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UNIVERSITY OF CALIFORNIA, SAN DIEGO

**Is Participatory Democracy the Answer? Participatory Budgeting and
Development in Brazilian Municipalities**

A dissertation submitted in partial satisfaction of the
requirements for the degree
Doctor of Philosophy

in

Political Science

by

Molly E. Hamilton

Committee in charge:

Professor Scott W. Desposato, Chair
Professor Amy Bridges
Professor Richard Feinberg
Professor James H. Fowler
Professor Peter H. Smith

2014

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The dissertation of Molly E. Hamilton is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

Chair

University of California, San Diego

2014

DEDICATION

For my family, Nancy, Bruce, and Susanna. None of this would have been possible without their love and support.

TABLE OF CONTENTS

Signature Page	iii
Dedication	iv
Table of Contents	v
List of Figures	vii
List of Tables	ix
Acknowledgements	xii
Vita	xiii
Abstract of the Dissertation	xiv
1 Introduction	1
1.1 Puzzle	1
1.2 Literature Review	3
1.2.1 Intrinsic versus Instrumental Motivations	3
1.2.2 Instrumental Outcomes	8
1.3 Background: Participatory Budgeting	18
1.4 Data and Methods	34
1.4.1 Data	35
1.4.2 Panels	39
1.4.3 Methods	39
1.5 Road Map of Dissertation	42
2 Why Participate? Intrinsic and Instrumental Motivations for PB Partic- ipation in Porto Alegre	44
2.1 Introduction	44
2.2 Participation	45
2.3 Comparing Intrinsic and Instrumental Motivations	57
2.4 Empirical Analysis	61
2.4.1 Methodology	63
2.4.2 Results	64
2.5 Discussion	71
3 Where Does the Money Go? Participatory Budgeting and Municipal Spending Patterns	75
3.1 Introduction	75
3.2 Literature Review	80

3.3	Hypotheses	83
3.4	Data and Methods	83
3.4.1	Data	83
3.4.2	Methods	88
3.5	Empirical Results	90
3.6	Discussion	95
4	The Effect of Participatory Budgeting on Sanitation Provision	100
4.1	Introduction	100
4.2	Literature Review	101
4.3	Hypotheses	103
4.4	Data and Methods	104
4.4.1	Data	104
4.4.2	Methods and Empirical Results	108
4.5	Discussion	126
5	Participatory Budgeting and Welfare Outcomes	129
5.1	Introduction	129
5.2	Literature Review	130
5.3	Hypotheses	133
5.4	Data and Methods	135
5.4.1	Data	135
5.4.2	Methods	143
5.5	Empirical Results	145
5.6	Discussion	167
6	Conclusion	171
6.1	The Argument and Findings	171
6.1.1	Intrinsic versus Instrumental Motivations	172
6.1.2	Instrumental Benefits	173
6.2	Limitations and Future Research	177
6.3	Conclusion	180
A	Appendix	181
	Bibliography	194

LIST OF FIGURES

Figure 1.1:	Instrumental Benefits of PB: Theory vs. Findings	17
Figure 1.2:	Participatory Budgeting Process	21
Figure 1.3:	(Top) Brazil: Regions, (Bottom) Number of Municipalities Adopting PB: by State and Treatment Period	23
Figure 1.4:	(Top) Percent of Municipalities with PB by State, (Bottom) Number of PB Municipalities by State	24
Figure 1.5:	(Top) Percent of Municipalities with PT Mayors by State, (Bottom) Number of Municipalities with PT Mayors by State	25
Figure 1.6:	(Top) Number of PB Municipalities with PT Mayors by State, (Bottom) Number of PB Municipalities with Non-PT Mayors by State	26
Figure 1.7:	Number of Municipalities Abandoning PB by State	27
Figure 1.8:	PB Participation by Year	31
Figure 1.9:	PB Sanitation Project - Before (Left) and After (Right): Pavement and sewer on Rua Gandhi, Belo Horizonte	33
Figure 1.10:	PB Health Project - Before (Left) and After (Right): Health center improvements (Centro de Saúde Tirol) in the region of Barreiro, Belo Horizonte	33
Figure 1.11:	PB Education Project - Before (Left) and After (Right): Preschool (Unidade Municipal de Educação Infantil (Umei) Sol Nascente) in the region of Barreiro, Belo Horizonte	34
Figure 1.12:	(Top) Sanitation Provision over Time, (Bottom) Welfare over Time	38
Figure 1.13:	Research Design	40
Figure 2.1:	PB Participation in Porto Alegre by Year	48
Figure 2.2:	PB Participant Demographics by Gender	49
Figure 2.3:	PB Participant Demographics by Age	51
Figure 2.4:	PB Participant Demographics by Race	53
Figure 2.5:	PB Participant Demographics by Education	55
Figure 2.6:	PB Participant Demographics by Gender	56
Figure 2.7:	Regime Support by Education and Socioeconomic Status, 2000	59
Figure 2.8:	Support for Citizen Participation by Education and Socioeconomic Status, 2000	60
Figure 2.9:	Motivation for PB Participation	65
Figure 2.10:	Motivation for PB Participation, by Income	66
Figure 2.11:	Motivation for PB Participation, by Education	67
Figure 2.12:	Motivation for PB Participation, by Length of Participation	69
Figure 2.13:	Motivation for PB Participation, by Opinion of Democracy	70
Figure 2.14:	Support for Democracy and Participation, by City - 2000	73

Figure 3.1:	Municipal Spending Allocation	77
Figure 3.2:	Municipal Welfare Spending Allocation by Year and PB Status	78
Figure 3.3:	Research Design - Spending	85
Figure 3.4:	Mean Municipal Spending by PB Status	92
Figure 4.1:	Sanitation Provision by PB Status	106
Figure 4.2:	(Top) Garbage Provision by Panel, (Bottom) Garbage Provision: Early PB	109
Figure 4.3:	(Top) Garbage Provision by Panel, (Bottom) Garbage Provision: Early PB	116
Figure 4.4:	(Top) Electricity Provision by Panel, (Bottom) Electricity Provision: Early PB	117
Figure 4.5:	(Top) Sewer Provision by Panel, (Bottom) Sewer Provision: Early PB	118
Figure 4.6:	(Top) Water Provision by Panel, (Bottom) Water Provision: Early PB	119
Figure 5.1:	(Top) Welfare - HDI by PB Status, (Bottom): Welfare - Health by PB Status	137
Figure 5.2:	(Top) Welfare - Education by PB Status, (Bottom) Welfare - Inequality/Poverty by PB Status	138

LIST OF TABLES

Table 2.1:	Instrumental versus Intrinsic Motivations - 2009	65
Table 2.2:	Instrumental versus Intrinsic Motivations - by Income	67
Table 2.3:	Instrumental versus Intrinsic Motivations - by Education	68
Table 2.4:	Instrumental versus Intrinsic Motivations - by Length of Participation	70
Table 2.5:	Instrumental versus Intrinsic Motivations - by Opinion of Democracy	71
Table 3.1:	Categories of Municipal Spending	76
Table 3.2:	Municipal Revenues - Taxes and Transfers	79
Table 3.3:	Public Service Provision Responsibilities by Level of Government	79
Table 3.4:	Baseline (1991) Difference in Means Test - Spending	91
Table 3.5:	2000 Difference in Means Test - Spending	91
Table 3.6:	2000 Difference in Means Test - Spending (Early vs. Non/Late PB)	91
Table 3.7:	Post-Test (2010) Difference in Means Test - Spending	91
Table 3.8:	Health/Sanitation Spending	94
Table 3.9:	DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB Adoption on Spending	97
Table 3.10:	Education and Culture Spending	98
Table 3.11:	Housing/Urbanism Spending	99
Table 4.1:	Baseline (1991) Difference in Means Test - Sanitation	105
Table 4.2:	2000 Difference in Means Test - Sanitation	107
Table 4.3:	2000 Difference in Means Test - Sanitation (Early vs. Non/Late PB)	107
Table 4.4:	Post-Test (2010) Difference in Means Test - Sanitation	107
Table 4.5:	Sewer Provision	111
Table 4.6:	Water Provision	112
Table 4.7:	Garbage Provision	113
Table 4.8:	Electricity Provision	114
Table 4.9:	DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB Adoption on Sanitation	122
Table 5.1:	Baseline (1991) Difference in Means Test - Welfare	136
Table 5.2:	2000 Difference in Means Test - Welfare	139
Table 5.3:	2000 Difference in Means Test - Welfare (Early vs. Non/Late PB)	139
Table 5.4:	Post-Test (2010) Difference in Means Test - Welfare	140
Table 5.5:	Human Development Index	146
Table 5.6:	Human Development Index - Health	147
Table 5.7:	Infant Mortality	148

Table 5.8: Childhood Mortality	149
Table 5.9: Probability of Surviving to Age 60	150
Table 5.10: Teen Pregnancy	151
Table 5.11: Human Development Index - Education	152
Table 5.12: Illiteracy - 11-14	153
Table 5.13: Illiteracy - 15+	154
Table 5.14: Frequency of School Attendance - Children under 6	155
Table 5.15: Human Development Index - Economic	156
Table 5.16: Poverty	157
Table 5.17: Inequality - Gini	158
Table 5.18: Inequality - Theil	159
Table 5.19: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Composites	162
Table 5.20: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Health	163
Table 5.21: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Education	165
Table 5.22: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Inequality/Poverty	166
Table A.1: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Spending	182
Table A.2: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Spending	183
Table A.3: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Sanitation	184
Table A.4: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Sanitation	185
Table A.5: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Composites	186
Table A.6: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Composites	187
Table A.7: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Education	188
Table A.8: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Education	189
Table A.9: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Health	190
Table A.10: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Health	191
Table A.11: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Inequality/Poverty	192

Table A.12: DID, PSM, and PSM-DID Results: Average Treatment Effect of
PB adoption on Welfare - Inequality/Poverty 193

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ABSTRACT OF THE DISSERTATION

**Is Participatory Democracy the Answer? Participatory Budgeting and
Development in Brazilian Municipalities**

by

Molly E. Hamilton

Doctor of Philosophy in Political Science

University of California, San Diego, 2014

Professor Scott W. Desposato, Chair

This dissertation uses the case of Participatory Budgeting (PB) in Brazilian municipalities from 1989-2008 to evaluate the motivations for and effects of citizen participation in local budgetary decisions.

Policies permitting citizen participation in local politics are being promoted around the world as a wholesale solution to a variety of problems, ranging from corruption, to voter apathy, to inequality. In the Brazilian case, the specific purposes of PB are improving public services and increasing citizen involvement in decision-making, and the policy is generally popular among citizens. In light of these dual demands, I argue that there are two potential theories derived from literature on voting, and democratic theory more broadly, that can explain the

widespread popularity of participatory budgeting: (1) PB is popular because it provides instrumental material benefits, such as improved public services to citizens; and (2) PB is popular because it provides intrinsic benefits: the act of participating (or having the option to participate) is itself valuable to citizens.

I begin by testing these competing theories of intrinsic and instrumental motivation for participation using subjective survey data from Porto Alegre—the flagship case of PB both in Brazil and around the world. I find that participants are fairly evenly divided between these two motivations, however the distribution is dependent on demographics: those with high socioeconomic status are much more likely to participate for intrinsic purposes than instrumental ones.

In the second part of the dissertation, I use objective quantitative measures to systematically test the instrumental effects of Participatory Budgeting on spending patterns, public service provision, and human welfare in all 562 Brazilian municipalities over 50,000 residents, 25 percent of which implemented Participatory Budgeting at some point between 1992 and 2008. After correcting for endogeneity, I find that while PB does produce a change in spending patterns, it does not produce a corresponding change in service provision or welfare.

Together, these findings suggest that while instrumental benefits may be lacking, PB should not be summarily dismissed as a result. It was adopted to address two related demands from citizens: (1) improved public services, particularly for poor citizens; and (2) opportunities for citizens to be involved in municipal decision-making. It could be that success in one of these areas is sufficient to justify its popularity.

1 Introduction

1.1 Puzzle

*“No one knows better than you what needs to be done in your region. Therefore, the city is implementing Participatory Budgeting. Starting now, you define what projects and services are priorities in Betim. A way to ensure democracy, transparency in use of public money and the construction of a better city for everyone” (“Orçamento Participativo está de volta” 2009, 1).*¹

*“Since 1993, more than 1,000 works completed in the city are the ultimate proof that Participatory Budgeting is a fundamental tool in the partnership between the city and the citizens” (City of Belo Horizonte).*²

Experiments with participatory democracy are underway around the world, and citizen participants and NGOs alike generally seem pleased with the process (Pateman 2012). 85 percent of survey respondents in Porto Alegre, Brazil either partially or totally agree that Participatory Budgeting “improves the quality of life in the city” (Bank 2008*b*, 40), and the World Bank and other organizations promote it enthusiastically. But it is unclear what is meant by these quality of life improvements and specifically whether the popularity is a result of concrete outcomes, or a general belief that citizen participation itself is desirable.

¹“Ninguém melhor do que você para saber o que é preciso ser feito na sua região. Por isso, a Prefeitura está implantando o Orçamento Participativo. A partir de agora, você define quais obras e serviços são prioridades em Betim. Uma forma de garantir a democracia, a transparência no uso do dinheiro público e a construção de uma cidade melhor para todos.”

²“Desde 1993, as mais de 1.000 obras realizadas na cidade são a prova definitiva de que o OP é uma ferramenta fundamental na parceria entre a Prefeitura e os cidadãos” (<http://portalpbh.pbh.gov.br/pbh/>).

Participatory Budgeting (PB) is a type of participatory democracy in which citizens, rather than city councils and mayors, choose how to spend select municipal funds. Between 1989 and 2008, PB was implemented in 227 of Brazil's 562 municipalities with more than 50 thousand residents. PB is an extension of the decentralization process from federal to municipal level that followed democratization in the late 1980s and early 1990s, and was adopted to address two related demands from citizens: Improved public services, particularly for poor citizens, and opportunities for citizens to be involved in municipal decision-making. The first demand can be seen as a result of a failure of development: the government was not providing the basic services needed for citizens to prosper. The second demand can be seen as a result of a failure of democracy, that is citizens did not feel that they were being adequately represented under the existing system.

In light of these dual demands, I argue that there are two potential theories derived from literature on voting, and democratic theory more broadly, that can explain the widespread popularity of participatory budgeting: (1) PB is popular because it provides instrumental material benefits, such as improved public services to citizens; and (2) PB is popular because it provides intrinsic benefits: the act of participating (or having the option to participate) is itself valuable to citizens.

In this dissertation, I first test these competing theories of intrinsic and instrumental motivation for participation using subjective survey data from Porto Alegre—the flagship case of PB both in Brazil and around the world. I find that participants are fairly evenly divided between these two motivations, however the distribution is dependent on demographics: those with high socioeconomic status are much more likely to participate for intrinsic purposes than instrumental ones.

I then conduct a large-N analysis of the instrumental effects of PB using a dataset of all 562 Brazilian municipalities with more than 50 thousand residents, 25 percent of which implemented PB at some point between 1992 and 2008. I use objective quantitative measures to systematically test these instrumental effects of Participatory Budgeting on spending patterns, public service provision, and human welfare, using a novel combination of econometric techniques to correct for the endogeneity of PB adoption, which was not adopted randomly. Many previous

studies have ignored this endogeneity issue, leading to biased results generally in favor of PB. After correcting for this issue, I find that while PB does produce a change in spending patterns, it does not produce a corresponding change in service provision or welfare.

Together, these findings suggest that while instrumental benefits may be lacking, PB should not be summarily dismissed as a result. It was adopted to address two related demands from citizens: (1) improved public services, particularly for poor citizens; and (2) opportunities for citizens to be involved in municipal decision-making. It could be that success in one of these areas is sufficient to justify its popularity.

This dissertation proceeds as follows: I begin by summarizing the literature on instrumental versus intrinsic motivations, which is grounded in theories of voting. I then discuss the theoretical background on the instrumental benefits of PB, which is grounded in decentralization literature. After summarizing this literature and my argument, I present a short background of PB in Brazil. I then outline the data and methods to be used in the subsequent chapters, and end with a summary of my findings and an outline of the dissertation.

1.2 Literature Review

1.2.1 Intrinsic versus Instrumental Motivations

I argue that support for PB can be explained by one of two theories, which are derived from the voting literature. In that case the puzzle is why people vote given that voting is costly. The theories suggest that people vote for one of two reasons: (1) instrumental: they want to have an impact on the outcome of the election (Downs 1957, Arneson 2003, Arneson 2004); (2) intrinsic: they vote because they derive some benefit from the act of voting, irrespective of the outcome (Pateman 1970, Frey, Benz & Stutzer 2004, Frey & Stutzer 2005).³ Voter turnout is the primary and most researched type of political participation, and

³Of course these motivations for voting are not mutually exclusive. It is absolutely possible to vote for both reasons.

thus provides an excellent basis for understanding participation in PB.

A wide range of scholars have addressed this “paradox of voting” (Downs 1957, Aldrich 1993, Riker & Ordeshook 1968, Brady, Verba & Schlozman 1995, Verba & Nie 1972, Frey, Benz & Stutzer 2004, Frey & Stutzer 2005, Gerber & Lupia 1995, Gerber & Green 2001, Geys 2006, Grofman 1995, Matsusaka 1995, Blais 2000, Fowler 2006*b*, Palfrey & Rosenthal 1985, Fowler, Baker & Dawes 2008, Mackie 2011, Fiorina 1976). Early theories postulated that participation would be contingent upon material benefits, the probability of casting the deciding vote, and the cost of voting, which can be expressed as follows: $p(B) - C > 0$, where p is the probability of being decisive, B is the value of the material benefit if the preferred candidate wins, and C is the cost of voting (Downs 1957).

Empirical evidence clearly demonstrated that these could not be the only decisive factors, given that the probability of being decisive is approximately zero, and thus the value of $p(B)$ is approximately zero as well. This means that if there is any cost involved at all, we should expect to see a turnout of zero, which is inconsistent with empirical observations. Later theories included non-material benefits, the most important of which is the “duty term,” or the “ D ” term (Riker & Ordeshook 1968).⁴ In this model, D represents a non-material benefit from the act of participation, which can be interpreted as a social duty, the warm fuzzy feeling one gets from engaging with others, etc. As Fowler and Kam (2007) explain, “the D term is independent of political outcomes—people with a strong sense of social obligation will participate even if they think the act of participating will have no influence on benefits derived from policy outcomes” (815). In the revised model, an individual will participate if $p(B) - C + D > 0$ (Riker & Ordeshook 1968), which more accurately represents empirical observations.

Those who argue for the instrumental value of participation believe that there is nothing valuable about democracy, and by extension nothing valuable about participation in democracy. Democracy only legitimate if it “produces better consequences for people than any feasible alternative mode of governance” (Arneson 2003, 122). On the other hand, strict intrinsic proponents believe that

⁴For the purposes of this dissertation, I will focus on the “ D ” term as the intrinsic value of participation.

“the justifiability of a political decision process depends only on its intrinsic qualities and not at all on the consequences of its implementation” (Arneson 2003, 124). Since the incorporation of the “ D ” term, few scholars would argue that people are motivated by exclusively instrumental or intrinsic purposes. While there is a vibrant literature arguing the merits of instrumental (Aldrich 1993, Palfrey & Rosenthal 1985, Arneson 2003, Downs 1957) or intrinsic (Pateman 1970) as the primary motivation for participation with varying levels of zealotry, most intrinsic supporters acknowledge the value of both D and B (Estlund 1997, Bratton & Mattes 2001, Elster 1997, Blais 2000, Frey & Stutzer 2005, Frey, Benz & Stutzer 2004, Geys 2006, Mackie 2003, Mackie 2011, Brennan & Lomasky 1997, Putnam 1995).⁵

Unlike the act of participation itself which is objectively observable, motivation for participation is inherently difficult to measure,⁶ particularly given that individuals are likely to participate for multiple reasons. In other words, for most individuals both B and D are greater than zero. Despite these inherent difficulties, scholars have attempted to empirically test the competing instrumental versus intrinsic motivations for participation in a variety of contexts (Frey & Stutzer 2005, Bratton & Mattes 2001, Olken 2010).

Frey and Stutzer (2005) find strong evidence for the intrinsic value of participation in Switzerland.⁷ In order to disaggregate the utility derived from outcomes (instrumental) versus the utility derived from the process (intrinsic), they compare the self-reported well-being of Swiss nationals versus foreign residents, who do not possess participation rights. They compare these scores across regions, which differ in levels of participation rights for citizens. They find that those with higher participation rights report a higher level of well-being and that the difference in reported well-being between citizens and foreigners is especially high in areas with high levels of participation rights. This suggests that citizens place a high value on

⁵I do not differentiate between “intrinsic” and “expressive” motivations for learning. For a discussion of those theoretical differences, see Geys (2006)

⁶Many would argue that participation itself is difficult to measure, however I believe that it is at a minimum more straightforward than unobservable motivation.

⁷The authors use the term “procedural utility” rather than “intrinsic” motivation.

the intrinsic value of participation rights, irrespective of instrumental outcomes.⁸

But intrinsic support for democracy and participation is not limited to highly developed countries. Bratton and Mattes (2001) ask a similar question in Ghana, Zambia, and South Africa, specifically in light of the low levels of instrumental benefits (lack of development). They find that there is widespread support for democracy in all three countries despite being “far from content with its concrete achievements.” They argue that this is evidence of intrinsic support of democracy that “supersedes instrumental consideration” (Bratton & Mattes 2001, 473). This case is particularly relevant to that of PB in Brazil in the sense that both deal with high levels of underdevelopment, which were not present in the Swiss case.

Similar results are found in Indonesia. In a natural experiment, development projects were determined by either representative village governments or direct plebiscites, which were randomly assigned. While the projects selected differed somewhat between representative and direct democracy villages, the satisfaction with the projects differed significantly. Specifically, direct democracy villages reported much higher satisfaction, indicating intrinsic value for the process itself (Olken 2010).

In a similar study in Afghanistan, Beath et al. (2012) compare both the types of public works projects chosen, and satisfaction with the selected projects by the decision-making institution. Like Olken’s (2010) study in Indonesia, the decision-making institutions for the projects were secret ballot (direct democracy) versus village council (representative democracy). As with Olken, villagers were more satisfied with projects selected by direct democracy irrespective of the project itself, thus indicating intrinsic support for the decision-making procedure. However, these effects were more pronounced when villagers preferred the project as well, indicating some level of instrumental support as well.

The fact that participants are more satisfied with decisions that were made through participatory measures is evidence for the intrinsic value they place on the act of (or right to) participation (Morrell 1999). While this does not imply a change

⁸Interestingly, they find that it is the participation *rights* and not actual participation that confers these improvements in well-being (Frey & Stutzer 2005, 90).

in the instrumental outcome of the decision, it could improve satisfaction with the decision itself, thus increasing the intrinsic value of participation. One PB delegate from Santo André described her experience with this as follows in an interview with SINPA:⁹ “This year I did not manage to approve anything to my area but I am equally happy because others managed to get their priorities satisfied... We ended up seeing that in comparison to what somebody else’s situation we live in heaven” (Acioly, Herzog, Sandino & Andrade 2003, 46-47). The World Bank study provides similar evidence that PB participation has a positive effect on participants in Porto Alegre.

While there is evidence of the intrinsic value of participation in countries with significantly different levels of development, it is not clear if certain groups within a society tend to systematically place a higher value on intrinsic versus instrumental benefits. Specifically I am interested in the question of whether certain groups operating under a single set of participatory institutions will rank their primary motivation as intrinsic or instrumental. Survey results from Latinobarómetro in Brazil indicate that demographics are highly correlated both with support for democracy and support for increased citizen participation in Brazil, and I theorize that demographics are also potential determinants of the intrinsic value of participation. In Chapter Two I test this theory using survey data from Porto Alegre.

The preceding literature focused on theoretical motivations for participation without respect to outcomes. It addressed the value of B relative to D , but has not addressed the content of B , nor whether there is a difference between the outcomes under PB and the outcomes under non-PB decision-making. In terms of the model, the question is whether $B_{PB} = B_{NonPB}$. I now turn to the theoretical predictions regarding these instrumental outcomes of PB, which correspond to the empirical tests in Chapters Three, Four, and Five.

⁹SINPA is “Support to the Implementation of the National Plan of Action” financed by the Dutch government.

1.2.2 Instrumental Outcomes

Decentralization

The previous section focused on the intrinsic versus instrumental motivations for participation. Here, I discuss the theoretical underpinnings of the instrumental benefits of PB. PB was implemented as part of a larger process of decentralization that followed a period of democratization both in Brazil and across Latin America. While there was a devolution in power from the federal government to municipalities, there was a corresponding devolution of power from municipalities to citizens. Therefore I situate the theoretical literature on the instrumental benefits of PB in the context of decentralization literature.

Early literature predicted that the implementation of federalism and/or decentralization would have positive effects on both democracy and public service provision, and by extension, citizen welfare (Hayek 1945, Musgrave 1959, Oates 1972, Weingast 1995). These works suggest that decentralization will increase allocative efficiency because subnational governments are better informed about local preferences. It is also hypothesized to produce efficiency-inducing competition between sub-national units (Tiebout 1956) and reduce corruption (Shleifer & Vishny 1993).

However, more recent literature has begun to empirically test the predictions with variation on the type and extent of decentralization and the context in which it is implemented (Prud'Homme 1995, Rodden & Rose-Ackerman 1997, Bardhan 2002, Willis & Haggard 1999, Weingast 1995). These studies have been essential to our understanding of decentralization as they have shown that the original predictions are not robust. While early predictions suggested that we should see positive effects of decentralization on democracy and public services across the board, these findings have shown that the impact is highly dependent on the type of decentralization and the context in which it occurs.

One of the primary problems is that the assumptions associated with the early predictions have been partially discredited in terms of developing countries (Bardhan 2002). One example is the assumption of voter mobility, which is central to the competition between subnational units argument. Effective competition can

only function if those living in the competing units have access to full information and can credibly threaten to exit if the government does not provide the services they demand. This assumption has been shown to be less valid in developing countries where voter mobility options are limited and often the only source of information is the local government (Rodden & Rose-Ackerman 1997, Banerjee, Iyer & Somanathan 2007). Furthermore, there is some evidence that decentralization increases the probability that local governments are captured by elite interests (Bardhan & Mookherjee 2005). In this case even if voters can credibly threaten to exit, it will not help them because their exit option is a different elite-captured subnational unit.

Other assumptions in the early literature have been discredited not just in terms of developing countries, but on general terms as well. Musgrave (1959) and Oates (1972) contend that decentralization will lead to increased efficiency due to competition between districts, however it has been demonstrated that not all goods are most efficiently provided at the local level. For example, Besley and Coate (1999) demonstrate that “decentralization is welfare superior for small spillovers, while centralization is better when spillovers are large. The result differs sharply from the conclusions of Oates’ analysis, which suggests that centralization is always desirable when districts are identical” (13). Additionally, Treisman (2000) shows that decentralization does not necessarily have the corruption reducing effects hypothesized by Shleifer and Vishny (1993), and may in fact increase corruption.

According to Bardhan and Mookherjee, “the key question is whether decentralization acts as a disciplining device for government officials” (2006, 163). If the institutional framework fails to provide local officials with incentives to provide the local public services desired by the community, the improved information that is theoretically generated by decentralization provides no additional accountability (Gélineau & Remmer 2006, 134). Therefore, in order for decentralization to effectively improve local accountability, it must include mechanisms that provide information on citizen preferences to local officials and incentives for local officials to not only obtain that information, but to use it to provide

the services desired by the community (Hoffman & Gibson 2007, Bardhan & Mookherjee 2006*b*, Seabright 1996).

However, when these conditions are absent or are only partially met, decentralization and the threat of electoral sanctions are unlikely to provide adequate incentives for local officials to provide the services desired by their constituents in contrast to the predictions of first generation fiscal federalism (Musgrave 1959, Oates 1972). As recent empirical analysis in developing countries has shown, the “success” of decentralization is not inevitable, but rather is context specific and depends on, among other things, the distribution of monitoring abilities (Hoffman & Gibson 2007, Bardhan & Mookherjee 2006*b*). A balance of monitoring ability that favors politicians over citizens is particularly likely to occur when the municipality has the following characteristics: heterogeneous population (socio-economic, ethnic, etc.); large poor population (unorganized, uneducated); strong local clientelist networks.

In Brazil, decentralization and the threat of electoral sanctions alone did not create the intended effect of accountability. I argue that this is because Brazilian municipalities meet the characteristics described above, which strengthened the monitoring ability of the politicians and not the citizens. Thus even if citizens possess sanctioning ability, it is useless without the ability to monitor those who deserve the sanctions. Therefore the local officials lack incentives to provide the services desired by their constituents because they do not fear sanctions. The large poor populations continued to lack political access due to the strong clientelist traditions that survived decentralization. Due to these conditions, decentralization did not create accountability, particularly in the poorest sectors, as municipal funds were instead spent on the middle and upper-classes in exchange for political support, or what is known as “perverse accountability” (Stokes 2005). As a result, there emerged a growing dissatisfaction with the persistence of elite-driven politics, which led to the implementation of additional accountability mechanisms, including various forms of citizen participation.

Participatory Democracy

The trade-offs between direct democracy and representative democracy have been debated at least since Locke and Rousseau. Critics of direct democracy tend to cite as evidence the lack of expertise of citizens, inefficiency, instability of long-term policy, and Arrow's theorem that "[n]o procedure for democratic collective decision-making can be guaranteed not to produce arbitrary and unwanted outcomes" (Budge 2008, 596). Conversely, critics of representative democracy argue that it fails to produce policy that accurately reflects citizen preferences.

According to Subirats, "Citizens' participation is often spoken of as an answer, without it being clear what the question is" (Subirats 2008, 8). This encapsulates the theoretical literature underlying PB analyses. Attempts to export one-size-fits-all solutions that claim to strengthen democracy and induce development from the United States and other developed countries to the developing world are hardly a new phenomenon. Each of the past few decades has brought a "new" solution that proved too good to be true by the end of that decade: The Washington Consensus marked the 1990s, while decentralization followed in the 2000s. As the limitations of the previous solution are uncovered, scholars and policymakers move on to the next silver bullet. Participatory democracy is emerging as the latest one: policymakers, urban planners, and NGOs, such as the World Bank, UNDP, UN Habitat Program, UNCHS, and the International Budget Partnership (IBP), recommend and often partially fund the adoption of participatory budgeting. These overly simplified claims echo those made by decentralization enthusiasts a decade ago: high on theory, and low on solid empirical evidence.¹⁰

The decentralization process of PB shares the previously summarized theoretical logic of political and fiscal federalism on a smaller scale. While political and fiscal federalism delegate powers from the central government to the state level with the assumption that this will increase fiscal responsibility and accountability, the implementation of PB makes the same assumption with regard to the delegation of power from the state or central governments to citizens or groups of citizens on a smaller scale. There it is assumed that citizen participation will induce an increase

¹⁰For a comprehensive review of decentralization literature, see (Wibbels 2006)

in the same ideals of “credibility, trust, transparency, accountability, empowerment of ordinary citizens, solidarity,” incorporation of previously excluded citizens into the political arena, and a decrease in levels of clientelism (de Souza 2001, 181). Furthermore, participatory democracy advocates assume that citizens know their own preferences better than the government, and so should be better able to select the best public works projects (Wampler 2000, Mansuri & Rao 2004). This follows from the allocative efficiency assumptions of fiscal federalism made by Hayek (1945), Musgrave (1959), Oates (1972), etc. Additionally, it has been argued that bringing participation opportunities to the local level would significantly decrease the cost of participating, thereby increasing the representation of the poorer sectors of society (Serageldin, Driscoll, Meléndez San Miguel, Valenzuela, Bravo, Solloso, Solá-Morales & Watkin 2003).¹¹ This participation would then result in increased provision of public services to these previously excluded sectors of society.

Those who challenge PB as a universal policy prescription follow in the tradition of decentralization and participatory democracy skeptics, who primarily question the universality of theoretical assumptions such as “voting with your feet.” These challenges to theoretical assumptions are particularly relevant regarding developing countries, and especially poor sectors of society within those countries. For example, we cannot expect citizens living at a subsistence level to pack up and move to a new town simply because they dislike the current mayor’s politics. Voting with one’s feet is a luxury that many cannot afford.

In the context of PB, Zamboni (2007) argues that there is a risk of manipulation by the mayor or local elites;¹² Rakodi (2003) points out that PB can deepen existing patterns of social exclusion, and both acknowledge the high potential for participant selection bias. Furthermore, while citizens may know their actual preferences better than politicians, they do not necessarily have the information or expertise necessary to make decisions. This is of course one of the

¹¹Serageldin et al. (Serageldin et al. 2003) find empirical support for this in their analysis of PB implementation. They compare attendance by females and poorer citizens at the local meetings and regional meetings, and find that there is a significantly higher proportion of both groups at the local level.

¹²Following previous literature by Bardhan (Bardhan 2002), Bardhan and Mookherjee (Bardhan & Mookherjee 2006a), etc.

main arguments for representative rather than direct democracy. In order to test this claim, Khwaja (2004) uses empirical data from Northern Pakistan and finds that citizen participation has positive effects in “non-technical” areas, however “increasing community participation in technical decisions actually leads to worse project outcomes” (427). This finding presents an important challenge to direct democracy in general and PB specifically.

Shah (2007) cautions that PB has the potential to “mask the undemocratic, exclusive, or elite nature of public decision making, giving the appearance of broader participation and inclusive governance while using public funds to advance the interests of powerful elites,” and “can be used to deprive marginalized and excluded groups of having a say in public affairs” (1-2).

There are two primary concerns with the current literature on instrumental PB benefits. The first is that it fails to take into account the effect of PB on specific development outcomes, focusing almost exclusively on broadly conceived democratic outcomes. The second is that it suffers from poor research design. I will discuss both problems in turn and then show how my research design corrects for the first problem by systematically testing three sets of dependent variables: spending allocation, sanitation provision, and welfare; and the second problem by conducting a large-n study and utilizing econometric methods to minimize the endogeneity problem of non-random PB adoption.

The existing empirical analyses of PB have primarily been single case studies (Abers 2000), or comparisons between several cases in which all municipalities implemented PB (Nylen 2003, Serageldin et al. 2003, Avritzer 2000, Wampler 2004, Wampler 2007, Teixeira 2003, Schneider & Goldfrank 2003, de Souza 2001, Wagle & Shah 2003, Koonings 2004, Wood & Murray 2007). While these studies provide useful detail about the process, and as I argue in Chapter Two, information about underlying motivations for participation, they present a selection bias by primarily focusing on “success stories” such as Porto Alegre,¹³ and so preclude broadly gener-

¹³It should be noted that few studies set out to challenge PB empirically. Existing analyses tend to be either agnostic or pro-PB. This represents an impact evaluation bias that Bruhn and McKenzie (2013) warn us about: studies showing positive results are published more frequently than those that challenge a given policy.

alizable conclusions.¹⁴ Failing to analyze the cases where PB was not implemented, or was less successful, provide useful descriptive accounts, including Chapter Two of this dissertation, though we cannot interpret them as valid empirical tests of the *effects* of PB (Wampler 2002).¹⁵

There are several noteworthy studies that have made important empirical contributions to our understanding of the effects of PB. These studies differ from previous work primarily because they move past the pure descriptive accounts. Boulding and Wampler (2010) create a new dataset of the 220 largest Brazilian municipalities in order to analyze the effect of PB on social spending.¹⁶ They find slightly higher health and education spending in PB municipalities, however they note that this does not translate into a noticeable effect on citizen well-being.

Five studies attempt to address the endogeneity issue of PB implementation using matching techniques, though the first two are still comparatively small-N, limiting the utility of the technique: Zamboni (2007) uses audits of municipal funds to test the level of government corruption in ten matched pairs of PB and non-PB municipalities.¹⁷ His findings show somewhat lower levels of corruption in PB municipalities, however his findings also show that PB implementation alone cannot combat entrenched corruption and low quality of governance. In a related study, Baiocchi et al. (2005) use a similar matching technique to test the effect of political indicators and civil society organization on PB implementation, though their sample is limited to five pairs of municipalities.¹⁸ Spada (2012) expands this technique to predict PB adoption in 447 municipalities with populations greater than 50,000.

The 2008 World Bank study uses matched municipalities for a differences-

¹⁴The generalizability of the results even within Brazil is questionable, due to the vast regional disparity in wealth and development.

¹⁵According to Wampler, “Too often researchers of PB have focused on the most successful cases and have overlooked the failures. Policy failures or under performing programs can be useful to understand how differing conditions make citizen empowerment, deliberation, or implementation more-or-less difficult to implement” (Wampler 2002, 18).

¹⁶As a robustness check, Boulding and Wampler also employ a matching technique, which does not alter their results.

¹⁷The municipalities are matched on voter turnout prior to PB implementation.

¹⁸For a more in depth analysis of civil society organizations and PB, see Lavalle et al. (2005), and Touchton and Wampler (Touchton & Wampler 2013).

in-differences (DID) comparison, however they are only matched on PT vote share and their sample only covered 1991-2004 (Bank 2008*a*, 90). They find mixed results on the effect of PB. While it is associated with reduced poverty rates in municipalities that adopted before 1996, the effect on fiscal performance is ambiguous.¹⁹ Touchton and Wampler (2013) find that PB has a positive effect on the share of health care and sanitation spending and number of civil society organizations, and a decrease in infant mortality rates. They find that these results are even more significant in municipalities with Workers' Party mayors and those that have had PB for longer, suggesting that "PB is associated with long-term institutional and political change—not just short-term shifts in funding priorities" (Touchton & Wampler 2013, 17). Gonçalves (2014) also analyzes the effect of PB on municipal spending and infant mortality, and similarly finds that PB is associated with higher spending on health and sanitation, and a reduction in infant mortality .

Of these studies that econometrically correct for the endogeneity of PB adoption, only Touchton and Wampler (2013) and Gonçalves (2014) find significant evidence supporting PB's claims, though the World Bank report offers mixed support. This has important policy implications: while PB enthusiasts advocate its implementation wherever possible, most empirical evidence of instrumental effects does not support this recommendation. However as I discuss in Chapter Two, many participants are motivated by intrinsic benefits, and thus PB could be a good policy choice despite the lack of instrumental benefits.²⁰

The analysis of instrumental benefits in Chapters Three, Four, and Five builds upon more recent large-N studies, including Wampler (2007), World Bank (2008), Spada (2012), Gonçalves (2009, 2014), Touchton and Wampler (2013), etc. I attempt to minimize the endogeneity of PB adoption with several econometric techniques: differences-in-differences (DID), propensity score matching (PSM), and PSM-DID. I also break the sample into different panels in order to compare early and late adopters with non-adopters. To my knowledge, this is the first

¹⁹This report also analyzes the specific experience of PB in Porto Alegre in comparison with similar cities that did not implement PB (a "synthetic control group). This is similar to earlier small-N studies.

²⁰However most advocates cite the supposed instrumental benefits as the primary justification for PB adoption.

study that employs this combination of methods to reduce selection bias using this dataset, and therefore provides an advance in our understanding of the effects of Participatory Budgeting. Additionally, I add to the literature by analyzing the effect of PB on three separate categories of dependent variables: municipal spending patterns (Chapter Three), sanitation provision (Chapter Four), and citizen welfare (Chapter Five).

Theoretically, government spending in one area results in increased public services in that area, which in turn leads to improved welfare outcomes in that area. However analyzing these outcomes individually is essential to our understanding of PB. It is possible that PB affects spending, but not public goods provision. And it is possible that it affects welfare without the intervening spending and public goods variables (see Figure 1.1). As the World Bank study points out, “[m]any intermediate results could have been achieved by a different budget allocation; however, such results may not be sufficient justification for the introduction of a policy. Instead, the evaluation of impacts should look at whether implemented policies have contributed to the ultimate goals they intended to achieve” (Bank 2008a, 88). Since PB is a method of choosing how municipal funds are spent, spending patterns represent the first layer of observable outcomes. So the question is whether the presence of PB is associated with a change in spending patterns. But if the ultimate goal of PB is to improve the lives of the citizens in a municipality, spending cannot be the only outcome of interest. Do these citizens actually get better services? And are they healthier and better educated? Increased spending in one area does not necessarily result in tangible improvements in that area, which is why it is important to look at the next two sets of dependent variables: public service provision and welfare. From a policy perspective it is important to know which step is affected by PB. A case where there is a change in spending but not a change in public service provision would require a different policy solution than a case where there is a change in public service provision but not welfare.

My findings support this theoretically important division of PB outcomes. I find increased spending on health and sanitation,²¹ which coincides with the find-

²¹which Gonçalves asserts was “an early and urgent demand in the participatory forums” (2014, 108)?108]Goncalves:2014cb

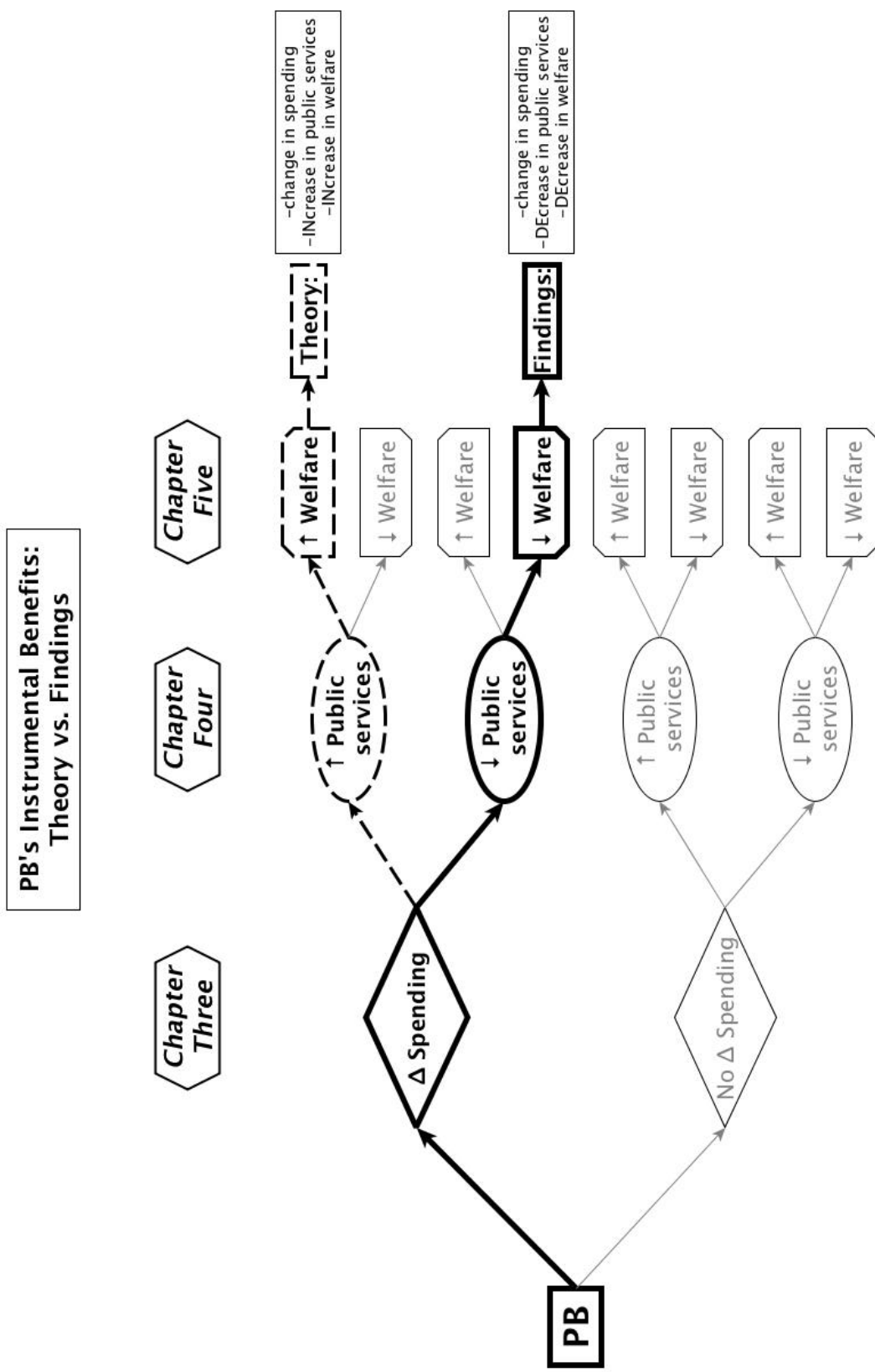


Figure 1.1: Instrumental Benefits of PB: Theory vs. Findings

ings in both Touchton and Wampler (2013) and Gonçalves (2014). However, both of these studies find a corresponding decrease in infant mortality, which I do not. It is assumed, though not stated, that the reduction in infant mortality is the result of improved health and sanitation services, which is a result of increased spending in those areas. I find that while the spending allocation of PB municipalities is shifted towards health and sanitation, there is not a corresponding increase in sanitation services, nor is there an increase in welfare, including but not limited to infant mortality. This suggests that the assumption that increased spending necessarily leads to increased services, which lead to improved welfare outcomes is flawed.

I argue that it is essential to evaluate these causal mechanisms individually in order to determine what questions PB has the potential to solve before blanketly prescribing PB in all contexts to solve diverse problems including corruption, accountability, inequality, and exclusion of marginalized citizens. This could permit more informed policy prescriptions that apply different forms of participatory democracy depending on the context. This will ideally lead to better outcomes for the citizens it purports to help. I now present an overview of PB in the Brazilian context.

1.3 Background: Participatory Budgeting

Brazil, like other large countries in Latin America, has a long history of experimenting with various degrees of decentralization. Until 1985, the alternations between decentralization and recentralization primarily consisted of transfers of authority between the state and central governments. However the most recent phase, which coincided with the return to democracy in 1985, is unique in a significant way that merits analysis: in contrast with the transfer of authority from the central to state governments characteristic of previous phases, the current phase has featured significant transfers of authority from the central government to the municipalities (Samuels 2004, de Souza 1997).

This new pattern came about because the return to democracy failed to

solve many of the problems that citizens had hoped it would (Bank 2008a).²² Clientelism and corruption were rampant and many citizens continued to lack the most basic necessities. This failure of government performance and accountability resulted in a profound lack of trust in elected officials. The 1988 Constitution sought to improve some of these problems in various ways. One was a significant move towards decentralization, primarily from the federal to municipal level (skipping the state level) (Montero & Samuels 2004, de Souza 1997). Interestingly, other solutions offered by the new constitutional provisions led to movements away from representative democracy in both directions: In 1993, just eight years after the return to democracy, Brazilian citizens voted in a referendum in which they would decide whether or not to restore the monarchy (which ultimately did not pass) (Smith 2005, 149-150).²³ On the other end of the spectrum was the surge in popularity of various forms of direct democracy, which allowed citizens to play a larger role in politics that was not limited to the ballot box.²⁴

One form of that direct democracy trend was PB, which is the delegation of fiscal decision-making power from the municipal government to the citizens (Wampler 2002). Specifically, budgetary decisions primarily regarding public works and services (roads, housing, sanitation, land use, etc.) that had previously been made by the mayor and City Council with little or no citizen oversight, would instead be proposed and voted on by citizens in town-hall style meetings. After the decisions are made, the municipal government is responsible for implementing the selected projects, which are overseen by citizen delegations, theoretically creating a more transparent municipal government (for an example of the process, see Figure 1.2). Furthermore, it was suggested that participation opportunities at the local level would be less costly for participants, and thus would increase participation of the previously excluded poorer sectors of society (Serageldin et al. 2003, 10; 25). This participation would then theoretically result in increased provision of public

²²This experience of "imperfect" democratization was common across Latin America during this time period (Feinberg 2008, 154).

²³While it did not pass, only 66 percent voted for democracy, 10 percent voted for monarchy, and 24 percent were null or blank (Smith 2005; <http://www.justicaeleitoral.jus.br/arquivos/plebiscito-de-1993>)

²⁴This was part of a larger movement towards "deepening" democracy across Latin America (Feinberg 2008).

services to these previously excluded sectors of society.

PB was first implemented in 1989 in Porto Alegre by the newly elected left-wing Workers' Party (PT) mayor. It was part of the PT's attempt to gain broader support by getting citizens involved in the city's budgeting process at a time when many had little faith in the existing democratic process (Acioly et al. 2003, 2). While PB was not immediately popular due to lack of funds necessary to implement the desired projects, it gained popularity over the next few years as more projects were completed. And over the next decade Porto Alegre's experiment with PB became the shining example of participatory democracy's success. Cities around Brazil and then across the world began to implement their own versions of participatory budgeting. Although the exact configuration and the amount of authority transferred varies across PB municipalities, the basic features and objectives are the same. I will first summarize the trends in PB adoption, followed by a more in-depth description of the process. I then discuss participation across groups, and general citizen impressions of PB before presenting my data and methodology for the subsequent chapters.

PB adoption: Brazil is divided into five distinct geo-political regions (see Figure 1.3). The regions differ significantly in income, access to services, most welfare measures, and demographics. The Southeast region has the highest GDP per capita, and is also the economic hub of the country. It contains the megacities of São Paulo and Rio de Janeiro, as well as three other cities with populations over one million. The second wealthiest region (by GDP per capita) is the Central-West region, which contains two cities with over one million residents: the federal capital, Brasília, and Goiânia. The South region has the third highest GDP per capita, and also contains two cities with over one million residents (Curitiba and Porto Alegre, the flagship case of PB). These three regions have a significantly higher standards of living than their counterparts to the north and east.

