Institutions in Development:
Five Essays on Politics, Property Rights and Prosperity

PhD dissertation

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Preface

This dissertation could not have been written without the help of a number people. First of all, I would like to thank my wife, Anne. In the mountains of Nepal, back in the summer of 2002, she convinced me that I should study economics. Later on she patiently read my papers and corrected any number of errors.

Thanks to my children, Hannah and Karen, for healthy distractions and for the immense joy they give us.

Also a great thanks to my supervisor, Professor Finn Tarp. Finn has been outstandingly helpful throughout the project, reading my drafts over and over again, and providing all kinds of important advice. He has been extremely forthcoming in terms of accommodating the many practical issues that came up as a result of my relocations to first the U.S. and then Kenya.

My most important sources of learning during my time as a PhD student have been my co-authors. They include Thomas Barnebeck Andersen, Henrik Hansen, Finn Tarp, Jean-Robert Tyran and Katleen Van den Broeck. Being somewhat solitary by nature, I am grateful that I was lucky enough to participate in joint projects with these extremely smart people. I hope to continue working with all of them in the future.

Thanks for excellent assistance from the secretaries to DERG, Vibeke Kovsted, Leise Kjer and Zanne Romanoff, and for many inspiring discussions with all my colleagues at DERG.

A special thanks is due to Rachel Ongaro, who as our nanny and housekeeper was the bedrock of my family's life during the time we spent in Kenya, from 2006 to 2008. There was a strange and sad coincidence during this period: This thesis is an academic discussion of two main themes, namely political economy and property rights to land. In Kenya during January and February 2008, a rotten political economy combined with deep-seated grievances over land rights to produce a massive, violent upheaval. During these events, Rachel and her family, among 600,000 others, were displaced from their homes, and lost all their possessions. While Rachel herself is now doing well, many of her family members and friends are still struggling to recover. This should remind us what our work as students of institutions and political economy should

ultimately be about: To contribute to avoiding such catastrophes, and the poverty, inequality and corruption that underlie them.

Introduction

Two of the most significant trends in development economics research in the last few decades is the increasing significance of "New Institutional Economics" (e.g. North 1990) and, related to that, of "New Political Economy" (e.g. Besley 2007). Development economists now appreciate that formal and informal rules, such as property rights or electoral rules, play an important role in guiding economic activities. They also acknowledge that a key precondition for economic development is the availability of a competent and honest government, and that such availability cannot be assumed a priori. Rather, the preconditions for good government need to be examined as a theoretical and empirical question. The focus on institutions and on good government are intimately linked, both because strong political, legal and social institutions are preconditions for well functioning government, and because one of the most important characteristics of good government is that it upholds good economic institutions, such as well defined property rights and transparent systems of taxation and subsidy.

The present dissertation includes five chapters which span a rather wide range of issues. All take their lead from the New Institutional- and Political Economics. By means of mostly empirical but also theoretical methods I investigate how specific institutions function, in order to understand how they can be improved. The papers are divided into two distinct groups. Three of them deal with different topics in political economics, while two investigate the effects of formal, individual property rights to agricultural land.

Political economy

The field of modern, political economics, or New Political Economy, initially focused on politics in mature democracies, primarily at the level of the national government. The main textbooks in the field (e.g. Mueller 1989, Persson and Tabellini 2000, Drazen 2000) mostly apply this focus. Many of the insights from this line of research carry over to politics in developing countries with less-than mature democracies, and to sub- and supranational levels of government. However, it is also necessary to develop new analyses that focus specifically on political systems in the developing world, and deal explicitly with politics outside the level of national government. For example, the standard, democratic rules of the game, such as the presence of independent courts or "one man, one vote", cannot be assumed with the same level of confidence in the typical, developing country,

or at the international level, as it can in Western democracies. Formal institutions often constrain actors less severely at the international- or local level, and in immature democracies and dictatorships, than they do at the national level in mature democracies. Therefore, the need to focus on issues such as informal institutions, corruption and executive discretion is stronger in these settings. The papers in this dissertation follow in the footsteps of those researchers who have attempted to take these issues seriously (e.g. Bardhan 1997, Basu 2000, Besley 2006).

Chapter 1, co-authored with Thomas Barnebeck Andersen and Henrik Hansen, is a study of the international, political economy of aid allocation. The paper investigates the allocation of loans by the International Development Agency (IDA) arm of the World Bank. IDA lends money on highly concessionary terms to countries with GDP per capita below a certain threshold. We argue that the allocation of these loans is affected by the political interests of the World Bank's major stakeholder, the United States. In particular, we demonstrate that countries who vote in line with the U.S. in the United Nations General Assembly (UNGA), on issues considered important by the U.S., receive more funds than other countries. The definition of UNGA votes, which are important to the U.S., is surprisingly precise, because the State Department each year publishes a list of "key votes" in the UNGA, and records whether each country voted with or against the U.S. We show that the correlation between voting and aid allocation is robust to a wide range of controls for institutional- and economic factors that might also affect loan eligibility and voting patterns.

Chapter 2 investigates the political economy of local government in a developing country, namely India. It studies the relatively unexplored topic of interactions between leaders and rank-and-file members of political parties. I argue that these interactions, combined with the logic of electoral democracy, may give rise to a bias in the allocation of public resources in favour of members of the governing political party. I term this bias "party capture". My results, based on survey data, suggest that party capture exists in the context of an important poverty alleviation program administered by local governments in the four southernmost states of India, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. Villagers who are members of the same political party as the leader of the local council are more likely to benefit from the program than other villagers. Also, I demonstrate the presence of an important interaction effect: party capture is only important in communities with a relatively unequal distribution of agricultural land. In line with the findings of other studies (e.g.

Knack and Keefer 2000, Galasso and Ravallion 2005, Easterly 2007) this suggests that high economic inequality hampers good government.

Chapter 3, joint with Jean-Robert Tyran, is a theoretical investigation of "political selection". It studies how electoral institutions, combined with institutions governing access to information about political candidates, affect the probability of appointing a leader with intrinsic preferences for good governance, rather than preferences for corruption. While the model in principle applies to many different settings, the issue of political selection is most important when leaders have a high degree of discretion. Such discretion is generally higher in developing democracies than in mature ones, and in that sense the model is more relevant for developing- than for developed countries. In the model, benevolent candidates coexist with egoistic ones. Voters prefer a benevolent leader, but egoists may imitate benevolent ones, although imitation is costly. We show that the quality of political selection increases with the amount of civic virtue in the pool of candidates, and with the effectiveness of the public sector. The interpretation of the latter result is that when the public sector is ineffective, a career outside politics is unrewarding. The economic success of a private citizen depends on the effective provision of public services. Therefore, when the public sector is ineffective, egoistic types are attracted to politics and corruption increases. So, while we normally assume that corruption is a cause of ineffective public services, the model shows that it might also be an effect of it. Another finding in the paper is that increasing the transparency of politics, defined as the ability of voters to obtain information about candidates' pre-election behaviour, does not necessarily improve political selection. Essentially, when transparency is high, it also becomes very attractive to imitate, and increased imitation might cancel the positive effects of increased transparency.

In sum, while the three papers on political economics are quite different, they all depart from the paradigm of focusing on national governments in mature democracies, and in that sense they all contribute to the construction of a genuinely comprehensive, political economic theory of development.

Land rights

One of the primary applications of New Institutional Economics in analyses of development is the study of property rights to agricultural land (Deininger 2003, Pande and Udry 2005). There are both

substantive and methodological reasons behind the strong growth of this field. First, the continued predominance of agriculture in the economies of many developing countries means that equitable and efficient use of land resources remains a primary concern in itself. Access to land, and incentives to use it efficiently, is the key to escaping poverty for millions of families. Second, the study of land rights offers rare methodological benefits. The typical units of observation, farms or fields, are more numerous, similar and simple than most other types of units we may study, such as companies or governments. Furthermore, institutional analyses often suffer from a lack of variation in institutional characteristics. For example, all citizens in a country are often subject to the same constitution, and to the same type of legal system. Therefore, the effects of such institutions cannot be studied without including observations from different countries. In contrast, there are many settings where the nature and strength of land rights varies significantly, not only within a single country, but even within a single community. This is a highly convenient fact when we attempt to isolate the effects of certain institutions. The two papers about land rights in the dissertation make strong use of it.

Chapter 4 investigates the effects of formal property rights to land in rural Cambodia. Using a national living standards survey, I show that plots of land which are held with an official paper documenting ownership are more productive than other plots. The interpretation is that secure property rights facilitate productivity enhancing investment. Identification is a major concern in this context. The incentive to seek stronger property rights is higher on a more productive field, and rights may therefore be an effect as well as a cause of productivity. I attempt to solve this problem by using the mode by which a plot of land has been acquired as an instrument for property rights. I furthermore investigate, in a community-level analysis, whether the spread of individual, private property rights leads to deterioration in the access to common property resources. One might suspect that strengthening the private rights of one individual leads to the exclusion of other individuals from using resources that they previously had access to. For example, a farmer who attains formal rather than merely informal property rights to a plot of land may use his strengthened claim to prevent other households from collecting firewood or fodder on the land. I only find very limited support for this hypothesis. The main contributions of the paper are to present analyses from a country, Cambodia, which has not previously received much attention in this field, and to show that formal property rights may be important even in an environment of weak state capacity.

Chapter 5, joint with Finn Tarp and Katleen van den Broeck, also investigates the effect of formal land rights on agricultural productivity, in this case focusing on rural households in Vietnam. The paper departs from other papers in the literature, including Chapter 4, by stressing the distinction between different types of property rights. In particular, most studies focus on security against expropriation and other "transfer rights", such as the right to rent, mortgage or bequeath a plot of land. Following the revolutionary changes to the Vietnamese Land Law in 1988 and 1993, these rights are reasonably well protected for most land in Vietnam. However, an equally important category of land rights, which has received very limited attention, consists of "use rights" – the right to determine what to grow on the land, or wow to use it otherwise. In most countries, strong transfer rights imply strong use rights, but in transition economies such as China and Vietnam, the situation is different. We use survey data from 12 provinces in Vietnam, and show that although more than 75 percent of plots have strong transfer rights, freedom to determine land use is severely restricted on more than half of the plots in the sample. We hypothesize that restrictions on land use lead to lower productivity, and that the effect of strong transfer rights are lower when use rights are restricted. Restrictions on use limit the scope for profitable investment. The latter hypothesis is supported by the data, the former is not. Identification is challenging in this case. The tentative conclusion is that while the Vietnamese land use restrictions regime does not have a severe, direct, negative effect on productivity, it may have an indirect impact by muting the effects of improved transfer rights. It is important to note that the results show than when use rights are not restricted, transfer rights do in fact have a strong, positive effect on productivity.

In sum, the two papers about land property rights mostly confirm the fundamental assumption in mainstream, institutional economics about the importance of private property rights. However, Chapter 5 makes the additional point that the effect of one type of property rights is likely to be conditional on the strength of other rights.

General lessons

The main aim of the dissertation is not to produce a single message which is supported by all five chapters. Rather, each chapter was written to make a contribution of its own. One general theme, which is pursued in at least three of the papers, is the contingent nature of institutional effects. Chapter 2 shows that local governments function better when economic inequality in the community is low. Chapter 3 shows that the tendency for democratic institutions to promote the

selection of benevolent leaders depends on civic virtue and public sector effectiveness. Chapter 5 shows that the effects of transfer rights to land depend on the strength of use rights. The implication is that general statements about the effects of decentralisation, democracy, property rights or other institutions should often be accompanied by statements specifying the conditions under which the alleged effects are likely to be realized.

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CHAPTER 1:

US Politics and World Bank IDA-Lending

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ABSTRACT *This paper studies the role of US political factors in the allocation of World Bank concessional lending, where US political interests are proxied by voting similarity in the United Nations General Assembly on issues identified as important by the US Department of State. In contrast to previous studies we find that the US exerted a significant influence on IDA lending during the period 1993–2000. We demonstrate that the influence was both statistically as well as economically significant. Finally, we demonstrate that our result is robust with respect to the omission of the IDA Country Performance Rating index.*

I. Introduction

Responding to the critique of the Meltzer Commission Report, Charles Calomiris notes that there is a (silent) debate as to whether these international financial institutions should have narrowly defined objectives or, alternatively, be used as tools of ad hoc diplomacy.[1]

> Behind closed doors critics are candid about their primary reason for objecting to our proposals: 'Forget economics; it's the foreign policy, stupid'. For our proposed reforms to succeed, then, they must face the challenges posed not only by economic logic, but by the political economy of foreign policy. (Calomiris, 2000:86)

An increasing number of academic studies indicating that political factors – in particular US political factors – do play a role in determining who receives IMF loans have emerged recently (see Thacker, 1999; Barro and Lee, 2002; Andersen et al., 2005). With respect to World Bank lending, however, there are only a few recent studies offering evidence indicating that flows are under the influence of the US. For instance, in an interesting paper Fleck and Kilby (2005) find that US

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commercial interests influence the geographical distribution of total World Bank lending (measured as the sum of IDA, IBRD and IFC loans). Moreover, they find that this influence differs across different presidential administrations.[2] Yet, with respect to the soft loan window, IDA, there is to our knowledge no clear evidence of US interference.

At first glance, this is not surprising since IDA's allocation criteria are (arguably) more explicit than those of any other donor, rendering a direct political influence more difficult. However, since the crucial CPIA and ARPP scores governing the allocation of IDA funds are not publicly available, the scope for political influence is clearly present despite explicit allocation criteria.[3] At the same time, the secret nature of country performance scores makes a proper statistical analysis somewhat difficult; one must establish that the omitted variables problem does not invalidate the statistical inference.

Notwithstanding statistical problems, there is an abundance of anecdotal evidence suggesting that the US can exert an influence on IDA lending. Kapur (2002), for instance, argues that the US enjoys pre-eminence within the World Bank despite a sharp decline in voting power from 35% in 1947 to 16.5% in 1999. Kapur lists three reasons for the continued US pre-eminence. First, the US has been more than willing to exercise power. Second, there are few countervailing pressures from other shareholders. Third, it is an inevitable outcome of what Nye (1990) has dubbed the 'soft power' of the US: Today a much higher percentage of World Bank staff is educated in the US compared to the early years, and the shaping of World Bank policies are heavily influenced by a number of US-based civil society actors (academia, think tanks, NGOs, etc).

There are also clear cases of politically motivated World Bank lending decisions. For instance, the Bank turned down lending to Vietnam in 1977 despite the fact that staff members admitted that project implementation was much better there than in many countries actually receiving loans. Even more starkly, the suspension of lending to Chile during the Allende years 1970–1973 were cited in a US Treasury report as a significant example of the successful exercise of US influence on the Bank (Gwin, 1997). More recent examples include the Bank's decisions not to lend to Nicaragua in the 1980s and Iran in the 1980s and the 1990s (Gwin, 1997; Kapur, 2002). Finally, following the 9/11 terrorist attacks and the ensuing military campaign in Afghanistan, World Bank ODA to Pakistan, a key ally of the US in its 'War on Terror', tripled from USD 226 million in 2001 to USD 860 million in 2002 (UN System Pakistan, 2004).

In this paper, we ask whether IDA lending is influenced in any systematic way by US political factors. Our measure of political interest is that used by Thacker (1999) in a study of the role of US foreign-policy factors in IMF lending. Thacker relies on the degree of coincidence between the votes of the sample country and the US in the United Nations General Assembly (UNGA) on issues, which the US Department of State defines as 'key votes'. The precise definition given by the State Department is: 'all such votes on issues which directly affected important United States interests and on which the United States lobbied extensively' (US Department of State, 1994: 1).

Key votes are listed in the annual US Department of State publication 'Report to Congress on voting practices in the United Nations'. The first report from 1985 notes that the: 'only votes that can legitimately be read as a measure of support for the

United States are those which we identified as important to us, and on which we lobbied other nations' (quoted in Thacker, 1999: 53).

Moreover, the report from 2000 states that:

> [A] country's behaviour at the United Nations is always relevant to its bilateral relationship with the United States, a point the Secretary of State regularly makes in letters of instruction to new U.S. ambassadors. This is also why copies of this report are presented to UN member foreign ministries throughout the world and to member state missions to the United Nations in New York. The Security Council and the General Assembly are arguably the most important international bodies in the world, dealing as they do with such vital issues as threats to peace and security, disarmament, development, humanitarian relief, human rights, the environment and narcotics - all of which can and do directly affect major U.S. interest. (US State Department, 2000: 8)

Specifically, the State Department lists identical votes, opposite votes, and abstentions and absences. Voting coincidence is then calculated by dividing the number of identical votes with the number of identical and opposite votes. Voting coincidence is listed for all countries in the Report to Congress, where an overall ranking is also provided. Hence voting behaviour on key UNGA votes is publicly available and easy accessible.

Using voting coincidence on UNGA key votes as a proxy for US-political influence, we demonstrate a significant influence on World Bank IDA-lending in a data set covering 1993–2000. The influence is not only statistically significant; the gain or loss in terms of USD is noticeable for the recipients. Moreover, we demonstrate that the omission of the (secret) country performance ratings is unlikely to cause significant bias in our results.

The paper is structured as follows: In Section II we provide a discussion of IDA, including a discussion of IDA allocation criteria and of the different ways in which the US can exercise influence within the World Bank. Section III contains a brief selective survey of the empirical literature on aid allocations with a view to World Bank lending, while Section IV provides the empirical analysis. Section V concludes.

II. Background

The World Bank and IDA

IDA, which was established in 1960, is the arm of the World Bank that lends to the poorest developing countries on concessional terms. Loans are normally interest free, with a service charge less than 1 per cent (currently the charge is 0.75 per cent), and have a 10 year grace period with maturities of 40 years (35 years for IBRD–IDA blend countries). These loans are categorised as ODA (Official Development Assistance); and by this definition, IDA is one of the most important aid donors. In the period under study, IDA allocated about 11 per cent of total ODA; more than any bilateral donor save Japan. In 2002 the total value of IDA lending was USD 8.1 billion, distributed to 62 recipient countries. Moreover, because of the

well-documented 'bandwagon effect' by which bilateral donors tend to support countries with IDA loans, the importance of the Bank's allocation policies is actually amplified by bilateral allocations (Ranis, 1997; Sender, 2002).

Allocation Criteria

IDA's allocation criteria are probably more explicit than those of any other donor. In order to be eligible for IDA lending, the per capita GNI of a country must fall below a certain threshold;[4] the country must lack access to international capital markets; it must adhere to certain policy and institutional standards set by the Bank; and it must be a member of the World Bank. Some countries that do have access to international capital markets but are very poor, such as India and Indonesia, are eligible for IDA funds. These are referred to as 'blend' countries, since they receive funds from both the IBRD (the arm of the World Bank that lends on commercial terms) and from IDA. Moreover, exceptions are given to several small island economies (IDA, 2003a).

Among eligible countries funds are allocated according to poverty (as measured by GNI per capita) and to the CPR (IDA Country Performance Rating). The CPR is an index calculated as a weighted average of a country's score on two indices: the CPIA (Country Policy and Institutional Assessment) and the ARPP (Annual Report on Portfolio Performance), where the former weighs 80 per cent and the latter 20 per cent.

The CPIA is the average of a country's score on 20 indicators grouped in four categories: economic management, structural policies, policies for social inclusion/equity, and public sector management and institutions. On each of the 20 indicators, countries are rated between 1 and 6. The ARPP measures the performance of past World Bank projects in the country. To produce the final CPR, the weighted average of the CPIA and the ARPP is multiplied by the 'governance factor', which is composed of seven governance indicators, six of which are also included in the CPIA.

Based on the CPR and the GNI per capita, a formula exists to calculate how much IDA funding a country can expect to receive if it maintains its policies and institutions at a stable level, assuming that high-quality projects are available (IDA, 2003a). This level of funding is however not an entitlement, and it is not always adhered to strictly. Exceptions are given to countries emerging from protracted violent conflict, which under certain circumstances may be eligible for more funds than their CPR would otherwise indicate (IDA, 2003b). Allocations to blend countries are adjusted downward, since these countries also have access to funds from the IBRD and from commercial sources.

The allocation mechanism has developed gradually over the years, with progressively higher weight put on policies and institutions. Policy-based lending has been practiced at least since the debt crisis in the early 1980s (Gwin, 2002), but institutional indicators were not added to the CPIA until 1998 (Neumayer, 2003a). Unfortunately, the Bank does not disclose countries' exact scores on the CPIA, ARPP and CPR; only quintile distributions are available (covering only the very recent past). However, since countries are themselves informed about their own scores, it would appear from the above description that the allocation mechanism of

IDA is impartial, detailed and transparent. We shall argue that contrary to this appearance, the political interests of the US do in fact play a systematic role in the allocation of IDA funds.

US Influence

The US has several avenues for influencing the decisions of IDA and other parts of the World Bank Group. The general management of the Bank is undertaken by the Board of Executive Directors, which is responsible for the approval of all loans and decides on policy issues that guide the general operations of the Bank. The US is one of the five countries with a permanent representation in this body; the other countries are the UK, Japan, Germany and France. The board of Executives elect the President of the World Bank, who is by custom always a US citizen (a part of an informal agreement, which also says that the managing director of the IMF is always a European).[5,6] Voting in the World Bank is based on shareholding, and since the US is the largest shareholder in IDA, it has the largest voting power in the organisation, currently 14.3 per cent. World Bank institutions are governed according to a set of Governing Articles that define their purpose, organisation and operations, and since changing these Articles requires a qualified majority of 85 per cent, the US comes close to having veto power with regards to Article amendments in IDA. The US has seen its voting shares in the Bank's institutions decline steadily over the years, but arguably this has not led to a decrease in its actual power in the organisation. For example, in response to declining vote shares, the US in 1989 managed to push through a proposal to increase the qualified majority required for changing the Governing Articles of the Bank to the above mentioned 85 per cent, allowing it to maintain its near veto power (Woods, 2000). Because IDA lending is on concessional terms, IDA resources must continually be replenished by the donors. Accordingly, donors meet every three years for replenishments negotiations. At these meetings donors also agree on overall policy directions for IDA. These meetings therefore represent crucial opportunities for exercising political leverage. The last negotiation round (the IDA-13 Replenishment) was concluded in 2002, with the US contributing the largest share of funds (just over 20 per cent). In cumulative terms, the US and Japan are the largest IDA donors. Obviously, the IDA-replenishment negotiations are part of a much larger foreign policy game, and the US can increase its influence beyond what springs directly from the size of its monetary contribution if it links issues of World Bank policy with other foreign policy issues. According to Woods (2000), the US has increased pressure for influence at the replenishment negotiations from the 1990s onwards.

Moreover, the US has maintained its dominance in the World Bank because it has increasingly been willing to exercise power, while other countries have done little to resist US pressure, and because of the increasing soft power of the US. Concerning the latter, one study of professional staff in the Policy, Research and External Affairs Departments in 1991 showed that 62 per cent of employees with graduate-level education had their degrees from US institutions (Stern and Ferreira, 1997). The geographical location of the World Bank headquarters in Washington DC means that American players have privileged access to the Bank, all of which

combines to create a pressure for American ideas and values to influence decision-making processes in the Bank.

The presence of strong US influence, which is hardly doubted by anyone, does not necessarily imply that the US uses this influence actively to make the allocation of IDA funds deviate from the official allocation criteria described above. However, as mentioned in the introduction, anecdotal evidence suggests that it has sometimes influenced allocation criteria. Examples serve to illustrate that US political interests do sometimes override considerations of poverty alleviation and development in the loan-allocation policies of the World Bank in general and of IDA in particular. However, they do not provide systematic evidence.

III. A Brief Survey of the Econometric Literature

There is a large literature on the determinants of aid allocation in general. A survey is found in Neumayer (2003a), but most studies focus on bilateral donors, in particular the US, while only a few studies look at the World Bank.

Early studies of the influence of donors' political interests on aid allocation include McKinlay and Little (1979) and Maizels and Nissanke (1984). Both studies focus on the US and find that a set of political-interest indicators such as strategic and commercial ties are much stronger predictors of US aid allocations than a set of development-interest variables such as GDP per capita and the Physical Quality of Life Index. Among the many, more recent, studies, Schraeder, Hook and Taylor (1998) analyze the allocation of aid from the US, Japan, France and Sweden, and show that political-interest variables are significant for all four donors although different variables are important for different donors. Alesina and Dollar (2000) study a broad set of bilateral donors and find that political interests, measured by colonial history and voting similarity in the UNGA, are generally more important determinants of aid allocation than institutional and policy performance variables, such as the level of democracy and the degree of trade openness in the economy. With particular relevance for the present paper, Alesina and Dollar report that voting similarity with the US in the UNGA is significantly correlated with the allocation of US bilateral development assistance.

There is some debate as to whether policy and institutional performance play any role at all for bilateral aid allocation. Alesina and Dollar (2000) find that while they are less important than the political-interest variables, openness and democracy are significant predictors of aid allocation for some countries, including the US, but not for others. Svensson (2000) and Alesina and Weder (2002) find that there is generally no relationship between corruption and aid allocation. Neumayer (2003a) looks at all the important aid donors and investigates a broad set of institutional (or governance) variables, including democracy, human rights, corruption, military expenditure, rule of law and regulatory burden. He finds that none of these variables show a consistent pattern of significance across the group of bilateral and multilateral donors, although all of them are significant for some donors.

Studies of other multilateral agencies apart from the World Bank have indicated that these are often affected by the political interests of major contributors. Tsoutsopolides (1991) shows that aid allocation by the European Community (EC) from 1975 to 1980 is affected by colonial affiliation with the original six EC members.

Neumayer (2003b) reports that the Asian Development Bank, UNICEF and UNTA share a tendency of several bilateral donors of giving more aid to former colonies of large donor countries, although the opposite effect is found for The African and Inter-American Development Banks, and possibly for UNDP. Interestingly, he also finds that the UN agencies tend to counteract certain biases of bilateral donors. Whereas bilateral donors tend to give more aid to countries geographically close to themselves, the UN agencies give more aid the further away from the United States, Western Europe or Japan a country is located. Neumayer (2003c) also shows that the Arab-dominated multilateral aid agencies are affected by potential recipients' voting similarity with major Arab donors in the UNGA.[7] Furthermore, Islamic countries have a larger probability of receiving positive amounts of aid from these agencies.

Studies of the IMF have demonstrated that the probability of receiving IMF loans is affected by the political interests of the US and other major donors. In particular, Thacker (1999) shows that countries that move closer to the US policy stance on issues considered important by the US in the UNGA increase their probability of receiving loans. Barro and Lee (2002) show that voting similarity in the UNGA and intensity of trade with the US and major European shareholders significantly increases the size of IMF loans a country receives.

Turning to studies of the World Bank, Frey and Schneider (1986) provide an early example.[8] In a study of the determinants of IBRD loans as well as IDA credits, they find that both economic needs of the recipients and political interests of major World Bank shareholders are significant determinants of the Bank's allocation of funds in the period 1972–1981. Among donor-interest variables, they find that the amount of IDA funds received by a country is significantly related to its share in exports from the UK, France, the US and the Benelux countries, and to being a former colony of France, or being a country 'dominated' by the US.[9] Frey and Schneider also provide evidence in favour of the hypothesis tested in this paper: viz. that US political interests affect the allocation of IDA funds. These findings are not reproduced in more recent studies, however.

Burnside and Dollar (2000) find that World Bank aid is more sensitive to economic needs (measured by GDP per capita) and to an index of good policies than is the aid from bilateral donors; and that it is less sensitive to the strategic interests of donors (measured by regional dummies and a dummy for Egypt).

Dollar and Levin (2004) study the sensitivity of aid allocation to institutions and policy. They find that IDA, like many other donors, has become more sensitive to policies and institutions in the 1990s as compared to the 1980s. They also find that IDA is among the donors with the highest sensitivity to these factors. These results are found both when institutional- and policy performances are measured by the CPIA (the World Bank's own indicator, as discussed above) and when indicators produced independently of the World Bank are used.[10] No variables measuring the political interests of donors are included in the models of the paper, however. Only population and GDP per capita are controlled for.

Fleck and Kilby (2005), mentioned in Section I, find that US commercial interests influence the geographical distribution of total World Bank lending (measured as the sum of IDA, IBRD and IFC loans).

