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Minimum Wage Setting and Standards of Fairness

IFS Working Paper W10/09

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Minimum Wage Setting and Standards of Fairness

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We examine the setting of minimum wages, arguing that they can best be understood as a reflection of voters' notions of fairness. We arrive at this conclusion through an empirical investigation of the implications of three models, considered in the context of policy setting by sub-units in a federation: a competing interests group model; a constrained altruism model; and a fairness based model. In the latter model, voters are interested in banning what they view to be unfair transactions, with the notion of fairness based on comparisons to the "going" unskilled wage. We use data on minimum wages set in the ten Canadian provinces from 1969 to 2005 to carry out the investigation. A key implication of the models that is borne out in the data is that minimum wages should be set as a positive function of the location of the unskilled wage distribution. Together, the results indicate that minimum wages are set according to a "fairness" standard and that this may exacerbate movements in inequality.

JEL Codes: J38, H73, D78

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Minimum Wage Setting and Standards of Fairness

David A. Green and Kathryn Harrison

Many economic analysts disparage minimum wages as a policy tool, and yet minimum wages not only persist, they have been raised in numerous jurisdictions in recent years. In this paper, we investigate the forces that drive minimum wage movements in an attempt to understand what lies behind this widely popular policy tool.[1] We do so out of direct interest in the minimum wage but also in the expectation that examining a policy that seemingly touches so few people directly but is so widely supported will provide some unique insights into the forces governing the setting of redistributive policy parameters in general. Studying minimum wage setting is also interesting because the minimum wage is typically treated as exogenous in studies of institutional impacts on inequality and of the elasticity of labour demand. Our results will allow us to assess that assumption.

Previous research has emphasized two main models for explaining minimum wage movements. The most common is one based on the competing influence of self-interested groups, with unions taken to be the primary group in favour of minimum wages and small or retail businesses as the main group against (e.g., Dickson and Myatt (2002), and Sobel(1999)). The key alternative is that the minimum wage is being set as a redistributive parameter out of an altruistic concern for the working poor. Thus, Sobel(1999) presents evidence that a consumption standard related to poverty lines is one of the main targets specified by politicians justifying minimum wage increases in the US. Both of these models face serious difficulties, however. With only about 5% of either American or Canadian workers directly affected by minimum wages and most estimates suggesting only limited spillover effects on above-minimum wages, it seems very unlikely that strong positive poll results (see footnote 1) are simply a reflection of self-interest. Moreover, as we will discuss later, the evidence in favour of the relative strengths of unions and small business determining minimum wage movements is decidedly mixed. As

[1] An Ipsos-Reid poll from 2000 found that 76% of respondents in British Columbia, Canada supported an increase in the minimum wage (Ipsos-Reid(2000)). Similarly, a 2004 poll conducted by the Pew Research Center found that fully 86% of Americans supported raising the federal minimum wage from $5.15 to $6.45 an hour (Pew Research Center(2005)).

Sobel(1999) points out, the altruistic model also faces difficulties since one would expect if this were a goal then minimum wages should track the cost of living, which they rarely do.

It is interesting to consider minimum wage setting in light of the behavioural economics literature on fairness. Many contributions in that literature argue that models based solely on self-interest (as in the political competition model just described) do not match results from experiments in which individuals divide up goods or money (see Fehr and Schmitt(2006) for a review). This has led researchers to propose alternative models of distribution decisions. For example, Charness and Rabin(2002) present experimental results which support the existence of "charity" social preferences in which individuals place positive weight on outcomes for those worse off than themselves. But their results (and those in other papers referenced in Fehr and Schmitt(2006)) also indicate support for what Fehr and Schmitt call "strong reciprocity" based social preferences. Of particular interest for us are results in Fehr and Fischbacher(2004) indicating that experiment participants are willing to pay a price to punish people who are perceived to have acted unfairly even when the respondent is a third party who is not directly involved in the transaction in question.[2] From this result, it is only a small step to the hypothesis that societies may express such preferences in policies designed to punish or ban behaviour deemed to be unfair or greedy. In more direct terms, policies may be expressions of societal notions of justice as well as (or, perhaps, instead of) reflections of self-interest or charity. We present a third model of minimum wage setting based upon this hypothesis.

In our third, "fairness" based model, minimum wages are set to outlaw labour market transactions with wages that are deemed to be unfairly low, i.e., in which employers are viewed as taking unfair advantage of low skilled, unorganized workers. To complete such a model, of course, we need to specify the standard by which individuals judge a transaction to be unfair.[3] For this, we turn to Kahneman et al (1986)'s arguments that individuals judge the fairness of a price or wage using the price in a "reference transaction" and that they tend to use market wages and prices as these references. Thus, we argue that individuals will judge a wage to be unfair

[2] In this sense, the "reciprocity" label might be misplaced. These might more accurately be described as preferences for justice, and not all notions of justice are built on reciprocity (Nussbaum (2006)).

[3] As Fehr and Schmitt(2006) point out, much of the recent behavioural literature provides little guidance for us since it focusses on experimental contexts in which the "fair" outcome tends to be self-evident.

based on its level relative to the "going" wage in a related labour market. More specifically, we argue that minimum wages will be set as a positive function of a measure of the location of the low skilled wage distribution, i.e., when typical unskilled wages rise then the threshold below which wages are deemed to be unfair (and worthy of being banned) also rises.

Our approach in the paper is to specify a simple version of a fairness model of minimum wage setting with a primary goal of generating empirical implications. We set this in a context in which minimum wages are being set by provincial level units in a federation (the context in which our data is generated). We specify the model so that it nests both the self-interested lobbying and altruistic models, allowing us to test among the three models. The altruistic model we consider is of a standard type used, for example, to describe setting welfare benefits in a federation. In that model, policy parameter values reflect a balance between altruism and concern about deleterious migration or factor flows induced by the policy. Importantly, we show that such a model has different empirical implications from a fairness based model.

We implement an empirical specification derived from our model using data on minimum wages in the ten Canadian provinces over the period from 1969 to 2005. The primary advantage of using Canadian data is that minimum wages are set at the provincial level in Canada, providing a large amount of variation in the minima. Using the results from this estimation, we test the derived implications from each of the models. Based on these tests, we argue that the pattern of minimum wage setting over time does not fit with either the self-interested lobbying or the altruistic models, alone. However, the patterns do fit with the standard of fairness model or, possibly, with a mixture of the altruistic and fairness models. We also present some US data patterns which suggest that our results may not be confined just to Canada.

One interesting result from the empirical investigation is that minimum wages are set, in part, as a function of the location of the low skilled wage distribution. The result raises intriguing questions about welfare effects of policy setting. In the case examined here, policy feedbacks lead to cutting of policy parameters intended to battle inequality precisely when inequality is increasing. Given results in Moffitt et al (1998) showing a positive relationship between low skilled wages and welfare benefit levels, it is possible that this reflects a more general result that political forces lead to cuts in parameters that have redistributive effects precisely when one might expect them to be most needed. The result also implies that minimum wages should not

be treated as exogenous in estimations of, for example, their impact on employment. Fortunately, the model presented here suggests natural candidates for instruments for the minimum wage.

The paper proceeds in 7 sections, including the introduction. In the second section, we present our data and the basic patterns we are trying to explain. In the third section, we set out our main theoretical model of minimum wage setting in a federation and derive empirical implications. In the fourth section, we describe the implications of alternative models. The fifth section contains the estimation results while the sixth contains some US data plots. In the last section, we discuss those results in light of the three models we consider and then conclude.

2) Data and Basic Patterns

We begin our discussion with an exposition of the basic data patterns we are seeking to explain. The main data we examine are nominal minimum wages for Canadian provinces for the years 1969 through 2005. Minimum wages are set at the provincial level in Canada.[4][5] In order to match our other data, we work at an annual frequency, taking the minimum wage for a province in a given year to be the minimum wage in place on March 1 of that year. We chose March because it is closest to the time when some of our other data are collected.

We argue in the next section that it is relevant to investigate movements of the minimum wage in relation to movements in wages in general. The specific comparison wage we use is the median wage of males with high school or less education who work full-time in each province, which we use since these are the wages that minimum wage workers might reasonably be expected to earn given their levels of investment in human capital. We obtain the wage data from the Survey of Consumer Finances (SCF) for the years 1969, 1971, 1973, 1975, 1977, 1979, 1981, 1982 and 1984-1997, and from the Labour Force Survey (LFS) for the years 1998-2005. The LFS is a large survey collected to ascertain labour force data such as unemployment rates. The SCF was an add- on to the LFS. We construct "hourly" wages by dividing weekly earnings by 40. We have data on earnings from both the LFS and SCF in 1997 and we use the ratio of the

[4] There is a federal minimum wage that covers workers moving across provincial borders and employees of the federal government but it is relevant only for a small minority of workers.

[5] At times, provinces maintained separate minima for young workers, students and workers deemed to be training, and even for women. Throughout this paper we use the adult minimum wage for men. We view this as the relevant parameter, in part, because of evidence that firms do not make substantial use of special sub-minima even when they are available (Card and Krueger(1996)).

median values in that year to adjust the LFS data to make the series smoother. We interpolate values for the years for which there are not surveys using a simple average of the median wages for the province in the years that bracket the gap. Finally, we use the median wage in an attempt to get a measure of the location of the wage distribution that is not affected by the minimum wage. The mean would be shifted by movements in the left tail caused by changes in the minimum wage even if those changes do not alter above-minimum wages. In addition, we use the wage for full time males of all ages because standard estimates imply very small disemployment effects of minimum wages for this group. If, instead, we examined the wage of a group for whom there were large disemployment effects then an increase in the minimum wage could generate a rise in the median wage because of the removal of people from the lower tail of the distribution. We investigate whether this median wage can be viewed as exogenous with respect to the minimum wage in section 5.4).

The patterns we are interested in are captured in figures 1a-c, which portray nominal minimum wages for (respectively) a set of Atlantic provinces (Newfoundland, Nova Scotia, and New Brunswick), the Central provinces (Ontario and Quebec), and three of the four Western Provinces (Manitoba, Alberta and British Columbia).[6] Minimum wage increases are sometimes phased in, with governments announcing an overall increase along with a series of steps with associated enactment dates to reach that overall increase. Empirically, this creates a challenge in matching minimum wage increases to the events that generated them. Our approach is to use the full announced increases in the minimum wage, assigning their timing to the announcement date. Thus, if a minimum wage increase of $1 is announced in 1998 but is to be phased in using 25 cent steps over the ensuing 4 years, we record this as a $1 increase in 1998. This insures that it is the events at the time that the decision is made that are related to the minimum wage increment. Importantly, no governments in our sample period ever turn back pre-announced increments. Since most minimum wage changes are either not staged in or are staged in over a brief period, the plot of the actual minima in place in each year is very similar to what we present here.

For each province, we plot a square at a point in time if the minimum wage was set by a

[6] We omit PEI and Saskatchewan to allow more clarity in the figures but PEI acts just like the other Atlantic provinces and Saskatchewan's minimum wage is typically very similar to Manitoba's.

right wing party and a triangle if set by a left wing party. We define all provincial New Democratic Parties (NDP) as left wing along with the Parti Quebecois, which has a history as both a separatist and a social democratic party, in Quebec. The right wing parties are more difficult to identify. The Social Credit in the western provinces, the recent Liberal Party in British Columbia (BC) and the recent Conservatives in Alberta are all clearly right wing. However, other Conservative parties, particularly earlier in our period, seem more centrist than purely right wing. We tried different definitions of right wing but settled on declaring all Liberal governments (apart from the most recent BC government) to be Centrist and all Conservative governments to be right wing. This is the most straightforward definition and, thus, less prone to the accusation that the definitions of left and right are being chosen to obtain a particular result.

Four main patterns jump out from these figures. The first is the general rising trend in the minimum wage interspersed with significant spells of time during which it is left unchanged. More specifically, the period from 1967 through 1980 is characterized by continually rising nominal minimum wages that outstrip the rate of inflation quite substantially for all provinces. In contrast, in the 1980s there are long periods when nominal minimum wages are unchanged or increased only slightly, implying substantial declines in the real minimum wage back to levels observed in the early 1970s. The 1990s is characterized by a positive trend slightly above inflation in most provinces with more substantive increases in Ontario, Quebec and British Columbia. The second feature is the extent to which the minima move together, especially within the regions. In Atlantic Canada after 1980, for example, the difference between the maximum and minimum real wage is never more than $1 and is often substantially less. Third, the highest minimum wages are associated with left wing parties being in power and periods of declining real minimum wages (particularly the 1980s) with right wing parties. However, this is by no means a universal rule. Right wing parties in BC and Alberta implemented substantial increases in 1988, and a left wing government was behind the decline in the real minimum wage in Quebec in the first half of the 1980s. This leads to our fourth point, that differences between outlier provinces and the rest of the pack tend to be reduced over time. This fits with the second observation that provincial minimum wages move together. Our goal is to understand what underlies these patterns.

Finally, we gathered additional evidence on minimum wage setting using qualitative

evidence drawn from documentary reviews and confidential interviews with provincial policymakers. In late 2003, we attempted to interview the Minister or a top civil servant responsible for the last minimum wage increase in each province. In all, we were able to conduct confidential interviews with five public servants and four Cabinet Ministers from seven of Canada's ten provinces (BC, Alberta, Manitoba, Ontario, New Brunswick, Nova Scotia, PEI).

