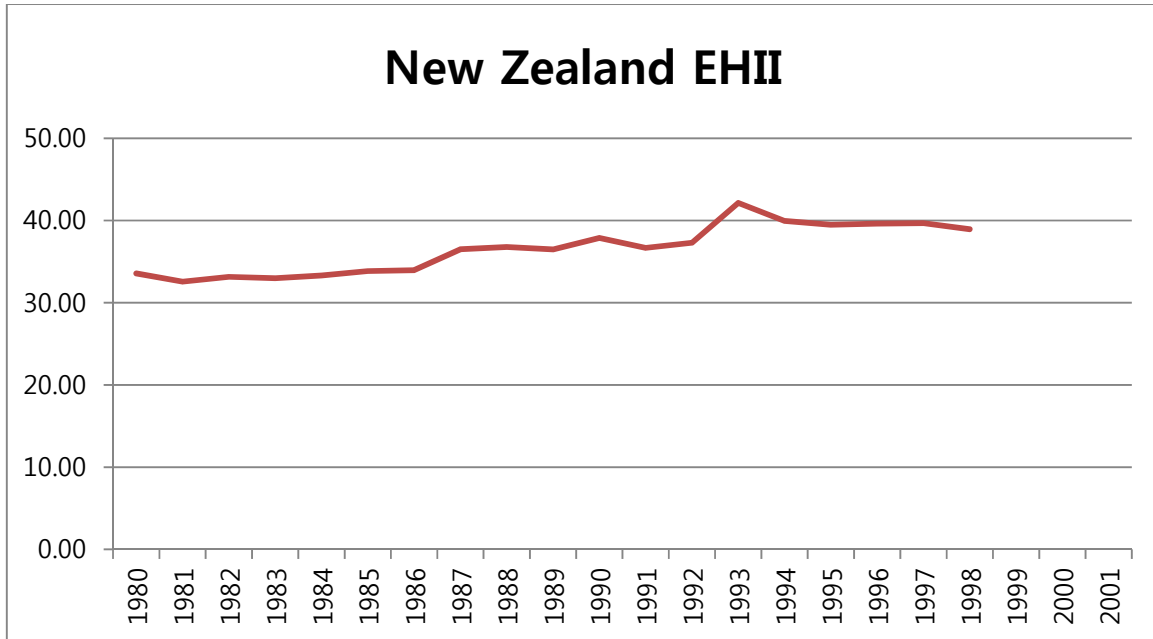


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

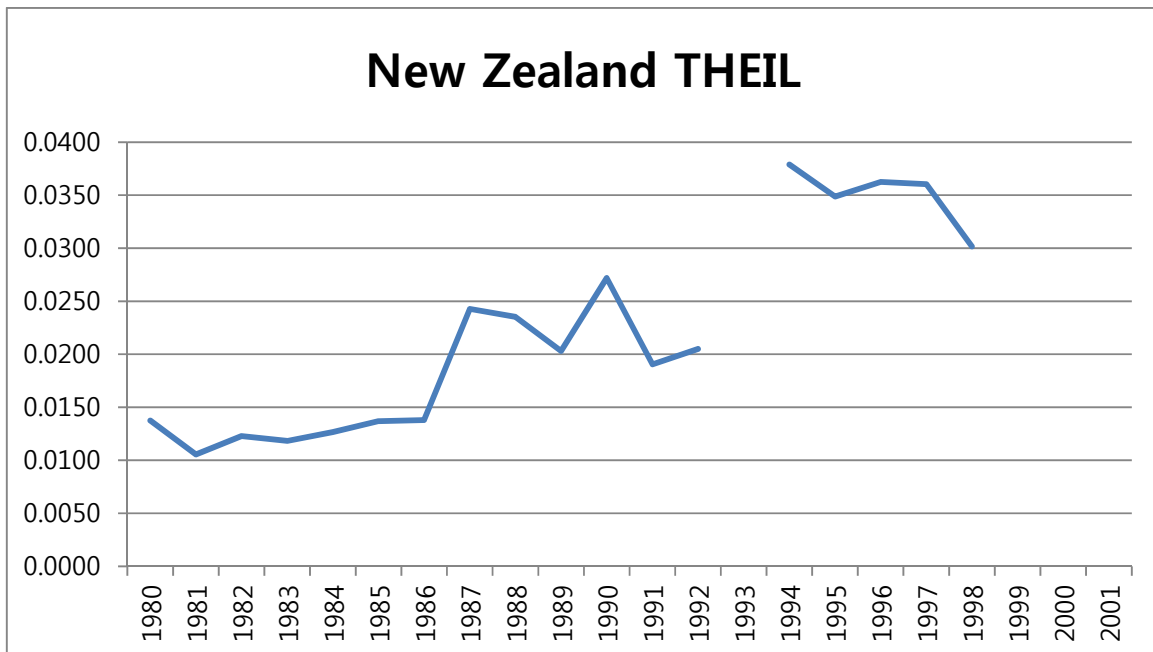
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

14) New Zealand

a. Movements of EHII



b. Movements of the Theil Index

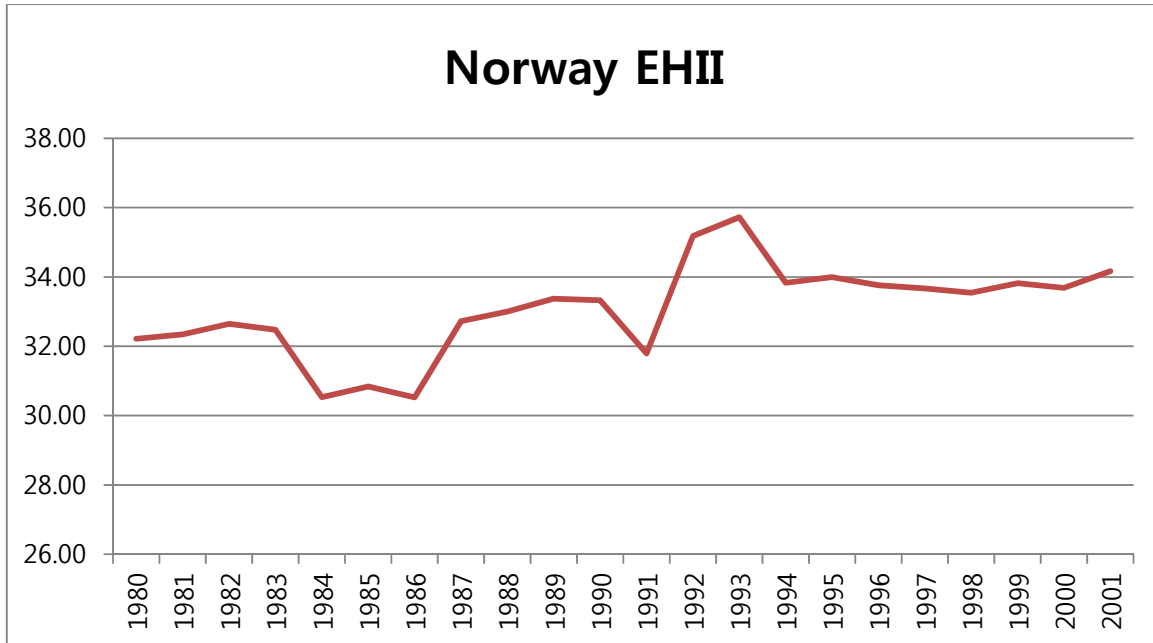


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

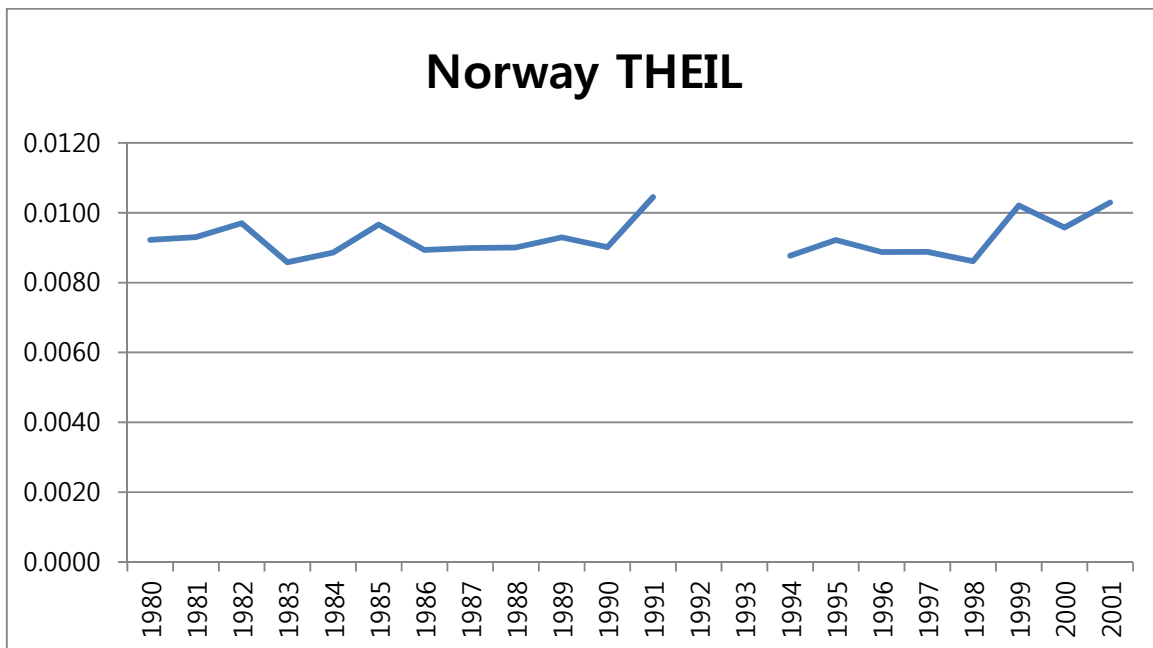
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

15) Norway

a. Movements of EHII



b. Movements of the Theil Index

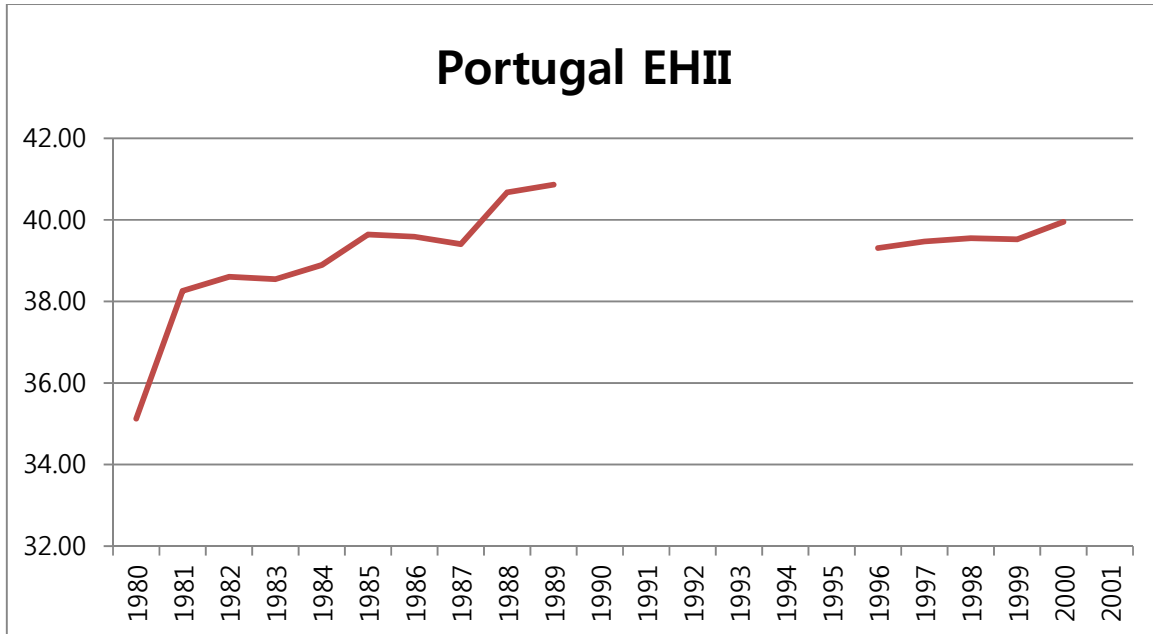


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

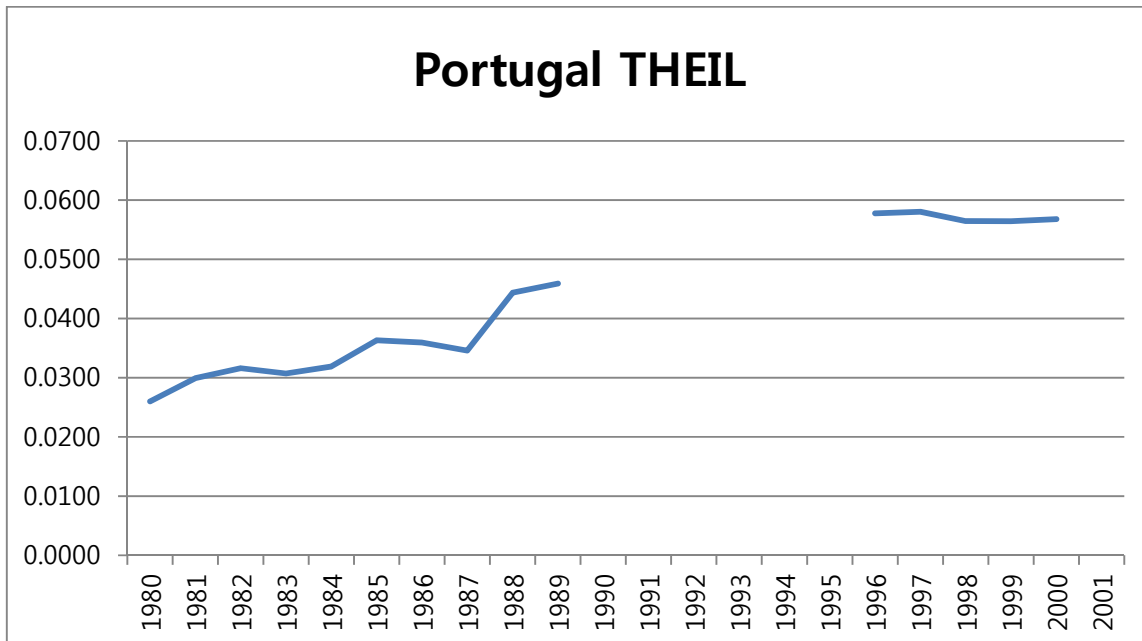
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

16) Portugal

a. Movements of EHII



b. Movements of the Theil Index

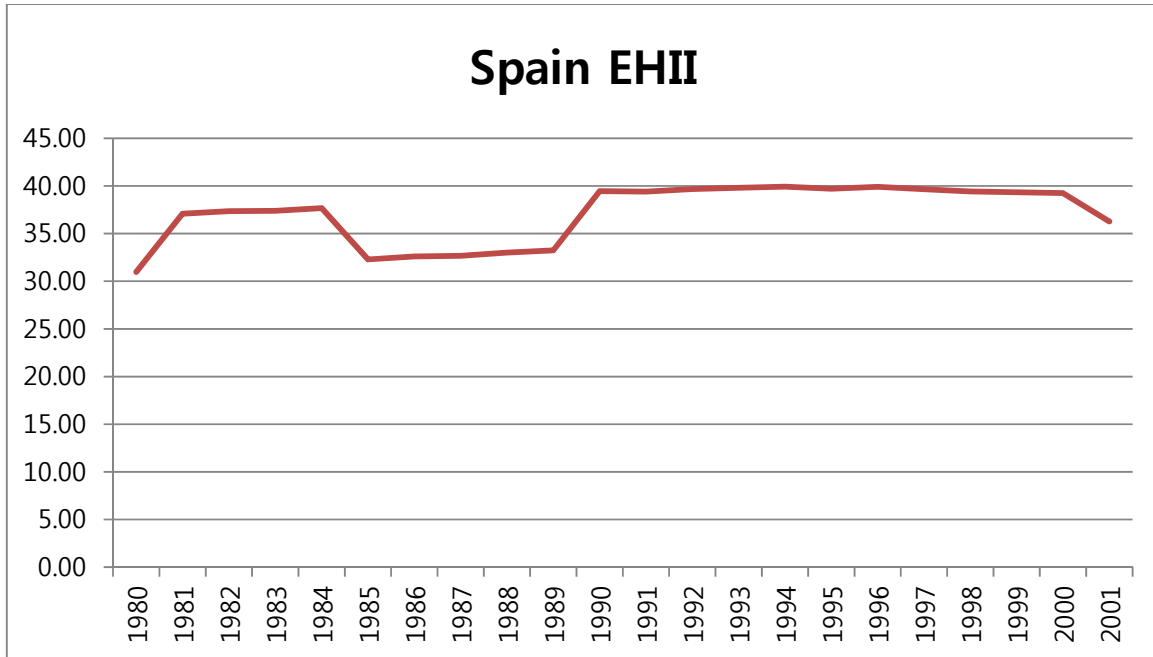


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

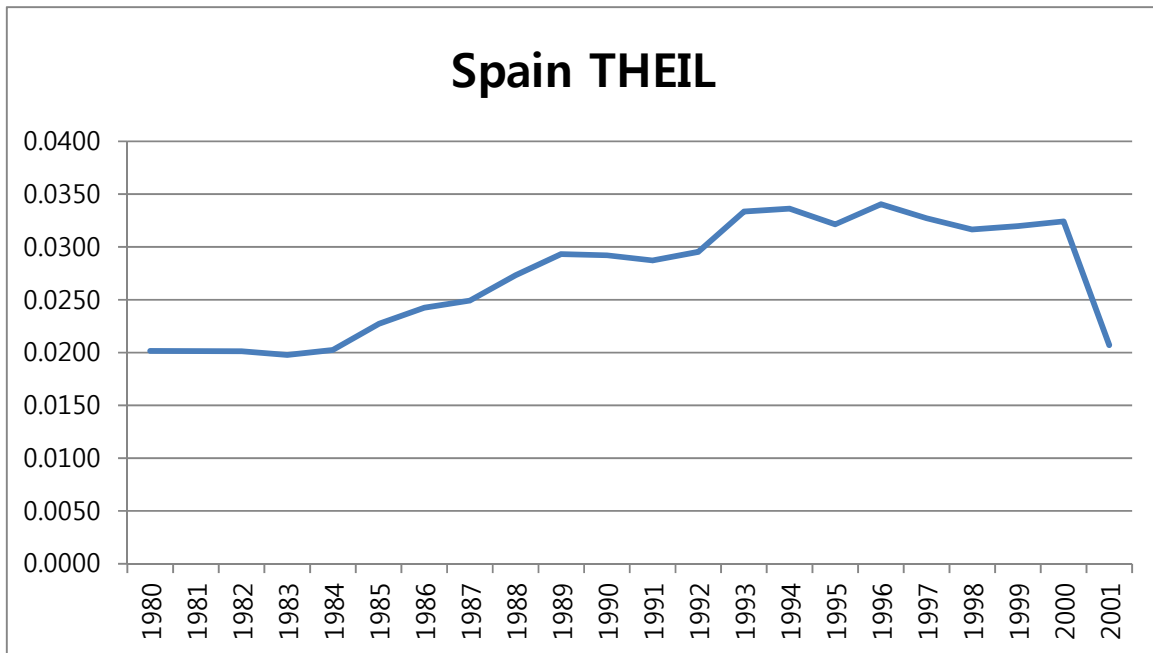
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

