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What Does Politics Have to Do with Innovation?
Economic Distribution and Innovation Policy in OECD Countries

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Abstract

Despite the fact that the distributional impact of innovation has been recognized in the social science literature, hardly any work has been done on the distributional politics of innovation policy. This study offers a first step in this direction as well as asking whether a government's ideology affects innovation policy from a distributional viewpoint. The paper uses both qualitative case study method and a statistical analysis of government R&D outlays for social purposes in twenty-six countries. In terms of innovation policy, neo-corporatist interest group representation is linked to relatively equitable public R&D investment and left-oriented governments are more likely to invest in social innovation than their rightist counterparts. Nevertheless, governments rarely consider innovation policy in distributive terms. Despite the significant distributional implications of innovation, it remains depoliticized in policy making.

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The views presented in this paper are solely those of the authors, and so are all the mistakes.

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Introduction

We live in an age characterized by innovation-driven economic growth (Helpman 2004). However, a far less positive defining feature of our age is growing economic disparity (OECD 2008). Realizing the importance of innovation for economic growth, governments have been pouring public money into R&D in various forms, using an array of mechanisms (Trajtenberg 2005). Decisions about how to allocate funding for innovation and the form it should take have significant and differential long-term impacts on society. Furthermore, innovation-based growth cannot be predicted to have a uniform social effect. In fact, there is overwhelming evidence to the contrary, linking rapid technological change to growing economic inequality (Krueger 1993; Acemoglu 2002; Hornstein and Krusell 2003; He and Liu 2008).

While the question of economic effectiveness of innovation policy has been widely researched, little has been written about the distributional aspects and politics of innovation policy. This major gap in the literature motivates this study. At the heart of our work is the question: Does the ideological orientation of a government (left-right) influence the distributional aspects of innovation policy?

This question, which involves an explanation of differences in policy between governments, led us to examine how the left-right political divide affects government innovation policy over time and space. Our findings suggest that leftist governments' innovation policy making is somewhat more attentive to distributional concerns than governments of the right, especially in social – not technological – innovation. Nevertheless, our study also suggests that innovation is a key policy domain that has been depoliticized rightward, with the left advancing no unique position, thus allowing what Culpepper termed "quiet politics" (2010). This

political apathy allows economic efficiency imperatives to reign, define the debate, and guide policy formulation. Although R&D policy has significant welfare effects, it is not perceived by policy makers as part of the welfare regime.[1] No less importantly, a necessary antecedent for formulation of hypotheses regarding the 'partisan – R&D policy' link is a theorization of different ways by which R&D policy is likely to affect distribution. This article therefore makes an additional contribution: It discusses how R&D policy could impact distribution with reference to specific producer and consumer groups. This discussion, we believe, sets the ground for future explorations of the distributive influence of innovation policy.

The paper begins with a discussion of the relationship between innovation and inequality. This is followed by a theoretical section dedicated to the novel question of how the right-left political-ideological continuum is expected to influence innovation policy. We then turn to our study design of combining quantitative and qualitative approaches and present the main findings. The paper concludes with a discussion of our findings and their implications for both research and policy.

Innovation and Inequality

The impact of government policy on innovation, specifically, the ability of government action to enhance innovation and therefore economic growth is widely agreed upon (Grossman and Helpman 1994; Trajtenberg 2005). In the past four decades,

[1] Welfare regime is a more comprehensive concept than welfare state because it focuses on the interaction of state and market in welfare production and not just on social amelioration policies (see Esping-Andersen 1990, 1-2).

governments across the globe increased their support of domestic R&D. In the European Union the Lisbon Strategy aims to transform Europe into a knowledge economy. In the United States, President Barack Obama highlighted innovation as a critical ingredient of American economic recovery plans (Kok 2004; Obama 2008). Yet economic growth is not the only result of innovation. Innovation affects society in myriad ways: for example, it can change our relationship with the environment or the quality of human interaction (e.g., Facebook). The focus of this paper is one such effect: resource distribution.

Research and innovation apply to all spheres of human activity: whether technological (e.g., new software) or social (e.g., innovations in government organization). To the extent that innovation, of whatever type, leads to economic growth, it is also likely to affect distribution. Some individuals, groups, and sectors benefit more than others from specific innovations: benefits that could be expressed in income, the likelihood of finding and retaining gainful employment, and the degree to which they can gain benefits from consuming new products that are created through innovation.

A general statement to the effect that innovation affects distribution is plausible but lacks specificity. To explore this relationship, it is necessary to discuss specific mechanisms. We believe that it is helpful to think about this relationship in terms of producers and consumers.[2] It should be noted that the inequalities, on which we focus below, fall under the general heading of between-group inequality (e.g., inequality across regions) which is distinct from within-group inequality. Both, however, are

[2] Throughout this article, we examine innovation's effect on inequality and not the reverse causal direction.

components of general inequality. Hence, if innovation policy reduces/increases between-group inequality it would reduce/increase overall inequality assuming no effect on within-group inequality.

First, innovation might influence distribution among different categories of producers. An important case in point is innovation's differential effect on workers with different skill levels. Several studies have found that skill-biased technical/technological change (SBTC) has widened the economic gap between highly skilled and less-skilled workers (Acemoglu 2002; Hornstein and Krusell 2003; He and Liu 2008). In other words, R&D investment has contributed to growing economic inequality at the national, if not international, level. Innovation generally increases the productivity of the highly skilled significantly more than of the less skilled and, by so doing, indirectly increases their income and employment opportunities. Since the 1970s the rate of SBTC has accelerated. One popular theory is that innovation is inherently skill-biased because the highly skilled are better able to absorb new technologies (Nelson & Phelps 1966). However, as argued by Acemoglu, such a theory does not satisfactorily explain periods in which technical change was in fact biased toward unskilled workers (Acemoglu 2002).[3] Hence, skill bias should not be viewed as an inherent trait of innovation.