Finally, looking at the period 1991 to 2000 and using the model specification and data that we shall build upon in this paper, Neumayer (2003a) finds that IDA aid

allocations are responsive to GDP per capita, population and institutions in the form of human rights standards. Importantly, he finds that no donor-interest variables are significantly related to the allocation of IDA lending.

In sum, the small group of recent studies of World Bank lending tend to portray IDA as a donor institution, which is responsive to economic needs, rewards good policy and institutional performance, and as being unaffected by the political interests of major shareholders.

IV. Empirical Analysis

Data

In our empirical analysis we rely on a slightly expanded version of the Neumayer (2003a) data set. The dependent variable is ODA commitments (as opposed to ODA disbursements). One advantage of using commitments when attempting to explain the allocation of aid is that commitments are fully controlled by the donor, whereas disbursements partly rely on recipient behaviour. The dependent variable is then total aid committed (in real terms) to a given country.

The explanatory variables include measures of recipient needs, institution and governance indicators and donor interests. Recipient needs are captured by per capita income and a quality of life index. Indicators for institutions and governance include a combined freedom index (political rights and civic liberties) based on Freedom House data; a human rights index based on two political terror scales; a measure of corruption; a measure of rule of law; a measure of the regulatory burden imposed on the private sector; and the share of government expenditures spent on military purposes. Donor interests are captured by colonial status; a weighted average of donor countries' export to the recipient country, where weights are equal to the share of the donor's contribution in total DAC aid; the percentage of Christian people living in the recipient country; and, our variable of interest, a measure of political similarity based on voting behaviour in the UNGA.

Neumayer (2003a) relies on a broader political-similarity measure developed by Signorino and Ritter (1999) and compiled by Gartzke et al. (1999) using all UNGA votes (i.e., key votes and non-key votes). Neumayer does not find evidence of political influence using this measure. However, in our view this measure suffers from two drawbacks: First, by using voting behaviour on all UNGA resolutions, the political-similarity measure does not discern important votes from less important ones. Second, political similarity is a weighted average of voting coincidence with all DAC donors, which renders a direct interpretation somewhat difficult. Using voting similarity with the United States on key UN votes (calculated by dividing the number of identical key votes with the number of identical and opposite key votes) is in our view a more direct measure of political factors. Therefore, we employ this measure to study US influence on allocation of IDA lending. All variables and sources are further described in the Appendix.

In 2005 there are a total of 81 countries eligible for IDA funds. In this paper, we have data for 76 IDA countries over the period 1993–2000 in the most parsimonious

empirical specification. In our most elaborate specification, data coverage drops to 54 IDA countries; the reason is lack of publicly available data on institutional quality for a number of IDA countries.

Regression Results

The basic empirical specification used in this paper follows Neumayer (2003a), although we depart from the Neumayer study in several ways. First, we use levels of real ODA commitments as opposed to shares of total donations. The main reason for doing so is to avoid violating the adding-up constraint when using the log-transformation. Second, as explained above, we use the US State Department classification of key UNGA votes as our political-interest variable. Third, we include two additional allocation indicators: viz. external debt to GDP and trade openness (the sum of merchandise imports and exports relative to GDP). Finally, we estimate a Heckman sample-selection model to account for the eventuality of sample-selection bias. It should be noted that only six sample countries (out of 76) never received any IDA funds over the period.[11]

Estimation results are reported in Table 1. In all estimations, the explanatory variables are lagged one year, save the UN key-voting coincidence, which is lagged two years.[12] Column 1 in Table 1 excludes several variables in order to maximise country coverage.[13] Columns 2 and 3 include additional variables progressively and country coverage decreases accordingly; Column 4 is the OLS estimation of the model corresponding to Column 3.

Our main finding is that UN voting on key issues is positive and significant at 5 per cent in the specification with maximum country coverage (Column 1) and at 1 per cent in Columns 2 and 3. We interpret this as strong evidence in favour of the hypothesis that US political interests affect the allocation of IDA resources. Moreover, UN voting is insignificant at the selection stage in all estimations.[14] Finally, OLS on the selected sample (associated with Column 3) gives similar results to the selection-corrected estimation reported in Column 3.[15]

Several other results from Table 1 are noteworthy. The coefficient on log population is positive but significantly below one in all level estimations, indicating the often-found small-country bias. The log of GDP per capita is insignificant in all specifications. This is a result of the role of GDP per capita at the eligibility stage: since only poor countries are eligible for IDA lending, there is only limited variation in this variable. The physical quality of life is significant in Columns 2 and 3, but enters with the 'wrong' sign. Countries with a higher physical quality of life receive more aid, indicating that this variable should not be regarded as a measure of the need for aid, as in Neumayer (2003a), but rather as an indicator of good policies. Keeping GDP per capita constant, countries that achieve better performance in health and education are expected to have more effective, pro-poor policies. Among the indicators for institutions and governance, we repeat the finding in Neumayer (2003a) that the human rights variable is positive and significant. Political freedom is significant at 1 per cent in all regressions, but has the 'wrong' sign. Somewhat surprisingly, trade openness is insignificant. However, this is in accordance with other studies. Finally, the debt variable in Model 3 points towards that those countries with high debt ratios receive more aid. We interpret this as an indication of

Table 1. Heckit and least squares results for IDA commitments to developing countries

Dependent variable:	IDA commitments (log)			
	Heckit			OLS
Model:	1	2	3	4
Log (population)	0.449***	0.578***	0.649***	0.634***
	(0.087)	(0.122)	(0.113)	(0.091)
Log (GDP per capita)	0.037	−0.202	−0.195	−0.178
	(0.224)	(0.220)	(0.177)	(0.169)
Physical quality of life	0.007	0.011*	0.010*	0.012***
	(0.008)	(0.006)	(0.006)	(0.004)
Former Western colony	0.001	−0.002	−0.003	−0.001
	(0.004)	(0.003)	(0.003)	(0.003)
Log (DAC export to recipient)	0.102	0.037	0.060	0.026
	(0.106)	(0.120)	(0.110)	(0.093)
Percentage Christian	0.003	0.003	0.003*	0.001
	(0.003)	(0.002)	(0.002)	(0.002)
Political freedom	−0.099***	−0.110***	−0.095***	−0.046**
	(0.029)	(0.033)	(0.033)	(0.022)
Human rights		0.156**	0.137*	0.198***
		(0.079)	(0.075)	(0.068)
Military expenditures		0.004	−0.004	−0.004
		(0.012)	(0.010)	(0.007)
Trade openness		−0.224	−0.136	−0.336**
		(0.198)	(0.177)	(0.161)
External debt		0.118	0.104*	0.171***
		(0.074)	(0.062)	(0.053)
Corruption			0.200	0.052
			(0.178)	(0.134)
Rule of law			0.041	0.191
			(0.177)	(0.161)
Regulatory burden			−0.252	−0.020
			(0.174)	(0.129)
UN voting on key issues	0.782**	1.191***	1.208***	1.324***
	(0.382)	(0.404)	(0.444)	(0.395)
Constant	−4.113	−4.075	−5.288*	−4.371
	−2.911	−3.441	(3.153)	−2.860
Total number of observations	553	420	389	299
Number of uncensored observations	362	312	299	299
Number of countries	76	60	54	51

Note: Autocorrelation and heteroscedasticity robust standard errors in parentheses; Asterisks *, **, *** denote significantce at 10%, 5% and 1%, respectively.

the much discussed defensive lending by the IFIs in the 1980s and 1990s (*see* Birdsall et al., 2003).

Using the least squares result in Table 1 we look into the robustness of the impact of UN voting behaviour. In Figure 1 the horizontal axis shows the average UN voting behaviour for each country across time. The vertical lines indicates the overall average UN voting behaviour (0.53) and the central part of the distribution, i.e., the range covered by the distance of one standard deviation from the mean. The vertical axis shows the parameter estimates obtained when a

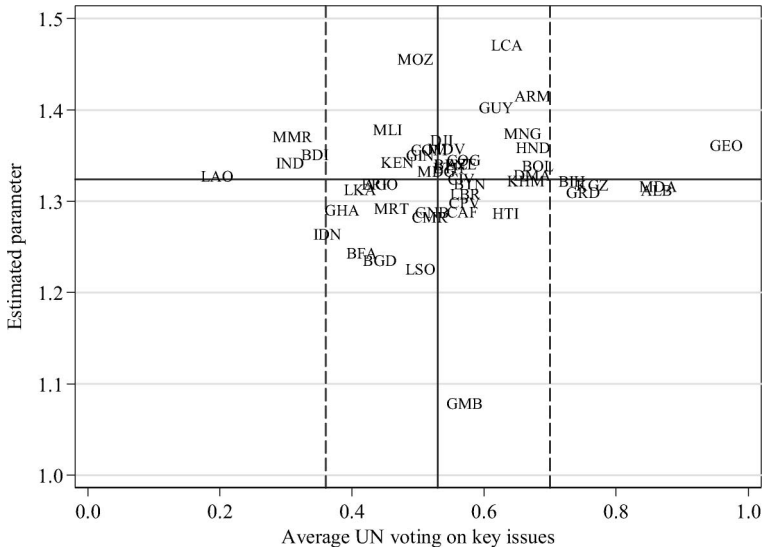

Figure 1. The estimated impact of un voting on key issues when countries are omitted one-by-one

country in the sample is excluded from the regression. The horizontal line represents the full sample estimate. As seen from Figure 1, the parameter estimates ranges from 1.08 when Gambia is excluded to 1.47 when St Lucia is the excluded country. In general, the point estimates are between 1.2 and 1.4 when the countries are excluded one-by-one, showing that the full sample result is not driven by a single country. This observation is confirmed by calculations of the scaled changes in the estimated impact of UN voting behaviour.[16] None of the scaled changes in the parameter estimate exceeds one in absolute value. Furthermore, it is clear from Figure 1 that extreme voting behaviour, such as Laos or Georgia, does not affect the estimated impact. In this sense the regression results are very robust to changes in the sample.

In conclusion, the results indicate that considerations of need and of the quality of institutions do matter for the allocation of IDA lending, but that US political interests also play a decisive role IDA lending. The next section addresses the economic importance of these factors.

Implicit Incentives in IDA Lending

Using the specification in Column 3 of Table 1, we can estimate the rewards associated with changes in the UN voting coincidence, the physical quality of life, and in human rights. These three variables are all significant in Column 3; they are all, at least to some extent, under the discretion of recipient governments; they are also insignificant at the selection stage (not reported); and finally, the correlations between the three variables are quite small whereby comparisons of counter-factuals in which the measures are changed one-by-one are empirically meaningful (see Table A2).[17]

In Table 2 we report three measures of the economic impact of changes in the three variables. In the last column in Table 2 we report the gain from a one standard deviation change in the explanatory variables – evaluated at the average level of IDA lending.

The UN voting coincidence variable is continuous on (0,1), where zero indicates no alignment with the US in the UNGA. The standard deviation of the UN voting variable is reported in Column 2 in Table 2. The reward facing an average country from a one standard-deviation increase in alignment with the US in the UNGA is an increase of approximately USD 33.8 million of ODA commitments from IDA.

Compare this to an improvement in the physical quality of life. This variable is continuous on (0,100), where one hundred is best. The estimated increase in IDA lending following a one standard-deviation improvement in the physical quality of life is an increase of USD 23.8 million.

Changes in the physical quality of life are probably harder to obtain than voting coincidence. Therefore, a comparison with human rights may be more interesting. The human rights variable is continuous on $(-5, -1)$, where minus one is the best and the sample average is -2.95. An increase in the human rights index of one standard deviation leads to an estimated reward of USD 17.8 million.

Interestingly, we find that an increase in voting alignment with the US in the UNGA on key issues is more important (in the sense of being more rewarding) than comparable increases in both human rights and the physical quality of life. Thus, in addition to statistical significance, the UN voting variable also has economic significance.

Robustness of the Interpretation of Key Votes

As described in Section II, IDA's official allocation criteria rely heavily on the policy and institutional performance of recipient countries, as measured by the Country Performance Rating (CPR), which is a combination of the CPIA index and the Annual Report on Portfolio Performance (ARPP) as described in Section III. Since none of the three indices are publicly available we cannot include these ratings in our model. Consequently one should worry that the UN voting variable is effectively a

Table 2. Estimated partial effects on IDA lending

	$\hat{\beta}$	sd(x)	$\widehat{\Delta \text{ODA}}$ USD million, 1995 prices
UN voting on key issues	1.208	0.20	33.8
Physical quality of life	0.010	17	23.8
Human rights	0.137	0.93	17.8

Notes: The estimated rewards are calculated as $\widehat{\Delta \text{ODA}} = \hat{\beta} \times \text{sd}(x) \times \overline{\text{ODA}}$ where sd(x) is a one-standard deviation change in x. Average ODA, $\overline{\text{ODA}}$, is USD 140 million (1995-prices) for IDA loans.

proxy for the CPR index – or for some aspects of it – and that may be the reason why we record a positive impact. However, there are strong indications that this should not be a cause for concern.

First note that the regressions in Table 1 contain a large number of institutional and policy variables, which may be expected to capture most of the variation in the CPR index; we show below that this is indeed the case. Second, the UN voting variable is much more significant when it is lagged two periods than when the one year lag or even the current value is used. This squares well with the story that commitments in year t are decided in year t-1, based on voting performance in year t-2. Related, if UN voting was merely a proxy for institutions and policies, we should not expect the twice lagged value to be a stronger predictor of aid allocation than the lagged or current value.

An even stronger argument can be made by looking at the variation in the voting behaviour and the institutional and policy variables across the CPR-2001 country quintiles.[18] Table 3 lists the means and standard deviations for the central variables in the regression model according to the CPR country quintiles, and the ANOVA F-test for equality of the means across the country groupings. Table 3 shows that the UN voting behaviour is not systematically related to the CPR country ratings. If anything, US alignment is far more pronounced in the second quintile compared to the top and bottom quintiles. In contrast, political freedom, the regulatory burden and the rule-of-law are all significantly related to the CPR in the way one would expect. In particular, the mean of these three indicators are decreasing systematically and significantly from the second to the fifth CPR quintile. Moreover, military expenditures are also (marginally) related to the CPR, with larger expenditure shares in the lower quintiles compared to the upper quintiles.

As we only have the CPR for 2001 we use averages over 1995–1999 for the UN voting behaviour, political freedom and the military expenditures.[19] Even though the CPR is expected to be very persistent over time (being mainly a function of the CPIA) the averaging may blur a systematic relationship between the UN voting behaviour and CPR. In order to look into this issue we use a set of other indicators of institutions and policies available from the World Bank for which we have data from 1996, 1998 and 2000. Specifically, Kaufmann, Kraay and Zoido-Lobaton (1999) and Kaufmann, Kraay and Mastruzzi (2003) have collected a large set of governance indicators from various sources, and summarised them in six indicators of different dimensions of governance using an unobserved components model. We refer to these measures as the KKZ indices. The six indices measure voice and accountability, political stability, government effectiveness, regulatory quality, rule of law and control of corruption. For several reasons, we expect them to capture a large part of the variation in the CPR index. First, since they originate from the same institution and are intended to measure broadly similar phenomena, we should expect them to be correlated. Second, the CPIA is listed as one of the sources of the KKZ indices. Specifically, the KKZ measures of government effectiveness, regulatory quality, rule of law and control of corruption all include some of the items from the CPIA index (Kaufmann, Kraay and Mastruzzi, 2003). Third, the KKZ indices are conceptually similar to the CPIA items, both focusing on rule-based, accountable, transparent and incorrupt government, and market-friendly

Table 3. Means and standard deviations of un voting, institutional and policy variables across IDA country performance ratings 2001

CPR Quintiles	UN voting on key issues average 1995–1999		Political freedom average 1995–1999		Military expenditure average 1995–1999		Regulatory burden (Time constant)		Rule-of-law (Time constant)		Corruption (Time constant)	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
1 (best)	0.466	0.126	−8.50	3.08	14.12	6.67	−0.134	0.586	−0.392	0.492	−0.520	0.474
2	0.563	0.162	−7.59	1.53	10.29	9.29	−0.344	0.405	−0.536	0.420	−0.486	0.259
3	0.490	0.194	−9.02	2.72	7.78	2.94	−0.140	0.389	−0.550	0.408	−0.607	0.430
4	0.423	0.124	−10.34	2.56	15.06	7.32	−0.486	0.760	−0.653	0.450	−0.382	0.432
5 (worst)	0.473	0.200	−11.56	1.99	17.44	12.95	−1.040	0.575	−1.193	0.503	−0.841	0.466
Total	0.486	0.168	−9.48	2.71	12.81	9.00	−0.445	0.633	−0.685	0.519	−0.576	0.432
ANOVA	1.30	[0.28]	4.76	[0.00]	2.44	[0.06]	5.20	[0.00]	5.20	[0.00]	1.98	[0.11]
Bartlett	4.86	[0.30]	5.08	[0.28]	20.61	[0.00]	6.34	[0.18]	0.68	[0.95]	3.80	[0.43]
Countries	70		55		55		55		55		55	

Source: The Country Performance Rating country quintiles are from IDA [*2002*].
Notes: ANOVA is the one-way analysis-of-variance, *F*-test for equality of the means across the quintiles. The *p*-value of the test statistic is reported in brackets. Bartlett is Bartlett's test of equality of variances across the quintiles. The test statistic is distributed as $\chi^2(4)$. The *p*-value of the test statistic is reported in brackets.

economic policies. As the KKZ indices are only available for 1996, 1998 and 2000 including them in our model would entail a severe loss of observations. Hence, instead, we use an indirect argument to show that the results on the importance of voting coincidence with the US on key issues would most likely not be affected if the KKZ variables were to be included.

Table 4 reports the means and standard deviations of the six KKZ indices across the CPR country quintiles, analogues to the results in Table 3. As seen, we find a very strong systematic association between the CPR country ranking in 2001 and the KKZ indices in 2000. This supports our hypothesis that the KKZ indices and the CPR are highly correlated measures.

Moving further to a comparison of the KKZ indices and the variables included in the regressions in Table 1, we report the sample correlations between the KKZ indices and our UN voting variable and of institutions and policies, using observations from 1996, 1998 and 2000 in Table 5. The table reveals two important pieces of information. First of all, the correlations between UN voting and the KKZ variables are very moderate in size suggesting that UN voting is a poor proxy for the CPR index. Second, the KKZ indices are all very highly correlated with one or more of the measures of policies and institutions included in our model. For example, the variable most highly correlated with UN voting, 'Voice and Accountability', has a correlation of 0.95 with the measure of Political Freedom included in our model. Moreover, notice that the pair wise correlations between the measures of Regulatory Burden (quality), Rule of Law, and Corruption are all in excess of 0.9, implying that we have almost perfect indicators. This means that most of the variation in the KKZ indices – and by implication most of the variation in the CPR index – is already accounted for by the variables included in our model.[20]

We take these results as a strong indication that most of the variation in the CPR index is captured in our model, and that it is not closely correlated with the UN voting variable. This strengthens the interpretation of the UN voting variable as an indicator of US political interests.

V. Concluding Remarks

Compliance with US political interests in the UNGA affects the allocation of aid flows to developing countries. This is well known from anecdotal evidence and backed by empirical work on USAID allocations and IMF lending. However, the World Bank, and in particular IDA, is by many perceived as a donor escaping strong US influence. Specifically, while US influence has been detected in empirical work covering the 1970s and early 1980s, none of the recent econometric studies of IDA lending, covering the 1980s and 1990s, have found significant effects of compliance with US policies using UNGA voting coincidence as the proxy for compliance.

In this paper, we have demonstrated that, when key votes (defined by the US State Department) are used to proxy compliance, it is possible to capture a statistically significant US influence on IDA lending. This result carries economic significance and is robust across different specifications. Moreover, our results are not influenced by the omission of the secret CPIA index.

Table 4. Means and standard deviations of KKZ indices 2000 across IDA country performance ratings 2001

CPR Quintiles	Voice and accountability		Political stability		Government effectiveness		Regulatory Quality		Rule-of law		Control of Corruption	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
1 (best)	−0.046	0.919	−0.510	0.879	−0.003	0.387	0.070	0.264	−0.205	0.495	−0.113	0.610
2	−0.035	0.614	−0.309	0.481	−0.442	0.396	−0.233	0.321	−0.461	0.274	−0.514	0.219
3	−0.466	0.681	−0.324	0.774	−0.537	0.378	−0.221	0.368	−0.614	0.321	−0.610	0.398
4	−0.474	0.771	−0.684	0.702	−0.620	0.455	−0.401	0.477	−0.726	0.251	−0.608	0.345
5 (worst)	−1.080	0.534	−1.408	0.794	−1.224	0.355	−1.14	0.732	−1.075	0.346	−0.964	0.339
Total	−0.420	0.797	−0.649	0.823	−0.565	0.553	−0.387	0.610	−0.616	0.447	−0.561	0.479
ANOVA	5.31	[0.00]	5.01	[0.00]	18.38	[0.00]	14.31	[0.00]	12.85	[0.00]	8.50	[0.00]
Bartlett	4.75	[0.31]	4.00	[0.41]	0.94	[0.92]	18.03	[0.00]	8.18	[0.09]	14.60	[0.00]
Countries	74		60		74		74		74		74	

Source: The Country Performance Rating country quintiles are from IDA [*2002*]. The KKZ indices are from Kaufman, Kray and Mastruzzi [*2003*].
Notes: ANOVA is the one-way analysis-of-variance *F*-test for equality of the means across the quintiles. The *p*-value of the test statistic is reported in brackets. Bartlett test is Bartlett's test of equality of variances across the quintiles. The test statistic is distributed as $\chi^2(4)$. The *p*-value of the test statistic is reported in brackets.

Table 5. Correlations between institutional and policy variables in the model and the KKZ indices

	Institutional and policy variables					
KKZ indices	UN voting (t-2)	Political freedom	Military expenditure	Regulatory burden	Rule of law	Corruption
Voice and accountability	0.34	0.95	−0.56	0.81	0.86	0.84
Political stability	0.02	0.70	−0.48	0.69	0.81	0.76
Government effectiveness	−0.10	0.69	−0.38	0.80	0.92	0.93
Regulatory quality	−0.07	0.75	−0.47	0.91	0.86	0.83
Rule of law	0.00	0.78	−0.41	0.82	0.97	0.93
Control of corruption	0.02	0.74	−0.37	0.79	0.92	0.95

Source: KKZ indices are from Kaufmann, Kraay and Mastruzzi [*2003*].

Acknowledgements

The authors thank two anonymous referees for their constructive comments on an earlier draft of this paper. Furthermore, the authors wish to thank Eric Neumayer for giving us access to his comprehensive data set on aid allocation. The usual caveats apply.

Notes

1. The report is a blueprint for reforming the IMF, the World Bank, and the other multilateral development banks. Allen H. Meltzer chaired the commission; Charles Calomiris was one of the eight members of the bipartisan majority who signed the report.
2. Related, work (in progress) by Axel Dreher and Jan-Egbert Sturm explores to what extent G7 countries have been able to buy votes from countries with IMF and World Bank money.
3. CPIA is the Country Policy and Institutional Assessment while ARPP is the Annual Portfolio Performance Rating. Both ratings are made by World Bank staff.
4. In the fiscal year 2004 the threshold was USD 865.
5. Although originally born in Australia, former World Bank President James Wolfensohn is a naturalised US citizen.
6. The nomination of candidates is considered sufficiently important by the US so that the task is undertaken by the White House, and not by the Treasury, which otherwise is responsible for most interactions between the US and the Bank (Fidler, 2001).
7. The Arab dominated aid agencies include the Arab Bank for Economic Development in Africa, the Arab Fund for Economic and Social Development, the Islamic Development Bank and the OPEC Fund for International Development.
8. Other early studies of World Bank aid allocation include Cline and Sargen (1975) and Isenman (1976).
9. Dominance is defined as the value of a country's export to the US relative to GNP (i.e., it is just trade dependence).
10. The authors have access to the CPIA data because they are at the World Bank.
11. IDA countries that did not receive any funds during the sample period include Afghanistan, Kiribati, Liberia, Myanmar, Samoa and Uzbekistan.
12. In Tables A2 and A3 in the Appendix we provide summary statistics of the variables used in the estimations and the correlation matrix.
13. There are no exclusion restrictions in the Heckman model; identification relies on the non-linearity of the model.

14. The selection equations are not reported but, naturally, they can be obtained from the authors on request.
15. A natural step further would be to ask whether the UN voting variable indicates that actual vote buying in the UN plays an important role for aid allocation, or whether it is a proxy for alliances with the US in a broader sense. In this paper, we leave this as an open question; see also endnote 2.
16. The scaled change, often denoted DFBETAS (Belsley, Kuhn and Welsch, 1980), is calculated as $\mathrm{DFBETAS}(i) = (b - b(i))/\mathrm{sd}(b(i))$, in which b is the full sample estimate and $b(i)$, $\mathrm{sd}(b(i))$ is the estimate and standard error, respectively, when country i is excluded from the sample. The scaled change is a t-like statistic. In Vellerman and Welsch (1981) it is suggested that statistics exceeding one in absolute value indicate influential data points.
17. Needless to say, in this comparison one should also consider the costs associated with changes in UN voting, quality of life and human rights to make it meaningful. However, we conjecture that the cost of changes in UN voting does not exceed the costs of changes in the two other variables.
18. The countries in each quintile are listed in Table A4 in the Appendix. Note that for the five variables using only 55 countries in Table 3 the loss is mainly in the first quintile in which we have only observations for 8 countries compared to 11, 13, 11, and 12 countries in quintiles 2-5. This probably explains why the mean of the first quintile is often lower than the mean of the second quintile. Hence, we conjecture that the systematic relationship is stronger in the population compared to our sample.
19. The regulatory burden, rule of law and corruption measures are time constant.
20. An important reason for the high correlations is of course that the measures in part build on the same surveys and polls. For example, the Freedom House indices of political rights and civil liberties, which we use as a measure of political freedom, is one of the components in the KKZ index of voice and accountability.

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Appendix

A. Description of variables, summary statistics and IDA country performance ratings

Table A1 provides a description of variables employed in the empirical analysis. All variables, except UN voting, IDA lending, debt and openness, are taken from Neumayer (2003a). Since this author provides a very detailed account of the data, we only provide the original source and a brief description. Neumayer should be consulted for further details.

Table A1. Description of variables and sources

Variable	Source	Description
Real IDA	World Bank (2002)	The amount of Real ODA commitments in millions of USD 1995 pledged by the International Development Association (IDA).
Population	World Bank (2001)	Population (not scaled).
GDP per capita	World Bank (2001) and WHO (2000)	GDP per capita in purchasing power parity units.
Physical quality of life	World Bank (2001)	Quality of life index ranging from 0 (worst) to 100 (best). It consists of three weighted components: literacy, infant mortality and life expectancy.
Former Western Colony	Alesina and Dollar (2000)	Number of years a country has been a DAC country colony in the period 1900–1960.
DAC exports to recipient	OECD (2002c)	Weighted measure of DAC countries' exports to a recipient country as a share of total exports. Weights equal the shares of respective donors DAC contribution.
US military grants	USAID (2002)	Percentage share of total US military grants a recipient country receives.
UNGA voting on key issues	US State Department (various years)	Voting coincidence on key UNGA issues as defined by the State Department. The measure ranges from 0 (no coincidence) to 1 (voting in complete accordance with the US).
Per cent Christian	La Porta et al. (2000)	Percentage of Christians in the population.
Political freedom	Freedom House (2000)	A combined freedom index based on adding the two Freedom House indices: political rights and civic rights. The combined index was reverted such that it ranges from -2 (best) to -14 (worst).
Human rights	Gibney (2002)	A combined human rights index based on adding the two Purdue Political Terror Scales (PTS). The combined index ranges from -1 (best) to -5 (worst).
Military expenditures	World Bank (2001), US Bureau of Arms Control (1995, 1998) and Encyclopedia Britannica (2001).	Percentage of government expenditure used on the military.