17) Spain

a. Movements of EHII



b. Movements of the Theil Index

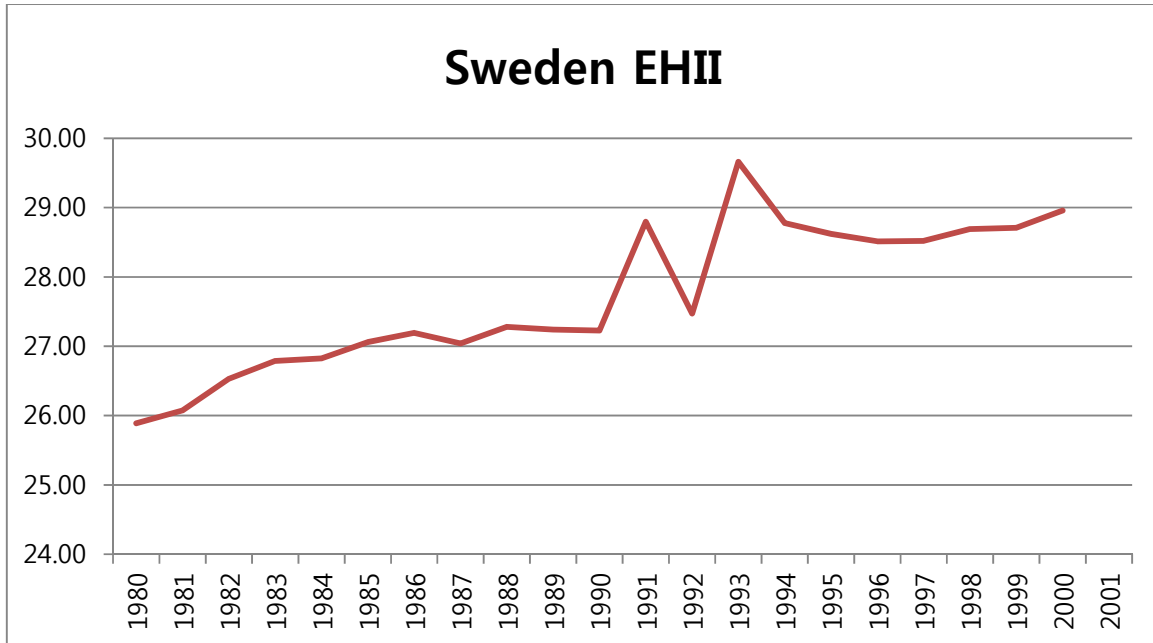


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

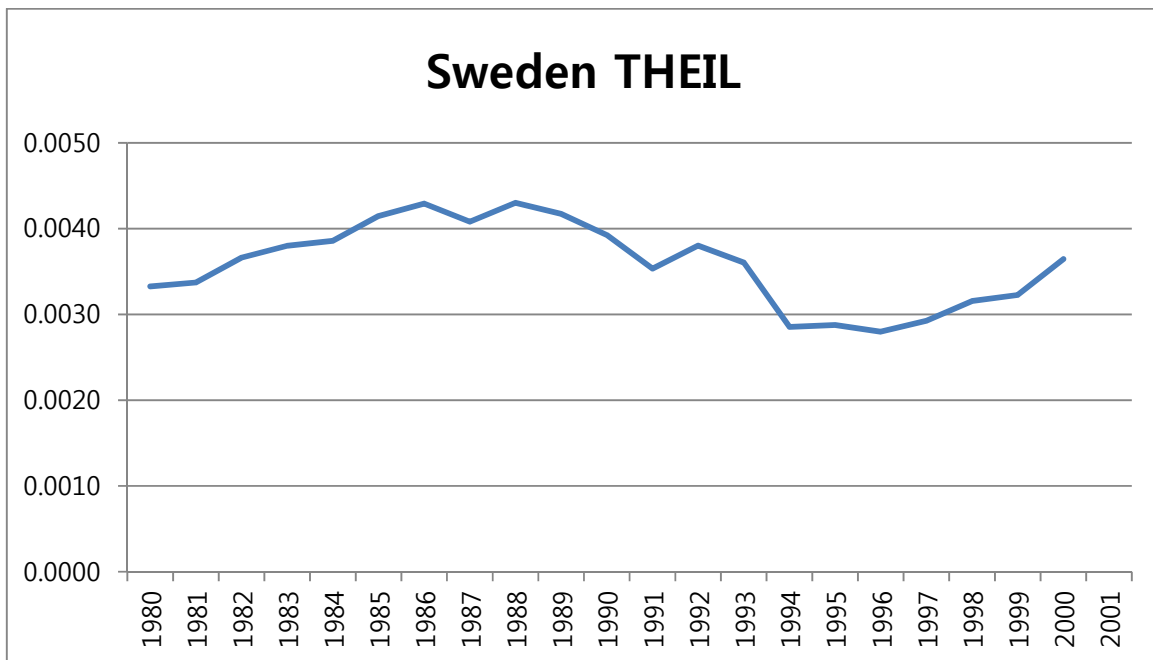
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

18) Sweden

a. Movements of EHII



b. Movements of the Theil Index

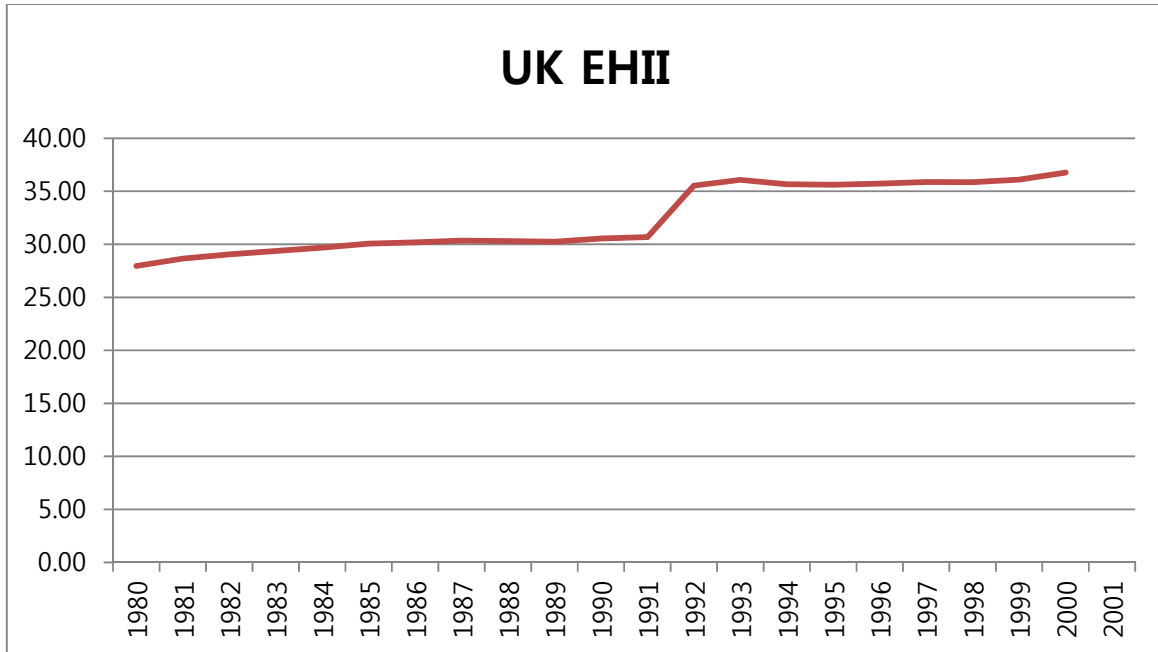


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

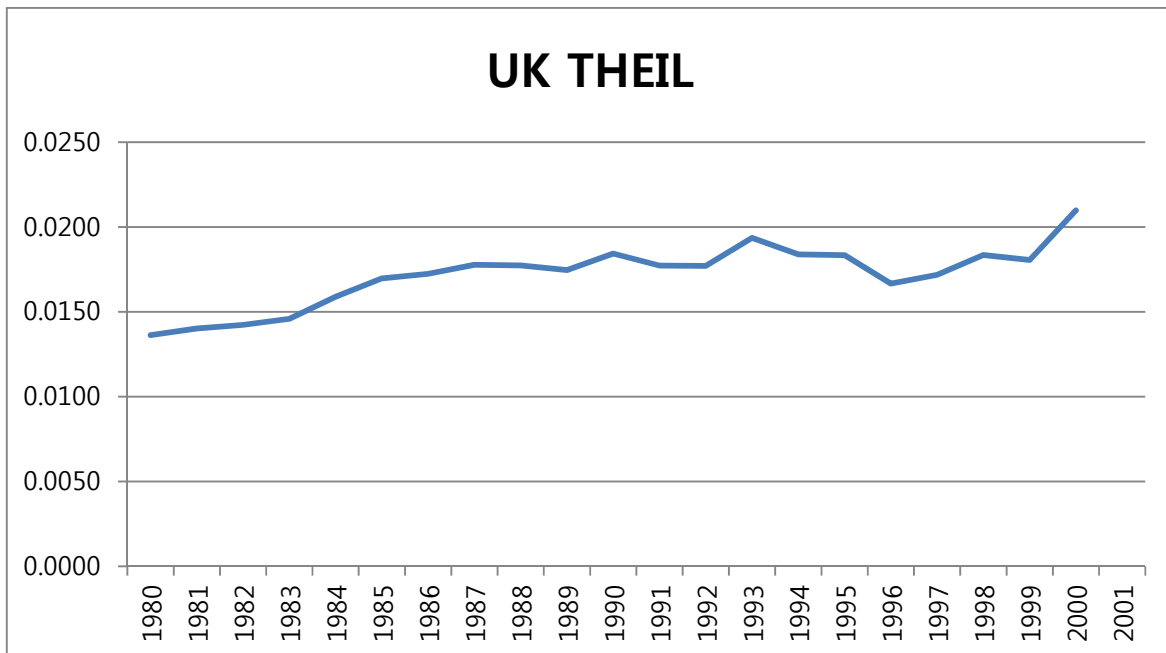
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

19) The UK

a. Movements of EHII



b. Movements of the Theil Index

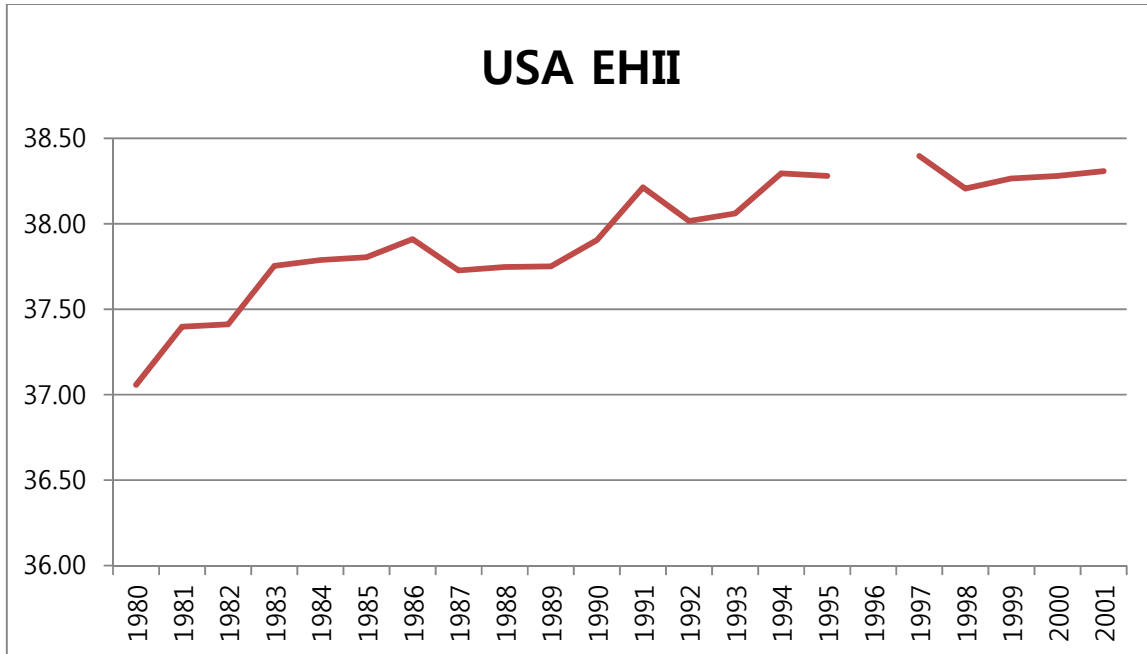


Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

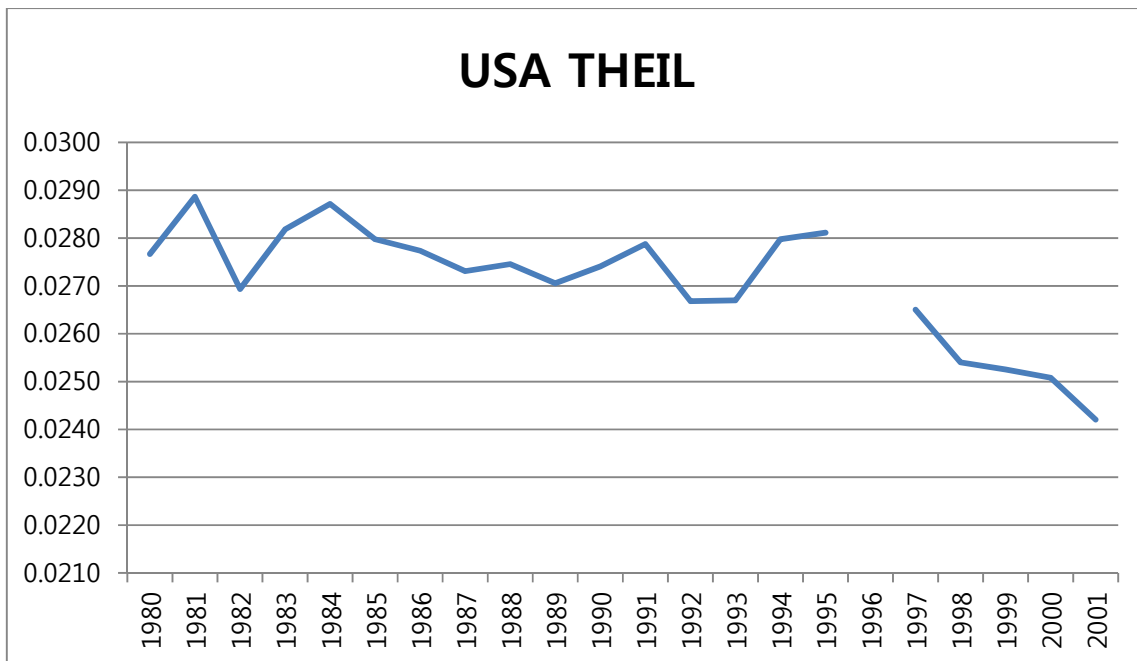
Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

20) The USA

a. Movements of EHII



b. Movements of the Theil Index



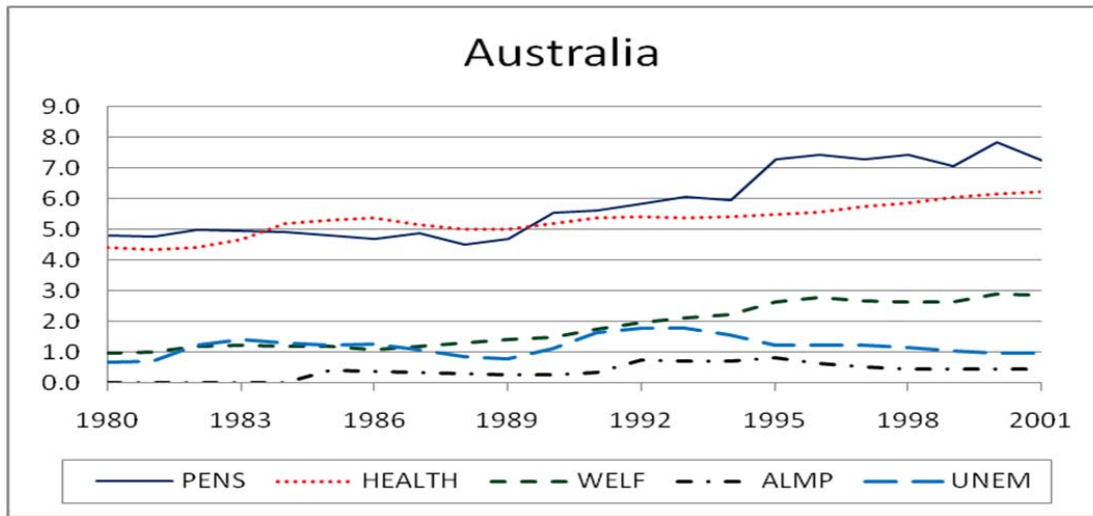
Notes: EHII denotes estimated household income inequality. Missing observations have resulted in disconnected plots.

Source: Both EHII and the Theil index data are obtained from the University of Texas Inequality Project at <http://utip.gov.utexas.edu/>.

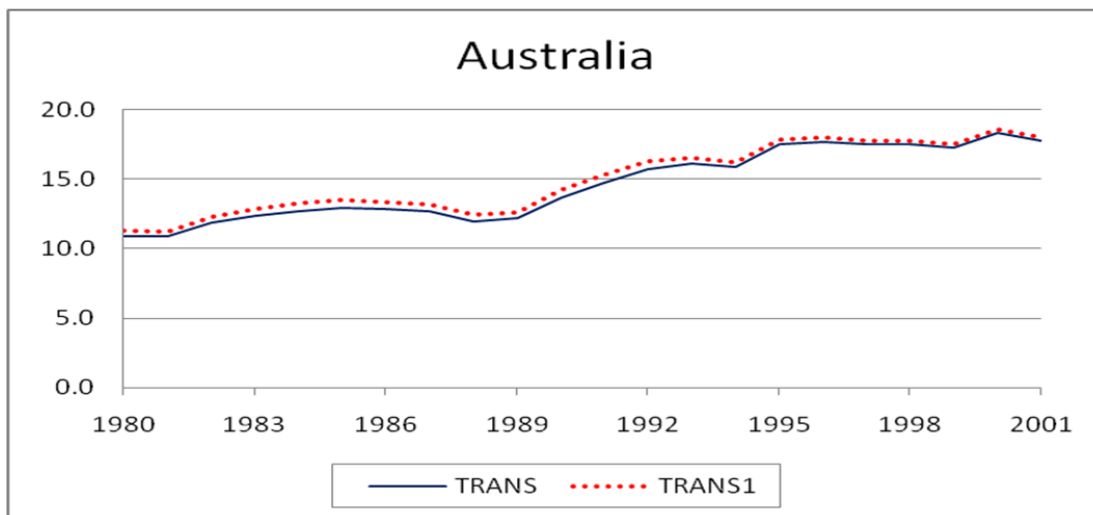
2. Movements of Redistributive Tax Rates and its Components in Individual Countries

1) Australia

a. Movements of Components



b. Movements of the Redistributive Tax Rates

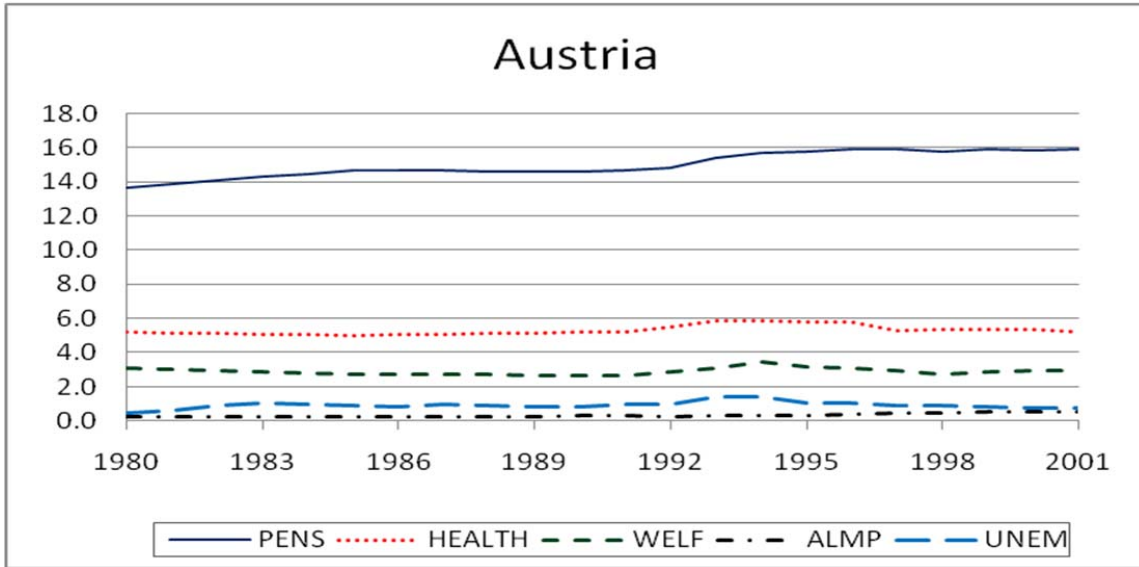


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

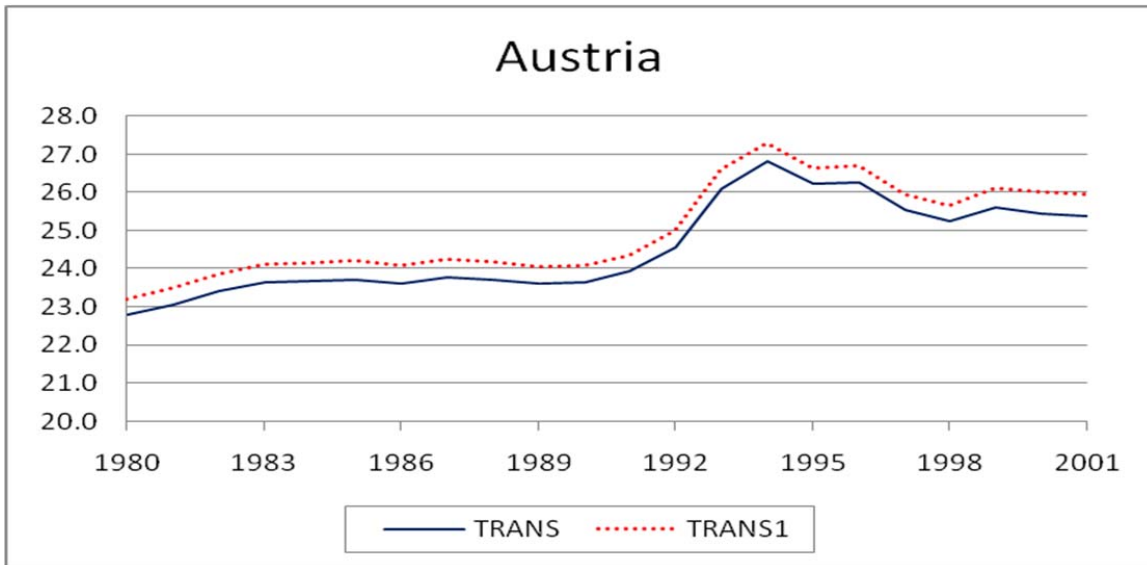
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