The North region falls second to last in terms of GDP per capita. Much of the region is covered by the Amazon Rainforest, and it has a much lower population density than the rest of the country outside of the two cities with more than one million residents: Manaus and Belém. The primarily coastal Northeast region is

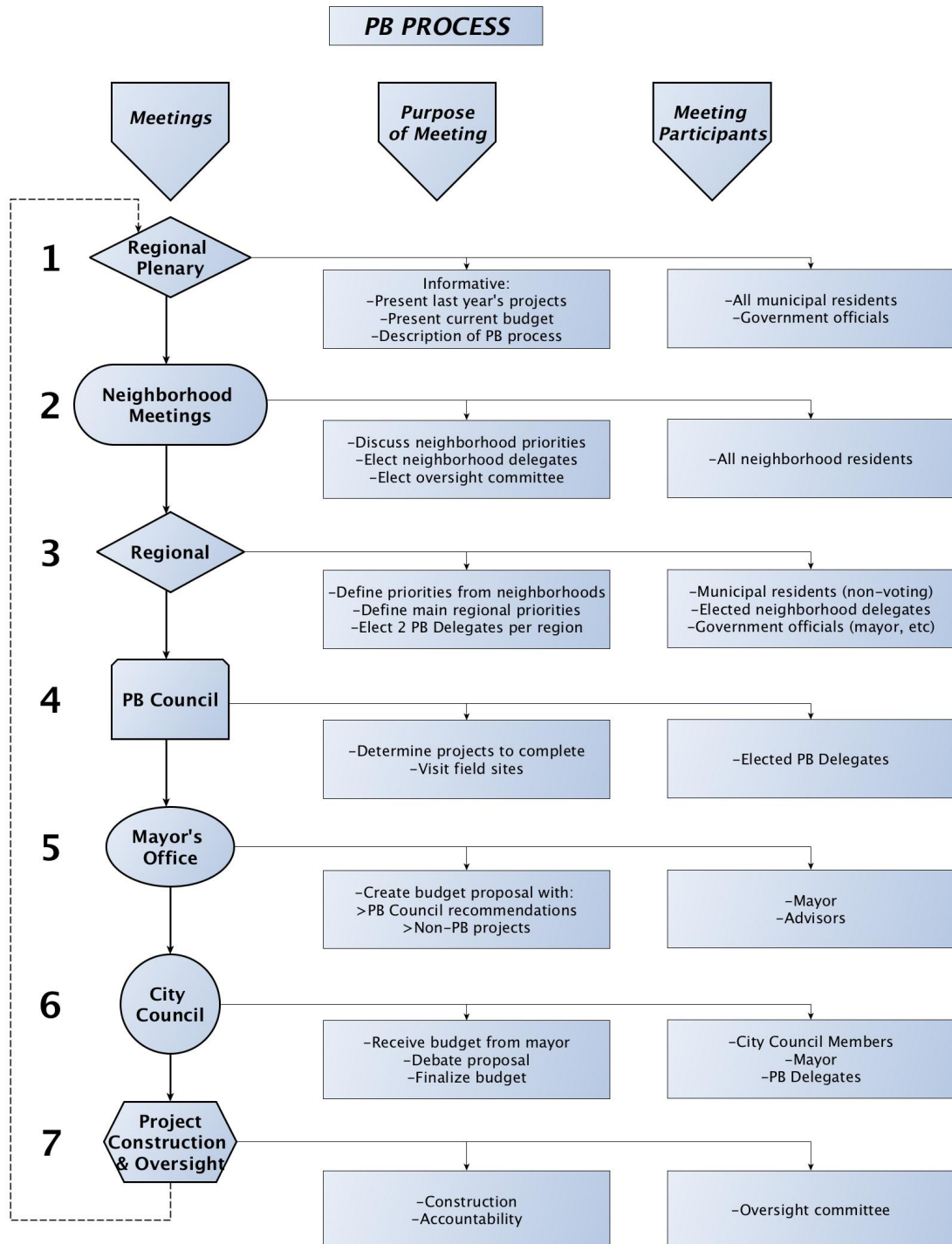


Figure 1.2: Participatory Budgeting Process

the poorest, and contains four cities with more than one million residents: Salvador, Fortaleza, Recife, and São Luís.

After PB was adopted in Porto Alegre, it spread to cities around Brazil. By 1992, it had been adopted in ten cities with over 50 thousand residents. With the exception of Teresina in the Northeastern state of Piauí and Porto Alegre in the Southern state of Rio Grande do Sul, all of these were in the Southeastern states of São Paulo, Minas Gerais, Rio de Janeiro, and Espírito Santo. And of the eleven that adopted PB by 1992, nine were in municipalities with PT mayors (see Figures 1.3 to 1.6).

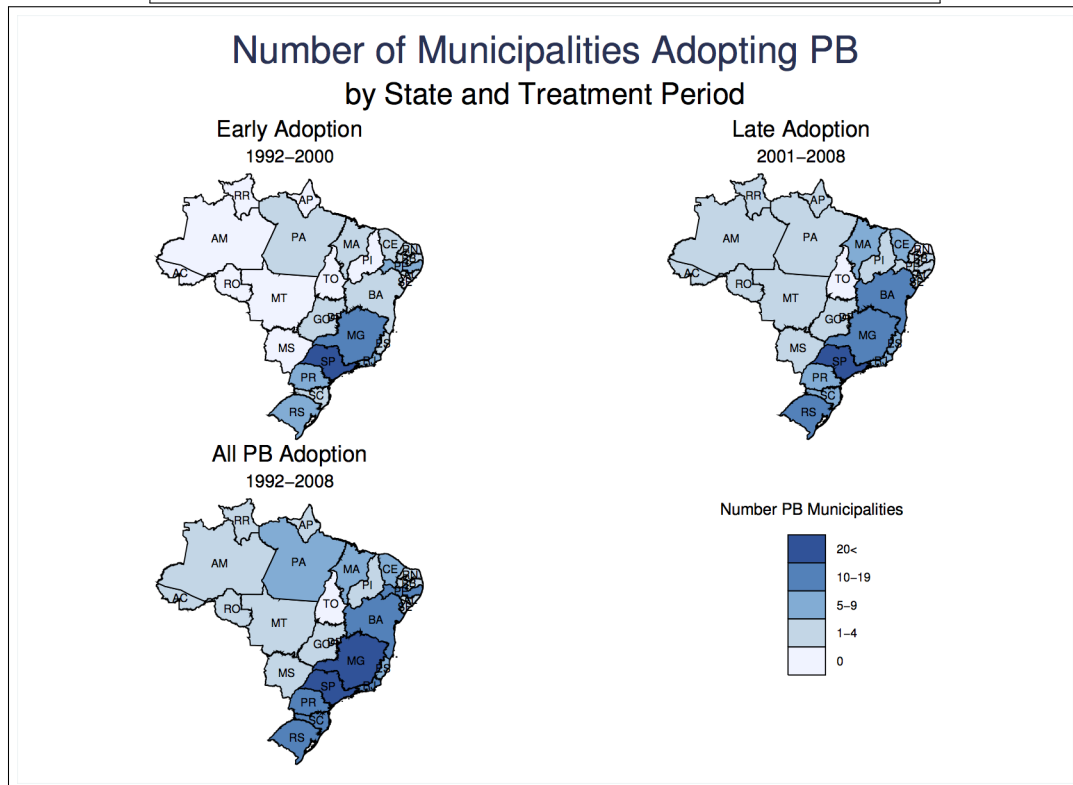
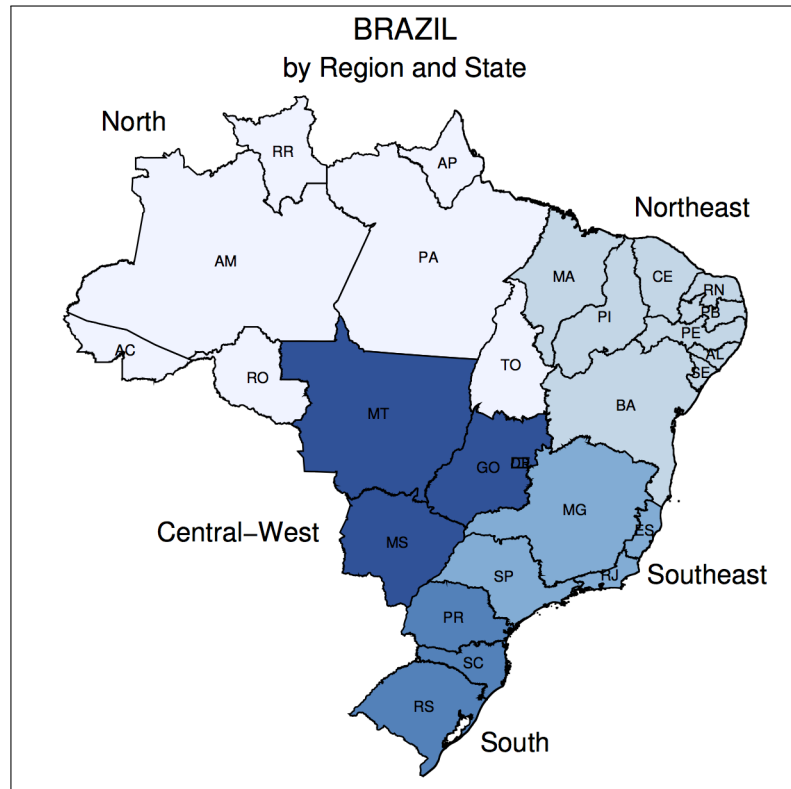


Figure 1.3: (Top) Brazil: Regions, (Bottom) Number of Municipalities Adopting PB: by State and Treatment Period

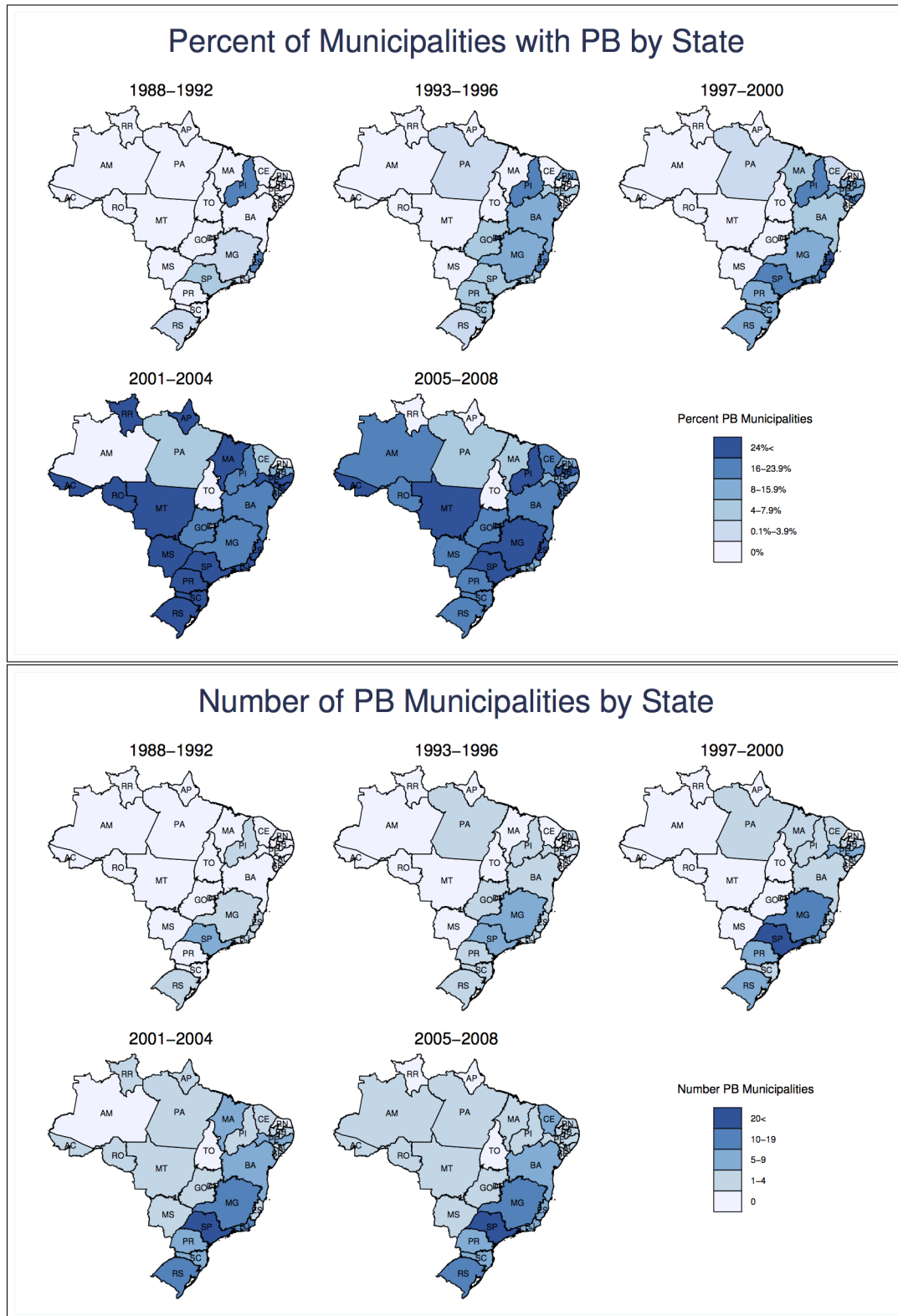


Figure 1.4: (Top) Percent of Municipalities with PB by State, (Bottom) Number of PB Municipalities by State

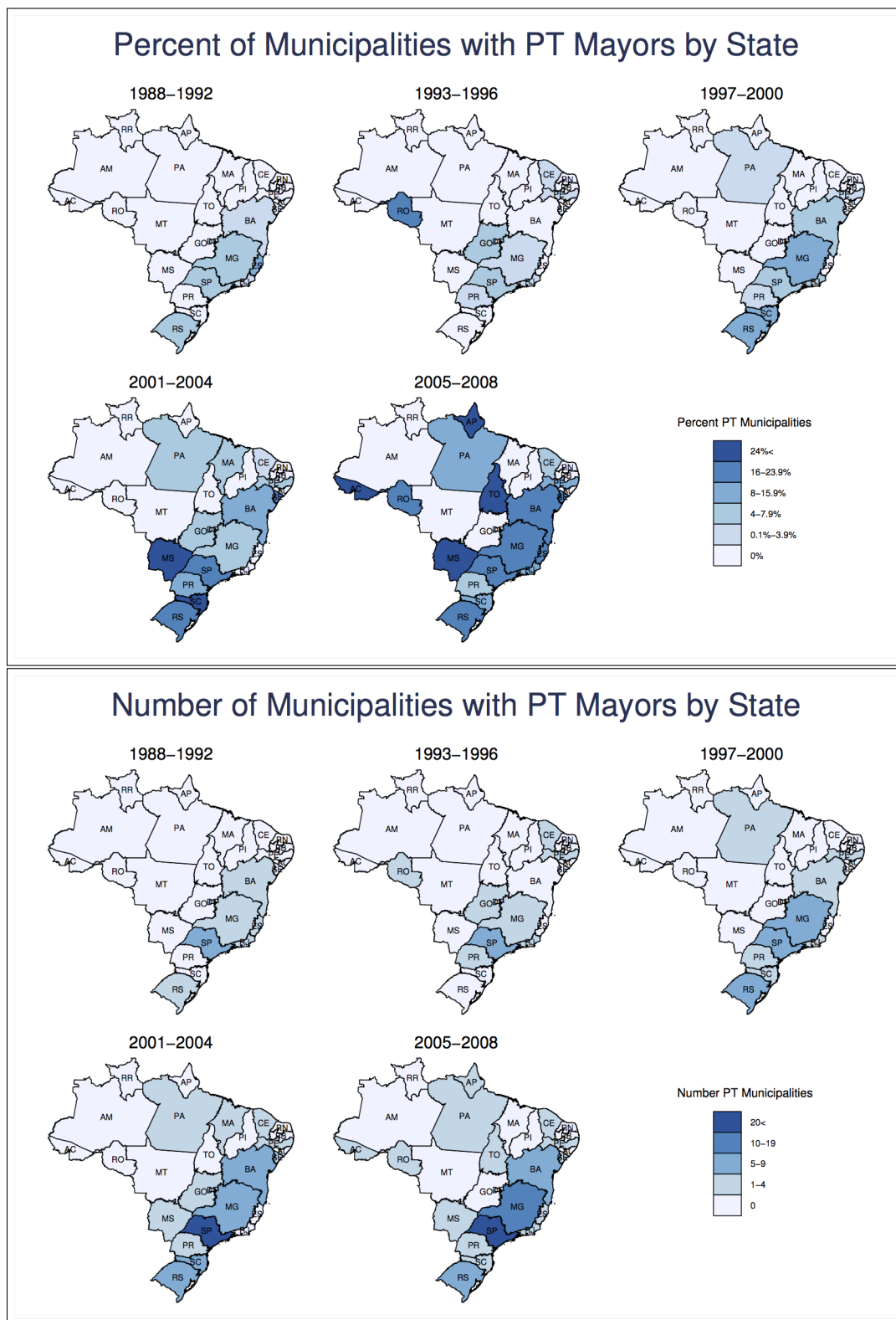


Figure 1.5: (Top) Percent of Municipalities with PT Mayors by State, (Bottom) Number of Municipalities with PT Mayors by State

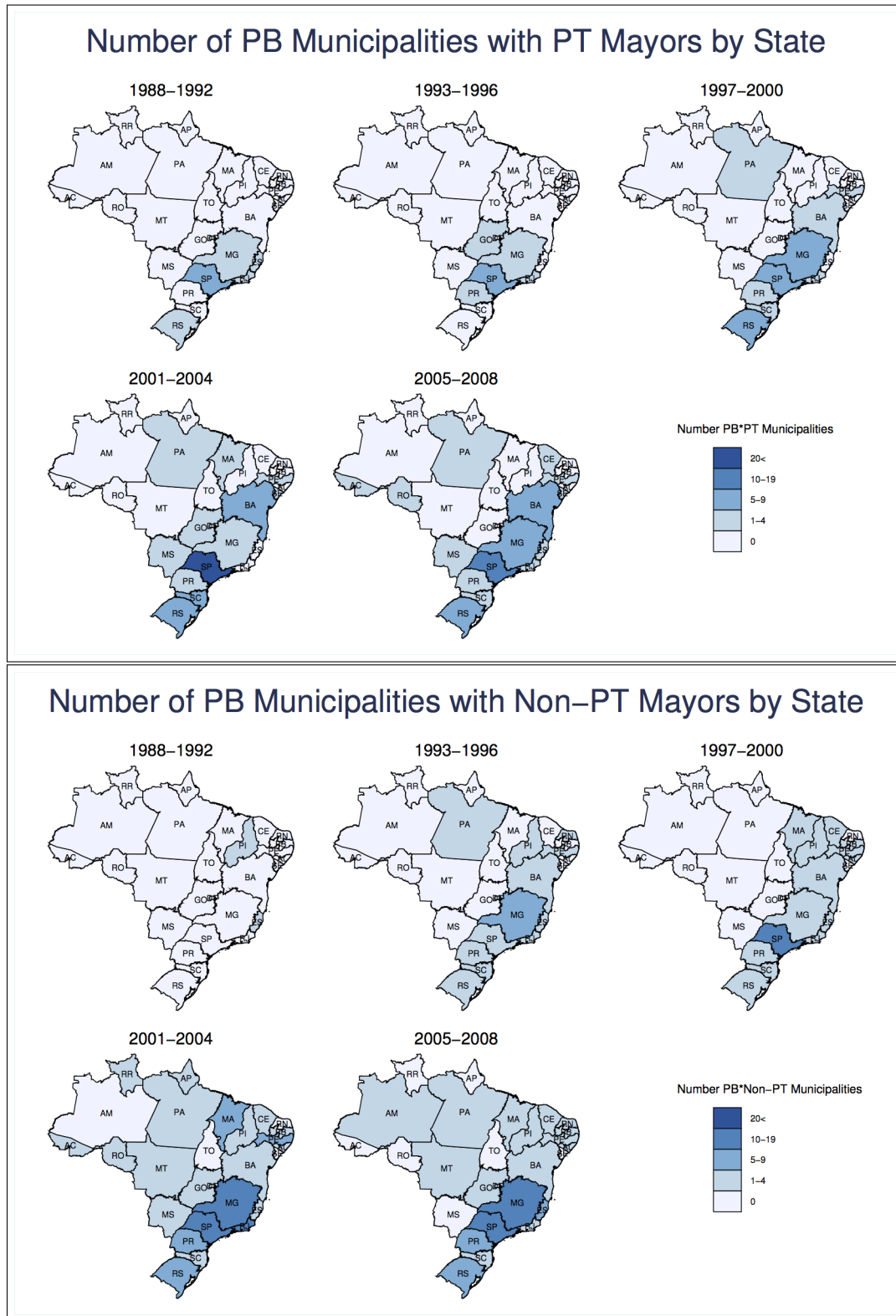


Figure 1.6: (Top) Number of PB Municipalities with PT Mayors by State, (Bottom) Number of PB Municipalities with Non-PT Mayors by State

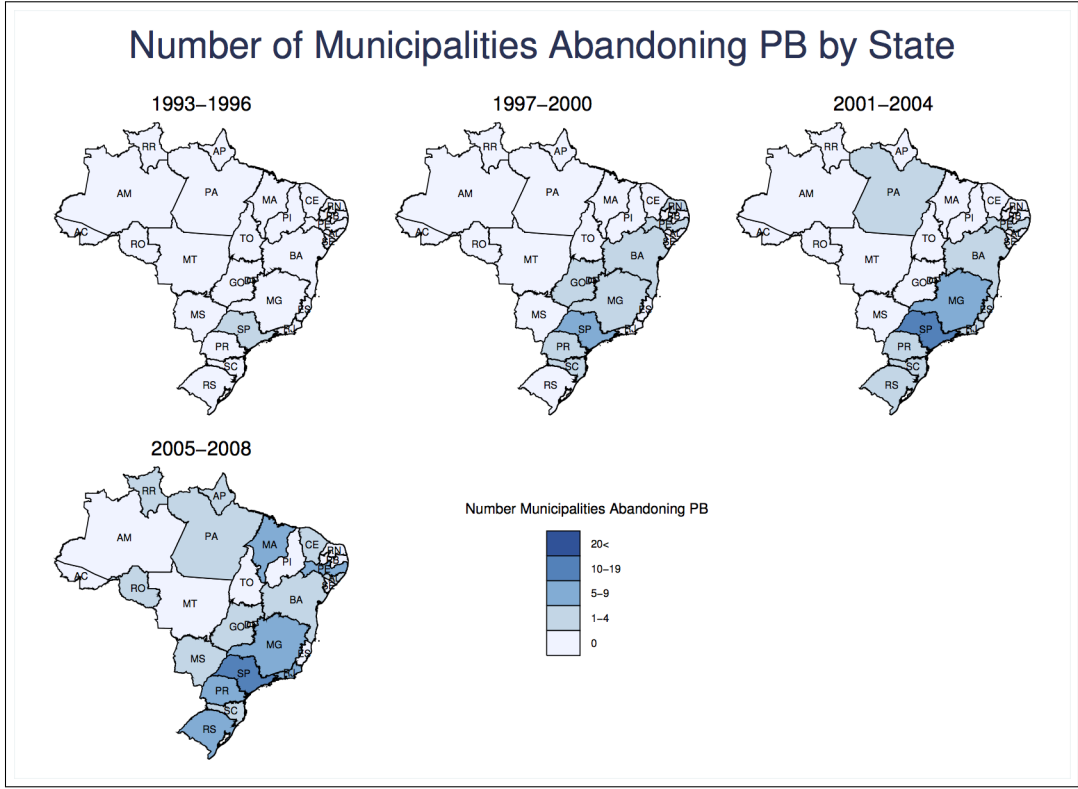


Figure 1.7: Number of Municipalities Abandoning PB by State

Between 1993 and 2000, an additional 74 municipalities with over 50 thousand residents adopted PB. Of these, 30 were adopted by PT mayors. 41 were in the Southeast, 15 were in the South, 15 in the Northeast, two in the Central-West, and one in the Northeast.

Adoption between 2001 and 2008 showed a similar pattern: 142 more municipalities had adopted PB, 55 of which had PT mayors. 67 were in the Southeast, more than half of which were in São Paulo alone. Additionally there were 30 in the Northeast, 26 in the South, 11 in the North, and eight in the Central-West.

However, PB has also been abandoned in some of these municipalities. Between 1993 and 1996, one municipality abandoned PB; between 1997 and 2000 nine municipalities abandoned PB; between 2001 and 2004 ten municipalities abandoned PB; and between 2005 and 2008 17 municipalities abandoned it (see Figure 1.7).²⁵

PB Process:

The general PB process is as follows (see Figure 1.2): Prior to the start of the citizen participation aspect,²⁶ city officials divide the municipality into regions and microregions (neighborhoods) where the upcoming meetings will take place.²⁷ The Quality of Life Index is also defined for each microregion. As one of the main goals of PB is to channel funds towards pro-poor areas, these designations are very important, and those regions with low Quality of Life scores will be more likely to receive PB projects.²⁸

1: ²⁹ Regional plenary meetings mark the first step in the process for PB participants. Each municipality contains multiple regions, and one of these meetings

²⁵For an in-depth discussion of PB abandonment, see Spada (2014).

²⁶The process differs somewhat across municipalities, but the main attributes are similar. This description reflects a composite of the processes in Porto Alegre, Recife, and Santo André.

²⁷The number of regions and microregions differs across municipalities. For example, the city of Belo Horizonte is divided into 9 regions and 46 microregions; Recife is divided into 6 regions and 18 microregions (and 95 neighborhoods within those microregions).

²⁸"A 'Quality of Life Index' is created by the government to serve as the basis for the distribution of resources. Regions with higher poverty rates, denser populations, and less infrastructure or government services receive a higher proportion of resources than better-off and wealthier neighborhoods. Each municipality devises its own formula to guarantee the equitable distribution of resources" (Wampler 2007, 26).

²⁹These numbered steps correspond to those in Figure 1.2

occurs in each. These first meetings are largely informational, and are open to the public. Here, city officials present information about projects from the previous year, present the current budget, and educate the attendees about the PB process. There is also a discussion of general priorities in the region.

- 2:** The second round of meetings occurs at the neighborhood or microregion level. Here, residents discuss priorities for their particular neighborhood, and elect members to a committee that will oversee the implementation of PB projects. They also delegate members to attend and speak for the microregion at the regional meetings.³⁰ According to Wampler these meetings often have high attendance “because turnout determines the number of elected representatives from each neighborhood to the regional level. Because final votes are taken at the regional level, a larger number of elected representatives (citizen-delegates) from a neighborhood increases its likelihood of having a project selected” (2007, 28).
- 3:** Next are regional budget meetings where neighborhood delegates (determined by turnout at neighborhood meetings) select which projects prioritized by the different neighborhoods will be included in the proposal to the PB Council. They also discuss and select general regional priorities. Each region votes for two delegates³¹ to attend the city-wide PB Council meetings.
- 4:** Municipality-wide PB Council meetings are attended by the two elected councilors from each region. They visit field sites and get technical information about the different projects under review. Ultimately, they decide which projects proposed at the regional level will be included in the PB proposal to the mayor and City Council.
- 5:** The proposal from the PB Council is submitted to the mayor for review. The mayor then creates the annual municipal budget proposal to submit to the City Council, based on the PB Council recommendations as well as non-PB projects, such as administrative costs, etc.

³⁰The regional meetings are open to the public, but only these delegates may vote.

³¹The number varies by municipality, but is frequently two.

- 6:** The mayor's budget proposal is reviewed by the City Council, where it is debated and then finalized. PB Councilors and the mayor can attend these proceedings.
- 7:** Finally, the year-long process (usually March-February) concludes, and the selected projects can be implemented. The citizen oversight committee monitors and reports on the progress. Meanwhile the process begins again for the following year.

PB Participants and Projects The PB process is obviously contingent upon citizen participation and ongoing support. This is the primary focus of Chapter Two with respect to Porto Alegre, however I summarize the more general patterns here.

Figure 1.8 demonstrates the general pattern in participation in PB in Porto Alegre from 1990-2012 (Fedozzi, Furtado, Sartori Bassani, Gomes Macedo, Parenza & Cruz 2013), Guarulhos from 2001-2007 (City of Guarulhos), and Belo Horizonte from 1994-2011 (de Arajo 2012). In Porto Alegre there is a clear increase in participation over the first 10 years, followed by a leveling off period, which fluctuates somewhat from year to year. Participation levels also fluctuate in Belo Horizonte and Guarulhos, but generally trend upwards.

There is evidence that PB attracts previously excluded citizens and that it is generally quite popular among participants.³² In what Pateman describes as “a very significant reversal of the usual pattern of political participation, poor citizens form a large proportion of participants; usually they are marginalized” (2012, 12). As compared to the sample population, the PB participants are older, poorer, and less educated. They are also more likely to be female and minorities, specifically Black and Mestizo (Bank 2008*b*, 67-68). Baiocchi also finds evidence of this pattern in Porto Alegre (2003, 53-56), Acioly et al. find this to be true in São Paulo and in Santo André (2003, 36), and Pires and Avritzer find similar evidence for Porto Alegre, São Paulo, and Belo Horizonte (2005). Chapter Two presents these statistics in much greater detail for Porto Alegre.

³²Though it should be noted that this is not necessarily indicative of general views of PB as those that do not support it are unlikely to participate at all.

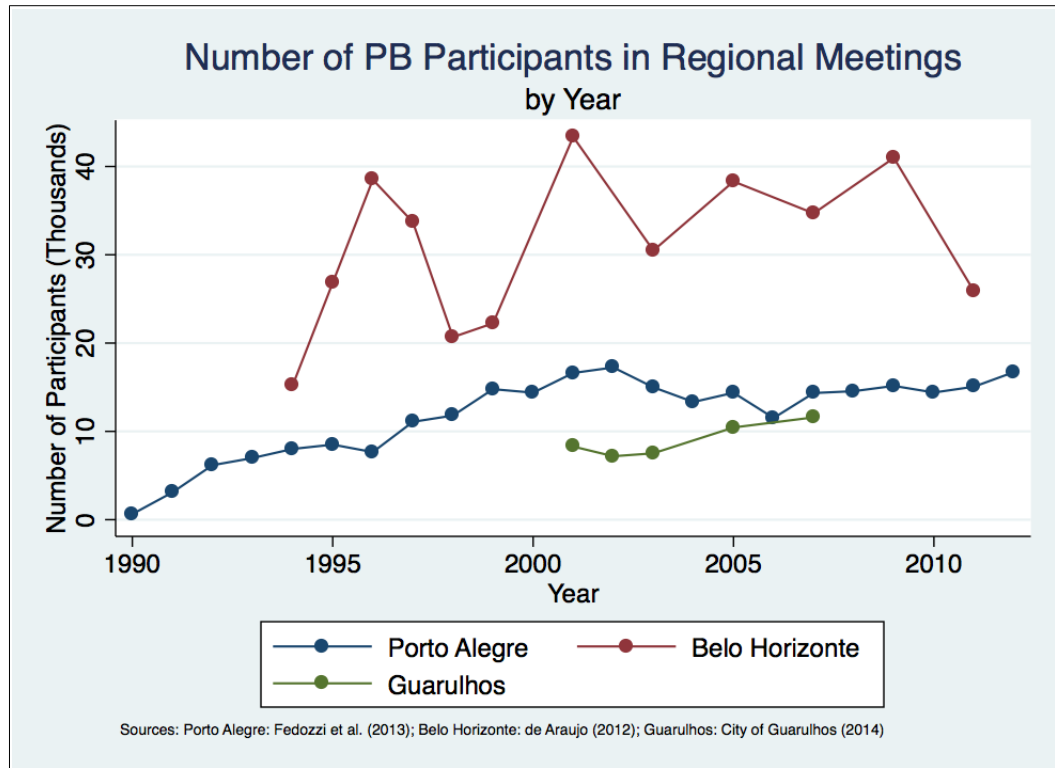


Figure 1.8: PB Participation by Year

However, the World Bank (2008), Acioly et al. (2003), and Pateman (2012) find that this pattern changes at the level of PB Councilor. At the higher level of responsibility, the participants tend to be wealthier, more educated, and male. Additionally they find that the very poorest sectors of society tend not to participate at any level, which is hardly surprising, given costs of transport and lost wages.

Survey results show that citizens generally believe in and like the PB process, and believe that it favors the poor. For example, 88 percent believe that “citizen participation [is] important in the decisions of the municipality” (Bank 2008*b*, 23) and 81 percent believe that “control of the use of money from municipality by the population” is “very important” (2008, 34). However, only 24 percent had ever attended a PB meeting. And of those who had attended a meeting, 50 percent had only attended once (2008, 58). When individuals who had not attended meetings were asked what, if anything, would get them to participate, the answers ranged from “nothing” to “more publicity,” to “beer and meat” (2008, 52-57).

In terms of instrumental results, participants seem to be fairly satisfied. 79 to 85 percent of respondents partially or totally agree that PB “broadens democracy in the city,” “increases the efficiency of the government” (2008, 38), “works or achieves results,”³³ and “improves the quality of life in the city” (2008, 40). When asked if they had been direct beneficiaries of a PB project, 25 percent said yes, while 67 percent said no (2008, 46). And when asked which group benefits most from PB, 45 percent said “poorer towns and villages,” 31 percent said “entire population,” and only 3 percent said “nobody benefits” (2008, 43). 84 percent of respondents partially or totally agree that PB “favors the poor people in the neighborhood and communities” (2008, 39). These views suggest that participants are motivated by both instrumental and intrinsic factors. Only a quarter of the participants directly benefitted from a project, and yet they still participated. I return to this in greater detail in Chapter Two.

The projects selected through PB are skewed towards the pro-poor areas of health and sanitation, education, and housing. Many municipal websites highlight this tendency by listing the completed projects with before and after pictures.³⁴ Porto Alegre takes it a step further, and publishes a special PB newsletter for each region, including PB priorities and completed projects, in addition to socioeconomic indicators.³⁵ The implicit, and occasionally explicit, suggestion is that these projects would not have occurred in the absence of PB. However, it is extremely important to keep in mind that data from Brazil during this time period indicate that this is not altogether likely, as both PB and non-PB municipalities saw significant improvements in these areas.³⁶ Nonetheless, citizens, and particularly participants, are unlikely to think about this counterfactual, thereby giving PB more credibility than it possibly deserves. Examples of projects selected by PB in Recife include: pavement and drainage of streets,³⁷ the construction of

³³In the survey, the statement was presented in the negative. Thus 79 percent of respondents partially or totally DISagree that PB “does not work; it does not achieve results.”

³⁴www.recife.pe.gov.br/op/antesdepois6

³⁵www2.portoalegre.rs.gov.br/op/

³⁶General trends are discussed in more detail in the “Data and Methods” section.

³⁷Rua Alexandre Neptuno Afogados

a maternity health center,³⁸ renovations of schools,³⁹ construction of low-income housing,⁴⁰ and renovation of public sewers.⁴¹ Similar projects are found in Belo Horizonte, which are accompanied by “before” and “after” pictures on the website, and shown in Figures 1.9 through 1.11.⁴²



Figure 1.9: PB Sanitation Project - Before (Left) and After (Right): Pavement and sewer on Rua Gandhi, Belo Horizonte



Figure 1.10: PB Health Project - Before (Left) and After (Right): Health center improvements (Centro de Saúde Tírol) in the region of Barreiro, Belo Horizonte

³⁸Construção Da Maternidade Do Ibura

³⁹Reforma Da Escola Municipal Luiz Vaz De Camões (Vila Maria Lucia E Aliança)

⁴⁰Construção De 145 Habitações (Ibura De Baixo)

⁴¹Recuperação Do Sistema De Esgotamento Sanitário (Aritana Imbiribeira)

⁴²www.flickr.com/photos/portalph



Figure 1.11: PB Education Project - Before (Left) and After (Right): Pre-school (Unidade Municipal de Educação Infantil (Umei) Sol Nascente) in the region of Barreiro, Belo Horizonte

1.4 Data and Methods

In Chapter Two, I look at trends in PB participation in Porto Alegre and test competing theories regarding the intrinsic and instrumental motivation for participation using secondary survey analysis. I first use data from a World Bank survey conducted in 2006-2007 to compare the demographics of PB participants with a representative sample of citizens in Porto Alegre. I also use data from a series of surveys conducted between 1993 and 2012 (Nuñez & Fedozzi 1993, FASE, CRC/PMPA, CIDADE & Abers 1995, CIDADE 1999, CIDADE 2002, CIDADE 2003, Fedozzi 2005, Fedozzi, UFRGS & ObservaPOA 2009, Fedozzi et al. 2013, SMCPGL 2012) in order to show time trends in participation by demographic group. I then test the intrinsic versus instrumental theories using survey data collected by Fedozzi et al. (2013) on motivations for participation among PB participants in Porto Alegre. I discuss the specific surveys and methods used in the methodology sections of that chapter.

The methodology in Chapters Three, Four, and Five differs significantly from that in Chapter Two. In contrast with the case study of Porto Alegre, I conduct a large-n study using data from all municipalities with more than 50 thousand residents to evaluate the instrumental effects of PB. Farrington (2011) asserts that “from one point of view, measuring instrumental deliberative quality is logically impossible, since measuring the impact of deliberation on decision making seems to require comparison with a (wholly inaccessible) counterfactual situation in which the decision-making involved was not deliberative” (157). However I am able

to approximate this counterfactual by comparing PB and non-PB municipalities.

1.4.1 Data

As of 2009, PB had been implemented in over 1100 of Brazil's 5564 municipalities, and in hundreds of municipalities around the world⁴³ as a result of the dissemination of information “through networks of political and civil society activists” on “Brazil's most successful PB experiences” (IBP 2005, 3). The problem is that these policy prescriptions, like those advocated by the Washington Consensus and decentralization proponents in the last few decades, are being made without a clear understanding of if, when, or how PB works because they are largely based on the anecdotal evidence of successful Brazilian cases. This ignores unsuccessful cases of PB and a control group in which PB was never implemented. And even when those cases are included, there is a potential endogenous treatment effect caused by non-random assignment; PB was not randomly assigned to municipalities, and therefore we cannot assume that the treatment and control groups differ only in their exposure to PB (Bank 2008*a*, 86).⁴⁴

My research strategy includes several methods of reducing this endogenous treatment effect problem: I use differences-in-differences (DID) to control for unobservable differences between treatment and control groups, while I use propensity score matching (PSM) to control for observable differences by matching treated municipalities with untreated municipalities that are otherwise similar. I then combine these two methods using PSM-DID to control for both.

In the next sections, I present a summary of the data used to test my hypotheses. I first describe the case selection, then outline the operationalization and sources for all dependent and independent variables, and then describe the set of treatment and control groups to be tested. I then present the econometric methods used in the tests, in addition to a summary of the results. These sections

⁴³Including South Africa, Indonesia, India, Serbia, the UK, France, Portugal, Spain, Argentina, Chile, Ecuador, Guatemala, Mexico, Peru, Venezuela, and Canada.

⁴⁴A discussion of why certain municipalities adopted PB and others did not is beyond the scope of this paper. For a detailed discussion, see Spada (2012), and Touchton and Wampler (2013).

are elaborated in the corresponding chapters.

My sample is limited to municipalities with more than 50 thousand residents (as of 1991). While this is in part due to a lack of data, which should be collected for future research, it is likely that PB works differently in small areas where everyone knows each other than in larger more anonymous city settings. Work by Olson, Ostrom and others suggests that participatory decision-making in small settings is actually quite successful (Olson 1965, Ostrom 1990, Ostrom 1998).

Boulding and Wampler (2010) test their hypotheses using a dataset of cities with over 100,000 residents from 1991-2000 (n=220). Touchton and Wampler (2013) expand that dataset to cover cities with more than 100,000 residents between 1989-2008 (n=253). I use an expanded dataset that includes cities over 50,000 residents between 1992-2008, for a total of 551,⁴⁵ but I exclude the 11 municipalities that adopted PB prior to 1992 due to incomplete and unreliable dependent variable data prior to 1991.⁴⁶

The dependent variables for Chapters Three through Five are summarized as follows: In Chapter Three, I analyze spending patterns, which are divided into three categories: (1) health and sanitation, (2) education and culture, and (3) housing and urbanism. In all cases, the variable is measured as spending in each category as a share of total spending. I select these spending categories for several reasons. On a theoretical level, these categories are closely associated with the needs of the poorest individuals in society. Access to health and sanitation, education, and housing are three of the most basic public services a state can provide to meet human needs (Banerjee, Iyer & Somanathan 2007, Bank 2008*b*). They are also generally services that wealthy individuals can and will purchase for themselves in the absence of government provision, thus making them specifically “pro-poor.” On an empirical level, these are also the areas of spending that are partially or fully provided at the municipal level. And finally, these are three of

⁴⁵The data for PB adoption were graciously provided by Brian Wampler and Paolo Spada. The data for PB municipalities with more than 100,000 residents were collected by Wampler and Avritzer, and the data for municipalities between 50,000 and 100,000 residents were collected by Spada.

⁴⁶The excluded municipalities are: Teresina (PI), Ipatinga (MG), Vila Velha (ES), Vitória (ES), Angra dos Reis (RJ), Piracicaba (SP), Santo André (SP), Santos (SP), São Bernardo do Campo (SP), São Paulo (SP), and Porto Alegre (RS).

the most frequent priorities selected in PB meetings, suggesting that these are in fact the priorities most important to participants. I discuss this in more detail in Chapter Three.

The dependent variables in Chapter Four pertain to sanitation provision, and include share of permanent private homes with access to (1) sewer, (2) water, (3) garbage, and (4) electricity. Chapter Five analyzes welfare outcomes. The first measure in Chapter Five is a composite Human Development Indicator. The other variables are divided into three categories, each of which has a corresponding composite HDI measure: (1) education, (2) health, and (3) inequality/poverty. Educational measures include literacy among 11-14 year olds, literacy among adults over 15, and school attendance for children under the age of 6. Health indicators include infant mortality, childhood mortality, probability of living past the age of 60, and rate of teenage pregnancy. Inequality and poverty measures include proportion of citizens living in poverty, the Theil index of inequality, and the Gini index of inequality.

Brazil experienced enormous strides in public service provision and most welfare measures between 1991 and 2010 (see Figure 1.12).⁴⁷ Among municipalities with more than 50 thousand residents, water provision increased from 64 percent of households in 1991 to 83 percent in 2010. Electricity increased from 72 percent in 1991 to 96 percent in 2010. As Figure 1.12 shows, all aggregate HDI measures increased as well. For example, infant mortality decreased from 39 (per 1000 live births) in 1991 to 16 in 2010. Life expectancy increased from 66 years in 1991 to almost 75 years in 2010. Illiteracy among 11-14 year olds decreased from almost 13 percent in 1991 to less than 3 percent in 2010, and school attendance for those under 6 years of age increased from 49 percent to 95 percent during the same period.⁴⁸

⁴⁷In depth descriptions of these variables, as well as complete summary statistics, can be found in the corresponding chapters.

⁴⁸As I discuss in Chapter 5, this period coincides with the Bolsa Familia program, which is a conditional cash transfer for poor families. The condition is school attendance, which likely explains a significant portion of this change.

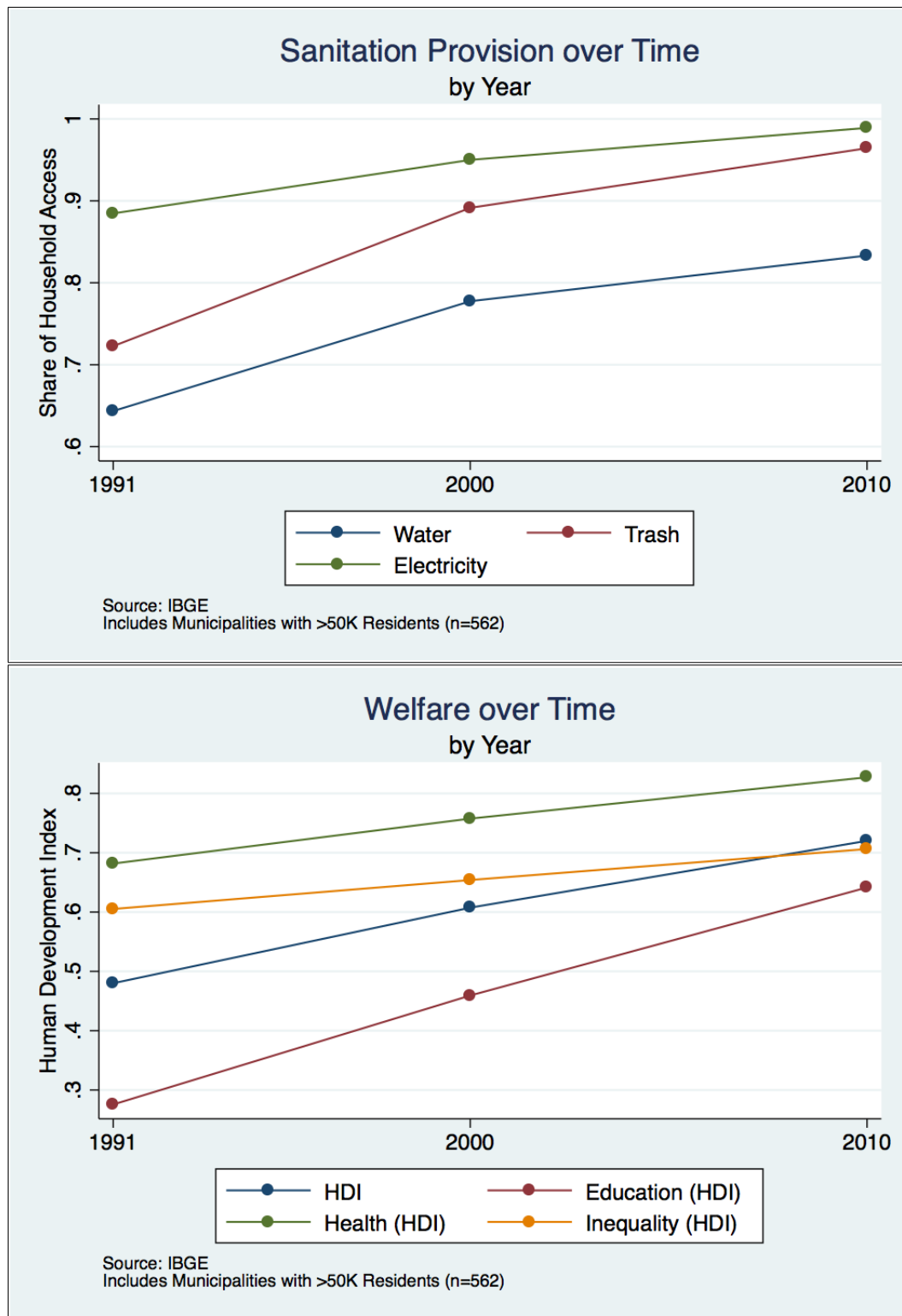


Figure 1.12: (Top) Sanitation Provision over Time, (Bottom) Welfare over Time

1.4.2 Panels

The logic behind breaking the full sample into multiple panels is to evaluate whether the time period in which PB was adopted has any correlation with spending, sanitation provision, or welfare. For example, those municipalities that were proactive in adopting PB (“early adopters”) might also be proactive in improving sanitation provision, independent of PB status.⁴⁹ Therefore, the panels differ along two dimensions: membership in treatment and control groups, and timing of baseline and outcome measurement (see Figure 1.13 for a summary of the research design). The panels consist of different configurations of the following groups of municipalities:

All PB adopters: (PB_{all}) are those municipalities that adopted PB in any period between 1992 and 2008.

Early PB adopters: (PB_{early}) are those that adopted PB between 1992 and 2000.

Late PB adopters: (PB_{late}) are municipalities that adopted PB between 2001 and 2008.

Non-PB municipalities: ($Non-PB$) are those that never adopted PB.

To my knowledge, this is the first study that breaks the sample into these panels in order to minimize the endogeneity problem and analyze potential adoption timing effects in this way.

1.4.3 Methods

I perform a series of tests on the panels described in the previous section to evaluate the hypotheses that PB adoption has a positive instrumental effect on pro-poor spending (Chapter Three), sanitation provision (Chapter Four), and welfare outcomes (Chapter Five). In this section, I briefly describe the methods

⁴⁹The econometric techniques used to address this problem more thoroughly are described in the methods section and in the individual chapters.

Panels		Measurement and Treatment Periods				
		1991	1992-2000 (PB_{early})	2000	2001-2008 (PB_{late})	2010
1	PB_{all}	Pre-test	PB			Post-test
	Control: Non- PB		0			
2A	PB_{early}	Pre-test	PB	Post-test	Hatched	
	Control: Non- PB ; PB_{late}		0			
2B	PB_{early}	Pre-test	PB			Post-test
	Control: Non- PB		0			
2C	PB_{early}	Pre-test	PB	Post-test	Hatched	
	Control: PB_{late}		0			
3A	PB_{late}	Pre-test	PB			Post-test
	Control: Non- PB		0			
3B	PB_{late}	Hatched	Pre-test			Post-test
	Control: Non- PB		PB	0		

Early baseline measure for Chapter Three is 1993, not 1991.

Figure 1.13: Research Design

used and present a summary of the results from each chapter. I then provide a road map of the dissertation.

The main obstacle to determining a causal effect of PB is the potential endogenous treatment effect caused by non-random assignment; PB was not randomly assigned to municipalities, and therefore we cannot assume that the treatment and control groups differ only in their exposure to PB. In short, the non-adopters cannot be assumed to provide a valid counterfactual, as demonstrated in the difference in means tests presented in Chapters Three, Four, and Five.

