Which Democracies Pay Higher Wages?

James C. Rockey

Discussion Paper No. 07/600

December 2007

Department of Economics
University of Bristol
8 Woodland Road
Bristol BS8 1TN

Which Democracies Pay Higher Wages?

James C Rockey*

Department of Economics, University of Bristol
8 Woodland Road, Bristol, BS8 1TN, UK

December 2007

Abstract

This paper asks if and how constitutions affect labour market outcomes. This question is motivated by Rodrik (1999), who suggests that "democracies pay higher wages" and Persson and Tabellini (2003) who provide evidence that constitutions impact on economic outcomes. An empirical analysis using treatment effect estimators and Bayesian Model Averaging provides robust causal evidence that presidential democracies are associated with lower wages, after controlling for other potential determinants such as the level of income per capita.

(JEL P16, J31, C11)

Keywords: Democracy, Constitutions, Wages, Factor Shares, Bayesian Model Averaging

Acknowledgements: I would like to thank Jonathan Temple for his supervision, help, and comments during the course of this project, and seminar participants at the University of Bristol.

*: Email:james.rockey@bristol.ac.uk

1 Introduction

It is well known that the average wage exhibit great variation across countries. Much of this variety can be explained by cross-country differences in productivity levels, however explaining the remainder requires further explanation. Economists have considered this issue with ever greater sophistication. This paper seeks to explain why workers receive a higher share of value added in some countries than others. One explanation is that because some markets do not clear completely, for whatever reason, rents are created. For example, some professions such as medicine, law, or accountancy restrict entry to ensure high standards. These restrictions may also create rents, since regulation will also result in a degree of monopoly power. More generally, imperfect markets lead to rents which are shared between the owners of capital and labour. How these rents are shared depends on the bargaining strength of the different parties, and will lead to variations in the labour share. This paper is concerned with the extent to which political factors can explain why workers in some countries are able to extract more of the value added they create than in others. Specifically, it investigates whether outcomes vary between democracies due to differences in their constitutional arrangements. That is, do some democratic constitutions engender labour market and societal institutions that cause the labour share of income to be lower than in other democracies?

The analysis takes Rodrik (1999) as its starting point. He provides evidence that "Democracies pay higher wages" conditional on income per capita. In particular, he shows that the labour share of income is higher in democratic countries than it is in others. However, even within the set of democracies there is great variation. This paper will emphasize Lijphardt's (1999) distinction between the characteristics of what are termed "majoritarian" democracies and "consensual" democracies.[1]

Why might wages be higher, relative to productivity, in one type of democracy rather than another? Rodrik (1999) writes "...the data seem to suggest that this paper's central finding on the relationship between democracy and wages is a consequence of political competition and political participation at large..." (p24). It would seem reasonable to suppose that variation in consti-

[1] Based upon an analysis of constitutional and electoral rules Lijphardt posits two archetypal forms of representitive liberal Democracy. These are "Majoritarian" democracies characterised by a presidential system and a majoritarian electoral system, and proportional or "Consensual" democracies which generally have cabinet government, multi-member electoral districts and an electoral system based upon proportional representation. This is discussed in more detail in Chapter 2.

tutional type could lead to variation in the degree and form of political competition. Several possible economic explanations of how this variation might lead to different wage levels present themselves. One explanation is that the effectiveness of lobbying in determining policy depends on the form of democracy, an alternative is that it is due to differences constitutional rules altering the incentives of politicians What these explanations share, however, is that they assume competition is restricted in either product or labour markets and that consequently there are potentially economic rents to be extracted.

The remainder of this paper will take the following form. The next section considers in more detail why the form of constitution might be expected to impact on the labour share of income. The third section will outline the econometric approach, and in particular the use of Bayesian Model Averaging. The fourth section discusses the data used for key variables, the fifth section presents the results and is followed by a brief conclusion.

2 Motivation

This section moots two reasons why it might be expected that the form of democracy will affect the labour share of income. The first explanation is related to the large literature on lobbying and its effects. Two different but related approaches are those of Lijphardt (1999) and Helpman and Persson (2001). Lijphardt suggests that consensual democracies are characterised by more formal and institutionalised roles for lobbies, such as workers' or employers' groups. It would be logical to expect that, on average, more powerful lobbies are more effective at altering labour market outcomes. Unfortunately, although Lijphardt (1999) distinguishes between social corporatism, where labour movements have more influence, and liberal corporatism, where business groups have more influence, both are associated with consensual democracies. Hence, it is not clear from his analysis whether consensual democracies should on average be associated with a higher or lower labour share of value added.

An alternative, economic explanation of the role of interest groups might be based on lobbying models such as that of Helpman and Persson (2001). They suggest that, in parliamentary regimes, there will be no campaign contributions by lobbyists and the governing coalition retains the rewards of office, whereas in some cases outcomes in congressional regimes can be influenced by lobbying. However, in the absence of any knowledge as to whom the lobbyists represent

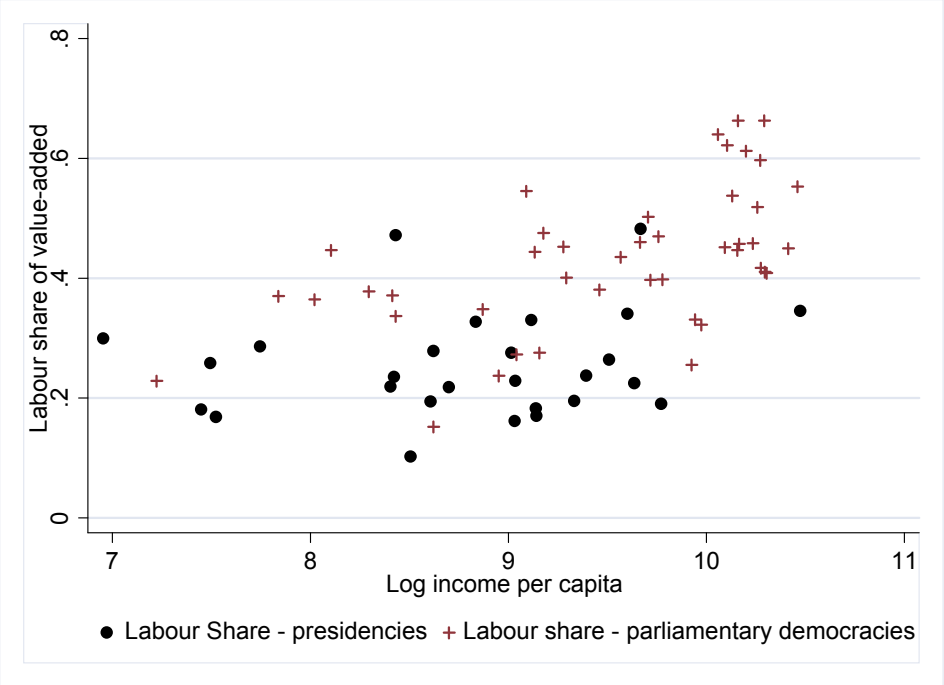
no prediction can be made. What is important is that both Lijphardt (1999) and Helpman and Persson (2001) suggest that constitutional form will influence lobbying outcomes. Clearly, the Lijphardt (1999) and Helpman and Persson (2001) analyses consider different sources of variation: the former is concerned with the general features of consensual as opposed to majoritarian democracies; the latter analyses the impact of specific features of the legislature, in particular the presence of coalitions and stable agenda-setting powers in a parliamentary democracy. But the relevant issue, in this context, is that in lobbying models the increased influence of interest groups, and more specifically workers', representatives could lead to workers eliciting more political favours, including favourable legislation and consequently higher wages.