We draw several main conclusions from the results of these interviews. First, concerns over capital mobility did not register as an important concern. Interviews were unstructured and confidential, but all subjects were first asked an open-ended question about what factors are taken into account in setting minimum wages in their province. None of the policy makers interviewed responded with concerns over factor mobility. Indeed, when explicitly questioned about capital mobility, they denied it was a factor. For example, a former BC Minister explained, "not too many workers are going to drive across the border to earn the minimum wage. And not too many companies will relocate to Alberta over the minimum wage." Moreover, a review of Canadian small business groups' websites and position statements does not reveal any reliance on the argument that minimum wage jobs will relocate to jurisdictions with lower wages.[7]

Our second conclusion, though, is that comparisons across provinces are an important part of minimum wage setting. Interview respondents were given no advance indication that the project was interested in provincial interactions, yet 5 out of the 9 subjects volunteered that other provinces' minimum wages were a consideration. Of the other 4, one subsequently indicated when asked explicitly about comparisons to other provinces that it was a "prime concern." The other three were from NDP or Conservative governments that, as discussed below, were defiant about not being tied to other provinces' minimum wages. One of the 6 who listed comparisons as important, a former senior official with the Manitoba government, explained, "We always looked at what other provinces were doing with respect to the minimum wage. You wanted to understand where you were." Atlantic provinces appear to be most concerned with inter-provincial comparisons, though with particular attention to their region. Newfoundland, Nova Scotia, and PEI all explicitly stressed in their most recent minimum wage announcements that

4. See, for instance, reports of a study of the impact of an increase in BC's minimum wage commissioned by the Canadian Restaurant and Foodservices Association (Bramham(1995)) and CFIB's position on a proposed minimum wage increase in Manitoba (Canadian Federation of Independent Business (1998).

they were in line with other Atlantic provinces. A senior public servant in the New Brunswick government explained "whenever we go to Cabinet, one of the first questions we're asked is where we stand [relative to other provinces]." His colleague in PEI concurred: "the [Atlantic] Ministers get together annually and one of the items discussed is always minimum wages. There's a concerted effort to stay within $0.25 to $0.30 of each other." Nor are the larger provinces immune to this dynamic. For a period of four years in the late 1980s Ontario and Quebec implemented minimum wage increases that not only took effect on the same date but were also announced months earlier on the same day, suggesting a conscious effort to harmonize minimum wages.

Discussions outside parliament also rely heavily on comparisons. Employer organizations in provinces with relatively high minimum wages cite the example of provinces with lower minimum wages to reinforce their argument that those standards are unreasonable (Canadian Press(2000b)). In turn, those seeking higher minimum wages seek to publicly shame their governments into raising the minimum wage by drawing comparisons with more generous provinces (Jacobs and Hunter (2003), Locherty and Harrington(1988)). Reflecting comparisons from both sides, press coverage of minimum wage increases routinely offers comparisons among the provinces, even on occasion providing tables (e.g., Stinson(1990)).

Our third conclusion is that provinces not only are aware of minima in other provinces, they try to move to the middle of the pack. This is reflected in the co-ordination of minima just discussed. It is also witnessed in provincial discussions of their policies. It is striking that Saskatchewan and Manitoba, whose minimum wages continually rank in the middle of the provincial pack, actually post comparisons of their own and other provinces' minimum wages on their websites.[8] Announcing its minimum wage increase in 2003, the Manitoba government stressed that, "The increase [would] retain Manitoba's ranking in the middle of rates among Canadian jurisdictions." Manitoba(2003).

Fourth, ideologically extreme parties resist the draw to the middle. Early in the BC NDP's first term in the early 1990s, the Labour Minister boasted to organized labour that his government would make BC's minimum wage "the highest in the country" (Hunter(1993)). At

[8]See www.labour.gov.sk.ca/MINWAGE.HTM and www.gov.mb.ca/labour/labmgt/resbr/wages/minwage.html

the other end of the political spectrum, a Minister in the Conservative Alberta government, which as of 2004 had not increased its minimum wage in six years, during that time falling $1 to $2/hour behind its neighbours, insisted that the comparison to other provinces, "is not a factor [in our deliberations]. That just becomes a popularity contest or horse race." That is not to say that such governments were entirely immune to the draw of the pack. The right-wing Conservative government in Ontario in the 1990s, which inherited the highest provincial minimum wage in Canada from their immediate predecessors, used divergence from provincial norms as a rationale to forgo further increases. One Cabinet Minister announced that, "We are committed to [freezing the minimum wage] for a period of time or at least until other minimum wages across Canada reach where we are"(Toronto Star(1995)).

Fifth, although several of the politicians and government officials interviewed noted that only a small fraction of workers earn the minimum wage, they did not dismiss its significance. A public servant in the Manitoba government explained, "The minimum wage is mostly symbolic," a sentiment echoed with almost identical language by an Ontario official. The symbolism they seek to achieve appears to be about a notion of fairness that includes balancing the interests of both minimum wage workers and their employers. Indeed, of the six most recent provincial government press releases announcing minimum wage increases that we were able to locate, four explicitly used the word "balance" in referring to business and workers, while two others used other terms to convey the same sentiment.

3) Models of Minimum Wage Setting

3.1) Standard of Fairness Model

In this section, we set out a standards of fairness based model of minimum wage setting in a federation. Our goal is to establish a framework which can guide our empirical investigations, providing, for example, a basis for thinking about endogeneity issues. In doing this, we build on the model of redistribution in Dixit and Londregan(1998) and models of interactions in policy setting among provinces or states in a federation such as those in the literature on tax competition (see Wilson(1999) for an extensive survey) or the inter-jursidictional yardstick model in Besley and Case(1995). Like Dixit and Londregan(1998), we assume that ideology enters utility functions directly and affects policy outcomes. However, we focus less on voter choices and more on the interplay of governments in different states or

provinces in the same country. We present the model mainly in a heuristic form (since our true focus is on the empirical work) but derivations can be found in Appendix A.

The basic building block of the model is the specification of individual preferences. In particular, we assume that individual, i, living in province, A, in year, t, has an indirect utility function given by,

$$1) \quad U_{it} = g(w_{it}) + h(m_t^A, s_t) + (\lambda_1 m_t^A) D_{Li} - (\lambda_2 m_t^A) D_{Ri}$$

where, w_{it} is after tax income for person i, m_t^A is the log of the nominal minimum wage in province A, and s_t is a vector of conditioning variables that affect i's views on a given value of the nominal minimum wage. Equation 1 says that person i gets utility from their own income (according to the function g(.)) and from some function of the provincial minimum wage. The role of minimum wages has two components. In particular, we assume that the population can be divided into those with left (L) ($D_{Li} = 1$), right (R) ($D_{Ri} = 1$) and centrist (C) ($D_{Li} = 0$ and $D_{Ri} = 0$) ideologies, with the C group being the largest. Further, we assume that all three groups share a common basic opinion about the value of the minimum wage described by the h(.,.) function. Left wing ideologues combine the evaluation summarized in h(.,.) with a belief that workers deserve a greater share of what is produced and, thus, higher wages. This is captured in the third main term in the utility function, with λ_1 capturing the strength of their ideology. Right wing ideologues combine the h function judgement with a dislike of government interventions. This position is represented in the $-\lambda_2 m_t^A$ term. Assumptions about the form of the h(.,.) function and how w_{it} is affected by movements in m_t^A differentiate specific models of minimum wage setting. Individuals are assumed to be immobile across provinces but capital is perfectly mobile. Finally, we assume that individuals take the values of policy parameters as given; thus abstracting from game theoretic interactions between voters and politicians.

Next, we specify how these preferences are translated into political decisions on the minimum wage. We will assume that in each province there are three potential parties: L(left), R (right) and C (centre).[9] Each party, when in power, has a single period value function which is a combination of the utility of the representative politician in the party and, following Dixit and Londregan(1998), a function of the probability of re-election in the next election. Thus, the value

[9] We do not allow coalitions among parties since they virtually never arise in Canadian politics.

function for the L party is,

$$2) \qquad V_{Lt} = g(w_{Lt}) + h(m_t^A, s_t) + \lambda_1 m_t^A + \gamma P_{te}$$

where, P_{te} is the probability of re-election in the election period, te. The value functions for the C and R parties are defined analogously, with $-\lambda_2 m_t^A$ replacing $\lambda_1 m_t^A$ for the R party and being left out altogether for the C party. Essentially, we assume, drawing on political science theories of party positions relative to the median voter (Aldrich(1983), Chappell and Keech(1986)), that the L and R parties are controlled by left and right wing ideologues, respectively, and the centre party has no ideologues. The party in power chooses a value of the minimum wage to maximize its version of equation 2).

We assume that the probability of re-election depends on the minimum wage based on how far it is from the preferred level of the "swing" centrist voters and on the relative sizes of the groups who expect to benefit from or suffer from a minimum wage. We also assume it depends on other policies and factors affecting how voters feel about the incumbent party such as political scandals and the state of the economy.[10] Since we want to focus on interactions among provincial governments, we assume that non-incumbents are passive players in an election, getting a proportion, $(1 - P_{te})$ of the vote on election day.

To obtain an empirical specification, we need to be more precise about how w is determined and about the f(.) and g(.) functions in 1). In particular, we will focus on the implications from a model in which individuals compare minimum wages to a fairness standard. As we stated in the introduction, experimental evidence in Charness and Rabin (2002) and Fehr and Fischbacher(2004) indicate that individuals are concerned about what they perceive as unfair or greedy inclinations in others and are willing to pay to punish such inclinations even when the potential punishers are not directly involved in the transaction in question. Given this, minimum wages could be seen as a way of effectively banning a set of unfair prices.

How might voters decide on a fair price for these transactions? In a seminal article, Kahneman et al(1986) design and implement a questionnaire on notions of fairness in economic

[10] Roemer(2001) argues that specifications of this type, with parties caring about the probability of re-election and factors other than the direct policy of interest affecting that probability, allow an equilibrium in which parties adopt genuinely different policy stances.

transactions including wage setting. They argue that individuals use a reference transaction, "a relevant precedent that is characterized by a reference price or wage," in evaluating the fairness of specific transactions. Moreover, they argue that market wages often form a natural reference for labour market transactions since they may be perceived to balance what is owed to workers and what is owed to firms to permit them to earn a fair profit. This suggests that observers could use movements in notions of the "going" wage in a related labour market to establish whether minimum wages should rise or fall. If low skilled wages, in general, are falling (in real terms) then what constitutes an unfairly low wage will also fall. Similarly, Moffitt et al (1998) argue that welfare benefits may be cut for equity reasons when real unskilled wages are falling.[11]

We also wish to consider the possibility that "yardstick" comparisons in the spirit of Besley and Case(1995) also affect fairness standards. The key idea is that fairness is partly a societal construct, with an individual's fairness ideals built on observations about what his or her fellow citizens deem fair. One way to get evidence on the opinions of others is to look at policy parameter values in other provinces. This is different from the Besley-Case model, where voters look to the behaviour of other state governments to get extra information on the true value of a policy parameter (the cost of providing services). Here, instead, the standard of comparison is endogenous, with notions of fairness shifting as the distribution of minimum wages shifts.

Based on these arguments, we propose a model in which,

$$3) \quad h(w, m_t^A) = (m_t^A - \rho_t)^2$$

with the standard of fairness, ρ, being a weighted average of a function of the log of the median unskilled wage, $\bar{w}_t$, and the log of the minimum wage in a comparator province, m_t^B,

$$4) \quad \rho_t = \theta\kappa\overline{w_t} + (1-\theta)m_t^B$$

where, θ and κ are parameters.

Finally, we assume that incomes in province j are generated based on marginal product conditions from an aggregate production function. It will prove useful in discussing differences across specific models of minimum wage setting to be specific about the production function and the mobility of factors of production. We will employ a constant returns to scale production

[11] Though in their analysis the relationship between benefits and wages is based on voters being worried that relatively generous benefits will increase welfare take-up, forcing a matching increase in taxes.

function for province j given by,

$$5) \quad Y_j = L_j^{\alpha} H_j^{\beta} K_j^{1-\alpha-\beta}$$

where Y_j is output and serves as the numeraire, L is unskilled labour, H is skilled labour, and K is physical capital. Both types of labour are immobile while capital is perfectly mobile across provinces. Minimum wage policies involve setting a minimum price for L workers. Politically, we assume that individuals are endowed with units of only one factor type and that owners of H (i.e., workers whose wages are not directly affected by minimum wages) are both the largest group and are predominantly C voters. Moreover, politicians are skilled workers and, thus, the relevant argument for the g() function in 2) is the wage paid to H. As a result, we need to consider the impact of minimum wage changes on the skilled wage. This impact could potentially arise through induced capital flows, but the qualitative evidence in the previous section strongly suggests that policymakers and other agents involved in the political debate (including business sector opponents of minimum wages) do not believe that minimum wage changes have important implications for capital movements. Based on this, we initially assume that H endowed voters and politicians do not believe that minimum wage changes directly affect their own wages. However, we will also discuss implications when we allow the H agents to recognize indirect impacts on their own wages.

Given the assumption that H endowed agents do not see the minimum wage as affecting their own incomes, the utility function for a skilled worker can be written as:

$$6) \quad U_{it} = g(v_{At}) + (m_t{}^{A} - (\theta\kappa\overline{w} + (1-\theta)m_t^{B}))^2 + (\lambda_1 m_t{}^{A}) D_{Li} - (\lambda_2 m_t{}^{A}) D_{Ri}$$

where v_{At} is the skilled wage in province A and is not a function of m^A or m^B.

3.1.2) Model Without Elections

We can learn quite a bit about minimum wage setting in this model by considering the simplest version: one where the parties in power are not concerned with re-election.