Therefore, the primary task is to employ methods that correct for, or at least minimize this problem of selection bias. One way in which I do this is by comparing early adopters with late adopters and measuring outcomes before the late adopters received the treatment (as described above in Panel 2C). This could provide a better control group than non-PB adopters because late adopters ultimately do get the treatment. However, there still may be important differences between early and late adopters. Therefore, I use several econometric techniques to reduce the selection bias more systematically across all panels.

The general methods are as follows: I begin with a basic OLS regression as a benchmark point of comparison. I then employ three strategies from economics and program evaluation literature, beginning with propensity score matching (PSM) to construct a less biased control group, which provides a more valid counterfactual. This allows me to control for observable differences between the two groups. I then use a differences-in-differences (DID) method to control for unobservable differences between the treatment and control groups. Finally, I combine the two methods (PSM-DID) in order to simultaneously control for observable and unobservable differences between the treatment and control groups. This combination of methods should produce a less biased estimate of the effect of PB than simple OLS regression. My goal is to use these methods to approximate a randomized experiment as closely as possible on the panels described above. This is obviously not entirely achievable, however it is one of the inherent limitations of real-world quasi-experiments.

1.5 Road Map of Dissertation

This dissertation proceeds as follows: In Chapter Two I look at trends in PB participation in Porto Alegre and test competing theories regarding the motivation for participation in PB using secondary survey analysis. I find that there are high levels of participation among low socioeconomic groups, despite theories which predict the opposite. I also find that participants are divided as to their primary motivation for participation (intrinsic versus instrumental), and that the division is correlated with demographic groups. Specifically, highly educated participants tend to cite intrinsic motivations, while those with less education are more prone to cite instrumental motivations. This pattern also holds for length of participation in PB.

In Chapter Three I analyze the effect of PB adoption on municipal spending allocation. I present the main dataset to be used in the subsequent chapters and discuss my research design in detail. I find that PB is associated with an increase in spending on health and sanitation, a decrease in spending on education and culture, and a neutral effect on housing and urbanism spending.

I then look at the effect of PB adoption on municipal sanitation provision in Chapter Four. As a result of endogeneity problems related to PB adoption, I employ several mitigating econometric techniques in Chapters Four and Five, which I present and defend in Chapter Four. I find that PB has a largely neutral effect on sewer, water, garbage, and electricity provision, and in some cases a negative effect. However, I find that spending does have a large and significant effect on service provision, which suggests that changes in spending allocation, rather than PB itself, could be the answer to solving some public service-related problems.

In Chapter Five, I analyze the effect of PB adoption on a series of citizen welfare outcomes, including measures for health, education, poverty and inequality, in addition to several composite Human Development Indicators. The results in this chapter are similar to those in Chapter Four: PB produces a largely neutral effect on welfare outcomes, but spending produces significant effects, as does the conditional cash transfer program, Bolsa Familia. The final chapter briefly sum-

marizes my argument and findings, and discusses the implications and limitations of the dissertation.

This dissertation contributes to the literature on Participatory Budgeting, decentralization, participatory democracy, intrinsic versus instrumental motivations, public service provision, and welfare, and it provides a theoretical framework for understanding the intrinsic and instrumental motivations behind participation, and thus how to think about evaluating the success of PB. It is my hope that it will be of value to both scholars and policy-makers.

2 Why Participate? Intrinsic and Instrumental Motivations for PB Participation in Porto Alegre

2.1 Introduction

“My motivation to work with [PB] is to achieve decent housing and live in dignity.”

- PB participant in Santo André¹

“In reality I am donating myself and my time, weekends and evenings, and the personal cost-benefit is very high. Though personal enrichment and the accumulated experience has no price.”

-PB participant in Santo André²

These quotes suggest that PB participants have differing motivations for participation. In this chapter I use survey data from Porto Alegre to analyze these intrinsic and instrumental motivations, and I hypothesize that citizens place a high value on the intrinsic benefits of PB as a process. That is, they gain value from the act of participating, or even the option of participating, irrespective of the material gains. This is not to say that participants are not interested in instrumental benefits, just that these benefits are not the only motives for participation.

I argue that unconditional support for democracy is an indication of the intrinsic value individuals assign to democracy and democratic participation, in

¹(Acioly et al. 2003, 39)

²(Acioly et al. 2003, 41)

that those who support democracy unconditionally would support it even if outcomes were worse. Data from the Latinobarómetro survey provide evidence that many Brazilians unconditionally support democracy, and as theoretical literature would predict, these data also show that unconditional support for democracy is highly correlated with education and socioeconomic status, which leads me to hypothesize that instrumental and intrinsic motivations for participation in PB differ across groups.

I test this hypothesis by conducting a secondary survey analysis, which allows me to compare motivations for participation across demographically stratified samples of PB participants in Porto Alegre. These findings suggest that, in addition to the expected instrumental motivations, there are strong intrinsic motivations for participation in PB. Intrinsic motivation is positively correlated with the length of time one has participated in PB, level of education, general favorable views on democracy, and to a lesser extent with income.

This chapter begins with a theoretical discussion of who participates, followed by empirical evidence on participation by year and demographic group. I then present instrumental versus intrinsic theories of motivations for participation as well as my model, followed by an empirical analysis. I end with a discussion of the implications of my analysis before turning to a quantitative evaluation of the instrumental benefits of PB in Chapter Three.

2.2 Participation

One of the main goals of PB is to include previously underrepresented members of society in the decision-making process, so it is important to look at who actually participates in the process. There are several empirically-based predictions about the demographic determinants of participation, primarily from the voting literature. According to Geys (2006), those with a high probability of participating include those with more education and wealth. In contrast, the youngest and oldest members of society have a much lower probability of voting. The positive correlation between socioeconomic status is tested in a vari-

ety of arenas and is found to be quite robust (Verba & Nie 1972, Verba, Schlozman & Brady 1995), particularly regarding education. This is true in the United States (Lijphart 1997, Lipset 1960, Verba, Schlozman & Brady 1995, Wolfinger & Rosenstone 1980, Rosenstone & Hansen 1993), and elsewhere, both in Europe and Canada (Powell Jr 1986, Dalton 1996), Central America (Seligson, Conroy, Macías, Pérez & Stein 1995), and Latin America more generally (Carreras & Castañeda-Angarita 2014, Aviel 1981). Income is also generally found to be a significant predictor of turnout, however the results are somewhat weaker when education is controlled for (Wolfinger & Rosenstone 1980, Dalton 1996).

The relationship between age and participation is also fairly strong, and participation increases with each age cohort, excluding the elderly (Matsusaka 1995, Wolfinger & Rosenstone 1980, Blais 2000, Carreras & Castañeda-Angarita 2014). The relationship between gender and participation is somewhat less robust in developed countries, upon which the majority of this literature is based (Powell Jr 1986), as well as in Latin America. While there is some evidence of a significant gender gap in participation in Latin America that favors men (Desposato & Norrander 2008), others have found that the gender gap actually goes the opposite direction, in favor of women (Carreras & Castañeda-Angarita 2014, Geys 2006).

Fornos et al. (2004) find the relationship between socioeconomic status and turnout to be lower in Latin America than in the United States and Western Europe, however more recent work calls that into question, finding that there is indeed a strong connection between age and socioeconomic status and voting in Latin America as elsewhere (Carreras & Castañeda-Angarita 2014). These findings are strongest in non-compulsory systems. As PB in Brazil is completely voluntary, these predictions should hold, as opposed to voting in general in Brazil, which is compulsory. Not surprisingly, compulsory voting systems show a smaller effect of education on turnout and a higher turnout overall (Blais 2000).

I present participant data from a series of surveys conducted between 1995 and 2012 on PB participants in Porto Alegre by the Brazilian NGO, CIDADE (Centro de Assessoria e Estudos Urbanos) and Fedozzi et al. (2013) to show participation trends over time (Nuñez & Fedozzi 1993, FASE et al. 1995, CIDADE 1999,

CIDADE 2002, CIDADE 2003, Fedozzi 2005, Fedozzi, UFRGS & ObservaPOA 2009, Fedozzi et al. 2013, SMCPGL 2012).³ I then present participant data collected by the World Bank in 2006 to show the demographic differences between PB participants and a general sample. The World Bank survey was conducted in two parts: A representative sample, containing both PB and non-PB participants, and a sample that consisted exclusively of PB participants. The first part took place in December 2006, and consisted of a representative sample of 1,000 residents of Porto Alegre in each of the 16 regions of PB. The number of surveys in each region was proportional to the population of each region. Of this sample 847 respondents had heard of PB and of that group, 204 had participated in it, leaving 638 who had heard of PB but did not participate, and 5 who did not answer (Bank 2008*b*, 22). The second part of the survey sampled only PB participants. It was conducted in January 2007 and consisted of 300 individuals in all PB regions of Porto Alegre (Bank 2008*b*, 69). Thus the comparisons are between the full sample of 1000, which includes 204 PB participants, and the participant sample, containing 300. The comparison is not between PB and non-PB participants, but between a representative sample and PB participants.

Gender

Desposato and Norrander (2008) find that turnout among women in Latin America is lower, and near the beginning of the survey period, there is some evidence of that in PB participation in Porto Alegre (see Figure 2.2). While the census data show that the population of females is higher in Porto Alegre (54.6 percent in 2000, and 54.7 percent in 2010), the earliest PB figures in 1993 show a gender difference in participation of only one tenth of a percentage point: 46.7 percent female and 46.6 percent male. In 1995 male participation is slightly higher, but then their paths diverge, with an increase in female participation and a decrease in male participation. By 2012, the ratio of female to male participation was 61.1: 38.9. So despite early evidence that females were less likely to participate

³The survey data in 2002 were collected by CIDADE, using random sampling. They surveyed 1,593 PB participants in Porto Alegre, out of a total of 17,457 in that round (CIDADE 2003). Surveys in other years used similar surveying methods.

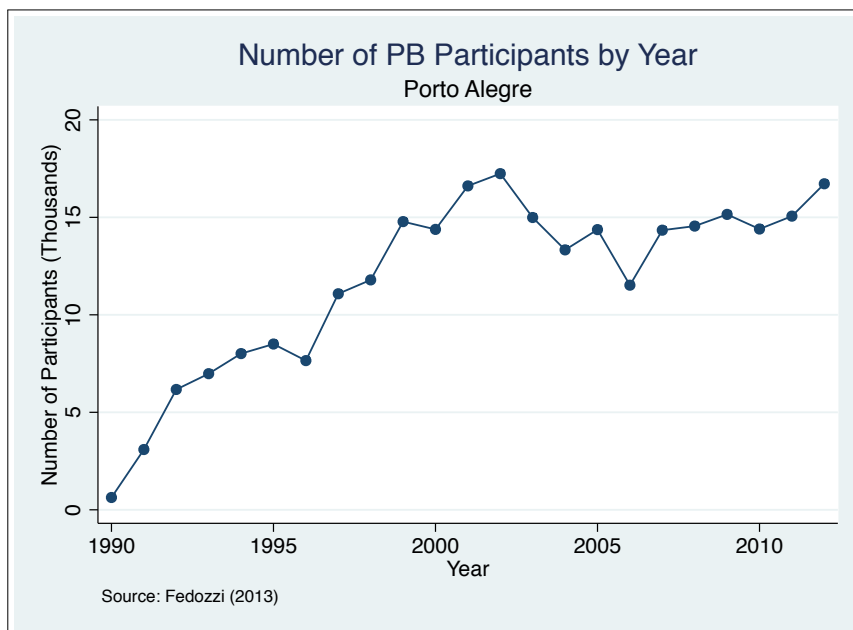


Figure 2.1: PB Participation in Porto Alegre by Year

as predicted, that does not appear to have held over time. Survey data from the World Bank (2008) comparing participants with a representative sample in 2006-2007 confirm these results (see Figure 2.2), and a χ^2 test shows these gender participation differentials to be statistically significant ($p = 0.06$).⁴ This pattern is consistent with political participation findings in Carreras and Castañeda-Angarita (2014), as well as PB participant characteristics in the northeastern city of Recife.⁵

Age

Both theory and past empirical evidence predict that the youngest cohorts are the least likely to participate (Geys 2006, Matsusaka 1995, Wolfinger & Rosenstone 1980, Blais 2000, Carreras & Castañeda-Angarita 2014), and that generally holds true in the case of PB in relation to their share of the population (see Figure 2.3). Interestingly, however, there seems to be a convergence of age group participation over time. In 1995, middle aged participants (ages 34-49) had a

⁴ $\chi^2(1) = 3.551$

⁵In Recife, the gender breakdown in 2001 was 43 percent male and 57 percent female (<http://www.recife.pe.gov.br/op>).

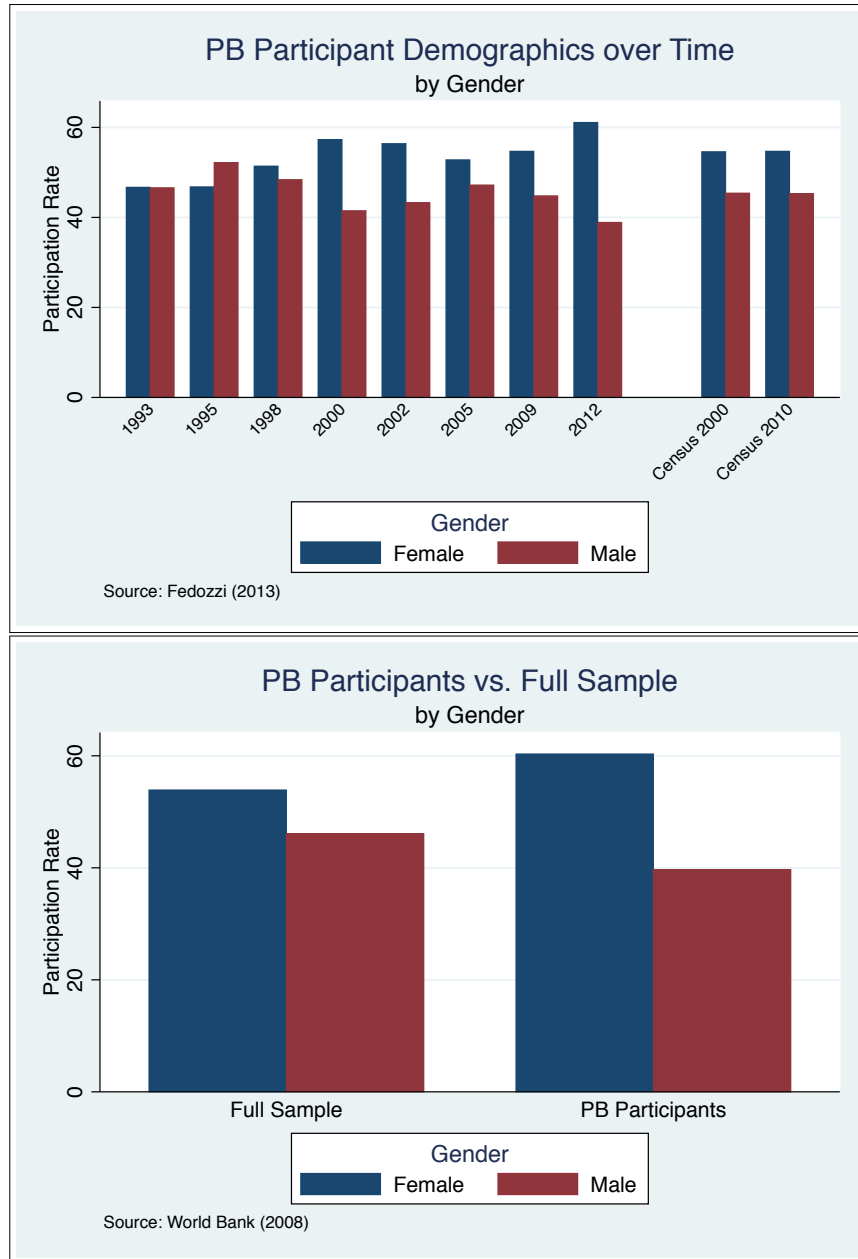


Figure 2.2: PB Participant Demographics by Gender

clear plurality with 41.8 percent, followed by the younger cohort (ages 16-33) with 34.9 percent. But by 2009, the middle aged cohort had declined to 36.6 percent, while the younger cohort's participation rate increased to 35.8 percent. During this time the older cohort (over 50) increased from 22.4 percent to 27.4 percent. Of course unlike the other demographic factors, we must be careful in interpreting these figures, as an individual will change age cohorts over time, whereas they will generally not change gender or race cohorts over time. Therefore, even the youngest members of the middle-aged cohort in 1995 (age 34) would be in the older cohort by 2012 (age 51), which could explain this difference over time. Desposato and Norrander (2008) point out that "a key difference between the developed world and Latin America is in political socialization: individuals' propensities to participate in politics may be set in their late twenties or early thirties and continues at that level throughout most of their lives." Given the non-democratic periods that were prevalent in Latin America until the 1980s, this could have a significant impact on the older generation of participants (Desposato & Norrander 2008, 149).

The World Bank survey comparing PB participants and a general sample uses slightly different age cutoffs, perhaps most importantly splitting the youngest cohort into two. Whereas the youngest cohort in the time trend data include those aged 16-33, the World Bank looks at 16-24 and 25-34. Figure 2.3 demonstrates why this may be an important distinction. The youngest cohort in the time series data had the second highest participation rate, while the youngest cohort in the World Bank data had the lowest. Additionally, Figure 2.3 shows a clear overrepresentation of those in the 45-59 cohort in 2006-2007. A χ^2 test confirms that these differences are highly statistically significant ($p < 0.000$).⁶

Race

Though Verba et al. (1993) find relatively little effect of minority status in participation if socioeconomic status is controlled for, excluding those controls reveals low levels of minority participation. Figure 2.4 demonstrates that traditional theoretical predictions regarding low minority participation rates are also called

⁶ $\chi^2(4) = 28.805$

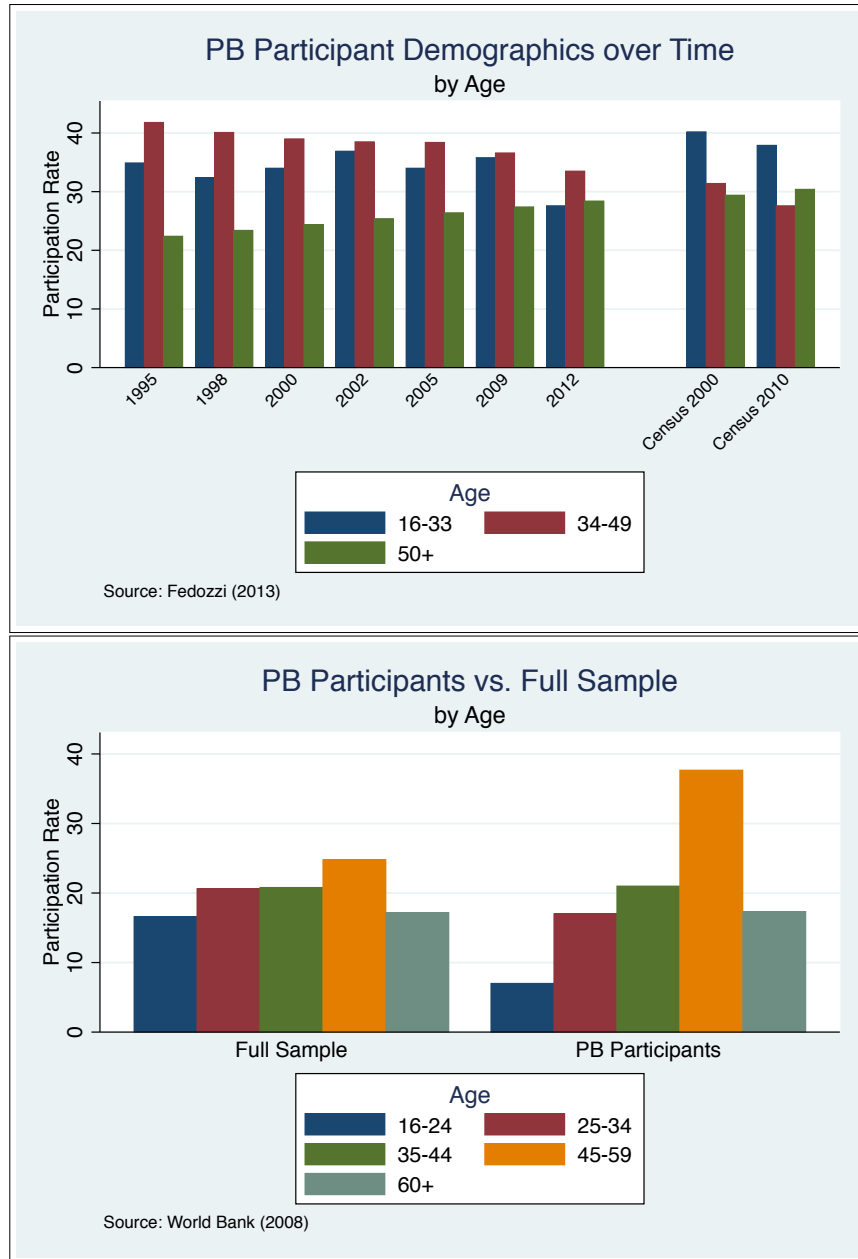


Figure 2.3: PB Participant Demographics by Age

into question by PB in Porto Alegre even without controlling for socioeconomic status. According to 2010 census figures the racial breakdown in Porto Alegre was 10.2 percent Black, 74.2 percent White, and 10.5 percent “Other”. However, between 1995 and 2009, the rate of white participation in PB declined from 71.4 percent to 56.4 percent, while the rate of black participation increased during the same period from 11.8 percent to 37.7 percent. Given that one of the goals of PB is to increase minority representation, these numbers are promising, however the World Bank survey from 2006-2007 does not show a statistically significant difference in ethnicity between participants and the representative sample (see Figure 2.4), where $p=0.768$.⁷ Furthermore, it should also be noted that the demographics in Porto Alegre differ significantly from many other cities in Brazil. While in 2010 the racial breakdown in Porto Alegre was 10.2 percent Black, 74.2 percent White, and 10.5 percent “Other” (including multiracial), the breakdown in the Northeastern city of Salvador was 27.8 percent Black, 18.9 percent White, and 51.7 percent “Other.” This suggests that we should not generalize about the racial patterns of PB in Porto Alegre to other cities.

Education

According to Persson (2013), “the relationship between education and political participation is perhaps the most well-established relationship that exists in research on political behavior” (1). While theoretical predictions on participation suggest that we should see a positive relationship between education and participation, PB survey data from Porto Alegre show the opposite, particularly in the late 1990s and early 2000s (see Figure 2.5). In 1998 those with basic education comprised 58.2 percent of participants, as compared to their census rate of 41.9 percent. This effect seems to have declined over time, with 2012 having the lowest rate of participation among those with only basic education. Results from the World Bank survey in 2006-2007 show similar results. There is a statistically significant ($p < 0.000$)⁸ difference in education

⁷This refers to the Fisher’s exact test rather than the χ^2 , which was necessary due to the low number of survey respondents in the “Other” category.

⁸ $\chi^2(3) = 36.81$

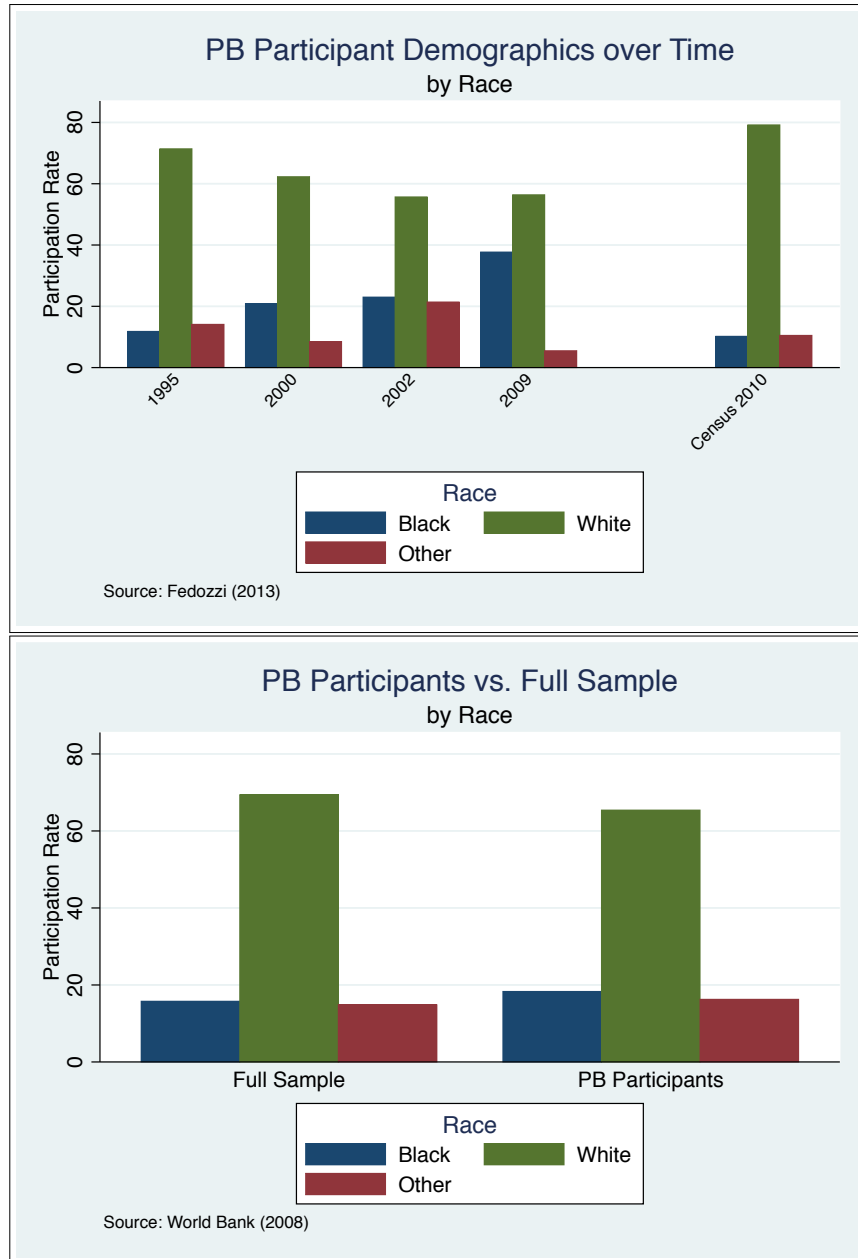


Figure 2.4: PB Participant Demographics by Race

between PB participants and the representative sample, with an overrepresentation of those with only basic education among PB participants (see Figure 2.5). Thus PB generally seems to challenge the existing theoretical predictions and empirical findings of a positive relationship between education and participation (Lijphart 1997, Lipset 1960, Verba, Schlozman & Brady 1995, Wolfinger & Rosenstone 1980, Rosenstone & Hansen 1993, Powell Jr 1986, Dalton 1996, Seligson et al. 1995, Carreras & Castañeda-Angarita 2014, Aviel 1981), excluding those with little or no education who have predictably low levels of participation.

Income

Participation by income group also shows promise for the goal of including previously excluded residents in PB (see Figure 2.6). While the lowest income group (those earning less than 2 minimum salaries) was fairly active in the first observation in 1998, representing 30.9 percent of all participants, their numbers have steadily increased to 53.2 percent in 2009, with the exception of 2000. The second lowest income group (between 2 and 4 minimum salaries) has remained relatively steady, with a low of 26.1 percent in 1998 to a high of 29.9 percent in 2002. Participation by those in the 4-8, 8-12, and 12+ income groups has shown a corresponding decline during this period. In comparison to the representative sample, the World Bank survey shows that incomes of PB participants are significantly lower than the general sample ($p < 0.000$),⁹ which can be seen in the bottom panel in Figure 2.6.

Together, these data show that demographic predictions of participation seem to be somewhat inaccurate in the case of PB in Porto Alegre both over time and in direct comparison to a representative sample, particularly in regards to education. This is quite promising given PB's goal of attracting previously excluded groups. However it does not tell us why people participate or what they hope to get out of it. I now turn to the question of motivation: why do those who participate choose to do so? And do those motivations vary by demographic group?

⁹ $\chi^2(4) = 60.683$

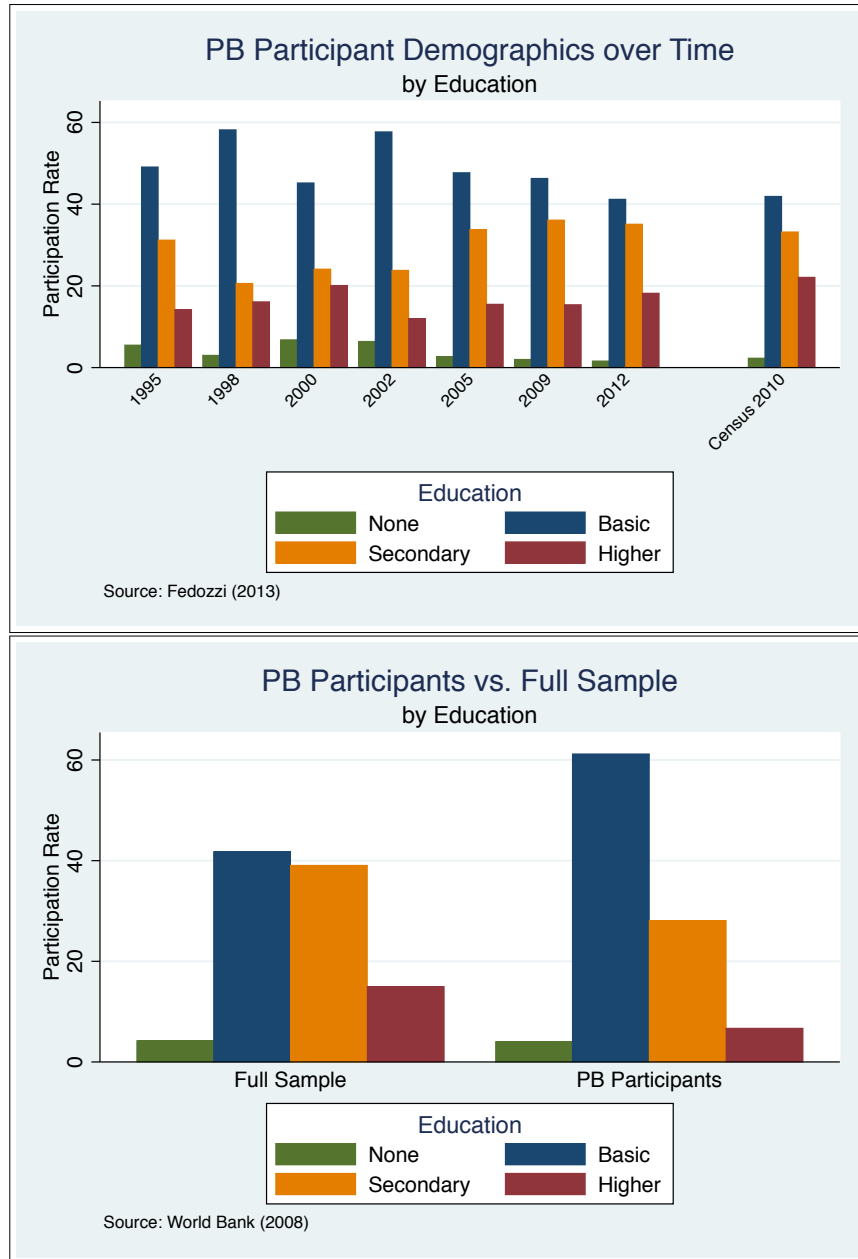


Figure 2.5: PB Participant Demographics by Education

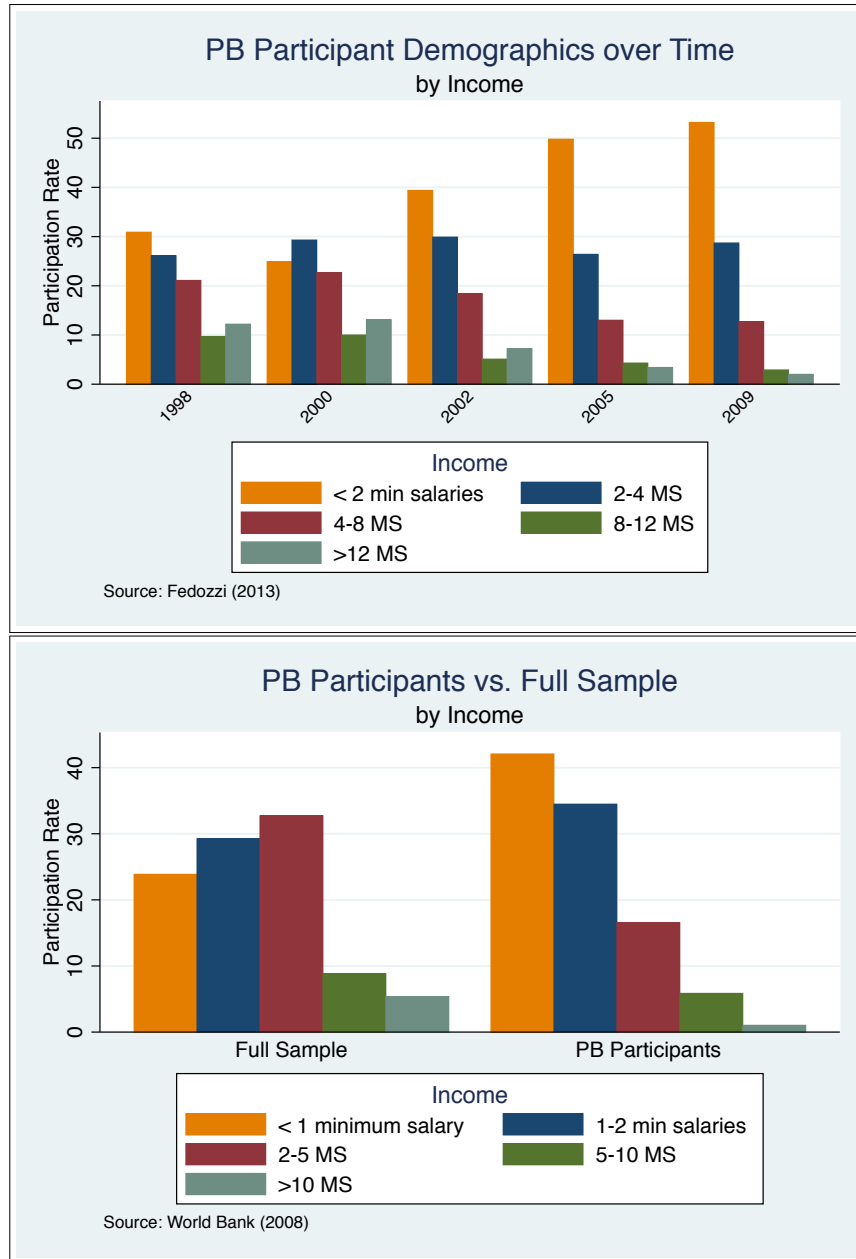


Figure 2.6: PB Participant Demographics by Gender

2.3 Comparing Intrinsic and Instrumental Motivations

The previous section looked at the demographic trends in PB participation. In this section I analyze competing instrumental and intrinsic theories of motivations to participate in PB and hypothesize that not only do instrumental and intrinsic motivations for participation differ across individual participants, as demonstrated by the quotes from two participants in Santo André at the beginning of the chapter, but that the motivations differ systematically across demographic groups. The literature review in Chapter One presented the competing theories of intrinsic versus instrumental motivations for participation which I will not repeat here in detail, but rather I focus on democratic values and motivations for participation across groups.

The idea that higher socioeconomic status is linked with democratic values is not new. In fact, Lipset made this argument in 1959 and many studies have built upon this work. These studies generally focus on the effect of support on the stability of democracy (Almond & Verba 1963, Norris 1999, Limongi, Cheibub, Alvarez & Przeworski 1996, Przeworski, Stokes & Manin 1999, Fung 2003, Inglehart & Welzel 2003), whereas I am interested in the differential motivations for participation. However both the theoretical and empirical literature on support for democracy are relevant to my analysis as well.

While he does not use the same terminology, Smith (2005) implicitly argues that many in Latin America support democracy for instrumental reasons: “Their backing is conditional: they want practical results” (286),¹⁰ and that the lack of practical results correspond to the comparatively low levels of support for democracy. Using data from the 2000 Latinobarómetro,¹¹ he shows that fewer than 40 percent of Brazilians agree with the statement, “democracy is always preferable” (292). Compared with advanced industrial democracies this is extremely low, but

¹⁰In the terminology of Bratton and Mattes (2001), “Intrinsic support is a commitment to democracy ‘for better or worse’[?] instrumental support is conditional. It is granted, and may be easily withdrawn, according to the temper of the times” (448).

¹¹Large-n cross-national public opinion surveys in Latin America.

it is low even within the context of Latin America as a whole. In Uruguay the figure is greater than 80 percent, and it is over 60 percent in the comparatively less stable Central American countries of Nicaragua, Honduras, and El Salvador (Smith 2005). Interestingly, the support for democracy in Brazil in 1995 was 48 percent, and declined in both 2000 and 2005 (low of 37.04 percent) before increasing to 53.74 percent by 2010.

Using survey data from the Hewlett Foundation, Smith (2005) finds that “preference for (and disenchantment with) political democracy in Latin America is more or less evenly spread throughout the population and the social structure.” He goes on to argue that “[t]his contradicts commonplace argumentation that support for democracy is strongest within specific social sectors, in particular, the educated middle class” (299-300).

However, analyzing Latinobarómetro data on Brazil shows the expected demographically stratified pattern in 1995, 2000, 2005, and 2010: higher socioeconomic groups¹² and education¹³ are both correlated with unconditional support for democracy (see Figure 2.7).¹⁴ Respondents were given three options: “Democracy is preferable to any other kind of government;” “In certain situations, an authoritarian government can be preferable to a democratic one;” and “To people like me, it doesn’t matter whether we have a democratic government or a non-democratic government” (Latinobarómetro Codebook 1995, 8). Unconditional support for democracy is highly correlated with high socioeconomic and educational status at statistically significant levels. Interestingly, conditional support for authoritarian governments does not vary extensively across groups, however the response that regime type does not matter to “people like me” is highly correlated with low socioeconomic status and illiteracy. This is hardly surprising, given that these groups have traditionally had very little political voice under democracy or authoritarian regimes.

¹²as estimated by the surveyor and based on “Perception of the respondent’s socioeconomic status. Point of reference: Quality of housing, quality of furniture and respondent’s looks.” See Latinobarómetro Codebook (2000, 28).

¹³Education level is reported by the respondent.

¹⁴This does not indicate whether they are satisfied with the current state of democracy, just that they favor democracy as a regime type.

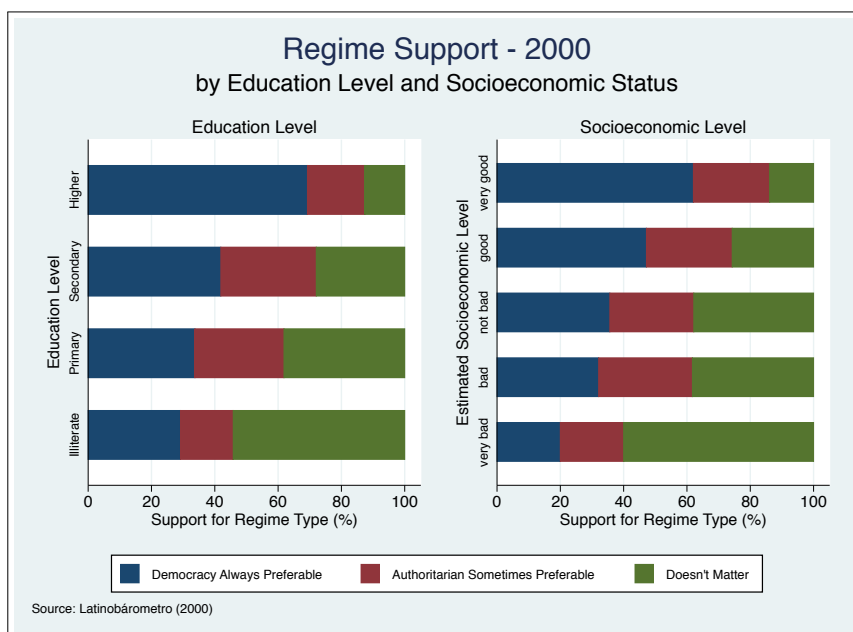


Figure 2.7: Regime Support by Education and Socioeconomic Status, 2000

Another pattern that emerges from these surveys directly relates to citizen participation, which follows a similar pattern to that of support for democracy: individuals with higher socioeconomic status and those who are highly educated care much more about increasing citizen participation than those with less education and lower socioeconomic status (see Figure 2.8). Respondents had four options to the question, “If you had to choose, which of these things would you say is the most important?”: “[1] Maintain the nation’s order; [2] Increase citizen participation in important government decisions; [3] Fight inflation; [4] Protect freedom of speech” (Latinobarómetro Codebook 2000, 21). None of the respondents in the “very bad” socioeconomic category rank citizen participation as the most important, however there are only five respondents in that category so we should not draw too many conclusions from that. The other more highly populated categories however, show an increasing level of support for citizen participation as the socioeconomic status improves. 11.7 percent in the second lowest category selected citizen participation as their first priority, while 25.9 percent of those in the highest socioeconomic category listed it first. The same pattern holds for educational attainment. Only 10 percent of illiterate respondents, and 15.7 percent of respondents with primary

education ranked citizen participation highest, while 30.5 percent of those with higher education ranked it first.

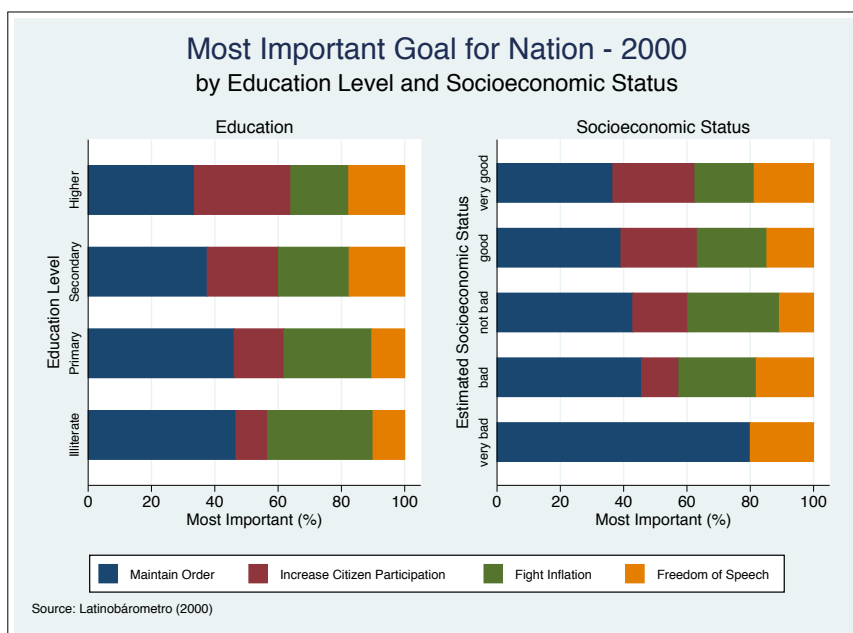


Figure 2.8: Support for Citizen Participation by Education and Socioeconomic Status, 2000

For low socioeconomic and education groups, maintaining order and fighting inflation, and to a lesser extent, freedom of speech, were the most frequently cited priorities. Maintaining order and curbing inflation reflect basic survival needs, which arguably must be met prior to “luxuries” such as citizen participation. These patterns are important for my analysis because they indicate that a high level of unconditional support for democracy as a regime type is highly correlated with support for increased citizen participation, and that support for both differs along socioeconomic and educational lines.

I argue that those who support democracy unconditionally inherently place a higher intrinsic value on the process. If they cared more about the outcome than the process, they would not support democracy under all circumstances. This is not to say that they do not also value instrumental outcomes. Just that those who support democracy under any circumstance are likely to place intrinsic motivations ahead of instrumental motivations more frequently than fair-weather supporters of

democracy. Thus general support for democracy can be seen as an inexact proxy for the intrinsic value of democracy. Hypothesis 4 will test this directly.

2.4 Empirical Analysis

I now present the empirical analysis of intrinsic versus instrumental motivations for participation in PB. Let us assume that (1) participation is determined by material self-interest; and (2) the material benefits derived from PB are equal to those that are present without PB ($B_{PB} = B_{NonPB}$).¹⁵ Given that participation in PB is costly in time, lost wages, etc. (C), we should expect participation in PB to equal zero, since ($B_{PB} - C < B_{NonPB}$).¹⁶ This corresponds to Downs' (1957) rational voter calculus as discussed in Chapter One, where one will vote only if the probability of being decisive multiplied by the benefit if you are decisive, minus the cost of participation C is greater than zero: $p(B) - C > 0$.¹⁷ Since empirical evidence clearly demonstrates that turnout is not zero, later voting models relaxed the first assumption of pure material self-interest, and incorporated the "duty term." Such that one will vote if $p(B) - C + D > 0$, where D is the duty term (Riker & Ordeshook 1968). This value can represent a variety of factors, from a sense of civic duty (Riker & Ordeshook 1968), to a desire to publicly declare one's preference (Brennan & Lomasky 1997, Tyran 2004)¹⁸, to altruism (Fowler 2006a).¹⁹ In my version, D specifically represents the intrinsic value of participation. Thus it is rational for a citizen to participate in PB if $B_{PB} - C + D_{PB} > B_{NonPB}$. Assuming that D is positive, we can see why participating in PB could be rational even if the outcomes are the same as they would have been under traditional municipal

¹⁵This assumption is based on my findings in the following chapters.

¹⁶There is no associated cost under the non-PB system.

¹⁷I use slightly different notation in my models for the sake of clarity. Downs, and Riker and Ordeshook use " P " to represent the probability of being decisive. Thus the notation for the probability of being decisive multiplied by the benefit would be represented by " PB ." This is obviously problematic in the present analysis, where PB stands for "Participatory Budgeting." I therefore use " p " to denote the probability, B to denote benefits, and PB to denote participatory budgeting.

¹⁸Also referred to as "expressive voting."

¹⁹The authors argue that altruism is not exactly an example of the D term, as altruism seeks an instrumental outcome. It is just for others rather than the self. Nonetheless, it is an example of an addition to the original calculus of voting.

budgeting procedures (i.e. decisions made by the mayor and City Council).

Chapters Three, Four, and Five analyze the first and last part of the equation, and show that $B_{PB} = B_{NonPB}$ on an aggregate level. Here I analyze the D_{PB} term (intrinsic value of participation) relative to B_{PB} (instrumental value of participation) in order to evaluate whether instrumental benefits matter at all. If people only participate in PB for intrinsic purposes, one could argue that the presence or absence of instrumental benefits is irrelevant, which would have interesting policy implications.

I theorize that the tradeoff between intrinsic and instrumental motivations will differ systematically across groups. Data from Latinobarómetro presented above provide support for this theory by showing different levels of support for democracy and citizen participation among socioeconomic groups.²⁰ This theory is also supported by Carlin (2006), who conducts a cross-country comparison of intrinsic support for democracy across Latin America using the *World Values Survey* and finds that education is the most significant individual-level predictor of intrinsic support for democracy, followed by income.²¹

Among participants, the following must be true (or else they would not participate), where the subscript h represents high socioeconomic status and l represents low socioeconomic status:

$$\begin{aligned} B_{PB_h} - C + D_{PB_h} &> 0 \\ B_{PB_l} - C + D_{PB_l} &> 0 \end{aligned}$$

PB is designed to target the poor and both participant and non-participant groups view it as such: 84 percent of respondents in the World Bank survey partially or totally agree that PB “favors the poor people in the neighborhood and

²⁰While it may seem that this is the same question as “who participates,” it is not. Participation rates could vary wildly across different demographic groups, but once the decision to participate has been made, the motivations for doing so could be identical Verba:1993id. Those who do not support democracy as a system could choose to participate despite their dislike for it for the sake of instrumental benefits. In fact, using survey data from the Latin American Public Opinion Project (LAPOP), Carreras and Castañeda-Angarita (2014) find that voting is *not* correlated with satisfaction with democracy (12).

²¹National GDP per capita was also significant, however that is less relevant to my work, which is sub-national. In future work it would be useful to use variation in GDP per capita across cities to evaluate support for PB.

communities” (2008, 39). I hypothesize that intrinsic motivations relative to instrumental motivations among already privileged groups will be higher than among non-privileged groups. If we return to the model, it becomes clear why: if PB projects target the poor, these projects are inherently less likely to help the advantaged members of society, thus B_{PB} would be lower for higher socioeconomic groups than B_{NonPB} .²² As B_{PB_h} decreases, D_{PB_h} (intrinsic value of participation) must be higher in order for an individual to decide to participate.²³

I therefore test four hypotheses that address the following relationships:²⁴

$$B_{PB_h} < D_{PB_h} \text{ versus } B_{PB_l} > D_{PB_l}$$

Hypothesis 1: Higher income participants will be more motivated by intrinsic benefits than lower income participants.

Hypothesis 2: More educated participants will be more motivated by intrinsic benefits than those with less education.

Hypothesis 3: Long-term participants will be more motivated by intrinsic benefits than new participants.

Hypothesis 4: Participants who generally favor democracy will be more motivated by intrinsic benefits than those who do not favor democracy.

2.4.1 Methodology

In order to test these hypotheses, I use survey data collected by Fedozzi et al. (2013) on motivations for participation among PB participants in Porto Alegre. Fedozzi et al. (2013) surveyed a random sample of PB participants. They based the minimum sample size on turnout in the previous three years in order to achieve

²²This is because non-PB policies do not explicitly target the poor in the same way that PB is theorized to.

