

THE POLITICS OF ECONOMIC POLARIZATION IN PERU

Michael R. Carter†
University of Wisconsin, Madison

John Morrow††
University of Wisconsin, Madison

July 2008

ABSTRACT. We develop a political economy model of forward-looking voters who consider their expected future incomes (income dynamics) as they form their political and policy preferences. Whether these forward-looking voters will be more or less radical than myopic voters depends fundamentally on the economy's underlying income distribution dynamics. We show in this paper that the sort of dynamics that would characterize what Adolfo Figueroa has called 'Sigma Society' would be expected to generate increasing political polarization and demand for redistribution over time. We then estimate the actual pattern of income distribution dynamics over the last decade in Peru and show that the estimated dynamics imply an increasing radicalization of forward-looking voters. This prediction is consistent with both recent electoral outcomes and with the observed trend in voters' self-reported ideological affiliations.

Keywords: income dynamics, redistributive politics, polarization, Latin America.

JEL Codes: D31, D72, D83, P16.

† Department of Ag and Applied Economics, mrcarter@wisc.edu

†† Department of Ag and Applied Economics, morrow1@wisc.edu.

Acknowledgments. We thank Jorge Aguero, Brad Barham, Swati Dhingra and Shiv Saini for insightful comments as well as seminar participants at UW-Madison and Midwest International Economic Development Conference.

1. INTRODUCTION

Recent presidential elections in Peru, like those in its neighbors, have been hotly contested, ideologically divided, and resulted in the election of left-wing candidates. While there are many reasons for this leftward shift amongst the Latin American electorate,¹ this paper focuses on an economic explanation that takes seriously the proposition that individuals vote their economic interests. Specifically, this paper shows that when income distribution dynamics are polarizing, the political preferences of forward-looking voters may be surprisingly progressive and evolve in ways that are consistent with the recent Latin American electoral experience. From this perspective, voting behavior provides a clue to the underlying dynamic economic structure, a suggestion that we corroborate with econometric analysis of income distribution data.

In his recent work “La Sociedad Sigma,” Adolfo Figueroa supplies one set of mechanisms that could generate polarizing income distribution dynamics. Picking up on themes developed in earlier work (Figueroa et al., 1996), Figueroa (2003) argues that income polarization can result from the tripartite exclusion of a social group (the “outs”) from: (1) Markets, because they are too poor to leverage capital; (2) Social Relations, because they have the ‘wrong’ cultural characteristics; and, (3) Political Relations, because they are too weak. The “outs” get stuck at a low income level, while the “in’s” are able to move ahead.

As discussed more in section 2 below, recent work on poverty traps and income distribution dynamics corroborates the insights of Figueroa and his colleagues: social and economic exclusion are necessary conditions for the existence of poverty traps. Section 3 then moves on to summarize a model of political preferences and voting behavior (full details are given in Morrow and Carter, 2008b). The model builds on the insight of Benabou and Ok (2001) who argue that voters in a growing economy should be non-myopic

¹Alternative explanations of this electoral shift include the fact that in some countries the political space for left participation has only recently opened. Others might argue that the leftward shift represents economically irrational behavior by voters swayed by the populist rhetoric of what Castaneda (2006) has dubbed the “wrong left.”

or forward-looking. But unlike Benabou and Ok, who show that forward-looking citizens may be surprisingly conservative even in high inequality societies, we show that voting patterns can be unstable but with a leftward drift in the presence of poverty traps or multiple equilibrium income distribution dynamics. Our work thus complements recent political economy work (such as Acemoglu and Robinson, 2006; Boix, 2003) that focuses on the political implications of (static) economic inequality.² Given Kaufman's (2007) recent work on the empirical impotence of static inequality-based models of voter behavior, our work suggests that the addition of dynamics to political economy models offers important insights.

Section 4 then uses data from SEDLAC to estimate the pattern of income distribution dynamics in Peru since 1990. The estimated pattern identifies the type of multiple equilibria process that would be predicted to generate a leftward shift in voting behavior over time. Latinobarametro data further corroborates this pattern with evidence of increasingly polarized ideological preferences. Section 5 closes the paper with reflections on further work needed to better understand the politics of economic polarization.