To begin, assume that there are only two provinces, A and B, and that the C party holds power in both provinces. We assume that both governments set their minimum wages simultaneously, which is a natural assumption given that one period will correspond to a year in our data. Thus, their policies can be summarized with their reaction functions, which for

province A is:

$$7) \quad m_t^A = \theta\kappa\overline{w_t} + (1-\theta)m_t^B$$

A key feature of 7) is that it is symmetric in m_t^B in the sense that equal sized increases or decreases in m_t^B yield the same sized response in m_t^A. This feature stems from our specification of the fairness standard function in 3) and 4). Recall that minimum wages from other provinces enter that function because voters form their notions of fairness in part by looking at what is considered fair by their fellow citizens. We do not see any reason why, controlling for ideology, an individual would place more weight on evidence that their fellow citizens' standard of fairness had moved up versus down. Nonetheless, we do not want to insist on symmetry and will test for it rather than imposing it in the empirical work. The key point for us is that a symmetric reaction function is a reasonable possibility in this model. As we will show, the main competing models of minimum wage setting specifically imply an asymmetry in the reaction function. Equation 7) also depicts the minimum wage as being set, in part, as a function of the median unskilled wage, which is also a direct reflection of how we specified the fairness model.[12]

The equilibrium in the situation where C governments are in power in both provinces is:

$$8) \qquad m_t^{Ae} = m_t^{Be} = \kappa\overline{w_t}$$

where the e superscript denotes an equilibrium value. If, instead, there is a C government in place in province A and an R government in province B then province A's reaction function is still given by 7). On the other hand, the reaction function for B's government is now:

$$9) \qquad m_t^B = (1-\theta)\kappa\overline{w_t} + \theta m_t^A - \frac{1}{2}\lambda_2$$

This function reflects the trade-off between the right wing ideologues' preference for lower minimum wages, λ_2 , and their concerns about being too far out of line relative to other

[12]It is worth noting that the reaction function in 7) can also be obtained in a model in which people endowed with H recognize impacts of minimum wages on their own wage through induced capital movements. Assuming the g() function is linear in the wage, and given the production function and factor assumptions set out earlier, we show in Appendix A that one can obtain 7) as the reaction function even if the standard of fairness is not a function of wages in other provinces. Thus, one can also obtain a symmetric reaction function through this route.

provinces. The equilibrium wage in A is now given by,

$$10) \qquad m_t^{Ae} = \kappa \overline{w_t} - \frac{(1-\theta)}{(2-\theta)2\theta}\lambda_2 ,$$

Our goal is to estimate the reaction functions given in 7) or 9).

The first observation from our simple model is that it implies an obvious endogeneity problem since A is setting its minimum wage as a function of the minimum wage in B at the same time as B is setting its minimum wage as a function of that in A. In addition, common factors could affect minimum wage setting in all provinces, resulting in a significant coefficient on other provinces' minima that does not reflect a causal effect. These points are well recognized in the spatial econometric literature (see Anselin(2003) and Brueckner(2003) for reviews). A solution is suggested by the fact that the equilibrium value in A changes from 8) to 10) when the political orientation of the government in B changes. Essentially, the change in government in B shifts B's reaction function but not A's, implying a tracing out of A's reaction function. This is related to the problem of measuring the impact of neighbourhood characteristics on individual outcomes (Manski(1993), Moffitt(2001)). Moffitt(2001) argues that identification would be achieved in this situation if there were exogenous changes in neighbourhood composition. In our case, such a change corresponds to a change in the political orientation of the government in another province. This suggests using the political orientation of governments in other provinces as an instrument in estimation of the reaction functions. As Kelejian and Prucha(2003) show, IV estimation in this context provides consistent estimates even in cases where the error term in the reaction function is spatially dependent. Brueckner(2003) discusses other, related approaches to these problems. An IV approach is used in, for example, Figlio et al(1999).

A further conclusion from this simple model is that interactions with other provinces generate a convergence in minimum wages, with the extent of the convergence depending on differences in political orientation between governments in different provinces. Thus, when two C governments are in power, there is complete convergence of minimum wages. Switching the B government to the R party generates a decline in the equilibrium wage in A as A's government adapts to the lower wage it knows that B's new government wants to choose. The R government in B sets an equilibrium value such that it accepts some penalty for being out of line with

province A in order to be closer to its desired, lower level. But, it still compromises. Thus, C governments follow right (left) wing governments up (down) in their minimum wage setting but they also act to mediate the extent of the cuts (increases) that those governments make. This means we obtain dynamics in this model from two sources: 1) movements in $\bar{w}_t$; and 2) changes in the set of political orientations of provincial governments. In a period such as the late 1980s when R governments were in power in many provinces, the minimum wage would fall relative to movements in $\bar{w}_t$, even in provinces where C and L parties were in power.

In our empirical specification we will also allow for dynamics by including lagged values of the own-province minimum wage. When an institution such as a minimum wage is in place for a while, social norms may start to adjust to it (Falk et al(2006)). Inhabitants of provinces with habitually high minimum wages may come to define themselves as inherently "socially conscious", for example. In the fairness standards model, this could be captured by making the benchmark value, ρ_t, a function of lags of the minimum wage in the province.

Finally, the effects on our predictions when we include the effects of an upcoming election are straightforward and do not alter the main points: that minimum wages are a function of both minimum wages in other provinces and the median unskilled wage; that provincial reaction functions may be symmetric in other provinces' minima; and that there is a potential endogeneity problem with a potential solution. For simplicity, we do not include the derivations from the more complete model.

3.2) Altruistic Model

The first alternative model we consider is very close to standard political economy models of tax competition in a federation (Wilson(1999)). In this model, the centrist voter has altruistic preferences concerning incomes of the working poor but the desire to act on these preferences is constrained by concerns about the factor price implications of policy setting. We will assume, in particular, that changes in minimum wages have an impact on capital flows across provinces and that H workers recognize the implications of those flows for their incomes and those of low skilled workers. This contradicts the politicians' statements that they were not concerned with capital flow effects but it is necessary to include such effects to allow a complete representation of this model. Thus, if we reject this model, it implies that the data provide some support for the politicians' claims.

Assume a working poor person receives an income equal to the low skilled wage times an inelastically supplied number of hours if he or she is working and equal to the social assistance benefit if not. Thus, his or her expected hourly income is,

$$11) \quad w_{pt}^{A} = \left(1 - UR_t^A\right) w_t^A + UR_t^A \, b_t^A$$

where, UR_t^A is the unemployment rate in province A at time t and b_t^A is the unemployment benefit expressed in hourly terms. If the minimum wage is binding, this implies that the hourly income of the poor is a weighted average of the minimum wage and the benefit. We will ignore issues about funding the benefit in order to maintain a focus on the minimum wage.

Given that a larger difference, m^B-m^A, induces capital flows from B to A and that politicians are H workers, the utility of a centrist politician (ignoring election probability effects) is,

$$12) \quad U = \lambda_3 [a_1 - a_2 a_1 (m^A - m^B) + a_1 a_2^2 (m^A - m^B)^2] + \lambda_4 [(1 - UR^A) m^A + UR^A b]$$

where a_1 and a_2 are positive parameters (see on-line Appendix A). Thus, their utility consists of a weighted average of an H worker's own income (written as a function of minimum wages in the first square bracket term) and a low skilled worker's income (the second square bracket term). We show in a complete derivation of this model in on-line Appendix A that (1-UR^A) can be written as a positive function of (m^B-m^A) and a negative function of (m^A-w*), where w* is the log of the equilibrium unskilled wage when there are no minimum wages in either economy. That is, altruistic centrist politicians will take account of both wage and unemployment effects of minimum wages on low skilled incomes.

Using quadratic approximations, we show in on-line Appendix A that the reaction function obtained by maximizing this function is asymmetric in m^B. Intuitively, the reason for this stems from the impact of changes in the minimum wage in B on capital flows. If m^B is cut, politicians in A must cut m^A in order to prevent an outflow of capital that will lower employment of low skilled workers and thus lower the expected income of the poor. On the other hand, if m^B rises, A politicians do not need to raise m^A - poor workers in A will benefit from an inflow of capital if the A government does nothing. This is an argument due to Gabszewicz and Ypersele(1996), who make this point in a two province-two factor model. We demonstrate the

same result in a three factor world in on-line Appendix A. Thus, minimum wages in a province should respond much more strongly to declines than to increases in minimum wages in other provinces.[13] [14]

The altruistic model also has other, more direct, empirical implications. First, since the policy setter is concerned with the well-being of the working poor (and thus, what their income can buy), positive movements in the cost of living should drive up the preferred minimum wage, implying that a cost of living index should be included in empirical specifications. In addition, the derivations in Appendix A show that m^A is a positive function of the market clearing wage, w*, because the higher is the market clearing wage, the higher the minimum wage can be set without incurring excess unemployment. Thus, one should also include a proxy for the market clearing wage in any empirical investigation. We will use the median unskilled wage described in section 2) as that proxy.

3.3) Political Competition Model

The most common model employed in previous papers on minimum wage setting is the type of political economy model set out in Becker(1983) (e.g., Blais et al. (1989) and Dickson and Myatt (2002) for Canada, and Sobel(1999) for the US). Becker argues that policy outcomes will ultimately reflect the relative influence of groups who gain and lose from the policy, with influence being a function of the size of the group, its resources, and the gains from expending those resources on affecting policies relative to using them for other pursuits. In the literature on minimum wage setting, the groups positioned for and against minimum wages are universally

[13]In contrast, in a standard analysis of the setting of a tax funded social assistance benefit in a federation, the reaction function for benefit setting may be symmetric. The difference between the two models stems from the fact that in the minimum wage model, changing minimum wages affects the factor incomes of the poor. This is the source of the asymmetry we have discussed. Changing benefits is not assumed to have that type of factor-flow related impact on the incomes of the poor in the standard model. Figlio et al (1999) argue that asymmetry often also arises in the standard model in race to the bottom scenarios, but it is not a necessity as it is here.

[14]Note that, except when both provinces equate their minimum wages to the market clearing wage, the two provinces will not set the same minimum wage. If they did, then one province would have an incentive to cut its minimum wage since it could then attain a market clearing wage equal to the minimum wage in the other province but without any unemployment. In our model, a left wing government may be willing to be the higher minimum wage setting province in spite of the higher associated unemployment rates in order to meet their ideological preferences.

represented by unions on the positive side and small or retail business on the negative side. Thus, in some US papers (e.g., Sobel(1999)) and all Canadian papers, the level of the minimum wage is related to the proportion of the workforce that is unionized and a measure of the influence or size of the business sector. We echo this approach in our empirical specification. In addition, a rising unskilled wage might itself be a reflection of increasing union power. In that case, we should see both the union proportion and the median wage having strong, positive coefficients but there should also be evidence of collinearity in their effects.

In the context of our general model, one could represent this model by setting the h(.,.) function to zero. Since we want to focus on non-ideological elements of the political process, we will also assume $\lambda_1 = \lambda_2 = 0$. Political parties will care about the opinions of those for and against the minimum wage because of their effects on P_{te}, the probability of being elected. Assume that one lobby, representing lower-income voters, wants to maximize the expected income of the poor (given by 11)), while a competing lobby, representing business interests, is concerned with the income of capital owners. Using the same assumptions about the production function and factor mobility as in the previous sections, the poor workers lobby should recognize the same lack of need to respond to increases in the minimum wage in other provinces set out in the previous section. Thus, an optimal choice of effort on their part should imply an asymmetry in their response to minimum wages in other provinces. The position of the business lobby, on the other hand, depends on factor mobility assumptions. If Canadian provinces are small relative to world capital markets and there is perfect capital mobility then changes in minimum wages in any province will not change returns to capital and the business lobby should put no effort into opposing the minimum wage (Bucovetsky and Wilson(1991)). To the extent they do perceive a need to exert effort, it will presumably be entirely in the direction of supporting cuts to their own provincial minimum in response to cuts in other provincial minima. Thus, the lobbying of both pro and anti-minimum wage groups will reflect stronger responses to cuts than increases in other provincial minimum, implying an asymmetric reaction function in this model as well.

4) Empirical Specification

In this section, we derive an empirical specification based on the standard of fairness model, pointing out how it can be extended to nest the altruistic and political competition models. In setting out the specification, we need to account for the fact that nominal minimum

wages are rigid downward. For Canada, there are no cuts to nominal minimum wages in any province in the period we examined (1969 to 2005). This, in itself, is evidence that fits best with the fairness model. Several papers on the social norm that nominal wages are rarely cut argue that this is related to worker concerns about fairness (e.g., Kahneman et al(1986)), and the fact that the minimum wage is also not cut points to it being viewed as setting a wage. If, instead, it were a policy parameter set primarily based on competing self-interest or redistributional preferences, there is no reason for it not to be cut. Provincial welfare benefit rates, for example, were reduced in nominal terms on multiple occasions in our same sample period .

To account for nominal minimum wage rigidity, we adopt a Tobit specification with an underlying desired minimum wage index. We specify the regression determining the desired minimum wage for province j in period t as,

$$13) \quad m_{jt}^{*} = \beta_0 + \beta_1 m_{jt} + \beta_2 m_{jt-1} + \beta_3 DR_{jt} + \beta_4 DL_{jit} + \beta_5 \overline{w_{jt}} + \\ + \beta_6 PP_{jt} + \beta_7 PB_{jt} + x_{jt}\zeta + u_{jt}$$

where, the * denotes the government's preferred minimum wage, the -j index refers to the average for all provinces other than j, DR_{jt} is an indicator variable for the governing party being right wing, DL_{jt} is a left wing indicator variable, PP_{jt} is a measure of the political power of those who support higher minimum wages (e.g., unions), PB_{jt} is a measure of the political power of the small business community, x_{jt} is a vector of factors affecting the probability of re-election (such as the growth rate), u_{jt} is an error term, the β's are parameters, and ζ is a parameter vector. We derive 13) from the fairness model including concerns for re-election in Appendix B. This specification incorporates all the elements suggested by our discussion in section 3.1). Importantly, it is the observed minimum wage in other provinces that is relevant in this specification, not the desired levels, since capital mobility will be determined by actual minimum wages. The lagged minimum wage variable is also the actual rather than the desired level because voters will update their norms based on what is actually enacted. This makes the estimation much simpler than if desired values were relevant.