A second, although not necessarily contradictory, explanation is in the spirit of Persson, Roland and Tabellini (2000). They describe why parliamentary (consensual) regimes would be expected to deliver more legislative cohesion. This could in turn lead to a stable majority in government whose constituents could be characterised as residual claimants.[2] This majority might be seen as likely to represent those who derive more of their income from labour than capital (the "workers") as opposed to the smaller group whose income is largely the returns from capital (the "capitalists"). Such residual claims might be manifested in legislation designed to increase the return to labour.

This argument is in some ways similar to that of Grossman and Helpman (2005). They present a model of majoritarian democracies in which the political need for legislators to benefit the voters in their district can lead to protectionist trade policies. Of particular interest is that districts vary in their endowments of different factors of production, providing an incentive for the representative of a particular district to favour particular goods when setting trade policy. This analysis can be reinterpreted in terms of bargaining over labour legislation. Grossman and Helpman model a three-district state in which the total ownership of capital is the same in each district. If the assumption of equal wealth were to be relaxed, and if capital ownership was assumed to be concentrated in one district, then the representatives of the other two would have an electoral incentive to try and legislate to increase the labour share. What is not analysed in Grossman and Helpman's (2005) model is what effect a president would have if conceived of as a veto player as in Persson, Roland, and Tabellini (2000). It is suggested here that a president may veto legislation favouring particular groups

[2] The term residual claimants describes the notion that the majority are able to direct the benefits of power to themselves via their representatives.

Figure 1: Scatterplot of log income per capita and the labour share of value added



of workers if either it were not in their electoral interest, or perhaps because they considered it not in the overall national interest.

Figure 1 shows the relationship between income per capita and data on labour's share of value added in manufacturing from the UNIDO (2005) database. Perhaps most notable is the degree of variation in the labour share, from around 10 percent to about 70 percent. It would also seem on casual inspection that workers in richer democracies receive a larger share of income, and also but less clearly that the labour share might be higher in parliamentary democracies. This will be confirmed by results obtained using Bayesian Modelling Averaging approach where it will be found that presidential democracies are associated with a labour share 12 percentage points lower than in equivalent parliamentary regimes.

3 Methodology

This section will provide a brief overview of the econometric approach employed, and how it provides for causal inference. Isolating the effects of constitutions from the potential determinants of the labour share is intrinsically complicated by the interactions between market and state. The approach taken is to conceive of the choice of constitution as a treatment, and to estimate the effect of that treatment. However, consistent estimation requires that the choice of constitution must be independent of any other factor determining the labour share. Formally, let Y_m, Y_c be the outcomes associated with a majoritarian constitution or a consensual constitution respectively. X is the set of variables which may partially determine the choice of constitution, and $S \in \{M, C\}$ is the choice of constitution.

It is unlikely that:

$$S \amalg Y_m, Y_c \tag{1}$$

But, it is potentially true that:

$$S \amalg (Y_m, Y_c) \mid X \tag{2}$$

As is standard, the relationship between the outcomes Y and the treatment S can be written as follows:

$$Y = (1 - S)Y_c + SY_m = Y_c + S(Y_m - Y_c) \tag{3}$$

If estimates of (3) using OLS are to be unbiased then (2) must hold and as such it is necessary to include the confounding variables X, whilst Y_c is subsumed into the constant term which is denoted α. Then by including a binary variable, S, to denote whether or not a particular country has received the treatment (in this case a majoritarian constitution) the associated coefficient β is an estimate of the treatment effect. Such an OLS model can be written as follows:

$$Y = \alpha + \beta S + \gamma X + \varepsilon \tag{4}$$

such that:

$$E(\varepsilon) = 0, E(\varepsilon S) = E(\epsilon X) = 0, E(\epsilon \mid S) = 0 \tag{5}$$

For estimation to be consistent both (2) and (5) must be true. This requires that there are no relevant variables missing from X, and that those variables included are uncorrelated with the error term, i.e. exogenous.

The reasons why different nations have chosen different constitutional rules are complex and varied. As discussed in Persson and Tabellini (2003) and Acemoglu (2005) intellectual fashion and also potential colonial influence have been of particular importance. But there are many other possible explanations and the number of variables required to describe these competing explanations is large. Given the small sample available, this prohibits including them all in a regression analysis and hence leads to concerns about model uncertainty since it is not known *a priori* what are the constituents of X. Many traditional econometric approaches to this problem, such as stepwise regression, suffer from path-dependence, that is they are sensitive to the order in which variables are included. Moreover identifying the constituents of X via any attempt to test down to a parsimonious specification from a large set of variables will lead to the inferential problems associated with data-mining as detailed by Miller (2002, ch.6). In contrast, a Bayesian Model Averaging (BMA) approach may be preferable since it will provide an estimate of the likelihood of different choices of X and also a posterior distribution for β obtained from each of the different possible models weighted by their respective posterior model probabilities.