2. INCOME DISTRIBUTION DYNAMICS IN SIGMA SOCIETIES

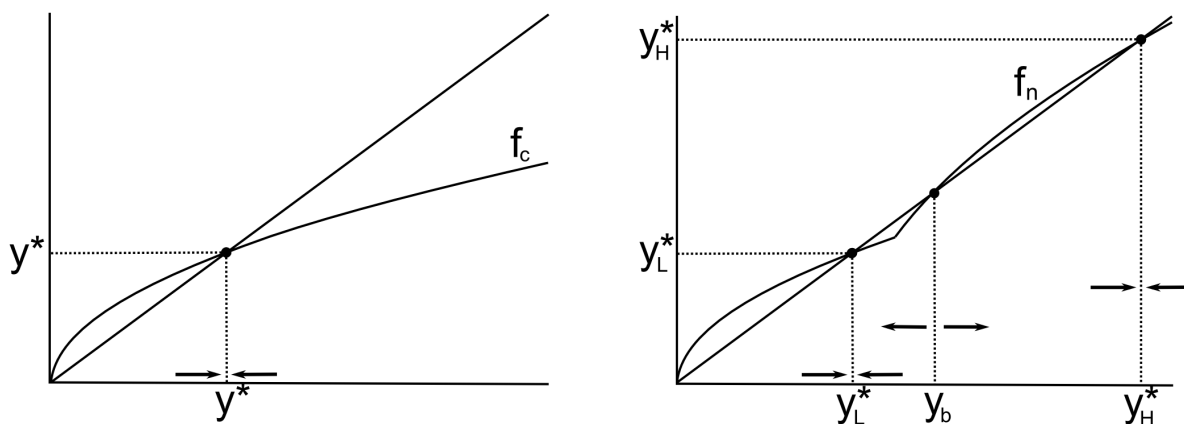
The Solow model of neoclassical economic growth relies on an assumption of diminishing returns to capital to hypothesize that poorer nations will tend to catch up over time, or converge, with the incomes of richer nations. When transported to the individual or microeconomic level, the Solow assumptions (concave technology and absence of risk, and, or perfect financial markets) imply a process of diminishing inequality and convergence among the population of a single country.

The upper panel in Figure 1 displays the concave income distribution dynamics that the standard neoclassical model generates. The horizontal axis displays the individual income at period t . The vertical axis displays income in the subsequent period $t + 1$. The concave income transition function, $f_c(y_t)$, maps current into future income: $y_{t+1}^i =$

²Yashar places such approaches in a broader context and critiques them in relation to explaining recent indigenous political movements (Yashar, 2005, pgs. 11-17).

$f_c(y_t^i)$.³ Note that this concave transition process implies a unique long-term or steady state income level, y^* , at the point where $f_c(y_t)$ crosses the 45-degree line. Under this transition process, individuals who begin with incomes below the steady state level will converge towards it, while those who begin above the steady state level will drop back towards it. Note that this sort of concave income distribution process offers prospects of upward mobility (POUM) to voters whose initial income levels are less than the steady state income level.

FIGURE 1. POUM and POZUM Income Transitions.



The convergence or upward mobility hypothesis has generated substantial debate at the macroeconomic level: Do initially poorer nations catch up with wealthier ones? This debate includes both theoretical controversies (are there increasing returns that trap poorer nations in a low level equilibrium, while initially wealthier nations takeoff to a higher equilibrium outcome?), as well as empirical disagreements over whether or not convergence really was taking place.⁴

Analogues to these macroeconomic debates also exist at the microeconomic level. The increasingly well developed theory of poverty traps suggests a number of mechanisms that can trap households at low living standards (see the review in Carter and Barrett,

³We assume that the transitions function preserve relative rankings in the income distribution such that an individual j with a higher period t income than an individual k will always also have a higher income in period $t + 1$.

⁴For an early review of both the theoretical and empirical controversies, see (Romer, 1994). A more recent review with a theoretical emphasis is (Azariadis and Stachurski, 2005).

2006). Central to all of these theories of poverty traps is exclusion from financial markets.⁵ Put differently, if households have access to loan markets and insurance instruments, then even when confronted by locally increasing returns to scale and risk, they can successfully engineer a strategy to obtain the assets needed to jump to a high level equilibrium. But absent access to those financial markets, households below a critical initial asset level will remain stuck in a low level, poverty trap equilibrium.

The right panel in Figure 1 illustrates the sorts of income transition dynamics implied by a poverty trap model (for empirical examples see Lybbert et al. (2004) and Adato et al., 2006). The non-concave income transition function, $f_n(y_t)$, maps incomes in period t into incomes in period $t + 1$. As can be seen, this non-concave transition function has multiple crossings of the 45-degree line and thus admits multiple equilibria: y_H^* is the high income steady state; while, y_L^* is the low level steady state. Bifurcation occurs around the unstable point y_b . Households that begin with incomes in excess of y_b will tend toward the high level equilibrium while those that begin below this critical threshold will head towards the low level, poverty trap equilibrium, y_L^* . In contrast to an economy with a concave income transition function, economic polarization will occur and inequality can deepen if income transitions are governed by a non-concave function like $f_n(y_t)$.⁶

While economic models of asocial people can generate multiple equilibria, people in the real world are embedded in complex webs of social and political relationships. These relationships can potentially substitute for market relationships. Individuals unable to leverage capital from the banking system may be able to borrow money or manage risk through social networks and relationships.⁷ Similarly, a family unable to sustain investment in child nutrition and schooling may be able to nonetheless secure the human capital of their children if they are positioned to demand that the government provide adequate public education and social insurance.

⁵There is now a plethora of theory about why financial markets are often thin, missing and, or biased against low wealth agents. For a recent contribution, see (Boucher et al., 2007).