We approach the estimation of 13) using Tobit estimators in which we treat observations where the nominal minimum wage in a province takes the same value as in the preceding year as

potentially censored. The specific form for the estimator is,

$$14) \quad I_{jt} = z_{jit}\chi + \eta_{jt}$$

$$15) \quad m_{jt} = m_{jt}^{*}, \quad if \ I_{jt} > 0,$$
$$m_{jt} = m_{jt-1}, \quad if \ I_{jt} <= 0$$

Equation 14) corresponds to the decision of whether to raise the minimum wage in period t based, potentially, on a comparison of the utility benefits and costs from changing the minimum. Thus, if the desired minimum is below last period's actual value plus a perceived political cost of adjustment then the minimum wage is left at last period's value. Given this logic, the z vector will include changes in the right hand side variables in 9).[15] We also implement a simpler Tobit with the censoring point treated as exogenous in order to show the basic patterns in the data. Note, though, that since the censoring point is actually the previous period's minimum wage, treating it as exogenous is inappropriate. The estimator is implemented using standard maximum likelihood techniques under the assumption that u_{jt} and η_{jt} are jointly normally distributed.

We incorporate the competing models by including variables suggested by our discussions in sections 3.2) and 3.3) in the x vector. Thus, we include the CPI as suggested by the altruistic model and measures of union and small business strength to capture the political competition model. In addition, we test for the asymmetry in the reaction functions implied by both models.

5) Empirical Results

5.1) Basic Specification

We present results from variants of our empirical model in Table 1. In all our specifications, we include a full set of provincial dummy variables because we are concerned that, without them, persistent ideological differences across provinces will confuse our interpretations. We have also consciously chosen not to include year effects in any specification. We are attempting to explain the long term pattern in minimum wages and, hence, do not want it

[15] We also implemented a version of the model in which the I function was just the difference between the desired minimum wages in period t and period t-1. A likelihood ratio test rejected the restrictions implicit in this specification relative to the more general one in 14) and 15).

absorbed by year dummies. Identification comes from a combination of standard within-province over-time variation and aggregate time variation.

Typically, fixed effect Tobit estimators are deemed to be inconsistent because of nuisance parameter arguments based on the fact that the number of fixed effects grows at the same rate as the cross-sectional dimension of the data. This creates a problem because the asymptotics are discussed in terms of N (the cross-sectional dimension) going to infinity. However, in our case there are a fixed number of provinces and consistency issues are based on T (the time dimension) going to infinity. In that situation, and particularly since we do not include time effects, there are no nuisance parameter problems and estimating the Tobit specification with provincial fixed effects provides consistent estimates. Finally, all of our reported standard errors are based on a variance covariance matrix that is robust to unspecified time dependence in u_{jt}.

Our dependent variable is the log of nominal minimum wages. As discussed earlier, we time full announced minimum wage increases to the time of the initial announcement. We start with results from the Type 1 Tobit (the Tobit with censoring treated as exogenous) because it is closer to demonstrating the basic patterns in the data. In the first specification, presented in column 1 of Table 1, we include only the proportion of workers who are unionized, the proportion of workers employed in the retail sector, and the growth rate of provincial GDP over the previous year as regressors. All variables vary by province and year. As discussed in section 3.3), this specification mirrors those in earlier papers focusing on the political competition model (e.g., Blais et al (1984)). In our estimates, the union and retail variables take the sign predicted in the political competition model, are strongly significant and economically substantial. The proportion union coefficient, for example, implies that a .1 increase in the proportion unionized is associated with a .44 log point increase in the minimum wage. The GDP growth rate variable, on the other hand, has a significantly negative effect, suggesting that minimum wages are set lower in good times. Notice from the bottom of the table that over half the dependent variable observations are censored (i.e., involve a nominal minimum wage value that has not changed from the previous year), indicating the need for the Tobit estimators.

In column 2, we introduce the key variables suggested by the altruism and fairness models. The median unskilled wage and the Left and Right dummy variables are defined in

section 2. The CPI variable is province specific and only shows variation in cost of living over time within provinces, not across provinces. Cross-province differences will be soaked up in the provincial fixed effects. We also include a variable corresponding to the minimum wage in other provinces. For province A in region k in year t, this equals the simple average of minimum wages in all provinces other than A in region k in year t. We use three regions: Atlantic (Newfoundland, PEI, Nova Scotia and New Brunswick), Central (Ontario and Quebec), and West (British Columbia Alberta, Saskatchewan, and Manitoba). We use the regional average because of evidence from interviews with policy setters that indicate they often used a regional comparator, particularly in Atlantic Canada. We also implemented all of our specifications using the national average in place of the regional average and obtained very similar results. The regional average minimum wage, the median unskilled wage and the CPI variables are all entered in log form.

One noteworthy result from the specification in column 2 is that the proportion union, the proportion retail, and the GDP growth variable effects become much smaller and very insignificant in this specification. The proportion union coefficient now implies that a .1 increase in the proportion unionized is associated with a .004 log point decrease in the minimum wage.[16] In contrast, the median wage, the regional average minimum wage, and the Left wing dummy variable are all strongly significant and economically substantial, with all three having positive associations with the minimum wage. The regional average plays a particularly strong role, with a 10% increase in the average minimum wage in other provinces in the region being associated with a 7% increase in the own-province minimum. Both the Right wing dummy and the CPI variable take the expected sign but are small relative to their standard errors. The value of the log likelihood function increases dramatically between the first and second specification, indicating that while the political interest groups have individually significant effects when entered on their

[16] We also implemented a specification in which, following Sobel(1999), we replaced the Proportion Retail variable with the provincial corporate tax rate on small business (using an extension of the series in Mintz and Smart(2004)) as a measure of the political strength of minimum wage opponents. This yields much the same results as presented here: a 10% increase in the tax rate was associated with a (statistically significant) 5.8% decline in the minimum wage in the equivalent of the column 1 specification but a 0.6% increase in the column 2 specification. We chose to present results with the Proportion Retail variable because of endogeneity concerns with the tax rate variable arising from the fact that, like the minimum wage, its values reflect interactions among provinces.

own, they leave much of the variation in the minimum wage unexplained.

In the third column, we add a lagged minimum wage variable to our specification.[17] Because we are trying to capture the idea of a slow moving adjustment of norms, we use the average of the log of the minimum wage in the preceding three years. The lagged variable has a similar sized effect to that of the median unskilled wage and is statistically significant at the 10% level but its introduction has little impact on the estimates of the other variables.

In the column entitled "Type 2, Tobit Full" in Table 1, we recreate our main results with the Type 2 Tobit (the Tobit allowing for endogenous censoring). Once again, the union, retail and GDP variables are not statistically significant and are not large. The effects of the other variables are also similar in size and significance to those obtained with the simpler Tobit in column 2. In contrast, when we introduce the lagged minimum wage variable in the Type 2 Tobit, it has a larger and more statistically significant effect than in the Type 1 Tobit. Its introduction also leads to sharp reductions in the estimated effects of the Left wing dummy and the regional average variable. Nonetheless, the broad conclusion remains that minimum wages are strongly, positively related to the median unskilled wage, whether a left wing government is in power, and the average minimum wage in the region.

In Table 2, we present the coefficients from the censoring process (14). We originally included differences and levels in all the variables from equation (13) but tested down to the main variables plus the Right and Left wing variables. The estimates suggest that provinces are more likely to increase their minimum wage when a Left wing government is first elected and when either the regional mean or inflation increases. Interestingly, the estimates indicate that right wing governments are more likely to keep the nominal minimum wage unchanged and, in contrast to the right wing effects in the desired minimum wage equation, the effect is statistically significant. Finally, the correlation between u_{jt} and η_{jt}, reported at the bottom of each column is above .9, which may explain why the Type 1 and 2 Tobits generate similar results.

5.2) Instrumental Variables Estimation

As we discussed earlier, the average minimum wage in other provinces is likely an

[17] Note that we do not need to drop observations when we introduce lags because we have minimum wage data before our sample start date for the other variables.

endogenous variable. In our discussion in section 3), we argued that the ideological positions of governments in other provinces are prime candidates for instruments to use in addressing this problem. The models also suggest that inflation rates in other provinces can act as instruments. What provincial governments care about are the actual minimum wages in other provinces. However, those observed minimum wages will reflect both the desires of the other governments and the restrictions imposed by the stricture against cutting nominal minimum wages. Thus, in low inflation times we should observe less movement in the average minimum wage in other provinces. Because equation 13) includes own-province inflation and political position variables, the instrumental variables (IV) identification arises from differences in these variables in other provinces in the region relative to their own-province values. Thus, they are not working off, for example, shifts in political opinion that are common to all provinces in a region.

We implement IV estimators of our model using the control function approach of Smith and Blundell(1986). This is a two step procedure in which the first step consists of regressing the right hand side potentially endogenous variable on covariates and instruments. In our case, this consists of regressing the average of the minimum wages in other provinces in the region on the own province GDP growth rate, unionization rate, proportion retail, CPI, median unskilled wage, provincial dummies, and left and right wing variables plus the average values for the instruments listed above across all other provinces in the region in a year. We run this as a pooled regression, stacking the "other province" averages for each of the ten provinces. Note that because it is actual as opposed to desired minimum wages in other provinces that are relevant, we do not need to run the first stage as a Tobit. In the second stage, we run our Tobit specifications including the residual from the first stage regression. Assuming the instruments are valid and enter the first stage significantly, this yields both consistent estimates of the coefficients in our minimum wage determination equation and a test of the exogeneity of the average minimum wage ratio regressor. If the coefficient on the constructed residual variable is statistically significantly different from zero in the second stage regression then exogeneity is rejected.

Our first stage regression implies the instruments perform well. The instruments all enter statistically significantly at the 5% significance level and the F-statistic associated with the joint probability that the three instruments (the average left and right wing variables, and the inflation rate) have zero effects is 22.0 which, given it is distributed as F(3,350), far exceeds any standard

critical value. This lends credence to our second stage testing and estimation results.

The first column of Table 2 contains second stage estimates from a Type 1 Tobit using the full specification but not including the lagged dependent variable. The residual term from the first stage estimation is significantly different from zero at the 5% level, implying that the mean minimum wage ratio in other provinces is an endogenous regressor. Following Smith and Blundell(1986), we present standard errors corrected for the fact that we are using an estimate of the first stage error.[18] The endogeneity-corrected results are similar to the Type 1 Tobit results in column 2 of Table 1 except that the CPI effect is now much larger and statistically significant, the median unskilled wage effect is larger, and the regional average effect is smaller.

In the second column of the table, we bring in the lagged minimum wage. Given our argument that governments may set minimum wages with an eye to affecting future social norms, it seems possible that the lagged minimum is also an endogenous variable. As instruments for it, we use lagged values on the average value of instruments used in the first stage for the regional average minimum wage under the assumption that average inflation and the political stance of governments in other provinces are strictly exogenous variables (i.e., innovations in province A's minimum wage are independent of both past and future values of, for example, inflation in other provinces). We once again use these instruments in a control function specification, regressing the lagged dependent variable on these province specific lagged covariates. As with the regional average variable, because it is the actual lagged value that is relevant, the first stage can be specified as a simple regression and does not require the use of Tobit techniques. Again, the instruments are strongly significant in the first stage. In a second stage in which we include both the first stage residuals corresponding to the regional average and the lagged minimum wage, we find that the latter residual never enters

[18] Our variance-covariance matrix estimator also includes a correction for potentially arbitrary dependence. Specifically, Smith and Blundell(1986) show that the variance-covariance matrix can be written as the sum of the standard Tobit variance-covariance matrix (the negative of the inverse of the expected value of the second partial matrix) plus a matrix that is a function of that matrix, the variance-covariance matrix of the first stage coefficient estimates, and $(\partial^2 \ln L)/(\partial\lambda\partial\pi)$ where λ is the vector of parameters from the Tobit likelihood function and π is the vector of parameters from the first stage regression. In this equation, we replaced the first term (the standard variance-covariance matrix) with the time dependence robust matrix. In the Type 2 Tobit, we also calculate the relevant $(\partial^2 \ln L)/(\partial\lambda\partial\pi)$ matrix.

significantly.[19] In Table 3, we present results not including that residual. Those results are much like the ones in the first column except that the CPI effect is now smaller and insignificant. The lagged minimum wage variable itself has an effect that is very similar in size and significance to the corresponding estimate from Table 1.

In columns 3 and 4, we move to the Type 2 Tobit results. Here, the first stage residual for the regional mean is significant when the lagged minimum wage is included but insignificant when it is excluded. The specification without the lagged minimum wage yields estimates that are very similar in magnitude to those from the Type 1 Tobit. However, as in Table 1, including the lagged minimum wage variable in the Type 2 Tobit yields somewhat different results: the estimated CPI effect is now very small and insignificant; the Left wing variable has a much smaller (though still statistically significant) effect; and the regional average effect becomes smaller. The lagged variable itself has a strong positive effect. However, lagged dependent variables can hide a myriad of sins, and we are encouraged that the main patterns (albeit somewhat different in magnitude) hold up each time we add the lagged minimum wage. In the end, given theoretical arguments and the significance of both the regional mean residual term and the lagged minimum wage variable, our preferred specification is the one given in the last column of Table 3.