The remainder of this section will provide a brief overview of BMA which is described in more detail in Hoeting, Madigan, Raftery, and Volinsky (1999) and Malik and Temple (2006). BMA is premised on the basis that since, there are sometimes multiple similarly likely statistical models which imply different inferences, it is sometimes helpful to consider a wide range of possible models, and the overall likelihood of a variable being important. A BMA analysis starts with a set of prior beliefs about which models are expected to be more likely, and prior beliefs about the distribution of the coefficients on particular variables. For example, if one had a strong theoretical justification for believing, or previous results suggested, that a certain variable was likely to be statistically important then models which included that variable could be given a higher prior probability. Similarly, if it was believed that this variable was very likely to be negatively associated with the dependent variable then its prior distribution could be chosen such that the majority of the probability mass was where the

coefficient was negative. In the analysis here, few assumptions are made as to the prior distribution. Instead what is termed a "diffuse" prior is used: in particular it is assumed that every possible model has an equal prior probability, that is if there are 2^{25} possible models then each model has a prior probability of $\frac{1}{2^{25}}$. This assumption implies that every variable is assumed to have an equal chance of 0.5 of inclusion in any given model. The prior distributions of the coefficients associated with each variable are chosen to have zero mean, and variance proportional to the sample variance of the explanatory variable.

Given these choices, the posterior model distribution (the probability of each model given the data) is calculated. Following Hoeting, Madigan, Raftery and Volinsky (1999) let Δ be the quantity of interest, such as the effect of a majoritarian constitution, and D the dataset. There are $N = 2^K$ possible models M_k where K is the number of explanatory variables. The posterior distribution of Δ is given by:

$$pr(\Delta \mid D) = \sum_{k=1}^{N} pr(\Delta \mid M_k, D) pr(M_k \mid D) \tag{6}$$

Where the posterior probability of any given model, M_k is:

$$pr(M_k \mid D) = \frac{pr(D \mid M_k) pr(M_k)}{\sum_{l=1}^{N} pr(D \mid M_l) pr(M_l)} \tag{7}$$

Where:

$$pr(D \mid M_k) = \int pr(D \mid \theta_k, M_k) pr(\theta_k \mid M_k) d\theta_k \tag{8}$$

The vector θ_k represents the parameters for model k, i.e. $\theta_k = \{\alpha_k, \beta_1, ..., \beta_K, \sigma_k\}$. The exact interpretation of (6), (7), and (8) are discussed more thoroughly in Kass and Raftery (1995), Raftery, Madigan, and Hoeting (1997), and Hoeting, Madigan, Raftery, and Volinsky (1999). In essence (8) describes the chance of observing the data if that particular model was the model believed before the data were observed. The posterior probability of a particular model given by (7) describes the probability of that model once the data have been observed and (6) describes the calculation of the distribution of Δ, that is the the probability of Δ taking a given value for each model multiplied by the posterior probability of that model.

Once the posterior model probability (PMP) of each model has been cal-

culated, several related quantities can be obtained. The posterior inclusion probability (PIP) is the sum of the PMPs of those models which include that variable (i.e. those in which its coefficient is non-zero). Also, the posterior mean and standard deviation of a given variable can be calculated by computing the weighted average of the mean or standard deviation across all models weighting by the PMPs.

4 Data

This section will discuss the data used to measure the labour share, the type of democracy, and the set of candidate control variables. Following Rodrik (1999) the labour share in value added in manufacturing is used as the measure of the labour share. As in Rodrik (1999) the data are taken from the UNIDO Industrial Statistics database. The Labour share was calculated as average labour costs divided by the mean value added per worker, and a five year average was then created. The only difference with Rodrik's approach is that the data were calculated for each year in the period 1990-94; this period represented the years for which there was greatest data availability and corresponds to the data used by Persson and Tabellini which is also for the early 1990s. Further details are contained in Appendix A. There has been some criticism of the use of factor-share data. In particular Gollin (2002) claims that previous work using data on factor shares overstates the variation between countries, as a consequence of failing to take into account the income of entrepreneurs and more generally the self-employed. However, these criticisms seem less applicable to manufacturing industry data which is used for this reason and because it is available for a large set of democracies.

Persson and Tabellini (2003) define six variables that describe different aspects of constitutional type. These variables all measure aspects of the differences between consensual and majoritarian democracies. The first, *pres,* is a dummy variable which takes a value of one if the executive is not accountable to the legislature via no-confidence votes. This measure corresponds to the distinction between congressional and parliamentary regimes discussed by Persson, Roland, and Tabellini (1997). *Pind* describes the proportion of the legislature not elected on the basis of party lists. In bicameral democracies it refers to elections to the lower house. *Magn* is the "inverse of district magnitude", the

number of electoral districts per seat in the lower chamber. *Sdm* is analogous to *magn*, but where there are electoral districts of different sizes it calculates the inverse of district magnitude as the weighted average of the different district sizes, where the weighting for each district size is the percentage of seats in the legislature elected from districts of that size. *Spropn* describes the proportion of electoral seats elected from national electoral districts rather than sub-national districts. In this respect it captures something akin to *pind*. The final variable is *maj* which takes a value of one if elections to the lower-house of the legislature are by plurality (first-past-the-post) rule, or zero otherwise.

Since the (latent) variable of interest is the degree of majoritarianism rather than specific constitutional characteristics, a principal components analysis was used to create variables describing the dimensions in which constitution type varies. An analysis of the loadings of the principal components suggests that the first broadly measures majoritarianism.[3]

The five principal components will be denoted by $g1$, $g2$, ... , $g5$. Two of the other controls merit discussion as they are not predetermined. Income per capita, denoted *logyl* is included because Rodrik finds it to be a significant determinant of the labour share. *logy*l is not predetermined and is partly determined by the choice of constitution and the pre-treatment control variables that generate constitutional selection. If constitutional choice partly determines income per capita and this has an effect on the labour share, then there will be an indirect effect of constitutional choice on the labour share due to its effects on income levels. In this case, to maintain the assumption that the coefficients on the constitutional variables identify a causal treatment effect it is required that *logyl* is independent of the error term conditional on X (the predetermined controls), that is, *logyl* $\amalg \varepsilon \mid X$. Following Lee (2005, ch.2) then the inclusion of *logyl* as a candidate independent variable will mean that the indirect effects on the labour share of constitutional choice through logyl will be partialled out. Therefore, the coefficients associated with the treatment (constitutional choice) will describe solely the direct effects of the treatment, which is the quantity of interest.