⁶Strictly speaking, this non-concave income transition function implies increasing polarization, not necessarily increasing inequality, as Esteban and Ray discuss (Esteban and Ray, 1994).

⁷See for instance (Bloch et al., 2005; Chantarat and Barrett, 2007).

While people’s sociability and social relationships may indeed solve the conundrum of missing or wealth-biased financial markets, Adolfo Figueroa’s work calls our attention to the fact that individuals with low social assets (cultural and political) may be excluded from social access to capital as surely as low wealth individuals are excluded from market-mediated access to finance. Figueroa’s Sigma Society is one in which a group of individuals is systematically excluded from both market and social access to capital.

Mogues and Carter (2005) provide microeconomic foundations for this sort of social exclusion. In their model, individuals can potentially substitute for missing financial markets by investing in social relationships that can be used to collateralize inter-temporal transactions for insurance or capital. However, individuals are also tagged with a social identity (language or ethnicity) which constrains their ability to create economically valuable social ties with other social groups. As shown by Mogues and Carter, income distribution dynamics economies become sensitive to the distribution of the population across income and identity space. An initially polarized sigma society will tend to remain that way as it will generate the non-concave income distribution dynamics shown in the right panel of Figure 1.

3. FORWARD-LOOKING VOTERS AND THE POLITICS OF SIGMA SOCIETY

This section explores the political implications of the concave and non-concave income distribution dynamics discussed in the prior section. To carry out this exploration, we follow the political economy literature and consider voter preferences over a very simple class of redistributive government policies. Specifically, we define a class of redistribution schemes that are composed of a flat tax rate τ and an equal lump sum transfer that is paid out to all individuals $\tau\mu_t$, where μ_t is mean income at time t . Denote this redistribution scheme as $r_\tau(y; \mu_t)$ where if r_τ is enacted in period t , each individual i receives a net income transfer of

$$r_\tau(y_t^i; \mu_t) \equiv \tau\mu_t - \tau y_t^i$$

and a total post-tax and transfer income of $y_t^i + r_\tau(y_t^i; \mu_t) = (1 - \tau)y_t^i + \tau\mu_t$.

While this income redistribution scheme vastly simplifies the sorts of policies considered by real world governments, it allows us to focus on core selfish economic preferences for redistribution. In the analysis to follow, we will assume that individuals prefer the policy which gives them the highest post-tax and transfer income. While this assumption clearly simplifies policy preferences, it does allow us to focus on how preferences change over time (in response to income distribution dynamics) and how preferences depend on the policy time horizon and the degree to which voters are forward-looking in their voting behavior. In the analysis to follow, we will focus on voter preferences over two extreme policy options: a *laissez-faire* scheme that sets $\tau = 0$ (denoted r_0); and, a complete egalitarian redistribution scheme that sets $\tau = 1$ (denoted r_1). While neither of these options is likely to be observed in reality, if a voter prefers r_1 to r_0 , she will also prefer r_τ to $r_{\tau'}$ for any $\tau > \tau'$ and vice versa for a voter who prefers r_0 to r_1 .

3.1. A Myopic Median Voter Model of the Demand for Redistribution. A straightforward way to model preferences for redistribution would be to assume that voters consider their position in the income distribution at the moment in which they vote. Assuming that an election takes place in period 0 and letting F_0 denote the cumulative distribution of income at that time period, then the fractions of the population preferring the egalitarian redistribution scheme ($\tau = 1$) and the *laissez faire* scheme ($\tau = 0$) scheme are given by:

$$(3.1) \quad \text{Fraction of Pop. by Preference} = \begin{cases} \text{Egalitarian Redistribution,} & F_0(\mu_0) \\ \text{Laissez Faire,} & 1 - F_0(\mu_0) \end{cases}$$

Under this model, we would expect voters to elect candidates who promise redistribution if $F_0(\mu_0) > 50\%$. Note that this perspective is equivalent to a median voter model as the median voter will prefer redistribution if and only if $F_0(\mu_0) \geq 50\%$.

While seemingly a sensible portrayal of voters' core economic preferences, this simple median voter approach implies that there should be strong support for redistribution in any economy in which mean income exceeds median income (i.e., in every economy in

the world). Reflecting on Western democracies (especially the United States), Benabou and Ok (2001) note that political support for redistribution is substantially less than this myopic median voter model implies. While there are alternative explanations for this lack of support for redistribution,⁸ Benabou and Ok note that this model assumes that voters are myopic and only consider their current position in the income distribution, and fail to take into account that policies will persist over time and that their income levels (relative to mean income) will evolve over time. The possibility that Benabou and Ok emphasize is that the prospect of upward mobility will lead voters who are currently below the mean income level to vote against redistributive policies as they expect to be better off in future time periods. We turn now to consider that and other possible voting behaviors by non-myopic voters who face a more general class of income transition functions.