5.3) Symmetry Tests

As discussed in sections 3) and 4), the altruistic and political competition models of minimum wage setting imply asymmetries in responses to movements in the minimum wages in other provinces while the fairness model does not imply asymmetries and, in one variant, may even imply symmetry. We investigate the symmetry properties of our estimated reaction functions in two ways. First, we interact the average wage rate in other provinces variable with a dummy variable equaling one if the province was below the average in the previous period.[20] The specification including this interaction term is reported in the first column of Table 4. We estimate using the Type 2 Tobit but do not report the censoring process estimates since they are of little interest. The specification includes the same variables as in the third column of Table 3

[19] In the Type 2 Tobit, its coefficient takes a value of -.11 with a standard error of .61.

[20] Figlio et al (1999) use a similar specification to test for symmetry in the case of welfare benefit setting.

but we only report a subset of the variables for parsimony. We also include a dummy variable equaling one if the province's minimum wage was below average in the previous year to ensure the key interaction variable is not just picking up persistently below average provinces. Notice that we do not include the lagged minimum wage in this specification. The concept of a below average province conditioning on its minimum wage makes little sense. The coefficient on the variable of interest (the interaction of the average in other provinces with the dummy for being below average last period) is both economically insubstantial and not statistically significant at any conventional significance level. Thus, according to this first test of symmetry there is no evidence that provinces above or below the average are more sensitive to movements in minimum wages in other provinces. Moreover, we can soundly reject the restriction implied from the altruistic and political competition models that initially below average minimum wage provinces should not react to movements in other provincial minima (i.e., that the sum of the coefficients on the Average of Other Provinces variable and the interaction variable equal zero).

In our second approach, we regress the first difference of our nominal minimum wage variable on changes in the other provinces' average, changes in the median unskilled wage, and the left and right wing dummy variables. We also introduce a variable equaling the difference between the log of the province's minimum wage and the log of the regional average minimum wage in the previous period and the interaction of that variable with a dummy variable equaling one if the province was below average in the previous period. The difference from the mean variable takes positive values for above average provinces and negative values for below average provinces. Its estimated effect is negative and highly significant, indicating that the farther a province was away from the mean in the previous period, the larger the change in the minimum wage it institutes. Further, the change is in the direction of a movement toward the mean. The relatively small size and lack of statistical significance of the interaction term indicates that below average provinces are no more or less responsive to their distance from the mean than above average provinces. This supports the findings of symmetry in response depicted in the previous column. The results in the second column indicate, further, that provinces actually race to the middle in the sense that provinces that find themselves on the extreme of the minimum wage distribution tend to change their minimum wages in order to move to the middle of the pack. This fits with some of the statements of policy setters described in section 2).

5.4) The Role of the Median Unskilled Wage

So far, we have treated the median unskilled wage as an exogenous variable. We investigate this assumption in two ways. First, we conduct Granger causality tests of whether the (log of) minimum wages Granger Causes the (log of) median unskilled wages and the reverse.[21] We test for stationarity and then test down to the appropriate lag structure and end up with models using two lags of both variables. Based on this, the F-statistic associated with the first test has a p-value of .76 and, thus, we cannot reject the null hypothesis that the minimum wage does not Granger Cause the median wage. In contrast, the F-statistic associated with the test of whether median wage Granger causes the minimum wage has an associated p-value of .023, indicating that the median unskilled wage does Granger cause the minimum wage. Put another way, innovations in the median unskilled wage tend to precede movements in minimum wages but the reverse is not the case.

We also investigate whether the minimum wage has a causal effect on the unskilled wage by regressing changes in the median unskilled wage on changes in the minimum wage, instrumenting for the latter using changes in the left and right wing variables. We first run a regression of changes in the minimum wage on changes in the unskilled wage. The coefficient on the latter is .24 with a standard error of .05, indicating that innovations in the two variables are related. We rerun this regression dropping the median wage variable but including changes in the Left and Right variables and save the residual. The change in the left wing variable enters this regression with a t-stat of 2.71, implying that the data variation we will use in our instrumental variables estimator is the increases in the minimum wage instituted by new left wing governments. Finally, we run a regression of changes in the median unskilled wage on changes in the minimum wage, including the first stage residual. In this second stage regression, the coefficient on the changes in the minimum wage becomes -.18 with a standard error of (.31). Thus, the statistical conclusion is that the minimum wage does not drive the median wage. This is a reasonable conclusion given other evidence in the literature. Green and Paarsch(1997) examine the Canadian wage distribution for spillover effects of the minimum wage on above-

[21]We use the actual minimum wage rather than the announced minimum wage in these tests because we believe the actual minimum wage is more likely to directly affect other wages.

minimum wages and conclude that there are impacts on wages up to $3 above the minimum wage but not beyond that point. This is well below the median unskilled wage. Other papers find even less evidence of spill-over effects (see, for example, Card and Krueger(1995)). Finally, it is worth re-iterating that we chose to work with the median wage to make sure that tail truncation effects induced by minimum wage changes did not affect our unskilled wage measure as they would if we had used average wages. Overall, we conclude that the relationship between minimum wages and median unskilled wages reflects a causal impact of movements in the central tendency of the unskilled wage distribution on minimum wage setting.

6) US Data Patterns

It is reasonable, at this point, to ask whether our results are relevant only for Canada. A key result from our empirical investigation is that the minimum wage is related to the location of the low skilled wage distribution. In this section, we check whether this pattern is also present in data for the US, the country where minimum wage investigations have been most extensive. To make this comparison, in figure 2 we plot, for Canada, the simple average of provincial median weekly real wages for males with a high school or less education along with the simple average of the provincial minimum real wages. We use real wages deflated by the CPI since we believe these are the series with which observers will be most familiar. We normalize both series to their values in 1969. Both series show substantial increases over the course of the 1970s and declines over the 1980s, though they part company to some extent in the 1990s. The periods when the real minimum wage was persistently high relative to the median wage (the late 1970s and after 1990) were periods either when there were a substantial number of left wing governments in power or when the minimum wage legacies of former left wing governments had not yet been eroded by inflation. In contrast, the minimum wage was relatively low in the late 1980s when a considerable number of right wing governments were in power.

In the U.S., in contrast to Canada, the federal government has a sizeable presence in minimum wage setting. In particular, workers covered by the Fair Labor Standards Act are covered by either the federal minimum wage or the relevant state minimum wage, whichever is higher. This means that, in practice, workers in the great majority of states face the federal minimum wage since only a minority of states (14 in 2005) set their own minima above the federal level. This makes our exercise of studying interactions among states difficult, though it is

worth noting that the states with above-federal level minima tend to be clustered, with the main clusters on the west coast and in New England. In terms of our model, the fact that so many states choose to accept the federal minimum could be explained as arising from states choosing to co-ordinate on the federal standard as the national standard of fairness.

The result that the minimum wage moves with the going low skilled wage is also true in the United States. In figure 3, we recreate figure 2 for the United States. Specifically, we plot the log of the real minimum wage (averaged across states in each year) and the log of the real median wage for men with 12 or fewer years of education for the years 1973 to 2005. Both series are normalized to 0 in 1979. The two series move together strongly, with a correlation of .89, and the pattern broadly fits with a story of the minimum wage tracking the median unskilled wage but falling significantly below it in times of right wing political dominance.[22]

The pattern in figure 3 might arise from changes in the minimum wage causing changes in the low skilled wage. Indeed, Lee(1993) argues that movements in the minimum wage can explain movements in the lower tail of the US wage distribution in this period. However, his results do not imply spill-over effects from the minimum wage on above-minimum wages that extend nearly far enough to affect wages in the range of our median unskilled wage measure (which is .7 log points above the minimum wage in 1979, for example). Thus, we again view it as likely that any causality inherent in the relationship in figure 3 runs from the unskilled wage to the minimum wage. Overall, we view the evidence in figure 3 as suggestive that the forces we argue are behind minimum wage setting in Canada may also be at play in the US.

7) Discussion and Conclusion

Finally, we compare the estimation results from section 5) with the implications of the various models we considered in section 3). The key implication from the political competition model is that the variables representing the influence of groups with competing interests in the minimum wage (the proportion union and the size of the retail sector) should be important determinants of the minimum wage. This is borne out when these variables are entered on their own, but they lose importance once variables such as the median wage and the average minimum

[22] The median low skilled wage is calculated from the CPS May supplement for the years 1973 to 1978 and from the MORG for the remaining years. Imputed observations are dropped where imputation is observed. We are grateful to Thomas Lemieux for providing us with this data.

wage in other provinces are introduced. In our preferred specifications the political influence variables are neither individually nor jointly significant at any conventional level (the p-value for the joint test in our preferred specification is .31). Further, they do not have economically substantial effects.

The previous Canadian literature, while referring to this model, finds mixed results. Blais et al. (1989) find a negative correlation between the share of employment accounted for by firms with less than 20 employees (their measure of the strength of opposition to minimum wages) and a province's minimum wage but also an (insignificant) negative correlation between the fraction of a province's workforce that is unionized and its minimum wage. Dickson and Myatt (2002) find the opposite: a negative effect from an importance of small business variable and an (insignificant) positive effect of the unionization rate. For the US, Sobel(1999) finds a significant positive relationship between a measure of the relative influence of unions and business and a measure of the long run growth of the minimum wage. Similarly, Silberman and Durden (1976) find a significant relationship between campaign contributions from both small businesses and unions and Members of Congress' voting patterns on increases of the US national minimum wage. However, Kau and Rubin(1978), who also study minimum wage support in the Congress, do not find a significant relationship between unionization and support. In contrast to other US studies, they include the average manufacturing wage as a regressor. As we show in Table 1, our estimated union effect drops dramatically when we include the median unskilled wage. This may mean that positive unionization impacts observed in other studies are really picking up a relative wage effect rather than a union power effect. Combining the lack of significance of the political competition variables and the lack of support for the asymmetry in the reaction function discussed in section 4), we conclude that our results fit with the part of the literature that does not find support for a model of political competition based on the self-interest of unions and business.

The empirical results also do not fit with an altruistic model in which minimum wages are set to maximize the expected income of the poor. In particular, most of our specifications indicate that nominal minimum wages are not set to match movements in the cost of living. In our preferred specification, the coefficient on the CPI variable is both quite small and statistically insignificant. Further, the implied restriction that low minimum wage provinces not

alter their own minimum wage in response to movements in other provincial minima is resoundingly rejected. Even the weaker requirement that there be asymmetric responses to minimum wage changes is not supported in the data. Given these results, we conclude that minimum wages are not being set primarily as a means of redistribution toward the working poor. This is not to say that considerations about redistribution do not enter the debate (they clearly do) or that desire for such redistribution does not motivate the activities of at least some pro-minimum wage advocates (it clearly does). The point is that it these arguments are far from forming the main factor determining actual minimum wage setting. This point is most powerfully and most simply made by noting that there have been large swings in the real minimum wage over time. In real terms (2005 dollars), Ontario's minimum wage rose from $6.24 in 1970 to $8.66 in 1978, fell to $6.83 by 1990 and then rose again to $7.81 in 2007.

In contrast to the first two models, the fairness standard model is not rejected by our results. In that model, voters are interested in banning what they view to be unfair transactions (labour market exchanges involving unfairly low wages), with the notion of fairness being based on comparisons to the "going" unskilled wage in the labour market. The model provides a clear rationale for the significance of the median unskilled wage as a determining factor and fits with the result that provinces react symmetrically to increases and decreases in minimum wages in other provinces. The significance of the Left wing government effect also appears to fit with models, such as the standard of fairness and altruistic models, that emphasize "ideology" in policy making (Dixit and Londregan(1998), Roemer (1999)). Indeed, to the extent that most voters are not directly affected by the minimum wage, it is a policy instrument where one would most expect to see ideological considerations emerge.[23] We also view the qualitative evidence in section 2) as fitting with the fairness standards model. In our model, voters and politicians use minimum wages in other provinces as a means of deciding what is a fair minimum wage. In that case, provinces will then tend to try to cluster together in their minimum wage values in order not to appear to be setting an unfairly low or high minimum, producing a "race to the middle".

[23] The left and right wing variables might be seen as reflections of influence group power in the political competition model. But if that were their role then one would expect results reflecting collinearity problems between the proportion union variable and the left wing dummy. Instead, the left wing coefficient is strong and well defined while the union effect is economically small.

Such a race is evident both in the empirical results and in policy maker's statements.

An additional key result from our empirical investigation is that minimum wages are set, in part, as a positive function of the location of the low skilled wage distribution. In the context of the fairness model, this points to the conclusion that voters look to the wage or income distribution to help in determining fair values for policy parameters. This is an argument raised by Moffitt et al (1998) in the context of welfare benefit setting in the US and fits with Kahneman et al(1986)'s arguments that people set their notions of fairness in exchange in relation to observed market prices. This has potentially important methodological implications since minimum wages are often used as exogenous driving forces determining unemployment or the shape of the wage distribution. Our results suggest minimum wages movements may partly reflect movements in the unskilled wage distribution, complicating interpretations of their estimated impacts.[24]

Overall, we argue that our results fit with a "fairness" model of minimum wage setting accompanied, possibly, by some elements of a redistributional model. We take this as evidence that the types of considerations raised in the behavioural economics literature play a direct role in public policy setting and as support for political economy models that incorporate a richer role for ethical (or ideological) selves in policy decisions (e.g. Dixit and Londregan(1998), Roemer (1999)). At first glance, this might seem to indicate that public policy setting has elements that express more "positive" social values than are evident in political economy models based on pure self interest. The results here, however, imply a more complex conclusion. Minimum wages may be set in order to enforce the payment of "fair" wages but, in an era of general decline in unskilled wages this can lead to cuts to real minimum wages. Thus, policy setting based on fairness standards may ultimately exacerbate movements in inequality.