(*continued*)

Table A1. (*Continued*)

Variable	Source	Description
Corruption	Kaufman et al. (1999a,b)	Corruption is based on the graft indicator created by the World Bank. It is based on subjective measures of corruption obtained from surveys of residents and entrepreneurs within the country and polls of experts. The indicator is normalized such that is ranges from –2.5 (worst) to 2.5 (best), and has mean zero and a standard deviation of one.
Rule of Law	Kaufman et al. (1999a,b)	Measure of 'respect for law and order, predictability and effectiveness of the judicial system, and enforceability of contracts'. The indicator is normalized as the corruption indicator above.
Regulatory burden	Kaufman et al. (1999a,b)	Measure of the 'burden on business via quantitative restrictions, price controls and other interventions in the economy'. Normalized as above.
Openness	World Bank (2002)	Openness is the sum of merchandise exports and imports, measured in current US dollars, divided by the value of GDP in US dollars.
Debt	World Bank (2002)	Debt is debt owed to nonresidents repayable in foreign currency, goods, or services, divided by the value of GDP in US dollars.

Table A2. Summary statistics for the sample of IDA countries

	Mean	Std. deviation	Min	Max
Real ODA	140.38	192.43	0.21	1231.80
Population (million)	70.2	229	0.47	1125
GDP per capita	1653.07	880.55	436.07	4579.97
Physical quality of life	55.16	16.52	10	90
Former Western colony	40.76	25.80	0	60
ln (DAC export to recipient)	0.113	0.413	0.0002	2.91
Per cent Christian	26.16	31.22	0	99.1
Political freedom	−9	2.74	−14	−3
Human rights	−2.92	0.93	−5	−1
Military expenditures	11.40	7.23	0	53.26
Corruption	−0.54	0.39	−1.57	0.35
Rule of law	−0.52	0.45	−1.62	0.27
Regulatory burden	−0.25	0.51	−1.82	0.88
Openness	4.11	0.48	2.72	5.64
Debt to GDP	1.10	0.97	0.03	6.71
UN voting on key issues	0.52	0.20	0	1

Table A3. Correlation matrix for the sample of IDA countries

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1)	ln(population)	1.00													
(2)	ln(GDP per capita)	0.04	1.00												
(3)	Physical quality of life	0.15	0.67	1.00											
(4)	Former W. colony	−0.05	−0.43	−0.48	1.00										
(5)	ln (DAC export to recipient)	0.82	0.37	0.35	−0.11	1.00									
(6)	Per cent Christian	−0.24	−0.07	0.06	0.09	−0.15	1.00								
(7)	Political freedom	−0.21	0.08	0.16	−0.06	−0.13	0.18	1.00							
(8)	Human rights	−0.39	0.07	0.15	−0.07	−0.25	−0.05	0.38	1.00						
(9)	Military exp.	0.29	−0.04	−0.16	−0.05	0.19	−0.14	−0.39	−0.49	1.00					
(10)	Corruption	0.08	0.08	−0.01	0.23	0.10	0.00	0.07	−0.10	0.02	1.00				
(11)	Rule of law	0.27	0.22	0.25	−0.07	0.28	−0.18	0.13	0.20	−0.10	0.33	1.00			
(12)	Regulatory burden	0.29	0.17	0.26	0.11	0.40	0.24	0.39	0.16	−0.28	0.17	0.53	1.00		
(13)	Openness	−0.54	0.34	0.32	−0.08	−0.25	0.10	0.11	0.40	−0.25	0.03	0.03	−0.05	1.00	
(14)	Debt	−0.37	−0.13	−0.12	0.17	0.21	0.31	0.08	0.08	−0.19	0.02	−0.19	−0.04	0.34	1.00
(15)	UN voting on key issues	−0.49	0.16	0.08	−0.35	−0.37	0.09	0.27	0.19	−0.27	−0.04	−0.11	−0.14	0.25	0.06

Table A4. IDA country performance ratings 2001

First quintile	Benin, Bhutan, Cape Verde, Grenada, Honduras, India, Maldives, Mauritania, Rwanda, Samoa, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Tanzania, Uganda
Second quintile	Albania, Armenia, Bosnia and Herzegovina, Burkina Faso, Dominica, Ghana, Madagascar, Malawi, Moldova, Mongolia, Mozambique, Nepal, Pakistan, Senegal, Vanuatu
Third quintile	Eritrea, Ethiopia, Georgia, Guinea, Guyana, Indonesia, Kenya, Kirgyz Republic, Lesotho, Mali, Nicaragua, Niger, Vietnam, Zambia
Fourth quintile	Azerbaijan, Bangladesh, Bolivia, Cambodia, Chad, Comoros, Cote d'Ivoire, Gambia, The, Kiribati, Lao PDR, Nigeria, Sao Tome and Principe, Sierra Leone, Tonga, Yemen, Rep.
Fifth quintile	Angola, Burundi, Cameroon, Central African Republic, Congo, Dem. Rep., Congo, Rep., Djibouti, Guinea-Bissau, Haiti, Solomon Islands, Sudan, Tajikistan, Togo, Uzbekistan, Zimbabwe

CHAPTER 2:

Inequality and Party Capture: Theory and Evidence from South India

Thomas Markussen

Abstract. Political parties can be a driving force in economic and social development in poor countries. They can also serve as rent seeking instruments of exploitative groups. Uncovering how they function is therefore key to establishing the preconditions for good governance. I describe in a theoretical model how interactions between candidates for political office, rank-and-file party members and voters may lead to "party capture", defined as a bias of public policy in favor of members of the governing political party. In a sample of local governments in India, party capture is shown to exist and to be strongly affected by economic inequality.

JEL classification: D31, D72, H7, O1

Keywords: Decentralization; Political parties; Capture of government; Inequality; Poverty; India

1. Introduction[1]

What is the role of political parties in local governments in developing countries? Are they forces for social change, or vehicles of patronage? The significance of democratically elected local councils in the developing world has grown dramatically in recent decades, making it essential to understand how local governments work and what explains the wide differences in performance between them (Manor 1999, Bardhan 2002). Current debates about good governance at the community level tend to neglect the role of political parties, and instead focus on (other) non-governmental organizations, such as user groups or religious organizations. For example, in a recent, comprehensive review of the literature on community driven development, political parties are not mentioned at all (Mansuri and Rao 2004). However, parties continue to be key players in both local and national democracies almost everywhere, and knowing how they function is essential for understanding the preconditions for good governance.

This paper investigates the role of political parties in local governments by studying the phenomenon I term "party capture", defined as a bias of public policy in favor of members of the governing political party. The main contributions of the paper are (i) to investigate party capture theoretically, (ii) to show that it is empirically important in the context of local governments in India, and (iii) to demonstrate that party capture is strongly affected by economic inequality -- more unequal communities are more prone to capture.

Studies in political economy usually assume that political parties are monolithic actors. The theoretical part of the paper departs from this assumption by looking inside political parties and examining the interaction between candidates for political office and rank-and-file party members. I augment the model of interest groups and electoral competition developed by Baron (1994) and Grossman and Helpman (1996) to describe this interaction, and show how it affects candidates' policy-choice. Essentially, non-candidate party members offer support for the candidate's election campaign in return for policy favors. In equilibrium, this leads to party capture. The strength of party capture depends on how susceptible the electorate is to the influence of campaign activities. I argue that this susceptibility is higher in more unequal societies and derive the model prediction that party capture increases with inequality.

The implications of the model are tested on data from a survey of local governments and households in four South Indian states, namely Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. I exploit a data set collected by Tim Besley, Rohini Pande and Vijayendra Rao. My empirical

[1] I am grateful for comments from Anne Christensen, Kalle Moene, Eva Rytter Sunesen, Finn Tarp, Radu Ban and seminar participants at the Universities of Copenhagen, Oslo and Cornell. The usual caveats apply.

approach also ows a great a deal to the papers published by these authors based on the dataset, although my focus is different than theirs (Besley et. al. 2004, Besley, Pande and Rao 2005a,b).[2]

The operational definition of party capture is simply the strength of the partial correlation between membership in the party of the local government leader (the Pradhan) and beneficiary status in a policy program. An advantage of this measure is that both party membership and beneficiary status are fairly objective and easy-to-measure variables. This stands in contrast to more commonly used measures of the quality of governance, which are often based on informants' subjective judgments. For example, the "Governance Indicators" published by the World Bank rely "exclusively on subjective or perceptions based measures of governance" (Kaufmann, Kraay and Mastruzzi 2004, p. 19). As Esteban and Ray (2006) point out, such measures are vulnerable to bias stemming from "rationalizations" of the observed performance of an economy.

Results show that members of the Pradhan's party are more likely to benefit from an important poverty alleviation program than others, and that this effect is more important than other forms of nepotism, such as nepotism based on shared language, religion or place of living. The presence of a strong interaction effect between economic inequality and party affiliation is demonstrated. In equal communities the influence of party capture is negligible but in unequal ones it is strong and quantitatively important.

The paper is organized as follows: Section 2 reviews existing literature and section 3 presents the theory of party capture. Section 4 gives background information and presents the dataset, while section 5 sets up an econometric model and defines key variables. Section 6 provides descriptive statistics, and section 7 presents estimation results. This section first provides evidence on the existence of party capture and how it is affected by inequality and economic development. It then deals with endogeneity problems. Section 8 concludes.

2. Literature review

The paper relates to several different strands of literature. First, It distinguishes itself from the tradition of political economy which views political parties as monolithic actors and treats candidates for political office as more or less synonymous with the parties they represent. For example, the dominant approach to the analysis of government capture by special interests has been to focus on the influence of interest groups external to political parties such as labor unions, farmer groups and business lobbies (see Grossman and Helpman 2001). The analysis carried out here shifts

[2] The collection of these data was funded by the World Bank and DFID and directed by Tim Besley, Rohini Pande and Vijayendra Rao. I am highly grateful to these authors for giving me access to the data.

the focus to interactions within parties, namely those between candidates for political office and rank-and-file members. A few other studies have looked at intra-party interactions, but they differ from the present paper in several respects. Caillaud and Tirole (1999) assume, as is also done here, that candidates are "office seekers" (they only care about being elected), but they also assume that the rank-and-file are motivated by ideological values. In contrast, I propose that rank-and-file party members are classical "economic men" who are mainly concerned about maximizing their own welfare. The studies by Fleck (2001) and Roemer (2005) are other examples of studies looking inside political parties, but they both study the rivalry between different factions within parties instead of the candidate versus rank-and-file dimension, which is the focus of this study.

Second, The paper follows in the footsteps of other empirical studies of local government capture in developing countries, summarized by Bardhan and Mookherjee (2005, 2006). These authors provide an important contribution themselves in their comparison of national and local governments in a theoretical model. They find that the relative propensity to elite capture of local as compared with national governments depends on a number of institutional and socioeconomic factors, such as electoral systems and relative levels of inequality (Bardhan and Mookherjee 2000, 2002).

A number of recent, empirical studies have in different ways focused on capture of local governments in India. Foster and Rosenzweig (2001) study local government provision of infrastructure in an India-wide sample of rural communities (Gram Panchayats, or GPs). Some are democratically governed and some are not. Foster and Rosenzweig argue that the principal economic classes in rural India are the landowners and the landless, and they find that the introduction of local democracy reduces "elite capture", in the sense that it leads to more pro-landless public investment. In a similar vein, Bardhan and Mookherjee (2003) find that effective, political competition leads to pro-poor policies. They show in a study of local governments in West Bengal (a state in Northeastern India) that more equal vote shares between the two major political blocs (Congress and the Left Front) leads to higher levels of pro-poor land reform. Another indication of the potential for openness and democracy to improve targeting of public resources is provided by Besley and Burgess (2002). They show that government responsiveness to natural disasters is highest in those states of India that have the most well-developed news media.

Bardhan and Mookherjee (2006b) study the inter-GP and intra-village targeting of public resources to the poor in West Bengal and find that intra-village targeting of resources is only weakly affected by poverty, land inequality and caste composition. This leads them to conclude that there are few signs of elite capture within villages. On the other hand, they find that inter-GP

allocation patterns are negatively correlated with poverty and inequality. This indicates that central- rather than local government is captured by elites. They also investigate whether political favoritism affects inter-community allocations, but find no evidence in favor of this hypothesis. Bardhan and Mookherjee's findings on intra- and intervillage targeting echo the results of the Galasso and Ravallion (2005) study of a poverty reduction program in Bangladesh, which demonstrates that although intra-community targeting at the local level is not perfect, it is significantly better than the inter-community targeting achieved by central authorities (which amounts to virtually nothing). Galasso and Ravallion also show that intra-village, pro-poor targeting is negatively affected by inequality.

Several studies have investigated the effects of political reservation in the Gram Panchayats. For example, Chattopadhyay and Duflo (2001) find that GPs in West Bengal and Rajasthan, where the Pradhan position is reserved for women, prioritize resources differently than other GPs. Besley et. al. (2004) find (in the dataset used in the present paper) that programs are better targeted to scheduled castes and scheduled tribes in GPs reserved for these groups. We can interpret this as indicating that gender- and caste based capture can be reduced through institutional design.

Besley, Pande and Rao (2005a), again using the same dataset as here, find that GP politicians favor themselves and their fellow villagers in the allocation of public resources. For example, politician households are more likely than other households to benefit from the poverty alleviation program also studied in this paper (the BPL scheme). However, more educated politicians are less prone to nepotism. They also find that households affiliated with the local political leaders party are more likely than others to benefit from the program. However, this result is reported only in a footnote (p.24), without further discussion. I follow up on that result by (i) offering a theoretical discussion of party favoritism, (ii) including a number of additional, relevant control variables, and (iii) exploring interaction effects.

In sum, the literature on local government in India has in different ways dealt with government capture along lines of caste, class, gender and political position. However, apart from the footnote in Besley, Pande and Rao (2005a), capture along lines of party affiliation is unexplored.

Third, the focus on economic distribution places the paper in the large literature on the effects of inequality on economic development, which has recently been summarized in the 2006 World Development Report (World Bank 2005b). With the exception of Bardhan and Mookherjee (2006b) and Galasso and Ravallion (2005), none of the empirical studies of local government capture described above have investigated how capture is affected by inequality. However, in studies of

irrigation management and other collective action problems on the local commons (see Bardhan 1999, Dayton-Johnson 2000 and Khwaja 2002) and on the management of agricultural cooperatives (Banerjee et. al. 2001), it has been shown that inequality has an important effect on performance levels. This paper builds on these studies in its attempt to investigate the influence of inequality on good governance in the Gram Panchayats.

3. A Theory of Party Capture

The theory of party capture presented here is a version of the model of electoral competition and special interests developed by Grossman and Helpman (1996).[3] Bardhan and Mookherjee (2000, 2002) augmented this model in order to study local governments, and I follow their version of the theory closely. The innovation is to interpret the model in terms of interaction between candidates and rank-and-file party members, rather than interaction between candidates and external interest groups. In other words, I suggest we regard party organizations as a type of interest group.

3.1 Candidates

Consider a political jurisdiction in which two candidates, *a* and *b*, compete to win an election. The candidates simply maximize their probability of winning. The winning candidate selects a vector of policies, π. Candidates are able to commit credibly to a policy vector before the election.

3.2 Voters

There are N voters, indexed $i = 1,...,N$. Voters are divided into three groups, indexed $g = A, B, C$. Groups *A* and *B* are organized in political parties that support candidates *a* and *b*, respectively. To simplify the analysis, we assume that all members of groups *A* and *B* are members of their respective political parties, denoted party *A* and *B*. Group *C* is not organized. The decision to join a party is not modeled, but we can imagine that there are fixed economic and non-economic costs attached to being a party member, which explain why some people choose not to join a party. Alternatively, parties may restrict entry and allow only people with certain ethnic or economic characteristics to join, for example for reasons of trust. The population weight of group *g* is β_g. A representative voter in group g derives utility $U_g(\pi)$ from the policy vector π. In each group, a fraction of voters, α_g, is politically aware. They know the political platforms of the parties, and vote according to how these platforms are likely to affect their welfare. The complementary fraction, *1-*

[3] An important precursor to this paper is Baron (1994).

α_g, is impressionable. Impressionable voters either do not know the party platforms, or are unable to evaluate the potential impact of these platforms on their own well-being. They are therefore easily impressed by electoral campaigns. Assume that $\alpha_A = \alpha_B = 1$, that is, all party members are aware. Denote by $\alpha = \beta_A + \beta_B + \alpha_C\beta_C$ the fraction of the entire population who is aware. Aware voters base their vote on an evaluation of the candidates' policies, and on their preferences for exogenous characteristics of the candidates. These characteristics could either be policy positions that candidates are unable or unwilling to change, for example because of strong ideological attachment, or they could be personal characteristics. Thus, aware voter i in group g votes for candidate a if:

$$U_g(\pi^a) + \varepsilon_i + \lambda \geq U_g(\pi^b) \tag{1}$$

where ε_i is a voter-specific, fixed preference parameter. The candidates observe only the distribution of ε_i, not the individual values. Assume that ε_i is uniformly distributed on the interval $\left[-\frac{1}{2f}, \frac{1}{2f}\right]$. Then, the density of the distribution is everywhere f. ε_i is uncorrelated with group membership and awareness-status. λ is a general preference parameter, the value of which is realized only after candidates announce policies, but before the election. It is the unpredictable swing in relative candidate popularity that might take place in the run-up to an election, for example as a result of news-reports or rumors about the private lives of the candidates. Let $G(-\lambda)$ be the cumulated distribution function of $-\lambda$. The shape of this distribution is known to candidates at the time they set policy. Note that candidate a receives votes from both group A and group B. Hence, even though members of group B cannot join party A, some of them still vote for candidate a. This could result from the rule of the secret ballot. While party membership might be subject to severe social sanctions, voting is not, because it cannot be observed.[4]

Impressionable voters, on the other hand, base their vote only on preferences for the exogenous characteristics of candidates. These preferences, in turn, can be affected by campaign activity. Impressionable voter j votes for candidate a if:

[4] We can allow members of party A to be biased in favor of candidate a without changing the flavor of the result, for example by letting ε_i be distributed on $\left[m - \frac{1}{2f}, m + \frac{1}{2f}\right]$, $m > 0$ in party A (we could do the same for party B with $m < 0$). What matters is that the density of the distribution around the critical point that separates voters for candidate a from voters for candidate b is the same in the different groups, and that at least some members of party A vote for candidate b, and vice versa.

$$h(C^a - C^b) + \varepsilon_j + \lambda \geq 0 \tag{2}$$

Where C^k denotes campaign activity per member of the electorate in favor of candidate $k = a, b$, and h is a scalar representing the effectiveness of campaign activities. Note that h is a technological parameter. It measures, for example, how many voters one campaign worker can reach with the candidate's message (and bribes) in one day.

3.3 Parties

A crucial distinction is made in this model between those members of a political party who run for political office (the candidates) and the rank-and-file members who do not. In essence, the party functions as a marketplace where these two types of agents can trade campaign contributions for policy favors.

Rank-and-file party members can offer campaign contributions, but only to the candidate affiliated with their own party. In the model by Grossman and Helpman, campaign contributions are offered by external interest groups, and each interest group may contribute to both of the parties, and will in general do so. In the context of parties, however, it seems natural to assume that party members can only support the campaigns of candidates affiliated with their own party. However, if agents' motives for offering campaign contributions are purely instrumental, it is natural to ask why they should constrain themselves to supporting only one of the candidates. We can explain this either by assuming, as in Baron (1994), that each candidate is constrained in his choice of policies, and can only bias policy away from the campaign free outcome in the direction that his own party-members desire, and not in the direction desired by members of the competing candidate's party. For example, for reasons of ideology, reputation or credibility, it may not be possible for a working class party to offer extremely business-friendly policies. Alternatively, we can argue from the premise that candidates will only respond to promises of campaign support if they believe them. The credibility of promises may rely on social or economic ties between the candidate and the contributors. Therefore, it may not be possible for potential contributors to give credible promises of campaign contributions to all candidates (for example, members of party *A* might not be able to offer credible promises to candidate *b*).

Members of party *g* coordinate their actions to maximize the common utility function

$$G^k U_g(\pi^k) + (1 - G^k) U_g(\pi^{\square k}) - \frac{C^k}{\beta_g} \tag{3}$$

where G^k is the probability that candidate k wins the election, and the last term is the per-member level of campaign activity.

Party members offer to their candidate a contribution schedule, $C^k(\pi^k)$, which relates the level of campaign activity that party members are willing to supply to the policy vector chosen by the candidate. $C^k(\cdot)$ is a continuous and differentiable function.

The assumption that party members can coordinate on maximizing a common utility function and offering a common contribution schedule to the candidate is not trivial, but also not entirely unrealistic. First, all party-members are politically aware, and therefore realize that they will derive utility $U_g(\pi^k)$ from the policy vector π^k. Second, most political parties elect high-ranking party-officials who do not hold, or attempt to be elected to, any government office, and whom we can therefore imagine will represent party members in negotiations with candidates. It is possibly more realistic to assume that candidates bargain separately with each local branch of the party. This assumption would lead to a more complicated model, where each candidate faces multiple groups of potential contributors, in the form of party branches, and each of these branches takes into account not only the candidate's response to a contribution schedule, but also the responses of other branches. Fortunately, Grossman and Helpman (1996) show that the extension of the model to accommodate this assumption is relatively straightforward. Furthermore, it leads to results that are qualitatively similar to the ones obtained in the model where each candidate faces only one group of potential contributors. I will not pursue this strand of the argument further here.

3. 4 Equilibrium

The timing of the model is as follows: First, party members present contribution schedules. Then candidates set policy, and subsequently campaign activity and the swing factor are realized, and elections held. Finally, the winning candidate implements policy.

A candidate faces a trade-off between, on the one hand, pleasing aware voter and on the other, attracting campaign contributions that will allow him to capture votes from impressionable voters. In other words, when the party offers a contribution schedule to the candidate, it needs to take into account the candidate's participation constraint. The candidate's expected vote share must be at least as high if he accepts the contribution schedule as if he ignores the party and targets only aware voters. Essentially, the party determines the candidate's policy platform, subject to the participation

constraint. When this constraint is fulfilled with equality, party *A* induces candidate *a* to announce a policy vector, π^a, that maximizes the following expression:

$$\beta_A(1+\chi G^a)U_A(\pi^a)+\beta_B U_B(\pi^a)+a_C\beta_C U_C(\pi^a) \tag{4}$$

where G^a is the probability that candidate a wins the election, and $\chi = h(1-\alpha)$ is the product of the effectiveness of campaign activity, and the fraction of the electorate that is impressionable. The proof of (4) follows standard techniques and is given in appendix A. The expression shows that in equilibrium, party *A* induces candidate *a* to announce a policy vector which maximizes a weighted welfare function, with greater weight attached to the welfare of members of party *A* than to other citizens.[5]

π^a is only implemented if candidate a wins the election. Hence, (4) leads to the prediction that the allocation of public resources will be biased in favor of members of the governing party. Equally important, expression (4) implies that the size of this bias depends on campaign activity effectiveness *(h)* and on the weight of impressionable voters in the electorate *(1-α)*. These results are summarized in Proposition1.

> *Proposition 1:* In a democratic political jurisdiction, where candidates can commit credibly to policies before an election, and where a part of the electorate is susceptible to the influence of election campaigns, policy is biased in favor of members of the governing party. This bias increases with the share of impressionable voters in the electorate and with the technological effectiveness of campaign activity.

3.5 Determinants of awareness and campaign effectivity

There may be many determinants of χ. Here I shall focus on two fundamental characteristics of an economy that are potentially important, namely inequality and economic development.

Assume that the probability that a voter is politically aware is an upward-sloping, concave function of her wealth. The positive slope is explained by the fact that more well-off individuals are more likely to be educated, and to have access to media and other sources of information about politics, and that they are less likely to be affected by the small gifts and bullying techniques often

[5] It is assumed that the participation constraint binds. If it does not, members of party A are favored even more strongly (see Bardhan and Mookherjee 2002)

applied in political campaigns. The concavity of the function relies on the assumption that the likelihood of possessing the prerequisites for awareness increases more rapidly with wealth among the poor than among the rich -- for example because literacy rates or radio ownership are concave functions of wealth.[6] These assumptions imply that a mean preserving increase in inequality leads to a lower fraction of voters being politically aware. Hence, the fraction α of voters that are politically aware depends negatively on the level of wealth inequality.

The assumptions also imply that awareness is a positive function of economic development, as measured by average wealth in the community. The total effect of economic development on χ is unclear, however, because h, the effectiveness of campaign activities, might be higher in more developed regions where access to mass communication and transport is more widespread. Hence, as communities develop, two countervailing forces come into work. On the one hand, increasing education and access to information decreases susceptibility to propaganda. On the other hand, better infrastructure and media also make it easier to spread this propaganda.

In sum, we expect χ, and therefore party capture, to increase with inequality, while the expected effect of economic development is ambiguous.

4. Empirical setting and data

4.1 Background

The theory of party capture set out above is tested on data from a survey of local governments, villages and households in rural areas of the four southernmost states of India: Andhra Pradesh, Karnataka, Kerala and Tamil Nadu. The constitutional basis for decentralized government in India has existed almost since the country gained independence in 1947, although in most states local governments were extremely weak until 1993 when the constitution was amended to reinforce the importance of local level democracy. States were required to set up three layers of democratically elected councils at the District, Block and Gram levels, and to divert substantial amounts of tasks and funds to these new entities.

[6] As a somewhat casual test of this assumption, I take the dataset presented below and regress the number of times per week the respondent reads a newspaper (a proxy for political awareness) on an index of durable goods ownership (a proxy for wealth), and its square. In a model with village fixed effects, I find a positive coefficient on the linear term, and a negative coefficient on the squared term, both very statistically significant. The same patterns of results appear if land owned is entered instead of the durable goods index. This supports the assumption that political awareness is a concave funtion of wealth. For more evidence on the validity of the assumption, see Bardhan and Mookherjee (2002).

The data cover the lowest level of government, the Gram Panchayat (GP). A GP typically comprises between one and five villages, and has a few thousand inhabitants. The responsibilities of GPs vary between states, but in all states they serve at least two main functions. First, they provide public goods such as roads, street lights and water supply. Second, they select individual beneficiaries for state and federal welfare schemes (Besley et. al. 2005). It is this second function that we draw upon to investigate the effects of party capture.

The GP is subdivided into wards, and elections for GP councils are held at the ward level. The leader of the GP is called the Pradhan. In Andhra Pradesh and Tamil Nadu the Pradhan is elected directly, while in Karnataka and Kerala the elected ward representatives nominate the Pradhan. A council is elected for a fixed term of five years. Council members and Pradhans can seek reelection, but the same seat cannot be reserved for the same group in two consecutive elections.

A genuinely competitive multiparty democracy is functioning in all four states, at state as well as local levels. In no state is one party so dominant as to be able to effectively ignore competition from other parties. The Indian National Congress (INC) is a central player in at least three of the sampled states. The only exception is Tamil Nadu, where the INC has not controlled the state government for several decades and has few members in our sample. Apart from that, the politics of the four states are dominated by different parties. In Andhra Pradesh, the regional Telugu Desam Party is the major player, challenged only by the INC. In Karnataka, the main competitors of the INC are two other, national (as opposed to regional) parties, namely the Janata Party, and the Bharatiya Janata Party (BJP). In Kerala, the main parties are the INC and the Communist Party of India (Marxist). In Tamil Nadu, several regional parties compete for power, the principal ones being the Dravida Munnetra Kazhagam (DMK) and the All India Anna Dravida Munnetra Kazhagam (AIADMK).

