ABSTRACT. The minimum wage is a political-economic issue. Substantial number of papers indicate that special interests play an important role in determining the minimum wage. I formulate a model of minimum wage determination based on the common agency lobbying approach in order to evaluate how competition for political influence between special interest groups in the economy affect the minimum wage determination. Specifically, the theory explains when a binding minimum wage will be imposed, how its level reflects the interaction between various economic and political variables, and under what circumstances the policymaker will be induced through lobbying to increase or not the minimum wage. Theoretical predictions indicate that when the elasticity of labor demand is higher, the benefit of lobbying against (for) an increase in the minimum wage is greater since a potential minimum wage increase has a larger negative (positive) effect on firms profits (unionized workers' income). In that case, lobbying is successful in inducing the policymaker to set the minimum wage rate in accordance with her political preference; a more business (labor) friendly policymaker reduces (increases) the minimum wage because that increases profits (income of unionized labor). I am also able to relate the level of minimum wage to the skill composition of union members and the overall unionization level in the economy. The minimum wage increases when the average skill of union members is greater and when union density in a given economy decreases. I empirically evaluate the prediction on the panel of Canadian provinces over the 1965-2014 period.
1. Introduction

Despite affecting a relatively small proportion of the overall workforce, minimum wage laws are ubiquitous across many countries. In fact, it might not be an exaggeration to point out that no other modern economic policy issue has generated so much research by so many for the benefit of so few, as the minimum wage policy controversy did.¹

The vast majority of research about the minimum wage has focused on empirically analyzing its (dis)employment and welfare effects. In theory, these effects vary with the type of labor market in which the minimum wage is introduced or raised.² Although minimum wage laws are not just an economic but a political question as well, when analyzing their effects on the labor market outcomes economists take the minimum wage as an *exogenously* determined policy. This is likely because they generally do not advocate introducing price-floors in a market in the first place, and it is not a policy that arises as an *economic equilibrium* from the workings of a competitive labor market.

Nevertheless, minimum wages are a form of a labor market price-floor, determined in a *political equilibrium*³ with various normative policy goals.⁴ Yet, little research has been done on the determination of minimum wage policies. As Dickson and Myatt [2002, reviewed in more detail below] point out in their study of minimum wages in Canada, the basic question ‘what determines the minimum wage?’ has received very little attention from economists.

In this paper, I specify a theory that illustrates how the minimum wage is determined in a political equilibrium by SIGs’ directly lobbying the policymaker, the policymaker’s political preferences, and certain labor market conditions in a particular jurisdiction.

Researching the political economy of the minimum wage in Canada’s neighbor, Sobel [1999] points out that the enactment of the minimum wage legislation in the U.S. was subject to many

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¹For a good overview of the history of the minimum-wage controversy see Leonard [2000].
²On the one hand, in a simple model of a perfectly competitive labor market and some search models, the minimum wage has negative effects on employment. On the other hand, in a monopsony model, which can also arise in a search framework, a rise in the minimum wage has the potential to increase employment. See also Zavodny [1996] for an examination of political endogeneity reason why an increase in minimum wage might not lead to adverse employment effects.
³This is in the spirit of Besley and Case [2000]’s view that “There is little doubt that policy choice is purposeful action and can rarely be treated as experimental data.”
⁴For example, enabling single parent families to lift their household out of poverty, preventing ‘unfair’ wages, or guaranteeing a nominal income floor in order to compress earnings inequality and alter the distribution of income.
political pressures. Besides the initial legislative act, “many other endogenous features of the minimum-wage legislation, such as the level of the minimum wage, the effective date of the change, and the number and the timing of the series of steps” are under the pressure of various special interest groups. [Sobel, 1999, p.768]

Consider the following example. Suppose the stated goal of the minimum wage policy is to achieve a certain base level of nominal income. Then, for a minimum wage increase, the earnings of minimum wage workers’ will rise only if the labor demand is inelastic. Accordingly, the total value of income earned by the minimum wage workers will be maximized by setting the minimum wage up to the point where labor demand elasticity is unitary.

Saint-Paul [1998] points out that the process of setting the minimum wage can be influenced and distorted by special interest groups (SIGs). There is the potential then that the minimum wage is set above or below the optimal level with respect to the elasticity of labor demand, relative to the influence these groups have in the political process. Since both labor demand elasticity and the power of various SIGs can differ across different jurisdictions, their minimum wage rates can differ as well. I theoretically explore these possibilities in this paper and provide possible answers to questions: how political and economic factors interact in determining the minimum wage legislation in a particular jurisdiction and how differences in these factors drive differences in minimum wages over time?

I use the theoretical predictions to evaluate the heterogeneity of minimum wages across different jurisdictions - ten Canadian provinces - and to determine if and to what degree minimum wage changes are the outcome of political competition and strategic interaction between various SIGs, and certain political and economic variables in a particular province at a point in time.

Specifically, I use the ‘common agency’ approach to lobbying, where the principals are interpreted as SIGs - a union representing skilled workers and an association of industry firm owners - who are lobbying the government policymaker, their common agent responsible for setting the minimum wage, by offering her political contributions.

The policymaker is susceptible to lobbying efforts, but might also be hesitant to fulfill the SIGs demands since changing the minimum wage changes aggregate income and she cares about the welfare of both workers and business owners in the economy. With that in mind, I attach
a (potentially) different preference for profits and labor income in the policymaker’s objective function. Her objective is therefore a weighted sum of political contributions, workers’ income, and business owners’ income in the form of profits. Political contributions take the form of a payment commitment conditional on the minimum wage rate imposed.

I derive a minimum wage rate that arises in the political equilibrium of such a contribution game. The results - presented in Corollaries 1 to 4 in Section 4.5 - provide a clear insight about how a minimum wage level reflects various political (labor vs. business friendly government) and economic (size of industries, labor demand elasticity and skill composition of the union) variables.

First, when the labor demand elasticity is high, the benefit of lobbying against (for) the minimum wage increase by the firm owners (union) is greater since a given minimum wage increase has a larger negative (positive) effect on industry profits (union workers’ income). Lobbying is then successful in inducing the policymaker to set the minimum wage rate in accordance with her preference for profit income relative to labor income. Accordingly, a more business (labor) friendly policymaker reduces (increases) the minimum wage because that increases profits (income of unionized labor) when labor demand elasticity is higher.

Second, the more representative the union membership is of high skilled workers, the higher the minimum wage will be. The intuition is that the income of higher skilled union workers rises when the minimum wage is increased because their marginal product rises as some low skilled non-union workers become unemployed. The minimum wage increases with the average skill level of unionized workers. This results contrasts with some past literature which takes into account only the raw number of union members and expects that the minimum wage rises monotonically with union membership and/or union density. Under this hypothesis, a larger union is an indication of a politically stronger union which is then able to put more pressure on the government to increase the minimum wage. In this paper, however, it is also the case that a smaller union composed of more high skilled workers induces the government to increase the minimum wage through lobbying and benefits from such a policy by making the unskilled labor more expensive to hire, reducing their employment and raising the marginal product of its members.

Third, the minimum wage also rises when industries, the labor intensive ones which are more likely to lobby against minimum wage increases, become more productive. When the marginal
productivity of labor rises, workers at all skill levels become more productive and firms can afford to employ those lower skilled workers for which the minimum wage was previously binding.

As documented by Boeri [2012] minimum wage setting differs considerably from one country to another.\(^5\) This heterogeneity of minimum wage legislations, and their periodic changes, has resulted in a substantial cross-jurisdictional variation in evolution of minimum wages across time. We know, for example, that the minimum wage is usually set at higher levels in Europe than North America and that the purchasing power of the minimum wage in North America has been stagnant, while in France it steadily increased since the late 1980s and has actually tripled since the 1960s. Additionally, compared to Anglo-Saxon and some continental European countries, Scandinavian countries\(^6\) spend much more on active labor market policies, yet no Scandinavian country has a national minimum wage policy while almost all other European countries, as well as Canada and the U.S., have a statutory minimum wage.

Can the theoretical predictions derived shed some light on these differences in minimum wage levels across various jurisdictions? I empirically evaluate these predictions by narrowing the focus to a single country, Canada, which nevertheless exhibits substantial heterogeneity of minimum wage rates. The unique advantages that Canada offers for studying the minimum wage policy have already been noted in the literature. Foremost, the minimum wage legislation is under provincial jurisdiction. Therefore, I am able to obtain minimum wage rates for 10 Canadian provinces for the period 1965-2014. Further, as evident from Figure 1 and Figure 2, there is substantial provincial heterogeneity in timing, levels and frequency of changes of minimum wages over 1965-2014 period. Together, these provide a good foundation for a panel-data analysis of the determinants of changes in the nominal and real minimum wages.\(^7\)

The rest of the paper is organized as follows. Sections 2 and 3 review the pertinent, but mostly empirical, past literature on the political economy determinants of minimum wages. Section 4 presents

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\(^5\)A minimum wage can be paid on an hourly, daily or even monthly basis; indexed for inflation, bargained between employer and employees; set differently for different age groups; it can be legislated on a federal level, as in the U.S., or regional as in Canada. See Cahuc and Zylberberg [2004, p.715] for examples of countries associated with these various rules.