3.2. Forward Looking Preferences for “One-shot” Redistribution. As a first step toward a more satisfying model of redistribution preferences, consider a population that votes at time 0 for a one-shot redistribution that will take place in period 1 (after the election). In this case, individual i will prefer r_1 to r_0 at time t if and only if their income at time 1, y_1^i is less than the mean income at time 1 which is denoted μ_1 . Using the notation introduced in section 2 above, an individual's income in period 1 can be expressed as the following function of their income in time 0:

$$y_1^i = f(y_0^i)$$

for income transition function f . Letting f^{-1} denote the inverse income transition function, we can express the critical period 0 income level that will map exactly into mean period 1 income as $\tilde{y}_0 = f^{-1}(\mu_1)$. The voter with this critical period 0 income \tilde{y}_0 will

⁸For example, voters may exhibit false consciousness about their true class position or be manipulated by political parties into voting against their economic interests. Voters may of course care about values other than their economic well-being. John Roemer, for example, explains the surprising economic conservatism of the US electorate by reference to non-economic social values. Formally, he considers equilibrium party policies when the policy space includes both redistribution and a party position on salient social values (Roemer, 1998). His Theorem 5.1 implies that for sufficiently salient social values, if mean wealth is lower than the mean wealth of voters with the median social value then Left parties may not offer redistributive policies.

be indifferent between *laissez faire* and redistribution. More generally, a voter i sitting at time 0 will prefer r_1 to r_0 if and only if $f(y_0^i) \leq \mu_1$. Working backwards, the set of voters at time 0 who prefer r_1 will be compromise of those for whom $y_0^i < \tilde{y}_0$. Recalling that F_0 denotes the cumulative income distribution function for period 0, the set of set of r_1 – *preferring* voters is given by $F_0(\tilde{y}_0) = F_0(f^{-1}(\mu_1))$. More compactly, aggregate period 0 voting preferences for redistribution are given by:

$$(3.2) \quad \text{Fraction of Pop. by Preference} = \begin{cases} \text{Egalitarian Redistribution,} & F_0(\tilde{y}_0) \\ \text{Laissez Faire,} & 1 - F_0(\tilde{y}_0) \end{cases}$$

The difference between expressions (3.1) and (3.2) is subtle, but important. Note that in a world without any distributional change, the two expressions have identical implications, with equal numbers of voters preferring redistribution according to both the myopic and the one-shot, forward-looking models. However, to the extent that there are changes in the income distribution, then the two expressions have different implications. An expectation of upward mobility by initially less well-off individuals will tend to reduce the fraction of the population preferring redistribution under (3.2) versus (3.1). Conversely, downwardly mobility that affects low and middle income voters can have the opposite effect.

As we explore in greater detail below, whether or not forward-looking voters would exhibit more or less support for redistribution than would myopic voters will of course depend on the nature of the income transition function, f . Before turning to that issue, we first offer one more extension to our basic model of voter behavior.

Equation (3.2) gives the fraction of people who would vote for a redistributive candidate in period 0. However, the distribution of income changes each period through the income transition f which will cause changes in voters preferences. For instance, a

voter i with period 0 income y_0^i will have a period 1 income of $y_1^i = f(y_0^i)$ and a period 2 income of $y_2^i = f(y_1^i) = f(f(y_0^i))$. For ease of notation we write such sequential compositions of f with a superscript (t) denoting the number of compositions, i.e. $y_2^i = f(f(y_0^i)) = f^{(2)}(y_0^i)$. This dynamic movement of incomes implies that voter preferences in period t differs from that of period 0. By similar reasoning to that above, a voter i sitting at time t will prefer r_1 to r_0 if and only if $f(y_t^i) \leq \mu_{t+1}$ where μ_{t+1} is the mean income at period $t + 1$. The fraction of all such r_1 – preferring voters is given by the Fraction of individuals i with $f^{(t)}(y_0^i) = f(y_t^i) \leq \mu_{t+1}$ which can be written $F_0(\text{voters } i \text{ with } f^{(t)}(y_0^i) \leq \mu_{t+1}) = F_0(f^{(-t)}(\mu_{t+1}))$ where $f^{(-t)}$ is the inverse of $f^{(t)}$. Thus the fraction of r_1 -preferring voters, $F_0(f^{(-t)}(\mu_{t+1}))$ changes over time, depending on the nature of the income transition f .

3.3. General Forward Looking Demand for Redistribution Regimes. We now consider the more realistic case where voters consider a regime which will last for T periods rather than a one-shot redistribution. Most presidential systems elect a leader for four or five years, and we will assume that in voting for a candidate, citizens expect the candidates policies to last at least for the duration of the political term.⁹

Building on the approach of Benabou and Ok, we assume that voters have additively separable utility with discount factor δ . The T -period forward-looking discounted income stream for a voter i under r_0 is thus given by:

$$(3.3) \quad g_T^i = \sum_{t=0}^T \delta^t y_t^i \text{ where } y_t^i = f^{(t)}(y_0^i)$$

where for ease of notation we write sequential compositions of f with a superscript (t) denoting the number of compositions, i.e. $y_2^i = f(f(y_0^i)) = f^{(2)}(y_0^i)$. If redistribution policy r_1 is enacted over the periods from 0 to T then each voter receives the mean income

⁹When running for reelection in 1984, US President Regan challenged citizens to vote for him based on whether or not they were better off in 1984 than they had been four years earlier when he was first elected. His message to voters was clearly that the prior four years should be taken as a reliable guide for the stream of income they could anticipate in the next four years.