²³It is also possible that C is lower for high socioeconomic participants. They are more likely to have cars, access to childcare, etc. However I do not address this issue here.

²⁴In Hypothesis 3, h represents long-term participants and l represents new participants; in Hypothesis 4, h represents democracy supporters and l represents those who are indifferent to democracy.

a 3 percent sampling error. Their sample size was 967, and they surveyed every 15th person to arrive at the meeting (Fedozzi et al. 2013, 130-131)²⁵.

In order to assess instrumental versus intrinsic motives, I look at responses to the following question: “What is the principal motive for your participation in PB meetings?”²⁶ (Fedozzi et al. 2013, 101). The respondents were given five options: 1) Demand works and services; 2) Identity and community solidarity; 3) Recruitment; 4) Knowledge and control; and 5) Democracy and citizenship rights. I code the first option (demand works and services) as “instrumental,” in the sense that they are seeking specific material benefits. I code the second (identity and community solidarity) and the fifth (democracy and citizenship rights) as “intrinsic” in the sense that these responses suggest that the individual was less interested in the instrumental outcome than the process itself. I ignore the responses for the third and fourth options, as they do not clearly fall under the auspices of intrinsic or instrumental motivations.²⁷

I employ χ^2 tests to evaluate whether participants choose to participate for instrumental or intrinsic motives, and whether it varies across demographic group. I find that while the motivations across the full sample of participants are evenly split between intrinsic and instrumental, motivations differ significantly across demographic groups.

2.4.2 Results

The full sample shows an almost identical distribution between instrumental and intrinsic motivations, with 49.7 percent ($n=394$) citing instrumental and 50.3 percent ($n=398$) citing intrinsic motivations (see Figure 2.9 and Table 2.1). However, as I predicted, those motivations vary significantly by demographics.

²⁵This design was based on a similar survey conducted in 2005.

²⁶“Qual é o principal motivo de sua participação nas reuniões do OP?”

²⁷These categories account for 18.1 percent of the responses.

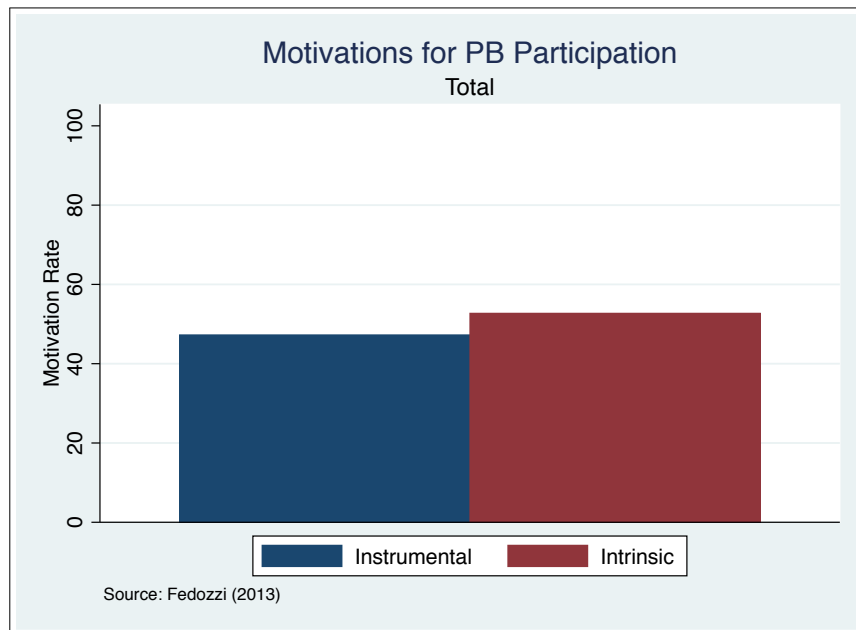


Figure 2.9: Motivation for PB Participation

Table 2.1: Instrumental versus Intrinsic Motivations - 2009

Instrumental	Intrinsic	Total
49.74 (394)	50.25 (398)	100 (792)

Counts in parentheses

Hypothesis 1

My first hypothesis tests the intrinsic/instrumental trade-off by income level. Those who earn less than one minimum salary are evenly split, though they only represent 6 individuals.²⁸ Excluding this group, there is an inverse relationship between income and instrumental motivations (see Figure 2.10), with 55.6 percent of those earning between 1 and 2 minimum salaries (“Low”) citing instrumental motivations, and 44.4 percent citing intrinsic motivations. This pattern is reversed for those making between 2 and 4 minimum salaries (“Medium”), with 46.5 percent citing instrumental and 53.5 percent citing intrinsic. This trend continues with those earning even more, with only 40.5 percent of those making over 4 minimum salaries (“High”) citing instrumental motivations, and 59.5 percent citing their primary motivation as intrinsic. The χ^2 test of independence in Table 2.2 shows that these results are highly significant ($p = 0.003$).

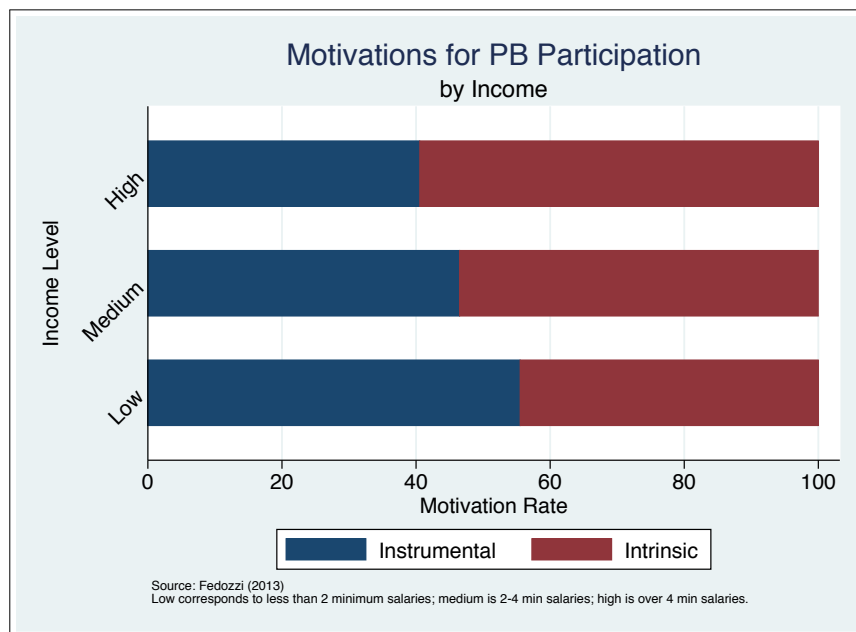


Figure 2.10: Motivation for PB Participation, by Income

²⁸and thus are not included in the chi square test.

Table 2.2: Instrumental versus Intrinsic Motivations - by Income

Income	Instrumental	Intrinsic	Total
<2 SM	55.52 (226)	44.47 (181)	100 (407)
2-4 SM	46.49 (106)	53.5 (122)	100 (228)
>4 SM	40.54 (60)	59.45 (88)	100 (148)

$$\chi^2(2) = 11.394, p = 0.003^{***}$$

Counts in parentheses

Hypothesis 2

The second hypothesis looks at the intrinsic/instrumental motivation trade-off by level of education. In this case, the inverse relationship between instrumental motivations and education level is even higher than that of the relationship between instrumental motivations and income level (see Figure 2.11). 57.4 percent of those with basic education rank instrumental motivations first, whereas only 25.7 percent of those with higher education do. Accordingly, 74.2 percent of those with higher education cite intrinsic motivations, compared with only 42.6 percent of those with basic education. The χ^2 test confirms this hypothesis, with a p -value < 0.000 (see Table 2.3). While this is a similar pattern to that found in the first hypothesis, the

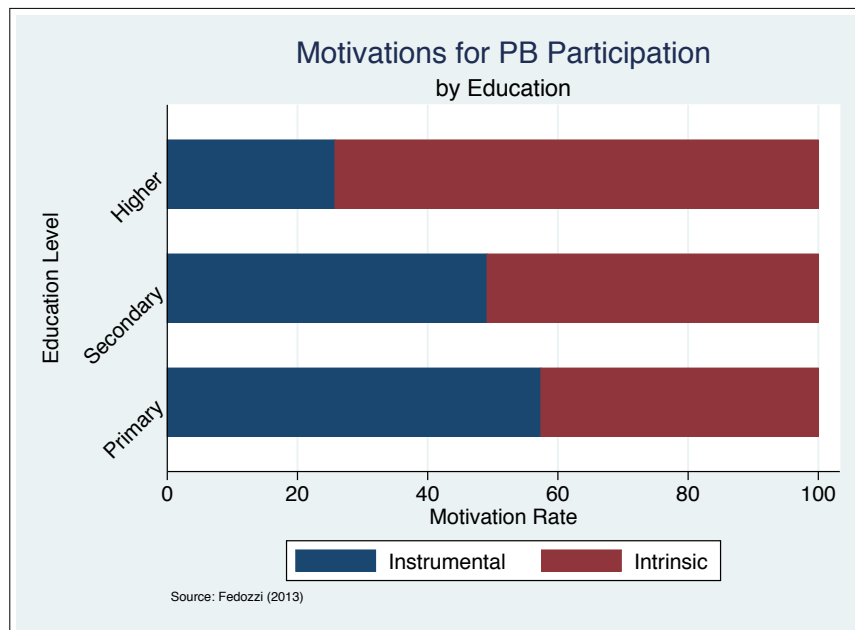


Figure 2.11: Motivation for PB Participation, by Education

difference between intrinsic and instrumental motivations among the most highly educated is even more striking: intrinsic motivations are almost three times higher than instrumental motivations, while intrinsic motivations are only about 1.5 times higher than instrumental motivations in the top income group.

Table 2.3: Instrumental versus Intrinsic Motivations - by Education

Education	Instrumental	Intrinsic	Total
Primary	57.38 (206)	42.61 (153)	100 (359)
Secondary	49.12 (140)	50.87 (145)	100 (285)
Higher	25.75 (34)	74.24 (98)	100 (132)

$$\chi^2(3) = 38.629, p = 0.000^{***}$$

Counts in parentheses

Hypothesis 3

The third hypothesis evaluates the relationship between length of participation in PB and intrinsic versus instrumental motivations. Length of participation is positively associated with intrinsic motivations, and intrinsic motivations outweigh instrumental motivations beginning in the second year of participation (see Figure 2.12). First time participants are highly motivated by instrumental reasons, with a 68.5 to 31.5 percent margin. Between the second meeting and the end of the first year of participation, that margin is reduced to zero, before intrinsic motivations dominate beginning in year two. It is possible that this is due to the fact that one time participants are so moved by the act of participating that they begin to experience the intrinsic motivations almost immediately. However, I think it is equally likely that many of those instrumentally-motivated first time participants only come once and either get the instrumental benefit they sought or do not, but do not return.²⁹ The margin between intrinsic and instrumental motivations increases from 50:50 in year one to 60:40 in years 2-4, then to 69.3 percent intrinsic to 30.7 percent instrumental motivations for veteran participants,

²⁹While I do not have enough data to adequately test this hypothesis, data from the World Bank survey show that among the 300 PB participants, 55 (18.3 percent) participated only once, 161 (53.6 percent) participated more than once, and only 83 (27.6 percent) were still participating at the time of the survey. This suggests that a significant number of participants never reach the stage where intrinsic motivation surpass instrumental motivations.

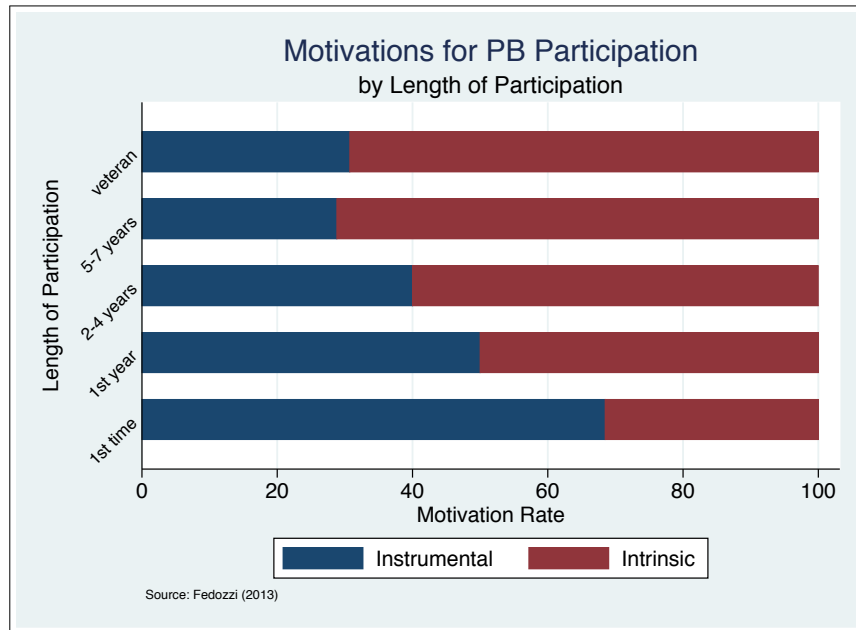


Figure 2.12: Motivation for PB Participation, by Length of Participation

which are defined as those who have participated for more than 7 years.³⁰ This is interesting because it suggests that sustained participation could actually change the motivations for participating, however it is also possible that those who participated from the beginning were inherently more motivated by intrinsic values, and that the act of participation does not actually affect these motivations at all. Unfortunately we do not have the necessary data to answer this question, though it would be an interesting avenue for future research. The χ^2 test presented in Table 2.4 is significant with a p -value of 0.001, which confirms the third hypothesis that intrinsic motivations for participation are positively correlated with length of participation.

Hypothesis 4

Not surprisingly, my results confirm the fourth hypothesis that those who favor democracy (as opposed to those who are indifferent or do not know), cite intrinsic motivations more frequently, by a 54.3 to 45.6 percent margin, as shown in Figure 2.13. Those who do not know or did not respond to the question of

³⁰There is a slight decline in intrinsic motivations between those in the 5-7 year group (71.1 percent) and veteran participants (69.3 percent).

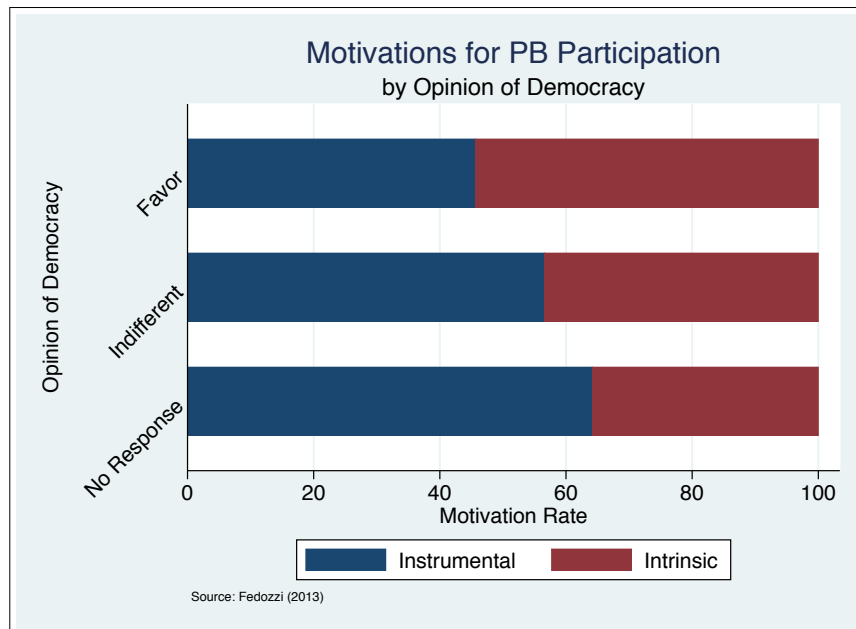
Table 2.4: Instrumental versus Intrinsic Motivations - by Length of Participation

Length	Instrumental	Intrinsic	Total
1st time	68.48 (213)	31.51 (98)	100 (311)
1st year	50 (56)	50 (56)	100 (112)
2-4 years	40 (58)	60 (87)	100 (145)
5-7 years	28.81 (17)	71.18 (42)	100 (59)
veteran	30.72 (51)	69.27 (115)	100 (166)

$$\chi^2(4) = 83.581, p = 0.000^{***}$$

Counts in parentheses

the opinion of democracy had the highest instrumental to intrinsic motivation ratio, at 64.2 to 35.8. The χ^2 results presented in Table 2.5 are significant for this hypothesis as well, though less so than the other hypotheses ($p = 0.031$). This hypothesis is important because it provides justification for my theory that support for democracy is correlated with intrinsic preferences. This was the basis of my subsequent theory that intrinsic and instrumental support would follow the same demographic patterns as support for democracy in general, as demonstrated in the Latinobarómetro surveys.

**Figure 2.13:** Motivation for PB Participation, by Opinion of Democracy

Data from the World Bank surveys also demonstrate an intrinsic value

Table 2.5: Instrumental versus Intrinsic Motivations - by Opinion of Democracy

Democracy	Instrumental	Intrinsic	Total
Favor democracy	45.65 (252)	54.34 (300)	100 (552)
Indifferent towards democracy	56.6 (90)	43.39 (69)	100 (159)
Don't know/NR	64.19 (52)	35.8 (29)	100 (81)

$$\chi^2(2) = 13.458, p = 0.001^{***}$$

Counts in parentheses

of democracy. 90.1 percent of PB participants totally or partially agree that “PB broadens quality of democracy in the city,” while 83.9 percent of the general sample totally or partially agree with the statement. While the number is obviously higher for PB participants, non-participants clearly find the process valuable despite their lack of participation. This corresponds to the findings in Frey and Stutzer (2005), in which the higher well-being scores of Swiss citizens were correlated with higher participation *rights* and not the actual act of participating. However, I found that the level of intrinsic motivation is positively correlated with length of participation, suggesting that there is at least some reason to believe that participation itself has an effect. Comparing subjective well-being scores across PB and non-PB municipalities irrespective of actual participation would be an interesting avenue for future research.

2.5 Discussion

This chapter analyzed both the trends in PB participation in Porto Alegre and the instrumental versus intrinsic motivation for participation. The most interesting finding is that the groups that are generally predicted to participate the most – highly educated, high income – actually seem to participate the least in PB in Porto Alegre. However, members of those groups who do participate tend to do so for substantively different reasons than members of lower educated and lower income groups. Specifically, highly educated and high income participants are much more likely to cite intrinsic motivations. This is especially pronounced in the highest education group, where intrinsic motivations are three times as prevalent as instrumental motivations. This pattern holds for long term participants as

well as those that generally favor democracy as a regime.

Of course one interpretation of these results is that participation for the sake of participation (intrinsic) is a luxury restricted to high socioeconomic groups. They do not participate for instrumental reasons because they do not actually need anything, whereas those from lower socioeconomic and educational groups cannot afford to participate for intrinsic motivations when they have pressing instrumental needs. However, this is not a valid interpretation based on my results here. I do not compare absolute values of intrinsic benefits for high socioeconomic groups with absolute values for low socioeconomic groups. I compare the instrumental versus intrinsic rankings of individuals within those groups. So it is entirely possible that lower socioeconomic groups are gaining greater instrumental *and* intrinsic benefits, relative to their higher status counterparts. In other words, these simultaneous scenarios are not ruled out by my findings:

$$B_{PB_l} > B_{PB_h} \text{ and } D_{PB_l} > D_{PB_h}$$

There are several important areas for future research that stem from my analysis. The first is that I have only looked at general participation in PB, ignoring the more prestigious elected positions within PB. There is some evidence that the characteristics of people in these positions conform to the traditional predictions of participation, namely highly educated males. It would be interesting to see if this pattern holds across municipalities, and also whether instrumental or intrinsic motivations are more prevalent among these individuals. I would hypothesize that those in elected positions strongly favor intrinsic motivations because those positions require more time, energy, and commitment, which imply a dedication to the process itself. The quote from a PB participant in Santo André earlier in this chapter suggests that this might be the case. He states that he derives few personal benefits, but personal enrichment and the accumulated experience has no price.”³¹

The second area for future research addresses the generalizability of my findings. My tests of instrumental versus intrinsic motivations for participation

³¹(Acioly et al. 2003, 41)

in PB are limited to Porto Alegre. Future studies should attempt to conduct similar surveys in other PB municipalities, however there is some evidence from 2000 Latinobarómetro data that Porto Alegre residents are not entirely different in their views on democracy and the importance of citizen participation than residents of other municipalities, though they are higher than average in both areas (see Figure 2.14). In both cases, Porto Alegre respondents ($n=100$) ranked democracy and citizen participation first more frequently than the mean: 50.6 percent of Porto Alegre respondents ranked democracy first, whereas the mean for other cities was 42.1 percent. 26.1 percent of Porto Alegre respondents ranked citizen participation first, whereas the mean for other cities was 19.7 percent. However, Porto Alegre did not rank first in either category. 65.6 percent of those in Salvador prefer democracy, while 29.6 percent of respondents from Rio de Janeiro ranked citizen participation first.

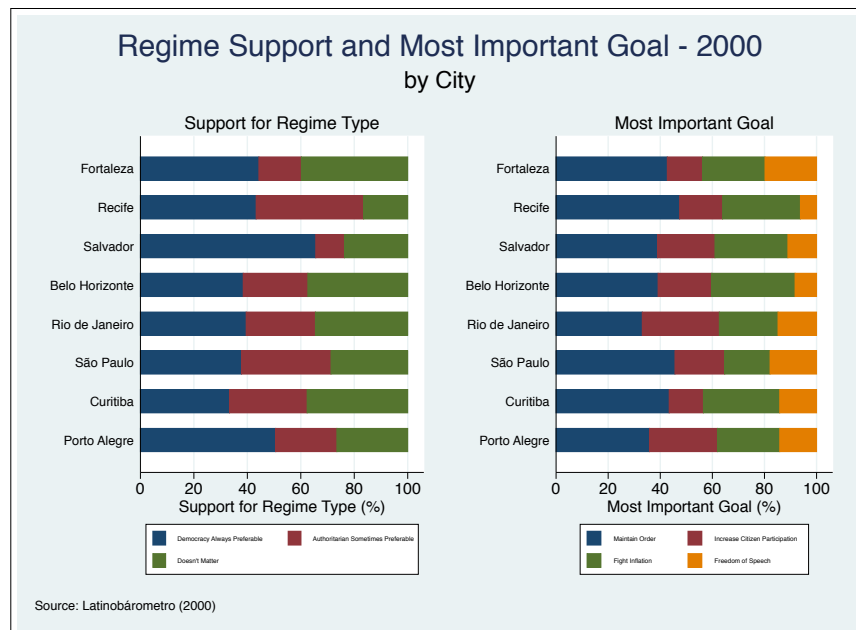


Figure 2.14: Support for Democracy and Participation, by City - 2000

The final area for future research would be an analysis of the reasons non-participants choose abstain from attending PB meetings. cursory evidence from non-participants in the World Bank survey suggest that there are a variety of

reasons that individuals choose not to participate.³² The most frequently cited responses to the open-ended questions were: lack of invitation/publicity, lack of time, and lack of information. The strong preference for an invitation or some other form of contact correspond to the findings in Gerber and Green (2001), in which getting out the vote campaigns significantly increased turnout. A more in depth analysis of data on non-participants would likely yield interesting results that could be of significant use to policy-makers.

This chapter has demonstrated that PB provides primarily intrinsic benefits to some participants, however those participants are generally from higher socioeconomic classes. These were not the intended beneficiaries of PB projects. Thus it is important to now evaluate the existence of instrumental benefits of PB, particularly for lower income citizens. This chapter was limited to instrumental versus intrinsic *motivations* for participation. The next three chapters evaluate the instrumental benefits.

³²Of the sample of 1000, 847 respondents had heard of PB, and 204 had participated in it. The remaining 638 were asked the questions “Why did you not participate in the OP?” (47) and “What would make you participate in the OP?” (52).

3 Where Does the Money Go?

Participatory Budgeting and Municipal Spending Patterns

3.1 Introduction

“Most PB programs allow citizens to bargain over discretionary funds. Unfortunately, very little research on resource allocation and implementation has been conducted, which is rather ironic since the ostensible focus of PB is on budget resources” (Wampler 2002, 28).

The previous chapter addressed the instrumental versus intrinsic motivations for participation. I now turn to an analysis of the aggregate instrumental benefits of Participatory Budgeting (PB) as a policy. While the ultimate instrumental goal of PB is to improve public services and welfare, at its most basic level PB is a method of determining the allocation of municipal funds. Many studies jump directly to the effect on services and welfare, however this ignores the first part of the story: does PB change how municipal funds are spent? The follow-up questions (addressed in Chapters Four and Five) depend on the answer to that first question. While it may seem trivial, this step is very important. If PB does not change spending patterns but does change service provision or welfare, those changes must be the result of something other than spending. If PB does change spending but does not change service provision or welfare, PB is not accomplishing the goals it set out to achieve, since spending itself is of no benefit to citizens

independent of goods and services, or direct transfers. My findings suggest that it is the second scenario (see Figure 1.1 on p. 17).

Municipal spending in Brazil is divided into 19 categories (see Table 3.1). I analyze whether PB has had an effect on the three that are most closely associated with pro-poor spending: (1) health and sanitation; (2) education and culture; and 3) housing and urbanism. In addition to being most closely associated with pro-poor spending on a theoretical level (Banerjee, Iyer & Somanathan 2007, Bank 2008*b*), these are the three largest spending categories after spending on “administration” at the municipal level. Additionally, they represent what citizens want. Specifically, they are three of the most frequent priorities selected in PB meetings.

I find that PB is associated with an increase in health and sanitation spending, a decrease in education and culture spending, and neutral effects on housing and urbanism. These findings on health and sanitation coincide with those in Touchton and Wampler (2013), Gonçalves (2014), and Boulding and Wampler (2010). However, Boulding and Wampler also find an increase in education spending, whereas I find a decrease (see Figures 3.1 and 3.2).

Table 3.1: Categories of Municipal Spending

Categories of Municipal Spending
Administration
Assistance
Communication
Science & Technology
Education & Culture
Energy & Resources
Housing & Urbanism
Industry, Retail & Services
Judiciary
Legislative
Sports & Leisure
Citizenship & Justice
Financing & Social Security
National Defense
Foreign Relations
Health & Sanitation
Labor
Transportation
Agriculture

Source: IPEA

This chapter proceeds as follows: I begin with a brief summary of the

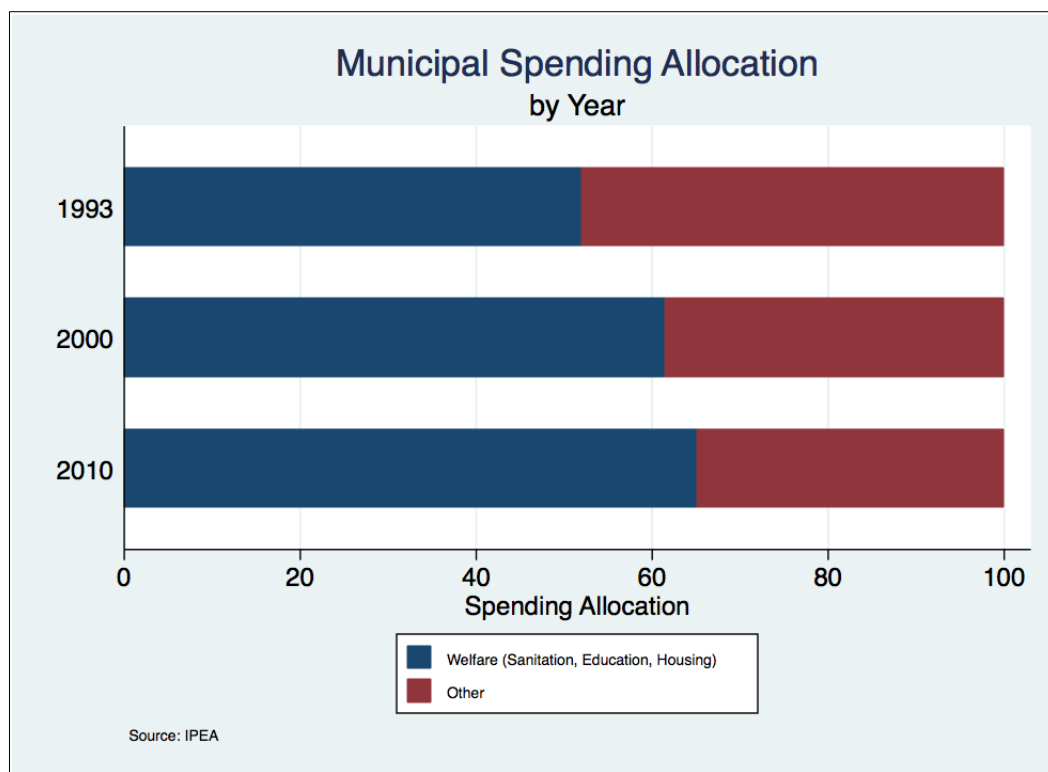


Figure 3.1: Municipal Spending Allocation

municipal budget structure and process in Brazil. Next I discuss the literature tying decentralization, direct democracy, and PB to spending. Then I present my hypotheses, data, and methodology, and I end with my empirical results and a discussion of their implications.

The period of decentralization that followed democratization in Brazil brought about significant changes in municipal structure. In an attempt to bypass the potential for state-level corruption, a substantial portion of federal power was transferred directly to the municipalities as a result of the 1988 Constitution (Posner 2003).¹ A primary goal of the fiscal component of decentralization included “leav[ing] subnational levels plenty of room to determine where and how to spend the resources transferred to them” (de Souza 2002, 13), though there are certain minimums that the federal government imposes on some categories of spending, including education and health care.

¹For a comprehensive summary of post-1988 Brazilian budgetary structure, see Souza (2002) and de Mello (2013).

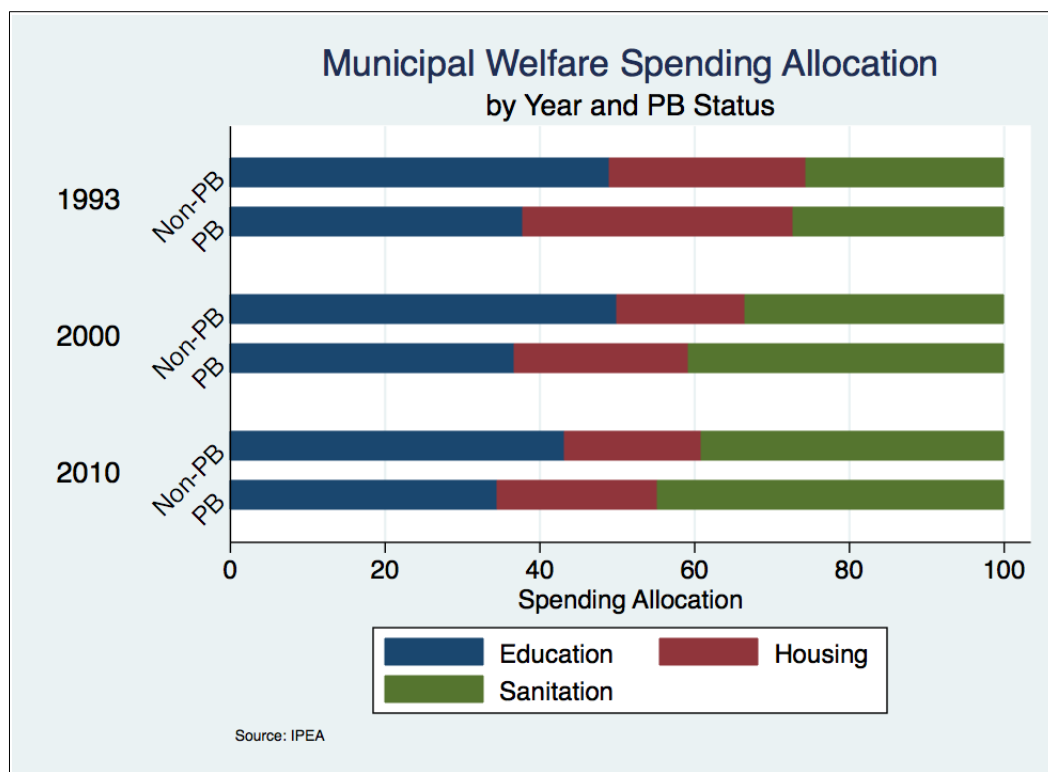


Figure 3.2: Municipal Welfare Spending Allocation by Year and PB Status

Municipal revenues come from two sources: municipal tax collection and federal or state transfers. Municipalities collect the service tax (ISS), urban property tax (IPTU), frontage tax, and property transfer tax (ITBI). Together, these taxes comprised 4.8 percent of total national tax revenue in 2001 (de Souza 2002, 14). Municipalities also receive transfers from taxes collected at the federal and state level (see Table 3.2). Including both local taxes and state and federal transfers, municipalities controlled approximately 3.5 percent of GDP in 2001 (de Souza 2002, 11).

The increased municipal budgets accompanied an increase in municipal responsibilities for service provision. Municipalities are exclusively responsible for land use and intracity public transport and primarily responsible for primary education, preventive health, and historic and cultural preservation. The remaining categories, including health and social welfare, and housing and sanitation, are jointly provided by federal, state, and municipal governments. (see Table 3.3). However, while many of these responsibilities are officially shared across these lev-

Table 3.2: Municipal Revenues - Taxes and Transfers

Local Tax	Federal Transfer	State Transfer
Service tax (ISS)	22.5% of income tax	25% of value-added tax (ICMS)
Urban property tax (IPTU)	50% of rural property tax	50% of motor vehicle tax (IPVA)
Frontage tax	25% of tax on industrial products (IPI)	
Property transfer tax (ITBI)	70% of tax on financial operations on gold (IPF)	

Source: Souza (2002, 11)

els, municipalities have become the main de facto providers of health care and primary education (de Souza 2002, de Mello 2006, 9; 14). As demonstrated by Figure 3.1, the share of municipal spending allocated to the “pro-poor” areas of education, sanitation, and housing increased significantly between 1993 and 2010.

Table 3.3: Public Service Provision Responsibilities by Level of Government

Level of Government	Service
<i>Federal/State/Local</i>	Health and social welfare
	Services for disabled persons
	Historic, artistic and cultural preservation
	Protection of environment/natural resources
	Culture, education and science
	Forests, fauna and flora protection
	Agriculture and food distribution
	Housing and sanitation
	Combating poverty and social marginalisation
	Exploitation of minerals and hydroelectricity
	Traffic safety
	Small business improvement policies
	Tourism and leisure
<i>Mainly Local</i>	Pre-school and primary education
	Preventive health care
	Historic and cultural preservation
<i>Only Local</i>	Public transport (inner-city)
	Land use

Source: Souza (2002, 9)

The municipal government consists of a mayor that is elected to four-year terms,² as well as a legislative body called the *Câmara de Vereadores* (Councillors’ Chamber).³ The majority of power resides with the mayor, and the *Câmara* does not have the authority to reject the mayor’s budget proposal, however it does

²As of 2000, mayors are eligible for reelection.

³The number of Councillors is based on municipal population, and ranges from 9 to 55.

serve as a check and balance for the mayor through veto overrides and budgetary approval (Posner 2003, 57).

3.2 Literature Review

“[E]fforts around the world to ‘empower’ poor people, whether through devolved decisionmaking or through participatory budgeting, are all responses to these failures of government expenditure policies” (Keefer & Khemani 2005, 1).

While there is not a great deal of literature that makes specific theoretical predictions about the effect of PB on spending allocation, there is existing literature that suggests PB should have a positive effect on “pro-poor” outcomes (see Chapter One).⁴ Though the causal path is generally not articulated, we have to assume that this would come about through increased spending in “pro-poor” areas (Bank 2008*a*, 88).

There are also relevant studies outside of the PB literature. These have looked at the effect of decentralization (Faguet 2004, Estache, Sinha & World Bank Office of the Vice President 1995, Wang, Zheng & Zhao 2012), direct democracy in the form of initiatives (Matsusaka 2000, Kousser, McCubbins & Moule 2008), and women’s participation (Miller 2008, Chattopadhyay & Duflo 2004, Fedozzi et al. 2013) on spending patterns, all of which are relevant to the theoretical effects of PB on spending. Decentralization applies because, as discussed in Chapter One, PB is really just a more extreme version of what we typically mean by decentralization: instead of decentralization from the federal level to state or municipality, it is decentralization from the municipality to the citizen. Initiatives are similar because they allow citizens to directly participate in policy process, circumventing elected officials, and women’s enfranchisement it relevant because it allows a previously excluded group in society to participate in the political process, which is also the case with PB.

One of the main arguments for decentralization is that local governments have more information about citizens, and can therefore better represent local pref-

⁴The exceptions, Boulding and Wampler (2010), Touchton and Wampler (2013), and Gonçalves (2014) are discussed below.

erences (Mansuri & Rao 2004, Tiebout 1956, Olson 1965). In a well-constructed empirical study of the effect of decentralization on local investment patterns in Bolivia, Faguet finds that decentralization is associated with a significant increase in spending on urban development, education, health, and water and sanitation services. However, he also finds that the presence of “participative planning methodologies” is associated with a decrease in water and sanitation investment (Faguet 2004, 883). Estache et al. (1995) find that decentralization increases spending on infrastructure in both developing and developed countries. And in a natural quasi-experiment, Wang et al. (2012) analyze the effects of a reform in China in the 1990s that gave certain counties more fiscal autonomy (province-managing-county, or PMC) than others. They find that those with more fiscal autonomy (more decentralized) spend less on education than those that do not (Wang, Zheng & Zhao 2012).

Direct democracy literature also generates some predictions about public spending. Matsusaka (2000) finds that U.S. states with voter initiatives increase spending overall, and specifically education and welfare spending (Matsusaka 2000, Lupia & Matsusaka 2004). Similarly, Miller (2008) finds that women’s enfranchisement in the United States is correlated with an increase in public health spending, which indicates that allowing previously excluded members of society to participate in politics can have real effects on spending decisions. There is also evidence of this in India. In 1993, a randomly selected set of Indian villages was required to choose female Village Council heads. Chattopadhyay et al. find that those villages spent more on “infrastructure that is directly relevant to the needs of their own genders,” including drinking water and roads (Chattopadhyay & Duflo 2004, 1409). As discussed in Chapter Two, Fedozzi et al. (2013) and the World Bank (Bank 2008a) find that women are disproportionately represented at PB meetings. This indicates that we might expect an increase in public health and sanitation spending as a result.

Under experimental conditions, Dawes, Loewen, and Fowler find that “subjects who were most interested in increasing total welfare in the dictator game were more likely to participate in politics than subjects with selfish preferences” (2011,

845). If these results can be generalized to real-world conditions, this suggests that at least in theory, those who choose to attend PB meetings might be predisposed towards increasing overall welfare in their communities, which could be observed as an increase in pro-poor spending.⁵

There is little theoretical or empirical literature on the effect of PB on local spending patterns. The work is generally more focused on policy outcomes, such as public service provision (though as discussed in the following chapter that is not fully developed either). The major exceptions to this are Boulding and Wampler's (2010) analysis of PB on spending, in which they find a significant and positive effect of PB on health and sanitation, and education spending. Touchton and Wampler (2013) also find a significant and positive effect of PB on spending on health and sanitation, and Gonçalves' (2014) recent study shows a positive effect of PB on health and sanitation spending as well. A 2008 World Bank report looks at the effect of PB on fiscal performance (ability to collect taxes) and operational versus non-operational spending, however their results are ambiguous (Bank 2008*a*, 92).

While the literature provides some general predictions, it is also useful to look at the intended goals of PB as a policy, as well as the observed preferences of participants. According to a World Bank Report, "strengthened pro-poor capital investments" is one of the main priorities of PB (Bank 2008*a*, 88), which Souza defines as "infrastructure in poor areas" (de Souza 2002, 25).

Survey data discussed in Chapter Two suggest that not only do citizens believe that it is important for them to have a say in how municipal funds are spent, but also that PB priorities are oriented towards pro-poor areas of spending. In the 2008 World Bank study of PB in Porto Alegre, 81 percent of the random sample of respondents (both PB participants and non-participants) indicated that they believed control over municipal funds by the population is "very important" (Bank 2008*b*, 34). The 1998, 1999, and 2002 PB priorities in Santo André "relate to immediate needs in geographically defined areas," including "pavement of segments of streets, flood prevention measures, enlargement of the health services'

⁵This could also be related to intrinsic motivations, however I do not explore that possibility here.

capacity, improvements in the drainage system, provision of water and sewerage systems, and relocation of families living in risk prone areas” (Acioly et al. 2003, 21). Participatory budgeting priorities from other municipalities corroborate these pro-poor preferences.

3.3 Hypotheses

Following existing literature, stated goals of PB, and observed preferences of participants, I test three hypotheses regarding the effects of PB on spending. If PB does increase pro-poor spending, we would expect to see an increase in spending in three categories: 1) health/sanitation; 2) education/culture; and 3) housing/urbanism (Faguet 2004).

Hypothesis 1: PB municipalities will spend a higher share of annual municipal funds on health and sanitation than those municipalities that did not adopt PB.

Hypothesis 2: PB municipalities will spend a higher share of annual municipal funds on education and culture than those municipalities that did not adopt PB.

Hypothesis 3: PB municipalities will spend a higher share of annual municipal funds on housing and urbanism than those municipalities that did not adopt PB.

3.4 Data and Methods

3.4.1 Data

As outlined in Chapter One, my dataset includes Brazilian municipalities with more than 50 thousand residents as of 1991. This group consists of 562 municipalities, however I exclude the 11 that adopted PB prior to 1992 because the dependent variable data is incomplete for that period. I am left with a total of 551 municipalities.

Independent Variable: The independent variable of interest is PB adoption (Wampler, Spada, Avritzer). I break my sample into panels that differ across two dimensions: membership in treatment and control group and timing of baseline and outcome measures (see Figure 3.3 for summary). I use these panels to analyze whether timing of adoption has any effect on spending. Breaking the sample into timing groups has been used in several other studies, including Touchton and Wampler (2013) and The World Bank (2008). Unlike those studies, I also incorporate the use of different control groups. For example, in Panel 2C I use late adopting (2001-2008) PB municipalities as a control group for those that adopted early (1992-2000). This is one way to mitigate the inherent endogeneity problem of non-random assignment. If there is something fundamentally different about municipalities that adopt PB, it is difficult to isolate the effect of PB implementation itself, as opposed to the effect of whatever caused those municipalities to be different in the first place. Comparing early adopters with late adopters begins to address this problem, since the late adopters ultimately did get the treatment. While less common in political science, this methodology is widely used in biomedical studies. To my knowledge, this is the first study that uses this particular strategy for PB analysis (see Figure 3.3 for summary of my research design).

Panel 1: PB_{all}

Panel 1 is used to test the effect of PB adoption in any time period between 1992 and 2008. The treatment group consists of municipalities that adopted PB during this period (PB_{all}), and the control group consists of municipalities that never adopted PB ($non-PB$).

Panel 2A-C: PB_{early}

I measure the impact of early PB adoption with Panels 2A, 2B, and 2C. The treatment group for these three panels consists of PB_{early} municipalities, which adopted PB between 1992 and 2000. The municipalities included in the control groups, as well as the timing of outcome measures, differ in Panels 2A, B, and C. The outcome measure for 2A is spending in 2000. The control group includes all non-PB municipalities, in addition to PB_{late} . Late adopters

Panels		1993	Spending Measurement and Treatment Periods: PB_{all}			2010
1	PB_{all}	Pre-test	PB			Post-test
	Control: $Non-PB$		0			

Panels		1993	1992-2000 (PB_{early})	2000	2001-2008 (PB_{late})	2010
2A	PB_{early}	Pre-test	PB	Post-test		
	Control: $Non-PB; PB_{late}$		0			
2B	PB_{early}	Pre-test	PB			
	Control: $Non-PB$		0			
2C	PB_{early}	Pre-test	PB	Post-test		
	Control: PB_{late}		0			

Panels		1993	1992-2000 (PB_{early})	2000	2001-2008 (PB_{late})	2010
3A	PB_{late}	Pre-test	0		PB	Post-test
	Control: $Non-PB$		0		0	
3B	PB_{late}			Pre-test	PB	Post-test
	Control: $Non-PB$				0	

Figure 3.3: Research Design - Spending

are included in this control group because the outcome is measured prior to late adoption. The outcome measure for 2B is spending in 2010, so PB_{late} are excluded from the control group in this case. In 2C, I directly compare PB_{early} municipalities with PB_{late} municipalities.⁶ The spending outcome variables are measured in 2000, which makes the post-2000 adopters (PB_{late}) a good control group. This is the simplest method of correcting for selection bias that may exist between those municipalities that adopted PB and those that never did.

Panel 3A-B: PB_{late}

Similarly, I use Panels 3A and 3B to evaluate the effects of late PB adoption (2001-2008). In both 3A and 3B, the treatment group consists of PB_{late} municipalities, while the control group consists of non-PB municipalities.⁷ The difference is that 3A uses 1993 as the baseline measure for spending, while 3B uses 2000 as the baseline measure. The outcome variables are measured in 2010 for both 3A and 3B.

Dependent Variables: All three dependent variables are categories of municipal spending, as defined by Ministério da Fazenda (Secretaria do Tesouro Nacional) and obtained from the IPEA⁸: 1) Health/sanitation, 2) Education/culture, and 3) Housing/urbanism. All three are measured as percentages of the total annual municipal expense budget. Using percentages rather than raw spending data allows me to compare over time and across municipalities with very different budgets. They are measured in 1993, 2000, and 2010.

Unlike the 1991 pre-test dependent variable measures used in Chapters Four and Five, the early pre-test for the spending dependent variables in this chapter are measured in 1993. 1991 might be preferable because it would have occurred before any of the municipalities in my sample adopted PB, however the municipal spending data prior to 1993 are incomplete and unreliable. This is likely because some fiscal decentralization to municipalities did not occur until 1991. So even if

⁶Non-PB municipalities are not included in this control group.

⁷Early PB adopters are excluded from both 3A and 3B.

⁸www.ipeadata.gov.br/

the 1991 data were available they would not serve as a good pre-test measure.

While not ideal to use a pre-test measure that occurs slightly after treatment begins, this should not pose a significant problem for three reasons: The first is that more than half of early PB adopters (41 of 74) adopted after 1997, so the difference between 1991 and 1993 is partially irrelevant. And perhaps 1993 is even preferable. Secondly, not all of the 33 who adopted between 1992 and 1996 started immediately in 1992. Annual PB adoption data are not currently available, but since there is significant evidence showing an increase in policy adoption frequency over time, it is reasonable to assume that the majority of those 33 adopted later in the 1992 to 1996 window, rendering 1993 an acceptable time for a pre-test measure. Finally, the PB process lasts throughout the year, so even if a municipality adopted PB at the beginning of 1992, that would not be reflected in the budget allocation until the end of the year.

Control variables: The covariates include the following:

Log population (LogPop91) is the log of the municipal population measured in 1991. It was obtained from the 1991 Census (IBGE).

Log per capita income (LogGDPpc00) is the log of municipal per capita income in 2000 (measured in 2000 Reals). It was also obtained from the IBGE.

PT mayor is a set of three dummy variables that correspond to the three time periods used in the PB adoption measures (PT: 1992-2008; PT early: 1992-2000; and PT late: 2001-2008). They are coded as one if the municipality had a PT mayor at any time in the given period, and zero otherwise.⁹

PB*PT is an interaction dummy variable for each time period. They are coded as one if the municipality had a PT mayor AND adopted PB in that time period, and zero otherwise.

Regional dummy variables for each of the five regions of Brazil (Norte, Nordeste,

⁹Data on the mayor's party for 1996, 2000, and 2004 are available from TSE. Data from 1992 were provided by David Samuels.

Centro-Oeste, Sudeste, and Sul). Each variable is coded as one if the municipality belongs to that region, and zero otherwise.

Baseline (1993) spending measures, which are described above under “dependent variables.”

3.4.2 Methods

OLS

I use several different econometric methods to test my hypotheses. I begin with a simple OLS model, which can be estimated with the following equation:

$$Y = \beta_0 + \beta_1(PB) + \beta_2(SpendingBaseline) + \beta_3(PTmayor) + \beta_4(PB * PT) + \beta_{5...n} + \epsilon \quad (3.1)$$

where Y is the posttest measure of the dependent variable, which represents $Spending_{2000}$ (Panels 2A, 2C) or $Spending_{2010}$ (Panels 1, 2B, 3A, 3B). β_0 is the constant, β_1 is the treatment dummy variable represented by PB_{all} (Panel 1), PB_{early} (Panels 2A, B, and C), or PB_{late} (Panels 3A and B). It is coded as one for the treatment group, and zero for the control group. β_2 is the baseline measure of spending. As with Y , its value depends on the panel, and represents $Spending_{1993}$ (1, 2A, 2B, 2C, 3A), or $Spending_{2000}$ (3B). β_3 is the covariate for PT mayor, β_4 is the interaction dummy for PB adoption and PT mayor, and $\beta_{5...n}$ represent a vector of covariates including log population in 1991, log GDP per capita in 2000, and regional dummy variables, and ϵ represents the error term.

Since the adoption of PB was not randomly assigned to municipalities there is a potential endogeneity problem. I therefore test my hypotheses with additional methods to minimize this problem. My results from the different methods do not differ significantly in this chapter, so I do not go into a full explanation of the reasoning behind each one. That explanation can be found in Chapter Four, where the difference between methods is relevant. But the additional methods are summarized as follows: I use propensity score matching to control for observable differences between the treated and control municipalities, a differences-in-differences design to control for unobservable differences between the treated and control mu-

nicipalities, and finally a combination of PSM-DID to control for both observable and unobservable differences between groups.