2) Austria

a. Movements of Components



b. Movements of the Redistributive Tax Rates

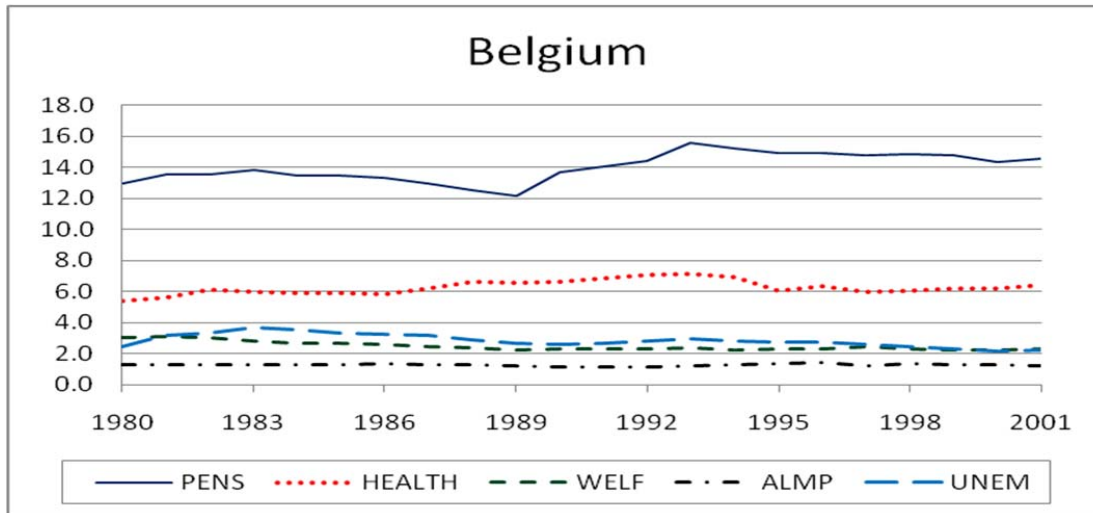


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

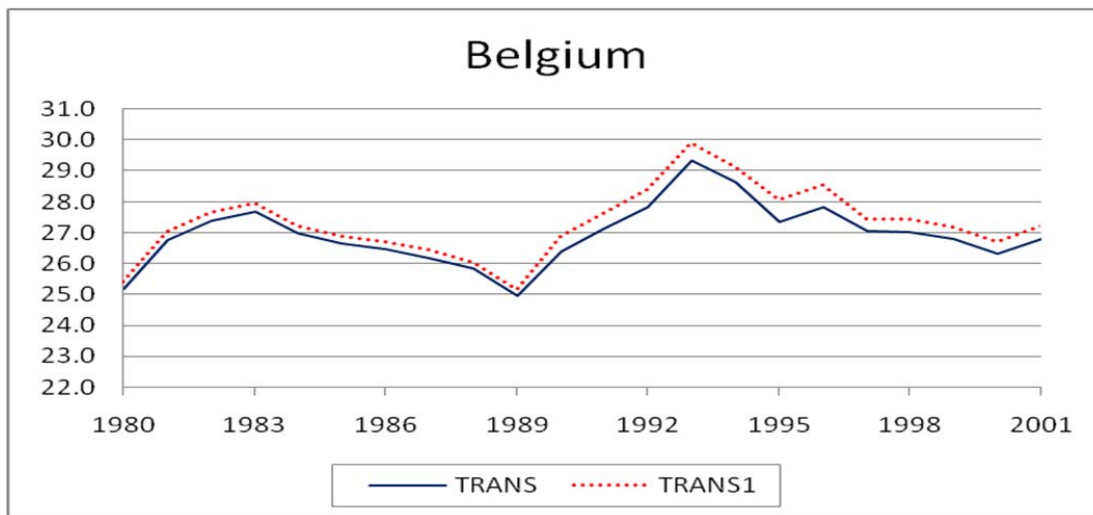
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

3) Belgium

a. Movements of Components



b. Movements of the Redistributive Tax Rates

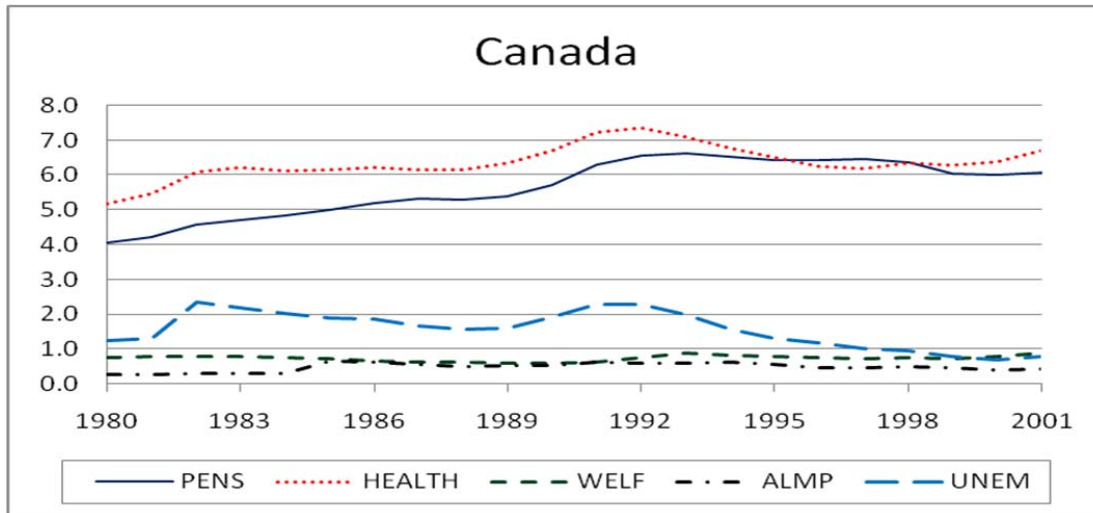


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

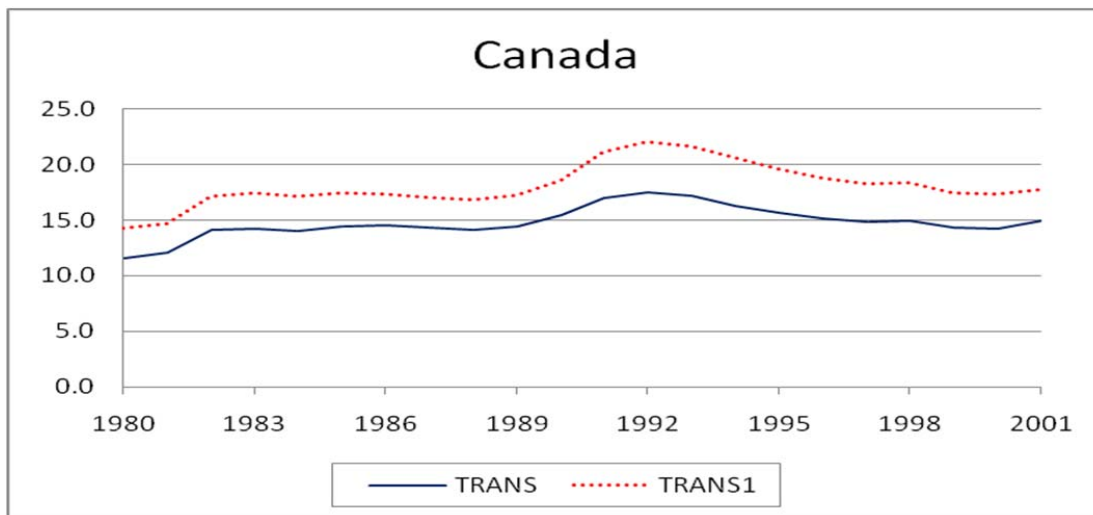
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

4) Canada

a. Movements of Components



b. Movements of the Redistributive Tax Rates

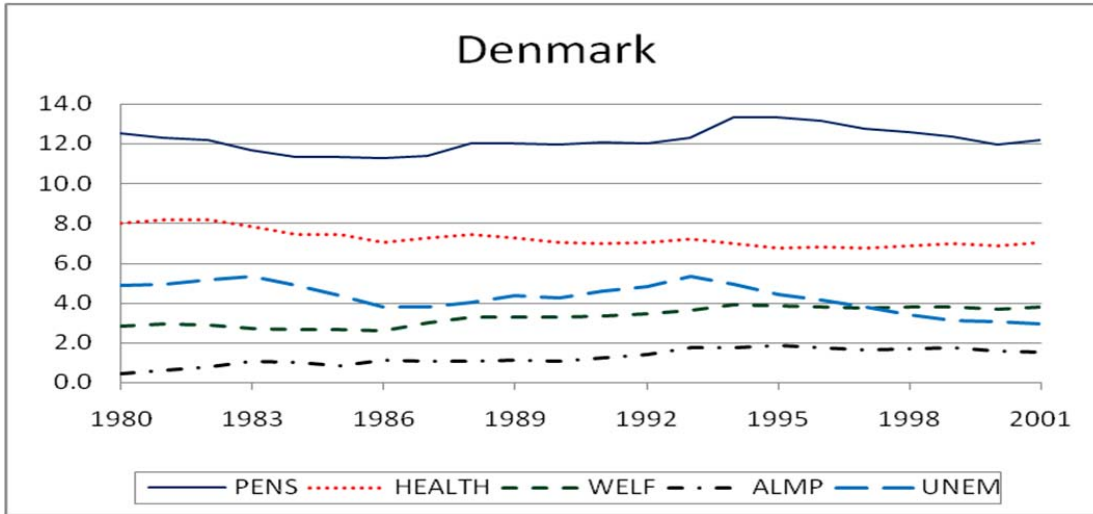


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

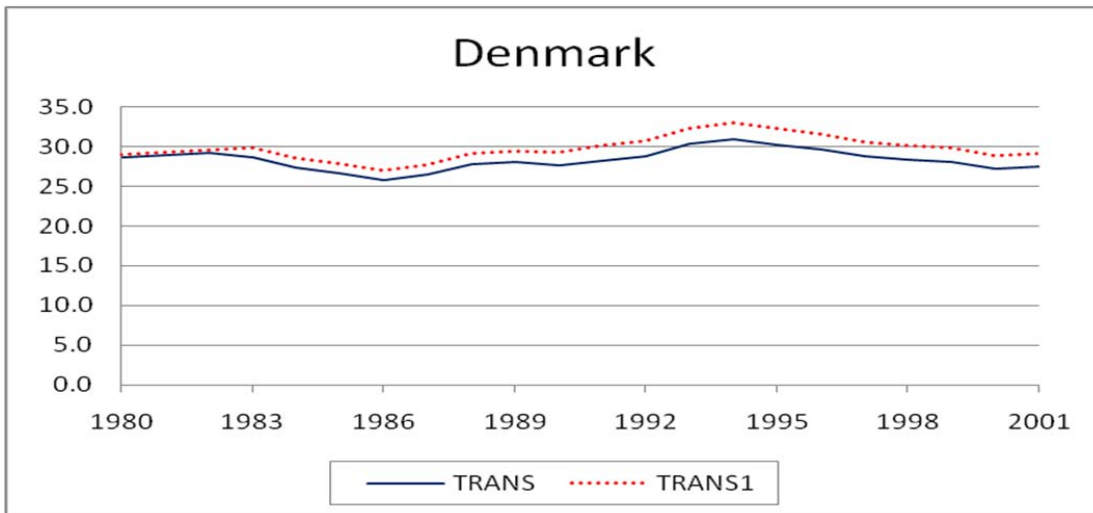
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

5) Denmark

a. Movements of Components



b. Movements of the Redistributive Tax Rates

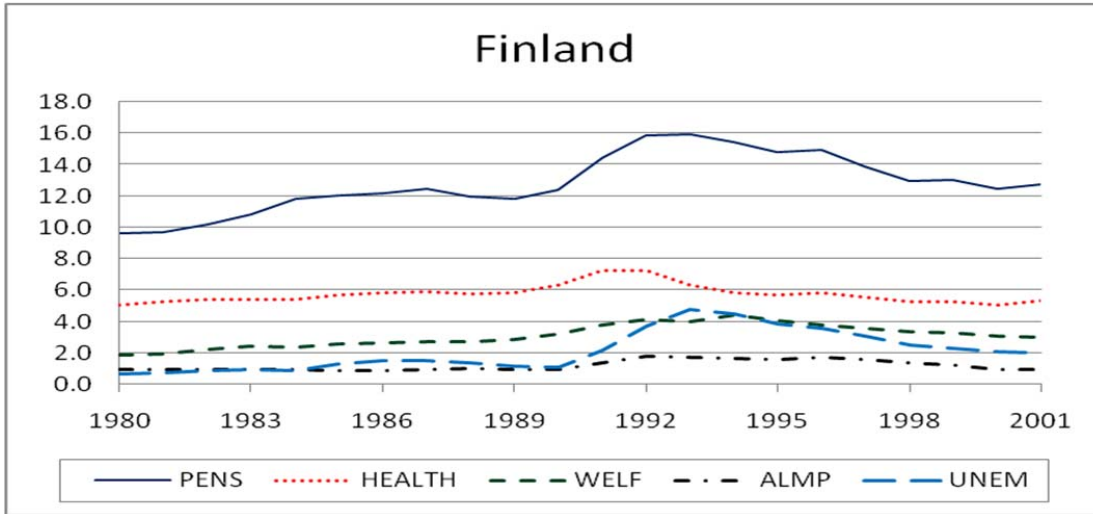


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

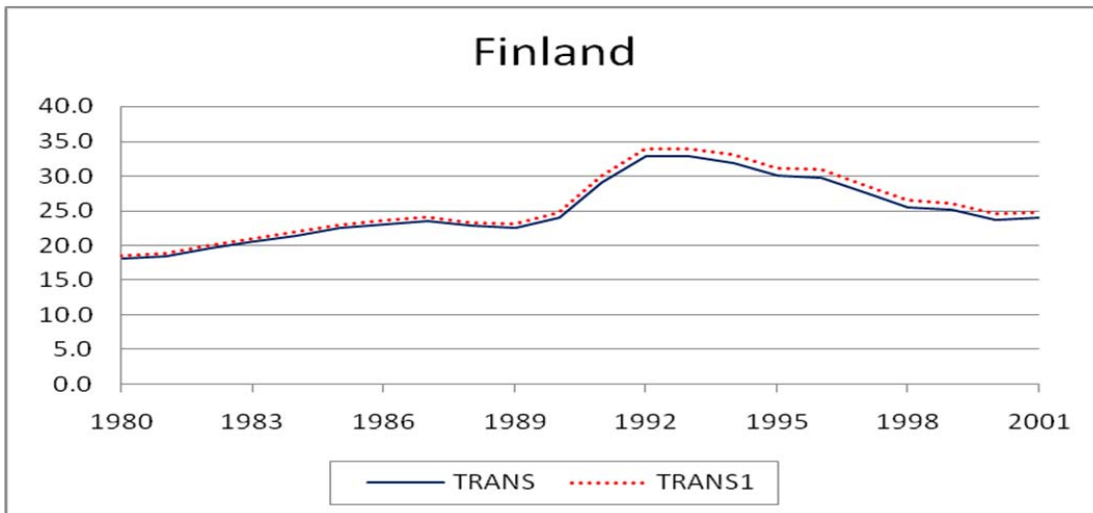
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

6) Finland

a. Movements of Components



b. Movements of the Redistributive Tax Rates

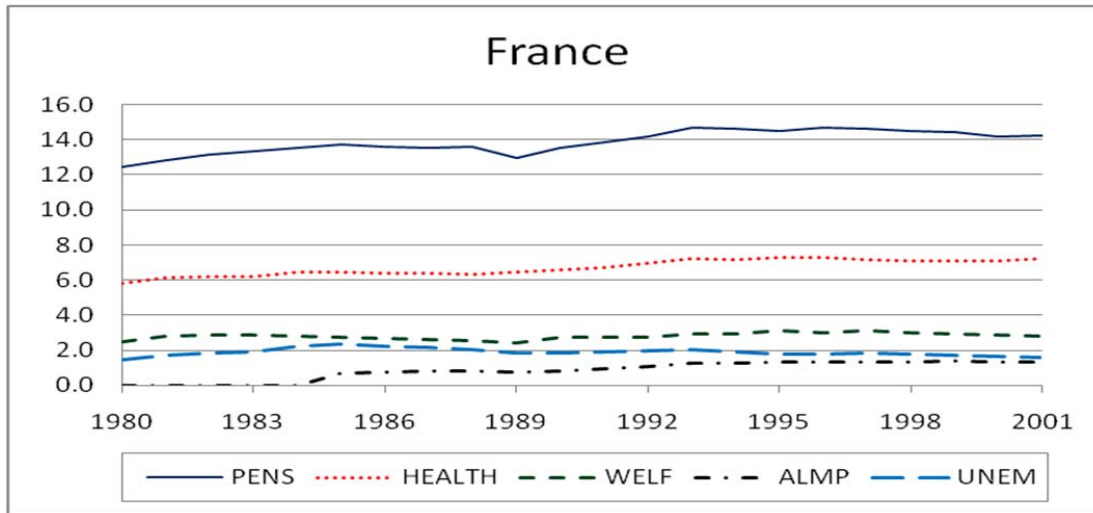


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

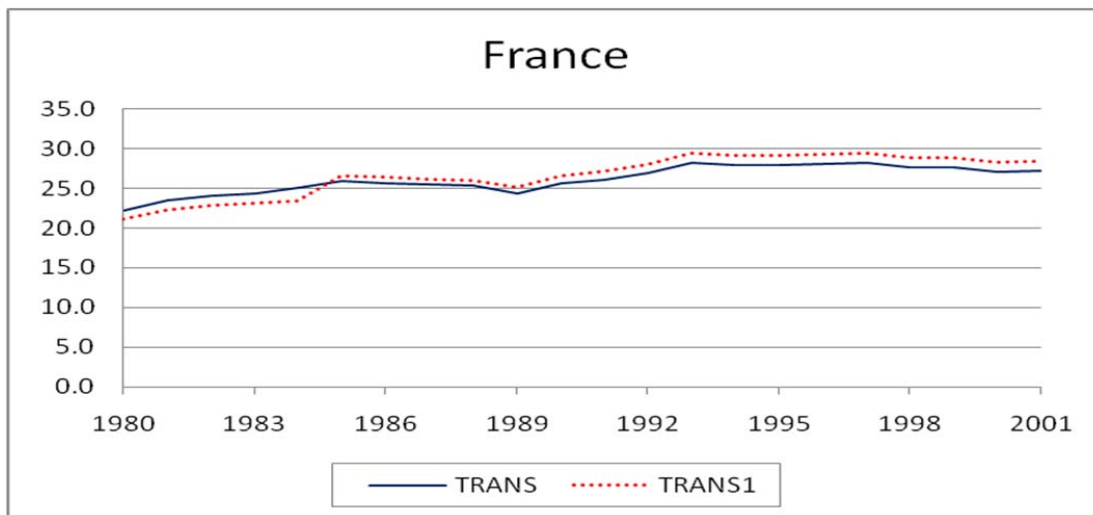
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

7) France

a. Movements of Components



b. Movements of the Redistributive Tax Rates

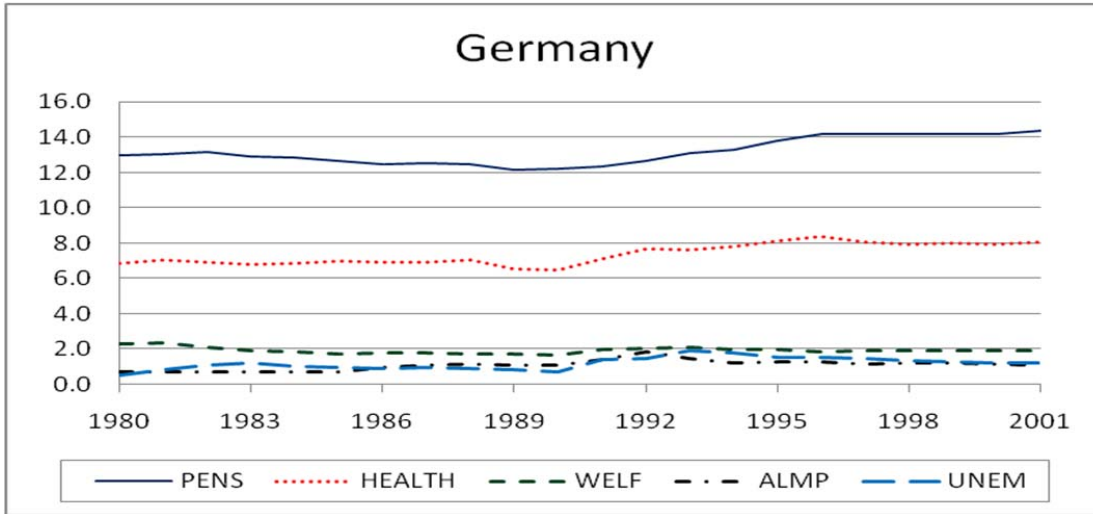


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

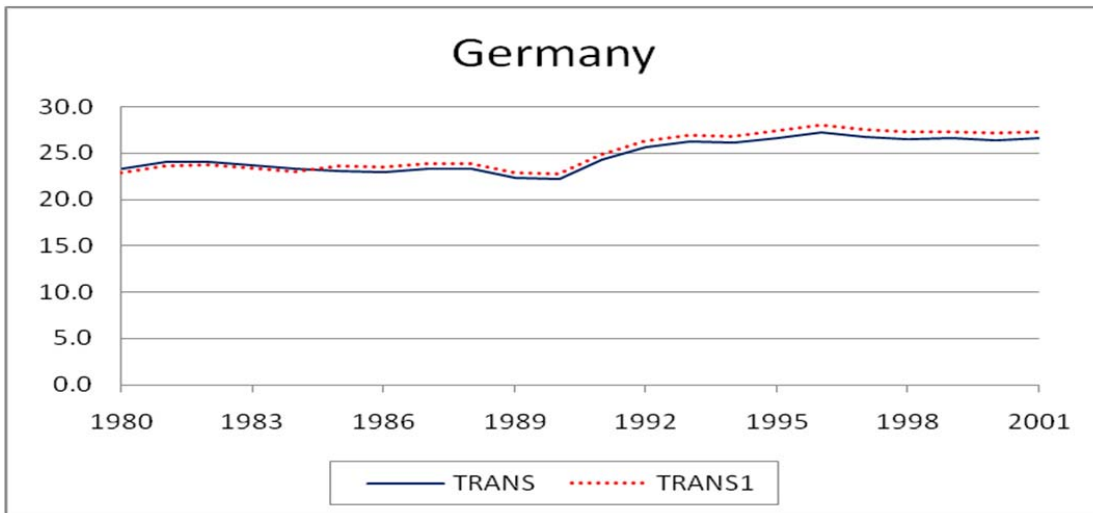
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