\(^6\)Denmark, Sweden, Norway and Finland.

\(^7\)See Baker et al. [1999] for a further discussion of the benefits of Canadian data for studying minimum wages.
Figure 1. The diagram on the left shows the number of minimum wage increases for each Canadian province in the 1965-2014 period. It shows the heterogeneity between provinces in the frequency of minimum wage changes. The diagram on the right shows the distribution of minimum wage increases for all ten provinces over the 1965-2014 period. It indicates the number of times all provinces increased the minimum wage in a given year.

the model and derives the comparative statics results. Section 5 [CURRENTLY IN PROGRESS] empirically evaluates theoretical predictions on the panel of Canadian provinces.

2. Literature Review

There are several past studies on the political economy of the minimum wage which test certain hypothesis of different interest groups competing to influence the minimum wage policy. Here I review some of the papers pertinent to the arguments made in later sections.\(^8\)

In the words of Cox and Oaxaca [1982, p.533] a common approach is that “labor unions promote minimum wage legislation and that some organizations of capitalists and corporate executives impede it.” They examine this “common knowledge” closer since higher earning unionized workers are in no need of a higher minimum wage, while (unionized) corporations might not necessarily impede an introduction or increase in the minimum wage if it raises the labor cost of their (non-unionized) competitors.

\(^8\)See Epstein and Nitzan [1999] and Bacache-Beauvallet and Lehmann [2008] for another type of political-economic approach to minimum wage determination.
Figure 2. Minimum wages for ten Canadian provinces between 1965-2014. Real minimum wages are expressed in 2014 constant dollars. Source: Labour Program Canada, Minimum Wage Database.
Specifically, Cox and Oaxaca [1982] try to answer two questions. First, what is the economic interest behind the involvement of high earning union workers and industry organizations in trying to affect the minimum wage legislation? Second, do these interest groups actually have a “significant” effect on the minimum wage policy? To answer the first question, they develop a model with two production sectors. One is unionized and employs skilled labour and capital, the second is non-unionized and employs both unskilled and skilled labor and capital as inputs.

Imposing a minimum wage in this setup has different effects on the equilibrium wage and employment outcome based on the assumptions made. In general, Cox and Oaxaca show that a minimum wage imposed on the non-unionized industry, which increases the wage rate of unskilled labor, can increase the wage rate of both union and nonunion skilled workers. This will induce a substitution of the union product for the nonunion product, increasing the demand for skilled union labor and thereby union employment. These are channels though which the minimum wage legislation will be promoted by the unions and opposed by corporate executives.

To answer the second question they postulate that the only way unions and corporations can affect the level of the minimum wage is by influencing the legislator. Cox and Oaxaca do not model the process of influencing the legislator, but simply assume that the legislator in a U.S. state is a self-interested individual who selects among alternative nominal minimum wage rates based on the impact this choice will have on his utility from holding public office. They estimate a “median legislator” utility maximization model of the relationship between the legislator’s state minimum wage, measures of the relative strengths of organized labor and capital, and average hourly earnings in legislator’s state.

Estimating the differential in minimum wages attributed to the presence of unions and organized ‘capitalists’ they show that the minimum wage enacted in a U.S. state in 1975 would be 62% higher than in the absence of unions and 25% lower than in the absence of capital income earners. Also, evaluating whether a state would have enacted a minimum wage in the first place, they show that for a state in 1974, there was a 30% higher (5% lower) probability to establish a minimum wage in 1975 than would have been without unions (capital earners).

[9]There is some earlier literature on the political economy of minimum wage legislation from the 1970s, cited by Cox and Oaxaca [1982], which I skip in this review as I do not think they are of crucial importance for the subsequent arguments.
A take away point from Cox and Oaxaca [1982] is that the results provide some support for the importance of organized interest groups in determining the minimum wage legislation. Both organized labor and capital are shown to be important for the probability of increasing and decreasing the minimum wage level. This highlights the need for a clearer theoretical model to study the political and economic factors that affect the minimum wage policy.

Two recent short papers, [Adam and Moutos, 2006, 2011] also discuss the politics of minimum wages. Adam and Moutos [2006] construct a model in which they relate the level of minimum wage and income inequality. Instead of evaluating the minimum wage legislation as the outcome of special interest politics, however, their politically determined value of the minimum wage depends on the median voter's preferences and a measure of inequality.

With an increase in inequality the median voter wants more redistribution, in the form of a higher minimum wage, since his share of the total cost of the minimum wage increase is lower. However, Higher inequality of ability means it is more costly for the median voter to keep a high equilibrium minimum wage. The net effect of these two forces is ambiguous and an increase (fall) in inequality can actually lead to a lower (higher) minimum wage. These results are based on “extensive experimentation with empirically relevant parameter values,” since the comparative statics results of a change in income inequality are ambiguous. [Adam and Moutos, 2006, p.174] The take away point is that these effects could be important for interpreting empirical research since they indicate that, even if a higher minimum wage can reduce employment, the data may show a positive relationship between minimum wage and employment if the minimum wage is changed as a result of political economy considerations.

Adam and Moutos [2011] examine a political economy mechanism of policymakers' unwillingness to implement a system of employment or wage subsidies in the place of minimum wages. Initially, minimum wages are endogenously determined through majority voting. The minimum wage is determined so as to provide the highest utility possible to the median voter and it increases the income of workers who remain employed. With the minimum wage in place, voters have a policy choice to implement a wage subsidy instead of the minimum wage “such that even though the wage rate that producers pay drops to its full employment level the workers gross take-home wage remains at the level of the minimum wage.” [Adam and Moutos, 2011, p.172].
This switch from the minimum wage to a subsidy scheme, however, is not always politically viable. The results depend on the presence of a profit tax and the size of the labour demand elasticity. If the costs of the wage subsidy are borne only by the workers through the income tax, the median voter will not be in favor of the switch. If the costs of the switch are borne by the firms that benefit from scrapping the minimum wage, the policy will be supported in a political equilibrium.

Saint-Paul [1998], although not dealing with the issue of minimum wage directly, develops a framework to assess the political support for active labor market policies that impact unemployment, wages and welfare of the employed. More importantly, he frames his theory in terms of interest groups’ influence on policymaking. The model consists of employed “insiders” who have policy decision power and the long-term unemployed “outsiders” who search less intensively. To the extent that minimum wage legislation is a policy directed toward the most disadvantaged groups, who are not politically powerful, Saint-Paul [1998] asks under what circumstances will there be political support by the insiders for such policies? The employed will oppose active labor market policies if they negatively impact their welfare. A higher minimum wage might lower the possibility for the unemployed to underbid the employed and, if it exacerbates the unemployment of outsiders, lowers the exposure to increased competition from outsiders. In general, employed insiders are more likely to support active labor market policies when the labor demand elasticity is higher and they are more exposed to the possibility of unemployment. Saint-Paul [2000] shows how the minimum wage can be a tool for the employed insiders of one group in the society to exclude the low skilled workers in the same group from the labor market and employment. By lowering their job prospects, an increase in the minimum wage reduces the supply of substitute lower skilled workers and increases the demand and wages of the politically powerful higher skilled insiders.

Saint-Paul [2000], however, does not explicitly model the political mechanism by which different groups of workers in the economy interact or from what they derive the political influence. Members of the more powerful group are simply able to impose the minimum wage to increase their rent in the labor market without lowering their employability.

In probably the most prominent study of the political economy of the minimum wage, Sobel [1999] examines whether U.S. Congress has been setting the minimum wage according to the normative policy goals - ‘poverty threshold target’ and a ‘nominal income target’ - or whether its
level was determined by the pressure from special interest groups. Accordingly, he estimates the minimum wage levels that would, with purely economic considerations, have to be implemented to achieve either one of those goals. Sobel obtains two minimum wage rates: a high $6.03 and a low $5.17, for the high and low ‘poverty threshold targets’ respectively.\footnote{Unlike the minimum wage rate, poverty level in the U.S. is adjusted for inflation and therefore since 1959 the real poverty threshold has been constant.}

To estimate the minimum wage needed to achieve a ‘nominal income target’ Sobel estimates the relationship between the minimum wage and total income. Insight about the politics of minimum wage legislation emerges from this model. Namely, in order to maximize workers’ nominal income in the long run, policymakers should increase the minimum wage up to the point where the long run labor demand has unitary elasticity. However, the short-run ‘political effects’ of the minimum wage on total income can be different from the ultimately more important long-run effects.