Propensity Score Matching

The propensity score $p(X_i)$ is defined as $p(X_i) = Pr(PB_i = 1 | X_i)$, where X_i is a vector of pre-treatment covariates on which treated and untreated cases are matched. I use a standard probit model to estimate the propensity score for each municipality:¹⁰

$$Pr(PB_i = 1) = \beta_0 + X_i + \epsilon \quad (3.2)$$

Using the restricted sample and the propensity score calculated above, I estimate the average treatment effect on the treated (ATT):

$$ATT_{PSM} = \frac{1}{N_{PB}} \left[\sum_{i \in PB} Y_i^{PB} - \sum_{j \in C} \omega(i, j) Y_j^C \right] \quad (3.3)$$

where PB indicates the treatment group, C indicates the control group, i is a municipality in the treatment group, and j is a municipality in the control group. N_{PB} is the number of treated municipalities (i), and $\omega(i, j)$ is the region of common support.

Differences-in-Differences

The basic model for calculating the DID estimator is the following:

$$\hat{\delta} = (\bar{y}_{PB,1} - \bar{y}_{C,1}) - (\bar{y}_{PB,0} - \bar{y}_{C,0}) \quad (3.4)$$

where $\hat{\delta}$ is the DID estimator; \bar{y} is average spending level; PB indicates membership in the treatment group, C indicates membership in the control group, and the subscripts 1 and 0 indicate the post-treatment and baseline measures, respectively. The following regression allows me to estimate the ATT given the set of covariates X_i :

$$\Delta Y_i = \beta_0 + \beta_1(PB_i) + \beta_2(T_i) + \hat{\delta}(PB_i * T_i) + X_i + \epsilon_i \quad (3.5)$$

¹⁰I restrict my matched sample using a caliper width of one percentage point. Municipalities that do not fall in this range are dropped

where ΔY_i is the ATT, PB_i is the same dummy variable as above. It is coded as one if *municipality_i* is in the treatment group, and zero if in the control group. T_i is a time dummy that takes the value of one for post-treatment, and zero for baseline. And X_i is a vector of covariates.

PSM-DID

The PSM-DID ATT can be estimated with the following equation:

$$ATT_{PSM}^{DD} = \frac{1}{N_{PB_1}} \left[\sum_{i \in PB_1} Y_{i,1}^{PB} - \sum_{j \in C_1} \omega(i, j) Y_{j,1}^C \right] - \frac{1}{N_{PB_0}} \left[\sum_{i \in PB_0} Y_{i,0}^{PB} - \sum_{j \in C_0} \omega(i, j) Y_{j,0}^C \right] \quad (3.6)$$

where the same notation is used as above in the PSM ATT equation, and the subscripts 1, and 0 represent the baseline and post-test time periods from the DID equation (Equation 3.4).

3.5 Empirical Results

Unlike in Chapters Four and Five where the different econometric methods produce significantly different results, the results in this chapter are largely similar across methodologies. Tables 3.4, 3.5, 3.6, and 3.7, and the graphs of pre- and post-test measures for each chapter suggest why this might be the case (see Figures 3.4, 4.1 (p. 106), 5.1 (p. 137), and 5.2 (p. 138)). While the majority of pre-test measures for sanitation and welfare differ significantly between PB and non-PB municipalities, pre-test share of spending on health and sanitation, education and culture, and housing and urbanism are generally very similar irrespective of PB status. The different econometric techniques that are so important in Chapters Four and Five are not as important here because the issue of preexisting differences between PB and non-PB municipalities is less pronounced.

Table 3.4: Baseline (1991) Difference in Means Test - Spending

Variable	Non-PB	PB	Difference	p-value
Health Spend	0.05	0.05	-0.00	0.15
Edu Spend	0.09	0.09	0.01	0.01
House Spend	0.05	0.06	-0.00	0.14

Table 3.5: 2000 Difference in Means Test - Spending

Variable	Non-PB	PB	Difference	p-value
Health Spend	0.20	0.24	-0.04	0.00
Edu Spend	0.32	0.28	0.05	0.00
House Spend	0.11	0.12	-0.01	0.06

Table 3.6: 2000 Difference in Means Test - Spending (Early vs. Non/Late PB)

Variable	Non-PB	PB	Difference	p-value
Health Spend	0.21	0.27	-0.06	0.00
Edu Spend	0.31	0.26	0.05	0.00
House Spend	0.11	0.12	-0.01	0.50

Table 3.7: Post-Test (2010) Difference in Means Test - Spending

Variable	Non-PB	PB	Difference	p-value
Health Spend	0.38	0.44	-0.06	0.00
Edu Spend	0.46	0.39	0.07	0.00
House Spend	0.16	0.18	-0.03	0.00

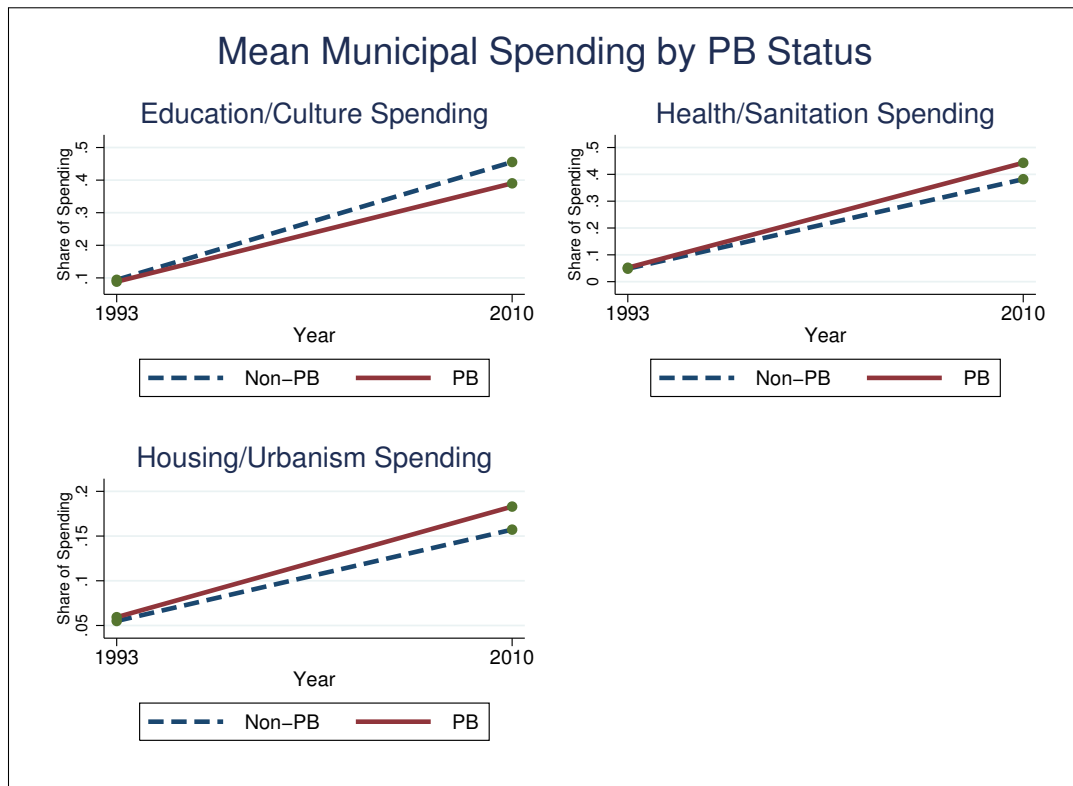


Figure 3.4: Mean Municipal Spending by PB Status

Health and Sanitation Spending: PB is associated with an increase in spending on health and sanitation, ranging from 3 to 8 percent (see Tables 3.8 and 3.9). While the results are not identical across panels and methods, there is enough evidence to support the first hypothesis that PB is associated with higher health and sanitation spending. For Panel 1, which compares all PB adopters with non-adopters, the results are only significant using the DID method. In this case, PB is associated with a 5 percent increase in health and sanitation spending. Panel 2A compares early adopters with non-adopters and late adopters, using a 2000 post-test measure. The results are significant and positive across all methods and range from a 3.6 to a 6.1 percent increase in health and sanitation spending. Panel 2B, which compares early adopters with non-adopters using a 2010 post-test measure, shows a significant and positive result in PSM, DID, and PSM-DID, ranging from 6.1 to 8.1 percent. However it is not significant under the OLS specification. Panel 2C compares early adopters with late adopters and measures the outcome in 2000, which is prior to late adoption. These results are only significant under OLS and DID specifications (2.7 and 3 percent, respectively). Panels 3A and 3B compare late PB adopters with non-PB adopters, and are only significant under DID specifications. The effect is between a 3 and 4 percent increase in health and sanitation spending.

Education and Culture Spending: In contrast with spending on health and sanitation, PB adoption is almost universally correlated with a decrease in share of municipal spending on education and culture across methods, panels, and specifications, causing me to reject Hypothesis Two. The OLS results (presented in Table 3.10) show a negative correlation in all panels, ranging from a 2.7 percent decrease in education and culture spending to a 4.2 percent decrease. All are significant at a 5 or 1 percent confidence level. The results are similar for the other methods (see Table 3.9). PB adoption is associated with a 1-6 percent decrease in education and culture spending across PSM, DID, and PSM-DID methods, and in all panels except for PSM and PSM-DID in Panel 2C. The fact that the results are robust across methods and panels suggests that we should take these findings seriously, and thus the second hypothesis that PB is associated with higher

Table 3.8: Health/Sanitation Spending

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.014 (0.015)					
HealthSpend93	0.463* (0.223)	0.657*** (0.140)	0.367 (0.252)	1.219*** (0.247)	0.273 (0.239)	
LogPop91	0.040*** (0.008)	0.022*** (0.005)	0.054*** (0.011)	0.014 (0.007)	0.031** (0.010)	0.019* (0.009)
LogGDPpc00	-0.001 (0.011)	-0.023*** (0.007)	0.002 (0.013)	-0.020 (0.012)	-0.005 (0.011)	0.014 (0.010)
PT	-0.032 (0.030)					
PB*PT	0.050 (0.035)					
North	-0.088** (0.028)	0.006 (0.017)	-0.075* (0.032)	0.024 (0.037)	-0.105*** (0.028)	-0.085*** (0.022)
Northeast	-0.012 (0.018)	-0.024* (0.011)	-0.000 (0.021)	-0.017 (0.019)	-0.021 (0.019)	0.003 (0.017)
South	-0.031 (0.017)	-0.035** (0.011)	-0.027 (0.020)	-0.022 (0.017)	-0.045* (0.018)	-0.021 (0.016)
Central-West	-0.007 (0.027)	-0.027 (0.017)	0.002 (0.031)	-0.022 (0.034)	-0.017 (0.027)	-0.001 (0.025)
PB early		0.037** (0.014)	0.027 (0.023)	0.028 (0.016)		
PT early		-0.050 (0.037)	-0.040 (0.057)	0.017 (0.022)		
PB*PT early		0.069 (0.042)	0.062 (0.065)			
PB late					0.011 (0.017)	0.014 (0.015)
PT late					-0.027 (0.032)	-0.006 (0.028)
PB*PT late					0.043 (0.039)	0.006 (0.035)
HealthSpend00						0.607*** (0.069)
Constant	-0.054 (0.125)	0.135 (0.075)	-0.236 (0.157)	0.178 (0.119)	0.091 (0.141)	-0.054 (0.129)
Observations	487	499	356	202	418	437

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

education and culture spending is rejected across all panels.

Housing and Urbanism Spending: The results for spending on housing and urbanism are more ambiguous. They are generally null, but show a positive correlation in a few cases, ranging from 2-3 percent (see Table 3.11). The results are not significant for any of the panels using OLS, and are only significant in Panel 1 under DID; Panel 3A (DID); and 3B (PSM, DID, PSM-DID) (see Table 3.9).

3.6 Discussion

In this chapter I find that PB is associated with an increase in health and sanitation spending, a decrease in education spending, and generally neutral effects on housing and urbanism spending. If there is a causal path between increased spending and increased service provision, these findings should bode well for sanitation provision in the next chapter.

My findings of an increase in health and sanitation spending correspond with those of Touchton and Wampler (2013) and Gonçalves (2014). These health and sanitation findings also correspond with Boulding and Wampler (2010), however they find an increase in education spending where I find a decrease.

My results showing a decrease in spending on education are consistent with Wang et al.'s findings on fiscal decentralization in China. They find a decrease in spending as result of decentralization to provinces and argue that “[f]iscal decentralization appears to have a U-shaped relationship with the share of budgetary education spending; it reduces the share of budgetary education spending and then begins to increase the share after it reaches a certain threshold” (Wang, Zheng & Zhao 2012, 5). This non-linear relationship suggests that we should reevaluate the relationship between PB and education spending over time.

It is important to note that spending in the areas of education, health and sanitation, and housing are not normatively “better” than spending in other areas. There is obviously a need for a balance between the different areas and that the ideal balance is different depending on local conditions (Banerjee, Iyer &

Somanathan 2007, 3138). However, these are the three areas most closely associated with pro-poor spending, so in the context of PB, there should be a rise in at least one of these areas, which I found to be the case.

Additionally, we must keep in mind that an increase in share of spending in one area by definition means that there will be a decrease in another area. So an increase in health and sanitation could come at the expense of housing and urbanism, which should not be interpreted as PB failing to bring about pro-poor spending. However, in order to be considered a successful pro-poor policy, an increase in spending in a given area must be accompanied by a corresponding increase in goods or services in that area. Clientelism, inefficiency, lack of knowledge, and various other intervening variables can block this theoretically causal relationship between spending and provision from occurring. Thus it is important to keep in mind that an increase in spending is not the same as an increase in output or provision of goods and services. I will discuss this issue in detail in the following chapter, but the point is that we cannot assume that more spending automatically leads to better outcomes. It is a necessary but insufficient condition.

Table 3.9: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB Adoption on Spending

Predicted Effect	Education and Culture Spending			Health/Sanitation Spending			Housing Spending				
	PSM	DD	<i>positive</i>	PSMDD	PSM	DD	<i>positive</i>	PSMDD	PSM	DD	<i>positive</i>
PANEL 1											
ATT	-0.034**	-0.055***	-0.033**	-0.041***	0.057**	0.051***	0.061***	0.021***			
Standard Error	-0.016	-0.009	-0.017	-0.014	-0.023	-0.011	-0.022	-0.008			
PANEL 2A											
ATT	-0.036**	-0.044***	-0.041***	-0.041***	0.057**	0.051***	0.061***				
Standard Error	-0.015	-0.009	-0.014	-0.014	-0.023	-0.011	-0.022				
PANEL 2B											
ATT	-0.049**	-0.053***	-0.053**	-0.053**	0.077**	0.081***	0.076**				
Standard Error	-0.023	-0.014	-0.023	-0.023	-0.034	-0.018	-0.035				
PANEL 2C											
ATT		-0.027***				0.028*					
Standard Error		-0.01				-0.016					
PANEL 3A											
ATT	-0.033*	-0.056***	-0.031*	-0.031*	0.041***	0.041***	0.023**				
Standard Error	-0.019	-0.011	-0.018	-0.018	-0.014	-0.014	-0.009				
PANEL 3B											
ATT	-0.044***	-0.028***	-0.050***	-0.050***	0.025**	0.025**	0.031**	0.018*	0.030**		
Standard Error	-0.016	-0.01	-0.017	-0.017	-0.013	-0.013	-0.014	-0.01	-0.015		

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.10: Education and Culture Spending

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	-0.042*** (0.011)					
EduSpend93	0.387* (0.183)	0.812*** (0.125)	0.306 (0.227)	0.812*** (0.174)	0.367 (0.193)	
LogPop91	-0.015* (0.006)	-0.024*** (0.004)	-0.016* (0.008)	-0.020*** (0.005)	-0.011 (0.007)	-0.000 (0.007)
LogGDPpc00	-0.031*** (0.008)	-0.012* (0.005)	-0.034*** (0.010)	0.001 (0.007)	-0.026** (0.008)	-0.021** (0.008)
PT	-0.039 (0.022)					
PB*PT	0.049 (0.025)					
North	0.033 (0.020)	0.012 (0.014)	0.049* (0.024)	-0.027 (0.022)	0.041* (0.021)	0.021 (0.017)
Northeast	0.016 (0.013)	0.003 (0.009)	0.026 (0.016)	-0.010 (0.012)	0.024 (0.014)	0.014 (0.013)
South	-0.009 (0.012)	-0.008 (0.008)	-0.012 (0.015)	-0.010 (0.010)	-0.015 (0.013)	-0.015 (0.012)
Central-West	-0.060** (0.019)	0.005 (0.013)	-0.070** (0.024)	0.008 (0.020)	-0.060** (0.020)	-0.059** (0.019)
PB early		-0.034** (0.011)	-0.048** (0.018)	-0.027** (0.010)		
PT early		-0.046 (0.029)	-0.037 (0.044)	0.018 (0.013)		
PB*PT early		0.068* (0.033)	0.086 (0.050)			
PB late					-0.037** (0.013)	-0.029* (0.012)
PT late					-0.037 (0.024)	-0.031 (0.021)
PB*PT late					0.021 (0.029)	0.011 (0.026)
EduSpend00						0.561*** (0.061)
Constant	0.844*** (0.095)	0.604*** (0.062)	0.883*** (0.124)	0.447*** (0.080)	0.748*** (0.110)	0.453*** (0.105)
Observations	488	499	357	202	419	439

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3.11: Housing/Urbanism Spending

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.009 (0.010)					
HouseSpend93	0.270* (0.124)	0.855*** (0.090)	0.342* (0.151)	0.858*** (0.135)	0.168 (0.135)	
LogPop91	0.016** (0.005)	0.005 (0.004)	0.011 (0.007)	0.007 (0.005)	0.020** (0.006)	0.020** (0.006)
LogGDPpc00	0.015* (0.007)	0.005 (0.005)	0.011 (0.008)	0.004 (0.008)	0.019* (0.007)	0.019** (0.007)
PT	-0.018 (0.020)					
PB*PT	0.010 (0.023)					
North	-0.016 (0.018)	-0.027* (0.013)	-0.039 (0.022)	-0.013 (0.026)	-0.022 (0.019)	0.002 (0.016)
Northeast	-0.014 (0.011)	0.010 (0.008)	-0.026 (0.013)	0.014 (0.014)	-0.015 (0.012)	-0.013 (0.012)
South	-0.026* (0.011)	-0.010 (0.008)	-0.037** (0.012)	0.000 (0.012)	-0.032** (0.012)	-0.025* (0.011)
Central-West	0.021 (0.018)	0.010 (0.013)	0.029 (0.020)	-0.006 (0.026)	0.027 (0.018)	0.029 (0.018)
PB early		0.006 (0.010)	-0.002 (0.015)	0.003 (0.012)		
PT early		0.018 (0.031)	0.026 (0.041)	-0.007 (0.016)		
PB*PT early		-0.024 (0.034)	-0.016 (0.046)			
PB late					0.011 (0.011)	0.006 (0.011)
PT late					-0.024 (0.021)	-0.020 (0.020)
PB*PT late					0.011 (0.026)	0.016 (0.024)
HouseSpend00						0.338*** (0.059)
Constant	-0.156 (0.081)	-0.041 (0.056)	-0.064 (0.101)	-0.052 (0.088)	-0.224* (0.093)	-0.249** (0.089)
Observations	480	491	351	200	412	436

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4 The Effect of Participatory Budgeting on Sanitation Provision

4.1 Introduction

“Allocated appropriately, public expenditures can overcome market failures that exacerbate poverty, such as the inability of poor people to borrow for education or to learn about preventive health care or the existence of externalities that increase the public health hazards that disproportionately hurt poor people. Allocation is often inappropriate, however. Public spending goes to wage bills for bulky state administrations, farm subsidies absorbed by the wealthiest farmers, or public works projects with limited public utility, all at the expense of the quality of public services” (Keefer & Khemani 2005, 1).

The previous chapter addressed the question of whether or not the presence of PB affects spending patterns in Brazilian municipalities. I found that PB is associated with a statistically significant increase in spending on health and sanitation, a decrease in spending on education and culture, and a mostly neutral effect on housing and urbanism, though positive in some cases. While these are interesting findings and should give hope about the potential of PB to correct some health and sanitation deficiencies, I would argue that most citizens care much more about actual public service delivery and their own well-being than they do about the technicalities of budgetary allocation.

In this chapter, I analyze the effect of PB on public service provision and in the next I analyze the effect on well-being. I find that PB has a largely neutral, and sometimes negative effect on both sets of dependent variables. I begin this chapter with a discussion of the relevant literature for service provision. I then present my hypotheses, data, and empirical strategy, with a focus on the endogeneity-minimizing econometric methods. Finally, I summarize my empirical results and discuss their implications and limitations.

4.2 Literature Review

Spending more is not the same as providing superior services. They are often correlated, however it is entirely possible to spend a large amount of money on a project without producing better services. It is particularly important to address the issue of public service delivery as opposed to making assumptions about it based purely on spending in a case like Brazil, which has a long history of clientelism. Spending more might just indicate that the politician is paying his friend more than the market rate to complete a project (Banerjee, Iyer & Somanathan 2007, 3134). This is obviously not the goal of PB, but if we just look at spending patterns, clientelism and increased pro-poor spending could be observationally equivalent. Banerjee cautions that “most studies rely on public good expenditures or on the physical location of facilities.” However “[i]n the presence of widespread bureaucratic corruption and agency problems that plague the public sector, the link between these outcome measures and actual provision can be fairly weak” (3134).

In fact, Blair (2000) finds evidence of this phenomenon in the Indian state of Karnataka. Despite mandated citizen participation, local elites still retain most of the power and decision-making: “For example, they upgrade existing high schools (which their children attend) rather than spend public funds to expand primary and secondary education (to serve all children)” (24). If we just look at budget allocation, it would appear that mandated citizen participation has a positive effect on education; whereas in reality, it is just hiding existing clientelist practices.

Another study on India looks at public health facilities in Udaipur, Rajasthan. Using random visits to primary health centers and subcenters, they find that weekly absenteeism of medical personnel is between 36 and 45 percent. And “[s]ince subcenters are often staffed by only one nurse, this high absenteeism means that these facilities are often closed: we found the subcenters closed 56 percent of the time during regular opening hours” (Banerjee, Deaton & Duflo 2004, 329).

Similarly, 2010 senatorial candidate and current Recife City Council member, Raul Jungmann, shows in a campaign advertisement how educational funds were used ineffectively in the state of Pernambuco. Money was spent on books and classrooms, however there were no teachers and consequently no students. He shows unused schools in disrepair that are full of brand new textbooks. He then interviews young people in the area who complain about the lack of education in the region. The point here is that a change in spending does not necessarily indicate a change in services, and those services, in addition to improved welfare, are what matter to citizens.

Given the disconnect between spending and provision, I choose service provision variables at the household level that are more immune to these problems than community-level goods. While schools do not equal education and hospitals do not equal health, household access to water, sewage, trash, and electricity are comparatively transparent. It is certainly possible for the government to misrepresent the number of households with access to these services, however these measures are superior to the alternatives (Heller 2006).

The theoretical literature on decentralization and direct democracy provide varied, and often contradictory, predictions regarding public service provision. Those that believe these institutions will have a positive effect on public service provision cite allocative efficiency arguments, in addition to superior information about the needs of a particular area (Tiebout 1956, Olson 1965, Weingast 1995). Their critics argue that decentralization in particular can lead to increased corruption and local capture (Bardhan & Mookherjee 2005, Rodden & Rose-Ackerman 1997, Banerjee, Iyer & Somanathan 2007), and that improved knowledge about local preferences does not necessarily translate into service provision if the proper

incentives are not in place (Bardhan & Mookherjee 2006*b*, Seabright 1996, Bardhan & Mookherjee 2005), as was the case with education in Karnataka and health centers in Udaipur.

There is some empirical evidence that direct democracy and inclusion of previously marginalized actors has a positive effect on service provision. According to Lupia et al, Pommerehne (1983) finds that cities with direct democracy provide municipal services, including trash collection, more efficiently than cities without direct democracy (Lupia & Matsusaka 2004, 474).¹ And villages with female Village Council heads in India provide more infrastructure such as water and roads (Chattopadhyay & Duflo 2004, 1409). The World Bank also finds a positive effect of PB on water and sanitation access (Bank 2008*a*, 88).²

4.3 Hypotheses

One of the major theoretical claims regarding PB is that it improves the quality of governance in terms of service provision to citizens, and particularly low-income citizens. I use sanitation provision measures as my dependent variables in order to test this claim. Access to these services varies widely both across and within municipalities, and those that lack access are generally the poorest citizens. Therefore, sanitation is an ideal measure to test the theory that PB adequately targets low-income citizens.

I test four related hypotheses:

Hypothesis 1: Municipalities that adopted PB will have a higher share of residents with public sewer access than municipalities that did not adopt PB.

Hypothesis 2: Municipalities that adopted PB will have a higher share of residents with public water access than municipalities that did not adopt PB.

Hypothesis 3: Municipalities that adopted PB will have a higher share of residents with garbage collection than municipalities that did not adopt PB.

¹Original source (Pommerehne 1983) is in German, which this author does not speak.

²For a more in depth review of this literature, see Chapter One.

Hypothesis 4: Municipalities that adopted PB will have a higher share of residents with electricity than municipalities that did not adopt PB.

If the theory is correct, we should expect to see a rise in these categories of sanitation provision in municipalities that adopted PB, relative to those that did not.

4.4 Data and Methods

4.4.1 Data

According to an article on the success of PB in Porto Alegre, “in 1989 the sewer system covered only 46 percent of the city. Now it reaches 82 percent. Sewage treatment was zero, today 44 percent of the sewage is treated. Therefore, Porto Alegre is the Brazilian capital with the best quality of life” (“Dez anos de Oramento Participativo”).

Conclusions such as these are common among PB proponents, and are understandably often convincing to participants. Municipal PB websites frequently list the projects that have been completed as a result of PB decisions in order to highlight the alleged benefits as well. However, this makes the assumption that these projects would not have been completed in the absence of PB, and data show that sewer provision increased in both PB and non-PB municipalities during this period. This is one of the primary problems regarding evaluation of PB programs specifically, but public policy more generally. We cannot assume that the change is a result of the policy itself without a counterfactual of those who did not receive the treatment.

In fact, the time period between 1991 and 2010 saw dramatic improvements in all household-level sanitation provision throughout Brazil. Access to the public water supply increased from an average of 64 percent of households in 1991 to 83 percent in 2010; garbage collection increased from 72 percent in 1991 to 96 percent in 2010; electricity increased from 88 percent in 1991 to 99 percent in 2010; and public sewer access increased from 41 percent to 53 percent.

This suggests that including a counterfactual is essential to determining the actual effect of PB, as opposed to misattributing a general rise in sanitation

provision over time to PB. Including non-PB municipalities would be the obvious choice for this, however difference in means tests demonstrate that there is another problem: Tables 4.1, 4.2, 4.3, 4.4 show the summary statistics and difference in means tests between treatment and control groups in 1991, 2000, and 2010. The difference in means tests show that PB municipalities provided higher levels of all sanitation services in all time periods relative to their non-PB counterparts. For example, in 1991 PB municipalities had a mean sewer provision level of 44 percent in contrast with 36 percent for non-PB municipalities. By 2010, PB municipalities had increased sewer provision to 64 percent, while non-PB municipalities increased to 45 percent. These differences are statistically significant at a 1 percent confidence level for all sanitation measures in all time periods, except for sewer in 1991, where it is significant at a 5 percent confidence level. The graphs also reflect these differences (see Figure 4.1).

These findings have important implications for the present study. The summary statistics demonstrate general time-trends in sanitation provision, indicating the need for a control group. Difference in means tests confirm that PB and non-PB municipalities provided significantly different levels of these services prior to their adoption, and therefore we cannot conclude that improvements in sanitation provision by PB municipalities relative to their non-PB counterparts is a result of PB itself. This would be a valid conclusion under randomized experimental conditions, however that is not the case here. I discuss the econometric techniques I use to address these issues after discussing the operationalization of my variables and presenting the OLS results.

Table 4.1: Baseline (1991) Difference in Means Test - Sanitation

Variable	Non-PB	PB	Difference	p-value
Sewer	0.36	0.44	-0.08	0.02
Water	0.57	0.74	-0.17	0.00
Trash	0.67	0.80	-0.13	0.00
Electricity	0.84	0.94	-0.10	0.00

I operationalize “sanitation provision” as the percentage of households in

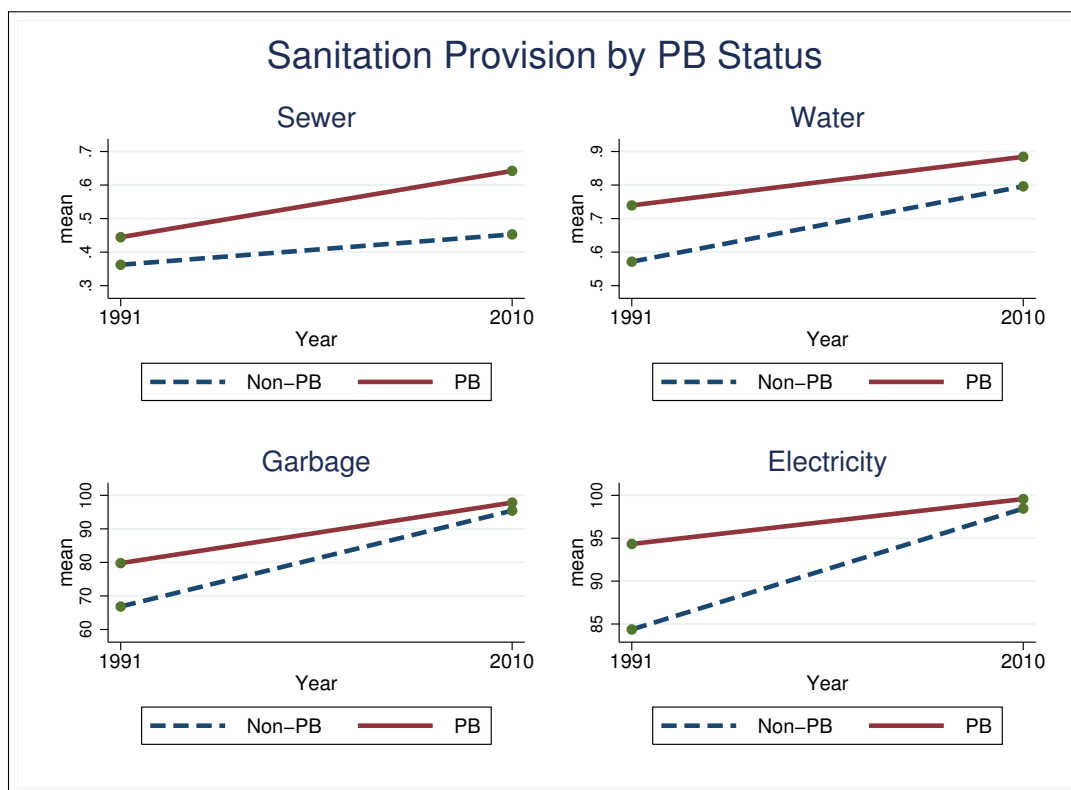


Figure 4.1: Sanitation Provision by PB Status

Table 4.2: 2000 Difference in Means Test - Sanitation

Variable	Non-PB	PB	Difference	p-value
Sewer	0.36	0.54	-0.18	0.00
Water	0.73	0.85	-0.12	0.00
Trash	0.86	0.93	-0.07	0.00
Electricity	0.93	0.98	-0.05	0.00

Table 4.3: 2000 Difference in Means Test - Sanitation (Early vs. Non/Late PB)

Variable	Non-PB	PB	Difference	p-value
Sewer	0.40	0.62	-0.22	0.00
Water	0.76	0.89	-0.14	0.00
Trash	0.88	0.95	-0.07	0.00
Electricity	0.94	0.99	-0.05	0.00

$municipality_i$ with access to (1) public sewer,³ (2) piped water,⁴ (3) garbage collection,⁵ and (4) electricity.⁶ All of these variables are measured in 1991, 2000, and 2010 and were obtained from the IBGE and IPEA.⁷ The 1991 measure provides a baseline comparison ($Sanitation_{1991}$).⁸ The 2000 score is a posttest measure for early adopters and a baseline measure for late adopters ($Sanitation_{2000}$);

³Defined as share of permanent private households in each municipality that are connected to the public sewage line.

⁴Defined as share of permanent private households in each municipality that are connected to the public water supply.

⁵Defined as the percentage of population living in permanent private households with garbage collection. “Included are situations where garbage collection performed directly by public or private company, or garbage is deposited into hopper, tank or vessel outside the home, for later collection by the service provider” (IPEA).

⁶Defined as the percentage of population in permanent private households with electricity.

⁷Data for both sewer and water access in 2000 and 2010 were obtained from the IBGE (<http://www.ibge.gov.br/home/estatistica/populacao/censo2010/>). Data for those measures in 1991 were obtained from the (IPEA, <http://www.ipea.gov.br/portal/>).

⁸Where “sanitation” represents each of the sanitation measures: public sewer, piped water, garbage collection, and electricity.

Table 4.4: Post-Test (2010) Difference in Means Test - Sanitation

Variable	Non-PB	PB	Difference	p-value
Sewer	0.45	0.64	-0.19	0.00
Water	0.80	0.88	-0.09	0.00
Trash	0.95	0.98	-0.24	0.00
Electricity	0.98	0.99	-0.11	0.00

and the 2010 scores provide a posttest measure for all adopters and late adopters ($Sanitation_{2010}$).

The dataset and independent variables used in this chapter are the same as the previous chapter, and includes the 551 municipalities with more than 50 thousand residents, excluding the 11 that adopted PB prior to 1992. Unlike the previous chapter, the baseline measure for this chapter is in 1991 (rather than 1993). The research design with the six panels varying across pre- and post-test measurement timing, and membership in treatment and control groups is also the same as the previous chapter, and is summarized in Figure 3.3 (p. 85).

4.4.2 Methods and Empirical Results

OLS

The basic OLS model serves as a benchmark for the additional tests. It uses PB adoption and a set of covariates to test the hypotheses that PB has a positive effect on sanitation provision. The following is the general model used for each of the panels presented above:

$$Y = \beta_0 + \beta_1(PB) + \beta_2(SanitationBaseline) + \beta_3(PT) + \beta_4(PB*PT) + \beta_5(Spend) + \beta_{6...n} + \epsilon \quad (4.1)$$

where Y is the posttest measure of the dependent variable, which represents $Sanitation_{2000}$ (Panels 2A, 2C) or $Sanitation_{2010}$ (Panels 1, 2B, 3A, 3B). β_0 is the constant, β_1 is the treatment dummy variable represented by PB_{all} (Panel 1), PB_{early} (Panels 2A, B, and C), or PB_{late} (Panels 3A and B). It is coded as one for the treatment group, and zero for the control group. β_2 is the baseline measure of sanitation provision. As with Y , its value depends on the panel, and represents $Sanitation_{1991}$ (1, 2A, 2B, 2C, 3A), or $Sanitation_{2000}$ (3B). β_3 is the covariate for PT mayor, β_4 is the interaction dummy for PB adoption and PT mayor, β_5 is spending variables from Chapter Three, and $\beta_{6...n}$ represent a vector of covariates including log population in 1991, log GDP per capita in 2000, and regional dummy variables, and ϵ represents the error term.

The OLS regression results presented in Tables 4.5, 4.6, 4.7, and 4.8 show that log population, log GDP, and pre-treatment sanitation measures are the only

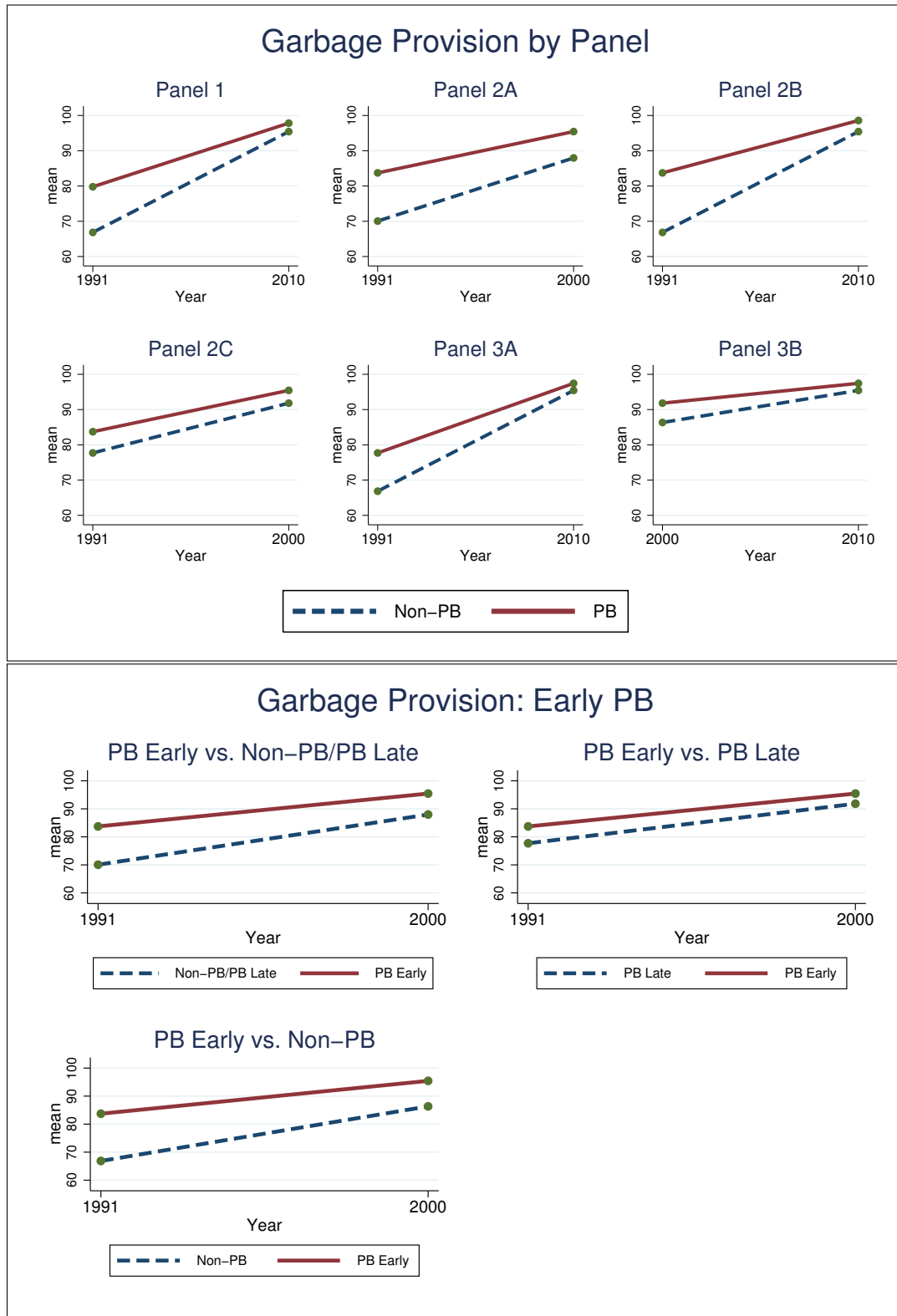


Figure 4.2: (Top) Garbage Provision by Panel, (Bottom) Garbage Provision: Early PB

consistently significant coefficients across the panels for sewer, water, and garbage. The tables show that sewer provision in Panel 3B (PB_{late} vs. Non-PB municipalities) is the only case in which PB is significant at the 1 percent confidence level, and the effect of PB is only a 2.6 percent increase in sewer provision.

Table 4.5: Sewer Provision

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.018 (0.020)					
Sewer91	0.489*** (0.036)	0.657*** (0.034)	0.537*** (0.046)	0.608*** (0.042)	0.491*** (0.041)	
LogPop91	0.030** (0.011)	0.020* (0.009)	0.027 (0.015)	0.018 (0.011)	0.033* (0.013)	0.017* (0.007)
LogGDPpc00	0.026 (0.016)	0.025 (0.015)	0.012 (0.020)	0.029 (0.020)	0.034 (0.018)	0.014 (0.008)
PT	-0.016 (0.049)					
PB*PT	0.021 (0.054)					
North	-0.345*** (0.055)	-0.208*** (0.051)	-0.360*** (0.077)	-0.189** (0.063)	-0.362*** (0.060)	-0.107*** (0.020)
Northeast	-0.084** (0.030)	-0.027 (0.028)	-0.070 (0.037)	-0.050 (0.038)	-0.075* (0.034)	-0.024 (0.015)
South	-0.032 (0.028)	-0.075** (0.026)	-0.008 (0.035)	-0.101** (0.033)	-0.039 (0.031)	0.065*** (0.015)
Central-West	-0.227*** (0.038)	-0.153*** (0.036)	-0.216*** (0.048)	-0.163** (0.049)	-0.230*** (0.042)	-0.039 (0.021)
PB early		-0.006 (0.024)	0.019 (0.029)	-0.002 (0.024)		
PT early		0.039 (0.102)	0.040 (0.114)	0.018 (0.032)		
PB*PT early		-0.020 (0.108)	-0.041 (0.120)			
PB late					0.021 (0.024)	0.016 (0.012)
PT late					-0.007 (0.053)	0.003 (0.022)
PB*PT late					0.005 (0.060)	-0.016 (0.028)
Sewer00						0.872*** (0.021)
Constant	-0.086 (0.170)	-0.122 (0.156)	0.042 (0.227)	-0.105 (0.191)	-0.187 (0.205)	-0.154 (0.099)
Observations	391	391	273	191	318	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.6: Water Provision

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.002 (0.011)					
Water91	0.563*** (0.028)	0.735*** (0.026)	0.590*** (0.034)	0.594*** (0.036)	0.581*** (0.030)	
LogPop91	-0.011 (0.006)	-0.000 (0.006)	-0.013 (0.009)	0.004 (0.006)	-0.011 (0.008)	-0.013** (0.004)
LogGDPpc00	-0.002 (0.008)	-0.003 (0.008)	-0.005 (0.010)	0.002 (0.009)	-0.003 (0.009)	-0.003 (0.005)
PT	0.021 (0.022)					
PB*PT	-0.008 (0.026)					
North	-0.110*** (0.021)	-0.059** (0.019)	-0.093*** (0.025)	-0.133*** (0.026)	-0.101*** (0.022)	-0.043*** (0.012)
Northeast	0.088*** (0.014)	0.077*** (0.014)	0.085*** (0.018)	0.059*** (0.016)	0.100*** (0.016)	0.040*** (0.008)
South	0.005 (0.012)	0.011 (0.011)	0.002 (0.015)	0.008 (0.013)	0.010 (0.014)	-0.001 (0.007)
Central-West	0.044* (0.020)	0.006 (0.019)	0.056* (0.025)	-0.016 (0.026)	0.047* (0.022)	0.052*** (0.012)
PB early		-0.008 (0.015)	-0.006 (0.018)	-0.006 (0.012)		
PT early		-0.028 (0.042)	-0.015 (0.046)	0.006 (0.017)		
PB*PT early		0.032 (0.047)	0.033 (0.052)			
PB late					0.005 (0.013)	-0.004 (0.007)
PT late					0.032 (0.025)	-0.013 (0.013)
PB*PT late					-0.022 (0.031)	0.024 (0.016)
Water00						0.828*** (0.017)
Constant	0.590*** (0.092)	0.317*** (0.085)	0.631*** (0.122)	0.350*** (0.092)	0.586*** (0.112)	0.348*** (0.059)
Observations	536	536	396	214	462	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.7: Garbage Provision

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.231 (0.436)					
Garbage91	0.127*** (0.010)	0.369*** (0.021)	0.130*** (0.012)	0.343*** (0.023)	0.135*** (0.011)	
LogPop91	0.023 (0.237)	0.517 (0.478)	0.085 (0.330)	0.158 (0.396)	0.088 (0.297)	-0.046 (0.257)
LogGDPpc00	0.893** (0.319)	2.770*** (0.691)	1.164** (0.406)	1.242 (0.677)	0.893* (0.363)	0.448 (0.311)
PT	0.502 (0.851)					
PB*PT	-0.303 (0.997)					
North	-0.990 (0.709)	-4.130** (1.530)	-1.373 (0.907)	-5.170** (1.660)	-0.707 (0.775)	-0.456 (0.651)
Northeast	-1.885*** (0.506)	-3.187** (1.099)	-1.590* (0.654)	-3.554** (1.076)	-1.843** (0.574)	-1.357** (0.497)
South	-0.080 (0.465)	0.251 (1.006)	-0.139 (0.603)	0.273 (0.902)	-0.107 (0.539)	-0.065 (0.465)
Central-West	1.936* (0.762)	2.600 (1.645)	2.431* (0.963)	0.361 (1.748)	2.299** (0.845)	1.004 (0.720)
PB early		0.131 (1.322)	0.164 (0.721)	0.295 (0.861)		
PT early		-1.171 (3.655)	-1.162 (1.852)	0.601 (1.176)		
PB*PT early		1.452 (4.145)	0.931 (2.101)			
PB late					0.090 (0.524)	-0.037 (0.454)
PT late					0.720 (0.967)	0.686 (0.835)
PB*PT late					-0.394 (1.188)	0.184 (1.029)
Garbage00						0.283*** (0.015)
Constant	79.835*** (3.521)	34.367*** (7.325)	76.720*** (4.823)	54.094*** (6.470)	78.521*** (4.313)	68.201*** (3.679)
Observations	537	537	398	213	463	463

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4.8: Electricity Provision

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.081 (0.214)					
Electric91	0.122*** (0.007)	0.593*** (0.015)	0.122*** (0.009)	0.469*** (0.020)	0.123*** (0.008)	
LogPop91	-0.085 (0.119)	-0.677** (0.239)	-0.060 (0.169)	-0.291 (0.179)	-0.050 (0.151)	0.047 (0.113)
LogGDPpc00	0.141 (0.156)	0.465 (0.334)	0.172 (0.207)	0.367 (0.285)	0.176 (0.180)	-0.134 (0.135)
PT	1.445*** (0.418)					
PB*PT	-1.638*** (0.491)					
North	-2.455*** (0.363)	-0.360 (0.776)	-2.859*** (0.479)	-0.988 (0.747)	-2.409*** (0.403)	-1.889*** (0.298)
Northeast	1.139*** (0.253)	2.801*** (0.543)	1.248*** (0.333)	0.893 (0.473)	1.270*** (0.293)	0.723*** (0.215)
South	0.047 (0.228)	0.224 (0.487)	0.076 (0.300)	0.112 (0.393)	0.031 (0.269)	0.003 (0.204)
Central-West	0.256 (0.371)	1.861* (0.790)	0.288 (0.475)	0.450 (0.768)	0.279 (0.417)	-0.130 (0.317)
PB early		-0.770 (0.643)	-0.402 (0.361)	-0.386 (0.378)		
PT early		3.074 (1.779)	1.667 (0.929)	0.204 (0.516)		
PB*PT early		-2.567 (2.017)	-1.366 (1.053)			
PB late					0.151 (0.261)	-0.030 (0.198)
PT late					1.215* (0.483)	0.405 (0.368)
PB*PT late					-1.556** (0.594)	-0.494 (0.453)
Electric00						0.238*** (0.009)
Constant	87.750*** (1.707)	45.455*** (3.509)	87.195*** (2.408)	53.911*** (2.815)	86.952*** (2.131)	76.932*** (1.626)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results for electricity are slightly different, in that the interaction effect of PB adoption and PT mayor is significant and negative in Panel 1, 2A, and 3A. In Panel 1 the interaction term shows a 1.4 percent decrease in electricity provision and is significant at the 1 percent confidence level. The interaction term in Panel 2A shows an even bigger decrease of 3.4 percent, also significant at the 1 percent level. And the interaction term in Panel 3A shows a decrease of 1.3 percent in electricity provision, and is significant at the 5 percent confidence level.

Therefore, excluding water provision in Panel 3B, the null hypothesis that there is no difference in post-treatment sanitation provision between PB and non-PB municipalities cannot be rejected for sewer, water, or garbage. The same is true for PB adoption and electricity, however the interaction between PB adoption and PT mayor is negative in some cases. While these results may seem somewhat ambiguous, there is no evidence that PB has a *positive* effect on public service provision except in that one case.

Propensity Score Matching

While the OLS results were generally not significant enough to reject the null hypotheses, we should keep in mind that the underlying assumption of that model is that the groups are equivalent in the absence of PB. As previously discussed, the difference in means test between PB and Non-PB municipalities presented in Tables 4.1, 4.2, 4.3, and 4.4 and reflected in Figures 4.1, 4.3, 4.4, 4.5, and 4.6, show that the difference between treatment and control groups is significant for all sanitation measures in all periods. The significant difference in baseline measures (1991 and 2000) suggest that we cannot assume that the treatment and control groups are equivalent prior to the treatment, and therefore we must employ additional methods to control for this bias.