[24] This echoes arguments made in Besley and Case(2000) concerning the need to take the source of policy parameter variation seriously. Lemos(2005) uses political variables for examining the impact of minimum wages on employment in Brazil.

References

Aldrich, J.H. (1983). "A Downsian Spatial Model with Party Activism," American Political Science Review, vol. 77, pp. 974-990.

Besley, T. And A. Case (1995). "Does Electoral Accountability Affect Economic Policy Choices? Evidence from Gubernatorial Term Limits," Quarterly Journal of Economics, vol. 110, pp. 769-796.

Besley, T. and A. Case(2000). "Unnatural Experiments? Estimating the Incidence of Endogenous Policies." The Economic Journal, vol. 110, pp. 672-694.

Blais, A., J-M Cousineau and K. McRoberts(1989). "The Determinants of Minimum Wage Rates," Public Choice, vol. 62. Pp. 15-24.

Bloch, F.E. (1993). "Political Support for Minimum Wage Legislation:1989," Journal of Labor Research, vol. 14, no. 2. pp. 187-90.

Bramham, D. (1995)."Increase threatens 1,700 jobs, study says," Vancouver Sun, 25 September.

Brueckner, Jan K. (2003). "Strategic Interaction Among Governments: an Overview of Empirical Studies," International Regional Science Review, Vol. 26, pp. 175-188.

Bucovetsky, S. And J. Wilson (1991). "Tax Competition with Two Tax Instruments," Regional Science and Urban Economics, Vol. 21, pp. 330-50.

Canadian Federation of Independent Business (1998). "Presentation to Minimum Wage Board of Manitoba," October 20.

Canadian Press (2000b).,"Decision on raising BC minimum wage by month's end, McPhail says," 15 August.

Card, D. and A.B. Krueger (1995). Myth and Measurement: The New Economics of the Minimum Wage. Princeton: Princeton University Press.

Chappell, Jr., H.H. and W. R. Keech (1986). "Policy Motivation and Party Differences in a Dynamic Spatial Model of Party Competition," American Political Science Review, vol. 88, pp. 881-899.

Charness, G. and M. Rabin (2002). "Understanding Social Preferences with Simple Tests," Quarterly Journal of Economics, vol. 117, No. 3, pp. 817-69.

Dickson, V. and T. Myatt (2002). "The Determinants of Provincial Minimum Wages in Canada," Journal of Labor Research, Vol. 23, no. 1, pp. 57-67.

Dixit, A.K. and J. Londregan (1998). "Ideology, Tactics and Efficiency in Redistributive Politics," Quarterly Journal of Economics, Vol. 124, pp. 497-529.

Falk, A., E. Fehr, and C. Zehnder (2006). "Fairness Perceptions and Reservation Wages - The Behavioral Effects of Minimum Wage Laws," Quarterly Journal of Economics, Nov., pp. 1347 - 1381

Fehr, E. and U. Fischbacher (2004). "Third Party Punishment and Social Norms," Evolution and Human Behavior, Vol. 25, pp. 63-87.

Fehr, E. And K.M. Schmidt (2006). "The Economics of Fairness, Reciprocity and Altruism - Experimental Evidence and New Theories," in Handbook of Giving Altruism and Reciprocity, Vol. I, S-C Kolm and J.M. Ythier, eds.. Chapter 8.

Figlio, D.N., W.W. Kolpin and W.E. Reid (1999). "Do States Play Welfare Games?" Journal of Urban Economics, Vol. 46, pp. 437-54.

Gabszwicz and Yypersele (1996). "Social Protection and Political Competition," Journal of

Public Economics, Vol. 61, pp. 193-208.
Hunter, J. (1993). "BC to Get Highest Rate in Country, Sihota Vows," Vancouver Sun, June 12.
Ipsos-Reid (2000). "Public Opinion on Increasing BC's Minimum Wage, September 2000."http://www.ipsos-na.com/news/pressrelease.cfm?id=1085 .
Jacobs, J. And S. Hunter(2003). "Low Income Earners in Nova Scotia Need a Raise," Canadian Centre for Policy Alternatives - Nova Scotia, March.
Kahneman, D., J.L. Knetsch, and R. Thaler(1986). "Fairness as a Constraint on Profit Seeking: Entitlements in the Market," The American Economic Review, Vol. 76(4), pp. 728-41.
Kau, J.B. and P.H. Rubin (1978). "Voting on Minimum Wages: A Time Series Analysis," Journal of Political Economy, Vol. 86, No. 2, pp. 337-42.
Kelejian, H.H. and I.R. Prucha (1998). "A Generalized Spatial Two-Stage Least Squares Procedure for Estimating a Spatial Autoregressive Model with Autoregressive Disturbances," Journal of Real Estate Finance and Economics, Vol. 17. Pp. 99-121.
Lemos, S.(2005). "Political Variables as Instruments for the Minimum Wage," Contributions to Economic Analysis and Policy, Article 16, http://www.bepress.com/bejeap .
Locherty, L. And C. Harrington (1988). "Alberta Trailing Last in the Country on Minimum Wage," Calgary Herald, 18 March, p. A5.
Manitoba(2003)."Manitoba to Raise Minimum Wages," Manitoba News Services, Dec. 4.
Manski, C. (1993). "Identification of Endogenous Social Effects: The Reflection Problem," The Review of Economic Studies, Vol. 60, pp. 531-542.
Mintz, J. and M. Smart (2004). "Income Shifting, Investment and Tax Competition: Theory and Evidence from Provincial Taxation in Canada," Journal of Public Economics, Vol. 88, No. 6, pp. 1149-1168.
Moffitt, R., D. Ribar and M. Wilhelm (1998). "The Decline of Welfare Benefits in the U.S.: The Role of Wage Inequality," Journal of Public Economics,
Moffitt, R. (2001). "Policy Interventions, Low-Level Equilibria, and Social Interactions," in Social Dynamics, eds., S. Durlauf and P. Young. Boston: MIT Press.
NDP Nova Scotia (2000). "NS Minimum Wage Falls Further Behind - Increases Needed," Press Release, December.
Nussbaum, M.C. (2006). Frontiers of Justice: Disability, Nationality, Species Membership. Cambridge: Belknap Press.
Pew Research Center(2005). "Beyond Red versus Blue." May.
Roemer, J.E.(1999). "The Democratic Political Economy of Progressive Income Taxation," Econometrica, Vol. 67, pp. 1-19.
Roemer, J.E. (2001). Political Competition: Theory and Applications, Cambridge: Harvard University Press.
Silberman, J.I. and G.C. Durden (1976). "Determining Legislative Preferences on the Minimum Wage: An Economic Approach," Journal of Political Economy, Vol 83, no. 2, pp.317-30.
Smith, R. and R. Blundell (1986). "An Exogeneity Test for a Simultaneous Equation Tobit Model with an Application to Labor Supply," Econometrica, Vol. 54, pp. 679-85.
Sobel, R.S. (1999). "Theory and Evidence on the Political Economy of the Minimum Wage," Journal of Political Economy, Vol 107, No. 4, pp. 761-785.
Toronto Star (1995). "Ontario Minimum Wage to be Frozen, Tories Say," Toronto Star, July 5.
Wilson, J.D. (1999). "Theories of Tax Competition," National Tax Journal, pp. 269-304.

Table 1
Basic Tobit Results
Dependent Variable: Log of (Minimum Wage)

Variable	Type 1 Tobit, # 1	Type 1 Tobit, Full	Type 1 Tobit, Full with Lag	Type 2 Tobit, Full	Type 2 Tobit, Full With Lag
Constant	1.30(.66)**	-.25 (.33)	.023 (.33)	-.40 (.24)	-.31 (.19)
Proportion Union	4.42 (.87)***	-.040 (.14)	-.050 (.14)	.14 (.14)	.017 (.11)
Proportion Retail	- 9.09 (.3.08)***	-.45 (.72)	-.25 (.60)	-.14 (.69)	.49 (.43)
GDP Growth Rate	-1.96 (.98)**	.030 (.19)	.019 (.19)	-.10 (.13)	-.14 (.11)
Provincial CPI	-	.052 (.11)	-.026 (.10)	.054 (.089)	-.16 (.070)**
Median Unsk. Wage	-	.22 .093)**	.18 (.075)**	.30 (.084)***	.21 (.057)***
Left	-	.14(.044)***	.12 (.043)***	.11 (.025)***	.054 (.023)**
Right	-	-.0044 (.025)	-.0089 (.025)	-.010 (.019)	-.024 (.019)
Regional Avg Min Wage	-	.69(.084)***	.62 (.11)**	.60 (.099)***	.43 (.10)***
Lagged Min. Wage	-	-	.18 (.095)*	-	.46 (.057)***
Provincial Dummies	Yes	Yes	Yes	Yes	Yes
No. of Obs	370	370	370	360	360
# Censored Obs	200	200	200	194	194
Log Likelihood	-194.86	45.9	47.95	20.06	42.45

Standard errors in parentheses. Standard errors based on a time-dependence robust variance covariance matrix. *** significantly different from zero at 1% level of significance. ** significantly different from zero at 5% level of significance, * significantly different from zero at 10% level of significance.

Table 2
Coefficients from Censoring Process, Type 2 Tobits

Variable	Table 1, Full	Table 1, Full With Lag	Table 3, Full	Table 3, Full With Lag
Change in Left	1.33 (.50)**	.92 (.44)**	1.18 (.59)**	.64 (.68)
Change in Right	.73 (.51)	.38 (.57)	.70 (.47)	.24 (.77)
Change in Median Unskilled Wage	.69 (1.05)	1.00 (.91)	.80 (1.14)	.99 (1.20)
Change in Regional Mean	4.69 (1.19)***	5.11 (1.32)***	4.48 (1.11)***	4.82 (1.81)**
Change in CPI	4.42 (2.38)*	3.69 (2.34)	4.46 (2.10)**	4.00 (2.28)*
Left	.12 (.26)	.12 (.24)	.16 (.29)	.17 (.31)
Right	-.48 (.26)*	-.44 (.27)*	-.47 (.26)*	-.44 (.28)
Constant	-.35 (.21)	-.36 (.22)	-.36 (.22)	-.37 (.21)*
Error Correlation	.93 (.067)***	.95 (.050)***	.95 (.064)	.98 (.070)

Standard errors in parentheses. Standard errors based on a time-dependence robust variance covariance matrix. *** significantly different from zero at 1% level of significance. ** significantly different from zero at 5% level of significance, * significantly different from zero at 10% level of significance.

Table 3
Instrumental Variables Results
Dependent Variable: Log of (Minimum Wage)

Variable	Type 1 Tobit, Full	Type 1 Tobit, Full with Lag	Type 2 Tobit, Full	Type 2 Tobit, Full With Lag
Constant	-.97 (.46)**	-.68 (.49)	-.89 (.37)***	-.29 (.22)
Proportion Union	-.13 (.14)	-.15 (.14)	.10 (.15)	-.032 (.12)
Proportion Retail	-.18 (.78)	.0081 (.66)	.071 (.65)	.73 (.50)
GDP Growth Rate	.20 (.18)	.18 (.18)	.029 (.17)	.029 (.12)
Provincial CPI	.26 (.12)**	.17 (.13)	.19 (.12)	.017 (.088)
Median Unsk. Wage	.34(.12)***	.29 (.10)***	.37(.11)***	.29 (.11)***
Left	.15 (.045)***	.14(.045)***	.12 (.024)***	.059 (.029)**
Right	.0031 (.027)	-.0013 (.026)	-.0072 (.021)	-.021 (.020)
Regional Avg Min Wage	.38 (.17)**	.31(.18)*	.41 (.15)***	.16 (.080)**
Lagged Min. Wage	-	.18 (.099)*	-	.49 (.097)***
Residual: Regional Avg.	.37 (.18)**	.36 (.18)**	.26 (.19)	.36 (.14)***
Provincial Dummies	Yes	Yes	Yes	Yes
No. of Obs	370	370	360	360
# Censored Obs	200	200	194	194
Log Likelihood	47.45	49.6	21.86	46.69

Standard errors in parentheses. Standard errors based on a time-dependence robust variance covariance matrix. *** significantly different from zero at 1% level of significance. ** significantly different from zero at 5% level of significance, * significantly different from zero at 10% level of significance.

Table 4
Specifications for Testing Symmetry

Variable	Type 2 Tobit: Dep. Var: Nominal Minimum Wage	Type 1 Tobit: Dep. Var: First Diff. Of Nominal Minimum
Constant	-.42 (.56)	-.070 (.027)***
Left	.078 (.013)***	.076 (.051)
Right	-.0039 (.026)	-.030 (.019)
Avg of Other Provs	.70 (.26)***	-
Median Unskilled Wage	.20 (.11)**	-
Change in Avg of Other Provinces	-	.73 (.21)***
Change in Median Unskilled Wage	-	.071 (.086)
(Avg of Other Provs) *(Below Avg Last Period)	-.016 (.023)	-
Below Average Last Period	-.039 (.034)	
(Avg of Other Provs) *(Drop in Avg Last Per.)	-	-
(Min Wage) - (Regional Avg.), Last Period	-	-.69 (.16)***
[(Min Wage) - (Regaional Avg.), Last Period] *(Below Avg Last Period)	-	-.030 (.19)
Provincial Dummies	Yes	Yes
No. of Obs	360	360
No. of Censored Obs	194	194
Log Likelihood	42.68	43.71

All estimates based on Tobit specification. Standard errors in parentheses. ** significantly different from zero at 5% level of significance, * significantly different from zero at 10% level of significance.