μ_t each period and each voter's discounted income stream is \bar{g}_T where:

$$(3.4) \quad \bar{g}_T = \sum_{t=0}^T \delta^t \mu_t$$

Considering the entire time horizon, a voter i prefers redistribution to *Laissez Faire* if and only if $g_T^i \leq \bar{g}_T$. Note that one-shot redistribution preferences developed in the prior section is a special case of this model (and would emerge when voters expect the policy to last only one period). Assuming that voters prefer the redistribution regime that offers the highest discounted stream of future income, Morrow and Carter (2008b) show that the fraction of voters preferring the redistributive and *laissez faire* regimes can be expressed as:

$$(3.5) \quad \text{Fraction of Population by Preference} = \begin{cases} \text{Redistribution,} & F_0(\text{voters } i \text{ with } g_T^i \leq \bar{g}_T) \\ \text{Laissez Faire,} & 1 - F_0(\text{voters } i \text{ with } g_T^i \leq \bar{g}_T) \end{cases}$$

Equation (3.5) allows us to consider the demand for redistribution for policies with differing longevity, i.e. for different period lengths T . In particular, if upward mobility (POUM) is absent in the income transition f , for instance in the presence of poverty traps or “glass ceilings” and voters are aware of this, then the lack of future increases in income can effect current voting behavior. This suggests that current levels of inequality may not be good predictors of voting patterns if voters are forward looking. This can lead to big surprises, for instance if economic policies have been set in motion which reduce upward mobility over the long term even though they have little or no visible effects on income. We now consider income processes which can lead to such surprises.

3.4. Political Dynamics under Concave and Non-concave Income Transitions: POUM versus POZUM. Benabou and Ok consider voter behavior under concave income transition ($f_c(y)$) which offers low income voters prospects of upward mobility (POUM). In

their proposition 2, Benabou and Ok show that in this “POUM world,” $f_c^{(-t)}(\mu_t)$ *monotonically decreases* over time so that the fraction of the population that wants redistribution $F(f_c^{(-t)}(\mu_t))$ monotonically decreases over time. A consequence of their Theorem 3 is that the fraction of voters who desire T period redistribution *monotonically decreases* as the time horizon T increases.

Compared to the myopic median voter model, we see that forward looking voters in a POUM world will demand less redistribution, both in the sense of “one-shot” evaluations each period and in terms of the time commitment to a particular redistributive policy. While this forward-looking voter model under POUM is thus consistent with the surprisingly anti-redistributive politics of the US, its predictions stand at odds with the electoral shift to the left in Peru and other Latin American countries. This shift could of course be explained by appeal to false consciousness arguments that would parallel the explanations of US voter conservatism (see note 8 above). In the case of Latin America, pundits such as (Castaneda, 2006) have spoken out strongly against the misleading populist appeal of the “wrong left.” Without disputing the possible veracity of this argument, we instead explore alternative explanations of the leftward shift in the Peruvian polity in a way that (analogous to Benabou and Ok) respects the fundamental economic rationality of voters.

As Benabou and Ok make clear, their results depend fundamentally on the concavity of the income transition function. However, as discussed in section 2 above, a body of theory has emerged that suggests that income transition functions are not concave and offer at least some individuals a prospect of zero upward mobility (or POZUM). Figueroa’s Sigma Society is an example of one such model, and we here explore the expected political dynamics of a Sigma or POZUM society.

As detailed in Morrow and Carter (2008b), forward-looking political preferences and voter dynamics are complex in the face of a non-concave income transition function, $f_n(y)$. In contrast to a POUM world in which the path of $F_t(\mu_t)$ is decreasing in t , in a POZUM world this path could easily be increasing in the presence of non-convexities,

and need not even be monotone as incomes evolve. What is true for the single period indicator of redistributive preferences $F_t(\mu_t)$ also holds for T period policies as well. In fact, the time compounded effect of non-convexities when voters consider long term policies may amplify the demand for redistribution as the time horizon increases. A POZUM world may thus offer complex movements in the demand for redistribution. Unlike the politely conservative concave POUM world of Benabou and Ok, the POZUM world may exhibit complex and perhaps volatile political patterns.

In the final analysis, the Morrow-Carter generalization of the forward-looking voting model signals the importance of understanding country specific income dynamics in order to understand evolving political preferences and choices. The next section of this paper will undertake an analysis of this sort for Peru.

4. ECONOMIC POLARIZATION AND POLITICAL PREFERENCES IN PERU

We now turn to empirical evidence about politically polarizing income dynamics in Peru. Using SEDLAC data on income deciles for several years based on national surveys SEDLAC (2008),¹⁰ we estimate a simple income dynamic model. The estimated income dynamics for Peru over the 1997-2005 period are non-concave. Employing the model of forward-looking voters developed above, we show that the fraction of the Peruvian electorate predicted to prefer redistributive policies increases over this time period, and should also increase the policy time horizon (meaning the period of time to which a government can commit to a particular regime) increases.