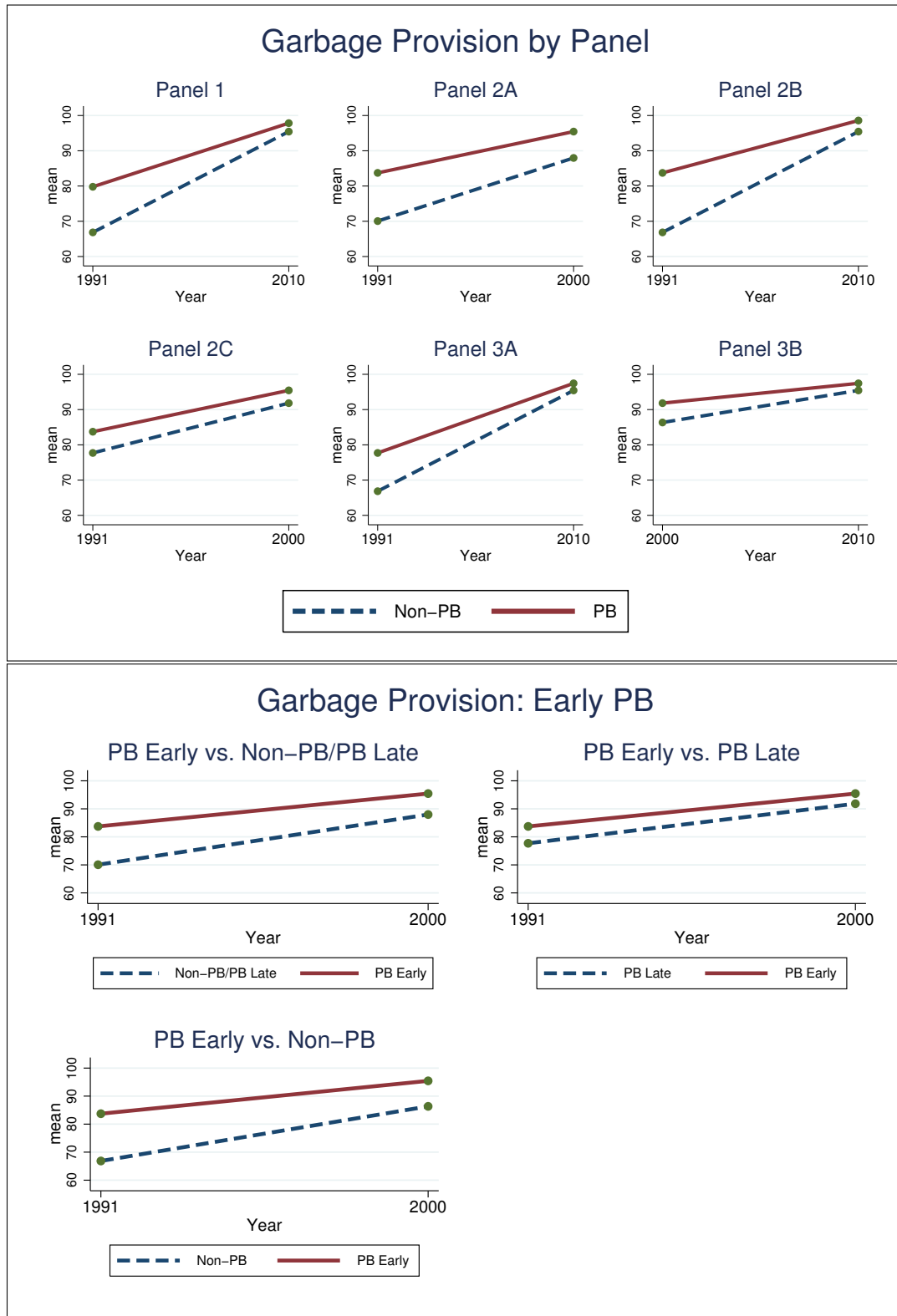


Figure 4.3: (Top) Garbage Provision by Panel, (Bottom) Garbage Provision: Early PB

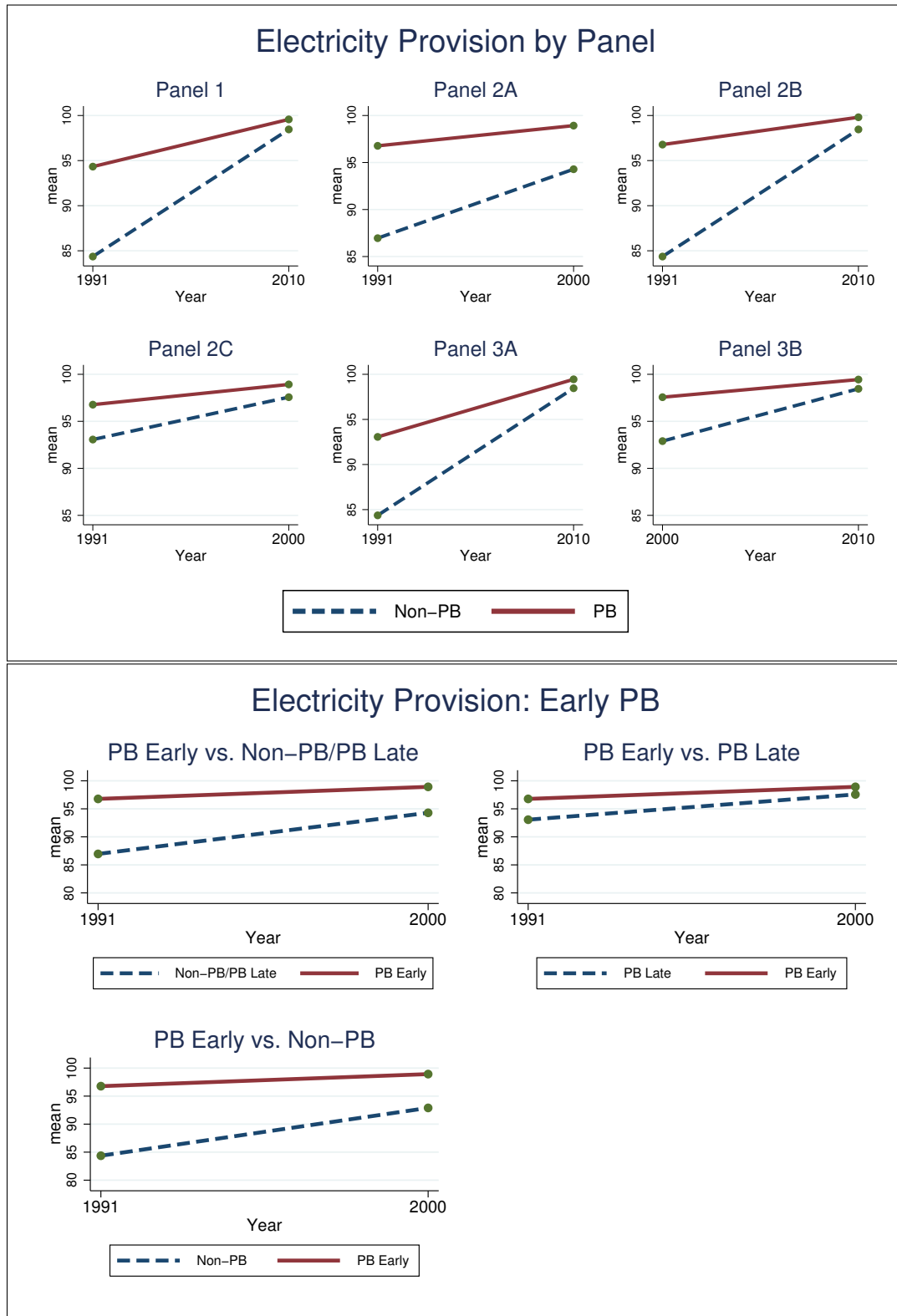


Figure 4.4: (Top) Electricity Provision by Panel, (Bottom) Electricity Provision: Early PB

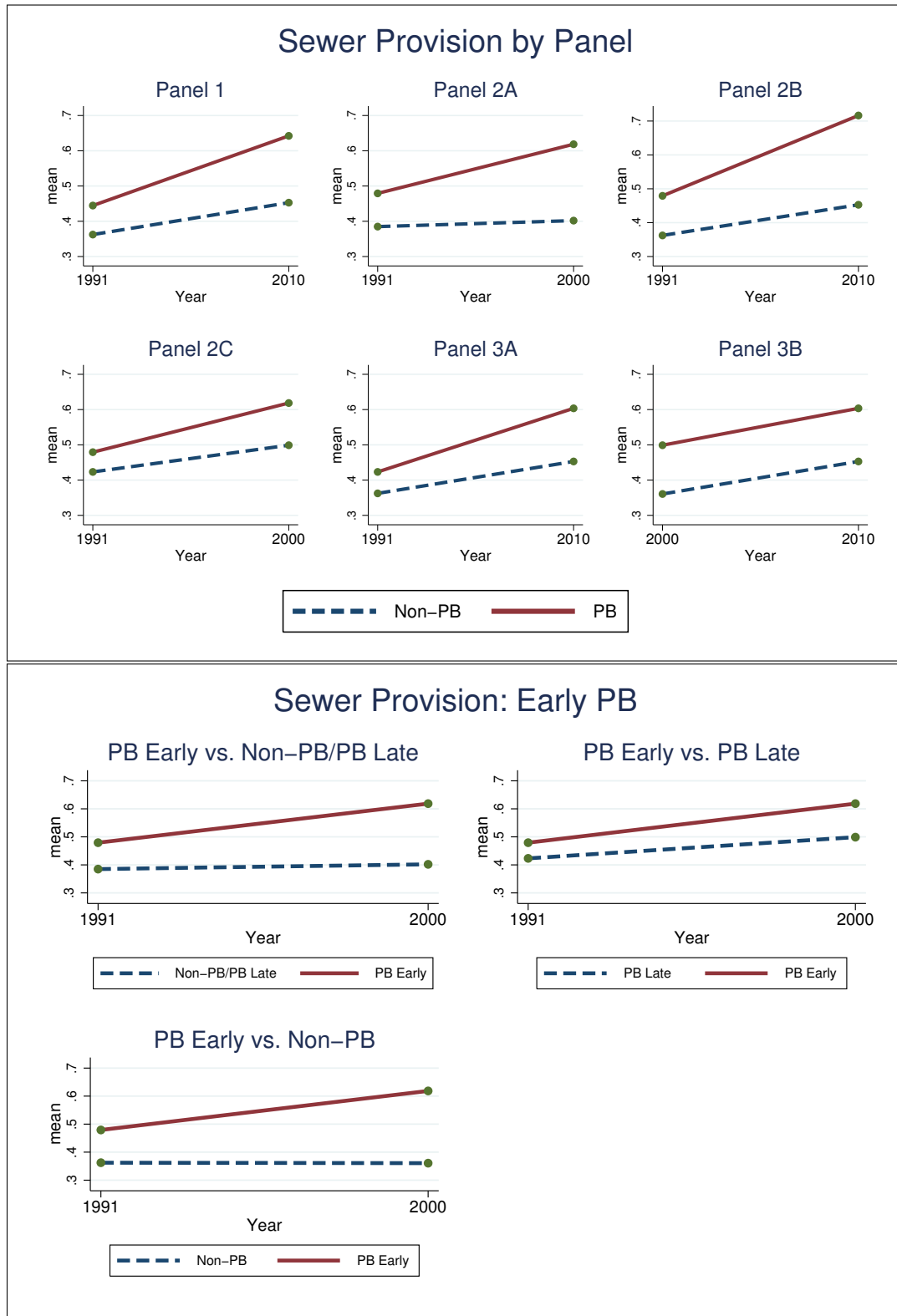


Figure 4.5: (Top) Sewer Provision by Panel, (Bottom) Sewer Provision: Early PB

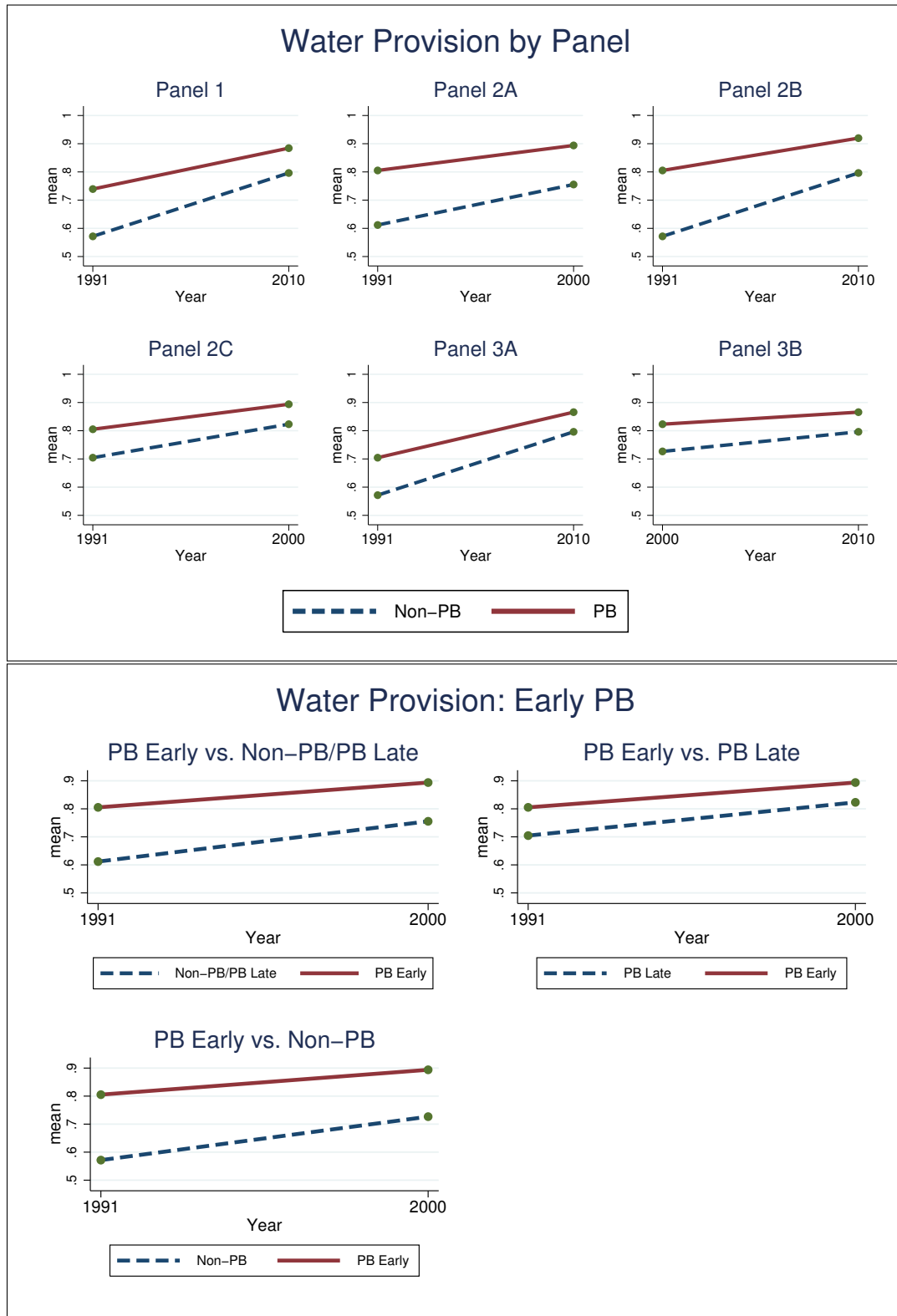


Figure 4.6: (Top) Water Provision by Panel, (Bottom) Water Provision: Early PB

The first method that attempts to reduce this problem of selection bias is propensity score matching. PSM originated in the economics literature (Rubin 1973, Rosenbaum & Rubin 1983, Dehejia & Wahba 1998) and has been adopted by political science and program evaluation literature. Rosenbaum and Rubin define PSM as the “[c]onditional probability of assignment to a particular treatment given a vector of observed covariates”(1983, 41). The motivation is to create a control group that provides a more valid counterfactual than the actual control group. This is done by matching treatment municipalities with otherwise similar control municipalities. In order to accomplish this, I first use a probit model to estimate the likelihood of *municipality_i* receiving the treatment (adopting PB) conditional on a set of covariates. The predicted probability is the propensity score, which is then used to estimate the effect of PB on sanitation provision.

The propensity score $p(X_i)$ is defined as $p(X_i) = Pr(PB_i = 1 | X_i)$, where X_i is a vector of pre-treatment covariates on which treated and untreated cases are matched (Wooldridge 2002). I match on the same sets of covariates used in OLS (and later in DID). The inclusion of the PT covariate for matching in particular is based on Spada’s (2012) work on PB adoption. He uses political explanatory variables to predict PB adoption with a linear probability model, and finds that PT mayors have a positive effect on PB adoption. I use a standard probit model to estimate the propensity score for each municipality:⁹

$$Pr(PB_i = 1) = \beta_0 + X_i + \epsilon \quad (4.2)$$

I restrict my matched sample so that treated and untreated municipalities that cannot be matched closely on the covariates are dropped from the sample. Using a tolerance level or caliper width (Rosenbaum & Rubin 1983), municipalities are only matched if the untreated municipality’s propensity score falls within 1 percentage point of the treated municipality’s score. Thus municipalities that do not meet the following criteria are dropped:

$$\|Pr(PB = 1) - Pr(PB = 0)\| < \epsilon \quad (4.3)$$

⁹This basic model varies slightly under different specifications, but follows the same patterns as those described in the OLS model. The basic population and GDP covariates are included in all specifications, but the year for the baseline measure (also included in X_i) depends on the panel.

where $Pr(PB = 1)$ is the probability that *municipality_i* receives the treatment, $Pr(PB = 0)$ is the probability that *municipality_i* does not receive the treatment, and ϵ is the designated caliper width of .01. With the newly restricted sample, I can estimate the average treatment effect on the treated (ATT) using the propensity score calculated above.¹⁰

$$ATT_{PSM} = \frac{1}{N_{PB}} \left[\sum_{i \in PB} Y_i^{PB} - \sum_{j \in C} \omega(i, j) Y_j^C \right] \quad (4.4)$$

where PB indicates the treatment group, C indicates the control group, i is a municipality in the treatment group, and j is a municipality in the control group. N_{PB} is the number of treated municipalities (i), and $\omega(i, j)$ is the region of common support.

Table 4.9 presents the results for the PSM tests on each of the panels. The results are not significant for either dependent variable in any of the panels tested, which supports the OLS results from Tables 4.5, 4.6, 4.7, and 4.8. The average treatment effect on the treated (ATT) is very small in all cases, and positive in all sewer panels except for 2C. The ATT is negative in all water panels except 1 and 3A. However, due to the significance level, we cannot reject the null hypothesis that PB has no effect on sanitation provision under any specification.

Differences-in-Differences

The next method that attempts to reduce the problem of selection bias is differences-in-differences (DID), which, like PSM, has been used extensively in the economics literature (Ashenfelter & Card 1985, Card & Krueger 1994), and more recently in the political science literature, particularly pertaining to program evaluation. This method allows me to control for unobservable characteristics that potentially differ between treatment and control groups. The basic model for calculating the DID estimator is as follows:¹¹

$$\hat{\delta} = (\bar{y}_{PB,1} - \bar{y}_{C,1}) - (\bar{y}_{PB,0} - \bar{y}_{C,0}) \quad (4.5)$$

¹⁰These equations use the notation from Khandker et al. (2010).

¹¹See Wooldridge (2002) and Angrist and Pischke (2008) for extensive explanation of DID methods.

Table 4.9: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB Adoption on Sanitation

Predicted Effect	Sewer			Water		
	<i>positive</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT				-0.082***		
Standard Error				(0.014)		
PANEL 2A						
ATT				-0.061***		
Standard Error				(0.016)		
PANEL 2B						
ATT				-0.112***		
Standard Error				(0.020)		
PANEL 2C						
ATT						
Standard Error						
PANEL 3A						
ATT				-0.066***		
Standard Error				(0.017)		
PANEL 3B						
ATT				-0.029***		
Standard Error				(0.007)		
Predicted Effect	Garbage			Electricity		
	<i>positive</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		-9.904***		-9.303***		
Standard Error		(1.738)		(1.247)		
PANEL 2A						
ATT		-6.163***		-5.199***	-2.393*	
Standard Error		(1.885)		(1.024)	(1.381)	
PANEL 2B						
ATT		-13.28***		-11.34***		
Standard Error		(2.602)		(1.972)		
PANEL 2C						
ATT		-2.229		-1.845*		
Standard Error		(2.142)		(1.005)		
PANEL 3A						
ATT		-8.104***		-8.222***		
Standard Error		(2.067)		(1.525)		
PANEL 3B						
ATT		-3.449***		-3.786***		
Standard Error		(1.058)		(0.840)		

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

where $\hat{\delta}$ is the DID estimator; \bar{y} is average sanitation level; PB indicates membership in the treatment group, C indicates membership in the control group, and the subscripts 1 and 0 indicate the post-treatment and baseline measures, respectively. The following regression allows me to estimate the ATT given the set of covariates X_i :

$$\Delta Y_i = \beta_0 + \beta_1(PB_i) + \beta_2(T_i) + \hat{\delta}(PB_i * T_i) + X_i + \epsilon_i \quad (4.6)$$

where ΔY_i is the ATT, PB_i is the same dummy variable as above, which controls for differences between treatment and control groups that are constant over time. It is coded as one if *municipality_i* is in the treatment group, and zero if in the control group. T_i is a time dummy that takes the value of one for post-treatment, and zero for baseline. And X_i is a vector of covariates, which are the same as those used in OLS and PSM, and differ slightly depending on the panel.

The DID results for each of the panels are presented in Table 4.9. The average treatment effect on the treated (ATT) is not significant for the sewer dependent variable in any of the panels. However, the ATT is significant at the 0.01 level for five of the panels with the water, garbage, and electricity dependent variables, and significant at the 0.1 level for Panel 2C of electricity. Interestingly, all significant results are in the negative direction, suggesting that PB may in fact have negative effects on sanitation provision.

Table 4.9 presents the results for Panel 1, which compares PB_{all} with Non-PB municipalities. It shows a DID ATT of -0.82 for water provision. This corresponds to a drop of 8.2 percent in water provision for PB municipalities relative to their Non-PB counterparts. Table 4.9 also presents the results for Panels 2A-C, and shows a significant and negative result for water provision in Panels 2A and 2B. Panel 2A, which tests early adopters versus non-PB and late adopters shows a decrease of 6.1 percent ($p < 0.01$). In Panel 2B, which tests early PB adopters and Non-PB municipalities, the ATT is -0.112 ($p < 0.01$), which corresponds to an 11.2 percent drop in water provision for PB_{early} , relative to non-adopters.

Table 4.9 shows similar results regarding water provision for late adopters. There is a significant and negative effect in Panels 3A and 3B, which compare PB_{late} with Non-PB municipalities, using 1991 and 2000 baseline measures, respectively.

The ATT for Panel 3A is -0.066 (6.6 percent drop), and the ATT for Panel 3B is -0.029 (2.9 percent drop), and both are significant at the 0.01 level.

Results for garbage and electricity are similar. There is a significant and negative effect in Panel 1 for both, which corresponds to a 9.9 percent drop in garbage collection and a 9.3 percent drop in electricity. Results for Panel 2A are slightly lower, but also significant and negative: 6.2 percent drop in garbage and 5.2 percent drop in electricity. However Panel 2B shows an even greater drop for both garbage and electricity: 13.3 and 11.3 percent, respectively. For Panel 3A, the drop for both garbage and electricity is in the 8 percent range, and for Panel 3B it is in the 3-4 percent range.

These results present a troubling finding for PB proponents, as PB may not only have a neutral effect (as suggested by other methods), but may actually lead to worse sanitation outcomes, particularly in water, garbage, and electricity.

PSM-DID

Since PSM and DID produced different results, I use a combination of DID and PSM methods (PSM-DID) to further evaluate my hypotheses. Of the methods presented, this should provide the least biased estimate of the effect of PB on sanitation provision (Heckman, Ichimura & Todd 1997, Heckman, Ichimura, Smith & Todd 1998). It uses the control group constructed in the PSM model, and combines it with the model from DID. This is a superior method because matching reduces bias associated with observable characteristics, while DID reduces bias associated with unobservable characteristics and time trends.¹²

The PSM-DID ATT can be estimated with the following equation:

$$ATT_{PSM}^{DD} = \frac{1}{N_{PB_1}} \left[\sum_{i \in PB_1} Y_{i,1}^{PB} - \sum_{j \in C_1} \omega(i,j) Y_{j,1}^C \right] - \frac{1}{N_{PB_0}} \left[\sum_{i \in PB_0} Y_{i,0}^{PB} - \sum_{j \in C_0} \omega(i,j) Y_{j,0}^C \right] \quad (4.7)$$

where the same notation is used as above in Equation 3.4, and the subscripts 1, and 0 represent the baseline and post-test time periods from the DID equation

¹²Heckman et al. (1997) pioneered this combined methodology in the field of program evaluation.

(Equation 4.5).

While the results from DID showed significant and negative effects for PB adoption on water provision, the PSM-DID results call that into question. Table 4.9 presents the ATT of PB adoption for each of the panels used in the other tests. Like the results for PSM, PSM-DID estimates are not significant for sewer, water, or garbage in any of the panels. In fact, the results are extremely close to the values estimated in PSM alone. The only case in which the PSM-DID results are significant is in Panel 2A where PB has a -2.39 percent effect on electricity for early adopters.

There are two interesting patterns that emerge from the DID results. The first is that the results are negative and significant for all variables except sewer. The second is that among the DID results for garbage, electricity, and water, the size of the effect differs across panels in a similar pattern. For each of these three variables, the largest effect is in Panel 2B, followed by Panel 1, then Panel 3A, 2A, and 3B. The fact that Panel 1 shows the second largest effect is fairly intuitive given that it is a combination of early and late adopters and that early adopters have the largest effect and late adopters have the third largest effect.

Panels 1, 2B, and 3A all have the longest interval between measurement periods: 1991-2010. Given the general trends in sanitation provision in Brazil, we should expect to see larger differences between raw baseline and outcome measures for those groups than for those that measure 1991-2000 or 2000-2010, however the differences-in-differences estimate should not necessarily be larger.

Panels 2B and 3A differ only in treatment group membership: baseline measures are in 1991, outcomes are measured in 2010, and the control group is non-PB municipalities. The treatment group in Panel 2B consists of early adopters and the treatment group in Panel 3A contains late adopters.

The fact that Panel 2B shows larger effects than Panel 3A suggests one of two things: (1) that there is something fundamentally different about early adopters that made their results distinct from late adopters, or (2) that there is a delayed or cumulative effect of PB, and that we should expect to see similar results if we measure late adopter outcomes in 2020.

Comparing Panels 2A and 2C provides some insight to these possibilities. The only difference between Panels 2A and 2C is membership in the control group. In both cases the treatment group is early PB adopters, the baseline measure is in 1991, and the outcome measure is in 2000 (prior to late adoption). The difference is that the control group in Panel 2A contains both non-PB adopters and late PB adopters, whereas the control group in Panel 2C only contains late PB adopters.

Using late adopters as a control group is a simple method of minimizing the endogeneity problem. While it is not perfect, it can reduce the potential bias of the non-PB control group. If municipalities that adopted PB are significantly different from non-adopters, we can minimize that problem by comparing early adopters with those that eventually do receive the treatment prior to the late treatment period (2000). This method is frequently used in medical trials.

Given that 2C is the only panel without consistently significant and negative results for garbage, electricity, and water, we can hypothesize that PB does not have an effect on early adopters as compared to late adopters (prior to their treatment). The difference between both baseline and outcome measures are different at a statistically significant level, but the change itself is not. This can be seen in the garbage provision graphs by panel (Figure 4.3). In Panel 2C, the lines for treatment and control group are parallel, in contrast with other panels, all of which show control groups with steeper slopes than treatment groups, corresponding to the negative treatment effect of PB in those panels. The steeper treatment group slope can also be seen in Panel 2C for electricity, which is the only variable for that panel that is significant (see Figure 4.4).

4.5 Discussion

The lack of significant findings under DID for sewer provision, in contrast with the statistically significant and negative findings for the other measures, tells an interesting story. Sewer provision was the only sanitation measure to increase faster in PB municipalities than in non-PB municipalities (see Figures 4.1 and

4.5).¹³ Unlike electricity provision, which started at 84 percent in non-PB municipalities and 94 percent in PB municipalities in 1991, baseline sewer provision was much lower for both groups: 36 percent in non-PB municipalities and 44 percent in PB municipalities. By 2010, electricity provision approached 100 percent for both groups: 98 percent in non-PB municipalities and 99 percent in PB municipalities. Given that provision obviously cannot increase past 100 percent, PB municipalities did not have the opportunity to increase at the same rate as their non-PB counterparts in electricity provision, which is reflected in the negative DID results in Table 4.9 (also see Figure 4.4). However, sewer provision only increased from 36 percent in 1991 to 45 in 2010 in non-PB municipalities, and 44 percent to 64 percent in PB municipalities, therefore leaving plenty of room for improvement in both groups. Of course this is not an inherent feature of sewer provision as opposed to electricity provision, but rather the proximity of post-test measures to the maximum possible value of 100. This phenomenon is discussed in more detail in the following chapter.

Another interesting finding is that including the spending covariates from the previous chapter produces significant results under OLS specifications. For Panel 1, share of health and sanitation spending in 1993 has a -15 percent effect on garbage provision, significant at the 5 percent confidence level. It has a positive effect of 12 percent on electricity provision, and a 48 percent effect on water provision, both of which are significant at the 1 percent confidence level. Percentage of spending on housing and urbanism produces a 48 percent increase in sewer access, and a 29 percent increase in water access, both significant at the 10 percent confidence level. The fact that these results persist whether or not PB is included in the regression suggests that spending, rather than PB itself, has a significant effect on public service provision.

Another possibility is that, at least in some cases, PB has not been in place long enough to have an observable effect on sanitation provision. Touchton and Wampler (2013) find some evidence of this persistence effect with infant mortality measures. However this seems less likely given that sanitation does not require the

¹³This only takes raw numbers into account, and does not include any of the controls used in my estimations.

same amount of time to take effect as something like infant mortality or literacy. Despite that fact, it is certainly something to consider and to analyze again in the future when longer-term data are available for late adopters.

The goal of this chapter was to empirically test the hypothesis that PB has a positive effect on sanitation provision. The results provide important empirical challenges to the unconditional recommendation of PB in particular, and participatory democracy in general for instrumental results. More specifically, the results suggest that we should be very cautious in prescribing PB as a viable solution for targeting the poor with sanitation provision. OLS, PSM, and PSM-DID methods produce largely neutral results, while DID showed negative effects of PB. But perhaps the most significant finding is that PB did not have a statistically significant positive effect on *any* of the dependent variables in any of the panels, regardless of method. The next step is to analyze the effect of PB on welfare measures. While there is little evidence that PB has a positive effect on sanitation provision, it is possible that it could affect welfare through other avenues. This is the subject of Chapter Five.

5 Participatory Budgeting and Welfare Outcomes

5.1 Introduction

“There cannot be development without education, health and sanitation. Growth with unequal income is only of interest to the rich. The people demand social development!” -Pernambuco senatorial candidate Jerônimo Ribeiro¹

In the previous chapters on instrumental effects of PB, I analyzed its effects on spending patterns and public service provision and found that PB seems to have a negative effect on education spending and a neutral effect on housing and urbanism spending, and while it has a positive effect on health and sanitation spending, it interestingly has a neutral or negative effect on sanitation provision. In this chapter, I analyze the effects of PB on a variety of welfare measures, including health, education, and poverty.

As mentioned in the previous chapter, citizens likely care much more about public service provision than they do about actual spending amounts. They presumably care at least as much, and probably much more, about their well-being. While clearly related, spending, service provision, and well-being are fundamentally different outcomes and must be treated as such (Ross 2006, 860). And as Heller notes in his analysis of access to water and sanitation services in Brazil, “the mere existence of coverage by wastewater collection does not necessarily lead to real improvement in health and environmental conditions.” In fact, he shows that

¹Campaign advertisement, Sept 8, 2010.

sewer connections that are built in areas without proper wastewater treatment facilities (which is a common occurrence in Brazil) can exacerbate existing health problems (Heller 2006, 16).

Additionally it is possible that participation in PB has an effect on well-being that is independent of spending and public service provision through the intrinsic benefits of participation discussed in Chapter Two: For example, it could generate social capital that leads citizens to seek out better educational or health care opportunities. It could provide them with information about pre-existing services that they were previously unaware of. In this case, changes in spending and public service provision might not matter at all. Since I have found mixed results regarding spending and public service provision, it would be a mistake to make any assumptions about PB's effects on welfare, and therefore it should be analyzed independently.

The set of dependent well-being variables in this chapter includes both aggregate indices and disaggregated measures of education, health, and income. Decentralization, direct democracy, and PB are theorized to have a positive effect in all three of these areas. However, I find that PB has a surprisingly negative or neutral effect on most measures of welfare.

I begin with a discussion of the literature on decentralization, direct democracy, and PB on welfare outcomes, and summarize the changing state of welfare in Brazil during the period of analysis. I then present the data and empirical strategy. I end with a discussion of the implications and limitations of my findings in this chapter before concluding in Chapter Six.

5.2 Literature Review

Proponents of both decentralization and direct democracy argue that they should have positive effects on various aspects of human welfare. However empirical literature suggests that the story is more complicated and that we cannot assume this positive effect. One way in which participatory democracy can influence human welfare is through changes in spending and provision of public services,

which were addressed in Chapters Three and Four (see Figure 1.1 on p. 17). Another possibility is through the intrinsic value of participation. As my results in Chapter Two demonstrate, intrinsic *motivations* for participation are prevalent in the case of PB. While this is an interesting area for future research I do not analyze the question of intrinsic *benefits* in depth, though I present a short discussion of the literature below since it provides some insight on what hypotheses to test, irrespective of the causal path.

Blair (2000) suggests a causal path in which participation and increased representation could have benefits that are independent of service provision: The representation of women and Dalits² in local politics in Karnataka, India is an important signal to children, particularly girls and those from lower castes, that important positions are not reserved for men from high castes. “For example, a Dalit girl who has an aunt or neighbor on the village council is more likely to have higher ambitions than one who perceives inevitable exclusion as her future” (Blair 2000, 25).

The inclusion of citizen input could also make citizens more likely to accept a group decision than if it were decided by the government alone (Morrell 1999). This could improve satisfaction with the decision without changing the instrumental outcome. Both Acioly et al. (2013) and the World Bank (2008) find evidence of this phenomenon in their surveys with PB participants in Porto Alegre and Santo André, and Frey, Kucher, and Stutzer find that citizens living in Swiss jurisdictions with more direct democracy reported higher subjective well-being than those that did not, and that these results are partially due to the fact that citizens “derive utility from the political process itself” (2001, 271).

While these examples certainly point to potential positive well-being effects of direct democracy, and perhaps PB, they are examples of intrinsic benefits of participation, and not necessarily the policy itself. Evidence on the effects of decentralization and democracy on instrumental benefits, by which I mean benefits that are the direct result of a decision made in PB, such as building a road or a school, and not a side benefit derived from the intrinsic value of participation, is

²Dalit or “scheduled caste” are the accepted terms for those who were formerly called “untouchables.”

mixed. Miller (2008) finds evidence in the United States that women's suffrage is associated with a decrease in infant mortality, which suggests that including previously excluded members of society in the political arena could result in tangible welfare changes, and perhaps especially the welfare of children. When comparing regime types at the national level, Navia and Zweifel (2003) find that democracies have a positive effect on infant mortality, independent of GDP and various other indicators as well. Wickrama and Mulford (1996) find similar evidence for this independent effect. This suggests that the type of regime or institutional configuration could also potentially affect other indicators of welfare. However in comparing regime type, Ross (2006) finds no evidence of a positive effect of democracy on infant mortality. And Bidani and Ravallion (1997) find that welfare is only improved by spending if it helps the poor. Which "implies that public spending will have no impact on infant and child mortality unless it delivers benefits to low-income households" (Ross 2006, 870).

Though there is slightly more literature in this area than on spending or public service delivery, little rigorous empirical work has been done on the effect of PB on welfare. The analyses are generally single case or small-n studies, which provide useful information about what questions to be empirically tested, however they do not systematically test the effects of PB (Abers 2000, Nylen 2003, Serageldin et al. 2003, Avritzer 2000, Wampler 2004, Wampler 2007, Teixeira 2003, Schneider & Goldfrank 2003, de Souza 2001, Wagle & Shah 2003, Koonings 2004, Wood & Murray 2007). The exceptions to this are Gonçalves (2014), Touchton and Wampler (2013) Boulding and Wampler (2010), and to some extent the 2008 World Bank report, though their methodology is not rigorous enough to draw broad conclusions. All of these studies make important contributions to the literature, which I build upon in the present analysis.

Using Human Development Indicator and inequality measures, Boulding and Wampler find that PB has not brought about the "dramatic improvements in social well-being anticipated by their founders or current advocates" (2010, 133). However they find marginal evidence that PB is correlated with a decrease in extreme poverty. On the other hand, both Touchton and Wampler (2013) and

Gonçalves (2014) find evidence that PB is associated with a decrease in infant mortality. And though not exactly a welfare measure, Touchton and Wampler also find that PB has a positive effect on the number of civil society organizations (CSOs) in their study of the 220 largest Brazilian municipalities, which is corroborated by Acioly et al.'s (2003) single case study of Santo André (Acioly et al. 2003, 43). This provides some evidence that PB does produce tangible changes in society.

The 2008 World Bank report finds that PB is associated with a reduction in poverty in those municipalities that adopted it prior to 1996, which they argue is of particular importance because “this poverty impact occurred despite a reduction in GDP per capita in these municipalities, suggesting that the OP can contribute to a redistributive impact over the long run” (Bank 2008*a*, 102). Touchton and Wampler (2013) do not include educational measures in their study because they argue that even if PB does have an effect, it would be lagged and is therefore unlikely to be perceptible at this time (Touchton & Wampler 2013, 10). Blair (2000) and Putnam (1995), among others, also point out that these processes could take time to show up in any measurable way. While this may be true, analyzing shorter term effects is important, especially given the worldwide promotion of PB. Potential adopters should be able to look to studies of PB to anticipate if, when, and what types of effects might occur. This is one of the reasons that I use the different panels to analyze the effect of PB during different time periods.

5.3 Hypotheses

The World Bank report discussed in Chapter Two conducted surveys of PB participants and non-participants in Porto Alegre, which provide useful guidance on what hypotheses to test based on citizen-level views of PB. For example, 85 percent of respondents either partially or totally agree that PB “improves the quality of life in the city” (Bank 2008*b*, 40), and when asked which group benefits most from PB, 45 percent said “poorer towns and villages,” 31 percent said “entire population,” and only 3 percent said “nobody benefits” (43). An impressive 84 percent of respondents partially or totally agree that PB “favors the poor people

in the neighborhood and communities” (39). Given these views, in addition to the theoretical literature, I test the following hypotheses regarding the effect of PB on well-being:

Hypothesis 1: Municipalities that adopted PB will have higher Human Development Index (HDI) measures than municipalities that did not adopt PB.

Hypothesis 2: Health: Municipalities that adopted PB will have:

H2a: higher health HDI scores...

H2b: lower infant mortality...

H2c: lower child mortality...

H2d: higher probability of living past 60...

H2e: lower rate of teen pregnancy...

... than municipalities that did not adopt PB.

Hypothesis 3: Education: Municipalities that adopted PB will have:

H3a: higher education HDI scores...

H3b: lower illiteracy rates among 11-14 year olds...

H3c: lower adult (over 15) illiteracy...

H3d: higher school attendance under 6 years of age...

... than municipalities that did not adopt PB.

Hypothesis 4: Inequality/Poverty: Municipalities that adopted PB will have:

H4a: higher economic HDI scores...

H4b: lower poverty rates...

H4c: lower inequality (Gini coefficient)³...

H4d: lower inequality (Theil coefficient)...

... than municipalities that did not adopt PB.

³where 1 is complete inequality and 0 is complete equality.

5.4 Data and Methods

5.4.1 Data

During the time period of this study, Brazilian municipalities experienced significant improvements in all three areas of human welfare: education, health, and inequality/poverty. In the 562 municipalities with more than 50 thousand residents, infant mortality decreased from an average of 39 per 1000 live births in 1991 to an average of 16 per 1000 in 2010. Adult illiteracy decreased from 21 percent in 1991 to 9.9 percent in 2010, and life expectancy increased from 73 years to 84.8 years. Meanwhile, poverty (those surviving on less than \$2 per day) decreased from an average of 36.1 percent in 1991 to 13.9 percent in 2010. The area that saw the least improvement was inequality: the average Gini coefficient of inequality increased from .54 to .56 between 1991 and 2000, though it decreased to .51 by 2010.

Given those impressive figures and the rise in number of municipalities with PB over this period (see Figure 1.4 on p. 24), it would be easy to believe that the change is at least partially due to its implementation. This is particularly true if we just look at the 2010 figures, which show that municipalities with PB have overwhelmingly higher welfare measures. And plenty of single case studies have come to that conclusion. Many citizens and various organizations are big proponents of PB and would like any evidence that it works. However, as with the measures in Chapter Four, the pre-treatment levels of welfare were also significantly different between PB and non-PB municipalities (see Figures 5.1 and 5.2). Difference in means tests highlight this fact (see Tables 5.1, 5.2, 5.3, and 5.4). In 1991, the difference between PB and non-PB municipalities is significant at the 1 percent confidence level for all welfare measures except for the two inequality measures: Gini coefficient ($p = 0.46$) and Theil coefficient ($p = 0.98$). And all of the measures show higher levels of welfare in PB municipalities.⁴ These significant differences persist in 2000 and 2010, with the exclusion of school attendance for

⁴The raw numbers are not necessarily higher because certain variables have an ideal score of 0 (illiteracy), while others have an ideal score of 100 (school attendance).

children under 6, which is not significantly different across groups by 2010.

Table 5.1: Baseline (1991) Difference in Means Test - Welfare

Variable	Non-PB	PB	Difference	p-value
HDI	0.45	0.52	-0.06	0.00
HDI - Health	0.67	0.70	-0.03	0.00
Infant Mortality	42.84	34.54	8.30	0.00
Child Mortality	53.36	42.34	11.02	0.00
Survive to 60	71.72	74.68	-2.97	0.00
Teen Pregnancy	6.67	6.00	0.67	0.00
HDI - Education	0.25	0.31	-0.07	0.00
Illiteracy (11-14)	16.23	8.30	7.93	0.00
Illiteracy (15+)	23.27	15.13	8.14	0.00
School Attendance	46.86	52.48	-5.61	0.00
HDI - Economic	0.58	0.64	-0.06	0.00
Poverty	41.98	28.01	13.98	0.00
Gini	0.54	0.54	0.00	0.46
Theil	0.52	0.52	-0.00	0.98

The main independent variables and research design for this chapter are the same as in Chapters Three and Four (see Figure 3.3 on p. 85). The sample includes the 551 municipalities with populations over 50 thousand residents, again excluding those that adopted prior to 1992. I use 6 panels that differ in membership in treatment and control group, and pre- and post-test measurement timing. Panel 1 compares municipalities that adopted PB at any time between 1992 and 2008 with non-PB municipalities. The baseline measurement is in 1991, and the post-test measurement is in 2010. Panels 2A-2C use early PB adopters as the treatment group. In Panel 2A, the measurements are taken in 1991 and 2000, and the control group consists of non-adopters and late adopters (since the post-test measure in 2000 precedes late adoption). Panel 2C is the same, except that the control group only contains late adopters, and not non-PB municipalities. Panel 2B uses non-PB municipalities as the control group, and measures welfare indicators in 1991 and 2010. Panels 3A and 3B only differ in baseline measurement timing. Both use late adoption as the treatment group and non-PB municipalities as the control group. Panel 3A measures the baseline in 1991, while 3B measures the baseline in 2000. Both measure the outcome in 2010.

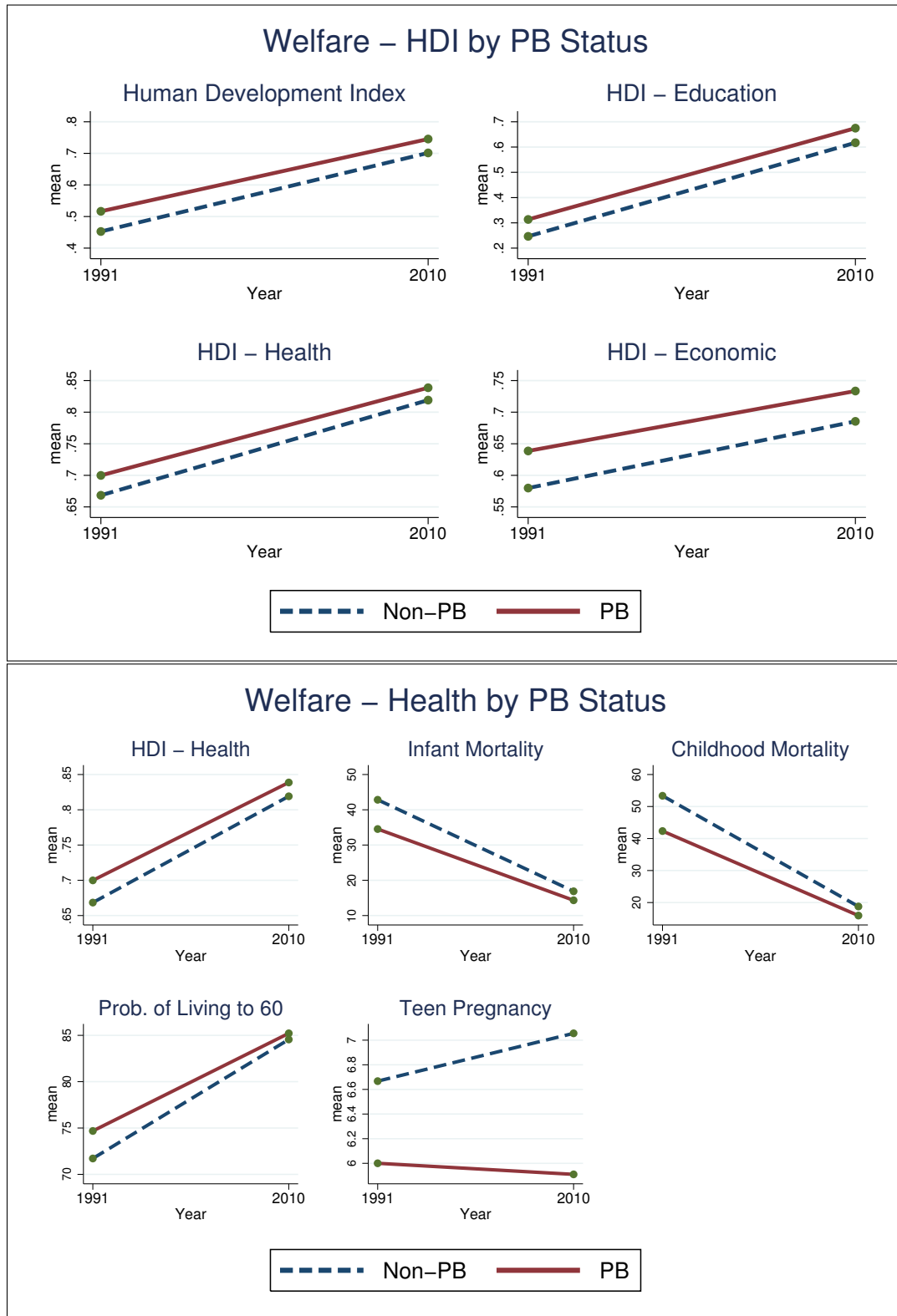


Figure 5.1: (Top) Welfare - HDI by PB Status, (Bottom): Welfare - Health by PB Status

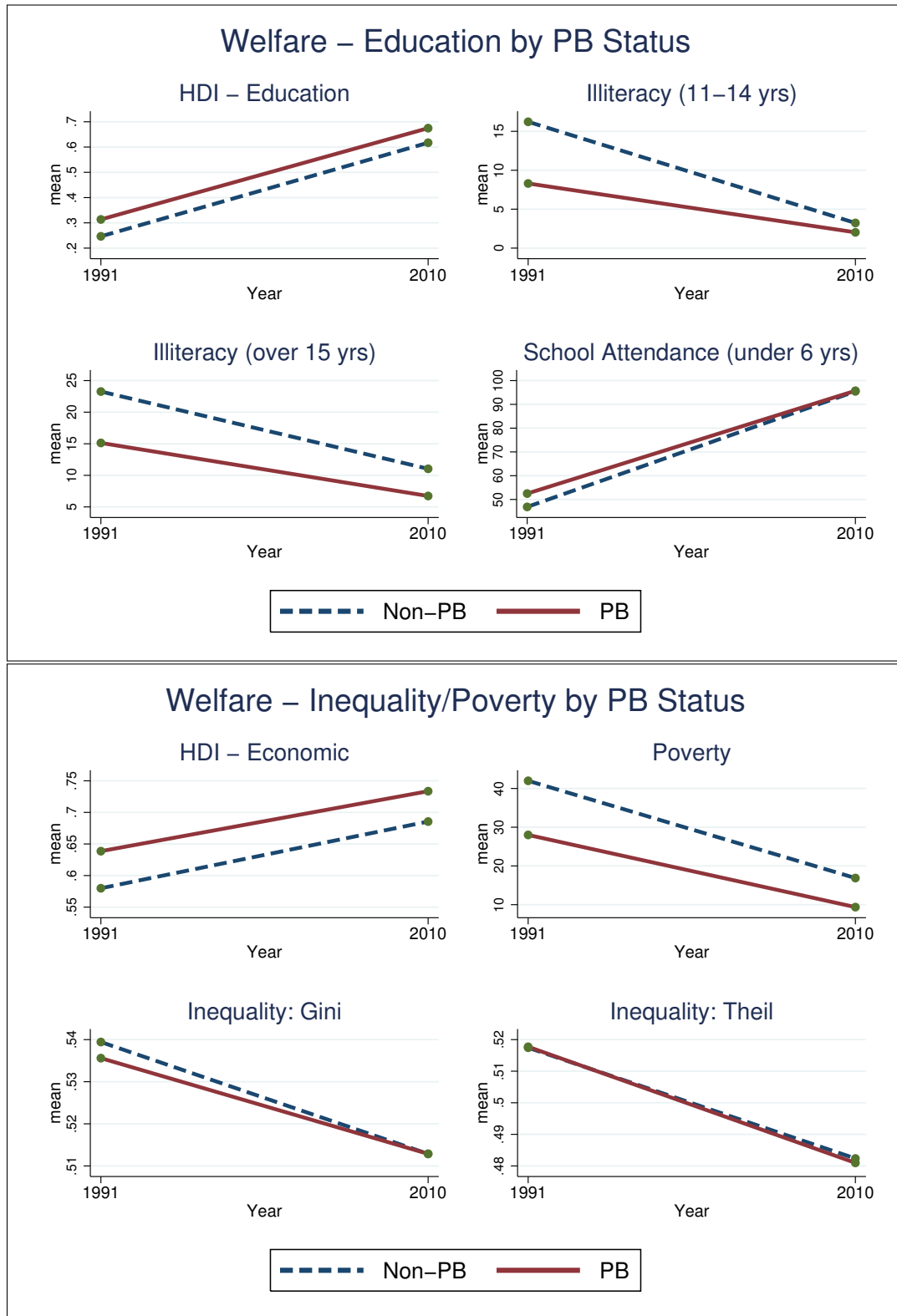


Figure 5.2: (Top) Welfare - Education by PB Status, (Bottom) Welfare - Inequality/Poverty by PB Status

Table 5.2: 2000 Difference in Means Test - Welfare

Variable	Non-PB	PB	Difference	p-value
HDI	0.58	0.64	-0.06	0.00
HDI - Health	0.75	0.77	-0.02	0.00
Infant Mortality	28.71	23.35	5.36	0.00
Child Mortality	34.19	27.51	6.68	0.00
Survive to 60	78.05	79.92	-1.87	0.00
Teen Pregnancy	9.01	7.82	1.20	0.00
HDI - Education	0.42	0.51	-0.08	0.00
Illiteracy (11-14)	6.40	3.38	3.03	0.00
Illiteracy (15+)	15.87	10.01	5.85	0.00
School Attendance	82.15	84.88	-2.72	0.00
HDI - Economic	0.63	0.69	-0.06	0.00
Poverty	30.89	19.93	10.96	0.00
Gini	0.56	0.55	0.00	0.52
Theil	0.55	0.55	-0.01	0.54

Table 5.3: 2000 Difference in Means Test - Welfare (Early vs. Non/Late PB)

Variable	Non-PB	PB	Difference	p-value
HDI	0.60	0.66	-0.07	0.00
HDI - Health	0.75	0.78	-0.03	0.00
Infant Mortality	27.31	22.06	5.25	0.00
Child Mortality	32.48	25.71	6.77	0.00
Survive to 60	78.48	80.70	-2.22	0.00
Teen Pregnancy	8.76	7.15	1.62	0.00
HDI - Education	0.44	0.53	-0.09	0.00
Illiteracy (11-14)	5.57	2.90	2.67	0.00
Illiteracy (15+)	14.29	8.99	5.30	0.00
School Attendance	82.76	86.19	-3.43	0.01
HDI - Economic	0.64	0.70	-0.06	0.00
Poverty	27.98	17.65	10.33	0.00
Gini	0.56	0.56	-0.00	0.95
Theil	0.55	0.56	-0.01	0.37

Table 5.4: Post-Test (2010) Difference in Means Test - Welfare

Variable	Non-PB	PB	Difference	p-value
HDI	0.70	0.75	-0.04	0.00
HDI - Health	0.82	0.84	-0.02	0.00
Infant Mortality	16.88	14.33	2.55	0.00
Child Mortality	18.76	15.93	2.83	0.00
Survive to 60	84.55	85.22	-0.66	0.00
Teen Pregnancy	7.06	5.91	1.15	0.00
HDI - Education	0.62	0.67	-0.06	0.00
Illiteracy (11-14)	3.23	2.03	1.21	0.00
Illiteracy (15+)	11.04	6.73	4.30	0.00
School Attendance	95.47	95.73	-0.25	0.43
HDI - Economic	0.69	0.73	-0.05	0.00
Poverty	16.87	9.36	7.51	0.00
Gini	0.51	0.51	-0.00	1.00
Theil	0.48	0.48	0.00	0.89

Dependent Variables

The dependent variables consist of a variety of measures of human welfare in order to get as complete a view as possible of the potential effects of PB. The operationalization of each variable is described below, and the summary statistics by PB status are presented in the difference in means tests in Tables 5.1, 5.2, 5.3, and 5.4.