Innovation's distributional impact on producers is also significant across geographical locations, not just across skill levels. In recent decades, awareness of the importance of geographical clustering has increased (Piore and Sabel 1984; Porter 2000). Innovators

[3] Acemoglu argues that a postwar era rise in skilled worker' supply increased the market share of innovation for the highly skilled and created a strong incentive for profit-seekers to direct their efforts in this direction. It should be acknowledged, however, that SBTC's effect on American inequality – especially in the 2000s – is debatable. Nevertheless, in general, SBTC contributed to growing income inequalities across numerous developed countries (Corsini 2012).

benefit from the significant spillover effects from proximity to other innovators. Clearly, the presence or absence of such innovation clusters contributes to unequal economic advantage (Saxenian 1994).

Second, innovation creates products that are consumed by different actors. An innovation is unlikely to create uniform benefits for all: Some benefit from consumption of an innovation more than others. Famously, for example, medical research for many years was male-biased in its focus, and hence, its impact (Auerbach and Figert 1995). To conclude, innovation impacts distribution patterns affecting both producers and consumers. The economics literature has shown that innovation has produced SBTC, which increases the income gap between the technology haves and have-nots. In addition, innovation clusters' growing significance exacerbates regional economic inequalities. Lastly, consumers do not benefit uniformly from the fruits of innovation. In these different ways innovation, inadvertently, contributes to economic inequalities.

Innovation policy is predicated on the notion that government interventions can lead to better results than what would have transpired without intervention. Consequently an important question to ask is, whether governments intentionally intervene to reshape the distributional implications of innovation? The few publications that link innovation policy to distribution indicate a negative answer. Distribution is not on the innovation policy agenda: at least, not on the agenda of American policymakers (Cozzens, Bobb et al. 2002; Woodhouse and Sarewitz 2007; Bozeman, Slade et al. 2011). This state of affairs could be the result of a deep belief in "trickle down" despite ample evidence that demonstrates that innovation benefits at the top do not necessarily improve the situation of those at the bottom (Woodhouse and Sarewitz 2007; Stiglitz 2008). A different reason for the lack of attention to distribution could be

that innovation policy is obviously not a welfare state policy domain as are, for example, health care or social services. It is more akin to industrial policy in that its main goal is economic growth although it might be employed for achieving distributive purposes as well.[4] However, even if that is the case,, to the extent that R&D policy has significant distribution effects, it should be considered part of the welfare regime (see fn. 1).

The reality is that there are several channels by which innovation policy could be effective in achieving egalitarian outcomes, for example, concentrating the investment of public R&D funds in disadvantaged regions; support of minority high-tech entrepreneurs; focusing public applied research on issues with special interest to the poor. The current state of affairs appears to be one in which the merits of distribution-altering innovation policy have yet to be debated. However, current academic analysis is both empirically limited and U.S. centered and, no study to date has discussed the relationship between innovation policy and party politics.

Partisan politics and innovation policy

[4] One could argue that while innovation clearly affects social distribution, government policy is too blunt to be an effective redistribution instrument. To this, one should also add the fact that innovation policy deals with end-products that do not yet exist and are therefore highly uncertain in nature. Nevertheless, this uncertainty has not prevented governments from successfully employing innovation policies to achieve specific goals, some of which with distributional goals in mind, such as public transportation or developing treatments for particular diseases.

Policy making is a political process, and politics is, to a great extent, a struggle between parties that represent competing social classes, worldviews, and goals. Much of that competition occurs along a left-right continuum. In their classic work on social cleavages and party systems, Rokkan and Lipset argued that Western political parties originated from an interaction of various social cleavages, of which the class cleavage was the most important (1967). Class cleavage has given rise to parties that are positioned on a left-right spectrum. Leftist parties traditionally represent the working class and are therefore associated with labor unions, while rightist parties represent the middle and upper classes. Accordingly, leftist parties tend to be supportive of state intervention in the economy, which leads to a more equal distribution of material resources and opportunities than is possible under a strictly free-market economy. Conversely, right-wing parties tend to oppose direct state economic intervention as well as state re-distributional policies favoring the less-well-off (Tufte 1980; Esping-Andersen 1990; Boix 1998).

Empirical research spanning several decades has explored the thesis of left-right policy differences. The strongest evidence for the existence of such a relationship appears to be in social and economic policy, of which innovation is now a core component (Esping-Andersen 1990; Huber and Stephens 2001; Soskice and Iversen 2006). In the context of social policy, numerous studies have shown that leftist power is positively associated with a redistributive welfare state and a relatively large share of public sector employment (Esping-Andersen 1990; Huber and Stephens 2001).

However, in recent years, different studies have questioned the persistence of right-left policy differences. A central argument is that a rightward convergence between right and left is occurring (Imbeau, Pétry et al. 2001; Zohlnhofer, Obinger et al. 2008). For

economic and political reasons (e.g., a shift toward the middle class in terms of the composition of its constituency), parties on the left have increasingly embraced economic and social policies that in the past they vilified. Convergence in specific policy fields could lead to depoliticization, by which we mean that past differences have been replaced by broad political agreement concerning policy goals (e.g., keep inflation low in macroeconomic policy) and less attention on distributional and social concerns. In Stokes' classic terminology, a growing number of issues have moved from the "position" to the "valence" category (1963). Clearly, the salience of right-left politics varies across policy fields and countries. However, even with the growing importance of innovation policy, no study to date has examined whether there are systemic differences in this domain across the left-right spectrum, nor has anyone tried to theorize about what such differences look like. Given the economic impact of innovation policy, this is a major oversight.