Anecdotal evidence suggests that party capture is important in South India. Kerala is famous for its successful, participatory development strategy, but Platteau and Abraham (2002) report that the local government program in Kerala "suffers from an important weakness in that it has become a platform for political favoritism in a country plagued by excessive party politicisation down to the local level" (p. 126). In a similar vein, Tharakan (2004) concludes that "The evolution of modern Kerala society and politics resulted in a process of party-politicisation of associational life, which subjected it to the clientelistic principle of winning support by way of partisan favours". In Tamil

Nadu, the regional parties that dominate the state's politics are reported to have governed through "populist clientelism" (Subramaniam 1999, p. 69, quoted in Harriss 2001, p. 19).[7]

4.2 Dataset

Sampling took place in several stages. Districts were selected in pairs on either side of state borders, so that district pairs with similar historical and socioeconomic characteristics were selected. More specifically, pairs of districts from two states were chosen so that each were part of the same political entity before the restructuring of state borders in 1956. Hence, the sample is not representative at the state level. Rather, the strength of the sampling strategy is that it builds in controls for historical factors that might influence current outcomes. Nine districts were sampled (one district entered the sample twice) and subsequently a total of 201 GPs were sampled from these districts. In each of the GPs, all villages were sampled if the GP had no more than three villages. If there were more than three villages, the Pradhan's village and two randomly selected villages were sampled. In each village a survey was administered to about three local politicians: the Pradhan, the Vice Pradhan and an ordinary council member. Village surveys were conducted to obtain data on local, public infrastructure, land and caste distribution. In a random sample of 101 GPs, household interviews were conducted in all the sampled villages. In total, 544 politician households and 5,180 ordinary households were interviewed. At least four scheduled caste or scheduled tribe households were sampled in each village. For further information on the sampling strategy, see World Bank (2005a) and Besley, Pande and Rao (2005a,b).

For the purposes of this study, data on households, as well as Pradhans and villages are needed. Therefore, only those villages where household surveys were conducted are included in the analysis. I use the sample of politicians to construct variables such as whether respondents belong to the same party as the Pradhan, but I do not include the politician households in the sample used for estimation. The reasons are, first, that the sample is not representative of the GP population when the politician households are included - politicians are overrepresented (politician households are allowed to enter the sample of ordinary households, if they happen to be sampled). Second, the theory to be tested concerns the distribution of public resources among citizens who are not candidates for political office. It therefore seems appropriate not to include the sample of elected politicians.

[7] See also Chandra (2004). Based on the large role played by the state in the provision of services and jobs and on the high level of discretion enjoyed by officials in charge of distributing these, he describes India as a "patronage democracy".

5. Econometric model and variable definitions

To test the implications of the theory presented in section 3, several versions of the following regression model are estimated:

$$y_{ijh} = \gamma_1 P_{ijh} + \gamma_2 K_{jh} + \gamma_3 (P_{ijh} * K_{jh}) + \beta' x_{ijh} + \theta + \theta_k + e_{ijh} \quad (5)$$

where y_{ijh} is an indicator for household i in GP j in district h being a beneficiary of a public welfare program, which is described in detail below. P_{ijh} is an indicator for being a member of the same party as the GP Pradhan and K_{hj} is a proxy for the parameter χ in the model above. x_{ijh} is a vector of household characteristics thought to affect beneficiary status, such as official eligibility criteria, and proxies for α_g in the model above. θ is a constant, θ_k is a district or GP fixed effect, γ_1, γ_2, γ_3 and β are coefficients to be estimated, and e_{ijh} is a household specific random error term. e_{ijh} is allowed to be correlated across households within the same village, but assumed to be uncorrelated across villages. The model is in most cases estimated by OLS or 2SLS, even though the dependent variable is binary. First, it is easier and requires fewer assumptions to take account of endogeneity problems in linear models, as is done in section 7.3, than in non-linear models (Wooldridge 2002, chapter 15). Second, the estimated coefficients are more intuitive to interpret. As robustness checks, results from using a probit estimator are also presented.

I follow Besley, Pande and Rao (2005a) and use the allocation of Below Poverty Line (BPL) cards as the dependent variable. BPL-card holders gain access to a number of state and GP welfare schemes, such as the right to buy subsidized food from the federal public food distribution system, and access to GP administered housing and employment programs. Having a BPL card is estimated to increase the income of an agricultural laborer household by about 5 percent in the four sampled states (Besley, Pande and Rao 2005a). Choosing BPL card holders is one of the most important tasks of the GP. The GP is allocated a fixed quota of BPL cards from authorities at the district level. It is subsequently supposed to carry out a household survey to determine who is eligible for the program, and produce a preliminary list of eligible households. The list is then officially required to be finalized in a village meeting open to all citizens, a so-called Gram Sabha. However, these meetings are often not held, and only about 22 percent of the respondents in the survey have ever attended one. In practice the GP council members and officials, in particular the Pradhan, have

considerable discretion in choosing BPL beneficiaries. In sum, the dependent variable y_{ijh} is an indicator variable taking the value one if the household has a BPL card.

A household is defined as belonging to "the winning candidate's party", in the terminology of the theoretical model, if the household head is a member of the same party as the Pradhan. The measure of party capture applied is then the partial correlation between membership in the Pradhan's party and beneficiary status in the BPL program.

An important implication of the theoretical model presented above is that the amount of party capture depends on electorate susceptibility to electoral campaigns, $(1- \alpha)$, and on the effectiveness of campaign efforts, h, summarized in the parameter $\chi = h(1 - \alpha)$. The main proxy for χ used in the analysis is the level of land inequality in the GP. As argued in the theoretical section, $(1-\alpha)$ is likely to increase with inequality. Furthermore, high quality data on land inequality is available, since the village survey asked respondents to record the entire land distribution of their village. More precisely, respondents were asked to report how many households fall into each of the following brackets: no land, between 0 and 1 acres, between 1.1 and 5 acres, between 5.1 and 10 acres, between 10.1 and 25 acres, and above 25 acres. I estimate the GP landlessness rate and land gini coefficients by pooling the data from the sampled villages in each GP. The landlessness rate is readily calculated as the share of households falling in the "no land" bracket. To estimate the land gini, the interval midpoint value is assigned to each household in a bracket, and inequality is estimated.[8] I use other proxies for χ apart from land inequality, described further below.

6. Descriptive statistics

Table 1 presents descriptive statistics on the sampled households. Some 22 percent of households are BPL card holders. The fraction of households where the household head is a member of a political party is 31 percent. This is a remarkably high level of political participation. Calculations based on the 1990-91 World Values Survey show that in most Western countries, less than 10 percent of the adult population are party members.[9] This could simply reveal the presence of an unusually active civil society, which is not entirely unrealistic in the case of South India. However, it may also indicate that membership of a political party serves other functions than it does in the

[8] The last, open bracket presents a special problem. However, only one household in the entire sample is in this bracket. It is assigned the value 30 acres.

[9] For example, the share of the adult population belonging to a political party or group is 2.0 percent in Japan, 4.9 percent in Great Britain, 6.5 percent in Denmark and 14.5 percent in the United States (World Values Study Group, 1994).

Table 1 Descriptive statistics

	All households		Hh head party member	Hh head member of Pradhans party
Variable	*Mean*	*Std. Dev.*	*Mean*	*Mean*
BPL-card holder	0.22	0.41	0.36	0.42
Paid tax to GP in last 12 months	0.69	0.46	0.59	0.57
Hh head member of political party	0.31	0.46	1.00	1.00
Hh head member of Pradhan's party	0.14	0.34	0.44	1.00
Family political history	0.06	0.23	0.11	0.09
Same religion as Pradhan	0.83	0.37	0.82	0.83
Same caste group as Pradhan	0.64	0.48	0.65	0.65
Same mother tongue as Pradhan	0.65	0.48	0.69	0.67
Same village as Pradhan	0.36	0.48	0.42	0.45
Gram Panchayat gini of cultivated land	0.63	0.15	0.66	0.65
Gram Panchayat landlessness rate	0.37	0.22	0.43	0.42
Scheduled caste or scheduled tribe	0.23	0.42	0.24	0.24
Head's education (years)	3.42	4.14	3.72	3.14
Agricultural land owned (acres)	2.07	4.38	1.79	1.55
Hh size	5.33	2.39	5.30	5.27
Age of household head	49.10	13.81	47.95	47.53
Dependency ratio	0.29	0.22	0.28	0.28
Durable goods (index)*	11.67	13.01	12.70	11.54
Female household head	0.12	0.32	0.09	0.08
Hh head unmarried	0.01	0.12	0.02	0.02
Hh head divorced	0.01	0.07	0.01	0.01
Hh head widowed	0.13	0.33	0.10	0.08
Farmers as a share of all workers, 1991 (m)	0.46	0.21	0.37	0.38
Farmers as a share of all workers, 1991 (f)	0.28	0.22	0.19	0.21
Main source of income:				
Selfemployment in agriculture	0.36	0.48	0.32	0.30
Agricultural labor	0.25	0.43	0.22	0.24
Casual labor (coolie)	0.18	0.39	0.23	0.25
Permanent wage labor	0.07	0.26	0.08	0.06
Selfemployment in non-agriculture	0.06	0.24	0.06	0.07
Rents, remittances, interests, pensions etc.	0.02	0.15	0.03	0.03
Other	0.04	0.20	0.04	0.04

Note: N = 5,180.

*This variable is a weighted sum of the durable goods owned by the households. I have not had access to price data which I could use to construct weights, and the weights are therefore based on casual estimates of relative value (This method was also used by La Ferrara (2002) for constructing a key asset inequality variable for a sample of Tanzanian households. For overlapping goods, my weights are roughly proportional to hers). The weights are: Pressure cooker, fan, bicycle, pressure lamp, desert cooler: 2, Radio, transistor, cassette player: 3, Watch, black and white TV: 4, Sewing machine, music system, color TV, autorickshaw, refrigerator, freezer, washing machine, camera: 5, Motor cycle, moped, telephone set: 6, Motor car: 7.

textbook model of democracy, for example by easing access to public resources. Only about half of party members are members of the same party as the Pradhan.

There is considerable variation in land distribution among communities. The GP Gini coefficient of cultivated land has a mean of 0.63 and a standard deviation of 0.15. The GP landlessness rate has an average of 0.37 and a standard deviation of 0.22. 61 percent of households rely on either self-employment in agriculture or agricultural labor as their main sources of income. Another 18 percent rely mainly on casual labor (day labor), which is also typically work in agriculture. Only 13 percent of households derive most of their income from permanent wage labor or non-agricultural enterprises. A closer look at the occupations of members of these households reveals that they are mainly employed in traditional crafts and services, petty trade and teaching. In sum, these are rural communities and it is meaningful to use land inequality as our indicator of economic inequality.

Table 1 also presents descriptive statistics specifically for members of political parties, and for members of the Pradhan's party. As predicted in the theoretical model, party members, particularly members of the Pradhan's party, are much more likely than the average household to benefit from the BPL program. This key result is explored further in section 7.1. Otherwise the table does not reveal any dramatic differences between party-member households and other households. Members of the Pradhan's party have somewhat smaller average landholdings than the average household and are a little more likely to report casual labor as their main source of income. This suggests that they are slightly poorer than the average household, which could in itself be a reason why they receive more BPL cards. To take account of this possible effect, landholding size, main source of income, and other proxies for poverty are included in the regressions reported below.

7. Estimation results

7.1 Existence of party capture

Table 2 shows the results of estimating (5) with γ_2 and γ_3 constrained to zero. In the first four columns, a linear probability model is applied, while the last column shows the results of estimating a probit-model. The first column shows the same result as the first line in Table 1, namely that there is a strong bivariate correlation between membership of the Pradhan's party and BPL beneficiary status. Members of the Pradhan's party are much more likely to be beneficiaries. Columns 2 to 5 investigate whether this relationship is robust to the inclusion of control variables.

Table 2: Party affiliation and beneficiary status in a poverty alleviation program

	Dependent variable: Household has BPL card				
	OLS	OLS	OLS	OLS	Probit^
Member of Pradhan's party	0.231	0.136	0.061	0.061	0.054
	(6.49)***	(4.39)***	(2.74)***	(2.74)***	(2.60)***
Member of other party		0.058	0.017	0.018	0.012
		(2.55)**	(0.95)	(0.94)	(0.64)
Family political history		-0.048	-0.037	-0.039	-0.046
		(2.38)**	(1.94)*	(1.99)**	(1.93)*
Scheduled caste/scheduled tribe		0.141	0.113	0.112	0.159
		(5.09)***	(6.29)***	(5.76)***	(6.45)***
Education of head in years		-0.001	-0.003	-0.004	-0.004
		-0.41	(2.05)**	(2.94)***	(2.01)**
Agricultural land owned, acres		-0.001	-0.002	-0.002	-0.019
		-0.99	(1.88)*	(2.33)**	(4.98)***
Household size		0.006	0.009	0.008	0.011
		(2.30)**	(3.71)***	(3.29)***	(3.98)***
Age of head		0.001	0.001	0.001	0.001
		(1.51)	(1.71)*	(1.35)	(2.35)**
Dependency ratio		-0.094	-0.100	-0.093	-0.108
		(4.00)***	(4.76)***	(4.48)***	(4.29)***
Index of durable goods ownership		-0.003	-0.003	-0.003	-0.003
		(4.66)***	(6.24)***	(6.02)***	(4.44)***
Female household head		0.057	0.045	0.04	0.063
		(2.54)**	(1.95)*	(1.66)*	(1.70)*
Head never married		0.034	0.045	0.018	0.046
		(0.72)	(1.00)	(0.38)	(0.99)
Head divorced or separated		-0.009	-0.004	0.003	-0.037
		(0.13)	(0.05)	(0.03)	(0.48)
Head widowed		-0.06	-0.043	-0.038	-0.053
		(2.55)**	(1.92)*	(1.67)*	(1.82)*
Main source of income (rfc: selfemployed in agric.)					
Agricultural labor		0.048	0.057	0.052	0.055
		(2.42)**	(3.51)***	(3.14)***	(2.53)**
Casual labor		0.12	0.135	0.134	0.11
		(4.94)***	(6.65)***	(6.60)***	(4.76)***
Permanent wage labor		-0.057	-0.037	-0.034	-0.053
		(2.53)**	(1.79)*	-1.62	(1.98)**
Non-agricultural enterprise		0.054	0.057	0.057	0.062
		(1.79)*	(2.24)**	(2.20)**	(1.98)**
Rents, pensions, remmittances etc.		-0.027	-0.013	-0.003	-0.019
		(0.70)	(0.37)	(0.08)	(0.40)
Other		0.034	0.023	0.02	0.013
		(0.93)	(0.86)	(0.74)	(0.37)
Same religion as Pradhan				0.042	0.030
				(2.20)**	(1.64)
Same caste-group as Pradhan				0.009	0.03
				(0.45)	(1.42)

(Table 2 continued)

Same mother tongue as Pradhan				-0.014	-0.018
				(0.99)	(1.06)
Same village as Pradhan				0.005	0.000
				(0.37)	(0.02)
Constant	0.184	0.119	0.136	0.105	
	(13.15)***	(3.67)***	(5.41)***	(3.03)***	
Fixed effects	None	District	GP	GP	GP
Observations	5,180	5,140	5,140	4,860	4,860
R-squared	0.04	0.22	0.36	0.36	

t statistics in parentheses. Standard errors are adjusted for clustering at the village level.
* significant at 10%; ** significant at 5%; *** significant at 1%
^Marginal effects reported

First, as discussed above, we might worry that membership of the Pradhan's party is merely a proxy for the official eligibility criterion for participation in the program, which is poverty. To take account of this objection, a number of variables known to be correlated with poverty are introduced, namely: (i) whether the household belongs to a scheduled caste or a scheduled tribe, (ii) education of the household head in years, (iii) amount of agricultural land owned by the household, (iv) household size, (v) age, gender and marital status of the household head, (vi) dependency ratio (defined as the number of household members below 15 or above 65 divided by the total household size), (vii) an index of durable goods ownership, and (viii) dummies for the household's main source of income. When these variables are introduced, most of them have the expected sign, and many are significant. The only surprising result is that a higher dependency ratio decreases the probability of being selected for the program. As noted by Besley, Pande and Rao (2005) the significant effect of variables correlated with poverty indicates that, even if various sorts of capture exist, GPs do in fact achieve some amount of targeting.

Second, we can imagine that membership of the Pradhan's party functions as a proxy for being a politician in the GP council. As described in section 2, Besley, Pande and Rao (2005a) show that politician households are significantly more likely than other households to be program beneficiaries, and surely politicians are more likely than others to be members of the Pradhan's party. We therefore introduce a variable measuring whether a member of the household's family holds or has held a political position ("members of the family" are not necessarily members of the household). This variable enters with a negative coefficient.[10]

[10] Besley, Pande and Rao (2005a) include the sample of elected officials in their estimation sample, whereas I do not. They find that households with members who are currently GP politicians are more likely than others to be program

Third, for the results to be in line with the theory presented, I have to check that membership of the Pradhan's party is more beneficial than membership of other parties. A dummy for being a member of other parties than the Pradhan's is therefore introduced. This variable enters with a positive sign, and it is significant in some specifications. This indicates that members of other parties are not discriminated against. In light of the theory, the positive coefficient can be read as a sign that party members are less susceptible to the influence of election campaigns than others, as assumed in the model, and are therefore given relatively high weights in the candidates' optimization problems. The point estimate of the coefficient on membership of other parties is in all specifications much lower than the coefficient on membership of the Pradhan's party, as the theory predicts. In formal tests (t-tests) of the hypothesis that the coefficients on the two variables are the same, the null hypothesis of equal coefficients is always rejected (although in one case only at the 10 percent level).

Fourth, it is possible to imagine that membership of the Pradhan's party is a proxy for other kinds of affiliation with the Pradhan, such as shared caste, religion or language, and that BPL card allocation takes place according to these characteristics rather than party membership. To test this hypothesis, I introduce dummies for sharing religion, language, caste-group and village of residence with the Pradhan. The caste group variable simply distinguishes between scheduled castes and tribes, and other castes. It takes the value one if the household belongs to the same of these two groups as the Pradhan. This is a very rough simplification of the complex system of castes in India. Unfortunately, I was unable to construct a more detailed measure. The introduction of these variables does not decrease the coefficient on membership of the Pradhan's party. The coefficients on the variables are always smaller than the coefficient on membership of the Pradhan's party, although the hypothesis that the coefficients on membership of the Pradhan's party and same religion as the Pradhan are equal cannot be rejected according to statistical criteria. Same religion as the Pradhan is significant in both specifications in table 2, and although this result is not robust to the additional variables introduced in tables 3 and 4, this gives some indication that favoritism along religious lines plays a role in the Panchayats. On the other hand, there is no evidence of favoritism along linguistic, caste-group or village lines.

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beneficiaries. My results, on the other hand, show that households where someone in the (extended) family is or was a politician are less likely than other to benefit. The difference between the results could be explained by the fact that the tendency for politicians to be from an economically privileged background was stronger in the past than it is today (in part because of the reservation system). In other words, the "family political history" variable should possibly be interpreted as a proxy for poverty. When I add the sample of elected officials to my estimation sample, the effect of membership of the Pradhan's party remains positive and significant in all specifications.

Finally, to control for unobservable characteristics at the state, district or GP level, such as the total number of BPL cards allocated to districts and GPs, district- and GP fixed effects are introduced.

The sign and significance of the member of Pradhan's party-variable is robust to the inclusion of all these controls, although the point estimate drops as more variables are introduced. The most substantial drop occurs when GP fixed effects are introduced (in column three). One way to interpret this result is that party favoritism plays a role not only when GP councils allocate BPL cards among individuals, but also when quotas of cards are allocated from states to districts and from districts to GPs. If leaders at state- and district levels give out more cards to GPs with many members of their own party than to other GPs, and if there is a correlation between the electoral fortunes of parties at GP- and higher levels, then the member of Pradhan's party variable might partly pick up the effect of living in a GP with many members of the same party as the district- or state leader. I test this hypothesis by adding a variable to the model in column 2 measuring the share of respondents in a GP belonging to the same party as the Chief Minister of the state.[11] This variable enters with a coefficient of 0.439 and is highly significant (t=3.50). The coefficient on member of the Pradhans party drops from 0.136 to 0.094, but remains significant (t=3.85). These results indicate that party capture is present at the central as well as the local level.

Member of the Pradhan's party is also significant and positive in both the linear probability- and the probit models. In the linear probability model with all controls included (column 4), members of the Pradhan's party are estimated to be six percentage points more likely to be selected as beneficiaries than others. Since 18.4 percent of non-members of the Pradhan's party are beneficiaries, this means that joining the Pradhan's party increases a household's probability of being selected by approximately 32 percent (0.061 divided by 0.184). The results correspond with the footnoted result in Besley, Pande and Rao (2005a, p.24) mentioned in section 2. Possible endogeneity of the member of Pradhan's party variable is discussed in section 6.3.

7.2. Determinants of party capture

The theory presented in section 3 suggests that party capture will not be the same everywhere. In particular, it will be higher where the productivity of campaign activities (h in the model) is high, and susceptibility to the influence of electoral campaigns $(1-\alpha)$ is low. In the model, these factors

[11] The chief ministers in the four states in 2002 were: C. Naidu (TDP) in Andhra Pradesh, S.M. Krishna (INC) in Karnataka, A.K. Antony (INC) in Kerala and O.Paneerselvam, followed by J. Jayalitha (both AIADMK) in Tamil Nadu.

were summarized in the parameter $\chi = h(1- \alpha)$. In this section, several different proxies for χ are introduced and interacted with the member of Pradhan's party-variable.

In section 3 it was argued that inequality is likely to increase susceptibility to campaign influence, and that party capture would therefore be more pronounced in more unequal communities. On the other hand, it was argued that the expected effects of economic development on party capture are ambiguous, because economic development tends to decrease the susceptibility to propaganda, but might also increase the productivity of campaign activities.

Tables 3 and 4 show the results of entering proxies for χ, interacted with the member of Pradhan's party-variable, into the BPL-allocation model.

Table 3: Determinants of party capture (a)

(Land gini as measure of inequality)

	Dependent variable: Household has BPL card				
	OLS	OLS	OLS	OLS	Probit^
Member of Pradhan's party	-0.229	0.043	0.04	-0.208	-0.095
	(2.84)***	(0.67)	(0.68)	(2.53)**	(1.50)
Member of Pradhan's party*Land gini	0.568			0.690	0.514
	(4.23)***			(4.04)***	(4.06)***
GP land gini	-0.225			-0.257	-0.261
	(2.61)***			(2.92)***	(2.98)***
Member of Pradhan's party*GP education level		0.026		-0.009	-0.026
		(1.60)		(0.38)	(1.09)
GP education level		0.012		0.020	0.025
		(0.85)		(1.21)	(1.36)
Member of Pradhan's party*GP dur. good index			0.008	-0.005	-0.001
			(1.82)*	(0.68)	(0.21)
GP durable goods index			0.001	-0.001	-0.003
			(0.34)	(0.15)	(0.60)
Constant	0.248	0.083	0.108	0.211	
	(3.94)***	(1.35)	(1.81)*	(2.85)***	
Control variables as in table 2, col. 4	Yes	Yes	Yes	Yes	Yes
Fixed effects	District	District	District	District	District
Observations	4,860	4,860	4,860	4,860	4,860
R-squared	0.24	0.23	0.23	0.24	

t statistics in parentheses. Standard errors are adjusted for clustering at the village level.
* significant at 10%; ** significant at 5%; *** significant at 1%
^Marginal effects reported.

Table 4: Determinants of party capture (b)

(Landlessness as measure of inequality)

	Dependent variable: Household has BPL card		
	OLS	OLS	Probit^
Member of Pradhan's party	-0.038	0.022	0.053
	(0.97)	(0.35)	(0.74)
Member of Pradhan's party*GP landlessness	0.430	0.494	0.337
	(4.34)***	(4.02)***	(3.85)***
GP landlessness	-0.189	-0.209	-0.207
	(2.76)***	(2.98)***	(3.12)***
Member of Pradhan's party*GP education level		-0.016	-0.028
		(0.64)	(1.16)
GP education level		0.021	0.025
		(1.30)	(1.44)
Member of Pradhan's party*GP dur. good index		-0.002	0.001
		(0.29)	(0.25)
GP durable goods index		-0.001	-0.003
		(0.20)	(0.61)
Constant	0.168	0.117	
	(3.99)***	(1.90)*	
Control variables as in table 2, col. 4	Yes	Yes	Yes
Fixed effects	District	District	District
Observations	4,860	4,860	4,860
R-squared	0.24	0.24	

t statistics in parentheses. Standard errors are adjusted for clustering at the village level.
* significant at 10%; ** significant at 5%; *** significant at 1%
^Marginal effects reported.

The two different measures of inequality described above - the land gini (table 3) and the landlessness rate (table 4) - are used. Furthermore, the average education of the household head in the GP and the GP average of the durable goods index are entered as measures of economic development. The regressions include the same controls as in columns 4 and 5 of table 2. To save space, the estimated coefficients on the control variables are not shown. In order to not loose the main effects of the GP-level measures inequality and development, district fixed effects are used instead of GP fixed effects. GP fixed effects are reintroduced in table 5.

The first column of Table 3 reveals a significant and numerically strong, positive interaction between membership of the Pradhan's party and the land gini. In fact, the model predicts that in completely equal communities (land gini = 0) there is a significant negative effect of being a member of the Pradhan's party (The coefficient on the same-party-as-Pradhan main effect is

significant and negative). However, no GPs in the sample are close to complete equality, and we should not attach too much significance to this result. What we should emphasize is this: As GPs become more unequal, party capture is predicted to increase rapidly. Party capture is estimated to be positive in GPs with a land gini above 0.4. Note from Table 1 that the average land gini is 0.63.

In column 2 and 3 the average education level of household heads in the GP and the GP average of the durable goods index, respectively, and the interactions between these variables and membership of the Pradhan's party are entered. The coefficients on both interaction terms are positive, and the interaction between the GP-durable goods index and membership of the Pradhan's party is significant at the ten percent level.

In column 4 all the interaction terms (and main effects) are entered in the same regression. The result is that the interaction between inequality and membership of the Pradhan's party remains significant and strong, while the two other interaction terms are now completely insignificant. This pattern is repeated in column 5, where a probit model is estimated. It is also repeated in table 4, where landlessness is used as the measure of inequality instead of the land gini. As stated in the introduction, this is a main result: Party capture is much stronger in unequal than in equal communities. On the other hand, there is no evidence that it is affected by levels of economic development. In the following sections I focus on further testing the robustness of the inequality-interaction.

7.3 Endogeneity

We might worry that both of the key explanatory variables, membership of the Pradhan's party and land inequality, are endogenous. First, membership of the Pradhan's party could be affected by BPL beneficiary status if beneficiaries tend to join the Pradhan's party out of gratitude for receiving the BPL card, or because they read the benefits as a signal of the party's competence. Note, however, that since the resources to which BPL card holders gain access are not procured by the GP, but by higher level authorities, the only issue of 'competence' concerns the GPs ability to obtain a high number of cards from these authorities. If the total number of cards available to the GP is public knowledge, it should affect the judgments of card-holders and others about party competence in the same way, and therefore not give rise to endogeneity problems.

Still, one would ideally like to find an instrument for membership of the Pradhan's party to be able to test these alternative explanations. I have attempted to use a number of variables measuring other kinds of affiliation with the Pradhan than party membership as instruments. They include

affiliation based on language, caste-group, village of residence, occupation and main source of income. However, none of these come close to passing standard tests of instrument relevance.[12] Instead, I shall rely on the reported interaction effects in arguing against the interpretation that membership of the Pradhan's party is endogenous. While it is not entirely implausible that some households would join the Pradhan's party because they are grateful for receiving benefits, or read the benefits as a signal of competence, there seems to be no reason why this effect should be much stronger in unequal than in equal communities. On the other hand, the inequality interaction is coherent with the model of party capture laid out in section 3. Hence, the significant interaction between membership of the Pradhan's party and inequality favors the theory of party capture over alternative theories.

Second, inequality could be endogenous. I claim that inequality leads to capture, but higher levels of capture may also reinforce inequality. I take account of the possible endogeneity of inequality by instrumenting current inequality with proxies for inequality in 1991 obtained from the 1991 Census of India. The Census did not collect information on land distribution, but it did include a classification of full-time workers according to industrial categories. In particular, the Census makes it possible to distinguish between people working on their own farm and other workers. I assume that workers employed on their own farm as a share of all workers is a good proxy for land inequality in 1991. The reason is simple. If land is equally distributed, many people will be small farmers, working on their own farm. On the other hand, if many households have no or only very little land (i.e. land inequality is high), many people will be working mainly on other people's farms, or outside agriculture.

The share of workers employed on own family farms can be calculated for both women and men, and I use both these variables as instruments for inequality in 2002. Furthermore, because I have interacted inequality with membership of the Pradhan's party, I also use as instruments the interactions between membership of the Pradhan's party and the shares of workers employed on own farms.