The Municipal Human Development Index (*HDI*) is a composite measure of welfare and was obtained from the Atlas of Human Development in Brazil.⁵ It is comprised of indices of education, longevity (health), and income (*HDI - Education*, *HDI - Health*, *HDI - Economic*, respectively), which are also dependent variables. The educational index is the mean frequency of schooling for children (weighted as 2/3) and the mean frequency of schooling for adults (1/3). The longevity index is the value of life expectancy at birth, with a minimum value of 25 and a maximum value of 85. It is calculated as $[(\text{Observed Value}) - (\text{min value})] / [(\text{max value}) - (\text{min value})]$. The income index is calculated using the formula: $[\log(\text{Observed Value}) - \log(\text{min value})] / [\log(\text{max value}) - \log(\text{min value})]$, where R\$8.00 is the minimum and R\$4,033 is the maximum.

⁵(Atlas do Desenvolvimento Humano no Brasil: <http://atlasbrasil.org.br>)

The following variables are disaggregated measures that fall under the categories of the indices listed above:

Education: I use several measures of education because PB could potentially affect different levels of education and the effects could appear at different times. For example, if PB has a positive effect on preschool attendance, that increase could not be reflected in the adult literacy rate until the first cohort is at least 18, and even then it would likely not be perceptible because it would be mitigated by older adults who did not benefit from early education (Smith 2005). Therefore, it is valuable to use not only the aggregate Human Development Index for education, but also the following disaggregated measures:

I use the illiteracy rate of 11-14 year olds, measured as the ratio of those who cannot read a “simple ticket,” to the whole population in that age group multiplied by 100 (*Illiteracy 11-14*), as well as the same measure for those who are over 15 (*Illiteracy 15+*). The measure for younger children is the ratio of those under six who are attending school to the whole population in that age range, multiplied by 100 (*School Attendance 6*). School attendance is a better measure for younger children, as they are not considered literate at that age regardless of their schooling.

Health: As with education, it is important to use disaggregated measures of health in addition to the Human Development Index measure of longevity. Infant mortality is measured as the number of children who do not survive the first year of life per 1000 live births (*Infant Mortality*); and childhood mortality is the number of children who do not survive the first five years of life per 1000 live births (*Child Mortality*). Longevity is measured as the probability that an infant will survive to 60 years of age (*Survive to 60*), and teenage pregnancy is measured as the ratio of 15-17 year old women who have given birth to the total number of women in that age group multiplied by 100 (*Teen Pregnancy*).

Income/Inequality: As with education and health, disaggregated measures of income tell a more comprehensive story about the effect of PB on human welfare. Brazil has one of the highest inequality rates in Latin America (Smith 2005, 231-236), and not surprisingly, poverty is a very significant problem.

Poverty is measured as the proportion of individuals living in permanent households where the household monthly income is less than R\$140.00 (approximately \$60USD), and inequality is measured in two ways: The Gini coefficient (*Gini*), and the Theil-index (*Theil*).

Control Variables

In addition to the control variables from Chapter Three, including population, GDP per capita, PT mayor, PB*PT (interaction term for municipalities with PB and a PT mayor), regional dummy variables, and baseline measures of the welfare variables discussed above, I include a measure for Bolsa Familia and for spending areas.

Bolsa Familia from 2004-2008 (*meanperbolsa*). This is a federal conditional⁶ cash transfer program that aims to reduce poverty by giving poor families monthly cash transfers. The monthly income requirement for families is less than R\$120 per capita, or less than R\$60 for anyone.* The variable is measured as the average number of families receiving Bolsa Familia benefits between 2004 and 2008 divided by the average 2004-2008 municipal population.⁷⁸

It is important to include this as a control variable when analyzing welfare outcomes for three reasons: The first is that there is evidence that Bolsa Familia was responsible for a reduction in inequality, as well as a reduction in poverty (Soares, Ribas & Osório 2010, 179). If this program is not taken into account, that change could be incorrectly attributed to PB. The second is that one condition of the transfer is school attendance. This could obviously have a positive impact on literacy outcomes. And finally, another condition is “regular visits to health centers for children younger than seven and for pregnant and breast-feeding women”

⁶“Bolsa Familia conditionalities are related to education: 85 percent attendance rate for school-age children to fifteen years old and 80 percent attendance rate for those of the ages sixteen and seventeen, as well as regular visits to health centers for children younger than seven and for pregnant and breast-feeding women” (Soares, Ribas & Osório 2010, 174).

⁷Ideally I would control for total number of families rather than total population, but those data are incomplete. Assuming that family size is relatively similar across municipalities, total population is an adequate substitute.

⁸Data were obtained from IPEA, but were collected by the Ministério do Desenvolvimento Social e Combate Fome (MDS)

(Soares, Ribas & Osório 2010, 174). Just as educational requirements could likely impact literacy outcomes, this requirement could impact health outcomes.

I also include spending measures from Chapter Three in some cases. This is to analyze whether PB affects welfare outcomes independently of spending, which could provide insight as to whether or not the social capital claims of PB are valid.

5.4.2 Methods

OLS

As in Chapter Four, I begin with OLS as a baseline for comparison, which is estimated as follows:

$$Y = \beta_0 + \beta_1(PB) + \beta_2(WelfareBaseline) + \beta_3(PT) + \beta_4(PB * PT) + \beta_5(Spend) + \beta_6(Bolsa) + \beta_{7...n} + \epsilon \quad (5.1)$$

where Y is the posttest measure of the dependent variable, which represents $Welfare_{2000}$ (Panels 2A, 2C) or $Welfare_{2010}$ (Panels 1, 2B, 3A, 3B). β_0 is the constant, β_1 is the treatment dummy variable represented by PB_{all} (Panel 1), PB_{early} (Panels 2A, B, and C), or PB_{late} (Panels 3A and B). It is coded as one for the treatment group, and zero for the control group. β_2 is the baseline measure of welfare. As with Y , its value depends on the panel, and represents $Welfare_{1991}$ (1, 2A, 2B, 2C, 3A), or $Welfare_{2000}$ (3B). β_3 is the covariate for PT mayor, β_4 is the interaction dummy for PB adoption and PT mayor, β_5 is spending variables from Chapter Three, β_6 is the mean number of households receiving Bolsa Familia benefits, and $\beta_{7...n}$ represent a vector of covariates including log population in 1991, log GDP per capita in 2000, and regional dummy variables, and ϵ represents the error term.

Given the fact that PB and non-PB municipalities were not equivalent prior to PB adoption, I use additional methods to control for endogeneity. The justification for these methods can be found in the previous chapter, but the general logic is as follows: DID compares the post-test measures across groups, but also takes into account the pre-test differences. As demonstrated in the difference in means tests (see Tables 5.1, 5.2, 5.3, and 5.4), this is important because of the

significantly different pre-test measures. PSM allows me to compare the treatment group with an artificially constructed control group that matches the treatment group on a vector of covariates such that (ideally) the only thing that differs between the groups is whether or not they receive the treatment. This means that any observed effect can be attributed to the treatment and not the preexisting differences between the two groups seen in the difference in means tests and the corresponding graphs (see Figures 5.1 and 5.2).

Propensity Score Matching

The propensity score $p(X_i)$ is the same as in Chapter Four, and is defined as $p(X_i) = Pr(PB_i = 1 | X_i)$, where X_i is a vector of pre-treatment covariates on which treated and untreated cases are matched. I use a standard probit model to estimate the propensity score for each municipality:

$$Pr(PB_i = 1) = \beta_0 + X_i + \epsilon \quad (5.2)$$

Again, I restrict my matched sample using a caliper width of one percentage point, and those municipalities outside of this range are dropped:

$$\|Pr(PB = 1) - Pr(PB = 0)\| < \epsilon \quad (5.3)$$

where $Pr(PB = 1)$ is the probability that *municipality_i* receives the treatment, $Pr(PB = 0)$ is the probability that *municipality_i* does not receive the treatment, and ϵ is the designated caliper width of .01. Using the restricted sample and the propensity score calculated above, I estimate the average treatment effect on the treated (ATT):

$$ATT_{PSM} = \frac{1}{N_{PB}} \left[\sum_{i \in PB} Y_i^{PB} - \sum_{j \in C} \omega(i, j) Y_j^C \right] \quad (5.4)$$

where PB indicates the treatment group, C indicates the control group, i is a municipality in the treatment group, and j is a municipality in the control group. N_{PB} is the number of treated municipalities (i), and $\omega(i, j)$ is the region of common support.

Differences-in-Differences

The basic model for calculating the DID estimator, presented in Chapter Four, is as follows:

$$\hat{\delta} = (\bar{y}_{PB,1} - \bar{y}_{C,1}) - (\bar{y}_{PB,0} - \bar{y}_{C,0}) \quad (5.5)$$

where $\hat{\delta}$ is the DID estimator; \bar{y} is average welfare level; PB indicates membership in the treatment group, C indicates membership in the control group, and the subscripts 1 and 0 indicate the post-treatment and baseline measures, respectively. The ATT is calculated with the following:

$$\Delta Y_i = \beta_0 + \beta_1(PB_i) + \beta_2(T_i) + \hat{\delta}(PB_i * T_i) + X_i + \epsilon_i \quad (5.6)$$

where ΔY_i is the ATT, PB_i is the same dummy variable as above. It is coded as one if *municipality_i* is in the treatment group, and zero if in the control group. T_i is a time dummy that takes the value of one for post-treatment, and zero for baseline. And X_i is a vector of covariates.

PSM-DID

The PSM-DID ATT is estimated as follows:

$$ATT_{PSM}^{DD} = \frac{1}{N_{PB_1}} \left[\sum_{i \in PB_1} Y_{i,1}^{PB} - \sum_{j \in C_1} \omega(i, j) Y_{j,1}^C \right] - \frac{1}{N_{PB_0}} \left[\sum_{i \in PB_0} Y_{i,0}^{PB} - \sum_{j \in C_0} \omega(i, j) Y_{j,0}^C \right] \quad (5.7)$$

where the same notation is used as above in the PSM ATT equation, and the subscripts 1, and 0 represent the baseline and post-test time periods from the DID equation (Equation 5.5).

5.5 Empirical Results

The OLS results for the effect of PB on welfare outcomes are almost universally insignificant (see Tables 5.5 through 5.18).

The covariates of significance are population, per capita GDP, and baseline measures for each of the welfare outcomes. Robustness tests also showed that regional covariates are significant in the predicted directions. The only case in

Table 5.5: Human Development Index

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.002 (0.002)					
HDI_91	0.608*** (0.017)	0.894*** (0.017)	0.619*** (0.021)	0.827*** (0.025)	0.620*** (0.019)	
LogPop91	-0.003* (0.001)	-0.005*** (0.001)	-0.002 (0.002)	-0.005*** (0.002)	-0.004* (0.002)	0.001 (0.001)
LogGDPpc00	0.007*** (0.002)	0.006*** (0.002)	0.008*** (0.002)	0.004 (0.002)	0.007*** (0.002)	0.002 (0.001)
PT	0.002 (0.004)					
PB*PT	0.002 (0.005)					
North	-0.016*** (0.004)	-0.031*** (0.004)	-0.018*** (0.005)	-0.028*** (0.006)	-0.015*** (0.004)	0.007* (0.003)
Northeast	-0.008** (0.003)	-0.025*** (0.003)	-0.007* (0.004)	-0.029*** (0.004)	-0.007* (0.003)	0.011*** (0.002)
South	-0.009*** (0.002)	-0.010*** (0.002)	-0.009** (0.003)	-0.010** (0.003)	-0.010*** (0.003)	-0.002 (0.002)
Central-West	0.009* (0.004)	-0.010** (0.004)	0.008 (0.005)	-0.005 (0.006)	0.009* (0.004)	0.016*** (0.003)
PB early		-0.001 (0.003)	-0.000 (0.004)	-0.001 (0.003)		
PT early		0.012 (0.009)	0.015 (0.009)	0.003 (0.004)		
PB*PT early		-0.008 (0.010)	-0.013 (0.010)			
PB late					0.001 (0.003)	0.001 (0.002)
PT late					-0.001 (0.005)	-0.001 (0.003)
PB*PT late					0.007 (0.006)	0.002 (0.004)
HDI_00						0.698*** (0.013)
Constant	0.406*** (0.018)	0.201*** (0.017)	0.382*** (0.024)	0.252*** (0.023)	0.409*** (0.021)	0.265*** (0.015)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.6: Human Development Index - Health

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.003 (0.002)					
HDI.health91	0.317*** (0.021)	0.688*** (0.025)	0.314*** (0.025)	0.653*** (0.041)	0.325*** (0.023)	
LogPop91	0.001 (0.001)	-0.002 (0.001)	0.003* (0.001)	-0.003* (0.002)	0.001 (0.001)	0.002 (0.001)
LogGDPpc00	0.006*** (0.001)	0.006** (0.002)	0.006** (0.002)	0.005 (0.003)	0.006*** (0.001)	0.004** (0.001)
PT	-0.003 (0.004)					
PB*PT	0.002 (0.005)					
North	-0.024*** (0.003)	-0.008* (0.004)	-0.026*** (0.004)	-0.013 (0.007)	-0.023*** (0.003)	-0.023*** (0.003)
Northeast	-0.018*** (0.003)	-0.005 (0.004)	-0.020*** (0.004)	-0.007 (0.006)	-0.018*** (0.003)	-0.020*** (0.003)
South	0.002 (0.002)	0.009** (0.003)	0.003 (0.003)	0.009* (0.004)	0.001 (0.002)	-0.002 (0.002)
Central-West	-0.003 (0.003)	0.009* (0.004)	-0.004 (0.004)	0.005 (0.007)	-0.003 (0.004)	-0.007* (0.003)
PB early		-0.000 (0.003)	0.002 (0.003)	0.000 (0.003)		
PT early		-0.001 (0.009)	0.005 (0.008)	0.006 (0.005)		
PB*PT early		0.006 (0.011)	-0.007 (0.009)			
PB late					0.002 (0.002)	0.003 (0.002)
PT late					-0.006 (0.004)	-0.003 (0.004)
PB*PT late					0.006 (0.005)	0.003 (0.005)
HDI.health00						0.410*** (0.023)
Constant	0.552*** (0.019)	0.262*** (0.022)	0.541*** (0.024)	0.310*** (0.034)	0.548*** (0.022)	0.467*** (0.022)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.7: Infant Mortality

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	-0.396 (0.275)					
InfantMort91	0.187*** (0.012)	0.423*** (0.023)	0.191*** (0.015)	0.282*** (0.036)	0.192*** (0.013)	
LogPop91	-0.160 (0.150)	-0.373 (0.257)	-0.250 (0.202)	-0.061 (0.297)	-0.197 (0.181)	-0.137 (0.180)
LogGDPpc00	-1.061*** (0.193)	-1.296*** (0.358)	-0.985*** (0.244)	-1.371** (0.474)	-1.116*** (0.211)	-1.058*** (0.211)
PT	0.282 (0.538)					
PB*PT	-0.107 (0.631)					
North	0.991* (0.455)	2.217** (0.841)	1.169* (0.566)	3.408** (1.276)	0.937 (0.481)	1.436** (0.465)
Northeast	0.165 (0.492)	5.349*** (0.914)	0.292 (0.608)	8.291*** (1.291)	0.104 (0.542)	0.816 (0.501)
South	-1.370*** (0.295)	-2.036*** (0.546)	-1.567*** (0.370)	-2.273** (0.685)	-1.214*** (0.331)	-0.882** (0.333)
Central-West	0.797 (0.477)	3.203*** (0.881)	0.591 (0.583)	3.274* (1.315)	0.782 (0.510)	-0.297 (0.509)
PB early		-0.226 (0.718)	-0.268 (0.444)	-0.365 (0.653)		
PT early		0.104 (1.979)	-0.921 (1.137)	0.147 (0.888)		
PB*PT early		0.212 (2.245)	1.148 (1.290)			
PB late					-0.288 (0.319)	-0.242 (0.318)
PT late					0.595 (0.590)	0.389 (0.588)
PB*PT late					-0.574 (0.726)	-0.488 (0.723)
InfantMort00						0.287*** (0.019)
Constant	19.423*** (2.395)	23.555*** (4.299)	19.661*** (3.189)	24.684*** (5.275)	20.078*** (2.777)	18.642*** (2.799)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.8: Childhood Mortality

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	-0.485 (0.322)					
ChildMort91	0.166*** (0.011)	0.420*** (0.019)	0.167*** (0.013)	0.318*** (0.032)	0.169*** (0.012)	
LogPop91	-0.345 (0.176)	-0.318 (0.272)	-0.541* (0.230)	-0.015 (0.334)	-0.319 (0.211)	-0.263 (0.202)
LogGDPpc00	-1.278*** (0.228)	-1.384*** (0.380)	-1.119*** (0.278)	-1.109* (0.536)	-1.345*** (0.247)	-1.147*** (0.238)
PT	0.311 (0.631)					
PB*PT	-0.263 (0.740)					
North	-0.443 (0.538)	0.968 (0.895)	-0.157 (0.647)	2.380 (1.448)	-0.484 (0.566)	0.056 (0.518)
Northeast	-2.352*** (0.619)	7.120*** (1.034)	-1.870* (0.737)	10.083*** (1.567)	-2.344*** (0.678)	-2.756*** (0.629)
South	-1.382*** (0.347)	-1.555** (0.578)	-1.572*** (0.422)	-1.833* (0.773)	-1.217** (0.387)	-0.963** (0.371)
Central-West	1.566** (0.560)	4.495*** (0.931)	1.313* (0.664)	4.372** (1.478)	1.599** (0.596)	0.039 (0.569)
PB early		-0.671 (0.757)	-0.330 (0.505)	-0.865 (0.733)		
PT early		-0.195 (2.089)	-0.934 (1.293)	0.233 (0.998)		
PB*PT early		0.636 (2.369)	1.175 (1.467)			
PB late					-0.392 (0.372)	-0.330 (0.355)
PT late					0.640 (0.688)	0.677 (0.657)
PB*PT late					-0.785 (0.847)	-0.994 (0.808)
ChildMort00						0.305*** (0.019)
Constant	25.269*** (2.824)	24.308*** (4.568)	25.929*** (3.641)	22.000*** (5.979)	25.303*** (3.259)	21.772*** (3.155)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.9: Probability of Surviving to Age 60

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.211 (0.183)					
Survive62_91	0.298*** (0.018)	0.577*** (0.025)	0.294*** (0.022)	0.504*** (0.040)	0.302*** (0.020)	
LogPop91	0.157 (0.099)	0.089 (0.123)	0.277* (0.131)	0.083 (0.160)	0.135 (0.119)	0.070 (0.115)
LogGDPpc00	0.604*** (0.127)	0.493** (0.170)	0.582*** (0.158)	0.235 (0.255)	0.634*** (0.138)	0.539*** (0.134)
PT	-0.265 (0.357)					
PB*PT	0.290 (0.419)					
North	4.679*** (0.288)	1.537*** (0.383)	4.426*** (0.350)	0.894 (0.666)	4.719*** (0.302)	3.733*** (0.278)
Northeast	5.101*** (0.262)	0.877* (0.350)	4.830*** (0.322)	0.338 (0.528)	5.091*** (0.288)	4.109*** (0.241)
South	0.552** (0.198)	0.591* (0.264)	0.571* (0.244)	0.818* (0.376)	0.539* (0.220)	0.500* (0.212)
Central-West	0.347 (0.320)	1.003* (0.426)	0.252 (0.384)	0.994 (0.718)	0.396 (0.341)	-0.259 (0.324)
PB early		0.207 (0.343)	0.235 (0.290)	0.321 (0.352)		
PT early		-0.197 (0.947)	0.657 (0.742)	0.187 (0.479)		
PB*PT early		0.360 (1.074)	-0.759 (0.841)			
PB late					0.117 (0.210)	0.128 (0.203)
PT late					-0.547 (0.389)	-0.293 (0.375)
PB*PT late					0.657 (0.479)	0.621 (0.461)
Survive60_00						0.396*** (0.023)
Constant	54.212*** (1.793)	30.969*** (2.319)	53.437*** (2.258)	38.828*** (3.594)	53.917*** (2.084)	46.645*** (2.233)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.10: Teen Pregnancy

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	-0.233 (0.241)					
TeenPreg91	0.298*** (0.039)	0.414*** (0.044)	0.319*** (0.045)	0.404*** (0.069)	0.276*** (0.042)	
LogPop91	-0.079 (0.131)	-0.101 (0.137)	-0.195 (0.168)	-0.142 (0.167)	0.066 (0.159)	0.069 (0.152)
LogGDPpc00	-0.552*** (0.162)	-0.419* (0.182)	-0.785*** (0.193)	-0.170 (0.258)	-0.593*** (0.176)	-0.445** (0.169)
PT	-0.194 (0.472)					
PB*PT	0.199 (0.553)					
North	3.806*** (0.399)	3.896*** (0.446)	4.089*** (0.469)	3.102*** (0.707)	3.979*** (0.424)	3.216*** (0.423)
Northeast	1.909*** (0.277)	1.636*** (0.311)	1.476*** (0.331)	2.130*** (0.438)	1.976*** (0.305)	1.567*** (0.299)
South	0.185 (0.259)	0.211 (0.291)	0.155 (0.308)	0.321 (0.385)	0.214 (0.290)	0.267 (0.276)
Central-West	1.144** (0.430)	1.496** (0.481)	1.273* (0.498)	0.941 (0.750)	1.309** (0.461)	1.142** (0.439)
PB early		-0.129 (0.381)	-0.011 (0.368)	-0.234 (0.362)		
PT early		0.256 (1.053)	1.151 (0.947)	-0.399 (0.495)		
PB*PT early		-0.768 (1.194)	-0.976 (1.074)			
PB late					-0.287 (0.279)	-0.268 (0.268)
PT late					-0.335 (0.517)	-0.411 (0.496)
PB*PT late					0.188 (0.636)	0.279 (0.610)
TeenPreg00						0.343*** (0.037)
Constant	9.378*** (1.954)	9.631*** (2.103)	12.556*** (2.473)	7.964** (2.765)	8.207*** (2.288)	5.952** (2.222)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.11: Human Development Index - Education

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.004 (0.005)					
HDI_edu91	0.686*** (0.030)	1.008*** (0.027)	0.721*** (0.037)	0.892*** (0.038)	0.715*** (0.033)	
LogPop91	-0.007* (0.003)	-0.007** (0.002)	-0.005 (0.004)	-0.007* (0.003)	-0.006 (0.003)	-0.001 (0.002)
LogGDPpc00	0.013*** (0.003)	0.012*** (0.003)	0.014*** (0.004)	0.010* (0.004)	0.012*** (0.004)	0.002 (0.002)
PT	0.008 (0.009)					
PB*PT	0.002 (0.011)					
North	-0.038*** (0.007)	-0.066*** (0.007)	-0.043*** (0.009)	-0.054*** (0.011)	-0.034*** (0.008)	0.019*** (0.006)
Northeast	-0.024*** (0.006)	-0.060*** (0.005)	-0.023** (0.007)	-0.064*** (0.007)	-0.020** (0.006)	0.026*** (0.004)
South	-0.033*** (0.005)	-0.029*** (0.004)	-0.033*** (0.006)	-0.030*** (0.006)	-0.033*** (0.006)	-0.011** (0.004)
Central-West	0.002 (0.008)	-0.035*** (0.007)	-0.000 (0.010)	-0.023 (0.012)	0.004 (0.009)	0.030*** (0.006)
PB early		-0.003 (0.006)	-0.002 (0.007)	-0.001 (0.006)		
PT early		0.017 (0.016)	0.026 (0.019)	0.008 (0.008)		
PB*PT early		-0.006 (0.018)	-0.016 (0.021)			
PB late					0.002 (0.005)	-0.000 (0.004)
PT late					0.004 (0.010)	-0.000 (0.006)
PB*PT late					0.009 (0.012)	0.003 (0.008)
HDI_edu00						0.747*** (0.018)
Constant	0.431*** (0.039)	0.191*** (0.034)	0.402*** (0.051)	0.253*** (0.045)	0.423*** (0.045)	0.288*** (0.029)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.12: Illiteracy - 11-14

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.049 (0.128)					
Illit11_16_91	0.175*** (0.007)	0.431*** (0.012)	0.179*** (0.009)	0.382*** (0.015)	0.179*** (0.008)	
LogPop91	0.164* (0.070)	0.278* (0.109)	0.203* (0.099)	0.171* (0.079)	0.158 (0.087)	0.073 (0.062)
LogGDPpc00	-0.060 (0.090)	-0.162 (0.150)	-0.137 (0.118)	-0.019 (0.129)	-0.047 (0.102)	0.038 (0.073)
PT	-0.178 (0.249)					
PB*PT	0.143 (0.292)					
North	0.527* (0.217)	-0.389 (0.358)	0.579* (0.287)	-0.206 (0.328)	0.487* (0.235)	0.676*** (0.162)
Northeast	-0.614** (0.208)	-1.303*** (0.344)	-0.875** (0.272)	0.018 (0.327)	-0.704** (0.233)	-0.111 (0.145)
South	0.037 (0.136)	0.160 (0.225)	0.061 (0.177)	0.042 (0.179)	0.049 (0.156)	-0.031 (0.113)
Central-West	-0.281 (0.220)	-0.768* (0.363)	-0.330 (0.279)	-0.403 (0.346)	-0.271 (0.242)	0.050 (0.175)
PB early		0.088 (0.296)	0.102 (0.213)	-0.046 (0.170)		
PT early		-0.259 (0.818)	0.371 (0.546)	-0.058 (0.233)		
PB*PT early		0.104 (0.928)	-0.476 (0.620)			
PB late					0.065 (0.152)	-0.020 (0.109)
PT late					-0.240 (0.281)	0.005 (0.203)
PB*PT late					0.185 (0.345)	0.059 (0.249)
Illit11_14_00						0.411*** (0.011)
Constant	-0.770 (1.106)	-1.817 (1.794)	-0.565 (1.533)	-1.620 (1.408)	-0.836 (1.322)	-0.574 (0.932)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.13: Illiteracy - 15+

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.172 (0.152)					
Illit15+_91	0.563*** (0.009)	0.752*** (0.008)	0.562*** (0.011)	0.733*** (0.012)	0.566*** (0.010)	
LogPop91	0.245** (0.086)	0.279*** (0.076)	0.250* (0.118)	0.163* (0.075)	0.245* (0.106)	0.066 (0.064)
LogGDPpc00	-0.491*** (0.111)	-0.350*** (0.103)	-0.600*** (0.141)	-0.195 (0.114)	-0.498*** (0.125)	-0.197* (0.077)
PT	0.332 (0.295)					
PB*PT	-0.425 (0.347)					
North	-1.373*** (0.239)	-0.981*** (0.222)	-1.539*** (0.305)	-0.376 (0.279)	-1.417*** (0.260)	-0.673*** (0.156)
Northeast	-0.623** (0.236)	-0.664** (0.219)	-0.630* (0.305)	-0.289 (0.242)	-0.652* (0.268)	-0.175 (0.157)
South	0.470** (0.163)	0.318* (0.151)	0.524* (0.206)	0.165 (0.158)	0.543** (0.188)	0.258* (0.114)
Central-West	-0.661* (0.262)	-0.501* (0.242)	-0.686* (0.323)	-0.193 (0.304)	-0.683* (0.288)	-0.293 (0.176)
PB early		0.048 (0.197)	0.149 (0.246)	0.002 (0.149)		
PT early		0.488 (0.545)	0.683 (0.631)	0.037 (0.204)		
PB*PT early		-0.450 (0.618)	-0.629 (0.715)			
PB late					0.224 (0.181)	0.072 (0.110)
PT late					0.389 (0.334)	0.349 (0.204)
PB*PT late					-0.620 (0.410)	-0.385 (0.251)
Illit15+_00						0.754*** (0.008)
Constant	-0.379 (1.460)	-1.501 (1.337)	0.527 (1.961)	-1.228 (1.395)	-0.385 (1.715)	0.077 (1.032)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.14: Frequency of School Attendance - Children under 6

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.160 (0.352)					
School8_91	0.082*** (0.011)	0.493*** (0.028)	0.082*** (0.013)	0.460*** (0.039)	0.076*** (0.012)	
LogPop91	-0.831*** (0.193)	-1.172** (0.437)	-0.926*** (0.249)	-1.600** (0.511)	-0.760*** (0.220)	-0.539** (0.195)
LogGDPpc00	0.453 (0.245)	0.783 (0.597)	0.560 (0.298)	0.775 (0.787)	0.412 (0.252)	0.280 (0.220)
PT	1.352* (0.688)					
PB*PT	-1.692* (0.807)					
North	-4.993*** (0.543)	-8.425*** (1.321)	-5.134*** (0.644)	-6.004** (2.045)	-4.999*** (0.543)	-3.422*** (0.504)
Northeast	-0.200 (0.400)	-1.300 (0.978)	-0.058 (0.480)	-2.275 (1.324)	-0.000 (0.416)	0.219 (0.371)
South	-2.284*** (0.382)	-1.760 (0.932)	-1.960*** (0.460)	-3.588** (1.164)	-1.964*** (0.406)	-1.682*** (0.359)
Central-West	-3.423*** (0.611)	-3.860** (1.485)	-3.523*** (0.715)	-0.166 (2.222)	-3.338*** (0.618)	-2.624*** (0.554)
PB early		-0.354 (1.212)	0.502 (0.545)	0.085 (1.106)		
PT early		-0.082 (3.346)	1.860 (1.398)	-0.609 (1.508)		
PB*PT early		-0.274 (3.786)	-3.355* (1.581)			
PB late					-0.080 (0.386)	-0.092 (0.343)
PT late					1.131 (0.714)	0.951 (0.635)
PB*PT late					-0.825 (0.879)	-0.839 (0.782)
School6_00						0.171*** (0.013)
Constant	98.246*** (2.808)	67.550*** (6.574)	98.367*** (3.608)	74.645*** (8.018)	97.951*** (3.137)	85.796*** (2.914)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.15: Human Development Index - Economic

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	0.002 (0.003)					
HDI_econ91	0.718*** (0.021)	0.868*** (0.019)	0.703*** (0.025)	0.859*** (0.027)	0.724*** (0.023)	
LogPop91	0.002 (0.001)	0.000 (0.001)	0.003 (0.002)	0.001 (0.002)	0.000 (0.002)	0.001 (0.001)
LogGDPpc00	0.009*** (0.002)	0.005** (0.002)	0.012*** (0.002)	0.001 (0.002)	0.007*** (0.002)	0.003* (0.001)
PT	0.003 (0.005)					
PB*PT	-0.004 (0.006)					
North	-0.013** (0.004)	-0.019*** (0.004)	-0.015** (0.005)	-0.020*** (0.006)	-0.014*** (0.004)	0.001 (0.003)
Northeast	0.006 (0.003)	-0.007* (0.003)	0.006 (0.004)	-0.007 (0.004)	0.004 (0.004)	0.010*** (0.003)
South	0.016*** (0.003)	0.005* (0.002)	0.015*** (0.003)	0.009** (0.003)	0.014*** (0.003)	0.011*** (0.002)
Central-West	0.015*** (0.004)	-0.000 (0.004)	0.014** (0.005)	0.008 (0.006)	0.013** (0.005)	0.014*** (0.003)
PB early		0.004 (0.003)	0.002 (0.004)	0.004 (0.003)		
PT early		-0.003 (0.009)	-0.003 (0.010)	-0.009* (0.004)		
PB*PT early		-0.006 (0.010)	-0.006 (0.011)			
PB late					0.002 (0.003)	0.001 (0.002)
PT late					0.003 (0.005)	0.004 (0.004)
PB*PT late					-0.001 (0.007)	-0.003 (0.005)
HDI_econ00						0.824*** (0.016)
Constant	0.172*** (0.020)	0.086*** (0.017)	0.135*** (0.026)	0.117*** (0.022)	0.198*** (0.023)	0.116*** (0.016)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.16: Poverty

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	-0.865 (0.607)					
Poverty91	0.410*** (0.021)	0.648*** (0.019)	0.425*** (0.026)	0.569*** (0.025)	0.433*** (0.023)	
LogPop91	0.270 (0.339)	0.172 (0.300)	0.058 (0.452)	-0.135 (0.331)	0.472 (0.415)	0.169 (0.257)
LogGDPpc00	-2.187*** (0.459)	-1.910*** (0.432)	-2.879*** (0.568)	-0.717 (0.539)	-2.154*** (0.517)	-0.286 (0.327)
PT	-1.107 (1.184)					
PB*PT	1.645 (1.390)					
North	8.113*** (1.002)	8.834*** (0.943)	8.744*** (1.252)	8.754*** (1.333)	7.790*** (1.081)	0.721 (0.728)
Northeast	1.954* (0.913)	6.206*** (0.862)	1.473 (1.148)	7.709*** (1.077)	1.480 (1.022)	-4.027*** (0.662)
South	-1.372* (0.644)	-0.871 (0.607)	-1.388 (0.798)	-0.981 (0.725)	-1.200 (0.737)	-0.720 (0.462)
Central-West	-2.580* (1.050)	-0.340 (0.986)	-2.331 (1.266)	0.450 (1.416)	-2.733* (1.144)	-2.560*** (0.717)
PB early		-0.036 (0.803)	0.373 (0.966)	-0.101 (0.695)		
PT early		-1.572 (2.218)	-3.079 (2.474)	0.818 (0.950)		
PB*PT early		2.725 (2.516)	3.758 (2.807)			
PB late					-0.987 (0.718)	-0.307 (0.451)
PT late					-0.405 (1.325)	-0.499 (0.831)
PB*PT late					0.951 (1.631)	0.763 (1.022)
Poverty00						0.720*** (0.018)
Constant	13.783* (5.839)	14.715** (5.417)	21.311** (7.615)	9.770 (6.181)	10.426 (6.918)	-3.328 (4.206)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.17: Inequality - Gini

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	-0.001 (0.004)					
Gini91	0.518*** (0.027)	0.616*** (0.025)	0.506*** (0.033)	0.640*** (0.031)	0.519*** (0.029)	
LogPop91	0.014*** (0.002)	0.004* (0.002)	0.013*** (0.003)	0.003 (0.002)	0.013*** (0.003)	0.011*** (0.002)
LogGDPpc00	-0.003 (0.003)	-0.004 (0.002)	-0.005 (0.003)	-0.002 (0.003)	-0.005 (0.003)	-0.002 (0.003)
PT	-0.004 (0.008)					
PB*PT	0.004 (0.009)					
North	0.057*** (0.006)	0.029*** (0.006)	0.064*** (0.007)	0.025** (0.008)	0.055*** (0.006)	0.039*** (0.006)
Northeast	0.025*** (0.005)	0.019*** (0.004)	0.027*** (0.006)	0.021*** (0.005)	0.022*** (0.005)	0.012** (0.005)
South	-0.013** (0.004)	-0.005 (0.004)	-0.011* (0.005)	-0.001 (0.004)	-0.013** (0.005)	-0.009* (0.004)
Central-West	0.005 (0.007)	0.010 (0.006)	0.009 (0.008)	0.024** (0.009)	0.002 (0.007)	-0.002 (0.006)
PB early		0.007 (0.005)	0.008 (0.006)	0.006 (0.004)		
PT early		-0.035* (0.014)	-0.042** (0.016)	-0.005 (0.006)		
PB*PT early		0.029 (0.016)	0.032 (0.019)			
PB late					-0.003 (0.005)	-0.003 (0.004)
PT late					0.004 (0.009)	-0.001 (0.007)
PB*PT late					0.001 (0.011)	0.002 (0.009)
Gini00						0.715*** (0.030)
Constant	0.094** (0.034)	0.210*** (0.030)	0.124** (0.044)	0.183*** (0.034)	0.121** (0.040)	0.001 (0.036)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.18: Inequality - Theil

	Panel 1	Panel 2A	Panel 2B	Panel 2C	Panel 3A	Panel 3B
PB	-0.002 (0.008)					
Theil91	0.467*** (0.027)	0.620*** (0.026)	0.451*** (0.033)	0.632*** (0.034)	0.461*** (0.029)	
LogPop91	0.028*** (0.005)	0.014*** (0.004)	0.026*** (0.006)	0.016*** (0.004)	0.025*** (0.005)	0.019*** (0.005)
LogGDPpc00	-0.007 (0.006)	-0.003 (0.005)	-0.011 (0.007)	-0.002 (0.007)	-0.012 (0.006)	-0.009 (0.005)
PT	0.004 (0.016)					
PB*PT	-0.006 (0.019)					
North	0.118*** (0.013)	0.052*** (0.012)	0.127*** (0.015)	0.049** (0.018)	0.114*** (0.013)	0.087*** (0.011)
Northeast	0.071*** (0.010)	0.036*** (0.009)	0.075*** (0.012)	0.042*** (0.012)	0.066*** (0.010)	0.050*** (0.009)
South	-0.024** (0.009)	-0.008 (0.009)	-0.021 (0.011)	0.000 (0.010)	-0.025* (0.010)	-0.019* (0.008)
Central-West	0.011 (0.014)	0.025 (0.014)	0.017 (0.018)	0.060** (0.019)	0.002 (0.015)	-0.008 (0.013)
PB early		0.015 (0.011)	0.014 (0.013)	0.015 (0.010)		
PT early		-0.075* (0.031)	-0.075* (0.034)	-0.015 (0.013)		
PB*PT early		0.059 (0.035)	0.053 (0.039)			
PB late					-0.006 (0.010)	-0.006 (0.008)
PT late					0.019 (0.018)	0.012 (0.015)
PB*PT late					-0.011 (0.022)	-0.013 (0.019)
Theil00						0.642*** (0.029)
Constant	-0.035 (0.066)	0.083 (0.062)	0.024 (0.088)	0.038 (0.070)	0.034 (0.078)	-0.024 (0.067)
Observations	538	538	398	214	464	464

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

which PB seems to play any role using OLS is in an interaction term. The PB*PT interaction term for school attendance under the age of 6 has a coefficient of -3.9 percent in Panel 2B and is significant at the 5 percent level. This goes against Hypothesis 3d, which predicts that PB (and PB*PT by extension) should have a positive effect on school attendance.

PT mayor is significant for three variables: for the composite HDI-Education variable, PT mayor is significant and slightly positive (0.018) in Panel 2C at the 10 percent confidence level, which corresponds to an increase in educational measures. PT also shows some evidence of reducing inequality. In Panel 2A the PT coefficient is -0.06 for the Theil index and -0.03 for the Gini index, both of which are significant at the 5 percent confidence level. PT is significant at the 10 percent level for the Gini index in Panel 2B, with a coefficient of -0.3.

The other covariate of interest is Bolsa Familia. The coefficient for mean number of households receiving Bolsa Familia is significant for a variety of welfare measures in Panels 3A and 3B, and the results are robust whether or not PB and PB*PT interaction terms are included. As discussed in the “Data” section, this covariate is only used for late adopter panels because the program did not start until 2004.

Given that the Bolsa Familia transfer is conditional upon school attendance, number of Bolsa Familia recipients is correlated with an increase in school attendance for children under the age of 6.⁹ It is also correlated with a decrease in illiteracy among 11-14 year olds. It is correlated with a higher level of illiteracy in those who are 15 and older, however this also makes sense given that the majority of that age group did receive those benefits while they were school-aged. It is also associated with an increase in life expectancy past 60 and a decrease in poverty level in Panel 3B. Interestingly, Bolsa Familia is correlated with an increase in poverty in Panel 3A, which measures the baseline in 1991, as opposed to 2000. Bolsa Familia is also correlated with an increase in infant and child mortality, and an increase in both measures of inequality, as well as a decrease in the composite HDI measures. This can partially be explained by the fact that the mean number

⁹As discussed in the “Data” section, this conditionality requirement does not apply to those who earn below a certain amount.

of Bolsa Familia recipients is higher in municipalities that have higher poverty rates. However, all regressions control for income per capita, so that is not the only factor in play.

The results for the effect of PB on welfare measures are generally consistent across the different variables (see Tables 5.19, 5.21, 5.20, and 5.22). For the most part, DID results are significant in the opposite direction of the prediction, while results using PSM and PSM-DID are generally insignificant. PSM-DID results are significant in the predicted negative direction for infant mortality in Panel 1 (a decrease of 3.6 per 1000 live births), and a 2.3 percent decrease in illiteracy between the ages of 11 and 14 in Panel 2C.

Human Development Index: The results for the general Human Development Index (*idhm*) show a statistically significant negative effect of PB using DID in Panels 1, 2B, 3A, and 3B, ranging from -0.015 to -0.03, however none of the results are significant in either direction using PSM or PSM-DID.

Health: Human Development Index - Health also shows a significant and negative effect using DID in Panels 1, 2A-B, and 3A, ranging from -0.01 to -0.02, though there is a positive effect of 0.01 under PSM specifications in Panel 2B at a 1 percent confidence level. DID results for infant mortality are significant and positive (indicating an increase in mortality) for all panels except 2C, ranging from 2.5 to 7.5 per 1000 live births. Childhood mortality follows a similar pattern of significance, with a minimum of 3.3 in Panel 3B to a maximum of 10.6 per 1000 live births in Panel 2B. Probability of living past 60 years of age is similarly negative and significant in all panels except for 2C, however the PSM results show a positive effect of 0.8 percent at the 1 percent confidence level. Under PSM-DiD specifications, PB has the expected negative effect on infant mortality in Panel 1, though not in the others.

The final welfare measure in the category of health is teen pregnancy (ages 15-17). These results are interesting because they show a distinct pattern from other variables. The graphs of summary statistics for welfare by PB status (see Figures 5.1 and 5.2) and the difference in means tests (Tables 5.1, 5.2, 5.3, and 5.4) show that not only did the teen pregnancy rate start at statistically signifi-

Table 5.19: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Composites

Predicted Effect	HDI			HDI - Education		
	<i>positive</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		-0.021***				-0.010**
Standard Error		(0.003)				(0.004)
PANEL 2A						
ATT						0.013**
Standard Error						(0.006)
PANEL 2B						
ATT		-0.028***				-0.016***
Standard Error		(0.004)				(0.006)
PANEL 2C						
ATT						
Standard Error						
PANEL 3A						
ATT		-0.017***				
Standard Error		(0.004)				
PANEL 3B						
ATT		-0.015***				-0.022***
Standard Error		(0.003)				(0.005)
Predicted Effect	HDI - Health			HDI - Economic		
	<i>positive</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		-0.012***				-0.011***
Standard Error		(0.003)				(0.003)
PANEL 2A						
ATT		-0.007**				
Standard Error		(0.003)				
PANEL 2B						
ATT		-0.017***				-0.014***
Standard Error		(0.005)				(0.004)
PANEL 2C						
ATT						
Standard Error						
PANEL 3A						
ATT		-0.009**				-0.009***
Standard Error		(0.004)				(0.003)
PANEL 3B						
ATT						-0.006***
Standard Error						(0.002)

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.20: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Health

Predicted Effect	Infant Mortality			Child Mortality		
		<i>negative</i>		<i>negative</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		5.795***	-3.625*	8.311***		
Standard Error		(1.285)	(2.075)	(1.883)		
PANEL 2A						
ATT		3.188***		4.270***		
Standard Error		(1.159)		(1.551)		
PANEL 2B						
ATT		7.511***		10.56***		
Standard Error		(1.958)		(2.859)		
PANEL 2C						
ATT						
Standard Error						
PANEL 3A						
ATT		4.888***		7.117***		
Standard Error		(1.522)		(2.227)		
PANEL 3B						
ATT		2.504***		3.318***		
Standard Error		(0.813)		(1.158)		
Predicted Effect	Survive to 60			Teen Pregnancy		
		<i>positive</i>		<i>negative</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		-2.318***		-0.453*		
Standard Error		(0.548)		(0.243)		
PANEL 2A						
ATT		-1.054**				
Standard Error		(0.429)				
PANEL 2B						
ATT	0.763*	-3.087***				
Standard Error	(0.451)	(0.818)				
PANEL 2C						
ATT						
Standard Error						
PANEL 3A						
ATT		-1.912***		-0.526*		
Standard Error		(0.642)		(0.289)		
PANEL 3B						
ATT		-0.950**				
Standard Error		(0.416)				

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

cant different levels in 1991 (6 percent for PB adopters and 6.7 percent for non-PB adopters), but the measures moved in opposite directions in PB and non-PB municipalities. In 2010 PB municipalities had a teen pregnancy rate of 5.9 percent while non-PB municipalities had a rate of 7.1 percent. This is the only case in all three chapters where the dependent variable moved in opposite directions in PB vs. non-PB municipalities.

There are several reasons why this might be the case. The measure is for teen pregnancy among 15-17 year olds. It is likely that early teen pregnancy would play an important role here. If early teen pregnancy goes down but late teen pregnancy goes up, it could be considered a welfare improvement. Unfortunately, the data on teen pregnancy from the ages of 10 to 14 are unreliable and incomplete for the years in question, so that hypothesis cannot be tested.

Schultz presents an empirical observation that development “involves first a decline in age-specific mortality rates, and then is generally followed by a decline in fertility rates” (Schultz 2010, 4786). Therefore, it is possible that the decline in teen pregnancy in PB municipalities is a result of the fact that PB municipalities tended to experience an earlier decline in infant mortality rates, and that we can expect to see a similar decline in non-PB municipalities in the future.

Education: The education HDI is not statistically significant under PSM or PSM-DID specifications. DID results contradict the expected effect in Panels 1, 2B, and 3B, while there is a significant and positive effect of PB in Panel 2A. DID results for illiteracy among 11-15 year olds and for those over 15 are similar and have a statistically significant effect for all panels except for 2C, and range from 1.4 to 7.8 percent. Under these specifications, PB is correlated with an increase in illiteracy. These results hold for PSM specifications for 11-14 illiteracy in Panels 2C and 3A as well, however the PSM-DID results for 11-14 illiteracy in Panel 2C show the expected negative result of PB.