Our exploration of how, if at all, right-left differences are manifested in innovation policy, is guided by several expectations/hypotheses.

First, it is well understood that some innovations are of greater benefit to specific social groups, as consumers, than to others. Accordingly, we should expect public funding decisions to take this into account. For example, government funding could be specifically channeled to support research and innovation that would create products dedicated to organizational circumstances that disadvantage workers, women's health, or development of affordable public transportation (U.S. Department of Health and Human Services 2011; Auerbach and Figert 1995). Due to their ideological leaning, leftist governments are expected to invest more in outlays with such purposes than governments on the right. Here, it important to note that much of the innovation that straightforwardly

benefits the disadvantaged as consumers would often fall under the heading of social/organizational innovation, not technological innovation.

H1: *Consumer-specific benefits*. Leftist governments are expected to fund proportionately more research aimed specifically at creating products that benefit disadvantaged groups.

Second, innovation policy can also be geared to support certain groups as producers: One common example is the use of innovation policy as a tool to enhance economic growth in disadvantaged regions. Because leftist governments are more likely than right-leaning governments to be concerned about inequality, they would seek to support R&D activities among certain groups or prioritize R&D funding for certain regions.

H2: *Support for disadvantaged producers.* Leftist policymakers are expected to channel more R&D funding to disadvantaged producers: women, minority ethnic groups, or regions.

Third, SBTC exacerbates economic disparities between workers with different skill levels. Innovation policy could address this by supporting innovation in directions that would create productivity gains for less-skilled workers. Such targeting is admittedly difficult to do. One possibility is focusing on support of innovation in industries with a high share of low- and medium-skilled workers. Leftist governments are more likely to pursue such a course for ideological but also for interest-based reasons: Traditional industries such as mining, automobiles, or textiles not only tend to have a high share of low- to medium-skilled workers but also tend

to be heavily unionized (Geishecker and Görg 2005). Hence, leftist parties, which are traditionally close to unions, might view support of R&D in traditional industries as politically advantageous.

H3: *Industrial sector-specific targeting*. Leftist governments are expected to diminish SBTC-related disparities by investing disproportionately in R&D in industrial sectors that traditionally employ large numbers of low- and medium-skilled labor.

Finally, the political science literature suggests that policy differences between right and left go well beyond distributional goals. The right prefers a smaller public sector than the left, regardless of the level of public expenditure (Tufte 1980; Schmidt 1996). This preference is motivated by both a belief that the private sector is superior to the public sector in terms of innovation and efficiency (Shleifer 1998) and because of strong political ties to private sector constituencies. Conversely, the political left is often associated with public sector constituencies. Therefore our last hypothesis is:

H4: *Public-Private R&D production ratio.* Assuming government R&D expenditure, right-wing governments are expected to prefer a higher ratio of private to public production.

If innovation policy is indeed a depoliticized domain, in which the left fails to advance an ideology of enhancing social and economic equality, differences between right and left might not materialize. It should be stressed, however, that while right and left might share distribution insensitiveness in their approach toward some types of innovation policy, this depoliticization might not apply in all innovation domains. For example left governments approach to technological innovation might resemble that of their right wing counterparts, however, they would invest more in social innovation whose declared goal is benefiting the disadvantaged. Similarly, as

a derivative of their different gender equalizing policies, right government might invest less in advancing women as innovation producers.[5]

Study design

An investigation of the different hypotheses underpinning our research requires a dual-methodology approach. Statistical inference methods are useful for discerning government R&D outlay patterns across OECD countries, and interviews, provide a wealth of case-level information that could help corroborate, or refute, conclusions derived from the use of statistics, as well as filling in the gaps in the reach of statistical inference. The use of overlapping methodologies also increases the study's internal validity: conclusions predicated on the triangulation of different methods are less susceptible to method-specific biases (Johnson and Onwuegbuzie 2004).

In terms of our statistical analysis, we analyzed the differences in allocation of R&D funding across the universe of OECD member countries. For the purpose of checking H4 (Share of public versus private R&D in the economy), we used variables on the share of public and higher-education workers in the R&D workforce. The data for government outlays was taken from different

[5] In this research, we focus on how governments might address R&D-driven change through support of specific types of innovation, but it is important to acknowledge that more traditional approaches could be employed as well. For instance, SBTC could be addressed by government support of R&D in low-skilled industries but also by education reforms designed to reduce the skills gap. Thus even if depoliticization occurred in the innovation policy domain, governments could still address distributional issues by the use of "traditional instruments" such as taxation, the welfare system, or collective wage agreements.

OECD datasets that measured "Government Budget Appropriations or Outlays for R&D." In order to test H1, we used a set of different variables associated with the social purposes of R&D (see appendix A). We opted to focus on these outlay categories since they mostly fall under the general heading of social/organizational innovation spending. Hence, it is in these items, which are often associated with distributive concerns (e.g., poverty), that we are most likely to unearth right-left differences. The social-purpose variables can be divided (although not in a clear-cut way) into variables that explicitly focus on outlays that would benefit disadvantaged populations or research that advances knowledge/products that benefit society in general (i.e., collective goods). To the former group belong "social security," which is dedicated to research on the development of methods of combating poverty and inequality, and "improvement of working conditions," which primarily stresses the working conditions of the lower classes. To the latter group belong "social change and social processes," which focuses on the sociological impact of economic and social developments; "social medicine," which is dedicated to research that explores how social and economic factors influence health; "political structure," which focuses on the impact of political structures (including regionalization); and "health and environment," which measures the public expenditure share of programs in these areas. Two composite variables, "social structures and relationships" and "human health" include these and other categories that reflect social aspects of R&D.

OECD data for these variables exist for the period 1981–2008 for 26 countries. Although there are numerous missing values, these tend to be concentrated in the weaker economies (e.g., Bulgaria). The data for the developed countries are relatively continuous.