8) Germany

a. Movements of Components



b. Movements of the Redistributive Tax Rates

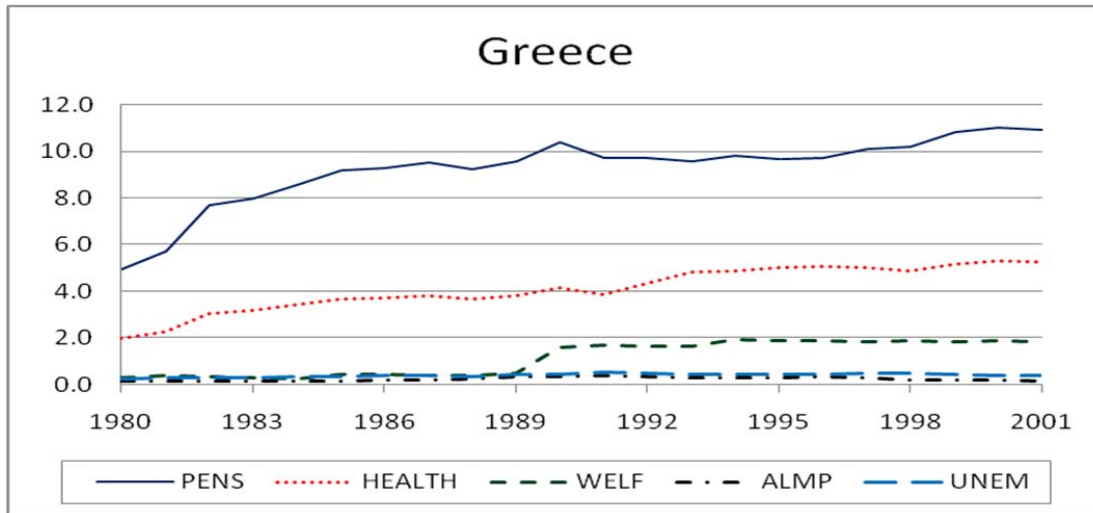


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

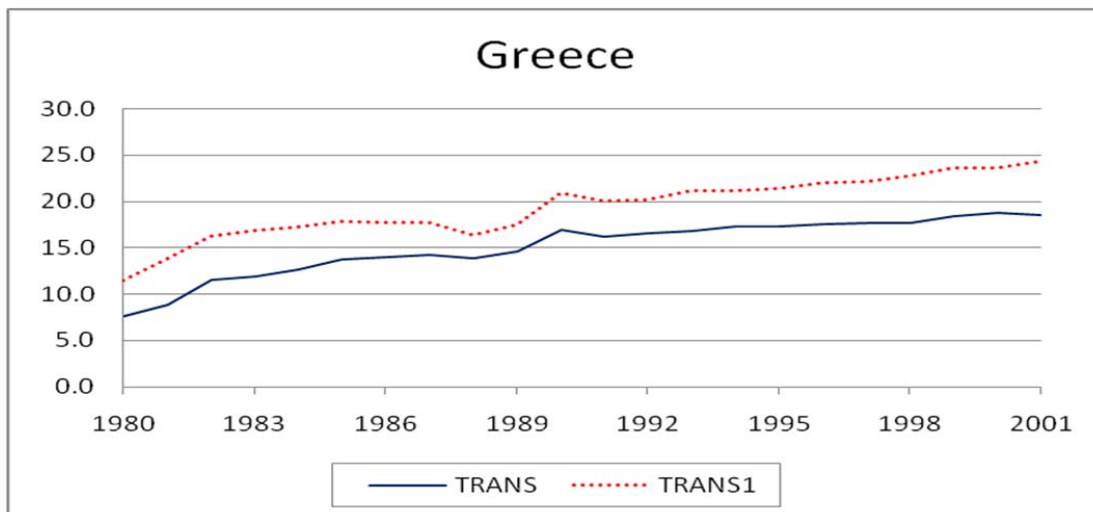
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

9) Greece

a. Movements of Components



b. Movements of the Redistributive Tax Rates

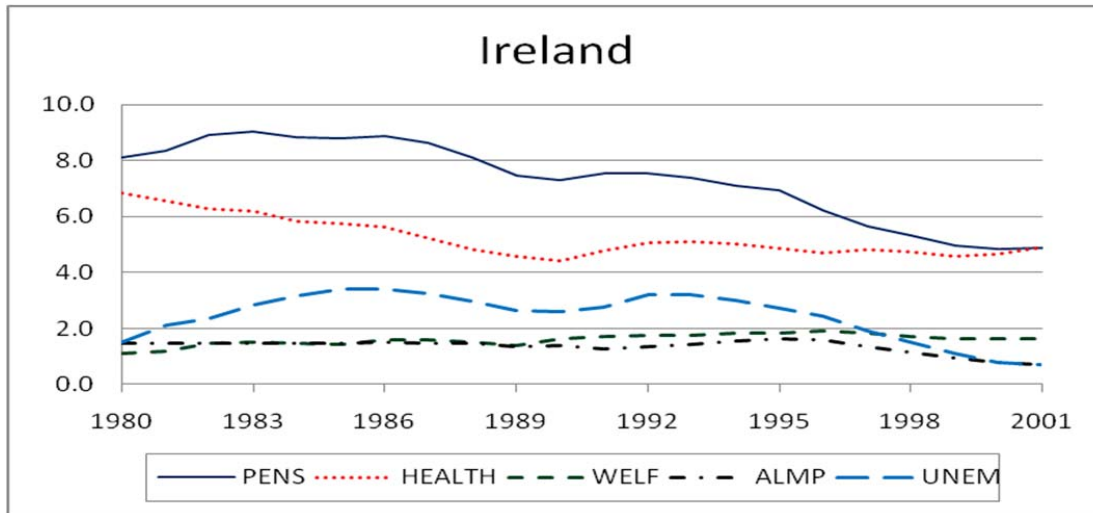


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

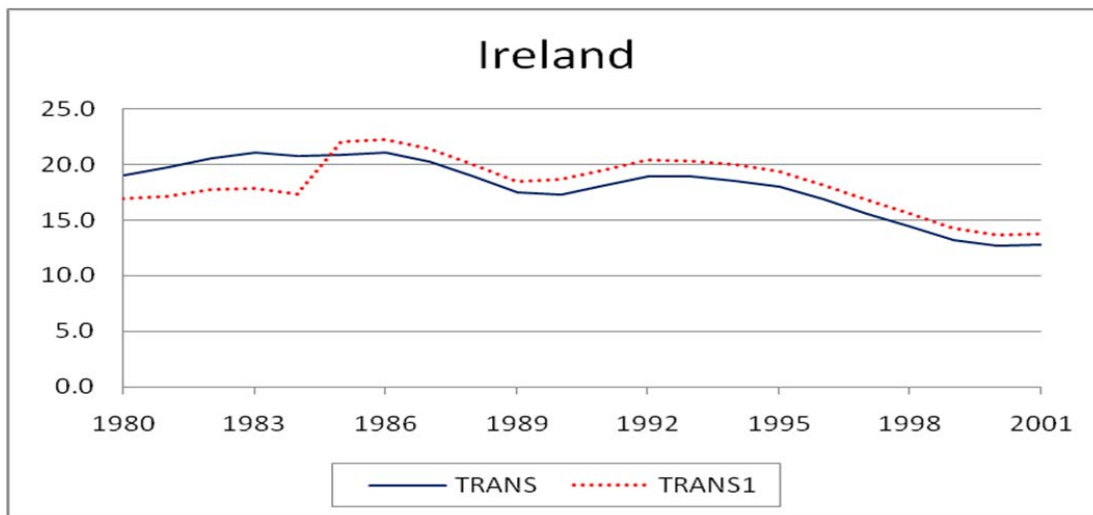
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

10) Ireland

a. Movements of Components



b. Movements of the Redistributive Tax Rates

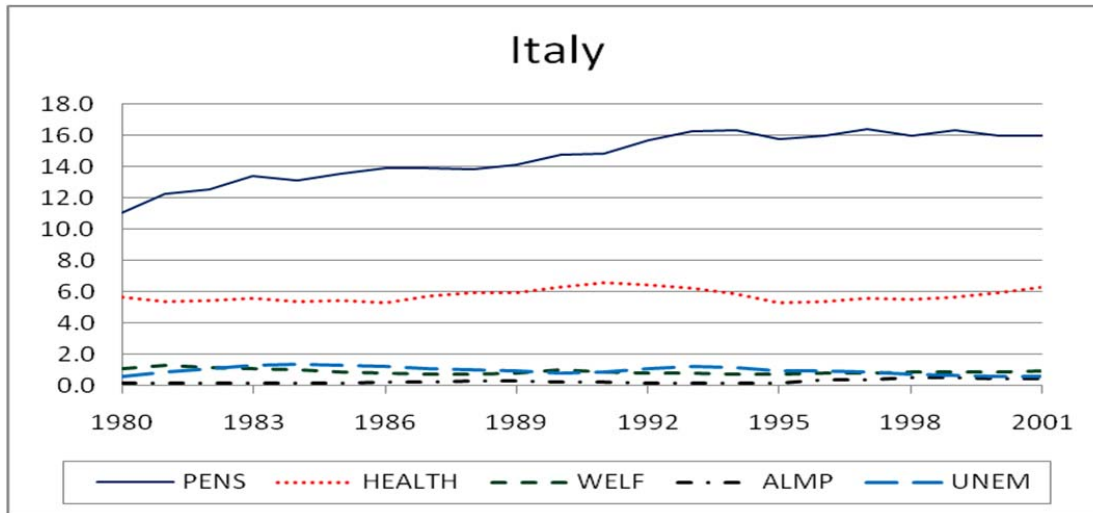


Notes: ‘PENS’ denotes non-contributory public pensions, ‘HEALTH’ denotes public health expenditures, ‘WELF’ denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, ‘ALMP’ denotes expenditures on active labor market policies, and ‘UNEM’ denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. ‘TRANS’ denotes the sum of these social transfers, and ‘TRANS1’ includes housing subsidies and other compensations in addition to ‘TRANS’.

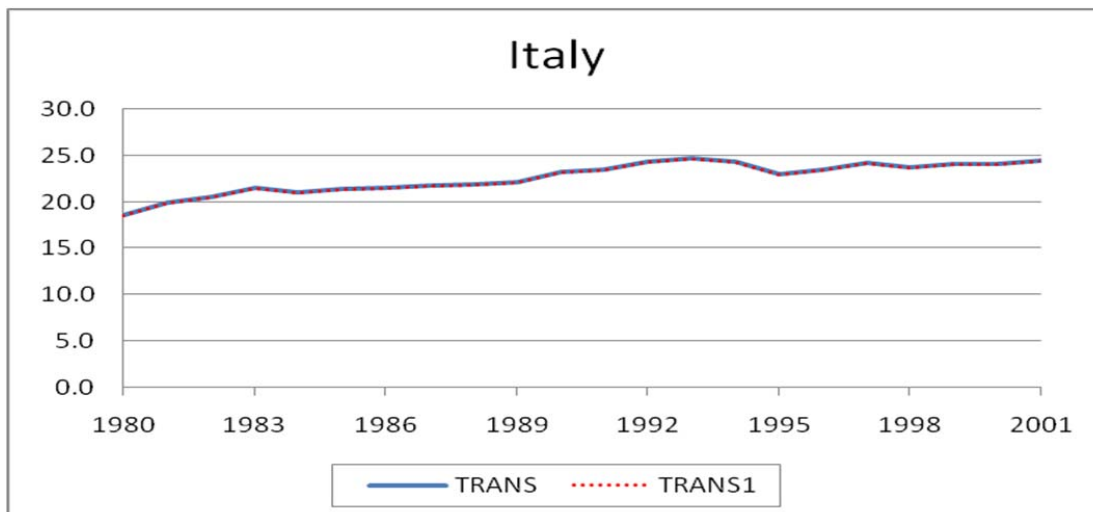
Source: Peter Lindert’s homepage (<http://lindert.econ.ucdavis.edu/>).

11) Italy

a. Movements of Components



b. Movements of the Redistributive Tax Rates

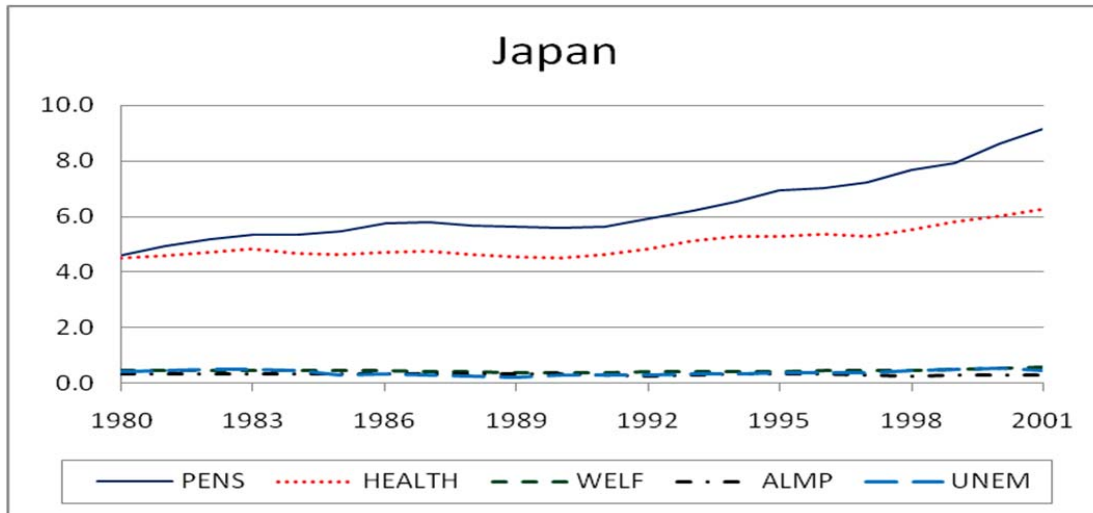


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

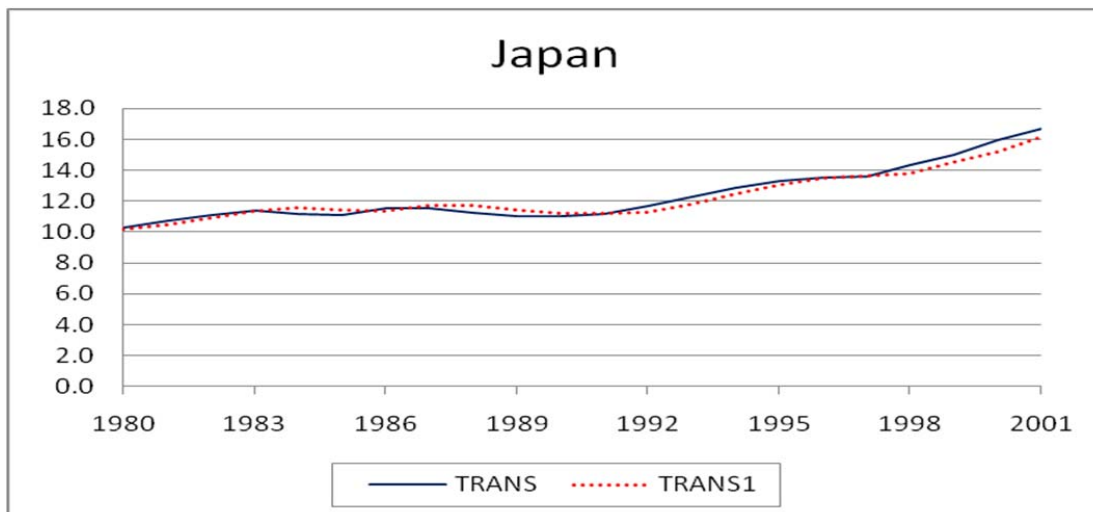
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

12) Japan

a. Movements of Components



b. Movements of the Redistributive Tax Rates

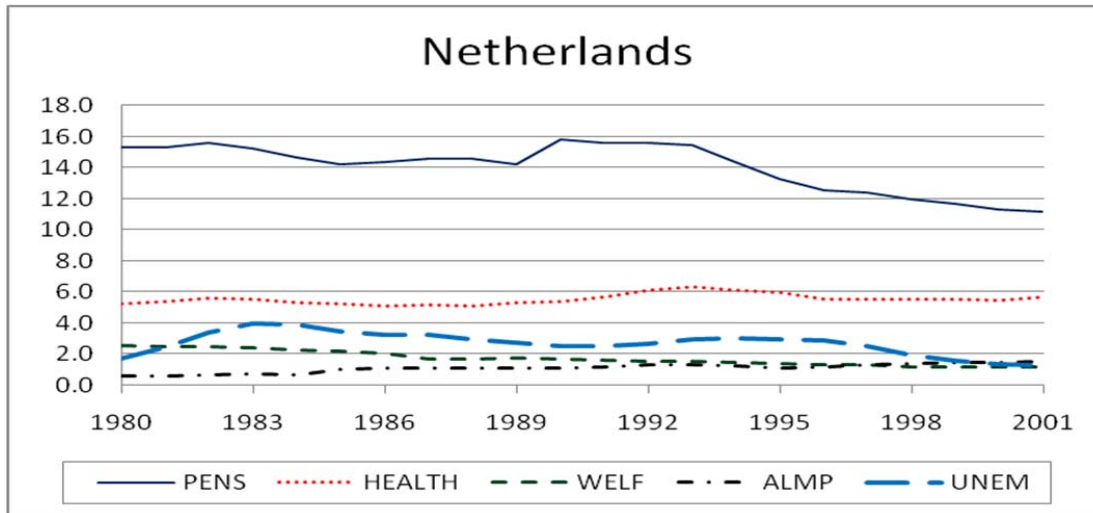


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

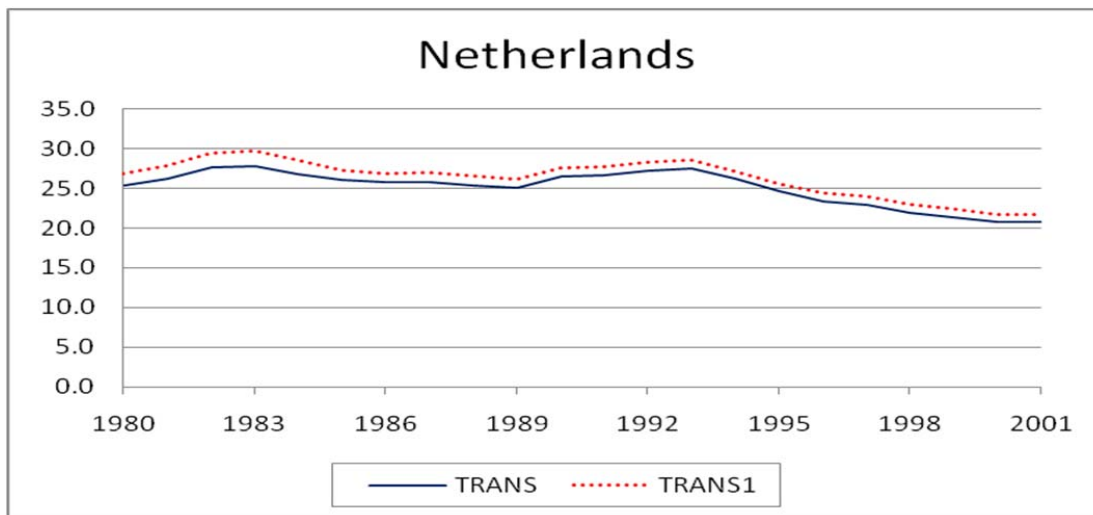
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