This predicted increase in the demand for redistribution is of course broadly consistent with recent Peruvian electoral politics. In addition, evidence comes from Latinobarometer concerning voters' ideological preferences over the 2000-2005 period. Consistent with our model, we find a marked decrease in moderate voters, and a polarizing fattening of the Left and Right ideological tails.

¹⁰We used income decile data from SEDLAC for Peru (1997-2003) which was then adjusted for inflation using the IFS data, taking 2000 as a base year.

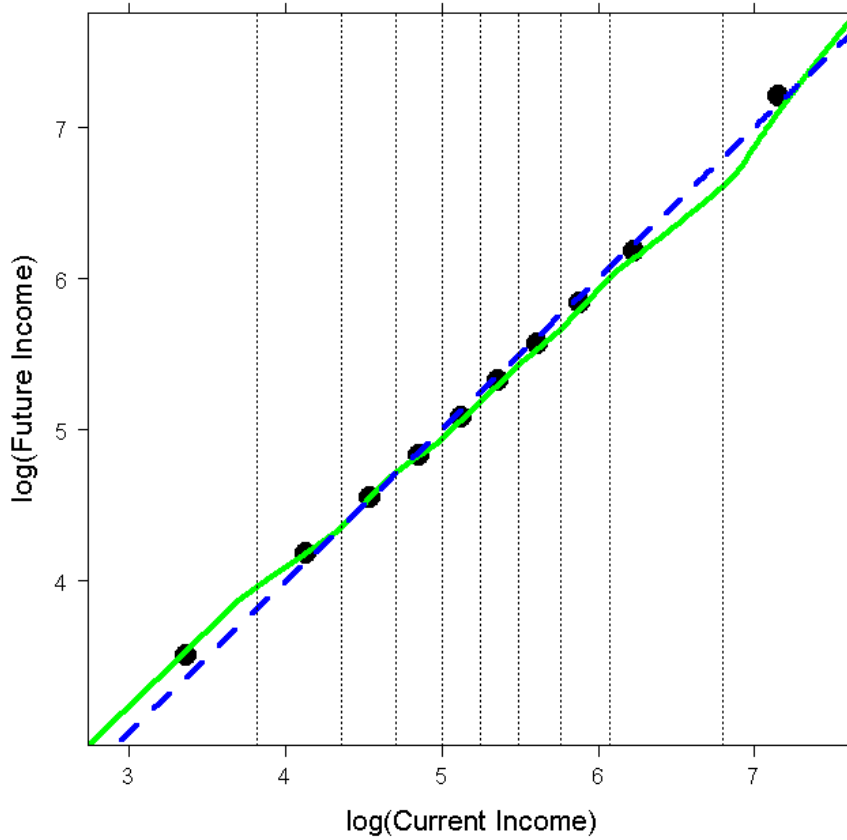
4.1. **Peruvian Income Dynamics, 1997-2005.** We assume income evolves as $y_{t+1}^i = f_\beta(y_t^i)$ where β are parameters of an increasing income transition f_β . We assume f_β is continuous and piecewise linear.¹¹ The income transition estimate for Peru is presented graphically in Figure 2. The dashed diagonal line is the 45 degree line representing the break-even points on the income transition function. A benchmark of five years was chosen for graphical purposes as this corresponds to the presidential election cycle in Peru. Vertical lines fixed by the mid-points between first year deciles divide the ten income bins used for the estimation. Finally, the solid line represents the estimated f_β income dynamic over five years (in other words, $f_\beta^{(5)}$). The relationship of the income dynamics to the 45 degree line in Figure 2 are reasonable in their reflection of macroeconomic trends. At the highest level of aggregation, GDP per capita in Peru has fluctuated around a fairly flat level.

However, as we have argued above, the most important aspect for redistributive dynamics has to do with the *shape* of the income dynamics. As mean income for the period lies in the seventh and eight deciles which is a *convex* region of the income transition, the immediate demand for redistribution increases throughout the period. This is consistent with our findings from Latinobarometer described below. The increase in the demand for redistribution also echos the recent history of strikes and protests which polls have shown to have had wide popular support¹² and the close 2006 election between Alan Garcia and Ollanta Humala.

¹¹For additional details see (Morrow and Carter, 2008b).

¹²For example, 71 percent support in the case of the May 2003 strikes (Schulte, 2003).