Due to the absence of sufficient comparable data, we abandoned an effort to compare outlays across subnational regions or outlays directed at specific industries.

The predictor variable for investigations of both H1 and H4 were measures of the relative position of governments on the left-to-right spectrum. We elected to employ the Comparative Manifesto Project (CMP) measures of government's general right-left position (RILE) and a specific measure for government approach to welfare (WELFARE) (Budge, Klingemann et al. 2001; Klingemann, Volkens et al. 2006). While the former measure aggregates four specific variables (e.g., view on planned economy), the latter speaks more directly to the government's welfare ideology, which is likely to be closely associated with egalitarian perspectives. CMP data is strongly correlated with alternative measures of government position and offers the most comprehensive longitudinal figures of all current alternatives (Volkens 2007). The predictor variables lagged by one year (i.e., government position for year *t* linked to outlays in year *t*+1) so as to capture the delayed impact, mainly in budgetary terms, of political influence.

We employ seven control variables, four of which are often mentioned in the literature that deals with the determinants of social policy: general government final consumption per capita (Consumption); central government debt per capita (Debt); gross domestic product per capita (GDP); unemployment share (Unemployment); and a weighted average of union density and coverage

(Union).[6] In addition, we control for total government R&D outlays (GBAORD) and Business and Enterprise R&D (BERD). Where appropriate, we control for purchasing power parity (PPP) to enable cross-country and time comparisons. We control for GBAORD to account for the possibility that high expenditure on social R&D is not simply a function of high public R&D expenditure in general. Consumption is included to control for the possibility that high social R&D expenditure is not merely a function of high general government expenditure. Government debt is expected to reduce expenditure on social R&D (and everything else), all else being equal. High GDP is expected to allow for greater spending, on social R&D all else withstanding. Unemployment is used as a proxy for levels of social crisis (Atkinson, Liem et al. 1986), which are expected to positively affect social R&D spending that could be employed as a partial response to the labor crisis. Strong unions could increase attention to social aspects, including R&D's social purposes and therefore are likely to have a positive effect. Finally, BERD is employed to control for the impact of private R&D funding on the public share of the R&D workforce. It is anticipated that the higher private investment, the lower the public workforce's share (see appendix A for summary of all variables). Variables were calculated either as shares or as per-capita spending in constant PPP and were therefore comparable.

Second, we conducted three case studies in which we evaluate how the debates and policies play out in specific national contexts. Because the independent variable is government position on the left-right spectrum, we selected the United States as the

[6] Not all control variables are used for each analysis. In some cases, a certain control variable is less relevant (e.g., BERD for all cases save for Gov & Edu employment). In others, a control variable was dropped from a specific analysis due to limited degrees of freedom after it was confirmed that the variable was not significantly associated with the dependent variable.

archetypical right-leaning country and Sweden as the archetypical left-leaning country. Israel was selected because it constitutes the only example of a *sharp movement from one extreme to the other on all the variables that concern us*: innovation intensity, left/right political dominance, and economic equality. Israel, in a transformation triggered by a series of innovation policies, moved across the R&D intensity scale in less than four decades: from the lowest in the OECD, at 1 percent of GDP, to the highest, at 4 percent. Furthermore, Israel shifted considerably from left-wing political dominance to right-wing dominance during the same period. Lastly, economic inequality in Israel increased considerably: Israel transformed from one of the most egalitarian societies in the OECD to one of the most unequal (Samuelson 1970; Brandolini and Smeeding 2008). All three countries are at the forefront of global R&D efforts (NSB 2010). This criterion motivated case selection because of a desire to avoid countries in which innovation policy is not a central concern and therefore its distributional aspects might receive little attention for that reason (e.g., Greece). While virtually all other OECD countries view innovation as important, in practice many of them still have a long way to go before reaching the point where innovation receives as much attention as it does in the countries that we are investigating.

The case studies were conducted using a qualitative assessment of both the debate and policy that was informed by formal documents, reports (formal and informal), and twenty eight interviews with high-ranking government officials, politicians, and union and business leaders who have in-depth knowledge of innovation policy and were directly involved in its formulation. Our questions focused on understanding whether and how innovation policy is informed by distributional concerns, who the main actors are in policy formulation, and how they differ with respect to the dimensions relevant to our study.

Findings

Given the bidimensional nature of the data available for the statistical analysis, 28 years over 26 countries, we opted to use panel data analysis. We analyzed the data using both fixed and mixed-effect (random effect introduced for the dependent variables) models. The fixed-effect analysis model is presented because it is generally more appropriate for inference about a universe of cases: in this case, public expenditure on science in OECD countries, in contrast to inferences about samples (Baltagi 2005).[7] Results were generally not sensitive to this technical choice although in a minority of cases fixed-effect results passed the significance test while parallel mixed-effect results did not. This disparity highlights the significance of variations between countries, which is accounted for in mixed- but not in fixed-effect analysis.

Due to missing values, *N* varied considerably, ranging from 67 observations for "social medicine" to 327 for "human health." To overcome heteroskedacity in some of the variables, we employed a LN transformation of the dependent variables. For analysis of each of the dependent variables, we included control variables and used RILE as the predictor variable in model 1 and WELFARE in model 2, assuming that different predictor variable conceptualizations could affect analysis outcomes. Results of the analysis are reported in Table 1.

[7] However, a major limitation of fixed-effects models – in contrast to random or mixed-effect models – is that they do not allow determination of the source of variation (i.e., difference across countries, across governments within a single country, or both).