Figure 1a

Nominal Minimum Wages, 1966 – 2005

Atlantic Provinces

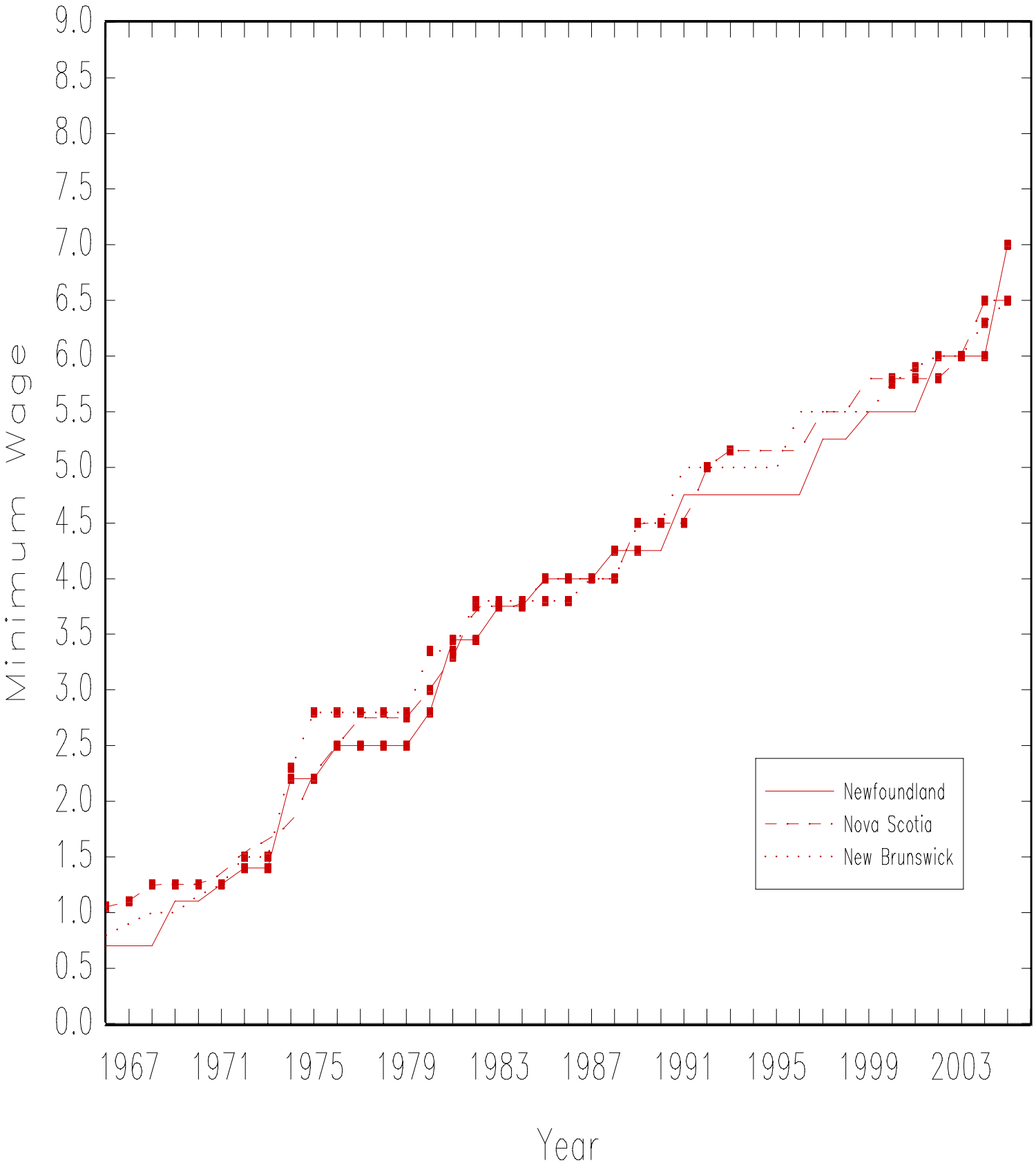


Figure 1b

Nominal Minimum Wage,

1966 – 2005, Ontario and Quebec

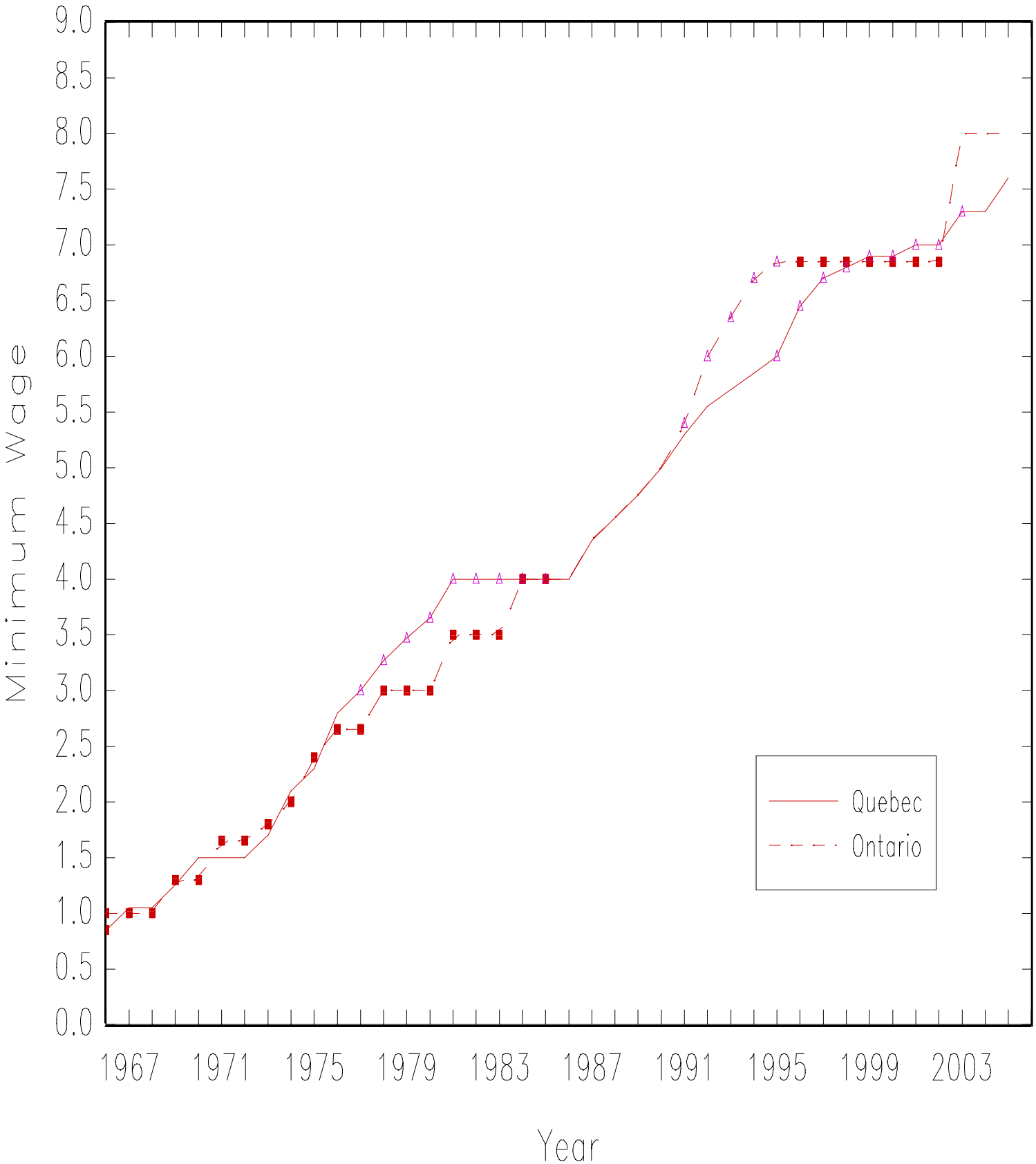


Figure 1c

Nominal Minimum Wage

1966 – 2005, Western Provinces

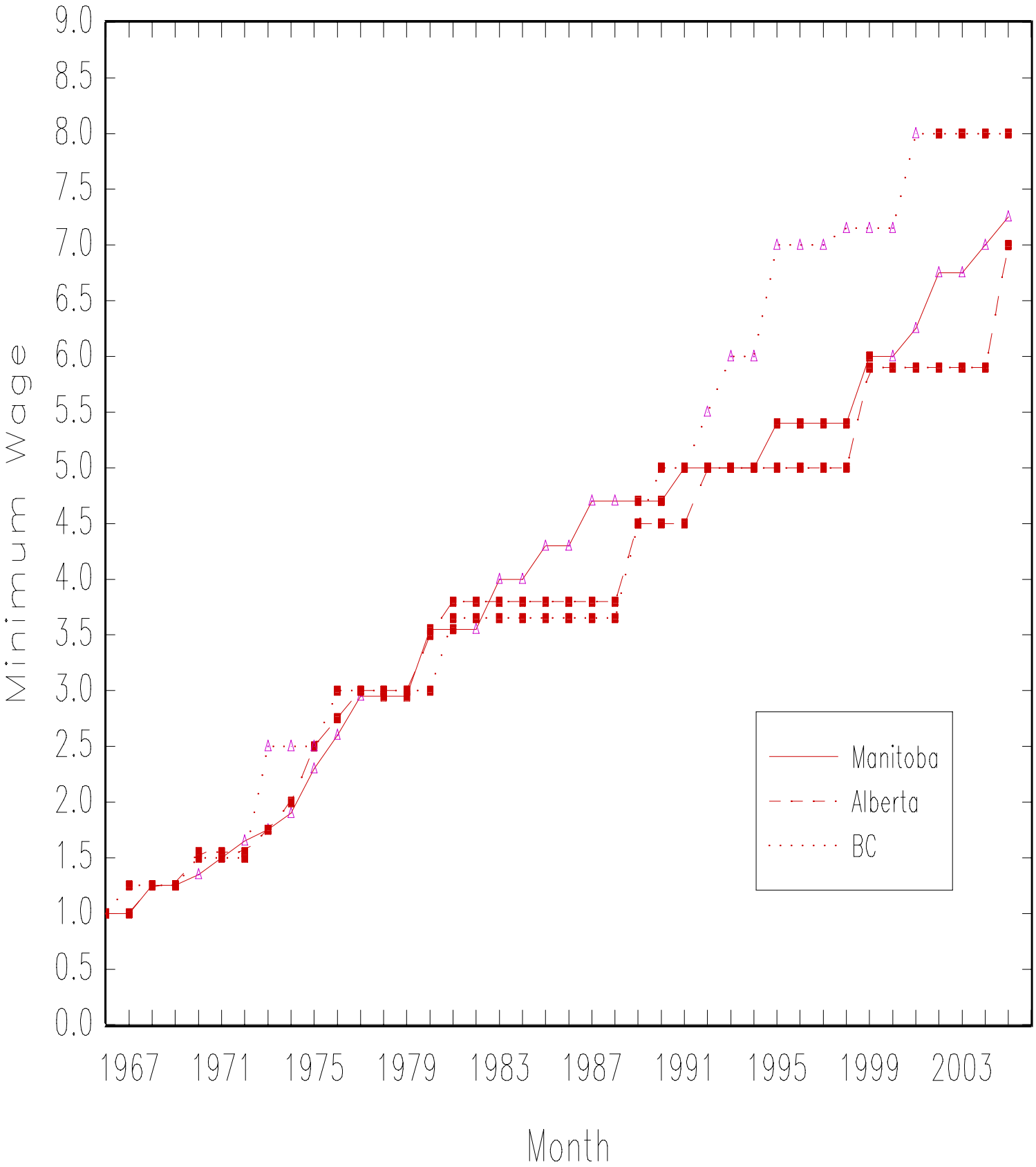


Figure 2
Real Minimum and Median Wages, 1969 – 2005
All Provinces

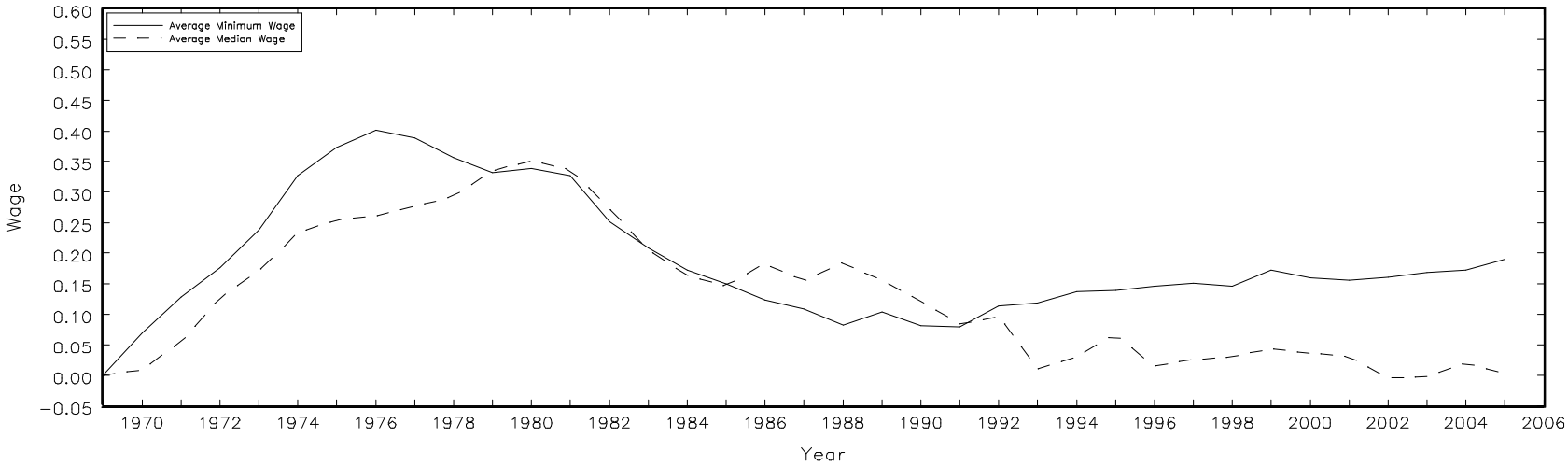
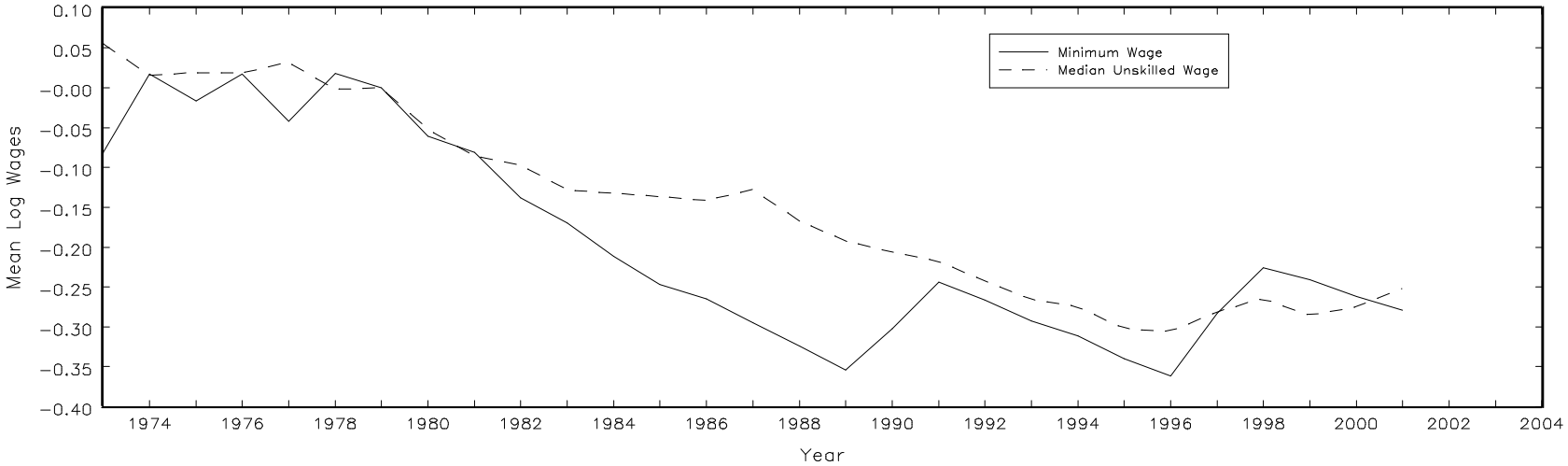


Figure 3
Real US Average Minimum Wage and Median Wage
for High School or Less Educated Males



Appendix A: Derivation of Estimating Equation

In this appendix, we derive the basic estimating equation (13) from the fairness model assuming own wages enter utility functions linearly. In particular, we take the case of an R government in province B facing an election with an L party official opposition and a C government in province A. Consider a 2 period version of the model. We are interested in deriving the period 1 reaction function for the R government. That government selects a minimum wage in the first (pre-election period) to maximize:

$$A1) \quad V_{R1} = w_1 - \lambda_3(m_1^B - \rho_t)^2 - \lambda_2 m_1^B + \gamma P + P V_{R2,R} + (1-P) V_{R2,L}$$

where $V_{R2,j}$, j=L,R is the ideologues in the R party's value function next period if party j wins the election and, hence, gets to set the minimum wage. We have again assumed no discounting of the future for simplicity. We will consider the case with dynamic norms and include the possibility that the norms relate to poverty standards rather than just relative wage comparisons:

$$A2) \quad \rho_t = (\theta(\delta m_t^B + (1-\delta) m_{t-1}^A) + (1-\theta)\kappa \overline{w_t^B}) + \mu CPI_t + \varepsilon_t^B$$

where, μ,θ, and δ are parameters and ϵ_t^B is an error term. The error term introduces potential taste differences in notions of fairness. Thus, the target minimum wage could change if a minister with different fairness ideals took over the portfolio that included the minimum wage. Note, also, that we allow for differences in the median wage across provinces and over time.

The first order condition related to optimizing A1) through the choice of m_1^B is given by,,

$$A3) \quad -2\lambda_3 (m_1^B - \rho_1) - \lambda_2 + \frac{\partial P_{te}}{\partial m_1^B} \psi + \frac{\theta(1-\delta)}{1-(\theta\delta)^2} = 0$$

where the last term is the derivative of $V_{R2,L}$ with respect to m_1^B and

$$A4) \quad \psi = \gamma + \frac{\lambda_2(\lambda_2+\lambda_1)}{2\lambda_3(1-(\theta\delta)^2)}$$

where γ is the impact of the probability of re-election on the party's value function. The second term in A4) corresponds to the difference, ($V_{R2,R}$ - $V_{R2,L}$), assuming that $\lambda_1 = \lambda_2$ (i.e., ideologues have equivalent strengths of their convictions).To get a closed form solution, we will use the following linear approximation:

$$A5) \quad \frac{\partial P_{te}}{\partial(m_1^B)} \approx \phi_0 + \phi_1 m_1^B + \phi_2 m_1^A + \phi_3(\pi_P - \pi_B) + \phi_4(x_1\alpha) + \phi_5 \overline{w_1^B} + \phi_6 CPI_1$$

where, π_P is the proportion of voters who benefit from the minimum wage, π_B is the proportion who see themselves paying it, and x_1 is a vector of provincial variables affecting election. Rearranging A3), using A5), leads to:

$$A6) \quad m_1^B = \omega\left(\frac{\theta(1-\delta)}{1-(\theta\delta)^2} + \psi\phi_0\right) + \omega(2\lambda_3\theta\delta + \psi\phi_2) m_1^A + \omega 2\lambda_3\theta(1-\delta) m_0^B - \omega\lambda_2$$

$$+ \omega(2\lambda_3(1-\theta) + \psi\phi_5)\kappa\overline{w_1^B} + \omega(2\lambda_3\mu + \psi\phi_6) d_1 + \omega\psi\phi_2(\pi_m - \pi_b) + \omega\psi\phi_4 x_1\alpha + \varepsilon_1^B$$

where ω= (1/(2λ_3 - ψϕ_1)). Note that the last term on the first line of A6) is specific to an R government. For an L government replace -λ_2 with λ_1. For a C government there is no such term. In the empirical specification, we capture these terms using dummy variables for right and left wing governments. The structural parameters in A4) are not identified from estimating equation 15) in the text without imposing extra restrictions. We are not ultimately interested in the structural parameters themselves and so will not search for such restrictions.

Appendix B
Theoretical Derivations
(On-line Appendix. Not for Publication)

1) Minimum Wage Impacts in Two Province, Three Factor Model

Consider a closed economy with two provinces, A and B, which have the same production technology and are symmetric in factor endowments. The production function for province j is given by,

$$A1) \quad Y_j = L_j^{\alpha} H_j^{\beta} K_j^{1-\alpha-\beta}, \qquad j = A, B$$

where L_j is unskilled labour employed, H_j is skilled labour, and K_j is capital in province j. Each province is endowed with an amount of unskilled labour, $\overline{L}$, and an amount of skilled labour, $\overline{H}$. Both types of labour are immobile. The total amount of capital in the economy is K* and is apportioned as $K_A = (1 - p_k)K^*$ and $K_B = p_k K^*$. Capital is perfectly mobile across the two provinces. Both provinces have minimum wages, the logs of which are m^A and m^B in A and B, respectively.