13) Netherlands

a. Movements of Components



b. Movements of the Redistributive Tax Rates

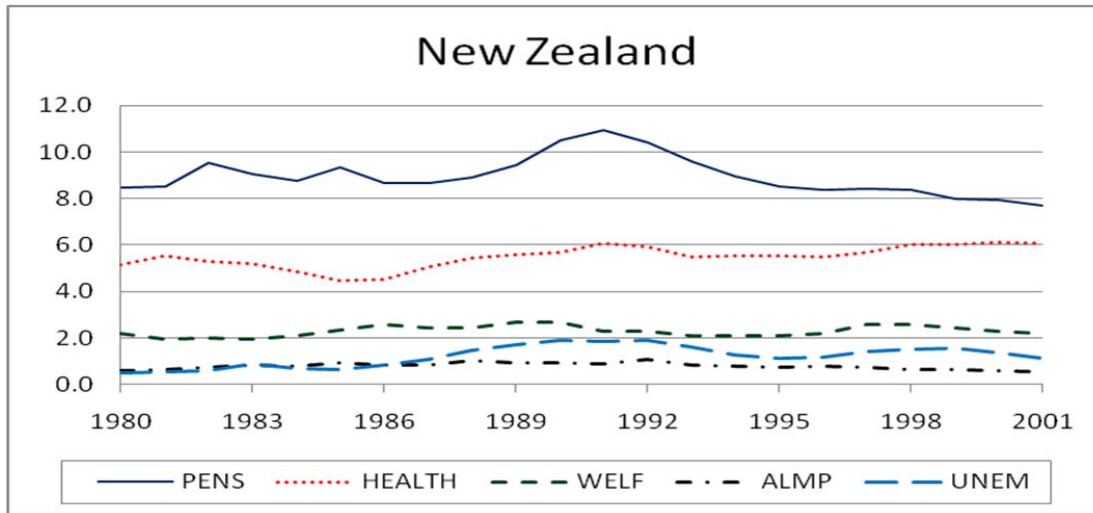


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

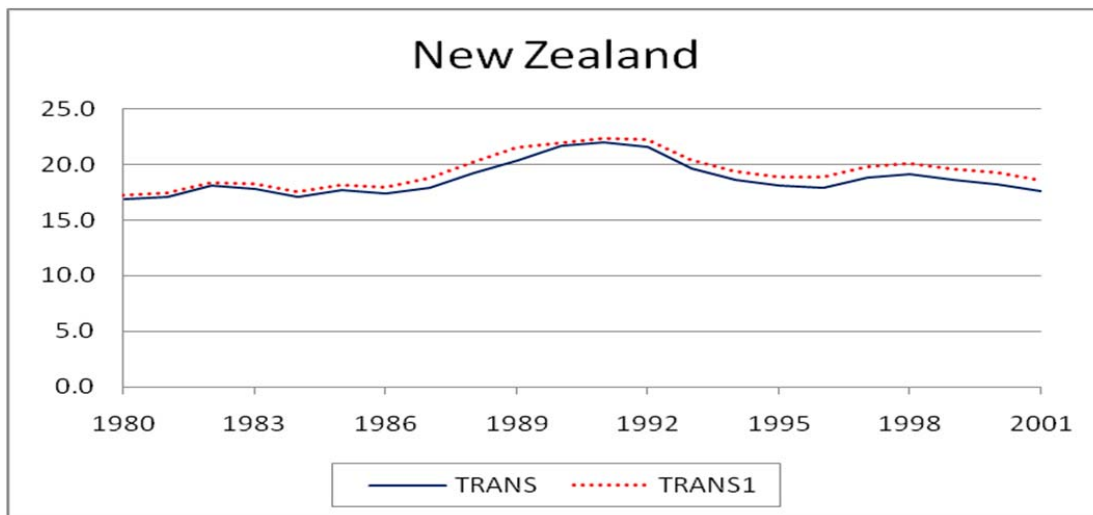
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

14) New Zealand

a. Movements of Components



b. Movements of the Redistributive Tax Rates

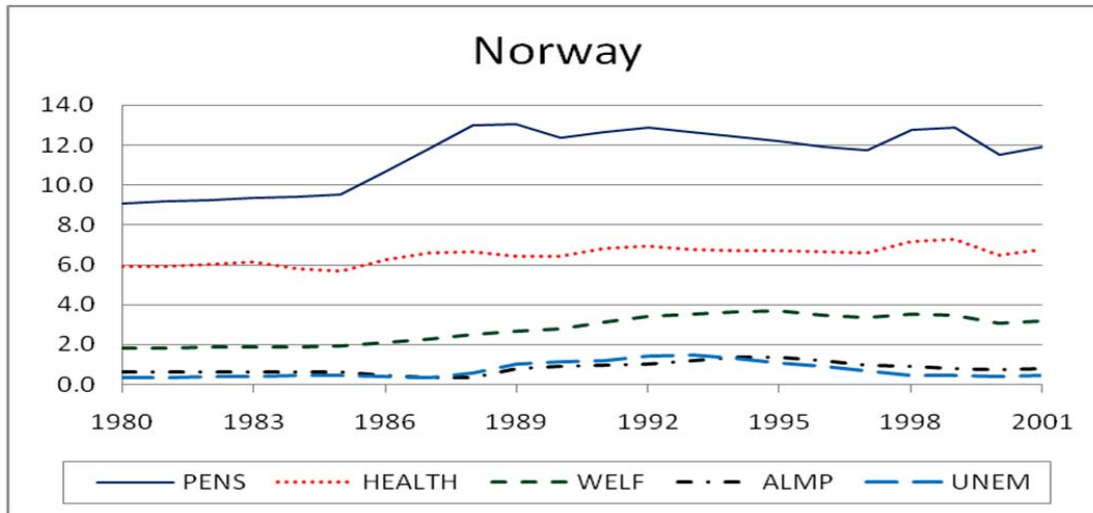


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

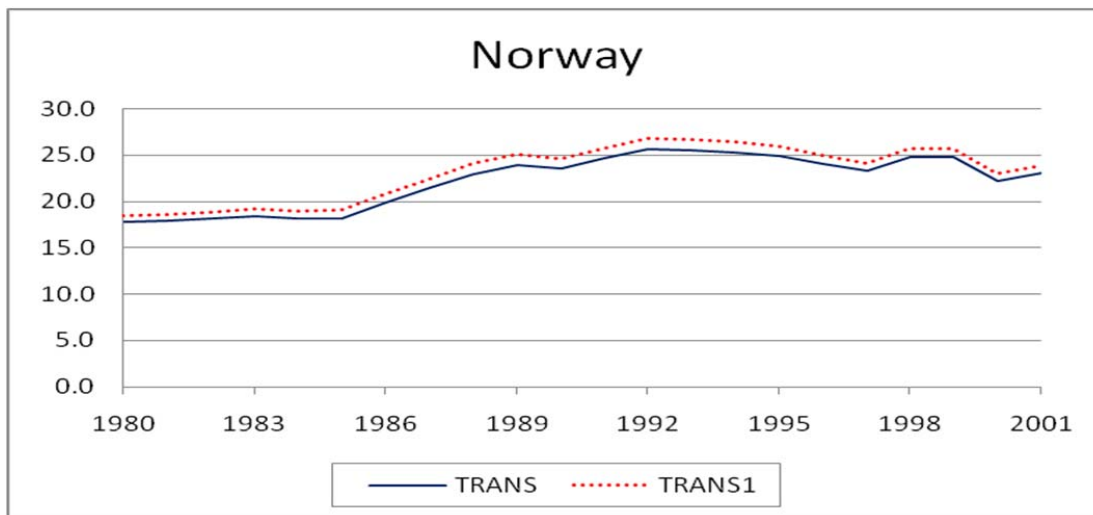
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

15) Norway

a. Movements of Components



b. Movements of the Redistributive Tax Rates

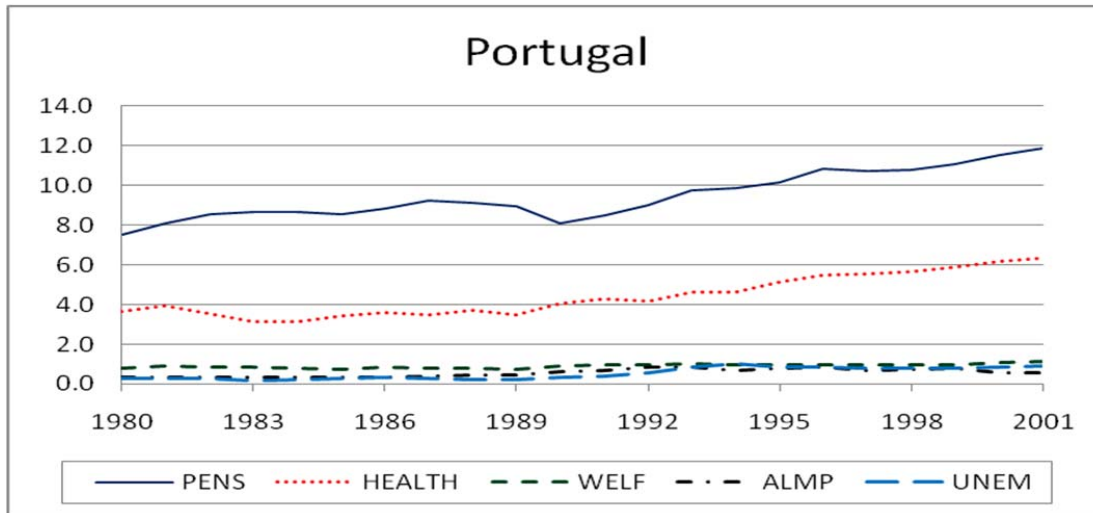


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

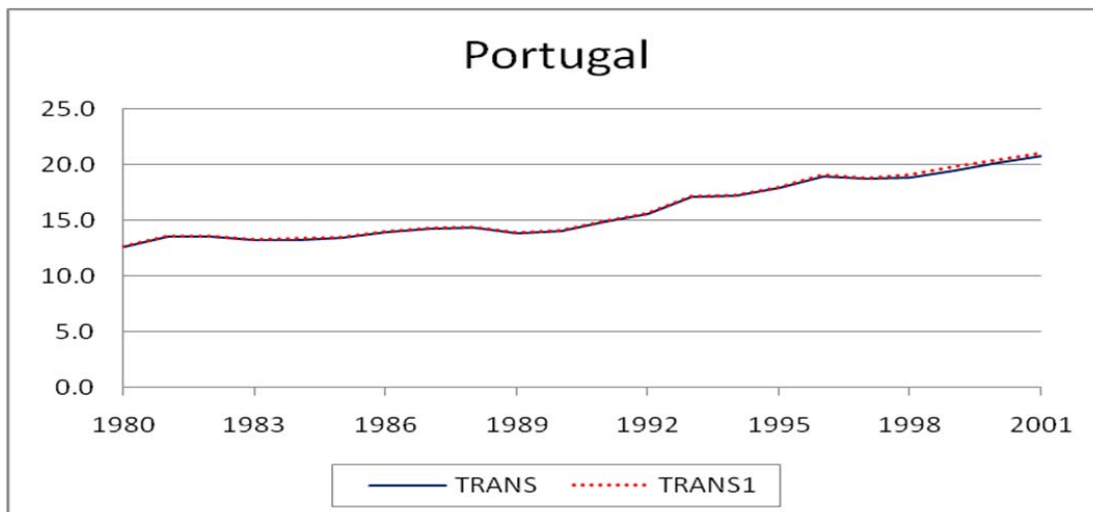
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

16) Portugal

a. Movements of Components



b. Movements of the Redistributive Tax Rates

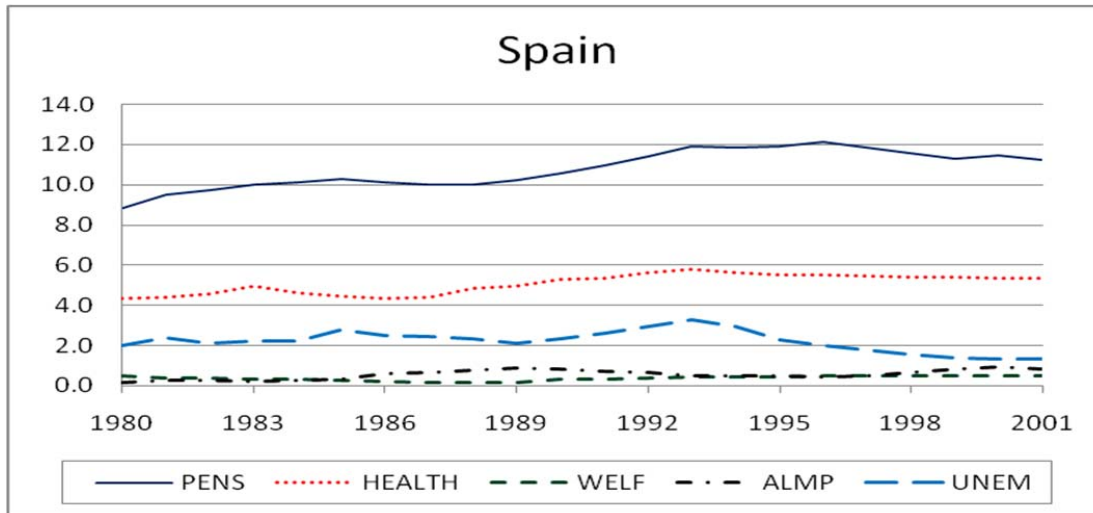


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

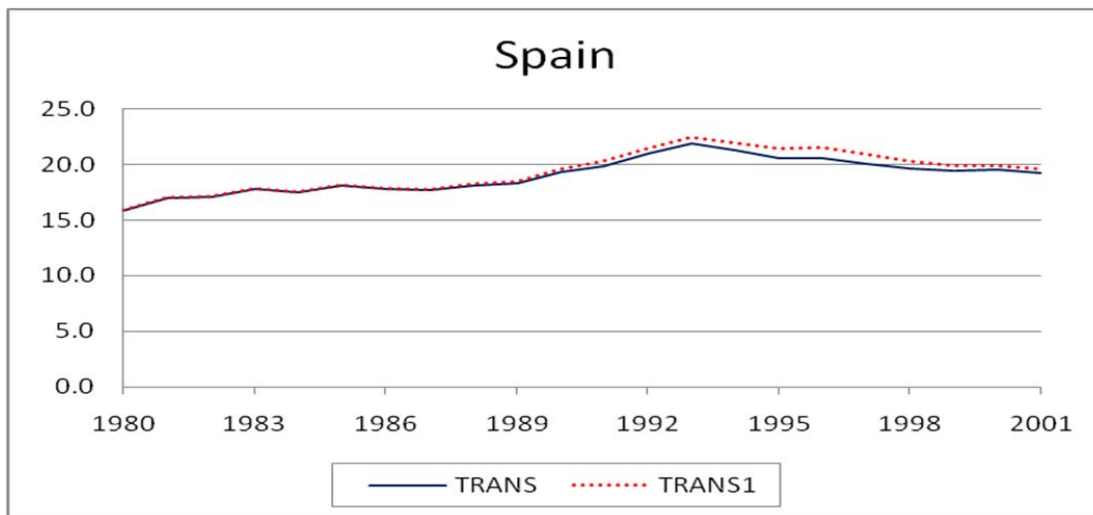
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

17) Spain

a. Movements of Components



b. Movements of the Redistributive Tax Rates

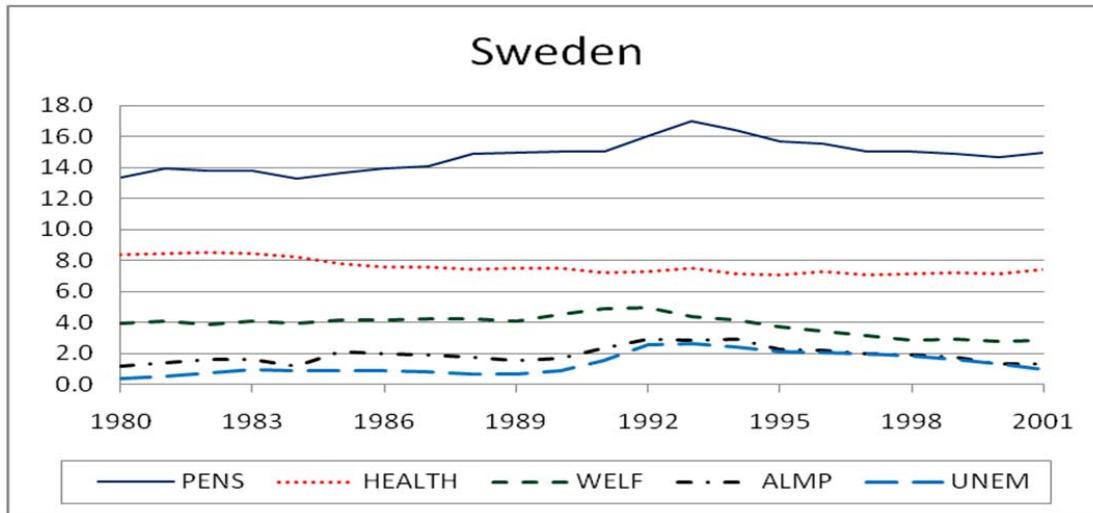


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

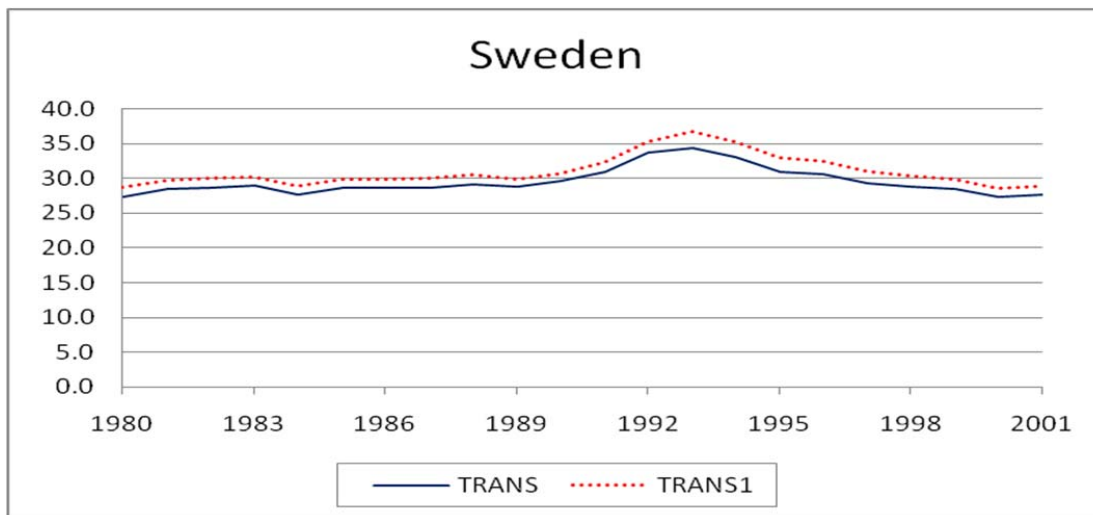
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

18) Sweden

a. Movements of Components



b. Movements of the Redistributive Tax Rates

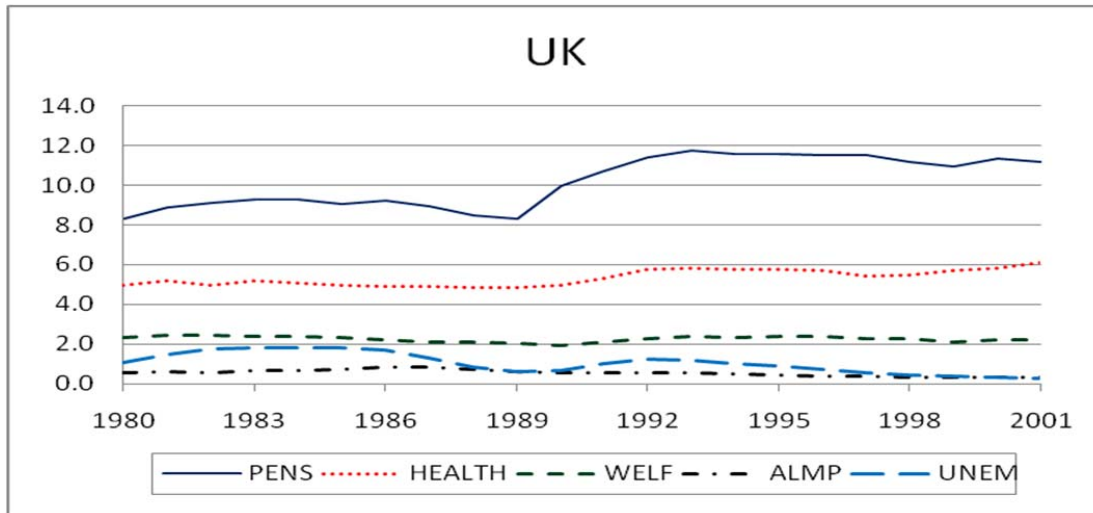


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

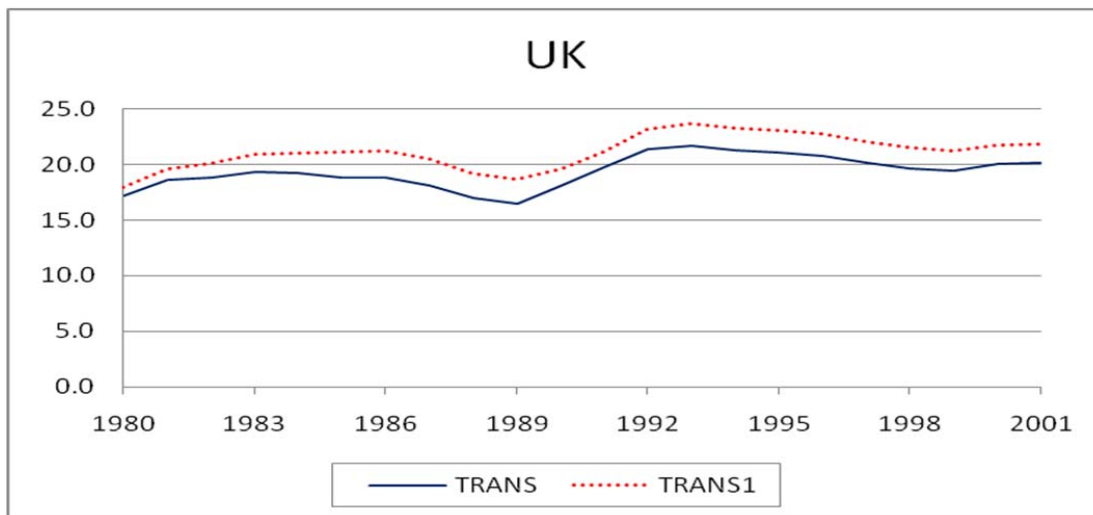
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