In the short run, increasing the minimum wage can increase workers earnings \emph{beyond} the equilibrium point based on the long run labor demand elasticity. As Sobel puts it even, “if Congress were pursuing the nominal income target, a shortsightedness effect could lead it to adopt a minimum wage at the [short-run] level rather than at the level best from the long-run perspective.” \cite{Sobel, 1999, p.766}\ Politicians thus have an incentive to exploit the short-run earnings curve and time minimum wage changes to pre-election periods.\footnote{Specifically, Sobel [1999] notes that even the FLSA became effective \emph{only} eight days before the national election in 1938.} The minimum wage that maximizes long-run nominal income target is around $5.36, while the minimum wage set in a shortsighted political equilibrium is estimated at $8.49. Sobel rejects the “hypothesis that the minimum wage has been entirely determined by the stated goals of policy.” \cite{Sobel, 1999, p.779}\ He indicates that for more than half of its history the actual minimum wage in the U.S. has been below the $5.17 lower poverty threshold and about a quarter of the time above the higher $6.03 level. In the empirical Section 5 I show that the same result holds across Canadian provinces. The actual minimum wage set was always considerably lower than the one required to achieve a Low Income Cut-Off level for the period 1965-2013.

Can the historical path of the minimum wage in the U.S. be explained by interest group pressures and historic variation in their political strengths? In concordance with previous studies, Sobel
considers organized labour unions and business interests as the two groups with an immediate interest in the minimum wage issue. He approximates their political strength by union membership and the corporate income tax, respectively. By simply plotting measures together with the real minimum wage the positive relation between them is clearly visible. When the minimum wage was introduced union membership was rising and so was the corporate income tax. Real minimum wage achieved its peak in late 1960s and its decline since then is associated with the decline in union membership and the corporate income tax rate in the 1980s in the United States.

Sobel concludes that “a relative measure of the political power of interest groups on the minimum wage issue appears to be highly correlated with the overall trends in the minimum wage, whereas the stated goal levels are not.” [Sobel, 1999, p.781] Although not based on robust econometric estimation, these findings seems to suggest that a simple interest group model in the style of Becker [1983] is able to explain the historical path of the minimum wage levels quite well. Also, it is clear that the short-run and long-run labour demand elasticities and their difference play a role in affecting the political incentives when (closer to election) and how (in several smaller steps) to change the minimum wage rate.

3. Three Canadian Studies

Unlike the United States where the minimum wage is legislated at the federal level, in Canada the minimum wage is under the provincial jurisdiction. This allows for a panel data set with more minimum wage heterogeneity, usually unavailable for other countries.

In the earliest study of determinants of provincial minimum wages in Canada during the 1975-1982 period, Blais et al. [1989] estimated the responsiveness of provincial governments to the pressure of political groups in establishing the minimum wage. They focus on the political market explanation - the winners are more numerous than the losers - and consider the relative importance of unions, small businesses, youths and women as political groups affecting the minimum wage legislation.

Without a formal theoretical model, Blais et al. [1989] formulate a hypothesis that if union members benefit from the increase in the minimum wage, and assuming they are politically more powerful than the groups who are negatively affected by the policy (small businesses, women
and youths), minimum wage will be a politically rational policy. Their results show all of these variables have negative coefficients, including the rate of unionization, measured as a percentage of unionized workers. The unionization effect, however, should be adjusted for the skill level; the average skill level of unions changed over time, the which Blais et al. [1989] do not discuss. Under the conjecture that low wage workers are a substitute for high wage ones, high earning union members will benefit from a higher minimum wage.

Their conclusion is that "two weakly organized groups, women and the youth, seem to have a greater impact on the level of the minimum wage than the strongly organized ones, unions and small businesses." [Blais et al., 1989, p.19]

Dickson and Myatt [2002] also study variations in minimum wage policies across nine Canadian provinces for the 1977-1996 period. They too consider the relative strengths of interest groups (unions, youths, big and small business) in influencing each province's minimum wage policy. However, they also examine the influence of politicians' ideology (represented by political parties) and four control variables (unemployment rate and insurance, election timing as in the argument of Sobel [1999], and inflation).

Their results are different from Blais et al. [1989]. The unionization rate has a positive coefficient here, although not very significant. Other interest group variables are significant, but in the “wrong” direction: youths and women have a negative coefficient. Both unemployment rate and insurance have a negative influence on the minimum wage determination. The strongest results come from political ideology variables. “Minimum wages are higher when left-wing governments are in power and lower when right-wing governments are in power, so ideology matters.” [Dickson and Myatt, 2002, p.64]

Overall, however, these results are difficult to interpret. In influencing an economic policy in its favor, it is the relative power of SIGs rather than absolute that matters. Neither of the two papers, however, make the distinction clear.

Finally, Green and Harrison [2010], and more recently Green [2014], contend that the political economy of minimum wages in Canada can best be explained in terms of voters’ ideas of fairness. They propose a model in which “minimum wages are set to outlaw labour market transactions
with wages that are deemed to be unfairly low.” (p.3) Voters are guided by the income or wage distribution to help them determine the fair value of the minimum wage.

Their basic goal is to explain the forces that lie behind four main patterns for Canadian provinces, some of which can be observed from Figure 2: (1) general rise in the minimum wage; (2) regional co-movement of minimum wages; (3) the highest minimum wages are correlated with the rule of left-wing parties; (4) the convergence of minimum wages between highest and lowest minimum wage provinces.

What is specific to their model is that the interest groups and altruism models emerge as special cases, thus allowing for an empirical test and comparison of derived implications between the three models. The study uses the data from ten Canadian provinces for the 1969-2005 period. After presenting the ‘fairness model’ where the voters’ goal is to ban unfairly low wages, their empirical investigation results do not reject it. The minimum wage is a function of both the median unskilled wage, used as a proxy for the comparison market wage, and minimum wages in other provinces. The overall point of the Green and Harrison [2010] paper is that it tries to deemphasize the importance of interest group pressures in minimum wage determination.

Except for Green and Harrison [2010] just mentioned, previously reviewed papers all emphasize the role of special interest groups (SIGs) in political economy of minimum wage legislation and their influence in determining the level, timing and frequency of minimum wage changes. Not all approaches and theories might, however, be equally capable in explaining the considerable variation the minimum wage policy displayed across time and jurisdictions.

Green and Harrison [2010] discount the importance of interest groups too easily. They point out that since “only about 5% of either American or Canadian workers [are] directly affected by minimum wages and most estimates suggesting only limited spillover effects on above-minimum wages,” it seems unlikely that a wide popularity and “breadth of the battle fought over the minimum wage” can be attributed to a competition for influence between “a small set of people with direct

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A notable addition to their paper is the qualitative evidence they present about minimum wage setting, gathered through interviews with provincial Ministers. A conclusion reached from these interviews is that labor mobility is not an important decision factor. As one Minister and his Cabinet colleague put it: “Minimum wage jobs are not mobile.” [Green and Harrison, 2010, p.8] but more importantly, inter-provincial comparisons are an important part of minimum wage setting.
self-interest in the minimum wage … while everyone else stands by, disinterested.”[Green and Harrison, 2010, p.1]

A contrary case can be made, however, that it is likely because the groups who benefits or are hurt by the minimum wage are relatively small, well organized, with a direct self-interest in the minimum wage policy, that they will compete for political influence and attempt to affect the political process of setting the minimum wage in their favor. The strongest candidates for such small, well organized group are firm owners, unions, and minimum-wage earners in specific industries (retail, food, etc.), all with a direct interest in the minimum wage legislation. As well, proportion of minimum-wage workers varies considerably across Canadian provinces - 1.2% in Alberta vs. 9.3% in Newfoundland in 2009 - indicating the political weight of workers earning a minimum wage varies across provinces.

Furthermore, Green and Harrison [2010] are making this observation only about a point in time. We do not know, and they do not discuss, how the popular support for the minimum wage varied across time and provinces and whether this may in fact be endogenous to the minimum wage level itself or a function of certain other political and labor market variables.

A more general theory of minimum wage policy determination would answer two basic questions. First, depending on the strength of interest groups, will a legal wage floor be created in a political process? Second, can the subsequent changes be explained by the relative power-shifts between interest groups? In the rest of the paper I outline a more general model that could potentially be fruitfully exploited in explaining whether a binding minimum wage is imposed and how its level reflects various economic and political variables.

4. The Model

I order to illustrate the effects of political competition between various SIGs and various economic conditions on the minimum wage policy, I adopt and modify a ‘common agency’ lobbying model from Grossman and Helpman [2001, Ch.8]. In the general model, principals in the form of special interest groups compete for influence over a single policymaker, their common agent. Since the common agent sets the level of the minimum wage that simultaneously affects several principals, they have an incentive to design and offer political contribution schedules (e.g., campaign
contributions) to induce the agent to take their interest into account and thereby influence her\textsuperscript{13} policy choice.\textsuperscript{14}

4.1. The Economy. A small open economy consists of two competitive industries, for example textiles and pharmaceuticals, denoted by \( T \) and \( P \), respectively, as in the Grossman and Helpman \[2001]\’s initial setup. We can think of one industry as labor intensive, say \( T \), and the other as capital intensive. Besides that purpose, names play no real role except to distinguish the industry that is actively lobbying as a SIG from the one that is not.\textsuperscript{15}

\( N \) workers in the labor force have different skill levels. They perform similar tasks in production and are perfectly substitutable after adjusting for their skill level. Their ability determines the amount of ‘effective labor’ supplied; a worker with the skill level \( a \) supplies \( a \) times ‘effective labor’ as a worker with the skill level 1. If \( e_i(a) \) is the number of employed workers of ability \( a \) by sector \( i \), then

\[
E_i = \int_1^\infty a e_i(a) \, da, \quad \text{for } i = T, P;
\]

is the total amount of effective labor employed by industry \( i \).\textsuperscript{16}

Each industry employs effective labor, uses capital and sector-specific technologies, \( A_T \) and \( A_P \). Accordingly, their production functions are

\[
F(E_i) = A_i E_i^\alpha, \quad \alpha < 1, \quad \text{for } i = T, P;
\]  

(4.1)

Capital used in production is normalized to 1 and assume that industry \( P \) is more capital intensive and \( A_P > A_T \). Each produced good is traded on a larger (world) market and its price is taken as given.\textsuperscript{17} For future reference, given the production function, the absolute value of wage elasticity of

\textsuperscript{13}I use the pronoun ‘her’ for the government policymaker throughout the paper.