Similarly, if constitution type matters in explaining variation in the labour share then it could be expected that the effect would be greater in better func-

[3] The first principal component explains 70% of the total variance and positively weights all of the constitutional variables except *spropn* which has a very small negative value. The second principal component acounts for a further 20% of the variance and places most weight on *spropn*.

tioning democracies. Hence, a measure of the quality of democracy is included. PT use *polityiv* which is a measure of current democratic quality.[4] It is suspected that the quality of democracy is to a large extent determined by variables not included in the set of candidate controls. For example, Dulleck and Frijters (2004) and Jensen and Wantchekon (2004) suggest that a large natural resource sector is associated with a failure to democratise.[5] Hence, it is not plausible to make the same assumption about the conditional exogeneity of *polityiv* as it is for *logyl,* and therefore an instrument is needed. The instrumental variable *partitioned* is from the data created by Alesina, Easterly, and Matuszeski (2006) in which they investigate the extent to which states are often "artificial", created by previous colonialists rather than representing underlying ethnic groups. *Partitioned* describes the proportion of a state's population who are members of an ethnic group which is present in one or more adjacent countries. They find that *partitioned* is correlated with measures of political success. Using both OLS and BMA analysis, *partitioned* is found to be a good predictor of *polityiv* and is considered plausibly exogenous.[6]

Persson and Tabellini use the Hall and Jones (1999) data on latitude but these data are unavailable for many Eastern European nations and consequently data from the datasets accompanying Gallup, Sachs, and Mellinger (1999) were

[4] *Polityiv* comes from the Polity IV project and is defined as the democracy score minus the autocracy score and varies between 10 (very democratic) and -10 (very autocratic). All countries in the sample have a score of zero or above following PT's definition of a democracy.

[5] Dulleck and Frijters (2004) propose a model in which elites in resource-rich countries have little incentive to develop a modern sector from which they can extract limited rents when they can extract large rents from "old sectors". This is supported by Jensen and Wantchekon (2004) who show that there is evidence to suggest that democratic transition and consolidation in Africa is hampered by a large natural resource sector. Acemoglu (2005) shows that in autocratic states, an elite may prefer inefficient institutions if they provide for greater rent extraction. The literature on democratic transitions, is also relevant. This includes the work of Acemoglu and Robinson (2001) who demonstrate that Western elites only extended the franchise when the threat of revolution was credible and limited redistribution could no longer sustain their rule. Similarly Acemoglu and Robinson (2000) present a model in which elites are forced to pick between full democratisation and repression, as a limited extension of the franchise or other concessions would be increase the demands of the majority since they would perceive the elite as being weak. The counterfactual case is described by Acemoglu, Robinson and Verdier (2004) in which elites are modelled as sustaining their rule by a process of "divide and rule". When these models are considered in concert with the evidence concerning natural resource extraction it is clear that there is ample evidence that democracy is commonly not in the interests of the ruling elite, and moreover that it is possible to conceive of natural resources as increasing the incentives for the elite to cling on to power, and their ability to do so.

[6] They also compile another new variable *fractal* which measures the extent to which a countries borders are straight, premised on the basis that states created by treaty or external interference are more likely to have straight borders and those that are the product of an evolutionary process to have complex-shaped borders. Unfortunately, *fractal* is not a good predictor of *polityiv.*

also used. [7] The data are not identical for those observations for which data were available from both sources, due to slight differences in definition. Consequently, a new variable using both datasets was created using multiple imputation, denoted *iLat01* which describes distance from the equator.

The other candidate control variables are largely from Persson and Tabellini (2003). *Engfrac* describes the proportion of the population speaking English as a first language, *Eurfrac* is the same but for the major European languages English, French, German, Portuguese, or Spanish. *engfrac* and *eurfrac* are included based upon the work of Hall and Jones (1999) and, to a lesser extent, Acemoglu, Johnson, and Robinson (2001). The variables *con*2150*, con*5180*, con*81 are indicator variables which describe whether the current constitution was promulgated between 1921 and 1950, 1951-1980 or post-1981 with 1920 or earlier the omitted category. The inclusion of these variables is designed to represent the well-documented notion of different waves of democratization. These waves coincided with systematic variations in what constitutions were chosen, as discussed in more detail in Persson and Tabellini (2003) and Rockey (2007). The variables *age* and *demage* describe how long a country has been a democracy. *demage* is defined by the start of a continuous set of positive Polity values excluding any interruptions due to foreign occupation. The Polity variable records the difference between the score given by the Polity IV database for the extent of institutionalised autocracy and the degree of institutionalised democracy with a score between of –10 (very autocratic) to +10 (very democratic). *age* is defined as 2000-*demage*. Also included are the variables, proposed by Rockey (2007): *mthconstit* and *mthelect* which are new measures of when a country first promulgated a democratic constitution, and when it held its first democratic election respectively. These variables are argued to represent a useful alternative to *age*. They were compiled by applying two sets of objective criteria to the development of democracy in each country in Persson and Tabellini's (2003) dataset. These criteria and are designed to better capture the variety in the democratisation experience of different countries. *logyl* denotes log income per capita. Finally indicator variables are included for whether a country has a federal government (*federal*) or was colonized by the UK, Spain, or another European nation discounted by time since independence (*coluka, colespa, colotha*) and finally which continent it is part of (*africa, asiae, laam*). Summary statistics for these variables are reported in Table 1.

[7] In particular Belarus; Czech Republic; Estonia; Latvia; Russia; Slovakia; and the Ukraine.

5 Results

This section will be organised as follows. Firstly, it will discuss the results and implications of a benchmark specification presented in Table 2. Then the results of the same analysis but using *partitioned* in place of *polityiv* are considered in Table 3. The second part of this section will analyse the implications of some robustness tests using a Markov-Chain-Monte-Carlo (MC^3) estimation approach that simultaneously performs BMA and the identification of outliers, the results of which are presented in Table 3. Some other robustness tests of the assumptions in section 3 are also discussed briefly.

The results from a benchmark specification in Table 2 show that *pres* has a PIP of 99.7%. This implies that *pres* is included in almost every likely model. The posterior mean associated with *pres* is -0.12 which implies that workers in countries with a presidential system receive a share of value added 12 percentage points less than their counterparts in parliamentary democracies. This is especially striking given the small range of values of *mean*9094 which has a standard deviation of only 0.14. However, none of the other constitutional variables had high PIPs. This is perhaps surprising, but suggests that the dimension of variation that is important is the presence (or not) of a presidential system.

There are several possible explanations. One is that the greater separation of powers in presidential systems means that any legislative majority is less able to act as residual claimants and that policies favouring workers are more likely to be enacted. Alternatively, perhaps the explanation is that presidencies are less likely to have institutionalized lobby groups or are less responsive to them.