The effect of PB on frequency of school attendance for those under the age of 6 is negative and statistically significant for all Panels under DID specifications, ranging from -2.1 to -7.5 percent. It is not significant under PSM or PSM-DID specifications.

Table 5.21: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Education

Predicted Effect	Illiteracy (11-14)			Illiteracy (15+)		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		6.846***		3.965***		
Standard Error		(0.988)		(0.502)		
PANEL 2A						
ATT		4.337***		2.150***		
Standard Error		(1.055)		(0.448)		
PANEL 2B						
ATT		7.847***		4.678***		
Standard Error		(1.560)		(0.782)		
PANEL 2C						
ATT	1.322*		-2.253*			
Standard Error	(0.732)		(1.229)			
PANEL 3A						
ATT	0.489*	6.317***		3.588***		
Standard Error	(0.277)	(1.187)		(0.600)		
PANEL 3B						
ATT		1.717***		1.419***		
Standard Error		(0.366)		(0.258)		
Predicted Effect	School Attendance Under 6			HDI - Education		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		-5.346***		-0.010**		
Standard Error		(1.046)		(0.004)		
PANEL 2A						
ATT		-3.497***		0.013**		
Standard Error		(1.213)		(0.006)		
PANEL 2B						
ATT		-7.511***		-0.016***		
Standard Error		(1.561)		(0.006)		
PANEL 2C						
ATT		-2.874*				
Standard Error		(1.575)				
PANEL 3A						
ATT		-4.202***				
Standard Error		(1.208)				
PANEL 3B						
ATT		-2.078***		-0.022***		
Standard Error		(0.890)		(0.005)		

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5.22: DID, PSM, and PSM-DID Results (Significant): Average Treatment Effect of PB adoption on Welfare - Inequality/Poverty

Predicted Effect	Poverty			Inequality - Gini		
		<i>negative</i>			<i>negative</i>	
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT		6.583***				
Standard Error		(1.045)				
PANEL 2A						
ATT		3.312***				
Standard Error		(0.869)				
PANEL 2B						
ATT		8.452***				
Standard Error		(1.523)				
PANEL 2C						
ATT						
Standard Error						
PANEL 3A						
ATT		5.595***				
Standard Error		(1.206)				
PANEL 3B						
ATT		3.095***				
Standard Error		(0.738)				
Predicted Effect	Inequality - Theil			HDI - Economic		
		<i>negative</i>			<i>positive</i>	
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT				-0.011***		
Standard Error				(0.003)		
PANEL 2A						
ATT						
Standard Error						
PANEL 2B						
ATT				-0.014***		
Standard Error				(0.004)		
PANEL 2C						
ATT						
Standard Error						
PANEL 3A						
ATT	-0.033*			-0.009***		
Standard Error	(0.018)			(0.003)		
PANEL 3B						
ATT				-0.006***		
Standard Error				(0.002)		

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Inequality/Poverty: The effect of PB on the four inequality and poverty measures is not statistically significant under PSM or PSM-DID specifications for any panel or variable except for a slight decrease in the Theil index in Panel 3A with PSM. As with other welfare measures, the DID results are generally statistically significant in the opposite direction of predictions for the composite HDI measure for income as well as poverty. The effect of PB on the composite HDI measure for income is negative in Panels 1, 2B, 3A, 3B. The effect on poverty is positive for all panels except for 2C under DID, and ranges from 3.1 to 8.4.

While there is some variation in the results of the effect of PB on welfare outcomes, there is very little evidence that PB has any of the hypothesized positive effects on any of the measures of health, education, or inequality/poverty. And in fact, there is evidence that under DID specifications in particular, that there is a negative effect. In the next section I will discuss the implications and limitations of these results.

5.6 Discussion

While the increased spending on health and sanitation findings in Chapter Three gave some hope that PB might produce positive welfare outcomes, my findings here do not support that. Rather, they show overwhelmingly neutral or negative effects of PB. In this context, it appears that Ross's cross-national findings hold: "it is not obvious that these infusions of money actually reach the poor; nor is it obvious that they produce better social *outcomes*, such as longer, healthier, or more productive lives" (Ross 2006, 860).

The DID results suggest that PB has the opposite of the predicted effect on most welfare outcomes. While this may seem counterintuitive, it actually makes a lot of sense. As discussed previously (and demonstrated in the baseline difference in means test in Tables 5.1, 5.2, 5.3, and 5.4, and Figures 5.1 and 5.2), PB municipalities had statistically significant better welfare scores than their non-PB counterparts. While the DID method corrects for part of this problem, it does not take into account the fact that there are minimum and maximum levels of welfare

measures that are impossible to surpass under any conditions. For example, the DID results show that PB *increases* illiteracy in PB municipalities relative to their non-PB counterparts by almost 7 percent. However this is somewhat misleading out of context. Figure 5.2 shows that the mean illiteracy rate for 11-14 year olds in PB municipalities was 8.3 percent in 1991. By 2010 it had declined to 2 percent. Non-PB municipalities decreased from 16.2 percent to 3.2 percent. Clearly there was a significantly larger decrease in the non-PB group, but we cannot assume that PB actually made those municipalities worse off. If illiteracy decreased at the same rate in PB as non-PB municipalities, the 2010 illiteracy score for PB municipalities would be -4.7 (the illiteracy rate in non-PB decreased by 13), which is obviously impossible. Phrased differently, as you approach zero, it becomes progressively more difficult to decrease illiteracy. Therefore, a better interpretation of these results is that PB failed to have a positive effect on welfare.

Similarly, building a well-equipped hospital where there previously were none could significantly reduce high infant mortality in a particular location. However, putting that same hospital in an area where a similar hospital already exists would likely have a negligible effect on infant mortality (Bank 2008a, 94). The same logic is true with life expectancy at the country level. Life expectancy increased by a quarter of a year every year in high income countries between 1940 and 1990, while it increased by a half year every year in low income countries (Oeppen & Vaupel 2002, Schultz 2010).¹⁰ If we assume this pattern extends to smaller units of analysis, the same would be true for high and low income municipalities, which is correlated with the presence of PB. My methodology controls for these factors, however it supports the idea that we should be cautious in concluding that PB has a negative effect on health measures as they approach minimum and maximum values.

The pattern of results across panels using DID is similar to the previous chapter. Specifically, the effect is greatest in Panel 2B, followed by Panel 1, then Panels 3A, 2A, and 3B. Results were generally not significant for Panel 2C, which uses late PB municipalities as a control group for early PB municipalities, with

¹⁰For an extensive discussion of the state of the literature of the causal relationship between development, health policies, and health outcomes, see Schultz (2010).

the outcome measured in 2000, which is prior to late PB adoption.

In addition to the level of significance, average treatment effects in Panel 2C were also much smaller than in other panels. For example, using DID specifications for Panel 2A (comparing early PB with the control group containing both late PB and non-PB municipalities), the average treatment effect on the treated for illiteracy is 4.3, which is significant at the 1 percent confidence level. The ATT in Panel 2C, which measures the outcome in 2000 and compares early PB only with late PB municipalities, is 0.049, and it not significant at any level ($p = 0.96$). This trend can also be seen with the poverty measure. For all panels except for 2C, the ATT ranges from 3.1 (3B) to 8.4 (2B) and is significant at the 1 percent confidence level. The ATT for Panel 2C is 0.56 ($p = 0.64$). The fact that the result is smaller AND less significant when using late PB adopters as opposed to non-PB municipalities as a control group provides even more evidence that PB does not have an effect on most welfare outcomes.

As in the previous chapter, I run OLS regressions for Panel 1 with the spending covariates from Chapter Three in order to analyze whether spending itself, rather than PB, might be driving some of the welfare results. Again, spending produces significant results for many of the variables.

In Panel 1, health spending improves the general and education composite measures by 0.16 and 0.39, respectively at a 1 percent confidence level, however it reduces the income composite measure slightly (-0.07) at a 10 percent confidence level. Education spending is correlated with a 9.2 percent increase in teen pregnancy, at a 5 percent confidence level.

Interestingly, health and sanitation, and housing and urbanism spending are correlated with improvement in educational measures, however education spending has no effect. Health and sanitation spending is correlated with an 8 percent decrease in illiteracy among 11-14 year olds ($p < 0.1$), and a 4.1 decrease in adult illiteracy ($p < 0.01$). It is also correlated with a 27.9 percent increase in school attendance for those under 6 ($p < 0.1$). Spending on housing and urbanism produces a 3.6 percent decrease in adult illiteracy ($p < 0.01$), and an 18.9 percent increase in school attendance ($p < 0.1$).

For Panel 3B, which compares late adopters and non-PB municipalities, education and housing spending are correlated with a 2.7 and 2.9 percent increase in teen pregnancy at the 10 percent confidence level. Education spending is associated with an increase in infant and childhood mortality (4.4 percent and 4.8 percent, respectively), both of which are significant at the 5 percent confidence level. It is possible that since a rise in education spending by definition requires a reduction in another area of spending, that health outcomes are suffering.

As a whole, these results suggest that spending, rather than PB, plays a significant role in welfare outcomes. The implication is that changing spending allocation is more important than PB itself. It could be argued that PB is one way to achieve these preferable spending allocations, however it does not appear that it has worked this way thus far. In the final chapter, I summarize my arguments and findings, and discuss the limitations and avenues for future research.

6 Conclusion

This dissertation analyzes the instrumental and intrinsic motivations for participation in Participatory Budgeting in Brazil before evaluating the instrumental benefits in the areas of spending, sanitation, and welfare. I find that while wealthier and more educated citizens tend to participate less frequently than predicted, they tend to do so for intrinsic motivations, whereas poorer and less educated citizens tend to participate in higher numbers and favor instrumental motivations.

In regards to instrumental benefits, I find that PB has a positive effect on health and sanitation spending and a negative effect on education and culture spending. Despite these positive health and sanitation spending effects, I find generally neutral or negative effects on sanitation provision as well as a variety of welfare measures. In this chapter, I briefly summarize my arguments and findings, and discuss the implications and limitations of the dissertation as a whole.

6.1 The Argument and Findings

“No one knows better than you what needs to be done in your region. Therefore, the city is implementing Participatory Budgeting. Starting now, you define what projects and services are priorities in Betim. A way to ensure democracy, transparency in use of public money and the construction of a better city for everyone” (“Oramento Participativo está de volta” 2009, 1).

Direct democracy is undergoing a surge of popularity across the globe. Proponents argue that it will solve a host of problems from inequality and lack of public services, to corruption and lack of government accountability, and participants are

generally happy with it. In the Brazilian context, Participatory Budgeting was implemented to achieve two primary goals: Improve public services, especially for poor citizens, and increase opportunities for citizen involvement in municipal decision-making. I argue that these represent instrumental and intrinsic goals, respectively, and that the trade-off between these goals can be understood through the lens of voting literature.

6.1.1 Intrinsic versus Instrumental Motivations

Theorists of voting behavior suggest that people choose to vote, which corresponds to “participate” for the purposes of this dissertation, for two primary reasons: instrumental—they seek specific material outcomes (Aldrich 1993, Palfrey & Rosenthal 1985, Arneson 2003, Downs 1957), or intrinsic—they derive value from the process itself (Pateman 1970, Frey, Benz & Stutzer 2004, Frey & Stutzer 2005).

Despite the existence of staunch advocates of each motivation, most believe that citizens are motivated for a combination of these factors (Estlund 1997, Bratton & Mattes 2001, Elster 1997, Blais 2000, Frey & Stutzer 2005, Frey, Benz & Stutzer 2004, Geys 2006, Mackie 2003, Mackie 2011, Brennan & Lomasky 1997, Putnam 1995). I follow in this tradition and hypothesize that the primary motivation will differ across demographic groups, just as support for democracy itself differs across those groups.

In Chapter Two, I use survey data from Porto Alegre to first analyze the demographic makeup of PB participants, and find that participation trends generally do not follow traditional theoretical predictions. Specifically, there is a much higher rate of participation among economically and educationally disadvantaged citizens. This is particularly interesting for two reasons. The first is that the positive relationship between participation and education is one of the most robust in political science (Lijphart 1997, Lipset 1960, Verba, Schlozman & Brady 1995, Wolfinger & Rosenstone 1980, Rosenstone & Hansen 1993, Powell Jr 1986, Dalton 1996, Seligson et al. 1995, Carreras & Castañeda-Angarita 2014, Aviel 1981). The second is that one of the stated goals of PB is to include previously excluded citizens, indicating some level of success in that area.

I then use survey data to test the primary motivations for participation in PB in Porto Alegre. Both theoretical and empirical literature suggest a positive relationship between socioeconomic status and support for democracy (Lipset 1959, Almond & Verba 1963, Norris 1999, Limongi et al. 1996, Przeworski, Stokes & Manin 1999, Fung 2003, Inglehart & Welzel 2003). I argue that this general support for democracy is positively correlated with the intrinsic value an individual places on the process of democracy. This is because those who unconditionally favor democracy – even when the outcomes are worse – must derive some benefit from the process itself, or they would be conditional supporters of democracy. This positive correlation between support for democracy and the intrinsic value of democracy is supported by data from Latinobarómetro surveys in Brazil. Given this correlation and the positive correlation between support for democracy and socioeconomic status, I test the relationship between socioeconomic status and intrinsic motivations for participation in PB specifically. I do this using survey data on PB participants in Porto Alegre collected by Fedozzi et al. (2013), and I find that despite their lower levels of participation, highly educated and wealthier individuals were more likely to participate in PB for intrinsic, or procedural, motivations, whereas those of lower socioeconomic status were more likely to participate for primarily instrumental motivations. It is therefore important to determine whether PB is providing these citizens with the instrumental benefits they seek.

6.1.2 Instrumental Benefits

While Chapter Two demonstrates that many participate in PB for intrinsic motivations, the intended beneficiaries are lower income individuals, who tend to favor instrumental benefits. The instrumental goals of PB, range from reductions in poverty, clientelism, and corruption, to increases in public services and government accountability. Given this wide range of goals, it is essential to test specific outcomes in order to analyze the effect of PB, and to perhaps gain insight about participatory democracy more generally. In order to do this, I analyze the existence of instrumental benefits from PB by comparing PB and non-PB municipalities over time, using objective data on spending, public service provision, and

welfare in Brazilian municipalities with over 50 thousand residents in Chapters Three, Four, and Five.

PB can be viewed as an extension of decentralization, in that certain federal and state power was transferred to local governments, some of which was further devolved to citizens. It is also a type of direct democracy, in that decisions are made by citizens rather than elected officials.

Early theories of decentralization predicted that it would result in a host of improved outcomes (Hayek 1945, Musgrave 1959, Oates 1972, Weingast 1995). The logic is that lower levels of government are more aware of local citizen needs, which will therefore increase allocative efficiency. It was also thought to improve efficiency due to increased competition between geographic units (Tiebout 1956), in addition to reducing corruption (Shleifer & Vishny 1993). However the assumptions, and therefore conclusions, of early theories have been challenged with more recent empirical literature, especially from the developing world. While local governments may know more about local preferences than state or federal governments, they do not necessarily have the incentives to provide the corresponding goods. Thus the ability to provide superior goods may result from decentralization, however the actual provision cannot be assumed (Hoffman & Gibson 2007, Bardhan & Mookherjee 2006*b*, Seabright 1996). Similarly, decentralization theoretically reduces corruption as it is easier for citizens to observe this behavior at the local level. However, this can only actually reduce corruption if citizens have the ability to sanction politicians either by voting them out of office, or by “voting with their feet” and moving to a new district. This assumes either non-corrupt alternative candidates or a level of voter mobility and organization that is not necessarily present anywhere, and less so in the developing world (Bardhan & Mookherjee 2006*a*, Wang, Zheng & Zhao 2012).

In many ways, theories of direct democracy, and PB specifically make similar predictions to those of decentralization, which makes sense given that direct democracy itself can be viewed as an extension of decentralization from governments to citizens. Just as local governments are theorized to know local preferences better than state or federal governments, citizens themselves are theorized to know

their own preferences even better than local governments. In fact, many municipal PB campaigns use slogans such as, “No one knows better than you what needs to be done in your region” (“Oramento Participativo está de volta” 2009, 1) that, probably very effectively, sell this argument. On the other hand, those who argue against direct democracy cite the problems of lack of citizen expertise, lack of long-term policy, and inefficiency (Budge 2008, 596).

The justifications for PB adoption rest on these theoretical benefits of decentralization and direct democracy. In order to evaluate the validity of these justifications, I test the theory that PB municipalities will experience improvements in spending,¹ public service provision, and welfare relative to non-PB municipalities. Despite the stated instrumental goals of PB, I find little evidence of instrumental improvements in PB municipalities relative to their non-PB counterparts.

Methodology

PB proponents often cite completed projects as evidence that PB works. This is especially prevalent on PB websites for individual municipalities. In fact, the municipality of Belo Horizonte lists every completed project between 1994 and 2012 on their website, complete with before and after photos (see Figures 1.9 through 1.11 on p. 33).² Recife, Novo Hamburgo (RS), Rio Claro (SP) and many more provide similar lists and photos.³ However this “evidence” for PB success lacks a counterfactual. We can only conclude that PB “works” if we would not have obtained the same outcomes in its absence. Unfortunately, PB was not adopted randomly, so generating a control group is not simple. Furthermore, difference in means tests of the variables of interest show that municipalities that adopted PB and those that did not are fundamentally different.⁴ This makes creating a control group both more difficult and more important. For these reasons, I implement several methodologies to control for these factors.

I begin with simple OLS models for a point of comparison. However, the un-

¹As discussed in Chapter Three, the test of spending is necessarily a test of “improvement” but a comparison of spending patterns in PB and non-PB municipalities.

²www.portalpbh.pbh.gov.br

³www.recife.pe.gov.br/op/, www.op.novohamburgo.rs.gov.br/, www.rioclaro.sp.gov.br/op/

⁴See difference in means tables on pages 105 and 136.

derlying assumption is that the groups are equivalent prior to treatment, and thus any post-test differences are the result of the treatment itself. PB, however, was not randomly assigned and the groups are not equivalent. I then use Propensity Score Matching (PSM), differences-in-differences (DID), and PSM-DID to control for this endogeneity problem. I use PSM to control for observable differences between treatment and control groups. PSM allows me to do this by creating a more valid control group by matching otherwise similar PB and non-PB municipalities. I use DID to control for unobservable differences between treatment and control groups. In the final method, I combine PSM and DID to simultaneously control for observable and unobservable differences.

Another strategy allows me to control for endogeneity in a complementary way, in addition to providing useful information about the potential timing effects of PB adoption. In Chapters Three, Four, and Five I test the effect of PB on 6 different panels that vary in membership in the treatment and control group, as well as timing of pre- and post-test measurement. Panel 1 looks at the whole time period (1992-2008), while Panels 2A-2C test early adoption, and Panels 3A and B test late adoption. Panel 2C is of particular importance because it allows me to use late adopters as a control group for early adopters. Given the inherent differences in PB and non-PB municipalities, this is a useful way of minimizing the problem. And in fact, in all chapters results for Panel 2C were consistently smaller and less significant than the other panels. This suggests two things: 1) that there is a very real difference between adopters and non-adopters, and 2) that PB has very little effect on sanitation and welfare outcomes.

Findings

In Chapter Three, I analyze the effect of PB on spending patterns, and find that it is associated with a statistically significant increase in spending on health and sanitation, a statistically significant decrease in education and culture spending, and a generally neutral, though slightly positive in certain cases, effect on housing and urbanism spending. Since spending on health and sanitation is often considered a “pro-poor” area of spending, one could conclude that PB

has achieved at least part of the goal of reducing poverty and increasing public services. However, results from Chapters Four and Five call this conclusion into question, making it clear that increasing spending in a particular area is not the same as providing improved services, and it is certainly not the same as tangible improvements in citizen welfare. It may be a necessary condition, however it is not sufficient.

In Chapter Four, I analyze the effect of PB on sanitation provision using four measures: public sewer connection, public water provision, trash collection, and electricity. I find generally neutral results, and in some cases PB is associated with a decrease in service provision relative to non-PB municipalities. The most significant finding is that PB is not associated with an improvement in any type of sanitation provision under any method. Thus it does not appear that PB is a successful method for targeting the poor with sanitation provision.

I test the effect of PB on a set of aggregate indices and disaggregated measures of education, health, and income in Chapter Five, and find little evidence of the predicted positive effect of PB. Welfare improvements occurred during the time period of study, however they were not limited to PB municipalities, and thus cannot be interpreted as a result of PB. The neutral or negative findings on the effect of PB on welfare coincide with those of service provision in Chapter Four.

Together, these findings suggest that while PB has been successful in incorporating previously excluded citizens in the decision-making process, it has been less successful in providing instrumental benefits. This is problematic if instrumental benefits are the primary goal of PB, however my findings show that citizens also value the intrinsic benefits of participation, indicating that support for PB could be rational even in the relative absence of tangible outcomes.

6.2 Limitations and Future Research

The primary limitation, and therefore area for future research, regarding intrinsic and instrumental motivations in Chapter Two is the generalizability of the results from Porto Alegre to other cities in Brazil and elsewhere. As I discussed in

the conclusion of that chapter, Latinobarómetro data show that Porto Alegre is not a complete outlier when it comes to general opinions of democracy and the value of citizen participation. However it is unclear whether this extends to opinions about PB specifically. PB is a source of great pride for residents of Porto Alegre. 75 percent of survey respondents partially or totally agree that PB “gave prestige to Porto Alegre throughout the world” (Bank 2008*b*, 41). Therefore, it is worth investigating whether residents there have a unique perspective on participation. Conducting similar surveys in other PB municipalities in Brazil, and elsewhere, should answer this question.

The generalizability issue in Chapters Three, Four and Five is somewhat different, though it can also be addressed with additional data collection. Unlike Chapter Two, which looks at a single municipality, the later chapters evaluate and compare the whole universe of the more than 500 Brazilian municipalities with over 50 thousand residents. Given the large sample size, my findings are unlikely to be completely unique to those cases. However, my sample is limited not only to Brazil, but also to large municipalities within Brazil. It is entirely possible that small municipalities function in fundamentally different ways from large municipalities, and therefore we should not assume that my results would hold with much smaller municipalities. In fact, work by both Olson and Ostrom suggests that we should take this concern very seriously (Olson 1965, Ostrom 1990, Ostrom 1998). Likewise, it is possible that PB functions differently outside of Brazil. That said, my results do call into question the idea that PB can solve the problems that it purports to, and at a minimum suggests that we should systematically investigate the effects of PB in different areas.

Other areas for future research should include additional variables and/or more nuanced operationalization. One path is to look at PB implementation as a continuous, rather than dichotomous, variable. It could be that different configurations of PB produce different results. The more general theoretical literature on participation cautions against this tendency to measure “participation” as a single entity (Bishop & Davis 2002, Arnstein 1969, Pateman 1970). Of course narrowing it down from participation in general to participatory budgeting specifically is a

step in the right direction. Furthermore, it is important not to disaggregate the measure too much, as this could make it difficult to conduct a large-n study.

There are several other areas that are tangential to this project, but would enhance our understanding of PB and are therefore important avenues for research. One is analyzing whether or not municipalities follow through on the projects selected by the PB process. Since PB is generally non-binding, the municipality is not required to implement the selected projects. There is evidence that this was a problem even in PB's most successful case, Porto Alegre. According to a government study, the municipality completed 30 percent of the PB selected projects in 1996, 22 percent in 1997, and less than 10 percent in 1998 (*PMDB/Orçamento Participativo-RS* 1999). While municipal websites often list completed projects as previously mentioned, they also have strong incentives to demonstrate success. Thus they are unlikely to publicize information that shows PB as anything less than successful. It would therefore be important to seek out other sources for this information.

Another interesting extension would look more closely at the intrinsic side of the story. I analyze intrinsic versus instrumental *motivations* in Chapter Two and instrumental *outcomes* in Chapters Three, Four, and Five. This does not take into account intrinsic outcomes or benefits, which should be addressed in future work. Measuring intrinsic outcomes is inherently more complicated than measuring instrumental outcomes, as it does not lend itself to quantifiable measures. However, this obviously should not preclude attempts at doing so.

A related question is whether or not intrinsic and instrumental motivations change with the length of time PB has been in place. According to Arneson, "what renders the democratic form of government for a nation morally legitimate (when it is) is that its operation over time produces better consequences for people than any feasible alternative mode of governance" (Arneson 2003, 122). This definition is interesting in the context of PB because of the time component. This suggests that a convergence of instrumental and intrinsic views of PB could be in play here. Specifically that while intrinsic views may have been more important at the beginning, over time the lack of instrumental results could mitigate these positive

intrinsic views. It could be that over time, instrumental concerns take precedence. This corresponds with Spada's recent work that demonstrates a decline in support for PB. Of course this requires a significant amount of time series data, which would be difficult to obtain retrospectively.

6.3 Conclusion

In this dissertation, I tested competing theories for intrinsic versus instrumental motivations for participation in PB and found that despite lower levels of participation than predicted, wealthier and more educated participants are more likely to cite intrinsic motivations, while their poorer and less educated counterparts are more likely to cite instrumental motivations. I then analyzed instrumental benefits by comparing PB and non-PB municipalities. I found that despite a change in spending patterns, PB does not seem to produce a corresponding improvement in service provision or welfare. Together these findings suggest that despite the lack of instrumental benefits, we should not abandon the idea of PB completely. It was implemented with two primary goals: Improving public service provision, and including citizens in municipal decision-making. While it does not seem to have solved the first problem, it could be that fulfilling the second goal is sufficient to justify its widespread adoption.

A Appendix

Table A.1: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Spending

Predicted Effect	Education/Culture Spending			Health/Sanitation Spending		
	PSM	<i>positive</i>		PSM	<i>positive</i>	
		DD	PSMDD		DD	PSMDD
PANEL 1						
ATT	-0.034**	-0.055***	-0.033**	0.012	0.055***	0.006
Standard Error	(0.016)	(0.009)	(0.017)	(0.025)	(0.012)	(0.024)
<i>n (Treated)</i>	143	200	143	150	200	150
<i>n (Total)</i>	412	488	412	420	487	420
PANEL 2A						
ATT	-0.036**	-0.044***	-0.041***	0.057**	0.051***	0.061***
Standard Error	(0.015)	(0.009)	(0.014)	(0.023)	(0.011)	(0.022)
<i>n (Treated)</i>	46	70	46	45	70	45
<i>n (Total)</i>	463	499	463	456	499	456
PANEL 2B						
ATT	-0.049**	-0.053***	-0.053**	0.077**	0.081***	0.076**
Standard Error	(0.023)	(0.014)	(0.023)	(0.034)	(0.018)	(0.035)
<i>n (Treated)</i>	35	69	35	38	69	38
<i>n (Total)</i>	280	357	280	299	356	299
PANEL 2C						
ATT	-0.017	-0.027***	-0.016	0.021	0.028*	0.030
Standard Error	(0.014)	(0.010)	(0.013)	(0.022)	(0.016)	(0.020)
<i>n (Treated)</i>	41	41	41	41	41	41
<i>n (Total)</i>	150	173	150	171	173	171
PANEL 3A						
ATT	-0.033*	-0.056***	-0.031*	0.008	0.041***	0.008
Standard Error	(0.019)	(0.011)	(0.018)	(0.024)	(0.014)	(0.024)
<i>n (Treated)</i>	94	131	94	96	131	96
<i>n (Total)</i>	345	419	345	360	418	360
PANEL 3B						
ATT	-0.044***	-0.028***	-0.050***	0.030	0.025**	0.029
Standard Error	(0.016)	(0.010)	(0.017)	(0.024)	(0.013)	(0.021)
<i>n (Treated)</i>	107	136	107	99	136	99
<i>n (Total)</i>	381	439	381	391	437	391

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Spending

Predicted Effect	Housing/Urbanism Spending		
	<i>positive</i>		
	PSM	DD	PSMDD
PANEL 1			
ATT	0.006	0.021***	0.013
Standard Error	(0.015)	(0.008)	(0.015)
<i>n (Treated)</i>	141	197	141
<i>n (Total)</i>	422	480	422
PANEL 2A			
ATT	-0.017	0.007	-0.002
Standard Error	(0.018)	(0.008)	(0.015)
<i>n (Treated)</i>	41	70	41
<i>n (Total)</i>	450	491	450
PANEL 2B			
ATT	-0.023	0.017	-0.025
Standard Error	(0.020)	(0.012)	(0.021)
<i>n (Treated)</i>	32	68	32
<i>n (Total)</i>	294	351	294
PANEL 2C			
ATT	0.012	0.006	0.013
Standard Error	(0.018)	(0.012)	(0.015)
<i>n (Treated)</i>	41	41	41
<i>n (Total)</i>	167	171	167
PANEL 3A			
ATT	0.017	0.023**	0.012
Standard Error	(0.015)	(0.009)	(0.015)
<i>n (Treated)</i>	95	129	95
<i>n (Total)</i>	362	412	362
PANEL 3B			
ATT	0.031**	0.018*	0.030**
Standard Error	(0.014)	(0.010)	(0.015)
<i>n (Treated)</i>	99	136	99
<i>n (Total)</i>	371	436	371

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.3: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Sanitation

Predicted Effect	Sewer			Water		
	<i>positive</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	0.033	0.009	0.005	0.009	-0.082***	0.030
Standard Error	(0.054)	(0.022)	(0.039)	(0.027)	(0.014)	(0.024)
<i>n (Treated)</i>	131	191	131	167	214	167
<i>n (Total)</i>	320	391	320	440	536	440
PANEL 2A						
ATT	0.022	-0.007	0.023	-0.006	-0.061***	0.011
Standard Error	(0.067)	(0.022)	(0.040)	(0.021)	(0.016)	(0.021)
<i>n (Treated)</i>	45	73	45	48	74	48
<i>n (Total)</i>	351	391	351	470	536	470
PANEL 2B						
ATT	0.088	0.000	0.019	-0.004	-0.112***	-0.011
Standard Error	(0.073)	(0.029)	(0.049)	(0.018)	(0.020)	(0.031)
<i>n (Treated)</i>	38	73	38	42	74	42
<i>n (Total)</i>	221	273	221	300	396	300
PANEL 2C						
ATT	-0.063	-0.006	0.043	-0.012	-0.039	-0.002
Standard Error	(0.070)	(0.038)	(0.050)	(0.018)	(0.024)	(0.023)
<i>n (Treated)</i>	42	43	42	44	44	44
<i>n (Total)</i>	159	161	159	157	184	157
PANEL 3A						
ATT	0.001	0.014	-0.008	0.021	-0.066***	0.012
Standard Error	(0.048)	(0.025)	(0.043)	(0.027)	(0.017)	(0.026)
<i>n (Treated)</i>	74	118	74	104	140	104
<i>n (Total)</i>	257	318	257	392	462	392
PANEL 3B						
ATT	0.013	0.019	0.011	-0.008	-0.029***	-0.005
Standard Error	(0.054)	(0.013)	(0.020)	(0.021)	(0.007)	(0.009)
<i>n (Treated)</i>	73	118	73	99	140	99
<i>n (Total)</i>	269	318	269	380	462	380

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.4: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB Adoption on Sanitation

Predicted Effect	Garbage			Electricity		
		<i>positive</i>			<i>positive</i>	
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	0.157	-9.904***	-3.508	-0.064	-9.303***	1.023
Standard Error	(0.532)	(1.738)	(3.167)	(0.190)	(1.247)	(1.607)
<i>n (Treated)</i>	157	213	157	160	214	160
<i>n (Total)</i>	461	537	461	455	538	455
PANEL 2A						
ATT	0.101	-6.163***	3.247	1.254	-5.199***	-2.393*
Standard Error	(1.872)	(1.885)	(2.487)	(0.892)	(1.024)	(1.381)
<i>n (Treated)</i>	47	74	47	46	74	46
<i>n (Total)</i>	488	537	488	495	538	495
PANEL 2B						
ATT	0.356	-13.28***	-2.286	-0.009	-11.34***	-1.325
Standard Error	(0.566)	(2.602)	(3.893)	(0.111)	(1.972)	(1.937)
<i>n (Treated)</i>	41	74	41	39	74	39
<i>n (Total)</i>	312	398	312	317	398	317
PANEL 2C						
ATT	-0.102	-2.229	1.978	-0.068	-1.845*	-0.310
Standard Error	(1.781)	(2.142)	(2.701)	(0.720)	(1.005)	(1.026)
<i>n (Treated)</i>	43	44	43	44	44	44
<i>n (Total)</i>	170	183	170	171	184	171
PANEL 3A						
ATT	-0.338	-8.104***	1.619	-0.045	-8.222***	0.447
Standard Error	(0.725)	(2.067)	(3.386)	(0.249)	(1.525)	(1.998)
<i>n (Treated)</i>	95	139	95	100	140	100
<i>n (Total)</i>	361	463	361	384	464	384
PANEL 3B						
ATT	0.053	-3.449***	-1.100	-0.164	-3.786***	0.367
Standard Error	(0.608)	(1.058)	(1.241)	(0.216)	(0.840)	(0.731)
<i>n (Treated)</i>	104	139	104	100	140	100
<i>n (Total)</i>	386	463	386	363	464	363

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.5: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Composites

Predicted Effect	HDI - Health			HDI - Economic		
	<i>positive</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	0.002	-0.021***	0.006	-0.006	-0.010**	0.010
Standard Error	(0.008)	(0.003)	(0.005)	(0.010)	(0.004)	(0.007)
<i>n (Treated)</i>	165	214	165	156	214	156
<i>n (Total)</i>	438	538	438	421	538	421
PANEL 2A						
ATT	-0.012	-0.003	-0.004	0.002	0.013**	0.008
Standard Error	(0.016)	(0.003)	(0.005)	(0.023)	(0.006)	(0.010)
<i>n (Treated)</i>	43	74	43	38	74	38
<i>n (Total)</i>	483	538	483	489	538	489
PANEL 2B						
ATT	0.010	-0.028***	-0.004	0.011	-0.016***	0.004
Standard Error	(0.013)	(0.004)	(0.008)	(0.018)	(0.006)	(0.011)
<i>n (Treated)</i>	34	74	34	38	74	38
<i>n (Total)</i>	341	398	341	324	398	324
PANEL 2C						
ATT	0.000	-0.005	0.000	0.000	-0.004	-0.001
Standard Error	(0.016)	(0.004)	(0.006)	(0.022)	(0.008)	(0.010)
<i>n (Treated)</i>	42	44	42	43	44	43
<i>n (Total)</i>	170	184	170	159	184	159
PANEL 3A						
ATT	0.002	-0.017***	0.000	-0.006	-0.007	0.003
Standard Error	(0.009)	(0.004)	(0.007)	(0.011)	(0.005)	(0.007)
<i>n (Treated)</i>	101	140	101	101	140	101
<i>n (Total)</i>	364	464	364	388	464	388
PANEL 3B						
ATT	0.000	-0.015***	0.000	0.000	-0.022***	-0.001
Standard Error	(0.009)	(0.003)	(0.005)	(0.012)	(0.005)	(0.008)
<i>n (Treated)</i>	100	140	100	102	140	102
<i>n (Total)</i>	364	464	364	377	464	377

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.6: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Composites

Predicted Effect	HDI - Health			HDI - Economic		
	<i>positive</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	-0.002	-0.012***	0.004	0.008	-0.011***	0.005
Standard Error	(0.005)	(0.003)	(0.006)	(0.010)	(0.003)	(0.004)
<i>n (Treated)</i>	161	214	161	172	214	172
<i>n (Total)</i>	447	538	447	470	538	470
PANEL 2A						
ATT	-0.010	-0.007**	0.004	0.002	-0.003	0.005
Standard Error	(0.009)	(0.003)	(0.005)	(0.015)	(0.003)	(0.005)
<i>n (Treated)</i>	44	74	44	44	74	44
<i>n (Total)</i>	488	538	488	476	538	476
PANEL 2B						
ATT	0.013*	-0.017***	-0.003	0.013	-0.014***	0.006
Standard Error	(0.007)	(0.005)	(0.009)	(0.014)	(0.004)	(0.007)
<i>n (Treated)</i>	39	74	39	41	74	41
<i>n (Total)</i>	291	398	291	316	398	316
PANEL 2C						
ATT	-0.007	-0.003	-0.004	-0.001	0.003	0.004
Standard Error	(0.010)	(0.004)	(0.006)	(0.014)	(0.003)	(0.004)
<i>n (Treated)</i>	43	44	43	44	44	44
<i>n (Total)</i>	176	184	176	175	184	175
PANEL 3A						
ATT	0.004	-0.009**	0.006	-0.007	-0.009***	0.001
Standard Error	(0.006)	(0.004)	(0.007)	(0.011)	(0.003)	(0.005)
<i>n (Treated)</i>	103	140	103	101	140	101
<i>n (Total)</i>	397	464	397	371	464	371
PANEL 3B						
ATT	0.005	-0.002	0.008	0.006	-0.006***	-0.005
Standard Error	(0.006)	(0.003)	(0.005)	(0.011)	(0.002)	(0.003)
<i>n (Treated)</i>	102	140	102	102	140	102
<i>n (Total)</i>	394	464	394	380	464	380

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.7: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Education

Predicted Effect	Illiteracy (11-14)			Illiteracy (15+)		
	<i>negative</i>			<i>negative</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	0.164	6.846***	-1.189	0.964	3.965***	-0.536
Standard Error	(0.273)	(0.988)	(1.390)	(0.905)	(0.502)	(0.762)
<i>n (Treated)</i>	155	214	155	159	214	159
<i>n (Total)</i>	457	538	457	462	538	462
PANEL 2A						
ATT	-0.071	4.337***	-0.151	0.972	2.150***	-0.161
Standard Error	(0.902)	(1.055)	(1.446)	(1.344)	(0.448)	(0.629)
<i>n (Treated)</i>	46	74	46	46	74	46
<i>n (Total)</i>	492	538	492	495	538	495
PANEL 2B						
ATT	-0.063	7.847***	0.908	-0.451	4.678***	0.380
Standard Error	(0.406)	(1.560)	(2.363)	(1.582)	(0.782)	(1.191)
<i>n (Treated)</i>	36	74	36	36	74	36
<i>n (Total)</i>	326	398	326	331	398	331
PANEL 2C						
ATT	1.322*	0.049	-2.253*	-0.817	0.121	0.079
Standard Error	(0.732)	(1.037)	(1.229)	(1.895)	(0.470)	(0.643)
<i>n (Treated)</i>	44	44	44	44	44	44
<i>n (Total)</i>	168	184	168	175	184	175
PANEL 3A						
ATT	0.489*	6.317***	-1.499	0.032	3.588***	0.180
Standard Error	(0.277)	(1.187)	(1.534)	(1.022)	(0.600)	(0.854)
<i>n (Treated)</i>	106	140	106	100	140	100
<i>n (Total)</i>	378	464	378	389	464	389
PANEL 3B						
ATT	0.154	1.717***	-0.231	0.083	1.419***	0.036
Standard Error	(0.280)	(0.366)	(0.409)	(1.058)	(0.258)	(0.352)
<i>n (Treated)</i>	103	140	103	99	140	99
<i>n (Total)</i>	391	464	391	385	464	385

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.8: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Education

Predicted Effect	School Attendance Under 6			HDI - Education		
	PSM	<i>positive</i> DD	PSMDD	PSM	<i>positive</i> DD	PSMDD
PANEL 1						
ATT	0.176	-5.346***	1.699	-0.006	-0.010**	0.010
Standard Error	(0.493)	(1.046)	(2.037)	(0.010)	(0.004)	(0.007)
<i>n (Treated)</i>	157	214	157	156	214	156
<i>n (Total)</i>	465	538	465	421	538	421
PANEL 2A						
ATT	0.870	-3.497***	-0.728	0.002	0.013**	0.008
Standard Error	(2.335)	(1.213)	(2.113)	(0.023)	(0.006)	(0.010)
<i>n (Treated)</i>	42	74	42	38	74	38
<i>n (Total)</i>	492	538	492	489	538	489
PANEL 2B						
ATT	0.819	-7.511***	2.774	0.011	-0.016***	0.004
Standard Error	(0.831)	(1.561)	(3.157)	(0.018)	(0.006)	(0.011)
<i>n (Treated)</i>	33	74	33	38	74	38
<i>n (Total)</i>	326	398	326	324	398	324
PANEL 2C						
ATT	0.875	-2.874*	0.810	0.000	-0.004	-0.001
Standard Error	(1.820)	(1.575)	(2.017)	(0.022)	(0.008)	(0.010)
<i>n (Treated)</i>	44	44	44	43	44	43
<i>n (Total)</i>	153	184	153	159	184	159
PANEL 3A						
ATT	0.127	-4.202***	2.265	-0.006	-0.007	0.003
Standard Error	(0.644)	(1.208)	(1.929)	(0.011)	(0.005)	(0.007)
<i>n (Treated)</i>	105	140	105	101	140	101
<i>n (Total)</i>	417	464	417	388	464	388
PANEL 3B						
ATT	0.395	-2.078***	0.198	0.000	-0.022***	-0.001
Standard Error	(0.633)	(0.890)	(1.236)	(0.012)	(0.005)	(0.008)
<i>n (Treated)</i>	101	140	101	102	140	102
<i>n (Total)</i>	403	464	403	377	464	377

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.9: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Health

Predicted Effect	Infant Mortality			Child Mortality		
	<i>negative</i>			<i>negative</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	0.366	5.795***	-3.625*	-0.602	8.311***	-3.989
Standard Error	(0.677)	(1.285)	(2.075)	(0.662)	(1.883)	(2.948)
<i>n (Treated)</i>	156	214	156	154	214	154
<i>n (Total)</i>	456	538	456	460	538	460
PANEL 2A						
ATT	0.902	3.188***	-1.750	1.171	4.270***	-1.878
Standard Error	(1.958)	(1.159)	(1.693)	(2.744)	(1.551)	(2.591)
<i>n (Treated)</i>	47	74	47	47	74	47
<i>n (Total)</i>	498	538	498	494	538	494
PANEL 2B						
ATT	-0.856	7.511***	2.198	-0.230	10.57***	-2.600
Standard Error	(0.973)	(1.958)	(3.287)	(0.959)	(2.859)	(4.364)
<i>n (Treated)</i>	36	74	36	34	74	34
<i>n (Total)</i>	312	398	312	317	398	317
PANEL 2C						
ATT	-1.149	0.728	-0.638	0.551	0.390	-1.164
Standard Error	(2.348)	(1.445)	(2.075)	(2.472)	(1.892)	(2.410)
<i>n (Treated)</i>	44	44	44	44	44	44
<i>n (Total)</i>	170	184	170	179	184	179
PANEL 3A						
ATT	-0.931	4.888***	0.065	-0.594	7.117***	0.116
Standard Error	(0.883)	(1.522)	(2.303)	(0.754)	(2.227)	(3.324)
<i>n (Treated)</i>	110	140	110	108	140	108
<i>n (Total)</i>	396	464	396	392	464	392
PANEL 3B						
ATT	-0.011	2.504***	-0.257	-0.625	3.318***	-0.077
Standard Error	(0.809)	(0.813)	(1.213)	(0.812)	(1.158)	(1.762)
<i>n (Treated)</i>	102	140	102	104	140	104
<i>n (Total)</i>	389	464	389	394	464	394

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.10: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Health

Predicted Effect	Survive to 60			Teen Pregnancy		
	<i>positive</i>			<i>negative</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	0.531	-2.318***	0.940	-0.272	-0.453*	-0.128
Standard Error	(0.345)	(0.548)	(0.871)	(0.415)	(0.243)	(0.363)
<i>n (Treated)</i>	158	214	158	157	214	157
<i>n (Total)</i>	441	538	441	468	538	468
PANEL 2A						
ATT	-0.085	-1.054**	0.939	0.304	-0.477	0.056
Standard Error	(0.686)	(0.429)	(0.719)	(0.582)	(0.349)	(0.619)
<i>n (Treated)</i>	44	74	44	40	74	40
<i>n (Total)</i>	481	538	481	482	538	482
PANEL 2B						
ATT	0.763*	-3.087***	-0.860	-0.922	-0.316	-0.435
Standard Error	(0.451)	(0.818)	(1.606)	(0.613)	(0.356)	(0.593)
<i>n (Treated)</i>	38	74	38	41	74	41
<i>n (Total)</i>	296	398	296	340	398	340
PANEL 2C						
ATT	0.583	-0.163	0.409	-0.138	0.067	-0.042
Standard Error	(0.723)	(0.556)	(0.735)	(0.549)	(0.452)	(0.625)
<i>n (Treated)</i>	44	44	44	43	44	43
<i>n (Total)</i>	178	184	178	168	184	168
PANEL 3A						
ATT	0.554	-1.912***	1.147	-0.804	-0.526*	-0.495
Standard Error	(0.390)	(0.642)	(1.058)	(0.496)	(0.289)	(0.461)
<i>n (Treated)</i>	98	140	98	102	140	102
<i>n (Total)</i>	390	464	390	393	464	393
PANEL 3B						
ATT	0.410	-0.950**	0.451	-0.247	-0.176	-0.546
Standard Error	(0.352)	(0.416)	(0.627)	(0.451)	(0.267)	(0.425)
<i>n (Treated)</i>	105	140	105	106	140	106
<i>n (Total)</i>	397	464	397	412	464	412

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.11: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Inequality/Poverty

Predicted Effect	Poverty			Inequality - Gini		
		<i>negative</i>			<i>negative</i>	
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	1.607	6.583***	-1.244	-0.001	0.005	-0.004
Standard Error	(1.421)	(1.045)	(1.907)	(0.009)	(0.004)	(0.007)
<i>n (Treated)</i>	151	214	151	152	214	152
<i>n (Total)</i>	444	538	444	465	538	465
PANEL 2A						
ATT	2.607	3.312***	-1.260	0.004	0.003	-0.005
Standard Error	(3.156)	(0.869)	(1.562)	(0.011)	(0.005)	(0.008)
<i>n (Treated)</i>	49	74	49	44	74	44
<i>n (Total)</i>	496	538	496	496	538	496
PANEL 2B						
ATT	-1.991	8.452***	-0.200	-0.012	0.006	-0.004
Standard Error	(2.493)	(1.523)	(2.904)	(0.011)	(0.006)	(0.011)
<i>n (Treated)</i>	40	74	40	39	74	39
<i>n (Total)</i>	351	398	351	317	398	317
PANEL 2C						
ATT	1.538	0.565	-1.622	0.018	0.000	0.004
Standard Error	(3.183)	(1.209)	(1.644)	(0.012)	(0.006)	(0.007)
<i>n (Treated)</i>	44	44	44	41	44	41
<i>n (Total)</i>	180	184	180	140	184	140
PANEL 3A						
ATT	-0.077	5.595***	-1.563	-0.006	0.004	0.002
Standard Error	(1.851)	(1.206)	(1.989)	(0.009)	(0.005)	(0.007)
<i>n (Treated)</i>	104	140	104	105	140	105
<i>n (Total)</i>	385	464	385	390	464	390
PANEL 3B						
ATT	0.501	3.095***	-0.617	0.001	0.003	0.004
Standard Error	(1.703)	(0.738)	(1.149)	(0.009)	(0.004)	(0.005)
<i>n (Treated)</i>	106	140	106	106	140	106
<i>n (Total)</i>	368	464	368	380	464	380

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.12: DID, PSM, and PSM-DID Results: Average Treatment Effect of PB adoption on Welfare - Inequality/Poverty

Predicted Effect	Inequality - Theil			HDI - Economic		
	<i>negative</i>			<i>positive</i>		
	PSM	DD	PSMDD	PSM	DD	PSMDD
PANEL 1						
ATT	-0.019	0.001	-0.021	0.008	-0.011***	0.005
Standard Error	(0.017)	(0.009)	(0.014)	(0.010)	(0.003)	(0.004)
<i>n (Treated)</i>	159	214	159	172	214	172
<i>n (Total)</i>	455	538	455	470	538	470
PANEL 2A						
ATT	0.001	0.009	0.021	0.002	-0.003	0.005
Standard Error	(0.023)	(0.010)	(0.016)	(0.015)	(0.003)	(0.005)
<i>n (Treated)</i>	46	74	46	44	74	44
<i>n (Total)</i>	498	538	498	476	538	476
PANEL 2B						
ATT	-0.010	0.002	0.004	0.013	-0.014***	0.006
Standard Error	(0.025)	(0.014)	(0.021)	(0.014)	(0.004)	(0.007)
<i>n (Treated)</i>	40	74	40	41	74	41
<i>n (Total)</i>	327	398	327	316	398	316
PANEL 2C						
ATT	0.016	0.002	0.023	-0.001	0.003	0.004
Standard Error	(0.027)	(0.012)	(0.016)	(0.014)	(0.003)	(0.004)
<i>n (Treated)</i>	44	44	44	44	44	44
<i>n (Total)</i>	154	184	154	175	184	175
PANEL 3A						
ATT	-0.033*	0.000	-0.011	-0.007	-0.009***	0.001
Standard Error	(0.018)	(0.010)	(0.016)	(0.011)	(0.003)	(0.005)
<i>n (Treated)</i>	103	140	103	101	140	101
<i>n (Total)</i>	381	464	381	371	464	371
PANEL 3B						
ATT	-0.013	-0.005	-0.001	0.006	-0.006***	-0.005
Standard Error	(0.018)	(0.008)	(0.012)	(0.011)	(0.002)	(0.003)
<i>n (Treated)</i>	102	140	102	102	140	102
<i>n (Total)</i>	392	464	392	380	464	380

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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