\textsuperscript{14}Formal models of common agency were initially developed by Bernheim and Whinston \[1986a,b\] and most notably applied by Grossman and Helpman \[1994\] and Dixit et al. \[1997a\]. See Martimort \[2007\] for a more extensive overview of theory and literature. Previously, Rama and Tabellini \[1998\] used the common agency approach, although they analyzed different issues in jointly determining trade and labor market policies.

\textsuperscript{15}What matters is distinguishing industries that are politically organized from those that are not. In that sense, the number of industries in this economy does not matter either. Having “only” 2 industries in the economy serves a purpose of simplifying the analytical part and clearly distinguishing members of organized interests.

\textsuperscript{16}We can imagine that instead of employment, the ‘raw’ labor input of firms is hours of work. Multiplying by the ability \( a \) would still give the aggregate efficiency units of labor hired \( E_i \).

\textsuperscript{17}In the Canadian context, a small open economy is a province whose two industries trade on the national and international markets, taking the price as given.
effective labor demand is

\[ \varepsilon = \left| \frac{\partial E}{\partial w_E} \right| = \frac{1}{1 - \alpha}. \quad (4.2) \]

Workers’ skills are distributed according to a Pareto distribution over a support interval \( a \in [1, \infty] \). This means that the lowest skill cannot take value less than 1 associated with the unskilled or ‘raw’ labor. Let \( \Phi(a) \) be the fraction of workers with ability less than or equal to \( a \) and \( N\Phi'(a) \) the total number of workers with the skill level \( a \). The Pareto skill distribution CDF and PDF are,

\[ \Phi(a) = 1 - \left( \frac{1}{a} \right)^z \quad \text{and} \quad \Phi'(a) = \frac{z}{a^{1+z}}, \quad \text{for } a \geq 1, \]

respectively, where \( z > 1 \) is the shape parameter governing the distribution of skill levels. Dispersion increases monotonically as \( z \) decreases. The lower (higher) the \( z \) the heavier (less heavy) the upper tail of the distribution and the proportion of high-skilled workers is greater (lower).

The decision to join a union is not endogenous in the model, but governed by the skill distribution. Specifically, there is one union in the economy which represents workers at the higher end of the skill distribution. Suppose there is a cutoff skill level, denoted \( a_U \), such that at every skill level greater than \( a_U \) all workers are members of the union. Figure 3 depicts the PDF of Pareto distributed skills with the cutoff value for union workers. Then, the total units of effective labor among unionized employed workers are

\[ E_U = N \int_{a_U}^{\infty} a\Phi'(a) da = \frac{Nz}{z-1}a_U^{-z}. \quad (4.3) \]

This might appear somewhat counterintuitive, but its purpose is to indicate that political representation of labor is skewed toward higher skilled workers, given that the union is a politically organized SIG. Besides, even though unionization rates vary across occupations and job characteristics, it is an empirical regularity that workers with higher educational attainment and workers employed in higher skilled industries are associated with higher unionization rates.

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18Technically, the distinction should be made between the workers who are members of a union and those workers who even though are not union members are covered by a union negotiated contract (collective agreement). This distinction might matter empirically based on the type of data available and we will return to this point later, in the empirical section. Sometimes, workers who are covered by a collective agreement, but are not actually members of a union are still considered as unionized.

19See, for example, Statistics Canada report “Long-term trends in unionization” from November 2013.
4.2. **Labor Market Equilibrium Without Minimum Wage.** How does the economic equilibrium look like without a minimum wage policy? Since all workers are perfectly substitutable, in a competitive equilibrium a single market wage for a unit of effective labor, denoted $\hat{w}_E$, would emerge. At this wage a worker with ability $a$ earns $a\hat{w}_E$ in the competitive equilibrium.

What matters to profit maximizing firms here is the units of effective labor employed. When the cost of a unit of effective labor is $w_E$, the maximum level of profits that firms in each industry can attain are given by $\Pi_T(w_E)$ and $\Pi_P(w_E)$. Then, their respective labor demands can be obtained through the Envelope result,

$$\bar{E}_i(w_E) = -\Pi_i'(w_E) = w_E^{\frac{1}{\alpha}} (\alpha A_i)^{\frac{1}{1-\alpha}}, \text{ for } i = T, P.$$

The total demand for effective labor is simply

$$\bar{E}(w_E) = \bar{E}_T(w_E) + \bar{E}_P(w_E) = w_E^{\frac{1}{\alpha T}} [ (\alpha A_T)^{\frac{1}{1-\alpha}} + (\alpha A_P)^{\frac{1}{1-\alpha}} ],$$
and total supply of effective labor is given by
\[ N \int_1^\infty a \Phi'(a) da = \frac{Nz}{z-1}. \]

Wage adjusts until the labor market satisfies the full-employment condition
\[ \tilde{E}(w_E) = N \int_1^\infty a \Phi'(a) da. \]

Without the minimum wage then, a unique market clearing wage \( \hat{w}_E \) is
\[ \hat{w}_E = \alpha \left[ N z \left( \frac{z-1}{A} \right) \right]^{\alpha-1}, \tag{4.4} \]
where the shorthand \( A = \left[ A_T^{1/\alpha} + A_P^{1/\alpha} \right] \) will be utilized throughout the paper.

4.3. **Labor Market Equilibrium With Minimum Wage.** To examine the political forces that determine the minimum wage, denoted by \( w_M \), we should understand how imposing a wage floor affects the economic equilibrium and therefore the incentives of SIGs to lobby and compete for or against it.

With a legislated minimum wage, firms still care about maximizing their profits and their demands for effective labor remain the same functions of \( w_E \). In the competitive equilibrium, the least skilled worker earns \( \hat{w}_E \), i.e. his marginal output.\(^{20}\) When a minimum wage greater than the wage paid to the least skilled worker in a competitive equilibrium is imposed, i.e. \( w_M > \hat{w}_E \), firms will not hire the least skilled worker since his marginal product does not cover the wage he *must* be paid. Imposing such a binding minimum wage then means the labor demand will fall short of supply. Therefore, if everyone must be paid \( w_M \), the least skilled hired worker will be the one with the skill level \( a_M \) such that
\[ a_M w_E = w_M, \tag{4.5} \]
which implies that the \( a_M \) is a function of \( w_M \). Furthermore, this changes the full-employment condition section 4.2 to
\[ E(w_E) = N \int_{a_M(w_M)}^\infty a \Phi'(a) da. \tag{4.6} \]

\(^{20}\)A more general statement is that the least skilled worker earns the wage \( a \hat{w}_E \). The assumption here is that the lower bound of the skill distribution is \( a = 1 \).
since only workers with ability greater than $a_M$ will be employable. Equations (4.5) and (4.6) enable us to jointly solve for $a_M$ and $w_E$ as functions of $w_M$. The solutions are denoted as $a_M(w_M)$ and $w_E(w_M)$, respectively. These two functions determine the income levels of all groups in the economy as a function of $w_M$ and thus give a stake to various interest groups to compete over the minimum wage policy.