Table 5 reports the results of this exercise, using both the land gini and landlessness rate as inequality measures, with district- and GP fixed effects. In the estimations with GP fixed effects, the main effects of inequality drop out because they are measured at the GP level. In all columns, the interaction between membership of the Pradhan's party and inequality remains significant and

[12] In this exercise (using 2SLS), the coefficient on membership of the Pradhans party in fact rises to 0.43. However, it is very imprecisely estimated, and not significant. The instruments pass the Hansen J test of exogeneity, but the F-statistic for the test of joint significance of the instruments is only 1.71 (p=0.14).

positive. t-statistics and point estimates are lower than in the OLS models (the interaction with landlessness in the model with district fixed effects is only significant at the ten percent level) but the interaction effects are still numerically important.

Table 5 Party capture and inequality – 2SLS estimation

	Dependent variable: Household has BPL card			
	IV	IV	IV	IV
Member of Pradhan's party	-0.106	-0.137	0.034	-0.024
	(0.92)	(1.53)	(0.65)	(0.62)
Member of Pradhan's party*Land gini	0.370	0.311		
	(2.00)**	(2.11)**		
GP land gini	-0.092	-		
	(0.30)			
Member of Pradhan's party*GP landlessness			0.247	0.222
			(1.89)*	(2.12)**
GP landlessness			-0.008	
			(0.04)	
Control variables	As in table 3	As in table 3	As in table 4	As in table 4
Fixed effects	District	GP	District	GP
Observations	4,720	4,720	4,720	4,720
Hansen J test of instrument exogeneity (p-value)	0.310	0.410	0.304	0.395
Tests of instrument relevance				
Partial R-sq of excluded variables in first stage regressions:				
Land gini/landlessness	0.120		0.161	
Interaction terms	0.551	0.574	0.587	0.578
Shea partial R-sq of excluded variables in first stage regressions:				
Land gini/landlessness	0.106		0.141	
Interaction terms	0.489	0.574	0.515	0.578
F-test of excluded variables in first stage regressions:				
Land gini/landlessness	9.1		13.0	
Interaction terms	40.7	75.2	57.0	94.8

t statistics in parentheses. Standard errors are adjusted for clustering at the village level.

* significant at 10%; ** significant at 5%; *** significant at 1%

Land gini and landlessness are instrumented by the share of male cultivators and livestock farmers in all male workers in 1991, and the share of female cultivators and livestock farmers in all female workers in 1991. The interactions between membership of the Pradhans party and land gini/landlessness are instrumented by interactions between membership of the Pradhans party and the share of cultivators and livestock farmers in all workers (male and female).

At the of bottom the table, tests of instrument exogeneity and relevance are reported. The Hansen J statistic test of instrument exogeneity fails to reject the hypothesis that the instruments are exogenous. However, since the two instruments, male and female shares of workers employed on own farm, are highly correlated (r=0.77) and conceptually closely related, we should probably not attach too much importance to this formal test. Rather, the credibility of the instruments relies mainly on the fact that intuitively it seems highly plausible that these proxies for inequality are exogenous, since they were measured 11 years before the survey.

I present several tests of instrument relevance (in other words, tests for weak instruments). In the models with district fixed effects, there are two first stage regressions for each column, one for the inequality main effect and one for its interaction with membership of the Pradhan's party. The standard, partial R-squared of the instruments from the first stage regressions is reported. I also show the Shea partial R-squared, which takes account of correlation between the instruments. If the Shea partial R-squared is much lower than the standard partial R-squared, this indicates that the instruments are weak (Baum, Schaffer and Stillman 2003). However, we see that the differences between the standard- and Shea partial R-squared measures are in all cases moderate. Furthermore, the F-statistics for the tests of joint significance of the instruments in the first stage regressions are provided. The well-known rule of thumb provided by Staiger and Stock (1997) is that these F-statistics should be at least 10. My instruments fall short of this standard in one case, namely in the first stage regression for the main effect of the land gini. However, the shortfall is not large. The F-statistic is above 9. I conclude that weak instrument problems are sufficiently small to be ignored. In sum, the IV estimations strengthen the case that higher inequality leads to higher levels of party capture.

8. Conclusion and discussion

The paper makes three main contributions. First, drawing on the two-party theory of interest groups and electoral competition, I have shed new light on the interplay between candidates for political office, rank and file party members and voters and shown that this interplay potentially leads to "party capture". Second, I have demonstrated the existence of party capture empirically in the context of local governments in India and shown that it is economically as well as statistically significant. Party capture is equally or more important than favoritism along lines of caste, religion and language. The measure of party capture applied is attractive. It is based on objective and easy-to-measure criteria, as opposed to the perceptions based measures often applied in other studies of

good governance. Third, I have documented that party capture is strongly affected by inequality. In equal communities party capture is unimportant, but in unequal communities it is pervasive. In contrast, there is little evidence that party capture is affected by economic development.

The finding of party favoritism does not imply that political parties in general play a negative role in development. The four states of South India have done relatively well over the past 30 or 40 years in terms of reducing poverty (Ravallion and Datt 2002) and political parties have been instrumental in this progress in several ways, for example by eroding traditional, caste-based patterns of political dominance (Harriss 2000). It is possible to interpret party capture as a "necessary evil". Mobilizing the masses to effect change, such as the removal of a repressive regime, presents a massive collective action problem, and perhaps the promise of private benefits is the only effective means of overcoming this obstacle (cf. Olson 1965). This being said, the allocation of public resources according to criteria of political affiliation does not correspond well with traditional standards of democracy and good governance. If, as shown in this paper, the benefits from a poverty alleviation program are targeted to members of the ruling party rather than to the poor, the program will not be effective.

I have not directly investigated determinants of the decision to join a party. However, the findings indicate that it is often prudent to interpret data on civil society activity with a degree of scepticism. While high levels of participation in parties and other civil society organizations could indicate high levels of political awareness and desire to affect public life, rent seeking may also play a role.

To some extent the paper serves as an antidote against the naive "small is beautiful"-romanticism which is sometimes behind the push for decentralization. Governance failure exists in local as well as national governments. On the other hand, the paper should not be read as a recommendation against decentralized government. First, it is entirely possible that capture is at least as strong at district-, state- or national levels as it is at the local level, as documented in the studies by Bardhan and Mookherjee (2005) and Galasso and Ravallion (2005) reported in chapter 2. Indeed, some of the results reported in section 7.1 point in this direction. Future research should focus on testing this hypothesis more rigorously. Second, the results reported document that the poverty alleviation program under study is in fact to an important extent targeted to the poor.

I do suggest, however, that the success of decentralization is likely to depend on implementation of complementary policies, such as land reform, policies to secure openness in political and administrative decision making, and reforms to strengthen the media. The call for land reform

follows directly from the finding that more equal communities are less prone to capture. The recommendations on introducing openness and strengthen the media stem from the theory-based assumption that party capture is a result of low levels of political awareness and of local politicians' misuse of discretionary powers. As demonstrated by Svensson and Reinikka (2005) for Uganda, stronger media and better access to information on political and administrative decision making is likely to increase levels of political awareness, and reduce the scope for clientelism.

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Appendix A

Proof of Proposition 1

We have already noted that candidates will implement the policies they have announced, and we have described the voting decision criteria of aware and impressionable voters. Now consider candidate *k*'s problem: how to set policy to maximize his expected number of votes? Look at candidate *A*. We first calculate the vote-share received by the candidate from aware voters. In group *g*, candidate *A* receives the votes of those voters who fulfill the condition:

$$\varepsilon_i^* \geq -\lambda - (U_g(\pi^a) - U_g(\pi^b)) \tag{6}$$

Therefore the share of the aware vote in group *g* that candidate *a* receives is (remember that ε_i is uniformly distributed):

$$\tilde{s}^a_{g,aware} = f\left(\frac{1}{2f} - \varepsilon_i^*\right) = \frac{1}{2} + f\left(\lambda + (U_g(\pi^a) - U_g(\pi^b))\right) \tag{7}$$

The share of the total vote that candidate *A* receives from aware voters in group g is $a_g \beta_g \tilde{s}^a_{g,aware}$. Therefore, the share of the total vote that the candidate receives from all aware voters is:

$$\begin{aligned} s^a_{aware} &= \sum_g a_g \beta_g \left(\frac{1}{2} + f\left(\lambda + (U_g(\pi^a) - U_g(\pi^b))\right)\right) \\ &= \left(\frac{1}{2} + f\lambda\right)\left(\alpha_A \beta_A + \alpha_B \beta_B + \alpha_C \beta_C\right) + f\left(W_I(\pi^a) - W_I(\pi^b)\right) \end{aligned} \tag{8}$$

where $W_I(\pi^k)$ equals $a_A \beta_A U_A(\pi^k) + a_B \beta_B U_B(\pi^k) + a_C \beta_C U_C(\pi^k)$. We can think of $W_I(\pi^k)$ as "the welfare of aware voters".

Now focus on the votes from impressionable voters. Candidate *a* receives the votes of all the impressionable voters who fulfill:

$$\varepsilon_j^* \geq -\lambda - h(C^a - C^b) \tag{9}$$

Therefore, the share of the impressionable vote that candidate *a* receives is:

$$s_{imp}^a = f\left(\frac{1}{2f} - \varepsilon_j^*\right) = \frac{1}{2} + f\lambda + fh(C^a - C^b) \tag{10}$$

The share of the total vote that candidate *a* receives from impressionable voters is

$$s_{imp}^a = \left(1 - \alpha_A\beta_A - \alpha_B\beta_B - \alpha_C\beta_C\right)\left(\frac{1}{2} + f\lambda + fh(C^a - C^b)\right) \tag{11}$$

We can now calculate candidate *a*'s total vote share, s^a:

$$\begin{aligned} s^a &= s_{aware}^a + s_{imp}^a \\ &= \left(\frac{1}{2} + f\lambda\right)\left(\alpha_A\beta_A + \alpha_B\beta_B + \alpha_C\beta_C\right) + f\left(W_I(\pi^a) - W_I(\pi^b)\right) \\ &\quad + \left(1 - \alpha_A\beta_A - \alpha_B\beta_B - \alpha_C\beta_C\right)\left(\frac{1}{2} + f\lambda + fh(C^a - C^b)\right) \\ &= \frac{1}{2} + f\left(\lambda + W_I(\pi^a) - W_I(\pi^b) + (1 - \alpha_A\beta_A + \alpha_B\beta_B + \alpha_C\beta_C)h(C^a - C^b)\right) \\ &= \frac{1}{2} + f\left(\lambda + W_I(\pi^a) - W_I(\pi^b) + \chi(C^a - C^b)\right) \\ &= \frac{1}{2} + f(\lambda + V(\pi^a, C^a) - V(\pi^b, C^b)) \end{aligned} \tag{12}$$

where $\chi = h(1 - \alpha_A\beta_A + \alpha_B\beta_B + \alpha_C\beta_C) = h(1 - \alpha)$ measures the weight of campaign activity in the vote-share function. Clearly, this weight depends on the effectiveness of campaign spending and on the share of voters that are impressionable. $V(\pi^k, C^k) = W_I(\pi^k) + \chi C^k$ measures the total effectiveness of candidate *k*'s electoral strategy. The candidate faces a trade-off between attracting

aware voters on the one hand, and inducing campaign contributions, which will allow him to attract impressionable voters, on the other.

Finally, the probability that *a* wins the election - the objective function of candidate *a* - is now given by:

$$\begin{aligned} prob\left(s^a \geq \frac{1}{2}\right) &= prob\left(f\left(\lambda + V(\pi^a, C^a) - V(\pi^b, C^b)\right) \geq 0\right) \\ &= prob\left(-\lambda \leq \frac{1}{f}\left(V(\pi^a, C^a) - V(\pi^b, C^b)\right)\right) \\ &= G\left(\frac{1}{f}\left(V(\pi^a, C^a) - V(\pi^b, C^b)\right)\right) \\ &= G^a\left(\pi^a, \pi^b, C^a, C^b\right) \end{aligned} \tag{13}$$

Remember that $G(\cdot)$ is a cumulative distribution function and hence monotonically increasing. This expression therefore implies that the dominant strategy for candidate *k* is simply to maximize $V(\pi^k, C^k)$.

We can now turn to the party's problem. Remember that we distinguish between the candidate and the party that (may) support him. Focus on party *A*, which maximizes

$$G^a U_A(\pi^a) + (1 - G^a) U_A(\pi^b) - \frac{C^a}{\beta_A} \tag{14}$$

If candidate *a* receives no campaign contributions, he sets policy to maximize $W_I(\pi^a)$. Denote the policy vector that solves this problem by π^*. In order to induce the candidate to set an alternative policy vector, π^a, the following participation constraint needs to be fulfilled:

$$W_I(\pi^a) + \chi C^a(\pi^a) \geq W_I(\pi^*) \tag{15}$$

Essentially, the party sets candidate *a*'s policy, subject to the participation constraint of the candidate. In the out-of-equilibrium situation where the participation constraint is not satisfied, the candidate runs without support from a party. For example, he could threaten to run as an independent. Now, assume that the participation constraint is satisfied with equality in equilibrium. Then, campaign contributions do not change the parties' winning probabilities, it only changes their policies. The probability that candidate *a* wins the election is therefore fixed. Denote this fixed probability by $\bar{G}^a$. From party *A*'s point of view, the policy of candidate *b* is also fixed. Therefore, maximizing (14) is the same as maximizing $\bar{G}^a U_A(\pi^a) - \frac{C^a}{\beta_A}$. Insert the participation constraint into this objective to find that the party maximizes $G^a U_A(\pi^a) - \frac{W_I(\pi^*) - W_I(\pi^a)}{\chi\beta_A}$, which, since $W_I(\pi^*)$ is fixed from the party's point of view, is equivalent to maximizing $\chi\beta_A G^a U_A(\pi^a) + W_I(\pi^a)$, which in turn is the same as maximizing (4).

CHAPTER 3:

Serving the Public Interest

Thomas Markussen and Jean-Robert Tyran*

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We present a model of political selection in which voters elect a president from a set of candidates. We assume that some of the candidates are benevolent and that all voters prefer a benevolent president, i.e. a president who serves the public interest. Yet, political selection may fail in our model because voters cannot easily tell benevolent from egoistic candidates by observing their pre-election behavior. Egoistic types may strategically imitate benevolent types in the pre-election stage to extract rents once in office. We show that strategic imitation is less likely if the political system is likely to produce good governance. That is, if benevolent candidates are common, if the president has little discretionary power, and if the public sector is effective. We analyze the role of institutions like investigative media and re-election and show that they can improve or further hamper political selection, depending on the parameters of the political game.

Keywords: Political selection, elections, social preferences, political leadership
JEL-codes: D64, D72, D82, H0

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1 Introduction

Economists routinely assume that all players in the political process, including political leaders, are strictly self-interested. According to this view, political leaders are not intrinsically benevolent but their policy choices may or may not be in line with public interest, depending on how the prevailing political institutions shape their incentives. It is therefore crucial to impose institutional rules that restrain egoistic leaders from extracting rents (e.g. Brennan and Buchanan 1980). We agree that political leaders often behave in self-serving ways and that institutions need to be set appropriately. However, we disagree with the standard assumptions which, in the words of James M. Buchanan[1], are that all "individuals must be modeled as seeking to further their own narrow self-interest, narrowly defined, in terms of measured net wealth position, as predicted or expected" and that "there is no suggestion that improvement lies in the selection of morally superior agents who will use their powers in some 'public interest'". In fact, the purpose of our paper is exactly to analyze the difficulties of selecting "morally superior" candidates – we call them benevolent – into office.

In this paper, we assume that some of the candidates for political office are benevolent and that many are egoistic. Once elected, the "president" has much discretionary leeway over a budget, and can use it to provide a public good or for his private benefit. By assumption, egoistic presidents seek "to further their own narrow self-interest" which, at least in the baseline version of our model, means total rent appropriation by the president. In contrast, a benevolent president spends the entire budget to provide a public good which is both efficient and fair. In that sense, a benevolent president uses his powers to serve a well-defined "public interest". Given these assumptions, egoists prefer to govern rather than to be governed, and all voters obviously prefer to be governed by a benevolent rather than an egoistic president. However, the voters' problem is that candidates' types cannot be directly observed, but must be inferred from their behavior. And this inference is imperfect due to strategic behavior by egoistic candidates. We analyze when strategic imitation by egoistic types hampers the ability of the political system to vote benevolent leaders into office.

[1] Quoted after Besley (2006: 29).

The baseline version of our model has three stages. In stage 1, candidates choose whether to make a "pro-social" action which is costly to the candidate. Voluntarily joining the army or working as a "community organizer" in a poor neighborhood are illustrative examples of pre-election activities of the main contenders in the 2008 U.S. presidential contest. Choices in stage 1 can be observed by voters with some probability which depends, for example, on the effectiveness of investigative media. In stage 2, a leader called "president" is elected, and in stage 3, the president is in control of a budget. The president chooses between providing a public good, i.e. a policy which is in the "public interest" in the sense that it is efficient and fair, and a policy which only benefits the president but not the rest of society.

We assume two "types" of candidates and that the shares of these types among candidates are common information. Benevolent types are non-strategic and find it optimal to pick the pro-social action in stage 1 and to provide the public good in stage 3. Egoistic types face a trade-off between making a costly pro-social action in stage 1 to appear as a benevolent type in the eyes of the voters and thus to increase the chances of rent appropriation in stage 3. We say that "strategic imitation" prevails if an egoist picks the pro-social action in stage 1. The incentives for strategic imitation are straightforward in the baseline model. Intuitively, an egoist balances the costs of behaving pro-socially in stage 1 against the expected benefits of rent appropriation in stage 3. The difficulty in this calculus is that the expected rent in stage 3 depends on the imitation behavior of the other egoistic candidates which in turn depends on the share of benevolent types.

The baseline model yields two main insights. First, we show that strategic imitation is less likely if the political system is likely to produce good governance. On average, the governed fare well if the share of benevolent candidates is high, the president has little discretion over the budget, and the public sector is effective in the sense that public goods provision yields large efficiency gains. In this case, the net gain from governing rather than being governed is relatively low, and strategic imitation is therefore relatively unattractive. Second, we find that more effective investigative media which foster "transparency" in the sense of improving voters' information about candidates' pre-election behavior, have ambivalent effects on political selection. While higher transparency improves the chances of telling benevolent from non-imitating egoistic candidates, it also provides incentives for

egoistic candidates to pose as benevolent types. We find that more transparency improves selection at low levels, but hampers political if the level of transparency is already high.

We extend the baseline model by allowing incumbents to be re-elected to investigate if re-election is a remedy against the failure in political selection diagnosed above. In line with an extensive literature in political economy (e.g. Austen-Smith and Banks 1993, Besley and Case 1995), we find that incentives to seek re-election tend to discipline egoistic presidents. However, the effects of re-election are ambiguous and depend on how far-sighted candidates are. If candidates are relatively patient, the incentive to seek re-election disciplines egoistic presidents in the first term and decreases the amount of strategic imitation. If candidates are relatively impatient, the possibility of re-election further aggravates the problem. In this case, the incentive to seek re-election does not curb rent extraction and may induce more strategic imitation.

The basic assumptions of the model are that (i) presidential candidates are heterogeneous with respect to social preferences, (ii) policy choices are in important ways shaped by the social preferences of presidents, and (iii) candidate's social preferences cannot be directly observed, and inferring them from behavior is fraught with difficulties. We now discuss these assumptions in turn by relating them to the literature and to empirical observations.

Assumption (i) is that people, including voters and political candidates, are heterogeneous with respect to social preferences. Mounting evidence from experimental economics suggests that pro-social preferences exist and that individuals are heterogeneous with respect to their concern for others (see Camerer 2003: Ch. 2 for a survey). Recent evidence shows that this also holds for representative samples of the general population (e.g. Bellemare, Kröger and van Soest 2008). While we assume that benevolent candidates exist, we consider the possibility that their share is small. Papers studying the selection into the political arena (e.g. Matozzi and Merlo 2007, Caselli and Morelli 2004, Messner and Polborn 2004) emphasize that "bad" types may select into the pool of candidates, perhaps because they find a career in the political arena more attractive than one in the market place. As a result, the share of benevolent types among candidates is smaller than in the general population.

Assumption (ii) is that policy choices depend on the "type" of the president selected. This assumption is well in line with empirical studies showing that the identity of policy makers shapes policy choices and economic outcomes (e.g. Jones and Olken 2005, Lee, Moretti and Butler 2004, Chattopadhyay and Duflo 2004). Assumption (i) that candidates are heterogeneous together with assumption (ii) that voters care about this heterogeneity is consistent with the observation that "personal qualities" like the "integrity" of political candidates often play an important role in political campaigns. For example, in exit polls taken in connection with the Republican presidential primary elections in the U.S. in 2008, around 45 percent of voters stated that "personal qualities" were more important for their vote than "issues"[2] (see also Mondak 1995).

Assumption (iii) is that political selection through elections is hampered because of strategic imitation. Our paper complements the literature on political selection through elections (e.g. Besley 2006: Ch. 3, Fearon 1999, Coate and Morris 1995, Banks and Sundaram 1993). In contrast to this literature, we consider "citizen-candidates" (e.g. Osborne and Slivinsky 1996) which implies that candidates carefully consider the expected utility of governing vs. being governed. Besley (2006: Ch 3) provides an excellent exposition of the relevance of political selection in general and presents some empirical evidence supporting its relevance.

One implication of our model is that voters will often be disappointed about the "character" of a president in the sense that they inferred from his pre-election behavior that he was benevolent but discover that he is not when in office. Examples of such disappointment abound. Ferdinand Marcos, the notoriously corrupt president of the Philippines, was a decorated war hero from World War II. Robert Mugabe, the president of Zimbabwe, was a widely admired hero of his country's liberation struggle but gradually revealed himself as one of the most self-serving leaders in Africa. Eliot Spitzer, the Governor of New York State from 2007 to 2008, built a reputation as a defender of clean government before being elected, only to be forced to step down as governor when he was caught buying illegal services from a prostitution ring. Strategic imitation offers a potential explanation for such disappointment.

2 Information found on the webpage "election center 2008" of CNN.com

2 The model

The baseline model has three stages (see figure 1): In stage 1, n candidates out of a population of size N run for president. Since the present paper focuses on selection through voting rather than entry, we assume that candidates are randomly selected from the population. Candidates can make a pro-social action at some cost c to themselves (donating money to a charity, volunteering etc.) and with a social benefit b. For simplicity, we set b to zero. (we discuss on the size of b and c in section 4). We assume two types of candidates. Candidates of a given type are homogenous. Benevolent types always choose the pro-social action because they value the resulting social benefit b more than the private cost c. Egoistic types choose the pro-social action if it maximizes their expected payoffs in the entire game. The share of benevolent types among the candidates is $\theta > 0$, and we assume that θ is public information. Candidates' choices in stage 1 are observed by voters with probability $r \geq 0$ and we assume that r is public information. We refer to r as the "transparency of politics" which is shaped by, for example, the strength of investigative media or by legislation requiring politicians to disclose information.

In stage 2, a president is voted into office by $N - n$ voters. Voting is compulsory and "sincere", i.e. voters cast their votes according to their material preferences. The president is elected by plurality vote or by random draw with probability $1/k$ if k candidates receive the highest number of votes.

Figure 1: Political selection game

Stage 1 (pre-election)		*Stage 2 (election)*	*Stage 3 (post-election)*
Candidates choose pro-social action at cost c or private action at cost 0	Actions in stage 1 are revealed with probability r	President is voted into office (n candidates, N-n voters)	President controls budget B. Allocation to public good or private good.

In stage 3, the president is in control of a budget B which can be used to fund a public good or be appropriated for the president's private benefit. We assume that the public good is linear, i.e. has constant returns to scale and benefits all voters equally. The effectiveness of the public sector is measured by α, the marginal per capita return of a dollar allocated to the public good, where $1/N < \alpha < 1$. Allocating the entire budget to the public good is both

efficient and fair. It is efficient in the sense that the sum of payoffs to society is maximal ($\alpha NB > B$), and it is fair in the sense that all agents, including the president, receive the same payoff, αB. Given that an egoistic president is elected, the entire budget is pocketed by the president – kleptocracy prevails. Payoffs in stage 3 are discounted by a factor δ, $0 < \delta < 1$.

2.1. Equilibrium

We analyze the determinants of successful political selection in equilibrium, i.e. the equilibrium amount of strategic imitation and the resulting probability of selecting a benevolent president. The main variables of interest determining equilibrium values are the share of benevolent candidates θ, the level of transparency r, the effectiveness of the public sector α, and the president's discretionary power over the budget B.

Given our assumptions, egoists prefer to govern rather than to be governed, and all voters obviously prefer a benevolent rather than an egoistic president. The problem is that voters cannot directly observe candidates' types, and have to base their decision in stage 2 on beliefs about types. These beliefs are shaped by observed behavior in stage 1. By assumption, benevolent types choose the pro-social action in stage 1 with certainty, and egoistic types may or may not strategically imitate the benevolent types, depending on how much imitation increases their expected rent. We denote the share of all candidates choosing the pro-social action in stage 1 by $\sigma \geq \theta$. A benevolent president is selected with certainty only if $\sigma = \theta$, i.e. if there is no strategic imitation. In contrast, if $\sigma > \theta$, a president may be voted into office who does not serve the public interest in stage 3.

From the perspective of an egoistic candidate, the benefits of strategic imitation depend on how much the signal increases the probability of being elected, on the difference in (discounted) expected payoffs between governing and being governed, and between good and bad governance if not elected. More specifically, if egoist i is voted into office, his payoff is B. If i is not elected, he earns 0 if the president is an egoist and $\alpha B > 0$ if the president is a benevolent type. We denote the conditional probability that an egoist is elected if he imitates by p_s and the probability if he does not by p_0. We denote the probability that a benevolent president is elected by p_A. These probabilities depend on the transparency of the political system (measured by r), i.e. on whether information about pre-election behavior is revealed at the election stage. The superscript r indicates that

information is revealed, and the superscript u that it is not. For example, p_s^r is the probability that a candidate is elected if he imitates, and information about pre-election behavior is revealed.