Given this set-up there are three first-order conditions in each province:

$$1j) \quad \ln\alpha + (\alpha - 1)\ln L_j + \beta \ln \overline{H} + (1 - \alpha - \beta)\ln K_j = m^j$$

$$2j) \quad \ln\beta + \alpha \ln L_j + (\beta - 1)\ln \overline{H} + (1 - \alpha - \beta)\ln K_j = \ln v_j$$

$$3j) \quad \ln(1 - \alpha - \beta) + \alpha \ln L_j + \beta \ln \overline{H} + (-\alpha - \beta)\ln K_j = \ln r_j$$

where, v_j is the skilled wage, r_j is the price of capital in province j, and we have assumed that the minimum wage is only relevant for the unskilled labour market.

Using the fact that the price of capital must be equated in the two provinces, we can obtain,

$$A2) \quad \ln L_B = \ln L_A + 2\left(\frac{\alpha + \beta}{\alpha}\right)\ln p_k - 2\left(\frac{\alpha + \beta}{\alpha}\right)\ln(0.5)$$

Substituting this into 1A) and then using 1B), we arrive at,

$$A3) \quad \ln p_k = \ln(0.5) - \frac{1}{2(1 - \alpha - \beta + \frac{\beta}{\alpha})}(m^B - m^A)$$

indicating that the proportion of capital assigned to B in equilibrium is decreasing in the difference between the minimum wage in B and that in A.

The expression for the equilibrium value of the skilled wage in A is given by,

$$\begin{aligned} A4) \quad \ln v_A &= \frac{\alpha}{1 - \alpha}\ln\alpha + \ln\beta - \frac{1 - \alpha - \beta}{1 - \alpha}\ln\overline{H} + \frac{1 - \alpha - \beta}{1 - \alpha}\ln(0.5K^*) \\ &\quad + \frac{1 - \alpha - \beta}{2(1 - \alpha)(1 - \alpha - \beta + \frac{\beta}{\alpha})}(m^B - m^A) \\ &= a_1^* + a_2(m^B - m^A) \end{aligned}$$

Thus, the impact of the difference in minimum wages on the distribution of capital implies that the skilled wage is positively related to that difference. A second order Taylor expansion of $\exp(a_1^* + a_2(m^B - m^A))$ with respect to m^A around the point $m^A = m^B$ yields equation 12) in the text (with $a_1 = \exp(a_1^*)$).

We can also generate an expression for equilibrium L_A relative to $\overline{L}$ (full employment):

$$A5) \quad \ln L_A = \ln \overline{L} - \frac{1}{1-\alpha}\left[\left(m^A - w^*\right) - \frac{1-\alpha-\beta}{2(1-\alpha-\beta+\frac{\beta}{\alpha})}\left(m^B - m^A\right)\right]$$

where w* is the log of the equilibrium low skilled wage if there are no minimum wages and capital is evenly divided between the two provinces. The term in square brackets can be positive if the extra restrictiveness of m^B relative to m^A is not large compared to the restrictiveness of m^A relative to the unrestricted equilibrium wage. In that case, there is equilibrium unemployment in A. On the other hand, if the minimum wage in B is substantially more restrictive than that in A then the term in square brackets is negative, implying the contradictory statement that L_A is greater than full employment. In that case, there is enough capital flow from B to A that the unskilled labour demand curve shifts out to a point that the minimum wage in A ceases to bind. In that case, we solve an alternate set of first order conditions which are the same as those set out above except that $\overline{L}$ replaces L_A and the unskilled wage in A, w_A, becomes an endogenous variable. One can show in this case that $\ln w_A$ is a weighted average of m^B and w*.

2) Obtaining Reaction Functions

2.1) Fairness model with minimum wages affecting wages of H workers

In this section, we show that one can obtain the reaction function 8) when H workers recognize the effect of minimum wages on their own income even if they do not use other provincial minimum wages to establish their notion of fairness.

The utility of a C person is given by,

$$A6) \quad U_{it} = \lambda_3(a_1 - a_1a_2(m_t^A - m_t^B)) + a_1a_2^2\,(m_t^A - m_t^B)^2) + (m_t^A - \rho_t)^2$$

where, we have used the quadratic approximation to ln(v) described earlier. Then, taking the first derivative with respect to m_t^A , setting it to zero and solving yields,

$$A7) \quad m_t^A = \frac{0.5\lambda_3a_2a_1}{1+\lambda_3a_1a_2^2} + \frac{\lambda_3a_1a_2^2}{1+\lambda_3a_1a_2^2}m_t^B + \frac{1}{1+\lambda_3a_1a_2^2}\kappa\overline{w_t}$$

Thus, the reaction function is again a weighted average of the other provincial wage and the median unskilled wage. In this case, the reaction function also includes an intercept.

2.2) Altruistic Model

In this section, we obtain the reaction function in the altruistic model. The utility of the centrist voter is obtained by substituting $\ln L_A - \ln\overline{L}$ for (1 - UR^A) in 12). Taking the derivative of this with respect to m_t^A, setting the derivative equal to zero and solving yields,

$$A8) \quad m^A = m^B + \frac{\lambda_3a_2a_1 + \lambda_4\exp(\frac{1}{1-\alpha}w^*)\exp(-\frac{1}{1-\alpha}m^B)c_1}{2\lambda_3a_2^2a_1 + 2\lambda_4\exp(\frac{1}{1-\alpha}w^*)\exp(-\frac{1}{1-\alpha}m^B)c_1^2}$$

where, $c_1 = -(1/(1-\alpha) + (1-\alpha-\beta)/(2(1-\alpha-\beta+\beta/\alpha)(1-\alpha))$. One can show that the derivative of this function with respect to w* (the no-minimum-wage equilibrium wage) is positive, that the derivative with respect to m^B is less than one, and that the derivative with respect to m^B is itself a non-linear function of m^B. Thus, this reaction function is not symmetric in m^B in the sense discussed in the text.