Specifically, equilibrium wage for a unit of effective labor, the unique solution to eq. (4.6), is

$$\hat{w}_E(w_M) = \alpha z^{1-a} \left[ \frac{N}{w_M} \right]^{(1-a)(1-z)} A_i^{1-a}. \quad (4.7)$$

Observe that $\hat{w}_E(w_M)$ is increasing in $w_M$. The minimum skill level at which a worker will be hired is

$$a_M(w_M) = \left[ \frac{N}{w_M} \right]^{1-a} A_i^{1-a}. \quad (4.8)$$

To facilitate deriving the political equilibrium, i.e. the equilibrium minimum wage determined under the influence of lobbying SIGs, I shall express each industry’s and total labor demand as well as union’s labor supply in terms of minimum wage. I make use of eqs. (4.7) and (4.8) to do so. The demand for effective labor by industry $i = T, P$ as a function of $w_M$ is

$$E_i(w_M) = \left[ \hat{w}_E(w_M) \right]^{1-a} (\alpha A_i)^{1-a} = \left[ \frac{N}{w_M} \right]^{1-a} A_i^{1-a}. \quad (4.9)$$

Then, the total demand for effective labor as a function of $w_M$ is

$$E(w_M) = E_T(w_M) + E_P(w_M) = \left[ \frac{N}{w_M} \right]^{1-a} \left[ \frac{w_M}{\alpha} \right]^{1-a} A_i^{1-a}. \quad (4.10)$$

With the minimum wage imposed in the economy, the expression for the total units of effective labor of unionized employed workers has to be evaluated for two possible cases:

**Case 1.** If the minimum wage imposed is such that $a_M(w_M) < a_U$, then

$$E_U = N \int_{a_U}^{\infty} a \Phi'(a) da = N \int_{a_U}^{\infty} \frac{z}{a^{1+z}} da = \frac{NZ}{z-1} a_U^{1-z}. \quad (4.11)$$
Case 2. If $a_M(w_M) > a_U$

$$E_U(w_M) = N \Phi'(a) = \frac{Nz}{z-1} a_M(w_M)^{1-z}. \quad (4.12)$$

Specifically, using eq. (4.8) for $a_M$ in eq. (4.12)

$$E_U(w_M) = \left[ \frac{Nz}{z-1} \right]^{\frac{1}{z-1}} \left[ \frac{1}{z-1} \right]^{\frac{(z-1)(1-z)}{z+\alpha-za}} \left[ \frac{w_M}{\alpha} \right]^{\frac{1-z}{z+\alpha-za}}. \quad (4.12)$$

These two cases are illustrated in Figure 4. Intuitively, in Case 1, when the binding minimum wage is set low enough such that the least employable skill level, denoted $a_1^M$, in the figure, is not greater than the cutoff skill level for union membership, the supply of effective unionized labor remains as initially specified in eq. (4.3). Case 2 describes the situation when $w_M$ is set so high that unionized workers with skill in the range $[a_U, a_2^M]$ lose their employment. Equations (4.9) to (4.12)

\[ \Phi'(a) = \frac{z}{a_1^{1-z}} \]

\[ \text{Possible values of } a. \]

**Figure 4.** Skills are Pareto distributed and above the cutoff level $a_U$ all workers are union members. The green line for $a_1^M < a_U$ depict Case 1 situation, and the red line for $a_2^M > a_U$ Case 2.

will be used to derive the political equilibrium in the economy, for a given pattern of lobbying.
4.4. **Political Equilibrium.** Suppose that two special interest groups compete for influence: (1) the association of capital owners in industry $T$ and (2) the union of workers with abilities skewed toward the high end. These are exogenous organizations. It is possible to introduce capital owners in the other industry and the rest of the workers as additional SIGs that also compete for influence over the minimum wage, but for now they remain unorganized.

The lobbying game has two stages. In the first stage, each lobbying SIG offers the policymaker an optimal, non-negative political contribution schedule. In the second stage, the policymaker observes all contributions received and sets the level of the minimum wage in order to maximize her objective function.

The government’s objective in setting the minimum wage is to maximize the sum of aggregate welfare, $W(w_M)$, and political contributions from the two SIGs, $c_T$ and $c_U$ for textile association and the union respectively. Thus, the government’s objective function takes the linear form

$$G(w_M) = W(w_M) + \lambda_C(c_T + c_U)$$

where $\lambda_C$ is a fixed positive weight put on total contributions received from the lobbying SIGs. With identical and homothetic preferences for all individuals in the economy, aggregate welfare is proportional to aggregate income, which is equal to the sum of total labor income and industries’ profits. Specifically, with the minimum wage in place, the aggregate welfare in the economy is

$$W(w_M) = \lambda_L w_E(w_M) E[w_E(w_M)] + \lambda_S \left[ \Pi_T[w_E(w_M)] + \Pi_P[w_E(w_M)] \right]$$

(4.13)

$\lambda_L$ ($\lambda_S$) is the weight the policymaker assigns to labor income (profits) and assume $\lambda_L + \lambda_S = 1$.

These different weights capture the possibility that policymakers of different political orientations, who set the minimum wage policy, have stronger preference for labor income relative to profit income. For example, a left wing policymaker could be expected to favor more labor income over profits, and reverse for the right wing. The weights can then be used to control for the type of government in power for a given period of time. The preference for the political contributions, $\lambda_C$, does not have to necessarily be different between the more labor or business friendly policymaker.
In order to influence the policymaker’s decision, both SIGs are simultaneously and independently offering the policymaker a political contribution, a binding payment conditional on the minimum wage level set by the policymaker. Thus, the union and the textile association design their contributions as schedules, denoted as \( c_U = C_U(w_M) \) and \( c_T = C_T(w_M) \), to maximize their members’ net-of-contribution labor income and industry profits, respectively. We will confine ourselves to non-negative contribution schedules that are differentiable when positive and locally compensating. Following the common-agency literature, a schedule that satisfies those properties is a *truthful contribution schedule*, formally defined as

\[
C_i(w_M, b_i) = \max\{0, W_i(w_M) - b_i\}, \quad \text{for } i = T, U, \tag{4.14}
\]

where \( b_i \) is the welfare anchor chosen optimally by each lobbying SIG. Reducing the contribution by \( b_i \) makes sense, since by doing so a SIG retains some of the gains from lobbying, without breaking the truthfulness condition.\(^\text{21}\) Also, Bernheim and Whinston [1986a] and Dixit et al. [1999] prove that a truthful contribution schedule is part of each principal’s best-response set to the opponent’s strategies and therefore does not involve any cost in playing that strategy.\(^\text{22}\) The ‘locally compensating’ condition means that near a political equilibrium the SIG’s marginal cost of contribution is equal to the marginal benefit it receives; therefore \( C'_i(w_M) = W'_i(w_M) \) and \( C'_j(w_M) = W'_j(w_M) \), where \( C'_i(w_M) = \frac{\partial C_i(w_M)}{\partial w_M} \), for lobbies \( l = T, U \).

The shape of the truthful contribution function exactly matches the shape of the SIG’s welfare function and so it exactly reflects the marginal impact of a change in the minimum wage policy. The change in contribution compensates for the change in the minimum wage so that the welfare of SIG members stays constant. It is basically a costless requirement for the contribution schedule to remain truthful.

Let us suppose that a binding minimum wage is set, i.e. \( w_M > \hat{w}_E \), but such that \( a_M(w_M) < a_U \). We can think of this as a candidate equilibrium solution. Then, the equilibrium minimum wage policy satisfies the necessary first-order condition for maximizing the policymaker’s objective

\[^{21}\text{A technical assumption is that political contributions are bounded from above by some maximum amount, since it is reasonable to assume that each SIG has a finite total income to contribute.}\]

\[^{22}\text{See also Dixit et al., 1997b, p. 759 for a discussion and justification for using truthful contribution schedules.}\]
function \( G \),
\[
W'(w_M) + \lambda C [C'_T(w_M) + C'_U(w_M)] = 0. \tag{4.15}
\]
I derive a closed form solution for the minimum wage from this first-order condition.

First, using the Envelope theorem properties of the profit functions observe that
\[
W'(w_M) = (\lambda_L - \lambda_S) w'_E(w_M) E[w_E(w_M)] + \lambda_L w_E(w_M) E'[w_E(w_M)] w'_E(w_M),
\]
which indicates how much total income changes as a result of the minimum wage increase. When the minimum wage increases, some loss in employment occurs and the value of output declines. To see this clearer simplify the \( W'(w_M) \) expression to
\[
W'(w_M) = (\lambda_L - \lambda_S - \varepsilon \lambda_L) w'_E(w_M) E(w_M) \tag{4.16}
\]
where \( \varepsilon \) is the absolute value of the constant wage elasticity of effective labor demand, derived in eq. (4.2). Given that \( \varepsilon \) is a function of the labor share parameter \( \alpha < 1 \) in the production function, the labor demand elasticity is greater than 1 for any reasonable value of \( \alpha \).\(^{24}\) Then, at the very least, if the policymaker is equally likely to favor wage income and profits in the economy, meaning \( \lambda_L = \lambda_S = 0.5 \) from eq. (4.16), raising \( w_M \) will have a negative effect on aggregate welfare. In general, regardless of whether \( \lambda_L \geq \lambda_S \) an increase in the minimum wage reduces total aggregate income and the larger is \( \varepsilon \) the greater is the decline in aggregate welfare.

Second, since the contribution schedules are locally compensating, \( C'_T(w_M) = W'_T(w_M) \) and \( C'_U(w_M) = W'_U(w_M) \), which can be substituted in the policymaker’s FOC. For the textile industry, a minimum wage rise increases the cost of effective labor and reduces profits. Then, given that \( W_T(w_M) = \Pi_T[w_E(w_M)] \) the marginal contribution is
\[
C'_T(w_M) = W'_T(w_M) = \Pi'_T[w_E(w_M)] w'_E = - E_T[w_E(w_M)] w'_E(w_M). \tag{4.17}
\]

\(^{23}\)To get to this expression start with
\[
W'(w_M) = \lambda_L w'_E(w_M) E[w_E(w_M)] + \lambda_L w_E(w_M) E'[w_E(w_M)] w'_E(w_M) + \lambda_S \left[ \Pi'_T[w_E(w_M)] w'_E(w_M) + \Pi'_P[w_E(w_M)] w'_E(w_M) \right]
\]
from the policymaker’s FOC and use the fact that \( \Pi'_i[w_E(w_M)] = -E_i[w_E(w_M)] \) for \( i = T, P \).