Table 2 also confirms the Rodrik (1999) finding that income per capita is a similarly important determinant of the labour share, with richer countries paying their workers a greater share of output. The African continent dummy, and the predicted share of trade in national income (*frankrom*) also have PIPs of over 90%. Why African countries and countries likely to trade more than average should be expected to have a higher labour share is not clear and is not analysed in detail here. Three measures of the age of democracy have intermediate PIPs (*con*2150, *con*81, and *mthconst)* which poses the question of whether they sometimes substitute for each other. However, inspection of a chart (not reported) displaying the composition of each model shows that if anything they tend to enter models together. Furthermore, the results are robust to the exclusion of all of the age-of-democracy variables from the analysis.

Table 3 reports BMA results using *partitioned* rather than *polityiv* among the candidates for controls. The main results are robust to this change: *Pres* has a high PIP of 98.7% while *partitioned* has a large PIP of 89.4%. Also the importance of some other covariates increases dramatically, notably *con*2150*, mthconst,* and *federal. A* smaller sample is available for *partitioned* as it cannot be calculated for islands. To ensure that this high PIP for *partitioned* was not a consequence of the smaller sample available, the benchmark specification was re-estimated using only those observations for which data on *partitioned* are available. The results (not reported here) show that where N is only 44 as opposed to 61, the PIP of *polityiv* remains almost zero whilst the PIPs of *pres* and *logyl* remain above 90 percent.[8]

Outliers are a problem that can affect cross-country analyses, as discussed by Temple (1998). In the context of BMA standard post-estimation methods of outlier identification, such as DFITS, are not compatible with the Bayesian approach. Instead, the two-stage estimation method combining outlier detection and BMA proposed by Hoeting, Raftery, and Madigan (1996) will be used. First, possible outliers are identified by the robust estimator Least Trimmed Squares (LTS) as developed by Rousseeuw (1984). Secondly, a Markov Chain Monte Carlo (MCMC) algorithm is used to estimate the posterior distribution of models. However, unlike the earlier BMA analysis it estimates (6) and simultaneously the posterior distribution of the outliers identified by the LTS estimation. Further details are contained in Appendix A. The results of this estimation method are contained in Table 4. The results confirm that *pres* has a PIP of nearly 100%, but also suggest Honduras and Ireland are outliers with 75% and 79% probability respectively. This method was repeated for the model containing *partitioned* as reported in Table 5. The results suggest that the alternative model is also outlier robust, with a reported PIP of over 99 percent for *pres* and a similar set of likely control variables.

A variety of other robustness tests were also performed. The results are as expected given the close to zero PIP of the constitutional variables other than *pres.* Tests included using the original variables describing constitutional form rather than those derived from the principal components analysis, using binary variable versions of the principal components, principal components derived from subsets of the constitutional variables, using *fractal* rather than *partitioned,* and including a wide range of interaction terms involving *age, polityiv,* and the

[8] There are 44 not 45 observations for which there are data on *polityiv* and *partitioned.* This is because there are data on *partitioned* but not *polityiv* for Belize.

constitutional variables.

OLS estimates of the most likely models identified in the BMA and MC^3 analyses with Huber-White robust standard errors are reported in Table 6. Again *pres* has an estimated coefficient of around -0.12 and is significant at the 1% level. However, some caution is necessary when interpreting these results, since when estimating a model identified through extensive model selection, conventional t-ratios are generally biased away from zero. But, taken as a whole the BMA, MC^3 and OLS results all point in the same direction: presidential democracies pay significantly lower wages. Moreover, since BMA helps to circumvent traditional issues concerning model uncertainty, there is little to suggest that the main finding is not unusually robust.

6 Conclusions

This paper was motivated by a simple question. If, as Rodrik (1999) claims, 'democracies pay higher wages', why do workers in some democracies receive a larger share of value-added than others? In particular, this paper has argued that different constitutional rules may alter the relative balance of power in wage negotiations. The results provide support for one of the hypotheses discussed in the introduction: that a president may veto legislation designed to benefit workers. All of the estimates obtained suggest that, on average, a Presidential system is associated with a labour share 12 percentage points lower than in parliamentary democracies. This is almost one standard deviation across countries, and given the robustness of the methodology used, the findings suggest that constitutions affect labour market outcomes in a quantitatively important as well as statistically significant way.

This empirical evidence is interesting in itself, and suggests that it would be desirable to develop a formal theoretical analysis of the political economics of the wage bargaining process. This task is far from trivial, due to the myriad factors that combine to influence both the political process and the labour market, but an obvious point of departure might be the work of Grossman and Helpman (2006) and Persson, Roland, and Tabellini (2000).

This paper used the labour share in manufacturing as the dependent variable. Further empirical work might consider the influence of constitutions on the aggregate labour share. Drawing on the work of Gollin (2002), the role of the self-employed could be investigated. This also raises the question of whether

regimes that engender a higher labour share simultaneously reduce the returns to self-employment.

7 Appendix A: Data and Computation

The Factor Share Data

Data on labour shares were downloaded from on the 9th of January 2006 from the United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database 2005 at the 3-digit level of ISIC Code (Revision 2), from ESDS International, (MIMAS) University of Manchester. Data was unavailable for the following countries described by PT's dataset: Czech Republic, Dominican Republic, Estonia, Guatemala, Latvia, Nicaragua, Papua New Guinea, Portugal, St Vincent & Grenadines, Switzerland, Uganda, and the Ukraine. Also, the data for Germany are data for West-Germany for 1990-'92. The calculated labour share of output is 0.62 for the entirety of Germany for the period 1998-2000 and 0.42 for Western Germany for the period 1990-'92. The data for West Germany is chosen premised on the idea that the effects of the form of democracy should only impact upon the democratic part of Germany. The averages are based upon only one observation for Gambia, Namibia, and Paraguay, but the results are robust to their (and Germany's) omission.

Computational Methods

The BMA was performed using code written in 'R' the GNU version of S^+. The particular package used, bicreg, was Ian S. Painter's translation from the S^+ code by Adrian Raftery and revised by Chris Volinsky. The MC^3 estimates were arrived at using Ian S. Painter's translation of Jennifer Hoeting's S^+ code. More precisely, the BMA estimates were obtained considering all models that at most were 100 times less likely than the model identified as most likely. The hyperparameters used for the MC^3 estimation were those recommended in Hoeting, Madigan, and Raftery (1996). In particular the prior probability that an observation was an outlier was set as 0.02 for the estimates involving *polityiv* and not *partitioned* and 0.1 for the dataset using *partitioned* where there are fewer than 50 observations. The number of iterations used was 50,000 but the results were checked for stability up to 1,000,000 iterations for similar specifications to those used. All other calculations were performed using STATA.