Figure 2: Optimization problem for an egoistic type

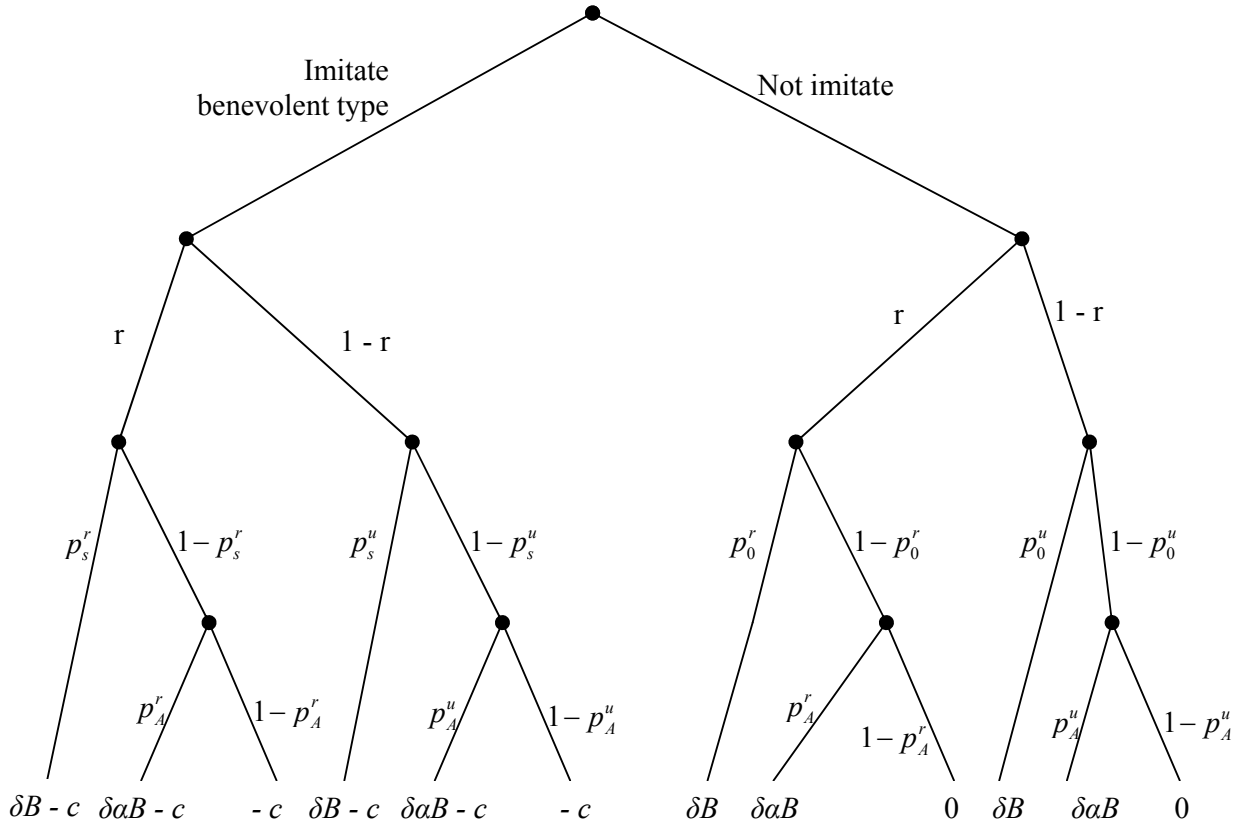


Figure 2 shows the decision tree representing the optimization problem of an egoist. Total discounted payoffs are shown at the bottom of the figure. It is clear that an egoist strategically imitates if the expected payoff is at least as big as when he does not:

$$r\left\{p_s^r(\delta B-c)+(1-p_s^r)\left[p_A^r(\delta\alpha B-c)-(1-p_A^r)c\right]\right\} + (1-r)\left\{p_s^u(\delta B-c)+(1-p_s^u)\left[p_A^u(\delta\alpha B-c)-(1-p_A^u)c\right]\right\}$$
$$\geq \tag{1}$$
$$r\left\{p_0^r\delta B+(1-p_0^r)(p_A^r\delta\alpha B+0)\right\} + (1-r)\left\{p_0^u\delta B+(1-p_0^u)(p_A^u\delta\alpha B+0)\right\}$$

Expression (1) can be considerably simplified by using the following facts. Imitation has no effect on the type voted into office if no information about pre-election behavior is available ($r = 0$) in the election stage. In this case, voters randomly select a candidate which means that $p_s^u = p_0^u = 1/n$ and $p_A^u = \theta$. Also, since we assume that there is at least one

benevolent candidate ($\theta > 0$), an egoist is never selected if he does not imitate and information about pre-election behavior is available, i.e. $p_0^r = 0$. Thus, (1) reduces to

$$r\delta B\left[p_s^r \left(1-\alpha p_A^r\right)\right] \geq c, \tag{2}$$

where the left-hand side is the expected, discounted benefit from imitation, and the right-hand side is the cost.

Note that both p_s^r and p_A^r are functions of σ which, in turn, is a function of all parameters, including θ, r, α, and B. Remember that the symbol p_s^r is the probability that a candidate is voted into office in stage 2 given that he chose the pro-social action in stage 1 and that information about it was revealed. This probability depends on σn, i.e. on how many candidates choose the pro-social action in stage 1.

$$p_s^r = \frac{1}{\sigma n} \tag{3}$$

A key variable in our model is the probability of selecting a benevolent president, p_A. This probability depends on the share of benevolent candidates and the tendency of egoists to strategically imitate. In particular, when information about pre-election behavior is revealed, a benevolent president is elected for sure ($p_A^r = 1$) if egoists do not imitate (i.e. if $\sigma = \theta$). In contrast, a benevolent president is elected only by chance, i.e. $p_A^r = \theta$ if all egoists imitate (i.e. $\sigma = 1$). In general, it holds that

$$p_A^r = \frac{\theta}{\sigma} \tag{4}$$

Inserting (3) and (4) into (2) we get the following condition for strategic imitation:

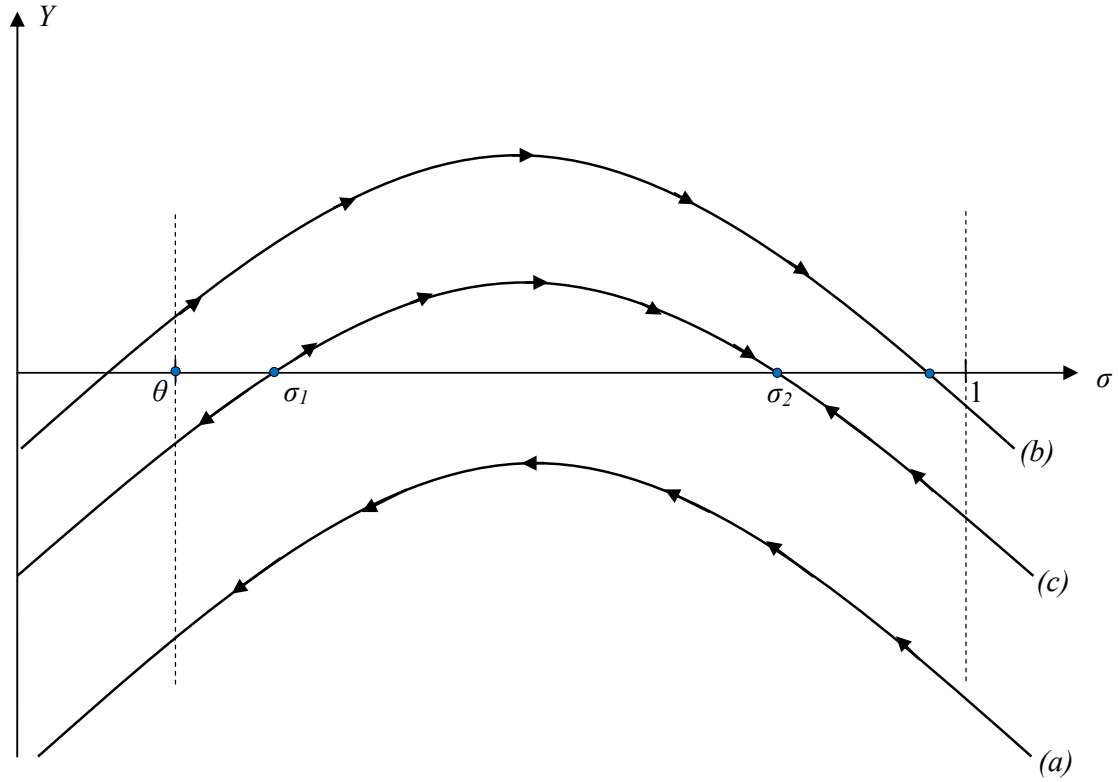
$$r\delta B\left(\frac{1}{\sigma n}\right)\left(1-\frac{\alpha\theta}{\sigma}\right) - c \geq 0 \tag{5}$$

We re-write (5) as

$$Y(\sigma) \equiv -(cn)\sigma^2 + (r\delta B)\sigma - r\delta B\alpha\theta \geq 0 \tag{6}$$

which can easily be represented by a parabola (see figure 3).

Figure 3: Strategic imitation equilibria



We denote the critical values yielding $Y(\sigma) = 0$ by σ_1 and σ_2 and distinguish 3 cases:

a) *No strategic imitation*: $Y(\sigma) < 0 \ \forall \ \sigma \in [\theta;1]$. In this case, the parabola in figure 3 is below 0 in the feasible range of σ. Therefore, strategic imitation never pays, and $\sigma^* = \theta$. A sufficient condition for this no-imitation equilibrium to occur is that the vertex of the parabola, Y_v, is below zero, i.e. that

$$Y_v = Y\left(\frac{r\delta B}{2cn}\right) = \frac{(r\delta B)^2}{4cn} - r\delta B\alpha\theta < 0 \quad . \tag{6b}$$

Condition (6b) is more likely to be met and strategic imitation therefore less likely to occur at all if, for example, the number of candidates n is high or if imitation is very costly. Interestingly, inspection of (6b) reveals that strategic imitation is less likely to be attractive if the public sector is very effective (α is large), if the president has little discretionary

power of the budget (B is small), or if most candidates are benevolent (θ is large). In other words, strategic imitation is discouraged if governance is likely to be good.

b) *Unique equilibrium with strategic imitation at* $\theta < \sigma^* \leq 1$. If the vertex of $Y(\sigma)$ is positive ($Y_v > 0$) and if $Y(\sigma)|_{\sigma=\theta} > 0$, a unique equilibrium obtains with a positive amount of strategic imitation of $\theta < \sigma^* \leq 1$. In figure 3, this case is illustrated for a situation in which only some egoists imitate in equilibrium ($\sigma^* < 1$). Since all egoists are identical in the model, it is natural to assume a symmetric equilibrium. The only symmetric Nash equilibrium implies that each egoist plays a mixed strategy, where he imitates with probability $(\sigma_2 - \theta)/(1 - \theta)$. If $Y(1) \geq 0$, imitation is dominant for an egoist, and the equilibrium is $\sigma^* = 1$. In this pooling equilibrium, incentives to imitate are so strong that all egoistic candidates behave as if they were benevolent before the election, but the elected president is unlikely to serve the public interest after the election (if θ is small). Note that if $Y(\sigma) > 0$ in the entire range, all egoists strategically imitate in equilibrium, and marginal changes in parameters do not reduce strategic imitation.

c) *Multiple equilibria*. If the vertex of $Y(\sigma)$ is positive ($Y_v > 0$) and if $Y(\sigma)|_{\sigma=\theta} < 0$, $Y(\sigma)$ intersects the horizontal axis twice in the feasible range of σ as illustrated in graph (c) of figure 3. Multiple equilibria prevail in this case, namely i) $\sigma^* = \theta$, ii) $\sigma^* = \sigma_1$, and iii) $\sigma^* = \min(\sigma_2, 1)$. However, only i) and iii) are stable equilibria, and beliefs about σ determine which equilibrium strategic candidates coordinate on. Suppose egoists hold an equilibrium common prior, σ_0 (see appendix A for a discussion of disequilibrium beliefs). If $\sigma_0 = \sigma_1$, then $\sigma^* = \sigma_1$ is an equilibrium, but it is unstable because if σ_0 deviates by ε from σ_1, the share of imitating candidates converges to either θ or $\min(\sigma_2,1)$. This means that equilibrium σ_1 is unlikely to prevail, and we do not consider it in the remainder of our discussion.

In sum, cases *a)* and *ci)* provide a complete description of the conditions for the absence of strategic imitation. Thus, when information about pre-election behavior is revealed, the elected president serves the public interest with certainty in these cases. In all other cases, there is a risk that an egoist is voted into office.

2.2. Comparative statics

We now investigate how the extent of strategic imitation in equilibrium and the probability of selecting a benevolent president p_A, depend on changes in parameters. We concentrate on the equilibrium at σ_2. The reason is that the other equilibria are either unstable or involve full or no imitation as the discussion above has shown, and are therefore not sensitive to marginal changes in parameters. Noting that (6) is a second-degree polynomial in σ, we see that σ_2 is given by:

$$\sigma_2 = \frac{r\delta B + \sqrt{(r\delta B)^2 - 4cnr\delta B\alpha\theta}}{2cn} = \frac{r\delta B + \sqrt{D}}{2cn} \tag{7}$$

where $D = (r\delta B)^2 - 4cnr\delta B\alpha\theta$. The comparative statics below are derived by differentiating (7) with respect to the parameter in question.

The effects of the first three parameters discussed below can be summarized in the statement that strategic imitation is less likely if governance is likely to be good. We show that a higher share of benevolent candidates, less discretionary power of the president over the budget B, and a higher effectiveness of the public sector all improve political selection, because they reduce the relative cost of being governed, rather than governing. We also discuss the effects of transparency (r) in the political process and find that the effect of transparency on the quality of political selection is ambiguous.

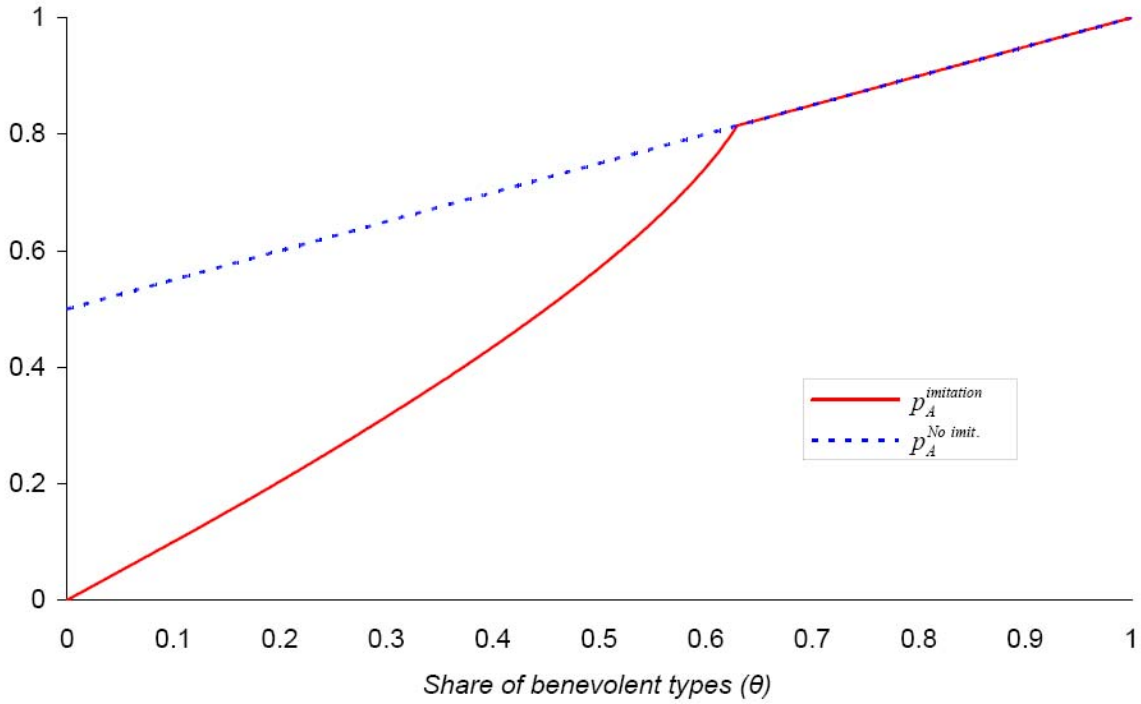
a) *Share of benevolent candidates* (θ)

A higher share of benevolent types decreases the incentives for strategic imitation [$\frac{\partial \sigma_2}{\partial \theta} = \frac{-r\delta B\alpha}{\sqrt{D}} < 0$, see eq. (7)]. The reason is that governance is likely to be good - a benevolent president is more likely to be selected - which reduces the cost for an egoist of not governing.

Figure 4 illustrates how the equilibrium probability of selecting a benevolent president, p_A, depends on the share of benevolent candidates (θ). Our result with strategic imitation is compared to a benchmark without imitation in which the cost of imitation c is high enough to deter any imitation, but not high enough to deter benevolent types from choosing the pro-social action. This implies that $p_A = p_A^{No\ imit.} = r + (1-r)\theta$ (see dashed line in figure 4). The figure shows that strategic imitation has the most adverse effects at low

values of θ. Suppose, for example, that 1% of all candidates are benevolent and 99% are egoistic. If only benevolent types make pro-social choices in the pre-election stage, benevolent types are selected whenever their signal can be observed (r is assumed to be 50% in the figure). In contrast, if egoistic types strategically imitate, only about 1% of presidents will serve the public interest. It is only for unrealistically high values of θ (of around 60% in the figure) that strategic imitation by egoists ceases to be harmful.

***Figure 4*:** Probability of voting a benevolent president into office (p_A) as a function of θ



Note: The figure is drawn assuming equilibrium σ_2 prevails and falls between θ and 1. We illustrate for parameters $n = 10$, $r = 0.5$, $\delta = 0.9$, $\alpha = 0.4$, $c = 0.3$, $B = 7$.

b) *Budget size* (B)

Control of a higher budget makes governing, and therefore strategic imitation for egoists more attractive [$\frac{\partial \sigma_2}{\partial B} = \frac{r\delta}{2cn} + \frac{D + (r\delta B)^2}{4cnB\sqrt{D}} > 0$, see eq. (7)]. A higher share of strategic imitators reduces the probability of selecting a benevolent type.

c) *Efficiency of public goods production (α)*

The incentives for strategic imitation fall with α, the effectiveness of the public sector [$\frac{\partial \sigma_2}{\partial \alpha} = \frac{-r\delta B\theta}{\sqrt{D}} < 0$, see eq. (7)]. The reason is again that the expected cost of being governed rather than governing is decreasing in α. The result is that the probability of selecting a benevolent president increases with the efficiency of public goods production. This resonates well with a number of empirical studies which have found a negative correlation between corruption and the effectiveness of public bureaucracies. These correlations are usually interpreted as indicating that corruption reduces this effectiveness (e.g. Bardhan 1997, Shleifer and Vishny 1993). Our model provides a rationale for why the causality may run the other way. If the public administration is ineffective, selfish individuals are attracted to seeking political office because life without political power is unpleasant. This surprising conclusion might help to explain why countries with highly ineffective public bureaucracies, e.g. in some African countries, also seem to attract a higher share of corrupt politicians than countries with more effective public administrations.

d) *Transparency (r)*

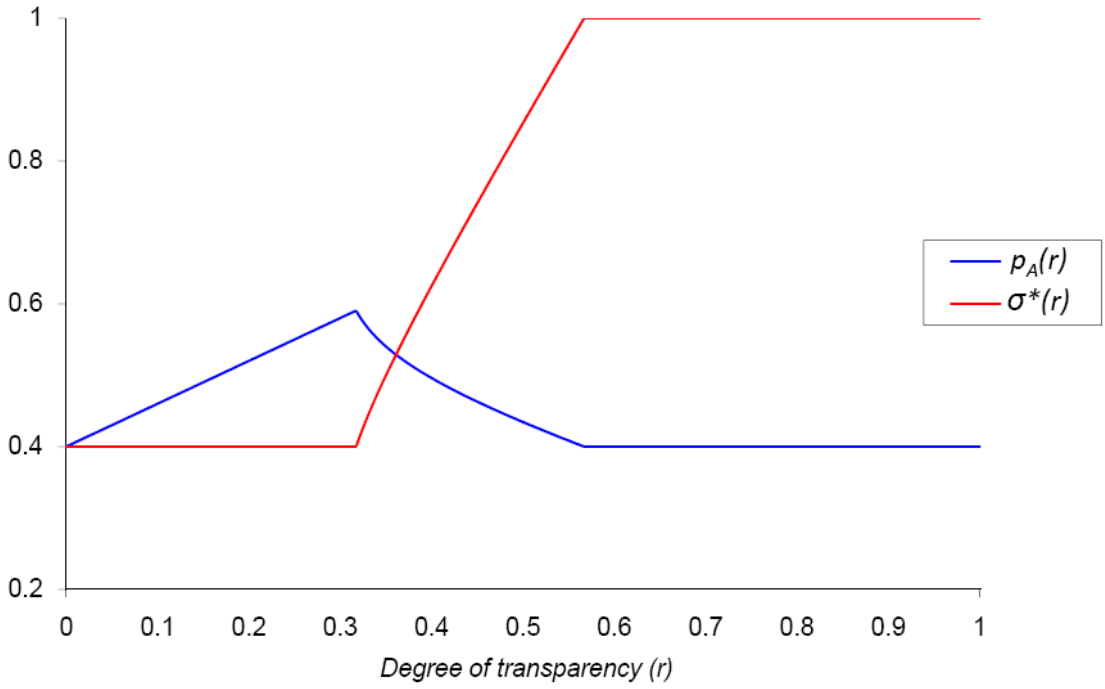
Strategic imitation is more attractive if actions in the pre-election stage are more likely to be revealed [$\frac{\partial \sigma_2}{\partial r} = \frac{B\delta}{2cn} + \frac{D + (r\delta B)^2}{4cnr\sqrt{D}} > 0$, see eq. (7)]. More strategic imitation means that the informativeness of the signal to voters is low. On the other hand, a higher value of r also means that a benevolent candidate is more likely to be detected at all. Therefore, the overall effect of r on political selection is non-monotonic. The probability that a benevolent president is elected is

$$p_A = rp_A^r + (1-r)p_A^u = \frac{r\theta}{\sigma^*} + (1-r)\theta = \theta + r\theta\left(\frac{1}{\sigma^*} - 1\right) \tag{8}$$

If no information is revealed, $r = 0$, voters pick a candidate at random which means that the probability of electing a benevolent president is θ. For sufficiently low ($r < 4cn\alpha\theta/\delta B$) values of r, imitation is not profitable, i.e. $\sigma^* = \theta$. In this case, p_A is increasing in r. However, at some point imitation becomes attractive (around $r = 0.3$ for the specific

parameters in figure 5). When all egoists imitate ($\sigma^* = 1$), voters cannot extract useful information from stage 1 signals, no matter how high r is, and p_A again drops to θ. Hence, increasing transparency has positive effects at low levels of transparency, but negative effects if the level is already high.

***Figure 5*: Investigative media and the quality of political selection**



Note: Illustration is based on same parameter values as Figure 4, and $\theta = 0.4$.

The intuition for this result is that higher transparency increases the cost of acting selfishly in the pre-election stage and therefore increases incentives for egoists to behave as if they were benevolent. This, in turn, decreases the quality of information available to voters about the type of the candidates. To keep the analysis tractable, we assumed that the cost of imitation c is not affected by r. If more effective media increase these costs, the negative effect of r on the quality of political selection might be weakened or reversed.

The finding that higher transparency of politics does not necessarily improve political economic outcomes resonates well with Matozzi and Merlo (2007) who find that higher transparency can lead to less competent politicians, because it increases the opportunity

cost of political activity for highly competent agents. Besley (2006) also finds that the effect of transparency on political selection is ambiguous, although the mechanisms driving his results are different from the ones in our paper.[3] Empirical studies mostly find a negative effect of media freedom on corruption (e.g. Brunetti and Weder 2003, Freille et. al. 2007), but typically do not test for non-linear effects. Theoretical models, including the one presented here, suggest that non-linear effects may exist.

3 Re-election: A cure for corruption?

We now extend our baseline model to investigate re-election as a constitutional constraint on rent extraction by egoistic (corrupt) presidents. While the analysis of incentives from re-election has been a recurrent theme in the standard public choice literature (e.g. Barro 1973, Ferejohn 1986), our analysis complements that literature by allowing for a (small) share of benevolent candidates for political office. As in Coate and Morris (1995), incentives from re-election serve two roles: to curtail rent-extraction by egoistic incumbents – a moral hazard aspect – and to select a benevolent candidate – an adverse selection aspect.

We now analyze if re-election is an effective constitutional constraint to rent extraction by adding a stage 4 and 5 which essentially replicate stages 2 and 3 in the baseline game of figure 1. A key difference is that at the beginning of stage 4, voters learn how much of the budget the incumbent allocated to public goods in stage 3.

The main results of our analysis depend on egoistic candidates' patience, i.e. by how much they discount accruing in later periods payoffs, and are as follows. If candidates are sufficiently patient, incentives to seek re-election discipline egoistic presidents and improve political selection. More specifically, we show that if re-election incentives discipline egoistic presidents in stage 3, they also (weakly) reduce strategic imitation, because the benefits from imitation are reaped only with a delay, i.e. after the second election. However, if agents are impatient, the incentive to seek re-election might not be strong enough to discipline incumbents and the introduction of a second election might lead to

[3] He assumes that voters receive an exogenous signal about an incumbent leader's type, and shows that a stronger signal might lead to worse outcomes, because it weakens the incentive for a bad incumbent to mimic a good one by choosing good policies.

further deterioration of political selection. Strategic imitation is now more attractive because imitators get two, rather than one, chances of winning the presidency and capturing the budget. We now deduce these results by solving the game backwards.

In stage 5, egoistic presidents appropriate the entire budget while benevolent presidents allocate B to public goods.

In stage 4, voters choose between the incumbent and a "challenger". We assume that voters prefer the incumbent over a challenger if the incumbent is equally or more likely to be benevolent than the challenger. That is the case if the incumbent allocates B to public goods in stage 3. If not, it is clear that the incumbent is an egoist and he would not be re-elected in stage 4.

Stage 3 outcomes can be understood as follows. We denote by p_{A5} the probability that a benevolent type is elected in the stage 4, given that an egoist was elected in stage 2. We assume that $p_{A5} = \theta$ when no information is revealed, and $p_{A5} = p_A^r$ when it is (for simplicity, we do not take into account that the particular egoist who won the first election is not a viable candidate in the second election. Unless n is small, this changes the results only slightly). If an egoistic president allocates B to public goods, his payoff is αB in stage 3, and δB in stage 5. If instead he pockets the budget B in stage 3, his expected payoff in stage 5 is $p_{A5}\delta\alpha B$. An egoistic president therefore chooses the benevolent policy in stage 3 if and only if $\alpha B + \delta B \geq B + p_{A5}\delta\alpha B$, i.e. if:

$$\delta \geq \frac{1-\alpha}{1-p_{A5}\alpha} \equiv \delta^* \tag{9}$$

Note that the threshold value for impatience δ^* is decreasing in α and increasing in p_{A5}. A more efficient public sector increases the president's incentive to act in the public interest because he himself benefits from the goods produced by the public sector. A higher probability of a benevolent president taking office in period 5, on the other hand, decreases the expected loss from giving up the chance of re-election. Since $p_A^r \geq \theta$, more patience is required to prevent an egoistic president from capturing the rent when information about stage 1 actions is revealed than when it is not. Note that δ^* is endogenous. It depends on p_{A5}, and therefore on the amount of strategic imitation.

In stage 2, a candidate who chose the benevolent action in stage 1 is elected, whenever information about pre-election behavior is revealed. Even if voters realize that an egoistic president is going to allocate *B* to the public good in stage 3, they also know that he will be re-elected and keep the entire budget in stage 5. Therefore, voters still have an incentive to favor the candidates they believe are most likely to be benevolent.

In stage 1, an egoist's incentive to choose the benevolent action depends on his policy plans if elected president, and on his beliefs about the policy choices of other egoistic presidents.

(i) $\delta \geq \delta^*$. If an egoist is sufficiently patient, he allocates *B* to public goods in stage 3 according to eq. (10) (below we check if the assumption $\delta \geq \delta^*$ is consistent with the equilibrium level of strategic imitation). Strategic imitation affects the probability of winning the election in stage 2 in exactly the same way as in the baseline game, but the discounted gains from winning the presidency are smaller. In stage 3, all agents earn αB, and there is no benefit from holding office. However, the president is re-elected with certainty, and earns *B* in stage 5. The probability that a benevolent president holds office in stage 5 is the same as in the baseline game. Hence, the expected gain from imitation is the same as in the baseline case, except that it is discounted by δ^2 rather than δ. In this case, therefore, the introduction of a second election leads to (weakly) less strategic imitation than in the baseline case. Denote by σ' the equilibrium value of σ in the case where the egoist intends to allocate *B* to the public good, and expects other egoists to do the same. The resulting value of p_{A5} is denoted by $p'_{A5} = \theta / \sigma'$, and the resulting value of δ^* by $\delta' = \dfrac{1-\alpha}{1-p'_{A5}\alpha}$.

(ii) $\delta < \delta^*$. The problem of a not sufficiently patient egoist is more complicated and analyzed in detail in appendix B. Egoistic presidents now grab the public budget in stage 3. The gains from imitation which are captured in stage 3 are therefore the same as in the original game, for a given value of σ (see appendix B for a proof). The additional benefit captured in stage 5 can be positive or negative. On the one hand, imitation provides a chance to win the second election, even if information about stage 1 actions is revealed. In this sense, imitation buys the egoist an additional chance of capturing the public budget. On the other hand, imitation slightly decreases the probability that a benevolent type holds

office in stage 5, which has a negative effect on the egoist's expected payoff in that period.[4] The appendix shows that the net effect might be positive or negative. Denote the equilibrium value of σ in this case by σ''. The resulting value of p_{A5} is denoted $p''_{A5} = \theta / \sigma''$, and the resulting value of δ^* by $\delta'' = \dfrac{1-\alpha}{1-p''_{A5}\alpha}$.