19) The UK

a. Movements of Components



b. Movements of the Redistributive Tax Rates

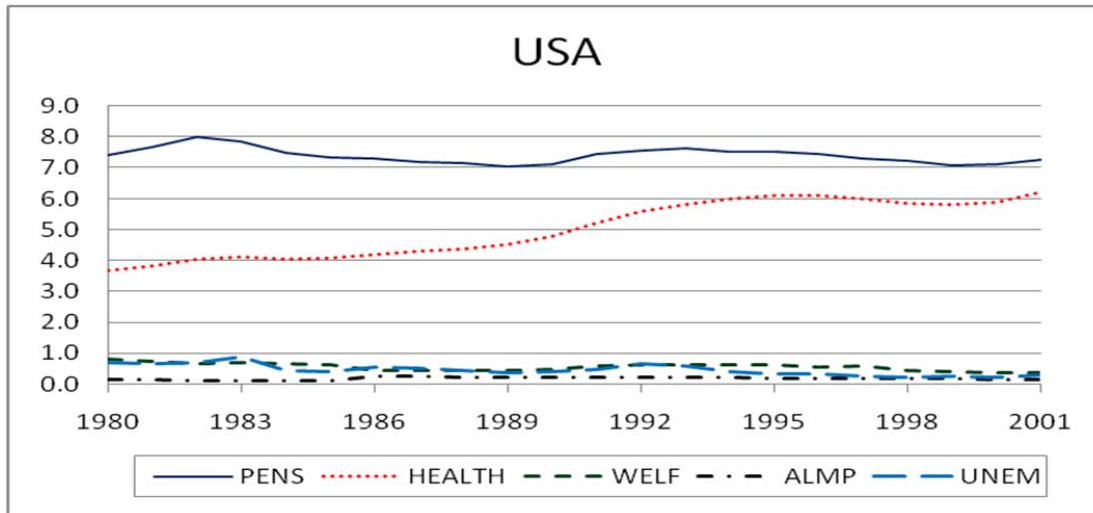


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

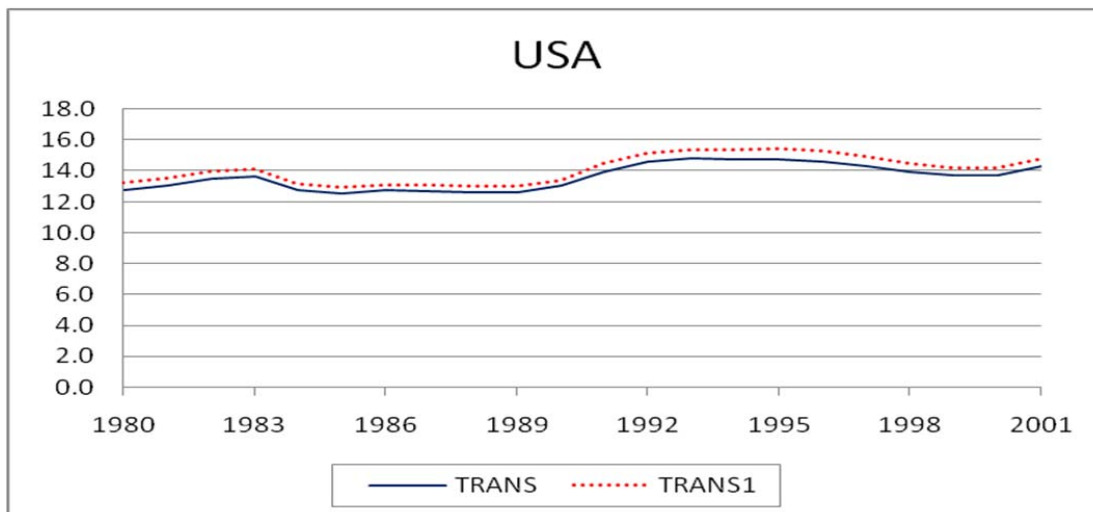
Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

20) The USA

a. Movements of Components



b. Movements of the Redistributive Tax Rates

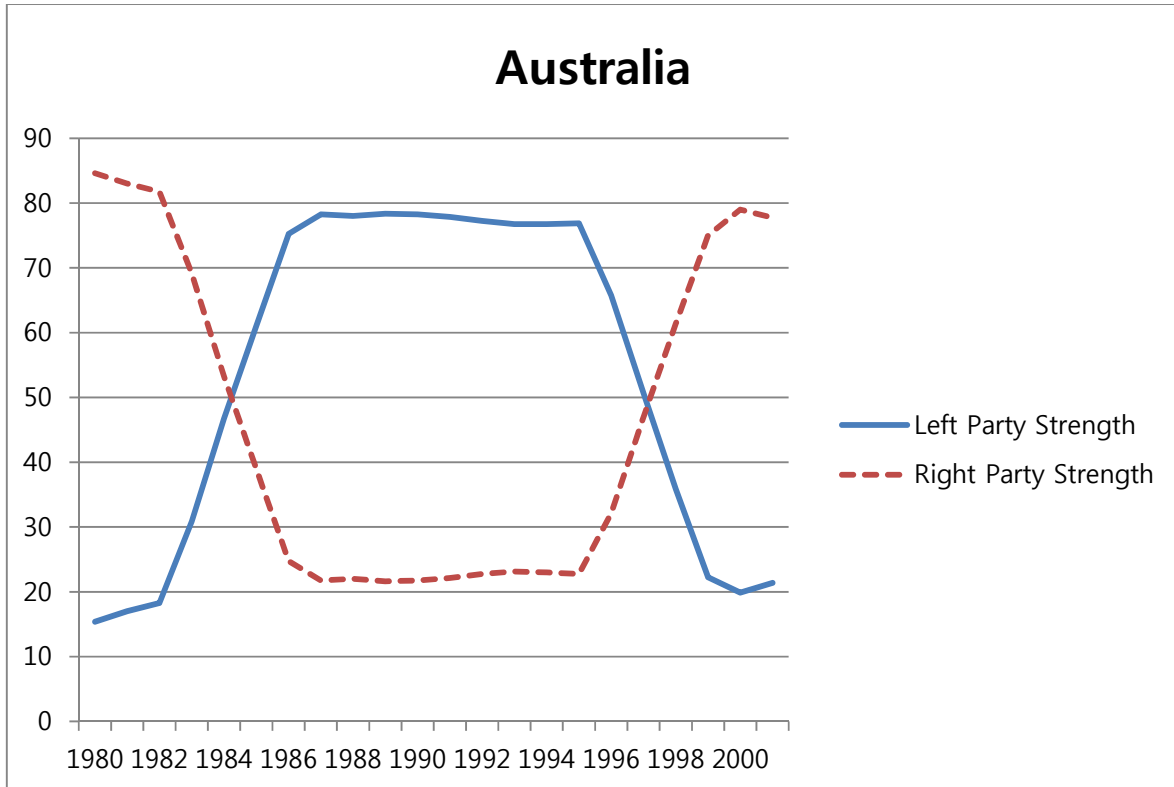


Notes: 'PENS' denotes non-contributory public pensions, 'HEALTH' denotes public health expenditures, 'WELF' denotes the sum of family cash benefits, family services expenditures and active labor market program expenditures, 'ALMP' denotes expenditures on active labor market policies, and 'UNEM' denotes the sum of unemployment compensation, early retirement for labor market reasons, and severance pay. 'TRANS' denotes the sum of these social transfers, and 'TRANS1' includes housing subsidies and other compensations in addition to 'TRANS'.

Source: Peter Lindert's homepage (<http://lindert.econ.ucdavis.edu/>).