Table 1: Summary Statistics

Variable	N	Mean	Std. Dev	Min	Max	Definition	Source
Dependent Variable							
mean9094	72	0.37	0.14	0.10	0.66	Average labour share of value added in manufacturing	UNIDO
Constitutional Variables							
pres	85	0.39	0.49	0.00	1.00	Equals 1 if Presidential regime, 0 otherwise.	PT
maj	85	0.39	0.49	0.00	1.00	Equals 1 if entirety of lower house is elected by plurality rule.	PT
spropn	76	0.13	0.25	0.00	1.00	Proportion of legislators elected from national electoral districts.	PT
magn	83	0.47	0.40	0.01	1.00	Inverse of district magnitude.	PT
pind	83	0.44	0.47	0.00	1.00	Proportion of lower house not elected using party lists.	PT
sdm	76	0.36	0.39	0.01	1.00	Average Inverse of district magnitude adjusting for number of districts of each size.	PT
g1	75	0.00	1.89	-1.88	2.78	First principle component of principle components analysis of maj, spropn, magn, pind, sdm	PCA
g2	75	0.00	1.02	-0.68	4.14	2^{nd} principle component	PCA
g3	75	0.00	0.50	-1.51	1.36	3^{rd} principle component	PCA
g4	75	0.00	0.34	-0.95	1.22	4^{th} principle component	PCA
g5	75	0.00	0.19	-0.70	0.34	5^{th} principle component	PCA
federal	83	0.16	0.37	0.00	1.00	Equals 1 if federal political system, 0 otherwise.	PT
Other Controls							
logyl	84	9.18	0.88	6.95	10.48	Natural log of income per capita measured in 1988	PT
polityiv	79	7.14	3.65	6.00	10.00	From Polity IV project DEMOC score minus AUTOC score, value of 10 is very democratic, -10 very autocratic.	PT
partitioned	55	21.57	25.86	0.00	99.00	Percentage of population belonging to an ethnic group split by a border.	AEM
engfrac	78	0.14	0.32	0.00	1.00	Percentage of population who speak English natively	PT
eurfrac	78	0.40	0.44	0.00	1.00	Percentage of population who speak a European language natively	PT
frankrom	78	2.87	0.84	0.94	5.64	Natural log of Frankel-Romer(1999) predicted trade share	PT
ilat01	85	30.75	18.46	1.22	67.47	Imputed absolute deviation from the equator	MI

Measures of Democratic Age							
age	85	0.21	0.22	0.03	1.00	2000- date when polityiv score first became permanently positive, measure of inception of democracy.	PT
con2150	85	0.11	0.31	0.00	1.00	Dummy equal to 1 if country became a democracy between 1921 & 1950, 0 otherwise	PT
con5180	85	0.29	0.46	0.00	1.00	Dummy equal to 1 if country became a democracy between 1951 & 1980, 0 otherwise	PT
con81	85	0.49	0.50	0.00	1.00	Dummy equal to 1 if country became a democracy after 1981, 0 otherwise	PT
mthconst	85	0.54	0.57	0.04	2.58	Date when democratic constitution was promulgated	CH3
mthelect	85	0.51	0.48	0.04	2.07	Date when first democratic elections were held	CH3
Continent and Colony Dummy Variables							
laam	85	0.27	0.45	0.00	1.00	Dummy variable equal to 1 if country is in Latin America, Central America, or the Caribbean, 0 otherwise	PT
africa	85	0.13	0.34	0.00	1.00	Dummy variable equal to 1 if country is in Africa, 0 otherwise	PT
asiae	85	0.15	0.36	0.00	1.00	Dummy variable equal to 1 if country is in East Asia, 0 otherwise	PT
coluka	85	0.28	0.39	0.00	0.93	Variable equal to 1 if country was a former UK colony discounted by number of years since independence	PT
colespa	85	0.06	0.13	0.00	0.79	Variable equal to 1 if country was a former Spanish colony discounted by number of years since independence	PT
colotha	85	0.22	0.36	0.00	0.98	Variable equal to 1 if country was a former colony of a country other than Spain Portugal and the UK discounted by number of years since independence	PT

PT indicates that the data are taken from the database accompanying Persson and Tabellini (2003, 2004). UNIDO indicates that the data are from the United Nations Industrial Development Organization (UNIDO), Industrial Statistics Database 2005 at the 3-digit level of ISIC Code (Revision 2), downloaded from ESDS International, (MIMAS) University of Manchester. CH3 indicates that the variable was created according to the criteria discussed in Chapter 3, MI indicates that the variable was constructed using multiple imputation as described in the data appendix, PCA indicates that the variables are constructed on the basis of a principal components analysis, all other sources as described. AEM denotes that the data are those developed by Alesina, Easterly, Matuszeski (2006).

Table 2: BMA estimates including *polity*

Dependent Variable: *mean9094* – Average labour share of value- added in manufacturing 1990-1994								
Variable	Posterior Inclusion Probability	Posterior Expected Value	Posterior Standard Deviation	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	100.0	-0.438	0.194	-0.502	-0.480	-0.490	-0.386	-0.413
pres	99.6	-0.114	0.030	-0.117	-0.113	-0.114	-0.117	-0.100
logyl	99.2	0.078	0.021	0.084	0.083	0.083	0.069	0.070
africa	90.9	0.103	0.052	0.114	0.107	0.121	0.107	0.109
frankrom	90.7	0.037	0.019	0.042	0.044	0.040	0.043	0.040
con5180	32.0	-0.015	0.026		-0.046			
con2150	27.9	0.016	0.031			0.054		
mthconst	18.9	0.007	0.019				0.033	
engfrac	16.7	-0.011	0.031					
ilat01	9.1	0.012	0.046					0.116
g5	5.6	0.003	0.019					
coluka	4.6	0.002	0.015					
federal	4.5	-0.002	0.013					
eurfrac	4.4	-0.001	0.009					
laam	3.9	-0.002	0.013					
g4	2.2	0.000	0.006					
g2	2.0	0.000	0.002					
age	0.7	-0.001	0.009					
g1	0.0	0.000	0.000					
g3	0.0	0.000	0.000					
polityiv	0.0	0.000	0.000					
mthelect	0.0	0.000	0.000					
asiae	0.0	0.000	0.000					
N	61							
R^2				0.616	0.637	0.633	0.629	0.628
BIC				-41.95	-41.26	-40.55	-39.88	-39.81

The dependent variable is the mean of the labour share of value-added in manufacturing in the period 1990-1994. The variables are sorted by their posterior inclusion probabilities (PIPs): the sum of the posterior probabilities of those models which include that variable. The posterior expected value is the weighted average of the expected value in each model, weighting using the Posterior Model Probability (PMP) of each model. The posterior standard deviation is calculated using the same approach but using the standard deviations in each model. Models 1-5 are the 5 most likely models based assessed on their PMPs, and describe the variables included in those models and their coefficients. The variables g1-g5 are derived from a principal components analysis of the five measures of constitutional type:- *maj, magn, pind, sdm,* and *spropn*.