The statistical analysis produced several interesting results. In all cases except "social medicine," the effect's direction was as predicted: left-leaning governments spent more than their counterparts to the right on social innovation. Moreover, choice of independent variable – RILE (model 1) or WELFARE (model 2) – hardly mattered: for almost all dependent variables, the independent variable coefficients were similar in terms of significance and magnitude (except Gov & Edu employment, which was significant in model 2 but not in model 1). We found in a few categories (social security, work conditions, social structure, social medicine, and health & environment), a statistically significant effect of party identity on government spending. The two composite variables – "social structures and relations" and "human health" – were not associated with partisanship. This could be the case because as composite variables they include some spending categories that are only weakly associated with distributional-social issues (e.g., "management of businesses and institutions" is one of the components of "social structures") that dilute the partisan effect of the distributional components. Moreover, 'human health' is closer than the other variables presented here to technological innovation – and correspondingly further from social innovation – and therefore more likely to be 'depoliticized'. The two variables that are more straightforwardly distributive – "social security" and "work conditions" – not only are statistically significant in the expected direction but also play central roles, in terms of their explanatory power, within their respective models. As we expected, the analyses dedicated to the effect of these "pure" distributive variables show the largest right-left disparities.

"Social medicine" is the one case in which the effect was significant and opposite of expectations. Perhaps this indicates that the right and the left have different views of medical vis-à-vis other social expenditures.

Analysis of the control variables, while by definition not at the center of this study, also offers some interesting insights. GDP, government debt, and unemployment failed to exert a significant effect in any of the analyses in which they were included. Consumption and GBAORD, however, exerted a positive effect for most variables, as expected. Finally, the union variable created mixed effects and was not always significant. In the one category in which we would expect unions to show particular interest – working conditions – the union variable indeed exerted a strong positive effect.

Past studies have associated leftist governments with higher employment in the public sector. Indeed, we found such a relationship. The effect was statistically significant, yet weak. Private investment (BERD) had a negative effect while public R&D investment, GBAORD, had a positive effect.[8] It is not surprising that high public R&D spending and high public R&D employment vary together as the first influence the second.

Conducting case studies in the US, Sweden, and Israel shed light not only on intra-country differences between governments, but also allowed for a cross-country comparison, which facilitated an examination of the causal mechanism underpinning our findings. A major finding was that explicit distributional concerns were absent in the framing of innovation policy. Indeed, parties of the left and the right were in agreement with respect to most innovation issues. There is a divide between public and political discussions of R&D and innovation, on the one hand, and public discussions of inequality, on the other in all three countries. None of the reports that

[8] Of course, it could be that 'right-left' impact the overall scale of public R&D spending (i.e., GBAORD) – not just its composition. In a separate analysis (not reported here), however, we found no independent effect of either RILE or WELFARE on GBAORD in a model that included all other control variables.

we read and policy actors whom we interviewed, framed the goals of innovation policy in distributional terms. In fact when asked, our interviewees answered that our interview was the first time that they had heard innovation policy spoken about from such a perspective. Innovation policy was clearly geared toward other goals, primarily economic growth and competition. Social goals (e.g., human health) were considered, but distribution was hardly ever discussed in all three countries. For example:

> I really don't recall distributive considerations coming up. In the 110th Congress, for example, there were probably around 500 witnesses testifying before the S&T committee and not even one talked from this perspective of distributive concerns. (Authors' interview, Washington, DC, February 24, 2011)

> I've been working in the innovation policy field since 1972… Distribution effects are not addressed in innovation policy in Sweden. It was understood that you need R&D in order to remain competitive in global markets. (Authors' interview, Stockholm, April 28, 2011)

> In Israel the goal of innovation policy has been to enhance the competiveness of the Israeli industry, distributional aspects were always referred to other policy domains, such as education, never discussed as part of innovation policy. (Authors' interview, Jerusalem, November 25, 2010)

Related to the absence of explicit distributive concerns in innovation policy, all three countries shared a lack of a clear general difference between the major rightist and leftist parties in terms of their approach to innovation policy. There was a general consensus among the main parties in all three countries about the importance of innovation policy and funding. In each of the three countries, stakeholders and civil servants saw little difference between political parties in terms of their emphasis in this field.[9]

[9] One important exception, the case of social research investment, is discussed below.

More substantial differences were detected in cross-country comparisons. Returning to our hypotheses, first, H2 speaks to differences between left and right with respect to policy directed at elevating inequality, based on producer attributes, among them regional differences. In all three countries funding was only marginally allocated according to a regional criterion, if at all. Nevertheless, in Sweden there was talk of achieving parity across regions by allocating innovation funds earmarked for disadvantaged regions. Admittedly, this was justified in the context of regional policies and was treated as an external constraint by the innovation policy experts. Nonetheless, in Sweden equality was definitely a policy concern. In contrast, in the United States, where regional inequalities are considerably greater than in Sweden, public outlays to economically weak areas were understood as a political imperative in a federal system that empowers state-based political actors—not as an egalitarian objective. In Israel, regional concerns were voiced and were expressed in policy that supported the establishment of high-technology industrial centers and technology incubators in the economic and geographical periphery. As in Sweden, however, this policy was perceived by innovation policy-makers as a policy derivative which is largely exogenous to innovation policy.