If imitation increases expected earnings in stage 5, i.e. if the effect from two rather than one chance of winning the presidency dominates, the total incentive for strategic imitation is stronger than in the case with only one election. Hence, the introduction of a second election leads to more strategic imitation and therefore less effective political selection compared to the situation with only a single election. Figure B2 in the appendix shows an example where this is the case.

To complete the analysis above, we need to check whether stage 1 strategies derived are consistent with the assumptions about δ^* which were used in its derivation. Assume $\sigma' \le \sigma''$. Then $\delta' \ge \delta''$. We can now distinguish three cases:

1. $\delta \ge \delta' \ge \delta''$. An egoistic president allocates *B* to public goods production in stage 3. In this case, therefore, the incentive to seek re-election fully discipline egoistic presidents in stage 3.
2. $\delta \le \delta'' \le \delta'$. An egoistic president captures the public budget in both stage 3 and stage 5. Now, the possibility of re-election might lead to more imitation than in the original game, and therefore actually worsen the outcome in stage 3, by decreasing the probability that a president is elected who serves the public interest.

---

4 The probability that a benevolent type holds office in the last stage is higher when the egoist chooses not to imitate than when he does. To see that this is the case, denote the probability that a particular egoistic agent is elected president in stage 2 when information about pre-election behavior is revealed by p_j^r, *j=s,0*. The probability that a benevolent type holds office in period 5 is $p_j^r p_{A5} + (1-p_j^r)p_{A5} + (1-p_j^r)(1-p_{A5})p_{A5}$ where the first term is the probability that the egoistic agent is elected in the first election, and a benevolent type replaces him. The second term is the probability that a benevolent type is elected in the first election and becomes re-elected. The third term is the probability that an egoist other than the one we are considering is elected in the first election, and that he is replaced by a benevolent type in the second election. Since $p_0^r = 0$, it follows:

$$p_0^r p_{A5} + (1-p_0^r)p_{A5} + (1-p_0^r)(1-p_{A5})p_{A5} = p_{A5} + (1-p_{A5})p_{A5}$$
$$> p_s^r p_{A5} + (1-p_s^r)p_{A5} + (1-p_s^r)(1-p_{A5})p_{A5} = p_{A5} + (1-p_s^r)(1-p_{A5})p_{A5}$$

3. $\delta'' < \delta < \delta'$. In this case there is no equilibrium in pure strategies in stage 3. If all egoists base their stage 1 behavior on the assumption that egoists capture the budget in stage 3, they will prefer to allocate *B* to public goods when they observe the resulting value of p_{A5}, and vice versa if they base their stage 1 behavior on the assumption that egoistic president allocate *B* to public goods. The only symmetric equilibrium is a mixed one, where each egoist allocates the entire budget to public goods with some probability ρ, and pockets *B* with probability 1-ρ, $0 < \rho < 1$.

4 Concluding remarks

This paper sheds new light on the relation between good governance and the selection of corrupt politicians ("egoists" in our terminology). While it natural to assume that corrupt politicians are a cause of bad governance, our results suggest that causality may also run the other way. If governance is poor, life as a citizen is unpleasant and egoists have a strong incentive to seek a career in politics to reap the rents available to office holders. Thus, poor governance breeds corrupt politicians. If, on the other hand, governance is good, rent seeking is relatively less attractive, and individuals with intrinsic preferences for serving the public interest strive for public office. Thus, good governance enables voters to select virtuous politicians. The parameters of good governance, i.e. the high efficiency of the public sector, the lack of discretionary power of the president, and a high share of benevolent types in the pool of candidates, determine in our model which outcome obtains. In our simple model, these factors are exogenous. However, it seems plausible that the causation runs both ways because these factors would be affected by the character of the president in power. Presidents with a flawed character may generate ineffective administration, raise taxes to increase the size of the budget they control, and destroy social capital in the pool of candidates. If this is the case, a vicious cycle results where bad governance breeds bad politicians, who in turn breed more bad governance.

The assumption that some share of candidates is benevolent relates our model to the issue of how "social capital" and "political culture" (e.g. Hillman and Swank 2000) may shape policy outcomes. If benevolence among candidates is a positive function of benevolence in the population at large, the share of benevolent candidates θ can be interpreted to reflect social capital in a society. Putnam (1993) argues that differences in the

quality of governance between Northern and Southern Italy mirror variations in civic culture between the two regions. Our model offers a direct and an indirect explanation for such data patterns. Not only are there fewer benevolent candidates around in places with weak civic culture (direct effect); our model also shows that strategic imitation is more common when θ is low, and strategic imitation makes it more difficult for voters to pick them out (indirect effect).

Strategic imitation has clearly adverse welfare effects in our model because pro-social acts are costly and because imitation hampers political selection. However, the welfare effects of strategic imitation would be ambiguous if the social return of the pro-social act in stage 1 (b) is assumed to be sufficiently high (see Cugno and Ferrero 2004 for a related case).

Overall, our model illustrates that political selection may fail even if benevolent candidates exist and all voters prefer to have benevolent presidents, depending on institutional and social factors like the discretionary leeway of the president, possibilities for re-election and the strength of investigative media. While our simple model of political selection yields a number of interesting results, we believe that the model could be fruitfully extended to capture additional aspects of selection. First, while we focus on political selection of "character", selection of competence may be equally important (Besley 2005, Messner and Polborn 2004, Matozzi and Merlo 2007). Second, we investigate political selection through elections from a given pool of candidates but the process of recruiting candidates, i.e. who selects into the political arena, is clearly also interesting to study. These two selection processes may interact in important ways. For example, if egoistic types are more likely than benevolent types to enter the political game, as argued by Caselli and Morelli (2004), it seems plausible that the share of candidates with benevolent preferences (the parameter θ in our model) is small, and that strategic imitation is common.

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Appendix A Disequilibrium beliefs

Consider case *c)* in section 4, where $Y(\theta) < 0$ and $Y_v > 0$ and $\sigma_1 \leq 1$. Suppose egoists hold the common prior σ_0, where $\theta \leq \sigma_0 \leq 1$. In contrast with the main text, assume that σ_0 might deviate from the equilibrium values. We distinguish three cases depending on how the initial belief relates to the critical values σ_1 and σ_2.

c1) $\sigma_0 < \sigma_1$. In this case, $Y(\sigma_0) < 0$ and the best reply to the belief is therefore not to imitate. Since this holds for all egoists, the equilibrium is $\sigma^* = \theta$. The equilibrium is stable because it is strict (i.e. a deviation by *i* reduces *i*'s payoff).

c2) $\sigma_0 \geq \sigma_2$. As in the previous case, $Y(\sigma_0) < 0$ and the best reply is therefore not to imitate. However, when sufficiently many agents refrain from imitating, σ falls below σ_2, and imitation is again a profitable strategy. The only stable equilibria are $\sigma^* = \sigma_2$ and $\sigma^* = \theta$.

c3) $\sigma_1 \leq \sigma_0 \leq \sigma_2$. In this case $Y(\sigma_0) \geq 0$ and imitation is the best strategy. However, when the share of agents choosing the pro-social action rises above σ_2, non-imitation again becomes attractive for egoists. The only stable equilibrium occurs at $\sigma^* = \min(\sigma_2, 1)$.

The equilibria obtained coincide with those derived in section 4. Therefore, the predictions of the model are the same, whether or not we assume that the common prior is equal to the equilibrium value of σ.

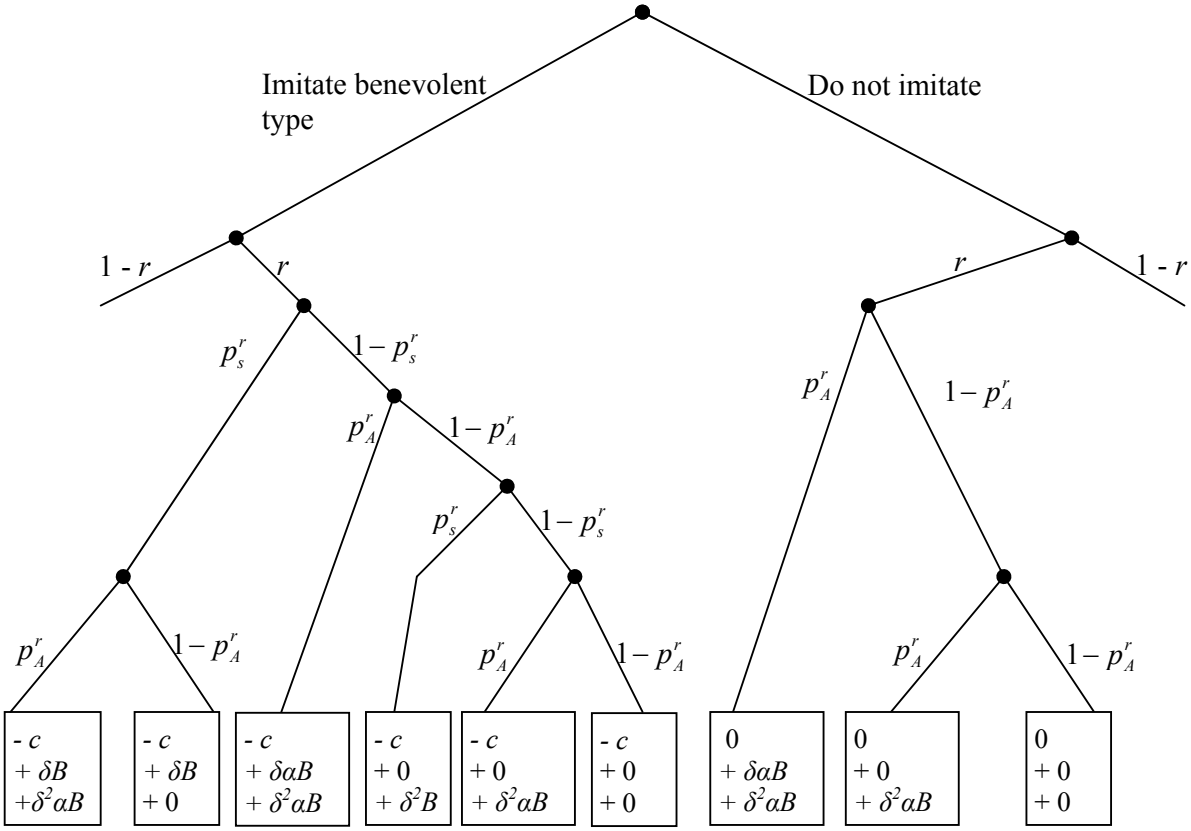
Appendix B The egoist's problem when there is a second election

Here we analyze the problem for an egoist who intends to pocket the entire budget if elected president in stage 3 and expects that all other egoists to do the same, even when there is a second election. Assume that information about behavior in stage 1 is revealed before the first election ($r > 0$). Note, first, that an egoist who does not imitate a benevolent type has no chance of winning either the first or the second election. Second, if the egoist is elected in the first election, he will not be re-elected since extracting *B* will reveal him as an egoist. If a benevolent type is elected in the first election, she is re-elected with certainty, since she allocates *B* to the public good. If egoist *i* is not get elected in the first election and the elected president *j* is an egoist, the *i*'s probability of winning the second

election is assumed to be p_s^r, which is equal to his probability of winning the first election. Similarly, we assume that the probability that a benevolent type wins the second election is is p_A^r if an egoist won the first election.

Figure B1 illustrates the optimization problem for an egoist who is committed to extract *B* if elected in the first election, and assumes that other egoistic presidents will do the same. Note that if $r = 0$, imitation at cost *c* does not improve chances to be elected. Therefore, the cases for "(1-*r*)" are omitted in the figure.

***Figure B1*:** Optimization problem for an egoistic candidate when there are two elections and egoists appropriate the entire budget



The boxes at the bottom of the figure show payoffs in stage 1 in the first line, payoffs in stage 3 in the second line, and payoffs in stage 5 in the third line. It follows from the figure that imitation is optimal if:

$$\begin{aligned}\tilde{X} \equiv & rp_s^r\left[p_a^r\left(\delta B+\delta^2\alpha B\right)+(1-p_A^r)\delta B\right] \\ & +r(1-p_s^r)\left\{p_A^r\left(\delta\alpha B+\delta^2\alpha B\right)+(1-p_A^r)\left[p_s^r\delta^2 B+(1-p_s^r)p_A^r\delta^2\alpha B\right]\right\} \\ & -r\left\{p_A^r\left(\delta\alpha B+\delta^2\alpha B\right)+(1-p_A^r)p_A^r\delta^2\alpha B\right\}-c\geq 0\end{aligned} \tag{10}$$

Inserting eq. (3) and (4) into (11) allows us to re-write the expression as a fourth-degree polynomial in σ. Hence, multiple equilibria continue to exist when a second election is introduced but a unique equilibrium prevails for some parameters, as figure B2 illustrates.

Consider the benefits from imitation which are captured in stage 3 and denoted by X_3 (see figure B1):

$$X_3 = r\left\{p_s^r\left[p_A^r\delta B+(1-p_A^r)\delta B\right]+(1-p_s^r)p_A^r\delta\alpha B-p_A^r\delta\alpha B\right\} = r\delta B\left\{p_s^r\left(1-\alpha p_A^r\right)\right\} \tag{11}$$

which is the same as the left-hand side of eq. (2). Therefore, the payoff from strategic imitation in stage 3 is independent of having a second election (as claimed in the main text).

Consider the benefits captured in stage 5, denoted as X_5:

$$\begin{aligned}X_5 = & r\left\{p_s^r p_A^r\delta^2\alpha B+(1-p_s^r)\left[p_A^r\delta^2\alpha B+(1-p_A^r)\left(p_s^r\delta^2 B+(1-p_s^r)p_A^r\delta^2\alpha B\right)\right]\right\} \\ & -r\left\{p_A^r\delta^2\alpha B+(1-p_A^r)p_A^r\delta^2\alpha B\right\} \\ = & r\delta^2 B(1-p_A^r)\left\{(1-p_s^r)p_s^r+p_A^r\alpha\left[(1-p_s^r)^2-1\right]\right\}\end{aligned} \tag{12}$$

This expression is positive if and only if $(1-p_s^r)p_s^r+p_A^r\alpha\left((1-p_s^r)^2-1\right)>0$, i.e. if:

$$(1-p_s^r)+p_A^r\alpha\left(p_s^r-2\right)>0 \tag{13}$$

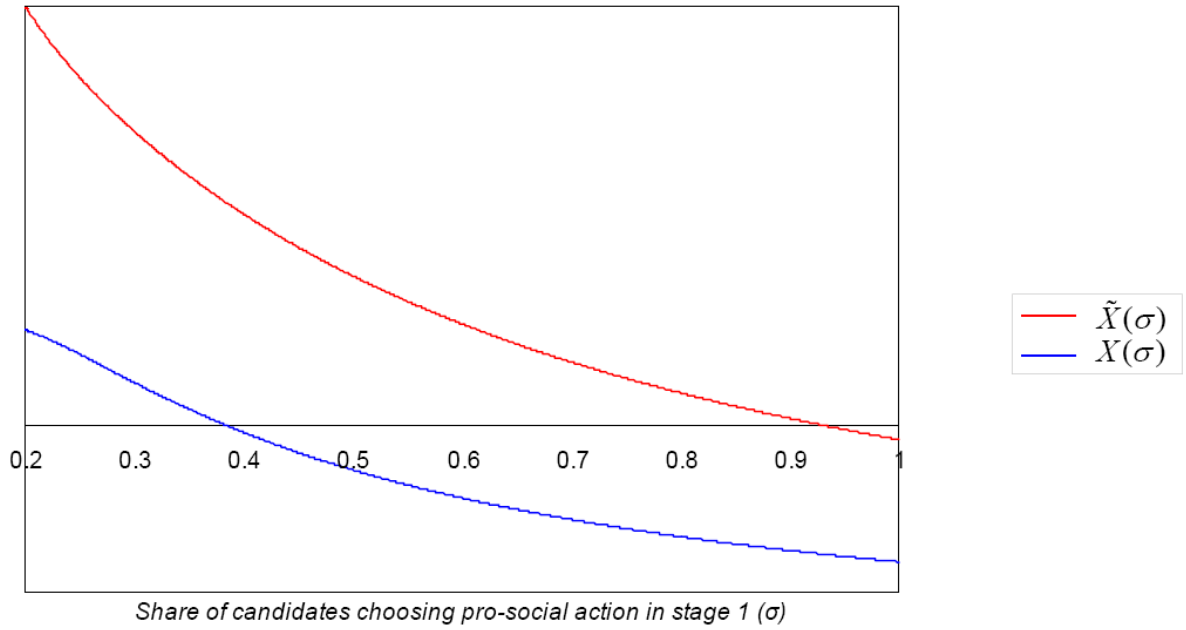
Insert eq. (3) and (4) into (14) and rewrite to obtain:

$$n\sigma^2-(1+2\alpha\theta n)\sigma+\alpha\theta>0 \tag{14}$$

Hence, depending on parameters, for some values of σ, the benefits from imitation captured in stage 5 are positive, for other values they are negative. The left-hand side of expression (15) is falling in α and θ, and in that sense higher values of those parameters therefore make it less likely that the possibility of re-election increases the amount of strategic imitation.

Figure B2 illustrates the case where the possibility of re-election deteriorates political selection with unique equilibrium values of σ.

Figure B2: Net benefit from imitation, with and without re-election



Note: $\tilde{X}(\sigma)$ shows an egoist's net benefit from imitation when re-election is possible and when he intends to appropriate the entire budget if elected president. *X(σ)* shows the net benefit from strategic imitation when there is only one election. The parameters are: $\delta = 0.4$, $\theta = 0.3$, $n = 10$, $c = 0.6$, $\alpha = 0.3$, $r = 0.5$, $B = 15$.

CHAPTER 4:

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Property Rights, Productivity, and Common Property Resources: Insights from Rural Cambodia [1]

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Summary. — This paper uses data from the 2003/04 Cambodia Household Socioeconomic Survey to investigate the effects of property rights to land. Plots held with a paper documenting ownership in rural Cambodia are found to have higher productivity and land values than other plots, while property rights have weak effects on access to credit. The paper also investigates whether the introduction of private property rights leads to decreased availability of common property resources. The data offers only weak support for this hypothesis. The general insight is that policies to strengthen land property rights can have important, positive effects on the rural economy, even in an environment of low state capacity.

Key words — property rights, agriculture, common property resources, Asia, Cambodia

1. INTRODUCTION

Land rights in developing countries have received much attention in development policy and research in recent years. In the fiscal year 2004, the World Bank committed nearly one billion US$ to land administration, land titling, and other land reform projects (Conning & Deb, 2007). Various studies have investigated the effect of land rights on agricultural investment and productivity. [2] This study contributes by investigating the effects of formal land rights, defined as government-issued land ownership documents, in a country where they have so far not been studied systematically, namely Cambodia.

Cambodia is an illuminating case study due to its special circumstances, and a priori it is unclear whether formal land rights can be expected to be effective. On the one hand, years of Khmer Rouge rule, civil war, and social upheaval have severely eroded traditional, informal institutions. In this context, we might expect the introduction of formal rights to be important. On the other hand, state capacity in Cambodia is weak. If the ability of authorities to enforce rights is limited, the introduction of formal rights may be ineffective. This paper analyzes the effects of formal property rights on owner-operated plots, which covers a large majority of agricultural land in Cambodia. The results show that government-issued land ownership documents do in fact have a significant effect on the value of output in crop agriculture, and on land values. This paper attempts to investigate whether this effect works through the perceived tenure security (the "assurance effect"), through the credit market, or the land market. Results indicate that the main channel of causality is perceived tenure security. Land rights are found to have moderate effect on interest rates (households with formal rights pay less), although they have no effect on the propensity to use credit.

The study also investigates whether the spread of formal, private property rights leads to decreased availability of common property resources. This question has so far received little attention in the literature. It is particularly important in Cambodia, where natural resources are an important source of rural livelihoods. The data offer weak support for the idea

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that formal, private property rights lead to erosion of common property resources.

Section 2 discusses how property rights may affect agricultural outcomes. Section 3 describes the history of land property rights in Cambodia and Section 4 presents the data set and provides descriptive statistics. Section 5 investigates the effects of land rights on agricultural productivity. Endogeneity issues are taken into account through the use of a 2SLS estimator. Section 6 analyzes the effects of property rights on land values, while Section 7 investigates the channels of causation from land rights to productivity and land values. Section 8 tests the hypothesis of a negative effect of formal property rights on the availability of common property resources, and Section 9 concludes.

2. POTENTIAL EFFECTS OF PROPERTY RIGHTS

(a) *Theory*

Property rights have the potential to increase agricultural investment, and therefore productivity and land values, through at least three channels (Besley, 1995). First, property rights increase incentives to invest simply by increasing the confidence of the landowner that he will be able to reap the benefits from investment (the "assurance effect"). This channel might be important in Cambodia, where problems of tenure insecurity and land conflict are widespread. Massive social upheavals during the Khmer Rouge regime and decades of armed conflict have severely weakened traditional customs regulating land use, and modern institutions for handling land disputes remain weak (Cooper, 2004; Williams, 2000). Land grabs by powerful individuals are frequently reported (see, e.g., Phnom Penh Post, 2004, 2005, 2006a, 2006b, 2006c; Economist, 2007). LICADHO, an NGO that monitors land conflicts in 12 of Cambodia's 24 provinces, reports that in the year 2005 alone, 9,832 families in those provinces were affected by land grabs, counting only the cases that started in 2005 (LICADHO, 2006, p. 3).

Property rights may also affect productivity by easing access to credit. In order to obtain a loan, the borrower is often required to provide collateral, and land is an excellent collateral. It cannot be moved and its quality can only be changed slowly. Auffret (2003) analyze determinants of productivity in Cambodian agriculture, and found that credit constraints are the most important obstacle faced by farmers. Until recently, the outreach of formal credit institutions in Cambodia has been extremely weak, but the importance of not-for-profit "micro-finance institutions" (MFIs) has increased rapidly in recent years (IFC, 2006). In the year 2000 the largest of these institutions, ACLEDA, transformed itself into a for-profit bank, and since then it has continued to increase its number of borrowers in rural areas at a high pace. In 2004, when the survey data used in this paper were collected, ACLEDA had 122,000 active borrowers, with a large share of these in rural areas (ACLEDA, 2005). ACLEDA always takes collateral for loans, and so do many of the MFIs, such as PRASAC Murshid (forthcoming, chap. 9). Apart from this, it is also common for informal lenders to take collateral. Hence, a priori there appears to be some scope for property rights to affect productivity through the credit channel.

Finally, property rights can increase agricultural productivity by facilitating trade in land. The costs of organizing trade will be lower if clear and comprehensive property rights, including transfer rights, are defined for each plot of land. An active market for land potentially increases agricultural productivity by ensuring that land is held by those who can use it most productively. This relationship is conditional on the functioning of other markets, however. If markets for labor, capital, or insurance are imperfect, trade need not necessarily transfer land to the most productive households (Deininger & Feder, 2001, chap. 6). Land markets in rural Cambodia are active (Ballard & So, 2004). On the other hand, imperfections certainly also exist in complementary markets and the incidence of distress sales appears to be high. For example, Chan and Sarthi (2002) found in a study of nine villages that 50% of households who sold land did so to pay for health expenses.

(b) *Empirical evidence*

Empirical studies of the effects of property rights to land on agricultural outcomes have produced mixed results. Only one other, unpublished, study has investigated the effects of property rights in rural Cambodia econometrically. Deininger (2005) (cited in World Bank, 2006) used the same data set as the one used in this paper, and found that titles increase land values (measured as households' own

estimates of value), and that a higher share of land with title leads to higher consumption. I modify the measure of property rights as explained below, and investigate the effects of property rights on agricultural productivity, access to credit, land rental market activity and availability of common property resources.

Analyses from other countries in East and Southeast Asian countries tend to support the theory of a positive link from property rights to agricultural outcomes. For example, Feder and Onchan (1987) found a positive effect of titling on agricultural investment and capital intensity in two of three Thai provinces. They showed that the effect works mainly through the credit market. SMERU (2002) found that a land titling program in Indonesia has led to increased investment, increased use of collateral-backed credit, and higher land values. Perhaps even more interesting are the studies from other countries with past experiences of collectivization in agriculture, such as China and Vietnam. Do and Iyer (2006) suggested that land titling in Vietnam has led to increased diversification into multi-year crops and to higher time-use in non-agricultural activities. Deininger and Jin (2003) found that improved transferability rights to land in Vietnam led to a large increase in activity in both rental and sales markets, and that transactions have on average transferred land to high-ability farmers with small land landholdings. So, the reforms had beneficial effects on efficiency as well as equity. For China, Deininger and Jin (2002) compared evidence from a province that introduced relatively radical property rights reform at an early point (Guizhou) with evidence from two other provinces. They showed that more secure property rights increased investment incentives without having negative effects in terms of higher household exposure to shocks (the reforms were hypothesized to lead to higher exposure to shocks because a previously established practice of redistributing land in favor of households hit by shocks was abandoned in favor of more secure long-term rights). Jacoby, Li, and Rozelle (2002) used data from north-eastern China and also showed that increased tenure security leads to higher investment.

These studies from Asia are interesting from the Cambodian perspective. Cropping patterns and agro-climatic conditions in Cambodia are most similar to those found in neighboring countries, and the historical experiences of Cambodia in the 20th in some ways resemble those in China and Vietnam, even though the upheavals in Cambodia were in many ways extreme. However, in terms of state capacity and institutional quality, it is also reasonable to compare Cambodia to countries in, for example, sub-Saharan Africa. One measure of state capacity is the state's ability to collect revenues. Over the period 1995–2004, Cambodia raised only 7% of GDP in Government revenue, the third lowest figure among low-income countries (World Bank, 2007, chap. 8). The corresponding figure for Vietnam is 20%. On the six Governance Indicators published in Kaufmann, Kraay, and Mastruzzi (2007), in 2004 Cambodia was in the lowest quartile of countries in the world on the indicators of "government effectiveness," "rule of law," and "control of corruption." It was in the second-lowest quartile on the indicators of "voice and accountability," "political stability," and "regulatory quality." Since the effectiveness of formal property rights depends on the ability of the state to enforce them, this means that studies of property rights in Africa, where institutions are also weak, should also be considered.

These studies have produced a much more mixed picture than studies from other regions (Feder & Nishio, 1999). Some studies do find positive effects. For example, Besley (1995) showed a positive effect of informal property rights on investment in the Wassa region of Ghana, although he found no effect in Anloga region. Hayes, Roth, and Zepeda (1997) demonstrated a positive effect of tenure security on agricultural productivity in peri-urban areas of the Gambia. Smith (2004) found similar results for the Southern province of Zambia. Holden, Deininger, and Ghebru (2007) found that land certification in the Tigray region of Ethiopia led to increased land rental market activity. Goldstein and Udry (2005) found that tenure security has a strong effect on agricultural investment in the Akwapim region of Ghana. On the other hand, Place and Hazell (1993) found only weak effects of informal land right on investment, productivity, and access to credit in survey data from Ghana, Kenya, and Rwanda. Place and Migot-Adholla (1998), using a survey of households in rural Kenya, failed to detect any effect of land titling on investment and productivity. Braselle, Gaspart, and Platteau (2002) found no effect of traditional land rights on investment in the Bobo-Dioulasso region of Burkina Faso, although they found that investment affects property rights. The positive effect of titling on productivity and investment

in Africa was also questioned by Atwood (1990) and Sjaastad and Bromley (1997).

3. BACKGROUND ON PROPERTY RIGHTS TO LAND IN CAMBODIA

Historical experiences with western style property rights to land in Cambodia are limited. During pre-colonial times, all land was formally owned by the sovereign, but since population density was low land, could in practice be freely occupied against payment of a symbolic, feudal tribute. The French colonial power attempted to introduce a modern system of property rights, but succeeded only in limited areas, particularly the rice growing plains. The colonial property rights system was continued after independence in 1953, but still did not extend beyond the plains. The Khmer Rouge collectivized all land, and few traces of land rights systems from before 1975 remain today.