\(^{24}\)Specifically, \( \varepsilon = 3 \) when \( \alpha = \frac{2}{3} \).
Third, union members’ labor income as a function of the minimum wage is given by

\[ W_U(w_M) = w_E(w_M)E_U = w_E(w_M)N \int_{a_U}^{\infty} a\Phi'(a)da \]

where \( E_U \) gives the total units of effective labor of all employed unionized workers. It is worth pointing out that this is an aggregate supply of effective unionized labor in the economy, not just in comparison with a particular industry, such as textiles whose owners are acting as a second lobbying SIG. Some of the unionized labor is employed in the pharmaceutical industry, and these may as well be the most skilled workers.

Depending on its level, a binding minimum wage can have two possible effects on unionized labor. First, corresponding to the Case 1 above, if the minimum wage is such that \( a_M(w_M) < a_U \) the supply of effective unionized labor is as in eq. (4.11) and since \( E_U \) is not a function of \( w_M \) the union’s marginal contribution is

\[ C_U'(w_M) = W_U'(w_M) = w_E'(w_M)E_U. \]  \hspace{1cm} (4.18)

In this case, if a minimum wage is increased, as long as \( a_M(w_M) < a_U \) the incomes of union members will rise because the decline in total employment increases their marginal product.

Second, corresponding to the Case 2, if the minimum wage is such that \( a_M(w_M) > a_U \) the supply of effective unionized labor is given by eq. (4.12) and the union’s marginal contribution is

\[ C_U'(w_M) = W_U'(w_M) = w_E'(w_M)E_U(w_M) + w_E(w_M)E_U'(w_M) \]  \hspace{1cm} (4.19)

Then, income increases for some union members with sufficiently high skill levels. However, union members with abilities in the range \( [a_U, a_M) \) lose their jobs because they become unprofitable to firms. The sum of these two effects, expressed in eq. (4.19), gives the total impact on union members’ income from an increase in the minimum wage.

We are looking for an interior solution where \( a_M(w_M) < a_U \). This is more sensible given that when the minimum wage is set such that the least employable skill level is greater than the lowest unionized skill, inevitably some union members will become unemployed. This goes against the interest of the union since it reduces the total earnings of its members and those union workers who
lose their jobs have no incentive to remain as member of the union. Thus, a very high minimum wage can potentially reduce the union’s membership.

Therefore, I evaluate Case 1. Substituting eqs. (4.16) to (4.18) into the policymaker’s first-order condition eq. (4.15) any binding minimum wage has to satisfy.

\[
\begin{align*}
(\lambda_L - \lambda_S - \varepsilon \lambda_L) w'_E(w_M) &= \lambda_C \left[ -E_T(w_M) w'_E(w_M) + E_U w'_E(w_M) \right] = 0 \quad (4.20) \\
\lambda_C \left[ E_U - E_T(w_M) \right] &= (\lambda_S - \lambda_L + \varepsilon \lambda_L) E(w_M) \quad (4.21)
\end{align*}
\]

This is the FOC for maximizing a weighted sum of incomes of different members of the economy. The incomes of lobbying SIGs, the union’s wages and textile industry firms profits, receive a higher weight than the incomes of politically unorganized workers and capital owners of pharmaceutical companies.\(^{25}\) Therefore, the incomes of lobbying SIGs are given more consideration when setting the minimum wage.

For a given increase in the minimum wage, the expression in the brackets on the left-hand side of eq. (4.21) represents the marginal increase in the joint welfare (income) of the two lobbying SIGs. The first term in the brackets captures the increase in income for unionized workers. The second term indicates by how much income drops for capital owners in industry \(T\). The right-hand side of eq. (4.21) tells us how much total income declines when \(w_M\) is increased.

Under what circumstances would \(w_M\) be enacted or increased? Equation (4.21) determines the equilibrium minimum wage and allows us to evaluate if the policymaker will impose or increase a binding minimum wage, and how its level reflects political and economic variables in the model. In order to do so I derive the explicit closed-form solution for \(w_M\).

Before doing so, however, two observations as in Grossman and Helpman [2001, Ch. 8] can be made. Suppose first that in this economy the demand for effective labor by industry \(T\) is greater than the supply of effective unionized labor, i.e. \(E_T > E_U\), for every possible minimum wage. We then have the following claim.

**Claim 4.1.** When \(E_T > E_U\) a binding minimum wage cannot emerge in the political equilibrium.

\(^{25}\)Namely, if 
\[ G' = \lambda_L W'_N + \lambda_L W'_U + \lambda_S W'_T + \lambda_S W'_P + \lambda_C (C_T(w_M) + C_U(w_M)), \]
where \(W_N\) is simply the welfare (income) of the non-unionized workers, the first-order condition is 
\[ G' = \lambda_L W'_N + \lambda_S W'_P + (\lambda_S + \lambda_C) W'_T + (\lambda_L + \lambda_C) W'_U = 0, \]
where I simply suppressed \((w_M)\) for notational simplicity. The lobbying industry \(T\) owners and unionized workers receive a higher weight than the non-lobbying workers and industry \(P\) owners.
Proof. Proof by contradiction is straightforward. Suppose that a binding minimum wage \( w_M > w_E \) is an equilibrium policy choice. However, since \((E_U - E_T) < 0\) in this case and the LHS of eq. (4.21) is negative, while the RHS is positive, the first-order condition is not satisfied. This contradicts the claim that a binding \( w_M \) is imposed in the political equilibrium.

The intuition is the following. The LHS represents an increase in the SIGs joint income when minimum wage increases. This term is negative when \( E_T > E_U \). Therefore, reducing the minimum wage would reduce the LHS thereby increasing the joint welfare of the two lobbying groups. The policymaker benefits from such a policy since it induces a larger contribution from both SIGs. Reducing the minimum wage also increases the RHS, the aggregate income in the economy. Therefore, a binding \( w_M \) cannot be the policymaker’s equilibrium policy choice here.

Recall that the union represents all higher skilled workers in the economy. What the environment where \( E_T > E_U \) means then is that the textile industry’s demand for effective labor is greater than the employment of effective labor among unionized higher skilled workers. It is then not unreasonable that (1) the demand for effective labor by industries that mainly employ low skilled workers (such as textile, retail, food, etc.) will not exceed the available supply of effective labor and (2) that it is precisely these industries that would be politically organized to lobby against a minimum wage and its increase.

This indicates that for a binding minimum wage to emerge or be increased in the political equilibrium, the supply of effective unionized labor has to exceed the demand for that effective labor by the industry \( T \), whose owner are lobbying against the minimum wage. Therefore, if \( E_U > E_T \) we have the following claim.

Claim 4.2. When \( E_U > E_T \) a binding minimum wage can emerge and will raise in a political equilibrium.

Proof. Suppose that the minimum wage is initially set at \( w_M = \hat{w}_E \). Then, workers at all skill levels are employed, implying \( a_M(w_M) = 1 \). But by definition individuals with lowest skills are not members of the union. The LHS side of the eq. (4.21) is positive and for some levels of \( \lambda_C \) it is greater than the RHS. Therefore, the marginal effect of increasing \( w_M \) on the joint income of the lobbying
SIGs is positive. The benefit from increasing the minimum wage above a market clearing one \( \hat{w}_E \) exceeds the cost.

Intuitively, the union is a clear winner from a higher binding minimum wage because its members’ earnings increase: as a result of reduced employment induced by a minimum wage the unionized workers marginal product increases. At the same time, no ensuing job loss falls on their members. Only, non-unionized low skilled workers experience loss in employment. The textile producers, however, are clear losers in terms of lost profits when a binding minimum wage is introduced or increased if it’s already implemented. This is obvious from eq. (4.17). Nevertheless, given that \( E_U > E_T \) the benefits to the union from pushing the minimum wage \( w_M \) above \( a_M \hat{w}_E \) is greater than the loss to the textile sector and the net effect on the joint income of the two SIGs is positive.

The outcome of the two SIGs competing over the \( w_M \) policy is in favor of the union and induces the policymaker to increase the minimum wage. This effect is reinforced if the policymaker’s preference for political contributions is strong. With a high enough \( \lambda_C \) the preference for political contributions overrides the negative effect of lower aggregate income and increased unemployment.

Even with lobbying and political contributions, politics would never set \( w_M \) above a certain maximum value. In Grossman and Helpman [2001, Ch. 8]’s original argument this value is the one above which the RHS is greater than the LHS in eq. (4.21). When the minimum wage is so high, both lobbying SIGs and the rest of the economy benefit from a reduction in the minimum wage. In my version of the model, this occurs in the Case 2 situation when the minimum wage is set such that \( a_M(w_M) > a_U \). Figure 4 illustrates this situation. We know that workers at all skill levels above \( a_U \) belong to a union. Since only union workers satisfy the total demand for labor when \( a_M(w_M) > a_U \), only union workers stand to to lose the job with a higher minimum wage. Those union members with the skill level \( a_U \leq a \leq a_M \) would become unemployed. This goes against the union’s goal to maximize the net-of-contribution earnings of its members. Therefore, the union would oppose an increase in the minimum wage such that \( a_M(w_M) > a_U \).