Differences were also apparent in relation to H3: addressing SBTC. The countries differed with respect to their approach to "traditional industries" (e.g., mineral extraction, textiles, heavy industry): industries with a relatively high ratio of low- and medium-skilled workers. Interviews in the United States were conducted shortly after the auto industry bailout, yet even after this massive investment of public funds, support for innovation in traditional industries was not viewed as a priority by our interviewees. In Israel, by contrast, the Office of the Chief Scientist created a program, with earmarked funds, to support innovation specifically in traditional

industries. From 2006 to 2010, annual program outlays for traditional industries grew more than threefold from 122 to 400 million shekels (OCS 2013). It should be stressed, however, that the stated motivation for this was less to improve the lot of the workers in this industry and thus to address growing inequality than to diversify the Israeli economy, which is considered excessively reliant on the high-tech sector. In Sweden, support of what are considered low- and medium-tech industries (e.g., minerals, paper and pulp) is in no way perceived as having an egalitarian motivation. Such support is driven by the still-dominant position these industries have in the Swedish economy and by their political muscle. Both Social Democrats and Moderates are considered political allies of "big industry," which in Sweden is made up of industries that are commonly considered in the midrange of technological development. Historically, Swedish unions and employers were organized along neocorporatist lines with powerful peak organizations that cooperated extensively with each other and with government in designing Sweden's economy and welfare state. Although union-employer ties frayed at the beginning of the 1990s, they were rebuilt in the late 1990s in the form of the joint industrial committee. The committee, among other tasks, lobbies for government support of traditional industries. The corporatist structure of Swedish policy making implies that the employer and union's voice as expressed by the joint industrial committee is not only heard but heeded. Hence, in Sweden government policy on innovation is not biased toward the high-technology industries—as is more characteristic of the United States or Israel—but toward the technological midrange to which the traditional industries belong.

H1 posits a positive relationship between leftist power and social innovation: that is, innovation that is likely to benefit the less advantaged in society. All three countries have allocations for basic research in medicine and the social sciences, which is conducted

predominantly at the universities. Applied social research—especially research dedicated to advancing innovation that would disproportionately benefit disadvantaged groups—is rare. However, in Sweden one government research council, the Swedish Council for Working Life and Social Research (FAS), is dedicated to this type of work. It should be noted, though, that its budget is relatively small compared to that of the other councils (about one-tenth of the Swedish Research Council's budget). A bill passed in 2009, sponsored by the Moderate right-wing government, explicitly stated that an important criterion in funding research is its social effect. Hence, for example, the Swedish research council should fund not only medical research (i.e., drug discovery) but also research into health (which could, for example, emphasize changes in lifestyle and not technological innovation). The bill, however, does not directly address distributional aspects of innovation. Until 2006, a separate institution—the National Institute of Working Life—operated in the field of applied social science. Following its rise to power in the 2006 elections, the Moderate Party-led government closed the institute. This is one of the few examples we encountered in which party ideological orientation appeared to play a role in guiding innovation policy. It should be stressed, however, that the Moderate government had no such plans for closing FAS, and, according to our interview subjects, the Institute of Working Life's close affiliation with unions—and therefore the Social Democratic Party—made it a political target for the Moderate government, not its area of research.

Unlike Sweden, the United States and Israel lack an established government-supported center for applied research on social innovation. Nevertheless, in the United States, a political debate with a partisan flavor has developed regarding National Science Foundation (NSF) funding for social science projects. Senator Tom A. Coburn (R-OK) has proposed eliminating NSF support for all

social science research on the grounds that social science does not add to American competitiveness and should not be a high research priority of the American taxpayer.[10] These partisan disparities regarding social research in Sweden and the United States could be motivated by differences in fundamental views regarding government's role (e.g., right-wing views that government should refrain from supporting research that does not pertain directly to economic growth or national security) or perceptions that social researchers, and their research, lean leftward.

Discussion

Innovation fuels not just contemporary economic growth but often also economic inequality. The political right and left have fought many battles centered on different forms of distributional policies. Has this been the case with innovation policy? The answer is not straightforward. While within-country comparisons of rightist and leftist governments reveal mostly similar goals and policies, cross-country comparisons demonstrated more significant divergences. These differences are captured in both the statistical analysis of government outlays and the qualitative inter-country comparison.

In general, our four hypotheses are at best only partially supported. First, there is little difference between right and left policymakers, with respect to R&D policy, *within* the different countries (H1-H4). This surprising right-left agreement stems from the

[10] Senator Coburn has a long history of opposing NSF funding of social science, especially political science. His latest move was to call for the closure of the Social, Behavioral, and Economics (SBE) Directorate ((see Coburn 2011).

fact that distributional concerns are simply not part of the R&D debate. Policymakers might care deeply about distribution, but distribution is not on the agenda when they design technologically-related innovation policy. R&D policy is unrelated to the welfare regime from the policymaker's perspective. Public discourse is dominated by the growth and competition imperatives. To the extent that distributional concerns find their way into the policy debates, they do so through the back door. One example of this is innovation policy that is sensitive to regional disparities (H2). In our interviews, it was made clear to us that regional distribution is viewed by innovation policymakers as an intrusion of a foreign element. Second, given that policymakers of neither left nor right thought about innovation policy in social terms, let alone distributional ones, it is unsurprising that innovation policy failed to systematically target weaker elements in society. We hypothesized that governments would address inequality through support of innovation that would benefit less-skilled workers (H3). In the United States, R&D efforts are not guided by such reasoning. Public funding for traditional industries, which tend to employ a lower share of highly skilled workers, is more pronounced in Israel and Sweden. In Israel, traditional industries are specifically targeted. Motivation, however, has little to do with distributional concerns: Israeli policymakers are motivated primarily by the diversification imperative ("do not invest everything in Information Technologies") and the economic disadvantages of creating a dual economy. In Sweden, quite differently from the United States, traditional industries receive considerable support. Nonetheless, motivation was unrelated to distribution concerns: it had everything to do with the entrenched power of the Swedish traditional industries that benefit from close union-employer collaboration. Neo-corporatist interest representation, which empowers traditional industries, could be linked to the right-left divide – neo-corporatism is largely foreign to

right leaning (mostly Anglo-Saxon) regimes. However, this relationship cannot be characterized as causal and is certainly not ideologically-based.