Table 3: BMA estimates using *partitioned* instead of *polity*

Dependent Variable: mean9094 – Average labour share of value- added in manufacturing 1990-'94								
Variable	Posterior Inclusion Probability	Posterior Expected Value	Posterior Standard Deviation	Model 1	Model 2	Model 3	Model 4	Model 5
Intercept	100.0	-0.233	0.345	-0.289	-0.183	-0.152	-0.279	-0.307
africa	98.9	0.182	0.056	0.183	0.196	0.188	0.200	0.192
pres	98.7	-0.120	0.038	-0.132	-0.116	-0.123	-0.100	-0.124
partitioned	89.4	-0.001	0.001	-0.001	-0.002	-0.001	-0.002	-0.001
logyl	87.7	0.059	0.035	0.069	0.060	0.057	0.060	0.071
con2150	87.7	0.107	0.060	0.147	0.116	0.125	0.103	0.134
monthconstit	86.0	0.062	0.036	0.076	0.073	0.070	0.062	0.079
federal	74.1	-0.071	0.054	-0.101	-0.109	-0.101	-0.077	-0.110
g5	47.5	0.066	0.089	0.125		0.114		
frankrom	46.2	0.020	0.026				0.033	
con81	28.7	0.015	0.028	0.052				0.046
asiae	15.5	-0.013	0.037					
g3	10.9	-0.008	0.028					
g2	5.7	-0.001	0.004					
laam	5.7	0.002	0.020					
coluka	5.5	0.003	0.016					
age	4.4	-0.004	0.027					
ilat01	3.9	0.000	0.035					
con5180	3.1	-0.001	0.008					
eurfrac	1.7	0.000	0.006					
g4	0.1	0.000	0.002					
g1	0.0	0.000	0.000					
N	45							
R2				0.806	0.769	0.788	0.786	0.784
BIC				-39.503	-39.282	-39.256	-38.969	-38.423

The dependent variable is the mean of the labour share of value-added in manufacturing in the period 1990-1994. The variables are sorted by their posterior inclusion probabilities (PIPs): the sum of the posterior probabilities of those models which include that variable. The posterior expected value is the weighted average of the expected value in each model, weighting using the Posterior Model Probability (PMP) of each model. The posterior standard deviation is calculated using the same approach but using the standard deviations in each model. Models 1-5 are the 5 most likely models based assessed on their PMPs, and describe the variables included in those models and their coefficients. The variables g1-g5 are derived from a principal components analysis of the five measures of constitutional type:- *maj, magn, pind, sdm,* and *spropn*.

Table 4: MC^3 estimates including *polity*

Dependent Variable: mean9094 – Average labour share of value- added in manufacturing 1990-'94						
Variable	Posterior Inclusion Probability	Model 1	Model 2	Model 3	Model 4	Model 5
pres	0.996	✓	✓	✓	✓	✓
logyl	0.993	✓	✓	✓	✓	✓
africa	0.939	✓	✓	✓	✓	✓
con2150	0.828	✓	✓	✓		✓
con81	0.718	✓	✓	✓		✓
mthconst	0.697	✓	✓	✓		✓
Federal	0.633	✓	✓	✓		✓
Coluka	0.432	✓		✓		
Frankrom	0.356				✓	
g5	0.266			✓		✓
ilat01	0.132					
Age	0.108					
con5180	0.088					
Engfrac	0.070					
Mthelect	0.070					
g3	0.060					
eurfrac	0.058					
polityiv	0.055					
g4	0.054					
laam	0.053					
g1	0.046					
asiae	0.041					
g2	0.034					
Possible Outliers	Posterior probability of being an outlier					
Ireland	0.799	✓	✓	✓		✓
Honduras	0.758	✓	✓	✓		✓
Turkey	0.053					
Belgium	0.046					
Sri Lanka	0.023					
Germany	0.014					
Poland	0.011					
Malawi	0.008					
Greece	0.006					
Bolivia	0.005					
Venezuela	0.003					
N	61					
Posterior Model Probability		0.050	0.028	0.028	0.014	0.013

Notes: See Table 5.

Table 5: MC^3 estimates using *partitioned* instead of *polity*

Dependent Variable: mean9094 – Average labour share of value- added in manufacturing 1990-1994						
Variable	Posterior Incusion Probability	Model 1	Model 2	Model 3	Model 4	Model 5
logyl	0.996	✓	✓	✓	✓	✓
pres	0.993	✓	✓	✓	✓	✓
africa	0.993	✓	✓	✓	✓	✓
con2150	0.889	✓	✓	✓	✓	✓
federal	0.817	✓	✓	✓	✓	✓
mthconst	0.790	✓	✓	✓	✓	✓
g5	0.497	✓		✓		✓
con81	0.442	✓		✓		✓
partitioned	0.284		✓			
coluka	0.240					
frankrom	0.152					
ilat01	0.117					
asiae	0.110					
laam	0.088					
age	0.086					
g3	0.083					
mthelect	0.079					
con5180	0.069					
g1	0.050					
g4	0.047					
g2	0.037					
Possible Outliers	Posterior probability of being an outlier					
Honduras	0.985	✓	✓	✓	✓	✓
Belgium	0.361	✓		✓		✓
Turkey	0.252	✓		✓		
Poland	0.099			✓		
Malawi	0.091					
Ghana	0.039					
Denmark	0.038					
Bolivia	0.019					
South Africa	0.011					
N	45					
Posterior Model Probability		0.050	0.028	0.028	0.014	0.013

The dependent variable is the mean of the labour share of value-added in manufacturing in the period 1990-1994. Estimates obtained using the MC^3 estimator. The variables are sorted by their posterior inclusion probabilities (PIPs): the sum of the posterior probabilities of those models which include that variable. Models 1-5 are the 5 most likely models based assessed on their PMPs, and describe the variables included, and observations identified as outliers, in those models. The variables g1-g5 are derived from a principal components analysis of the five measures of constitutional type:- *maj, magn, pind, sdm,* and *spropn*

Table 6: OLS estimates of models identified as being likely based on the BMA results