4.5. **Solution and Comparative Statics.** The equilibrium solution for the minimum wage in Case 1, when \( a_M(w_M) < a_U \), is given in Proposition 1.
**Proposition 1.** The equilibrium minimum wage in the political equilibrium of the lobbying game is

\[
\hat{w}_{M} = \frac{z-1}{M} \left[ \frac{\lambda_{S}(2-\varepsilon) - (1-\varepsilon)}{z+\frac{1}{a}} + \frac{\lambda_{C}}{z+\frac{1}{a}} \right].
\]  

(4.22)

**Proof.** To obtain the closed form solution for the equilibrium minimum wage simply insert eq. (4.9) for \(E_T(w_M)\), eq. (4.10) for \(E(w_M)\) and eq. (4.11) for \(E_U\) into the FOC eq. (4.21). This gives

\[
\hat{w}_{M} = \frac{z-1}{M} \left[ \frac{\lambda_{S}(2-\varepsilon) - (1-\varepsilon)}{z+\frac{1}{a}} + \frac{\lambda_{C}}{z+\frac{1}{a}} \right] \frac{1-z}{\lambda_{C}} \[N z^{-1} \frac{(1-a)[z^{-1}]}{z+\frac{1}{a}} + \lambda_{C} \frac{A^{\frac{1}{a}}}{z+\frac{1}{a}} \]
\]

After simplifying and rearranging, the equilibrium minimum wage is

\[
\hat{w}_{M} = \frac{z-1}{M} \left[ \frac{\lambda_{S}(2-\varepsilon) - (1-\varepsilon)}{z+\frac{1}{a}} \right] \frac{1-z}{\lambda_{C} \[N z^{-1} \frac{(1-a)[z^{-1}]}{z+\frac{1}{a}} + \lambda_{C} \frac{A^{\frac{1}{a}}}{z+\frac{1}{a}} \]}
\]

To obtain eq. (4.22) recall that \(\lambda_{S} + \lambda_{L} = 1\). Then, \(\hat{w}_{M}\) can easily be expressed in terms of \(\lambda_{S}\) or \(\lambda_{L}\) only. 

Equation (4.22) can tell us how the underlying political and economic (labor market) conditions of a particular jurisdiction matter for a minimum wage determined in a political equilibrium. Comparative statics results are presented in the following corollaries.

**Corollary 1.** The minimum wage increases with the unionization cutoff skill level, given that the shape parameter of the Pareto distribution \(z > 1\).

\[
\frac{\partial \hat{w}_{M}}{\partial a_{U}} > 0
\]  

(4.23)

**Proof.** This result follows directly from the partial derivate of \(\hat{w}_{M}\) w.r.t. cutoff skill \(a_{U}\). 

This means that when the lowest skill level necessary to be a member of the union is higher, the equilibrium minimum wage will increase. Intuitively, the change in the minimal unionization skill level \(a_{U}\) changes the average skill level of unionized workers; for a higher \(a_{U}\) the average skill of union members is greater. Then, since the high skilled unionized workers’ income increases following an increase in the minimum wage, as long as \(a_{M}(w_M) < a_{U}\) the more representative the
union is of high skilled workers, the more ‘room’ there is to push the minimum wage higher before it reaches the level for which \( a_M(w_M) = a_U \).

Furthermore, following an increase in \( a_U \) the skill composition of union’s membership is more representative of the high skilled workers, but given the fixed number of workers in the economy \( N \), the remaining number of unionized workers in the economy is lower. If we define union density as the number of unionized workers as a proportion of all workers, we can say that following an increase in \( a_U \) union density decreases. Therefore, the minimum wage increases when union density decreases.

This prediction contrasts with some previous theories (or rather hypothesis) reviewed in section 2, of the effect of unionization on the possibility of a minimum wage increase. A standard prediction is that larger union membership and/or union density should have a positive effect on the \( w_M \) level; more unionized workers means a politically stronger union, which can then exert more pressure on the government to increase the minimum wage. In the current model, this effect is captured by the first term in the LHS bracket of eq. (4.21).

The theory here, however, also interprets unionization adjusted for the skill level. It highlights that a smaller union with higher average skill level can also induce the \( w_M \) to be higher. Only the non-unionized low skilled workers are at the risk of becoming unemployed following an increase in the minimum wage. As the average skill level of unionized workers increases, the union composed of high skilled workers benefits from a higher minimum wage because it makes unskilled labor more expensive to hire, reduces their employment and raises the marginal product of its members.

**Corollary 2.** *Conditional on the level of labor demand elasticity, the minimum wage will decrease when the policymaker becomes more business friendly.*

\[
\frac{\partial \hat{w}_M}{\partial \lambda_S} \leq 0 \quad \text{when} \quad \varepsilon \geq 2. \quad (4.24)
\]

*Proof.* This result follows directly from the partial derivate of eq. (4.22) w.r.t. \( \lambda_S \).

Parameter \( \lambda_S \) captures the policymaker’s preference for the profit income relative to the labor income. If the value of elasticity is high (low), in this case greater (lower) than 2, the minimum wage
will decrease (increase) when $\lambda_S$ increases. From eq. (4.17) we know that reducing the minimum wage increases profits.

When labor demand elasticity is high, a given increase in $w_M$ has a larger negative effect on industry profits and so the benefit of lobbying against the minimum wage by the industry association is greater. Then, the more business friendly the policymaker is, the more successful the lobbying effort by firm owners is, and the more likely she is to reduce the minimum wage, or at least refrain from increasing it.\footnote{Although there is no recorded case of a minimum wage being lowered in Canada, if we think of the real minimum wage there are extended periods during which the nominal minimum wage was not changed and its value was simply eroded by inflation.} For a given high elasticity of labor demand, lobbying is able to induce the policymaker to set the minimum wage in accordance with her higher preference for profit relative to labor income. With higher $\varepsilon$ we can expect relatively more in lobbying against the minimum wage increase in a particular jurisdiction with a business friendly government in power.

When the elasticity of labor demand is low, a business friendly policymaker will be willing to increase the minimum wage. For lower $\varepsilon$, an increase in $w_M$ causes a lower decline in profits, i.e. the dis-employment effect is lower, and the benefit of lobbying by firm owners is lower. The decline of aggregate welfare eq. (4.16) in the policymaker’s objective function is also lower.

**Corollary 3.** *Conditional on the level of labor demand elasticity, the minimum wage can increase when the policymaker becomes more labor friendly.*

\[
\frac{\partial \hat{w}_M}{\partial \lambda_L} \geq 0 \quad \text{when} \quad \varepsilon \geq 2.
\]

*Proof.* This result follows directly from the partial derivate of eq. (4.22) w.r.t. $\lambda_L$ given that $\lambda_S = 1 - \lambda_L$.\footnote{Specifically, rewriting the eq. (4.22)}

Parameter $\lambda_L$ captures the policymaker’s preference for workers’ income. From eq. (4.18) a marginal increase in $w_M$ has a positive effect on the income of unionized workers.
When the elasticity of labor demand is high, the benefit to the union from an increase in the minimum wage is greater because the dis-employment effect on low skilled workers will be greater, causing a larger increase in labor income of union members. In other words, at higher $\epsilon$ an increase in the minimum wage has a stronger ‘bite’ in the sense that more low skill workers will lose employment inducing a greater increase in union workers’ marginal productivity.

Therefore, when $\epsilon$ is relatively high, the union’s benefit from lobbying for a higher minimum wage is greater. Lobbying is more costly too: in order to offset a more negative effect on aggregate welfare in the policymaker’s objective function, political contributions offered have to be higher. However, the more labor friendly the policymaker is the more successful the union is in its lobbying effort - the marginal payoff for each marginal dollar contributed is higher - and the minimum wage will increase.

Observe again that when labor demand elasticity is high the policymaker sets the minimum wage in accordance with her preference for labor income over profits. Even though this will decrease profits and so demand for lower skilled nonunion workers, the unionized workers through lobbying are able to induce a labor friendly policymaker to increase the minimum wage.

**Corollary 4.** *The minimum wage increases when the lobbying industry $T$ becomes more productive.*

\[
\frac{\partial \hat{w}_M}{\partial A_T} > 0. \tag{4.26}
\]

*Proof.* This result follows directly from the partial derivate of $\hat{w}_M$ w.r.t. technology $A_T$. \qed

The interpretation is that when the lobbying industry $T$ becomes more productive the marginal productivity of labor in industry $T$ is higher. and it can afford to employ and pay workers at higher skill levels. Then, the minimum wage can be increased without necessarily resulting in loss of employment for the lower skilled workers and therefore industry $T$ will not oppose a hike in the minimum wage.
5. Empirical Analysis

**VERY PRELIMINARY - IN PROGRESS**

We begin our empirical discussion by noting the heterogeneity in minimum wages across ten Canadian provinces. The dependent variable in the empirical analysis is the hourly real minimum wage (RMW), for which it is possible to construct two different time series, at monthly or yearly frequencies. Although certain provinces legislate special, lower rates for some classes of workers, such as students or liquor servers, the focus here is on the general minimum wage for adult workers in each province.