We also asked whether policymakers who design innovation policy take into account the socioeconomic profile of those who consume government-sponsored innovation (H2). Here the results of the statistical analysis were mixed. In some categories—mainly those that involve applied social research (e.g., research into working conditions)—leftist governments were generally more supportive. Even if not explicit in thinking about how R&D could serve the interests of redistribution, it seems that leftist governments demonstrate greater affinity for areas—Social Security, for example—that have significant distributional implications. However, in other areas, there was no significant difference between right and left. The interviews, in general, corroborated a "small difference" conclusion with regard to inter-government comparisons within countries.

There appeared to be more substantial differences across countries. In Sweden, it was the right-wing Moderate-led government that incorporated into the 2008 Research and Innovation Bill a guideline that public funding should take into account social effects. It is also telling that Sweden is the one country that has a separate research council that dedicates much of its work to the support of research and innovation in areas (e.g., working conditions) that are likely to positively affect weaker segments in society. In addition to Sweden's relatively egalitarian tradition, Swedish institutions are structured in a way that empowers actors that tend to be more cognizant of such concerns. The FAS committee for working life, for example, includes a union member who screens funding applications alongside academics and civil servants. The Israeli and, even more so, the American orientations are different. Social and

distributional effects, in general, are marginalized. Once again, it is important not to exaggerate differences: Amelioration of the distributional effects of innovation is not an explicit objective in Sweden any more than it is in the United States or Israel. Nevertheless, a comparison of the fixed- and mixed-effect model results indicates that inter-country differences are influential because introducing cross-national variation in the mixed-effect model influences the coefficient's strength and significance. Hence, given what we witnessed in the statistical analysis and in the inter-country comparison of case studies, we can conclude that differences across countries, while not large, are nonetheless meaningful.

Finally, we expected that political orientation would have a substantial effect on public and higher-education employment in the R&D sector (H4). Although the effect is significant, it is small. The magnitude of this difference, we believe, does not suggest that leftist governments strongly believe in public R&D production. Our interviews indicated that the prominence of private production in the R&D field is accepted as the norm by politicians on both sides of the aisle. Once again, we think that the left-right divide is mainly between countries: left-leaning states tend to be more tolerant of having a substantial public workforce.

The general picture is clear: There are meaningful policy differences across states but these are largely attributable to interest structure, not ideological orientation per se. Whatever differences between left and right exist in this field appear to be motivated by distribution-related concerns in related policy areas (e.g., regional policy) and not the result of an overt, distribution-conscious innovation policy. Although the evidence indicates that distributive concerns play some role in social innovation policy there is little to suggest that the same holds for technological innovation. In this context, distribution is not simply a low priority: It is a blind spot.

Why is this so? Two explanations come to mind: one that doubts the efficacy of innovation policy as an egalitarian instrument and the other that speaks to the ideational change that has swept the OECD countries in recent years. As argued above, it is likely that at least some forms of innovation policy could prove effective as equality-enhancing measures. The international survey demonstrates that governments did not evaluate innovation policy's egalitarian potential and decided against it. Social distribution-oriented innovation policy has not reached the stage of reasoned rejection: *It is yet to be discussed*.

Why is such a policy discussion absent? We believe that the social science literature that indicates a rightward policy convergence helps explain this state of affairs. Leftist parties have increasingly adopted a pro-market orientation typical of the right that views economic growth and national competitiveness in global markets as leading policy objectives (Ross 2000). In what are considered core welfare state fields, the distinction between left and right remains substantial (Imbeau, Pétry et al. 2001). However, left-right differences in economic policies have diminished as the left has embraced the right's conceptual framework and priorities (Cusack 1999). We claim that innovation policy, not unlike macroeconomic policy, is depoliticized in the context of current economic thinking. Discussions concerned with innovation policy tend to be technical in nature because participants have implicitly accepted economic efficiency as the sole legitimate goal of the enterprise, and the only question that remains is how best to promote it. However, R&D and macroeconomic policy differ in one important respect. Macroeconomic policy is more difficult to depoliticize because it is impossible to erase from memory the history of ideological policy debates that centered not just on economic growth but on these policies' distributional effects. Indeed, recent economic travails have reignited debates concerning the welfare aspects of

macroeconomic policy (Stiglitz 2012). Innovation policy is relatively new and lacks a similar history. Hence, its depoliticization requires less manipulation than in the case of macroeconomic policy simply because innovation policy debates were never truly politicized.

One could, of course, question whether debates concerning the distributional aspects of innovation policy are important. Interestingly, it is here that our interview subjects differed. In both the United States and Israel, not only were they interested in this novel perspective, but officials saw it as a valuable contribution and urged us to think about applicable policy recommendations. In Sweden, on the other hand, our interviewees were intrigued, but they wondered whether such a perspective is superfluous for Sweden. Swedish inequalities are substantially reduced by the Swedish tax and welfare systems. Moreover, its active labor market policy and extensive retraining programs reduce the skills gap and, with it, the impact of SBTC. This suggests that adding distributional concerns to innovation policy would probably be more effective in cases where inequalities are high and the politics surrounding welfare, tax, and labor market policies prevent the utilization of these mechanisms to expand economic equality. With this in mind, the reality is that in both the United States and Israel, two of the least-equal OECD countries, innovation policy is less distribution sensitive than in Sweden, despite greater national disparities: disparities that the majority of citizens in both countries view as too great (Bartels 2005; Shalev 2007)

Welfare states across the globe are strained and find it difficult to redress growing inequality driven by growth in wage disparity. In this respect, policies that tackle the sources of growing wage disparities become increasingly relevant. For this reason, we

believe, a discussion of the distributional outcomes of innovation policy is timely. Our findings indicate that innovation policy is largely depoliticized and, as a result, there is no coherent conceptualization of innovation policy that takes into account distributional objectives alongside economic growth objectives. Thus, our research directs attention to an important gap in both the academic literature and in policy. Future research, we believe, should explicate the intentional and unintentional distributional impact of innovation policy and in so doing offer guidance for policymakers who wish to address growing resource inequality with policy tools grounded in new research insights.