FIGURE 2. Estimated Income Transition for Peru



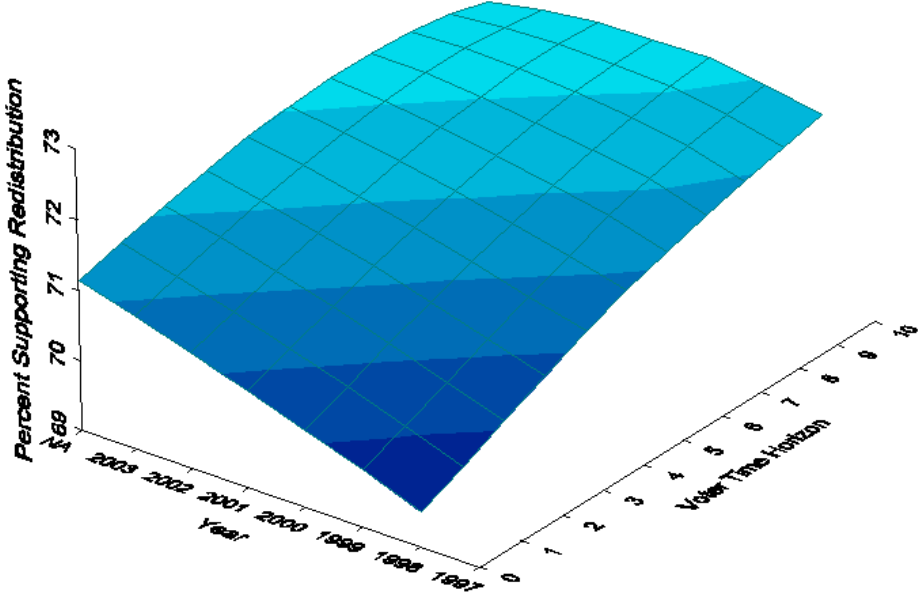
4.2. Dynamic Voter Preferences for Redistribution. As discussed in section 3, when income distribution dynamics are not concave, we cannot necessarily expect voters to exhibit the sort of quietistic conservatism that would be created by the prospect of upward mobility. In order to draw out the implications of the estimated dynamics for voter preferences, we use expression (3.5) above to calculate voter preferences for redistribution as a function of the time period and the extent of the policy time horizon. Assuming that voters have a rate of time discount of 0.95, Figure 3 illustrates the results of these calculations.

The height of the surface measures the fraction of voters who would prefer progressive redistributive to laissez faire policies. The base of the figure is defined by the time period (1997-2004) and the policy time horizon of the voter. A policy time horizon of

zero corresponds to the myopic voter who only considers whether or not they would be made better off by an immediate redistribution. As the time horizon extends, the voter takes into the expected income distribution dynamics and whether or not they would be made better off by a consistent redistributive policy over that time period. As can be seen from Figure 2, economically rational forward-looking Peruvian voters are more, not less, radical in their demand for redistribution.

The other dimension of Figure 2 allows us to explore how predicted redistributive preference have evolved over time. As can be seen, the estimated income distribution dynamics imply that even the myopic voter has become more in favor of redistributive policies over time. The highest level of demand for redistribution is predicted to be for the most forward looking voters in 2004. While real world politics are clearly more complex than our simple model of economic voting, the consistency between this model’s prediction and recent Peruvian electoral politics is clear.

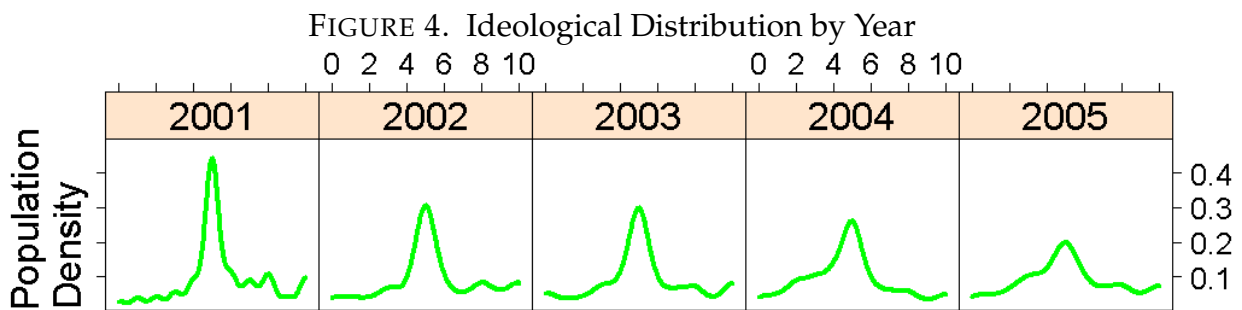
FIGURE 3. The Evolution of Redistribution Preferences by Forward-looking Voters



4.3. **Evolution of Political Ideology in Peru.** As a further check on the veracity of our model, we turn to the Latinobarometer survey data from the 2000-2005 period. Every year, Latinobarometer asks a representative sample of voters from through Latin America

to place themselves on a 10 point, left-to right ideological scale. Figure 4 presents that data for Peru.

As can be seen, the year 2000 data reveals a relatively strong centrist position, with nearly 50% of voters placing themselves in the middle of the political spectrum. Over the ensuing years, voters who place themselves in the middle drops sharply to about 25%. The right and especially the left tails of the ideological spectrum grow accordingly. While these left-right categories are clearly subjective and subject to change over time (e.g., what is perceived as a centrist position in the United States is likely perceived as a right-wing in most of Latin America), the clear shift in the ideological distribution is consistent with the model of forward-looking voters in a POZUM world.