Figures 1 and 2 already illustrated the RMW patterns by province and month; the variations over time are especially visible within each province. The 1965-2014 time frame can roughly be divided into three periods. First, RMWs were rising until mid 1970s in all provinces, when they reached an overall peak, measured in constant 2014 dollars. This indicates that the nominal minimum wage (NMW), the actual policy under provincial governments’ control, was begin raised faster than the rate of inflation.

Table 1. Summary statistics for the hourly real minimum wages over the 1965-2014 period. Real values expressed in 2014 dollars using the CPI for the respective province and month.

<table>
<thead>
<tr>
<th>Province</th>
<th>N</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>Min</th>
<th>Median</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newfoundland and Labrador (NL)</td>
<td>600</td>
<td>7.738</td>
<td>1.353</td>
<td>4.710</td>
<td>7.359</td>
<td>10.917</td>
</tr>
<tr>
<td>Prince Edward Island (PE)</td>
<td>600</td>
<td>8.144</td>
<td>0.924</td>
<td>6.880</td>
<td>7.833</td>
<td>10.509</td>
</tr>
<tr>
<td>New Brunswick (NB)</td>
<td>600</td>
<td>8.361</td>
<td>0.983</td>
<td>6.965</td>
<td>7.957</td>
<td>10.998</td>
</tr>
<tr>
<td>Nova Scotia (NS)</td>
<td>600</td>
<td>7.864</td>
<td>1.128</td>
<td>5.538</td>
<td>7.510</td>
<td>10.988</td>
</tr>
<tr>
<td>Quebec (QC)</td>
<td>600</td>
<td>8.786</td>
<td>1.208</td>
<td>5.111</td>
<td>8.771</td>
<td>11.495</td>
</tr>
<tr>
<td>Ontario (ON)</td>
<td>600</td>
<td>9.045</td>
<td>1.034</td>
<td>6.556</td>
<td>9.064</td>
<td>11.151</td>
</tr>
<tr>
<td>Manitoba (MB)</td>
<td>600</td>
<td>8.630</td>
<td>1.175</td>
<td>5.526</td>
<td>8.465</td>
<td>11.731</td>
</tr>
<tr>
<td>Saskatchewan (SK)</td>
<td>600</td>
<td>8.953</td>
<td>1.225</td>
<td>6.774</td>
<td>8.549</td>
<td>11.991</td>
</tr>
<tr>
<td>Alberta (AB)</td>
<td>600</td>
<td>8.747</td>
<td>1.159</td>
<td>7.176</td>
<td>8.359</td>
<td>12.091</td>
</tr>
<tr>
<td>British Columbia (BC)</td>
<td>600</td>
<td>8.514</td>
<td>1.239</td>
<td>6.121</td>
<td>8.522</td>
<td>11.772</td>
</tr>
</tbody>
</table>

Note: Monthly observations.

Second, from mid 1970s until beginning of ’90s, RMWs have declined across all provinces. This was a result of NMW rates remaining (almost) flat for several years, allowing for inflation to erode

---

28 The source is the Minimum Wage Database at the Labor Program of Government of Canada.
their value. The decline was not, however, of the same magnitude in all provinces. Compared to Ontario who’s RMW declined gradually since 1975, British Columbia had a sharp drop of the RMW.

As already noted by Baker et al. [1999], the beginning of 1990s is also the start of substantial provincial divergence in minimum wage policies with heterogeneity in frequency of changes. On the one hand, in British Columbia after an extended period of no increases during 1980s, the NMW started rising substantially and frequently such that by 2001 B.C. had the highest hourly real and nominal minimum wage in Canada. On the other hand, in Ontario, with the highest RMW in Canada in 1995, the NMW did not increase for nine years. By 2004 its real value was eroded below that of British Columbia. Figure 1 enumerates this considerable heterogeneity in the frequency of minimum wages changes across provinces. Since the beginning of 2000s, RMWs have been rising faster and converging across all provinces. Today they are slightly lower than they were at their peak.

**Figure 5.** Box plot summary of the Real Minimum Wage by province, 1965-2014 period, in 2014 constant dollars. Ordered by median level. Red points beyond the end of the whiskers represent outliers, defined as values greater than $1.5 \times IQR$. The dashed straight line indicates the median RMW across all provinces, while the dotted straight line indicates the RMW value of the robust Huber-M estimator of location.
in the mid 1970s. Table 1 provides summary statistics for the hourly RMW for adult worker across ten provinces. Recorded at a monthly frequency, there are 600 observations for each province over the period 1965-2014. Instead of repeating the same pattern on a yearly basis, in fig. 5. I display summary statistics for RMW in the form of box-plots for each province and year.

5.1. Political Effects. Figure 6 displays the real and nominal minimum wages for four Canadian provinces, overlayed by each province's political timeline of the party and Premier in power. Colors reflect standard provincial party colors in the Canadian political spectrum.\(^\text{29}\) Thus, the left-wing National Democratic Party is colored ‘orange’, the Liberal Party is colored ‘red’, the center-right Progressive-Conservative party ‘blue’, while the more regional parties such as the center-left Parti Québécois and the conservative Social Credit Party in British Columbia being ‘light blue’.\(^\text{30}\)

As indicated by Corollaries 2 and 3 in section 4.5, we can expect that the political ideology of the government in power - being more or less business or labor friendly - will have a different effect on the (real) minimum wage change. For example, we can expect that the minimum wage will be increasing, and relatively faster too, under a more labor friendly, left-of-center government such as the National Democratic Party (orange) and the Liberal Party (red), while a Conservative governments (blue) would be opposed to minimum wage increases.

Figures 6a and 6b, for Ontario and Manitoba respectively, show this pattern of minimum wage policies. The minimum wage increase more sharply, in nominal and real terms, under the labor friendly NDP governments in both provinces. Specifically, the nominal rate increases faster than inflation during NDP governments. The Liberal Party in Ontario has also, as expected, steadily increased the minimum wage. In contrast, the Progressive Conservative governments in both Ontario and Manitoba (where it alternated in power with NDP), have either not increased the nominal rate at all (late ’90s in Ontario) or very infrequently and in small increments so that its real value declined considerably. The effect of the NDP government on the minimum wage trajectory can also be seen in British Columbia during the 1990s.

\(^{29}\)In general, Canadian provincial parties are self-contained organizations and not necessarily connected to the federal party with the same name. Thus, membership in the provincial political party, for example Liberal, does not imply membership in the federal Liberal Party. The exception to this rule is the New Democratic Party.

\(^{30}\)Despite similar coloring, these two parties share different political ideologies.
Canadian politics, however, exhibits certain peculiarities as well. For example, the Liberal Party in British Columbia is a conservative, center-right party. Thus its opposition to the minimum wage increase, visible from the flat nominal rate during the 2001-2010 period in Figure 6d. Subsequent increases are not entirely incompatible since the theory does not preclude that even a business friendly, center-right government increases the minimum wage, under the condition that the labor demand elasticity is not high and lobbying for the increase is strong.\(^{31}\) (See Corollary 2.) The conservative Social Credit party in B.C. also kept the nominal minimum wage unchanged for extended periods of time, allowing the real minimum wage to deteriorate sharply during late '70s and all of 1980s.

In Québec too the Liberal Party is characterized as a center-right and free-market party, in opposition to the center-left, social democratic Parti Québécois. Despite that distinction, however, it would appear from Figure 6c that the minimum wage has increased relatively more during the times the Liberal Party was in power.

In what follows these and other comparative static results from the theoretical section will be more extensively tested.

\(^{31}\)Note that even with those recent increases the minimum wage in British Columbia is among the lowest in Canada, and the governing Liberal party opposes further increases.
Figure 6. Minimum wages and parties in power, 1965-2014. Period coloring follows standard party colors of the Canadian political system.
6. Summary

In this paper I attempted to better understand the difference between provincial minimum wage policies in Canada and their historical trajectories by analyzing their political origins, taking into account the political influence of SIGs in their determination, the government’s political preference, as well as the heterogeneity of labor market structures across provinces.

In general, the theory effectively relates relative power of various competing SIGs with other economic conditions prevailing in a specific jurisdiction; the size of industries, the skill (income) distribution, labor demand elasticity, skill composition of union members and unionization rates. Neumark and Wascher [2004] showed that cross-country differences in labor market policies and institutions can affect the impact of minimum wages. It seems reasonable then that these differences would help us understand the variation in minimum wage policies themselves.

Furthermore, Boeri [2012] and Besley and Case [2000] have pointed out the relevance of assessing policy endogeneity for the empirical analysis of the dis-employment and welfare effects of the minimum wage.

Importantly, in the theory, even when the policymaker cares about political contributions, the equilibrium minimum wage policy set can be the one which maximizes aggregate welfare. This will not be the case when some politically organized members of society (SIGs) are able to induce the level of minimum wage which benefits them at the expense of unorganized members of society.


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