Dependent Variable: mean9094 – Average labour share of value- added in manufacturing 1990-1994				
	(1)	(2)	(3)	(4)
pres	-0.11	-0.11	-0.13	-0.12
	(0.03)***	(0.03)***	(0.02)***	(0.03)***
logyl	0.08	0.06	0.09	0.07
	(0.15)***	(0.03)*	(0.02)***	(0.03)***
africa	0.10	0.18	0.11	0.19
	(0.03)***	(0.04)***	(0.03)	(0.04)***
frankrom	0.04			
	(0.01)***			
partitioned		-0.00		-0.00
		(0.00)**		(0.00)**
con2150		0.11	0.14	0.11
		(0.05)**	(0.03)***	(0.04)**
con81			0.07	
			(0.02)***	
monthconstit		0.07	0.06	0.06
		(0.02)***	(0.02)***	(0.02)***
federal		-0.09	-0.08	-0.08
		(0.29)***	(0.02)***	(0.03)***
coluka			0.48	
			(0.03)	
N	69	47	69	46
Nvars	4	7	8	7
R^2	0.61	0.75	0.79	0.81

Note: Estimation by OLS. Robust standard errors in parentheses where * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Constant term is included in each regression but not reported. Column 1 reports OLS estimates of the model suggested as being most likely by the BMA analysis reported in table 2. Column 2 reports OLS estimates of the model suggested as being most likely which does not include g5 by the BMA using partitioned reported in table 3. Columns 3 and 4 report results based on the corresponding MC3 analyses.

References

Acemoglu, Daron, "Constitutions, politics, and economics: A review essay on Persson and Tabellini's The Economic Effects of Constitutions," *Journal of Economic Literature*, 2005, *43* (4), 1025–1048. 48.

___ , "Modelling Inefficient Institutions," in Richard Blundell, Whitney Newey, and Torsten Persson, eds., *Advances in Economic Theory, Proceedings of World Congress 2005*, Cambridge University Press 2006.

___ **and James A. Robinson**, "Democratization or repression?," *European Economic Review*, 2000, *44* (4-6), 683–693.

___ **and** ___ , "A theory of political transitions," *American Economic Review*, 2001, *91* (4), 938–963.

___ , ___ , **and Thierry Verdier**, "Alfred Marshall Lecture: Kleptocracy and Divide-and-Rule: A Model of Personal Rule," *Journal of the European Economic Association*, 2004, *2* (2-3), 162–192.

___ , **Simon Johnson, and James A. Robinson**, "The colonial origins of comparative development: An empirical investigation," *American Economic Review*, 2001, *91* (5), 1369–1401. 82.

Alesina, Alberto, William Easterly, and Janina Matuszeski, "Artificial States," 2006.

Dulleck, Uwe and Paul Frijters, "Why the US and not Brazil? Old Elites and the Development of a Modern Economy," May 2004. Vienna Economics Papers.

Gallup, John Luke., Jeffrey D. Sachs, and Andrew D. Mellinger, "Geography and economic development," *International Regional Science Review*, 1999, *22* (2), 179–+.

Gollin, Douglas, "Getting income shares right," *Journal of Political Economy*, 2002, *110* (2), 458–474.

Grossman, Gene M. and Elhanan Helpman, "A protectionist bias in majoritarian politics," *Quarterly Journal of Economics*, 2005, *120* (4), 1239–1282.

Hall, Robert E. and Charles I. Jones, "Why do some countries produce so much more output per worker than others?," *Quarterly Journal of Economics*, 1999, *114* (1), 83–116. 58.

Helpman, Elhanan and Torsten Persson, "Lobbying and Legislative Bargaining," *Advances in Economic and Analysis and Policy*, 2001, *1* (1), 3.

Hoeting, Jennifer, Adrian E. Raftery, and David Madigan, "A method for simultaneous variable selection and outlier identification in linear regression," *Computational Statistics & Data Analysis*, 1996, *22* (3), 251–270.

___ , ___ , ___ , and Chris T. Volinsky, "Bayesian model averaging: A tutorial," *Statistical Science*, 1999, *14* (4), 382–401.

Jensen, Nathan and Leonard Wantchekon, "Resource wealth and political regimes in Africa," *Comparative Political Studies*, 2004, *37* (7), 816–841. 39.

Kass, Robert E. and Adrian E. Raftery, "Bayes Factors," *Journal of the American Statistical Association*, 1995, *90* (430), 773–795.

Lee, Myoung-Jae, *Micro-Econometrics for Policy, Program and Treatment Effects* Advanced Texts In Econometrics, 1st ed., Oxford, Uk: Oxford University press, 2005.

Lijphart, Arend, *Patterns of Democracy: Government Forms and Performance in Thirty-sex Countries*, paperback ed., New Haven, London: Yale University Press, 1999.

Miller, Alan, *Subset Selection in Regression*, 2nd ed., London: CRC Press Inc, 2002.

Persson, Torsten and Guido Tabellini, *The Economic Effects of Constitutions* Munich Lectures in Economics, 1st ed., Cambridge, MA: MIT Press, 2003.

___ and ___ , "Constitutional rules and fiscal policy outcomes," *American Economic Review*, 2004, *94* (1), 25–45. 29.

___ , Gérard Roland, and Guido Tabellini, "Separation of powers and political accountability," *Quarterly Journal of Economics*, 1997, *112* (4), 1163–1202. 32.

___ , ___ , and ___ , "Comparative politics and public finance," *Journal of Political Economy*, 2000, *108* (6), 1121–1161. 50.

Raftery, Adrian E., David Madigan, and Jennifer A. Hoeting, "Bayesian model averaging for linear regression models," *Journal of the American Statistical Association*, 1997, *92* (437), 179–191.

Rockey, James, "Constitutional Rules and Fiscal Policy: Three Problems, Two Solutions?," October 2007.

Rodrik, Dani, "Democracies pay higher wages," *Quarterly Journal of Economics*, 1999, *114* (3), 707–738.

Rousseeuw, Peter J., "Least Median of Squares Regression," *Journal of the American Statistical Association*, 1984, *79* (388), 871.

___ and Annick M. Leroy, *Robust Regression and Outlier Detection* Wiley Series in Probability and Mathematical Statistics, 1st ed., New York: John Wiley, 1987.

Temple, Jonathan R. W., "Robustness tests of the augmented Solow model," *Journal of Applied Econometrics*, 1998, *13* (4), 361–375.

UNIDO, "Industrial Statistics Database," 9/1/2006 2006.