Table 1: Panel data analysis for R&D outlays, 1981-2008

DV / IV & Control	social structure and relations		Human health		working conditions		Social security	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
government debt	0.07† (1.62)	0.08 (1.75)	0.04 (1.01)	0.06 (1.25)				
GDP per capita	-0.06 (-0.80)	-0.06 (-0.86)	-0.03 (-0.50)	-0.03 (-0.49)				
Government consumption	0.48** (6.22)	0.49** (6.30)	0.48** (6.64)	0.48** (6.68)	-0.08 (-0.53)	-0.07 (-0.44)	0.58** (2.80)	0.43* (2.34)
unemployment	-0.08 (-1.39)	-0.08 (-1.37)					-0.14 (-1.11)	-0.19 (-1.59)
Union	0.20** (3.97)	0.19** (3.75)	0.20** (4.11)	0.19** (3.85)	0.28** (2.90)	0.33** (3.38)	0.05 (0.39)	0.06 (0.52)
GBAORD	0.17* (2.47)	0.16* (2.36)	0.19** (2.87)	0.18** (2.79)	0.59** (3.47)	0.48** (2.80)	-0.13 (-0.71)	-0.03 (-0.18)
BERD								
RILE	-0.08 (-1.90)		-0.07 (-1.58)		-0.33** (-3.49)		-0.37** (-3.48)	
Welfare		0.08 (1.76)		0.08 (1.82)		0.27** (3.00)		0.49** (5.31)
Adjusted R^2	0.48	0.48	0.46	0.51	0.47	0.44	0.26	0.37
Independent variable (RILE/Welfare R^2 contribution	-	-	-	-	0.09	0.05	0.11	0.22
N	308	307	327	327	70	70	81	81

	Political structure		**Social change & processes**		**Social medicine**		**Health & Env**		**Gov & Edu employment**	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
government debt							0.11 (0.63)	0.07 (0.41)	0.00 (0.00)	-0.05 (-0.81)
GDP per capita							0.20 (0.90)	0.08 (0.36)	-0.12 (-1.44)	-0.12 (-1.36)
Government consumption	0.01 (0.07)	0.02 (0.13)	0.23 (1.41)	0.13 (0.73)	0.48* (2.29)	0.48* (2.19)	-0.17 (-0.72)	0.06 (0.22)	-.34** (-3.47)	-.37** (-3.84)
unemployment							-0.21 (-1.34)	-0.26 (-1.59)	-0.12 (-1.84)	-0.12 (-1.76)
Union	-.33** (-4.73)	-0.20* (-2.54)	-.29** (-3.00)	-0.27* (-2.59)	-0.11 (-1.03)	-0.31* (-2.59)	0.22 (1.46)	0.07 (0.48)	-0.12* (-2.15)	-0.09 (-1.67)
GBAORD	0.82** (5.88)	0.84** (5.64)	0.33 (1.95)	0.45* (2.37)	-0.40 (-1.89)	-0.41 (-1.86)	0.10 (0.43)	0.09 (0.35)	0.73** (8.63)	0.69** (8.24)
BERD									-.90** (-10.83)	-.85** (-10.39)
RILE	-.31** (-4.46)		0.06 (0.62)		0.43** (3.81)		-.38** (-3.85)		-0.06 (-1.04)	
Welfare		0.27** (3.30)		0.17 (1.50)		-.42** (-3.16)		0.32** (2.80)		0.14* (2.39)
Adjusted R^2	0.66	0.63	0.31	0.32	0.26	0.21	0.24	0.18	0.67	0.66
Independent Variable R^2	0.09	0.05	-	-	0.16	0.12	0.13	0.07	-	0.03
N	75	75	77	77	67	67	89	89	137	137

† figure in first row denotes beta coefficient, figure in parenthesis the standard error

* significant at the 0.05 level; ** significant at the 0.01 level

APPENDIX A: LIST OF VARIABLES

Name/type	**Explanation**
Dependent variables (All variables – except employment share and environment – are in constant dollars per capita.).	
Social structure and relations	research dedicated to social objectives, mainly in the social and human sciences. A composite variable.
(Improvement of) working conditions	research into the social aspects of work organization
Social security (system)	research on the development of social security and social assistance systems, including research on income redistribution
Political structure (of society)	research into the theories, doctrines, organizations and systems of society's political organization (including regionalization effects)
Social change, social processes (and social conflicts)	Research on the sociological consequences of economic and social developments which are the result of deliberate policies or social conflicts.
Social medicine	Research into public health and medical care of the communities from an organisational and socio-medical perspective
(Protection and improvement of) human health	A composite variable that covers research aimed at protecting, promoting and restoring human health. Includes health aspects of nutrition and food hygiene.
Health & Env	Health and Environment programmes as a percentage of Civil (non-defense) GBAORD
Gov & Edu employment	government and higher education share of total R&D employment
Independent variables	
RILE	Composite variable for right-left position of government (right positive)
WELFARE	Positive government mention of redistribution and welfare (pro-welfare positive)
Control variables	
GDP (per capita)	
Consumption	General government final consumption expenditure (World Development Indicators)
Debt	Central government debt as share of GDP (OECD)
Union	Equal weight variable of union coverage and density (ICTWSS Database)
GBAORD (per capita)	Government Budget Appropriations or Outlays for R&D (OECD)
BERD (per capita)	Business Enterprise R&D (OECD)
Unemployment	Unemployed workforce share (World Development Indicators)

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