5. VOTER LEARNING AND OTHER ISSUES

This paper has explored the political implications of non-concave income distribution dynamics that offer scarce prospects for upward mobility and that would be associated with the economics of what Adolfo Figueroa has called Sigma Society. While admittedly preliminary, our initial estimates of income distribution dynamics in Peru over the last decade reveals exactly the sort of non-concave dynamics that our model predicts would be associated with increasing political polarization and strong preferences for redistribution by forward-looking, economically rational voters. This predicted pattern is not only corroborated by recent electoral politics in Peru, it is also consistent with the disappearing center in Peruvian politics as reported by Latinobarometer data on ideological self-identification.

While the analysis here helps make sense of the recent course of politics in Peru (and perhaps in its neighboring countries), our model predicts extremely high levels of preference for redistribution, even by the mid-1990s. This finding thus throws into sharp relief the question as to why so many voters voted for largely laissez faire policies prior to the early part of this century. One explanation of course is that the political space was tightly constricted during that initial time period, or perhaps that voters were simply fooled and voted against their economic self-interest. Another, perhaps complementary, explanation would recognize the intrinsic complexity of income distribution dynamics. The analysis here has heroically assumed that voters know the actual income distribution dynamics. More realistically, voters needed to learn the pattern of income distribution changes, especially following the transition to liberal economic policies in the early 1990s. In related work, (Morrow and Carter, 2008a) develop a model of Bayesian voters who learn locally about the likely shape of income distribution dynamics. We hope that in the future this additional work will yield further insight on the politics of Sigma Society.

REFERENCES

- Acemoglu, D. and J. A. Robinson**, *Economic Origins of Dictatorship and Democracy*, Cambridge University Press, 2006.
- Adato, M., M. R. Carter, and J. May**, "Exploring poverty traps and social exclusion in South Africa using qualitative and quantitative data," *The Journal of Development Studies*, 2006, 42 (2), 226–247.
- Azariadis, C. and J. Stachurski**, "Poverty Traps," *Handbook of Economic Growth*, 2005, 1 (1), 295–384.
- Benabou, Roland and Efe A. Ok**, "Social Mobility and the Demand for Redistribution: The Poup Hypothesis," *The Quarterly Journal of Economics*, 2001, 116 (2), 447–487.
- Bloch, F., G. Genicot, and D. Ray**, "Informal Insurance in Social Networks," *GREQAM (Groupement de Recherche en Economie Quantitative dAix-Marseille) Working Papers*, 2005, 32.
- Boix, Carles**, *Democracy and Redistribution*, Cambridge University Press, 2003.
- Boucher, S. R., M. R. Carter, and C. Guirkingner**, "Risk Rationing and Wealth Effects in Credit Markets: Theory and Implications for Agricultural Development," *American Journal of Agricultural Economics*, 2007, 90 (2), 409–423.
- Carter, M. R. and C. B. Barrett**, "The economics of poverty traps and persistent poverty: An asset-based approach," *The Journal of Development Studies*, 2006, 42 (2), 178–199.
- Castaneda, Jorge G.**, "Latin America's Left Turn," *Foreign Affairs*, May 2006, 85 (3), 28–43.
- CEDLAS and World Bank**, *Socio-Economic Database for Latin America and the Caribbean*, CEDLAS and World Bank, January 2008.

- Chantarat, Sommarat and Christopher B. Barrett**, "Social Network Capital, Economic Mobility and Poverty Traps," MPRA Paper 1947, University Library of Munich, Germany February 2007.
- Esteban, J. M. and D. Ray**, "On the Measurement of Polarization," *Econometrica*, 1994, 62 (4), 819–851.
- Figueroa, A., T. Altamirano, and D. Sulmont**, *Social Exclusion and Inequality in Peru*, Geneva: International Labour Organisation, 1996.
- Lybbert, T. J., C. B. Barrett, S. Desta, and Layne D. Coppock**, "Stochastic wealth dynamics and risk management among a poor population*," *The Economic Journal*, 2004, 114 (498), 750–777.
- Morrow, John and Michael Carter**, "Voting Shifts and Learning Following Structural Change," August 2008.
- _____ and _____, "Zero Upward Mobility and Redistribution," April 2008.
- Roemer, J. E.**, "Why the poor do not expropriate the rich: an old argument in new garb," *Journal of Public Economics*, 1998, 70 (3), 399–424.
- Romer, P. M.**, "The Origins of Endogenous Growth," *Journal of Economic Perspectives*, 1994, 8 (1), 3–22.
- Schulte, Elizabeth**, "Mass Strike Brings Peru To A Standstill," *ZNet*, June 2003.
- Yashar, D. J.**, *Contesting Citizenship in Latin America: The Rise of Indigenous Movements and the Postliberal Challenge*, Cambridge University Press, 2005.