3. Movements of Party Strength in Individual Countries

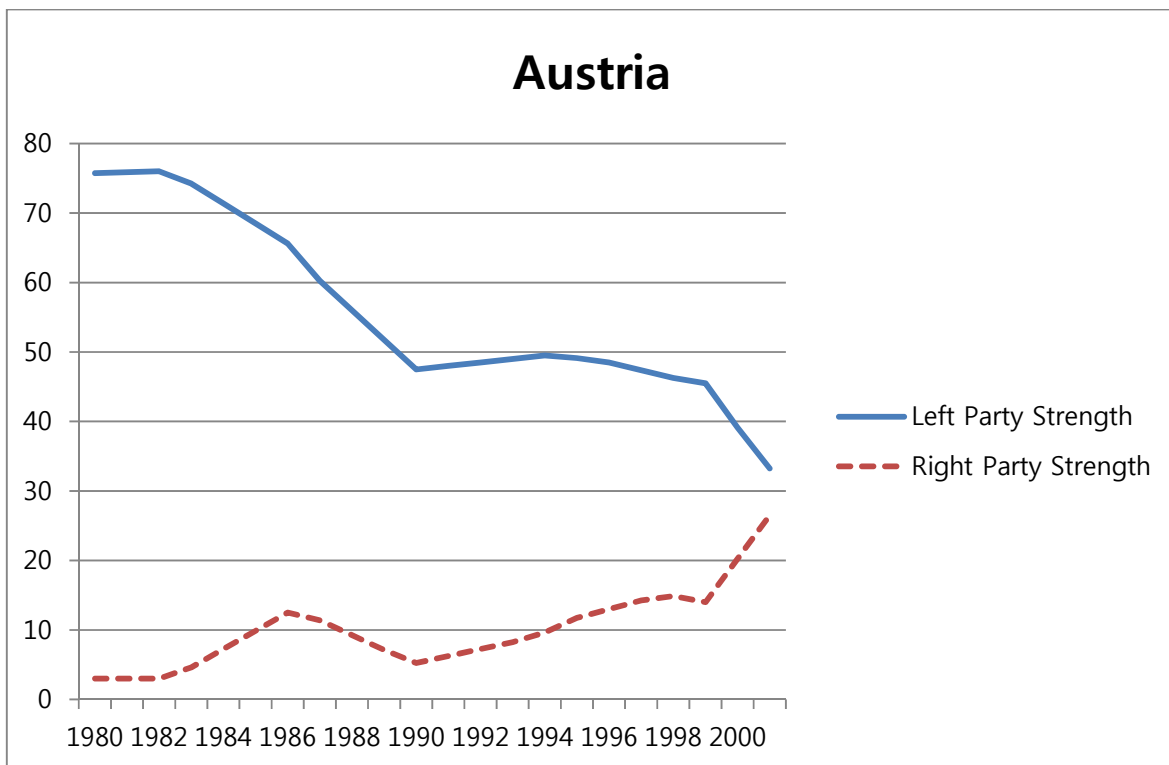
1) Australia



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

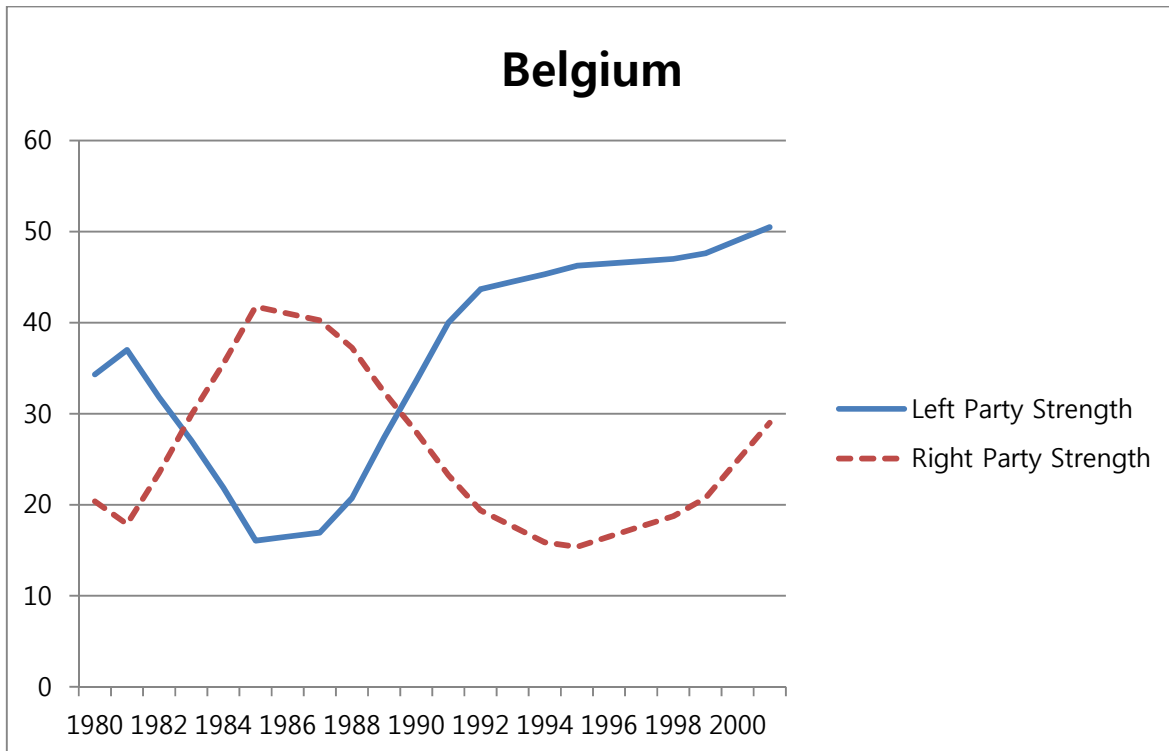
2) Austria



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

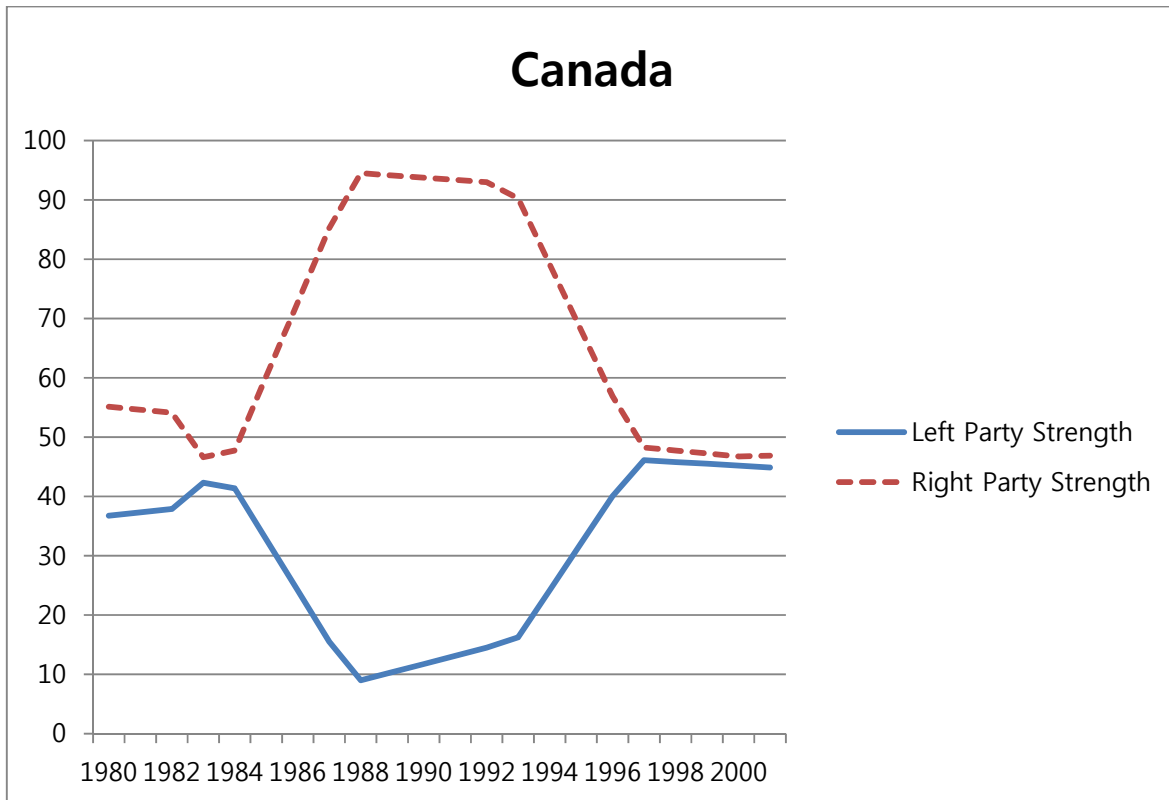
3) Belgium



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

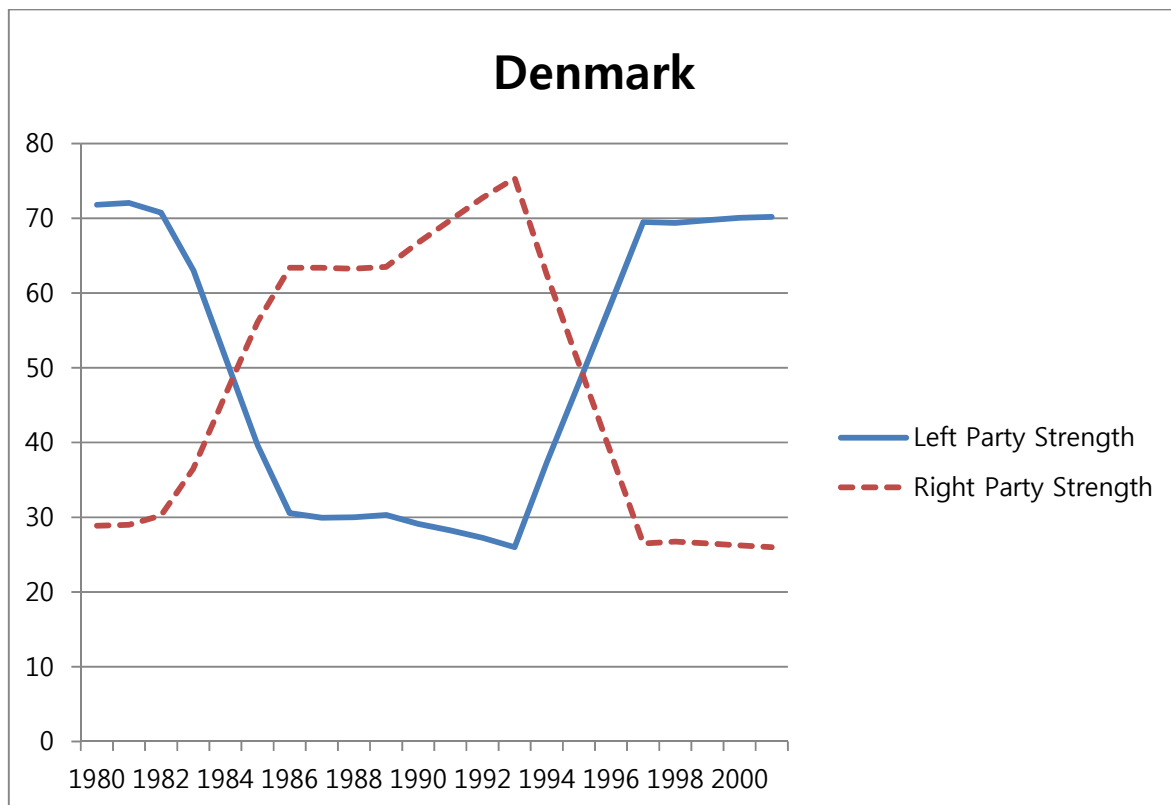
4) Canada



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

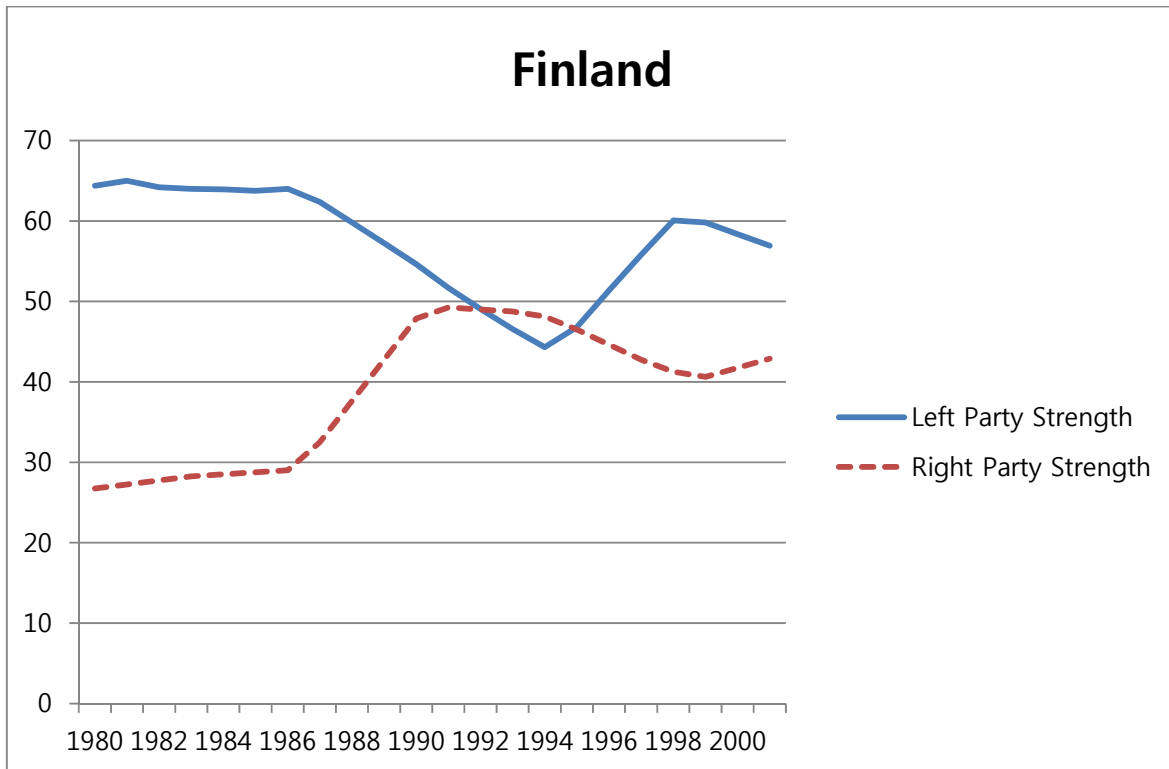
5) Denmark



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

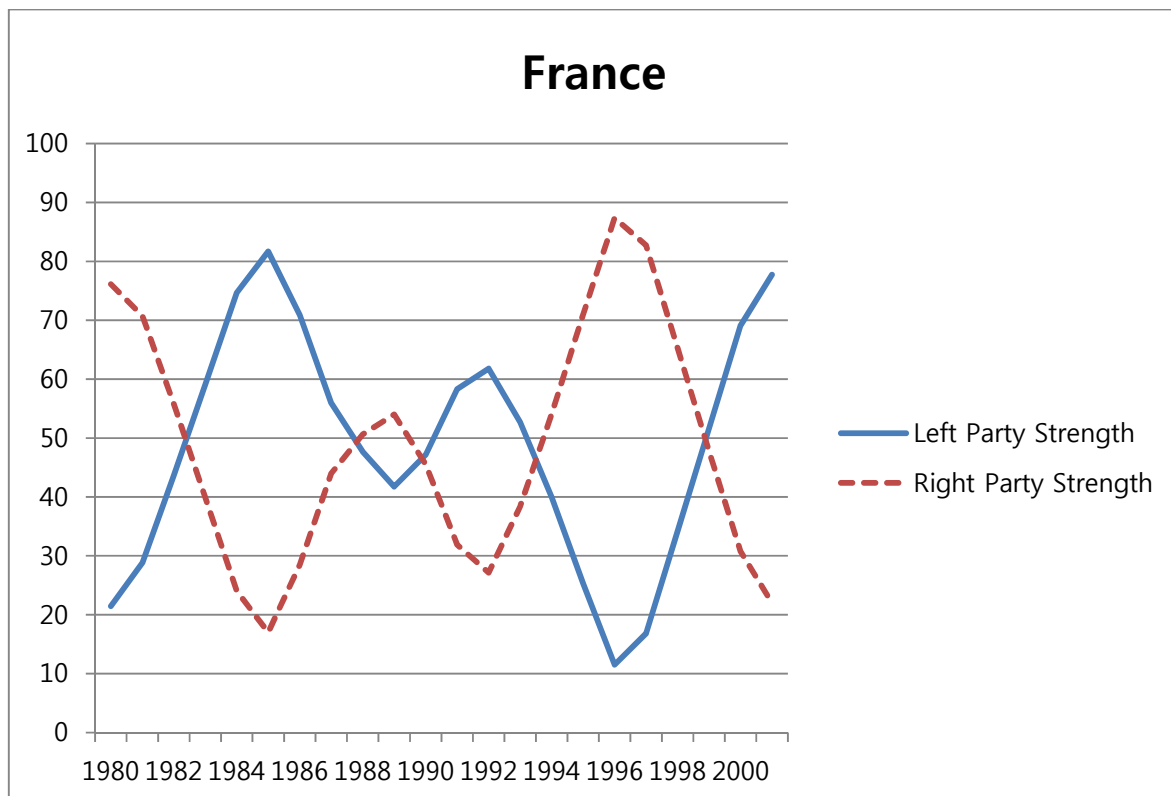
6) Finland



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

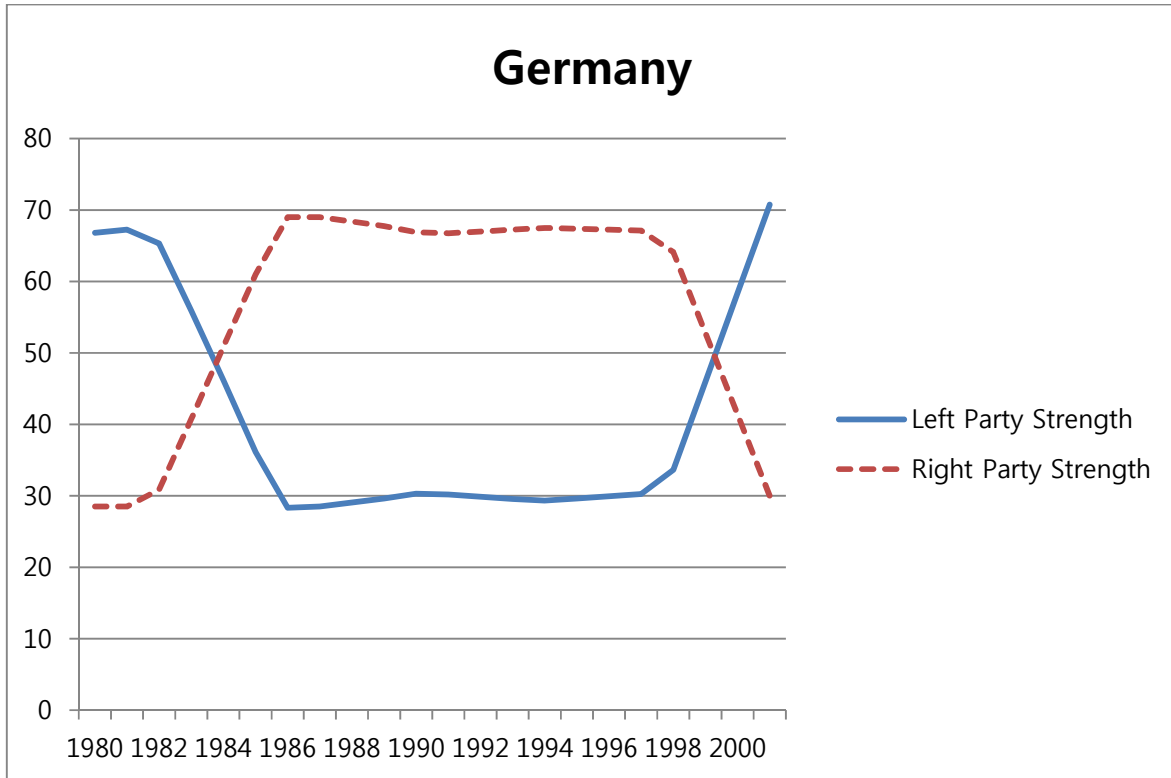
7) France



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

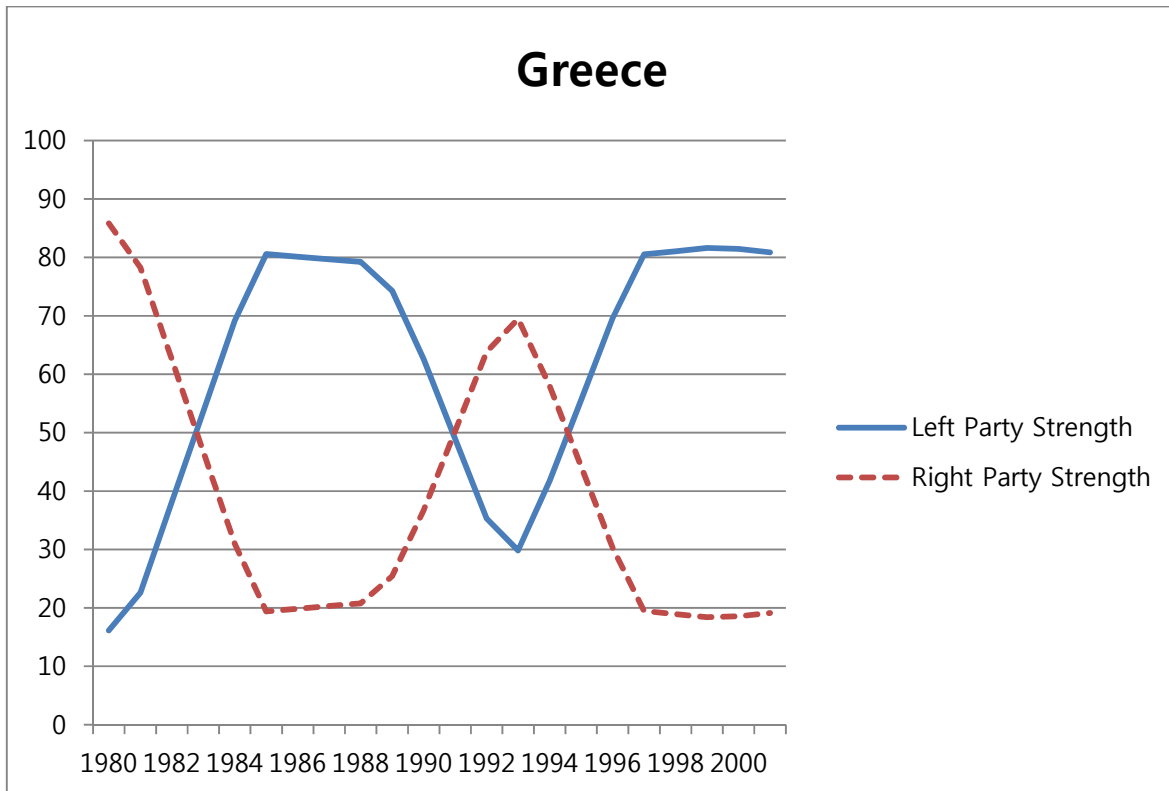
8) Germany



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

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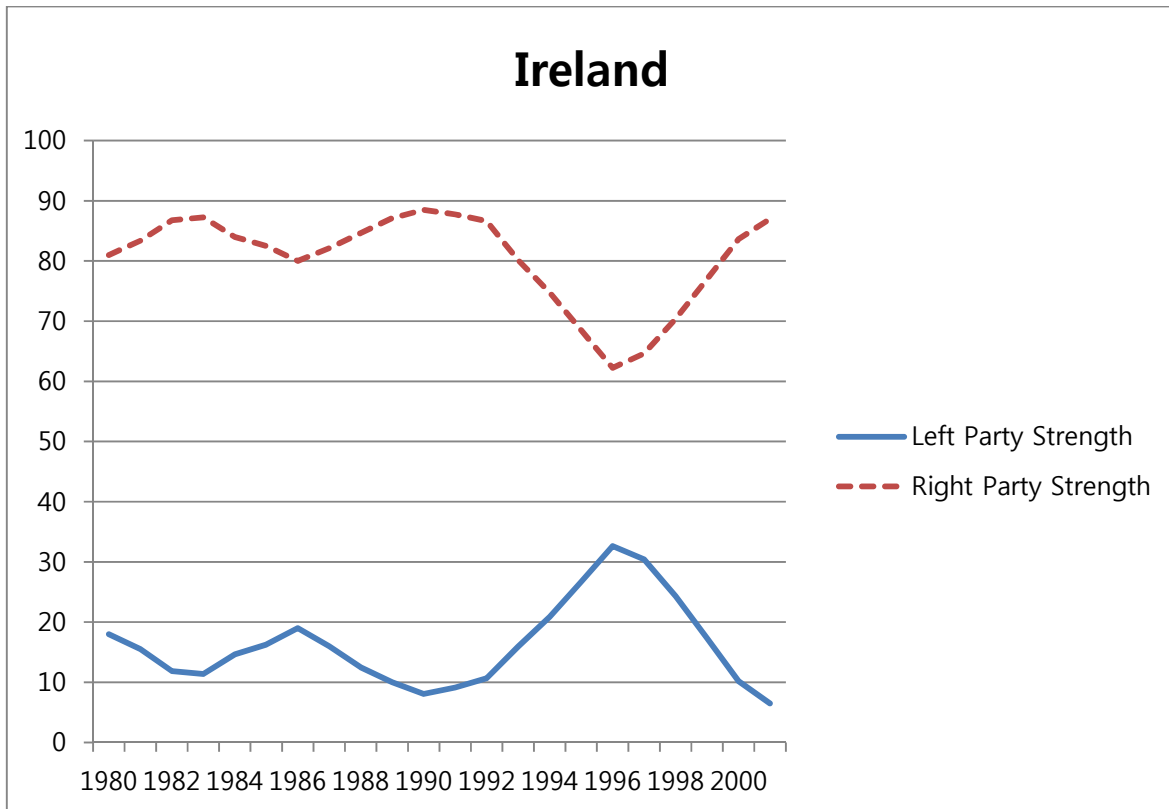
9) Greece



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

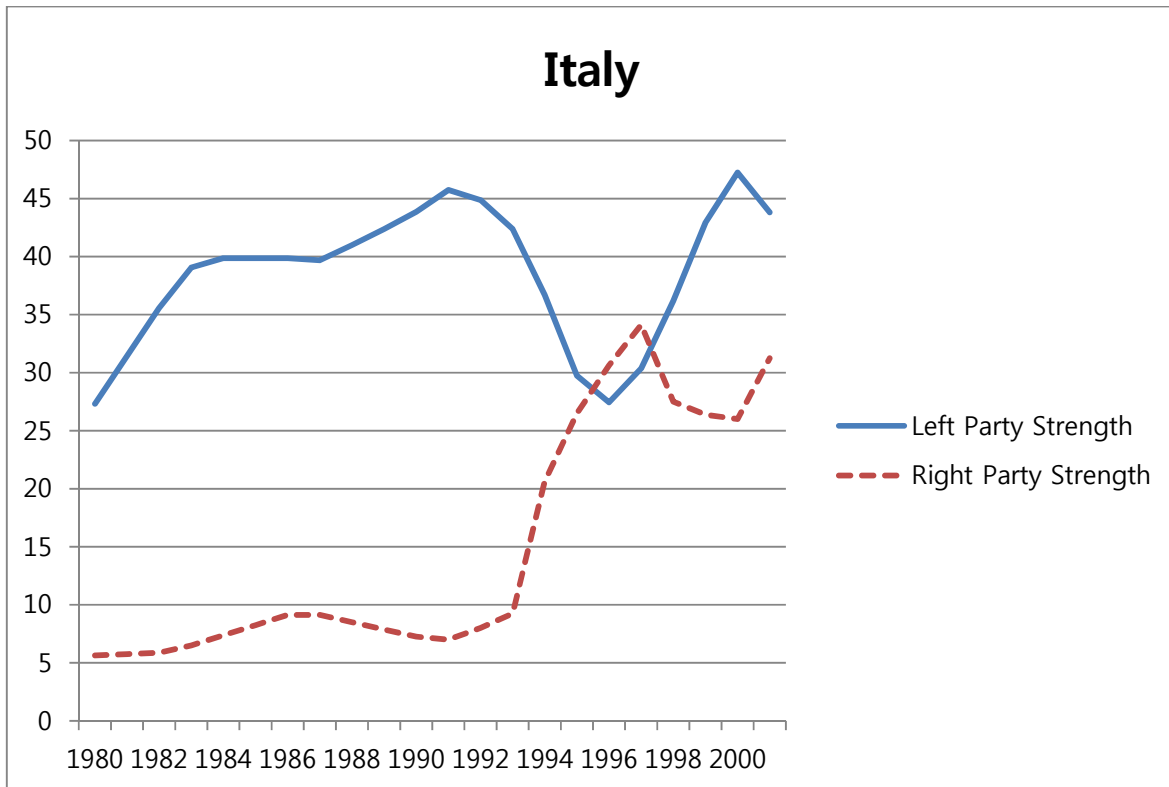
10) Ireland



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

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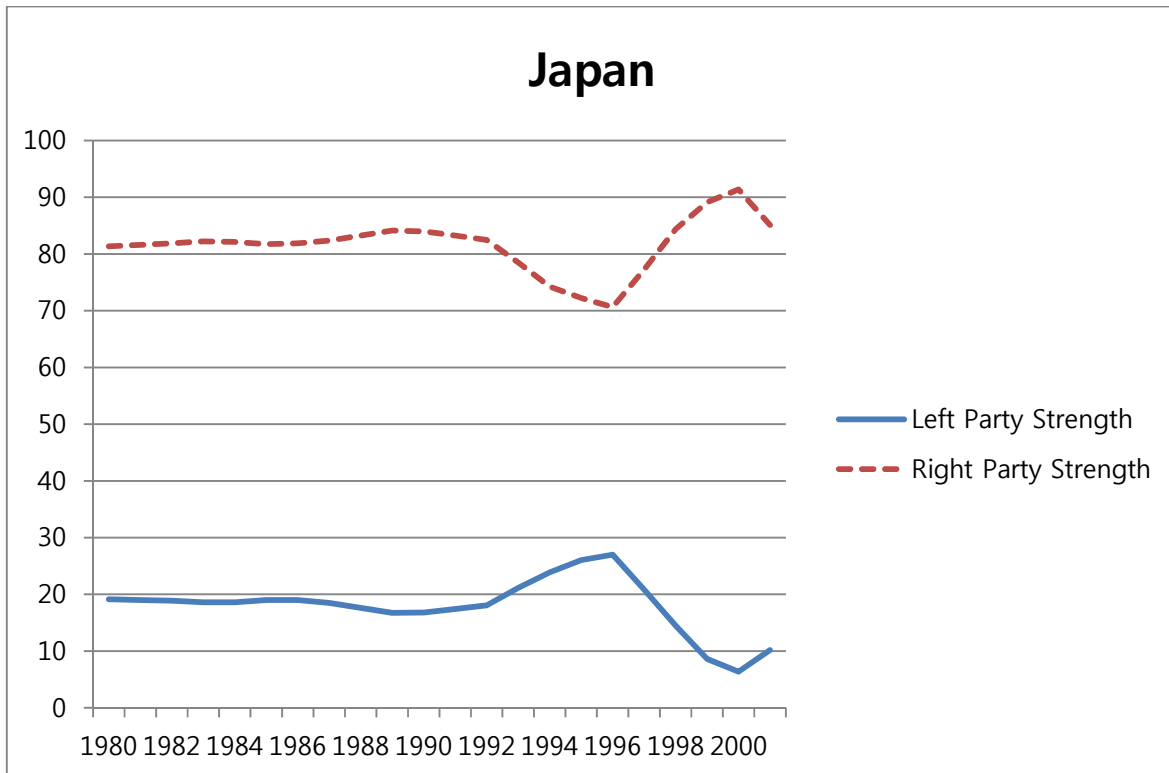
11) Italy



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

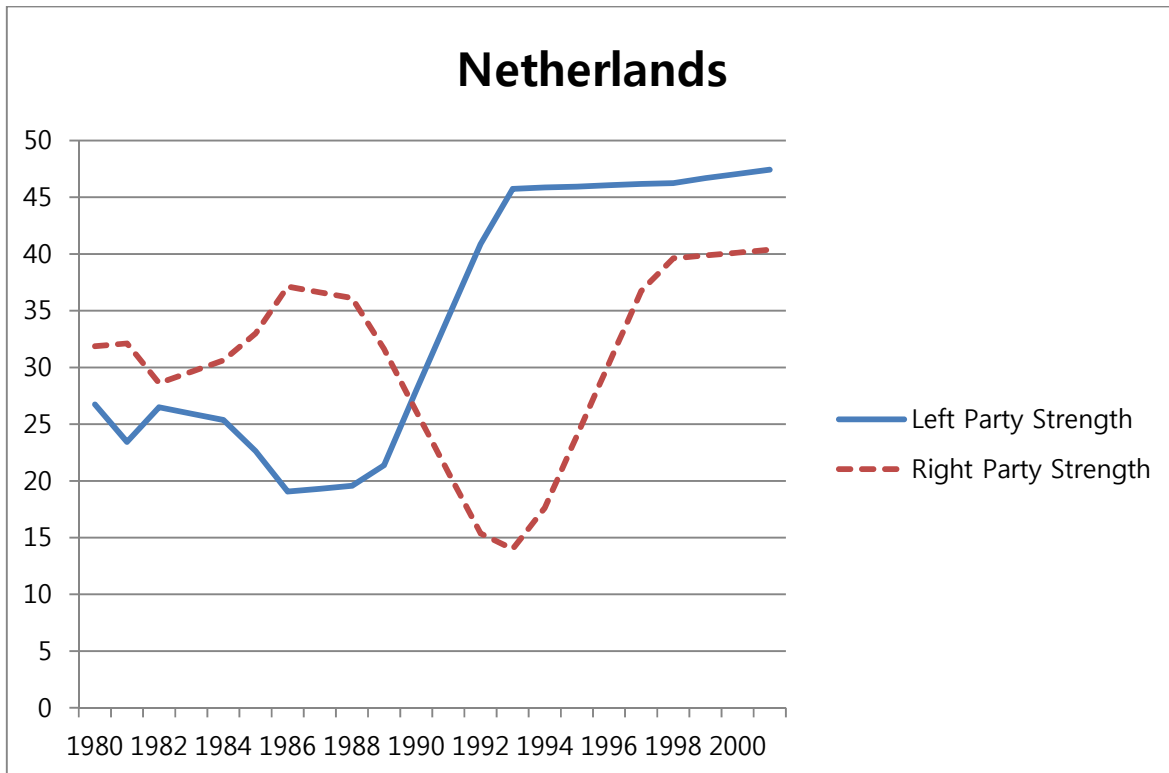
12) Japan



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

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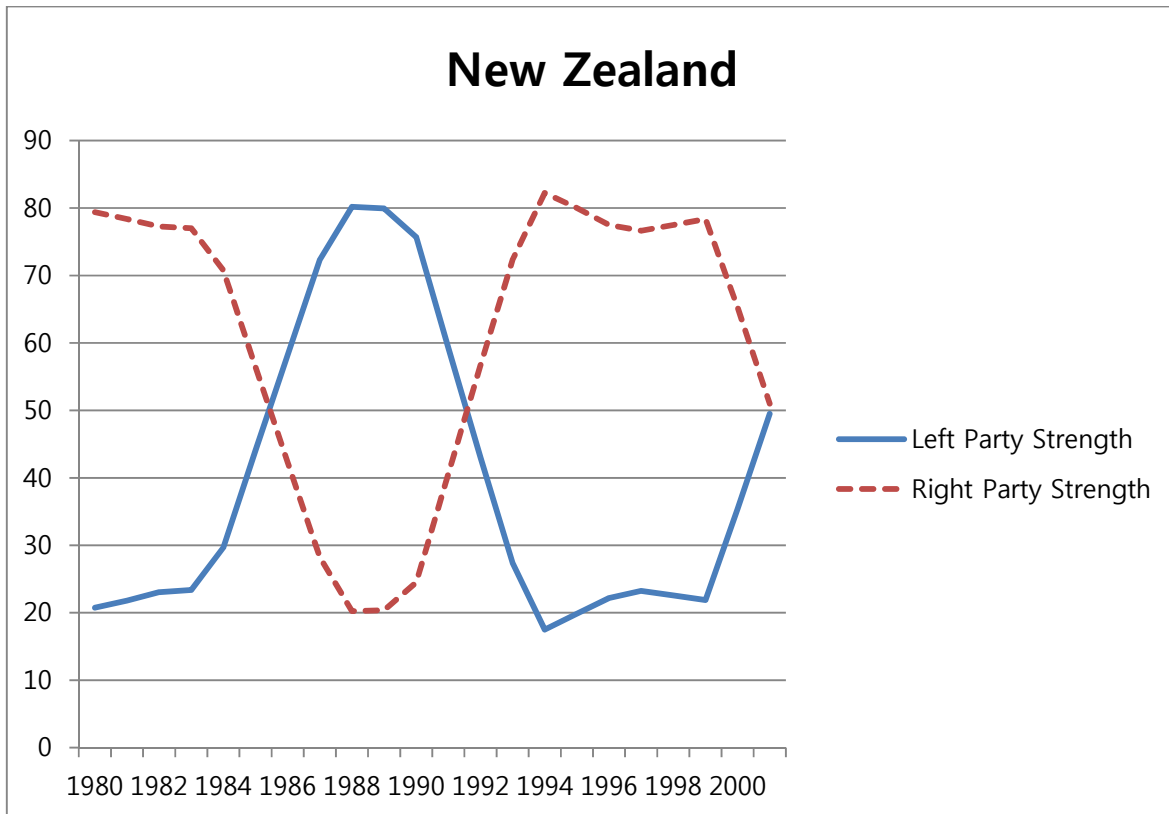
13) Netherlands



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

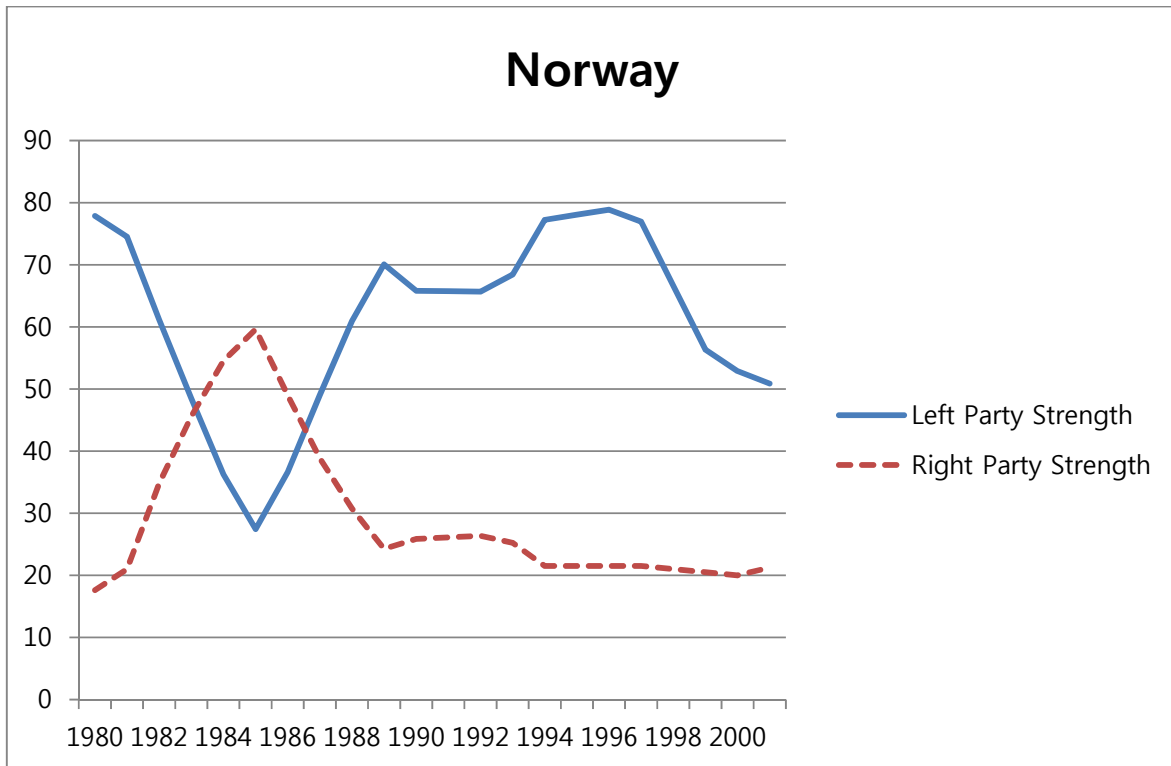
14) New Zealand



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

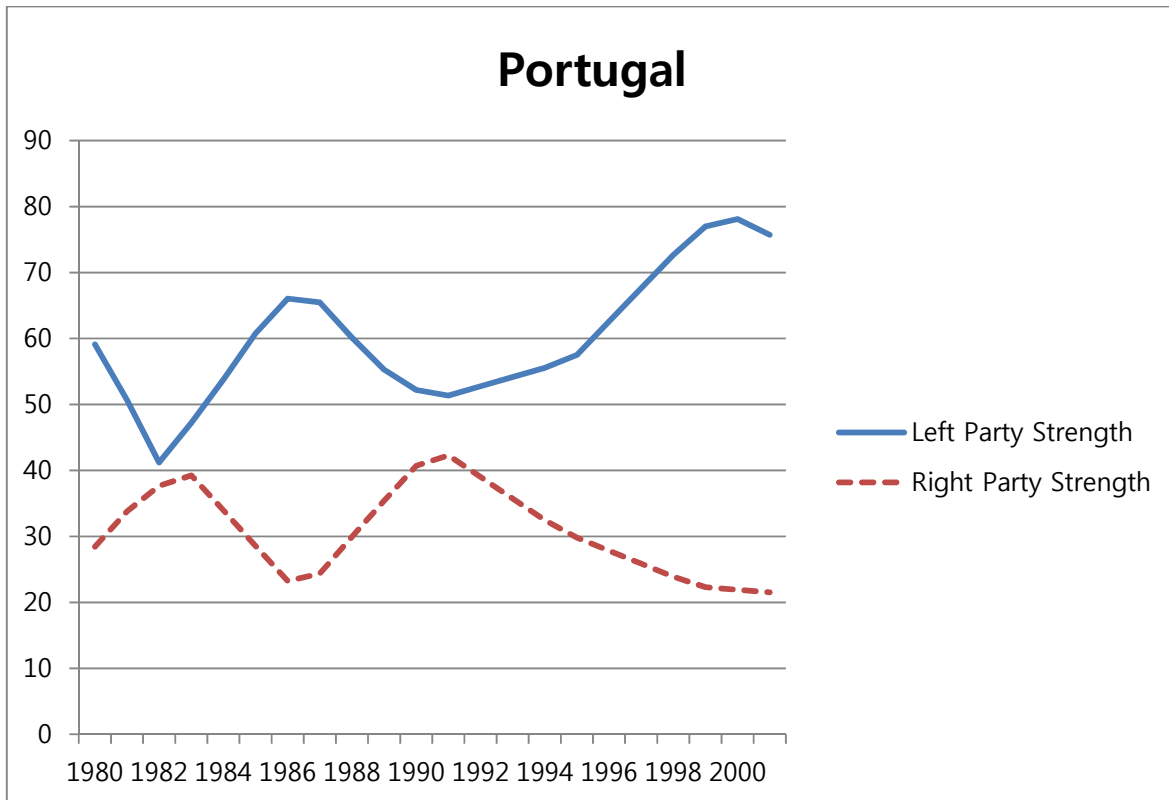
15) Norway



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

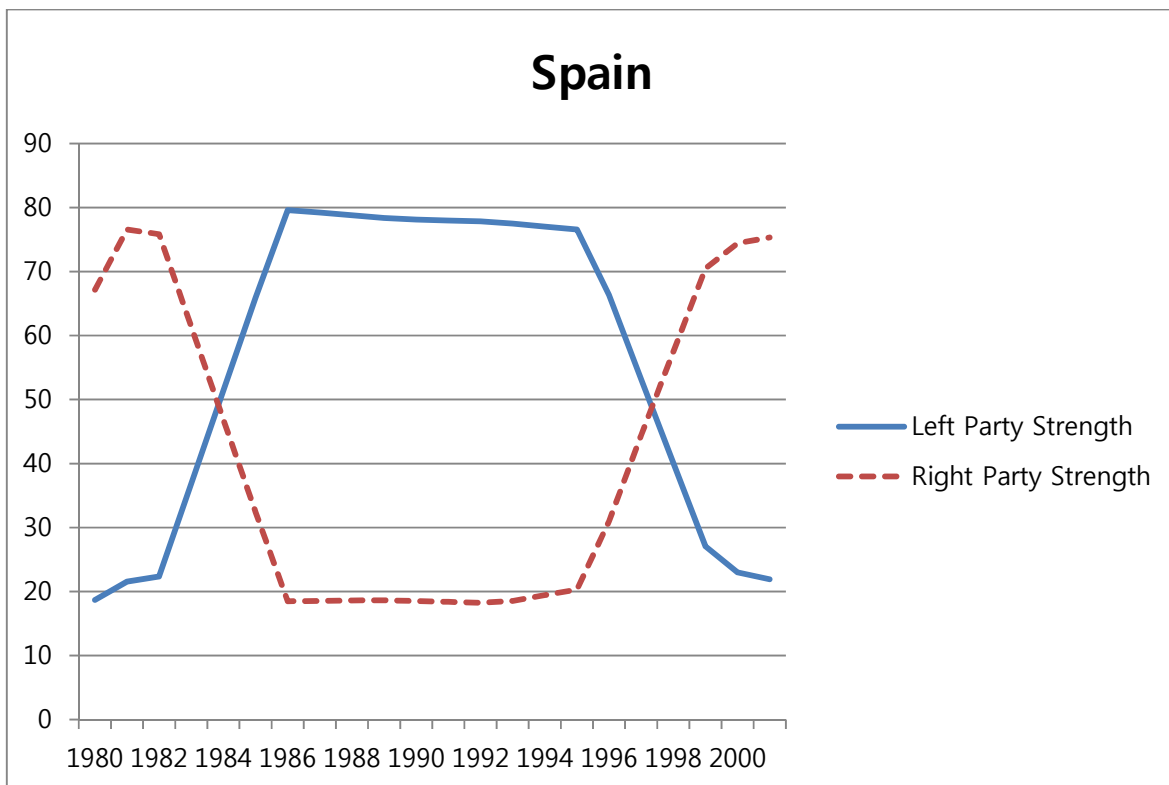
16) Portugal



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

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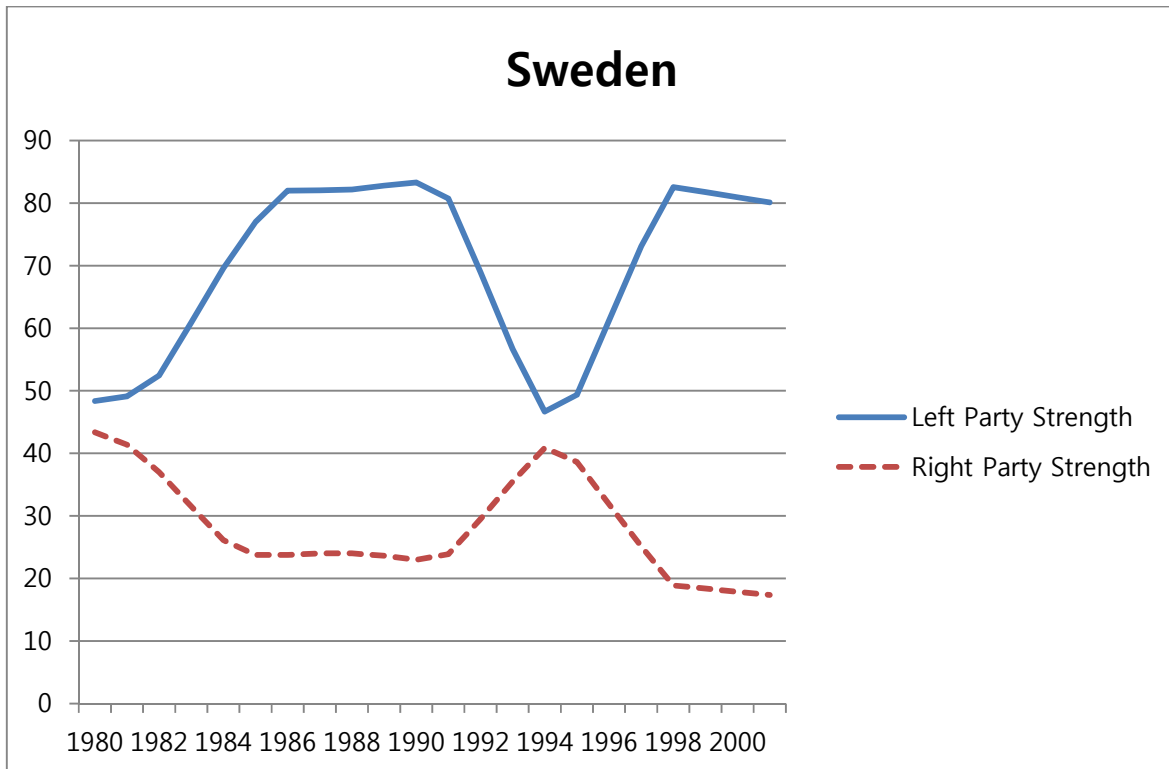
17) Spain



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

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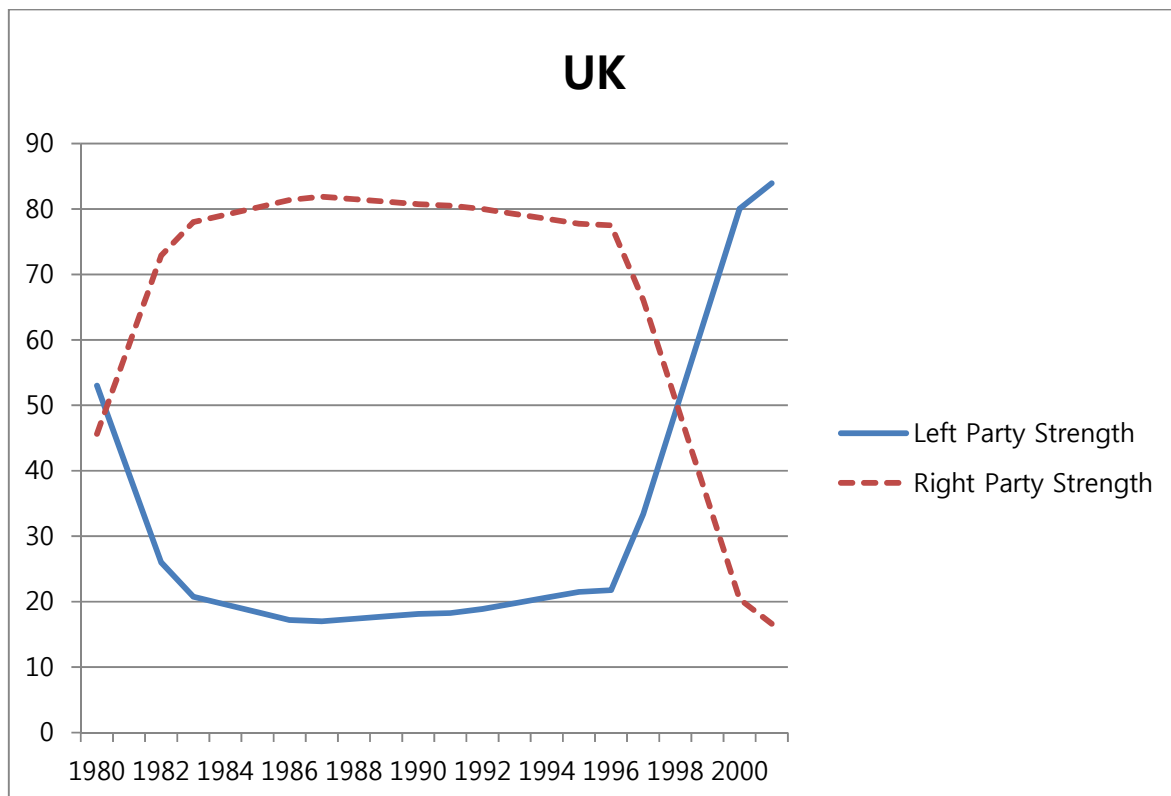
18) Sweden



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

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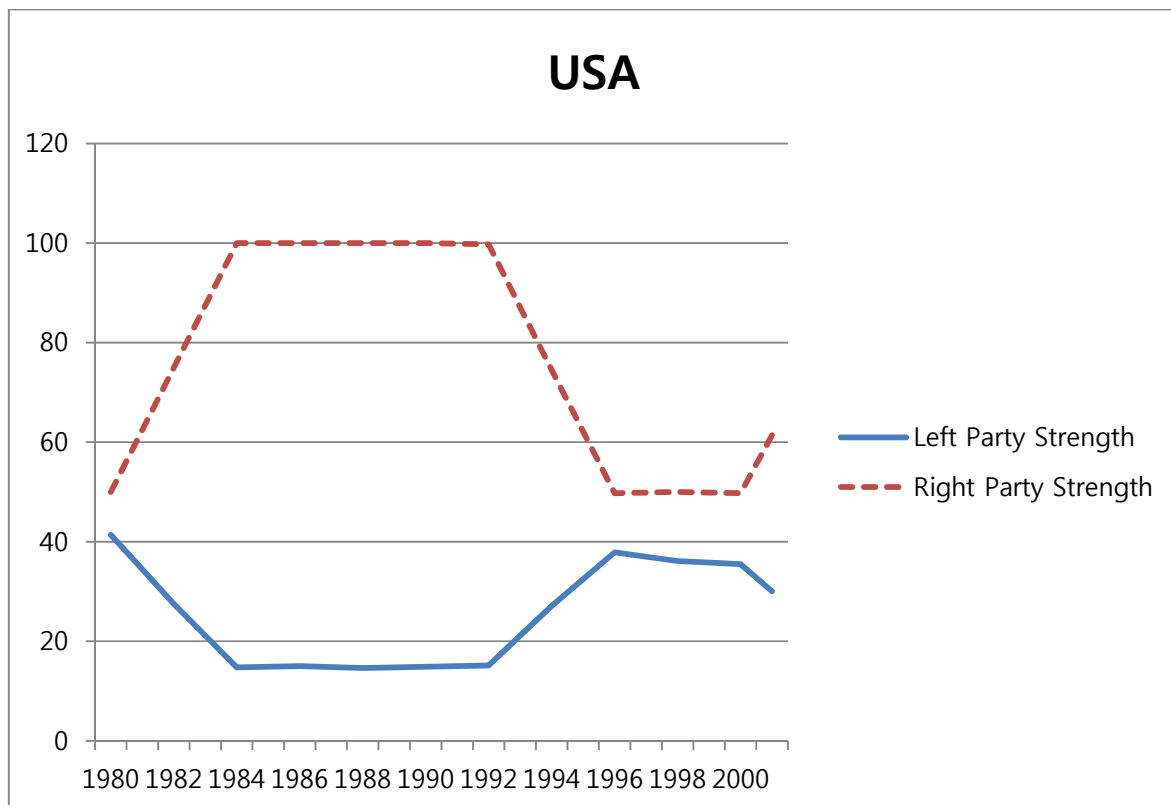
19) The UK



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

Source: Duane Swank's homepage (http://www.marquette.edu/polisci/faculty_swank.shtml).

20) The USA



Notes: Party strength is measured as the average of the cabinet portfolio percentage and the legislative seats percentage. Centrist party's strength is allocated equally to the leftist and rightist parties. This figure shows the three-year moving average of party strength.

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