After the fall of the Khmer Rouge in 1979, a new system of collective land management was implemented. Privatization started gradually in the mid-1980s, and private property rights to land were officially reintroduced in 1989 (Sik Boreak, 2000; So *et al.*, 2001). After 1992, landholders were encouraged to submit applications for formal land titles to residential and agricultural land and more than four million applications have been submitted. However, due to the limited administrative capacity of the government, only a small fraction of these applications have actually resulted in certificates being issued. Households may apply for a land title on their own initiative (''sporadic registration''), but there is evidence that obtaining titles through this process has often entailed very substantial costs in terms of informal fees. So *et al.* (2001, p. 25) reported that while the official fee of registration is 3–4$, the actual fee is sometimes as much as 300–400$. This is prohibitively high for most rural households.

In 2003, the Government of Cambodia renewed its efforts to issue land titles with the launch of the Land Management and Administration Program (LMAP). LMAP aims to facilitate a comprehensive reform of land management policies in Cambodia, and one of its main components is a systematic land titling program, aiming to issue one million titles in 11 provinces in the period 2003–07 (World Bank, 2002). However, by the end of 2004 only 38,481 titles had been issued (Deutsch, 2006, Table 3.2.1). There are more than 6 million plots in Cambodia and since the survey used in this paper was completed in January 2005, titles issued under LMAP are generally not captured in the data.

Plots larger than five hectares may be given out by the state as concessions (the so-called ''Economic Concessions'') for a limited number of years, for example, to allow the establishment of large-scale plantations. Formally, concessions are not allowed to be larger than 10,000 ha, but in reality several concessions are above this limit. Leuprecht (2004) estimated that 2.7 million hectares of Cambodia's total land area of 18.1 million hectares are under concession management.

4. DATA AND DESCRIPTIVE STATISTICS

The analyses in this paper draw upon the Household Socio-Economic Survey (HSES) 2003–04, carried out by the National Institute of Statistics during November 2003–January 2005. The survey is nationally representative and includes 15,000 households, of whom 12,000 live in rural areas. This section provides descriptive statistics on the variables used in the regression analyses in subsequent sections, and discusses key variables. Tables 1 and 2 show descriptive statistics at plot and household levels. Table 1 only includes plots owned by the surveyed households, and Table 2 only includes household owning at least some land. This is because the aim of the analysis is to focus on the difference between ownership documented with official papers and undocumented ownership, and not on the difference between owned and rented or sharecropped land. This focus is justified by the fact that more than 95% of plots in the sample are operated by the owner.

The first line of Table 1 shows that 50% of plots are held with a paper certifying ownership. This includes proper land certificates (titles) as well as receipts for certificate applications, and a small fraction of plots where ownership is documented by a land survey receipt. The survey does distinguish between these different types of documents but this information is not used here. The main reason is that the estimated share of titled plots appears unrealistically high. In the survey, 21% of plots are reported to be held with a title. On the other hand, Chan, Tep, and Sarthi (2001, Table 4.1) showed that at the end of the year 2000 a total of 518,000 land certificates had been distributed, with more than 85% handed out during 1989–95. World

Table 1. *Descriptive statistics, plot level (mean, unless otherwise stated)*

Variable	All plots	Plots with paper	Plots without paper	Observations
Held with paper	0.50			17,308
Area, ha (median)	0.50	0.40	0.50	17,306
Value of output, '000 riel/ha (median)	673	744	600	15,917
Sales value, '000 riel/ha (median)	2,500	3,000	2,000	17,239
Irrigated in at least one season	0.32	0.36	0.28	17,308
Type of land:				
Wet season land	0.68	0.68	0.68	17,308
Dry season land	0.11	0.12	0.10	17,308
Both wet and dry season lands	0.01	0.02	0.01	17,308
Chamkar land[a]	0.13	0.13	0.14	17,308
Vegetable garden	0.02	0.02	0.02	17,308
Other types of land	0.05	0.04	0.05	17,308
Mode of acquisition:				
Given by the state	0.47	0.57	0.38	17,308
Inherited or given by relatives	0.34	0.26	0.41	17,308
Bought	0.12	0.17	0.08	17,308
Donated by friends	0.00	0.00	0.00	17,308
Cleared or occupied for free	0.06	0.00	0.13	17,308
Other modes of acquisition	0.00	0.00	0.00	17,308
Years had plot	19	19	18	17,257
Conflict on plot since 1995	0.01	0.01	0.02	17,308
Rented out	0.03	0.03	0.03	17,308

Note: Sampling weights applied. Only rural households are included, only plots owned by the household are included. Area, value of output, and sales value are quite strongly skewed to the right, and medians are therefore more informative than means.

[a] Land used for growing vegetables or tree crops.

Bank (2002) estimated that there are six to seven million plots in Cambodia. Hence, for the true share of titled plots to be as high as 21%, a massive titling effort should have taken place during 2001–04. This was not the case, and it therefore seems likely that a significant share of the papers denoted as "certificates" (titles) in the HSES 03/04 are actually application receipts or other non-title documents. So *et al.* (2001) reported that "a large number of people consider the receipts to be titles" and "in the more market-exposed locales (...) people said that the receipt was not only an insurance against land grabbing, but was also useful in terms of land sale and property inheritance" (p. 26). In the 1992 Land Law, an application receipt was sufficient to lock in a possession right for a plot (Cooper, 2004). This rule was changed in the 2001 Land Law, but may well still have affected farmers' perceptions of application receipts at the time of the survey. Hence, it seems reasonable to believe that (i) certificates were often confused with other documents in the HSES (especially so because no specific instructions are given to the enumerators to distinguish carefully between certificates and other documents) and (ii) certificates, application receipts, and other official papers documenting ownership can be expected to have similar economic effects. I refer to all these papers as "formal" land rights documents.

Table 1 shows descriptive statistics for plots with and without a paper documenting ownership, and Table 2 distinguishes between households with, respectively, more or less than 50% of their land held with paper. Consistent with the view that papers have a positive effect on investment and productivity, plots with paper have higher value of output per hectare, higher reported sales value, and are more likely to be irrigated. Plots with paper are also less likely to have been exposed to land conflict. Households with more than 50% of their land held with paper have higher net income per hectare, use somewhat more inputs per hectare, and have slightly more non-land agricultural assets than other households. However, households with a large share of their land ownership documented with paper are slightly less likely than others to have an outstanding loan, although

Table 2. *Descriptive statistics, household, and loan level (mean, unless otherwise stated)*

Variable	All land-owning households	Share of land with paper $\geqslant 0.5$	Share of land with paper <0.5	Observations
Operated land area, ha (median)	1.0	0.9	1.0	9,352
Share of operated area not owned	0.05	0.01	0.09	9,310
Value of current inputs, excl. hh labor, '000 riel (median)	225	253	202	9,137
Value of non-land agricultural assets, '000 riel (median)	1,525	1,565	1,505	9,352
Non-land wealth, '000 riel (median)	5,138	5,845	4,560	9,352
Hh size	5.0	5.0	4.9	9,352
Dependency ratio	0.84	0.82	0.86	9,352
Years of schooling of hh head	3.8	4.1	3.54	9,293
Age of hh head	45	46	44	9,352
Female hh head	0.20	0.21	0.19	9,352
At least one hh member sought health care in the last 4 weeks	0.36	0.37	0.36	9,352
Hh has outstanding debt	0.44	0.42	0.45	9,352
Hh has outstanding debt with positive interest	0.26	0.27	0.26	9,352
Hh has outstanding debt with formal lender	0.10	0.12	0.08	9,352
Loans				
Amount '000 riel (median)[a]	250	300	250	2,562
Interest, pct./month[a]	6.2	6.0	6.3	2,562

Note: Sampling weights applied. Only rural households are included. Value of inputs, value of non-ag. assets and amount borrowed are quite strongly skewed to the right, and medians are therefore more informative than means.

[a] Interest free loans and loans with monthly interest >30 pct. ignored.

they are more likely to have a loan with a formal lender (an MFI or a bank). The loans taken by household with papers are somewhat larger than loans taken by other households, and the interest charged is slightly lower. In general, papers documenting land ownership are associated with more favorable outcomes. However, we cannot draw causal inference from these descriptive statistics. The positive association between paper status and other variables might result from the fact that receipts and titles were less likely to be handed out in remote locations than elsewhere. Until 1998 many of these locations were not even controlled by the government, but by the Khmer Rouge. Also, resourceful households with fertile land have a higher incentive and better opportunities for obtaining official papers, and hence the causal relationship may run from productivity to paper status, and not the other way. To take account of these possibilities, I turn to more careful, econometric analyses.

5. PROPERTY RIGHTS AND PRODUCTIVITY

One "reduced form" prediction emerging from the theoretical discussion in Section 2 is that property rights have a positive effect on agricultural productivity. In this section, I test this prediction. The measure of productivity used is the value of output per hectare. An important advantage of this variable is that it is available at the plot level. This makes it possible to make use of plot specific information on property rights. Increasing agricultural output can be an important policy goal, for example, in order to secure food supplies, or increase export earnings.

(a) *Model and estimation strategy*

The agricultural production function is assumed to take the Cobb–Douglas form, giving the following expression for agricultural productivity:

$$\frac{pY_{hj}}{Q_{hj}} = pA(x_{hj}, z_h, v)Q_{hj}^{\beta_Q - 1}L_{hj}^{\beta_L}V_{hj}^{\beta_V}K_{hj}^{\beta_K}, \qquad (1)$$

where Y_{hj} is the output on plot j in household h, p the price of output, Q the sown area, L the household labor input, V the variable inputs other than household labor, K the agricultural assets and A a measure of total factor productivity which depends on vectors of plot, household, and village characteristics (x, z, and v, respectively). It is furthermore assumed that total factor productivity, $A(\cdot)$, takes the following functional form:

$$\ln A(x_{hj}, z_h, v) = \ln A + \alpha' x_{hj} + \gamma' z_h + \theta' v.$$

Property rights, R, are modeled as an element in x_{hj}. In this perspective, property rights increase productivity by affecting total factor productivity, for example, because rights give stronger incentives or possibilities for productivity enhancing investment, or because rights facilitate a process by which plots are transferred to the most productive farmers. The measure of property rights used is whether a plot is held with a paper documenting ownership. Assuming a multiplicative error term, ε_{hj}, the following empirical model emerges for estimation:

$$\begin{aligned}\ln\left(\frac{pY_{hj}}{Q_{hj}}\right) = {} & \ln pA + \alpha_R R + \tilde{\alpha}'\tilde{x}_{hj} + \gamma' z_h \\ & + \theta' v + (\beta_Q - 1)\ln Q_{hj} + \beta_L \\ & \times \ln L_{hj} + \beta_V \ln V_{hj} + \beta_K \\ & \times \ln K_{hj} + \ln \varepsilon_{hj}, \end{aligned} \qquad (2)$$

$\tilde{x}_{hp}$ is simply x_{hp} without R. The model is specified at the plot level. Measures of labor and other inputs are available only at the household level, so they are entered at this level. Household labor is measured by the number of household members between 15 and 64 years of age. Land is measured as the area of agricultural land operated by the household, in hectares. "Agricultural assets" are measured as the value of agriculture specific assets, such as cattle, buffaloes, horses, ploughs, threshers, and carts. Furthermore, a variable measuring "non-household labor variable inputs" is entered. This variable includes spending on non-labor inputs (seeds, fertilizer, *etc.*) as well as on hired labor. The set of plot characteristics affecting the total factor productivity ($\tilde{x}_{hj}$) includes a dummy for whether the plot is irrigated (either during the wet or during the dry season, or both), and a set of dummies for the type of land. These variables together with village fixed effects proxy for soil quality, which would otherwise be a potentially important omitted variable. At the household level, I include years of education of the household head, and the dependency ratio, defined as the number of

household members below 15 or above 64 divided by the number of household members between 15 and 64. In principle, household fixed effects could be introduced to remove all effects produced by differences between households. Unfortunately, the data are not rich enough to allow for this exercise, since most households have only a few plots (often only one).

Village fixed effects are included to control for village level characteristics, such as infrastructure, market conditions, and differences in soil quality and agro-climatic conditions. Importantly, the fixed effects also take account of the fact that different geographical areas had different exposure to the programs under which titles and other papers were handed out. As in the descriptive analysis, only plots that households report to "own" (with or without formal documentation) are included. Only plots in rural areas are included.

As discussed above, the property rights variable is likely to be endogenous. This means that Ordinary Least Squares (OLS) estimation may yield biased estimates, and I therefore apply an instrumental variables (IV) estimator as well, namely Two Stage Least Squares (2SLS). The IV method also potentially diminishes the effects of measurement error. Following Besley (1995), Braselle *et al.* (2002), and Deininger and Castagnini (2004) I use dummies for the mode by which a plot was acquired as instruments for property rights. The idea behind this strategy is that, controlling for characteristics of plots and households that are correlated with both mode of acquisition and productivity, there is no reason why choices related to productivity should be linked to the way a plot was acquired (i.e., the instruments will be uncorrelated with the error term). On the other hand, there is a good reason to believe that the mode of acquisition affects property rights. For example, if a plot was bought or given by the state, there is a chance that obtaining a legal document for the plot was an integral part of the process of acquiring the plot. This would rarely be the case if the plot was granted by a friend, or acquired by felling trees on land that was previously held by the community. Table 1 shows that paper status is quite strongly related to mode of acquisition. Plots held with a paper are more likely to have been given by the state or purchased than other plots. While the instrument chosen here is the best one available in the data set, it is not necessarily perfect. First, mode of acquisition may not only affect property rights through the probability of having a paper, but could also have a direct effect on the *de facto* tenure security a farmer has over his plot. For example, a local community might be more inclined to recognize a farmers' claim to a plot if it was bought than if it was acquired by clearing communal land. Second, mode of acquisition might be correlated with unobservable plot characteristics, such as soil quality. Both these objections probably apply most strongly to land cleared by the household. In many places, it seems that cleared land has a higher probability than other types of being declared "state land" and therefore be subject to expropriation by the state (field observations). In terms of soil quality, recently cleared land might be better than other types of land, because more nutrients remain in the soil. On the other hand, clearing forest land with primitive tools can be a lengthy process, and several years may pass from the time a plot is acquired until it is fully cleared. In those years its productivity might be lower than on other plots. Cleared land is also much less likely than other types of land to be held with a paper, as shown in Table 1. For these reasons, it is investigated whether the estimated results are robust to taking plots acquired by land clearing or "occupied for free" out of the sample (the survey lumps these two modes of acquisition together).

(b) *Results*

Table 3 shows the results of estimating the model for the value of output per hectare. The first and second columns show the results of estimating (2) on the entire sample by OLS and 2SLS. The effect of having an ownership paper is positive in both models, but only significant in the 2SLS-model where it is also much higher. It is somewhat surprising that the coefficients are higher in the 2SLS-models than in the OLS models. One would expect a reverse, positive effect from productivity to rights, causing an upward bias in the OLS estimates. The results indicate that the main effect of instrumentation is to remove measurement error in the paper variable. Measurement error might arise from at least two different sources. First, simple misunderstanding, lack of knowledge on the part of the respondent, and recording mistakes can lead to errors. Second, although the effects of titles and other documents are likely to be similar, they may not be identical. If some types of paper provide

Table 3. *Land ownership documents and agricultural productivity*

	Dependent variable: value of output per hectare (log)			
	All plots		Cleared plots excluded	
	OLS	2SLS	OLS	2SLS
Plot held with paper	0.045	0.346	0.038	0.297
	(1.51)	(3.43)***	(1.17)	(1.71)*
Farm size (log)	−0.695	−0.700	−0.691	−0.696
	(27.83)***	(28.63)***	(26.45)***	(26.66)***
Working age hh members (log)	0.113	0.107	0.11	0.101
	(4.53)***	(4.27)***	(4.18)***	(3.75)***
Spending on inputs other than land and hh labor (log)	0.428	0.421	0.435	0.427
	(20.79)***	(20.54)***	(20.89)***	(20.48)***
Non-land agricultural assets (log)	0.031	0.031	0.03	0.03
	(6.54)***	(6.53)***	(6.29)***	(6.38)***
Irrigated during at least one season	0.089	0.087	0.079	0.076
	(2.57)**	(2.52)**	(2.22)**	(2.13)**
Type of land				
Dry season land	0.09	0.117	0.112	0.12
	(1.73)*	(2.25)**	(2.06)**	(2.26)**
Both wet and dry season lands	0.347	0.351	0.311	0.316
	(3.88)***	(3.96)***	(3.67)***	(3.82)***
Chamkar land	0.168	0.178	0.236	0.237
	(2.69)***	(2.89)***	(3.54)***	(3.63)***
Vegetable garden	1.055	1.09	1.101	1.132
	(5.89)***	(5.87)***	(6.15)***	(6.22)***
Other types of land	0.159	0.161	0.148	0.152
	(1.11)	(1.14)	(1.00)	(1.03)
Years of schooling of head	0.007	0.007	0.005	0.006
	(2.24)**	(2.29)**	(1.76)*	(1.89)*
Dependency ratio	0.017	0.015	0.013	0.011
	(1.29)	(1.20)	(0.96)	(0.85)
Female hh head	−0.015	−0.02	−0.015	−0.02
	(0.63)	(0.89)	(0.60)	(0.85)
Fixed effects	Village	Village	Village	Village
Observations	14,534	14,534	13,691	13,691
R^2	0.51		0.52	
Hansen *J*-test of instrument exogeneity (*P*-value)		0.94		0.79
F-test for joint significance of instruments in 1st stage reg.		78.4		30.1

Note: Robust *t*-statistics in parentheses. Standard errors are adjusted for clustering at the village level. * Significant at 10%; ** significant at 5%; *** significant at 1%. Only rural households included. Only plots owned by the household included (i.e., plots rented in are excluded). Constant not shown. The omitted category for type of land is the wet season land. In the 2SLS regressions, plot held with paper is instrumented with the mode of plot acquisition.

stronger tenure security than others, the underlying notion of property rights will be measured with error when we assign the same value to different types of paper. If measurement error is indeed the main cause for differences between the OLS and IV estimates, we should expect the

IV estimates to be upward biased. Kane, Rouse, and Staiger (1999), showed that in the case of a binary endogenous variable (such as "plot held with paper"), the instruments are correlated with the measurement error, and that this correlation leads to an upward bias in the estimate of the effect of the endogenous variable. In this interpretation the OLS estimate is a lower bound and the IV estimate is an upper bound for plausible values of the true parameters. Columns three and four show the results of estimating (2) with the plots cleared by the household or occupied for free removed from the sample. The effects of paper are still positive, although somewhat lower. The 2SLS estimate remains significant at the 10% level.

The instruments perform very well in the formal tests of relevance and exogeneity. The rule-of-thumb provided by Staiger and Stock (1997) in testing for weak instruments is that the *F*-statistic for the significance of the instruments in the first-stage regression should be at least 10. In the models presented here, the first-stage *F*-statistics are much higher. The Hansen *J*-tests fail to reject the hypothesis of instrument exogeneity in the full as well as the restricted sample.

The economic significance of property rights is quite high, according to the IV estimates of the coefficient on the paper variable. Plots held with a paper are on average 30–35% more productive than other plots. Even if we assume that the coefficients are somewhat upward biased due to measurement error, this effect is still remarkable. It is higher than the effect of, say, the plot being irrigated, or the head having five extra years of education.

(c) *Zone specific analysis*

The discussion in Section 2 implies that the effects of property rights are partly conditional on the existence of complementary markets, for example, for credit, land, and investment goods. Since these markets are more vibrant in some regions of Cambodia than others, we might expect that the effects of property rights differ between regions. To test this hypothesis, the productivity model is estimated separately for each of the four main, geographical "zones" in Cambodia: the Mekong Plains, Tonle Sap, Coast, and Plateau/Mountain. [3] Of these the Plains in the low-lying, Southeastern part of the country has the most developed infrastructure and markets. The most remote regions are the Coast and Plateau/Mountain zones. The Khmer Rouge rebels also generally held out longer in these zones than elsewhere, although parts of the Tonle Sap zone were also affected by conflict until the mid-1990s.

Table 4 shows the results of this exercise. Paper status is in all regressions instrumented with the mode of acquisition dummies. The hypothesis of a stronger effect of property rights in less remote regions receives some support. The paper variable is only significant in the Plains and Tonle Sap regions, which have the most developed infrastructure and markets. In the Coastal zone there is no effect. On the other hand, the point estimate is higher in the Plateau/Mountain region than anywhere else. However, since it is insignificantly different from zero, we may still conclude that property rights appear to have a stronger effect in the regions with more developed infrastructure and markets than elsewhere.

Table 4. *Land ownership documents and productivity by geographical zone*

Zone	Dependent variable: value of output per hectare (log)			
	Plains	Tonle Sap	Coastal	Plateau/mountain
	2SLS	2SLS	2SLS	2SLS
Plot held with paper	0.359	0.360	−0.006	0.478
	(2.70)***	(2.10)**	(0.01)	(1.22)
Fixed effects	Village	Village	Village	Village
Observations	7,505	4,449	1,044	1,511
Hansen *J*-test of instrument exogeneity (*P*-value)	0.6	0.9	0.44	0.64
F-test of joint significance of instruments in 1st stage reg.	54.1	30.3	18.1	7.44

Note: Robust *t*-statistics in parentheses. Standard errors are adjusted for clustering at the village level. * significant at 10%; ** significant at 5%; *** significant at 1%. Only rural households included. Only plots owned by the household included (i.e., plots rented in are excluded). Constant not shown. The same set of control variables as in Table 3 is included (results not shown). Plot held with paper is instrumented with the mode of plot acquisition.

6. PROPERTY RIGHTS AND LAND VALUES

If we assume that the value of a plot is the discounted sum of future income flows the plot is likely to generate, then plot value is an alternative measure of productivity, and the hypothesis of an effect of property rights on productivity can be tested by investigating whether property rights have a significant effect on land values. As mentioned in Section 2, Deininger (2005) found such an effect in Cambodia (reported in World Bank, 2006). The present analysis complements his analysis by using a different measure of property rights and a somewhat different specification of the econometric model. The HSES 03/04 asks respondents about the perceived sales and rental values of their plots. Since there are significantly more missing values on the rental value variable, I focus on sales value. Information on values of actual sales would probably be more reliable, but such data are not available from the survey. Regressions for the log of sales value per hectare (in '000 riel) are estimated. The measure of property rights included is still whether a plot is held with a paper documenting ownership. The size of the plot is included as a proxy for soil quality. Smaller plots are often of higher quality, in part due to the principles of distributing land during de-collectivization. Irrigation status and land type are important determinants of future productivity, and are also included. I also include the age, gender, and education of the household head. Although these variables do not affect the productivity of the plot in case it is sold to another household, they may affect the bargaining power of the household in case of an actual sale. Village fixed effects are included to capture geographical differences in soil quality and market conditions. [4] Paper status is instrumented by mode of acquisition, and the robustness of the instrumentation strategy is tested by estimating the model both with and without plots cleared or occupied for free included in the sample.

Table 5 shows the results of this analysis. The estimated coefficients on the paper variable are similar to those in the model for value of output. All estimates are positive, and the 2SLS estimates are higher than the OLS estimates. An important difference is that the OLS estimates in this model are significant. In the full sample, the instruments perform less well in the land value model than in the value of output model. The instruments remain highly relevant, but exogeneity is rejected at the 10% level. However, in the restricted sample (with plots cleared or occupied for free excluded), the exogeneity test is easily passed. The coefficient on paper status remains significant at the 10% level. The point estimate is 0.38 in the full sample 2SLS model, but drops to 0.20 in the restricted sample. The OLS estimates are in both cases around 0.10. These results strengthen the arguments for a positive effect of secure, private property rights on agricultural productivity. However, note that (i) the estimated effect of ownership documents is lower in the restricted than in the full sample and (ii) the exogeneity test is only passed in the restricted sample. This indicates that mode of acquisition does in fact have a direct effect on *de facto* property rights, in the sense that farmers have lower security of tenure for plots cleared or occupied for free than for other plots, regardless of whether they are held with a paper.

7. MECHANISMS OF CAUSATION

Section 2 argued that property rights may affect productivity via the "assurance effect," the credit market, and the land market. This section attempts to investigate which of these mechanisms are important in Cambodia.

(a) *The assurance effect*

The assurance effect argument holds that formal property rights affect productivity by changing farmers' perceptions of tenure security, and therefore their willingness to invest. The HSES does not provide information on farmers' subjective perceptions of tenure security. In a sample of 50 villagers and village leaders, 94% of respondents believe that the new land titles distributed by LMAP improve ownership security (Markussen, 2007; World Bank, 2007). The LMAP titles are by and large not captured in the data used for the present analysis, but the findings at least indicate that formal land ownership documents have the potential to affect perceived tenure security. The HSES does provide an "objective" measure of tenure security, namely whether a plot has been exposed to a conflict. However, in spite of the frequent reports about land conflict in other sources (see Section 2), only 1% of plots in the HSES have had a conflict since 1995. [5] Table 1 shows that

Table 5. *Land ownership documents and land sales value*

	Dependent variable: Sales value of plot per hectare (log)			
	All plots		Cleared plots excluded	
	OLS	2SLS	OLS	2SLS
Has legal paper for plot	0.105	0.381	0.095	0.204
	(3.96)***	(4.46)***	(3.44)***	(1.67)*
Plot size, ha (log)	−0.672	−0.674	−0.663	−0.665
	(42.88)***	(44.59)***	(40.42)***	(41.01)***
Irrigated during at least one season	0.149	0.146	0.144	0.142
	(4.98)***	(4.97)***	(4.62)***	(4.62)***
Dry season land	−0.068	−0.049	−0.077	−0.075
	(1.12)	(0.82)	(1.21)	(1.20)
Both wet and dry season lands	0.05	0.048	0.052	0.052
	(0.59)	(0.56)	(0.61)	(0.61)
Chamkar land	0.099	0.104	0.155	0.153
	(1.88)*	(2.02)**	(2.90)***	(2.93)***
Vegetable garden	0.148	0.171	0.174	0.182
	(1.54)	(1.80)*	(1.78)*	(1.89)*
Other types of land	0.24	0.254	0.305	0.306
	(2.40)**	(2.62)***	(2.78)***	(2.86)***
Female hh head	−0.075	−0.072	−0.07	−0.069
	(3.34)***	(3.30)***	(3.14)***	(3.16)***
Years of schooling of head	0.01	0.01	0.009	0.009
	(3.59)***	(3.48)***	(3.18)***	(3.19)***
Age of head	0.003	0.002	0.002	0.002
	(3.74)***	(3.06)***	(3.33)***	(2.90)***
Fixed effects	Village	Village	Village	Village
Observations	17,025	17,025	15,966	15,966
R^2	0.68		0.68	
Hansen *J*-test of instrument exogeneity (*P*-value)		0.09		0.60
F-test for joint significance of instruments in 1st stage reg.		97.4		42.3

Note: Robust *t*-statistics in parentheses. Standard errors are adjusted for clustering at the village level. * significant at 10%; ** Significant at 5%; *** significant at 1%. Only rural households included. Only plots owned by the household included (i.e., plots rented in are excluded). Constant not shown. The omitted category for type of land is wet season land. In the 2SLS regressions, plot held with paper is instrumented with mode of plot acquisition.

plots held with a paper are less likely than other plots to be affected by conflict (the difference is statistically significant at the 10% level), but this correlation cannot necessarily be given a causal interpretation. If the ownership of a plot is disputed, authorities are less likely to issue ownership documents than otherwise, implying that the direction of causality may also run from conflict to paper status. Given the sparse data on conflicts, a more rigorous identification of the effect of paper status on land conflict is not attempted.

(b) *Credit markets*

As argued in Section 2, property rights may increase productivity by easing credit constraints. The HSES includes data on currently outstanding loans taken by households. Here, I exploit these data to analyze the relationship between property rights and access to credit. Table 2 shows that 44% of landowning, rural households had an outstanding loan at the time of the interview. A substantial share of this debt is interest free loans, usually obtained

from friends or family. It is assumed that these loans are not related to land property rights. Some 26% of households have an outstanding loan with a positive interest rate, and 10% have a loan with a formal lender, that is, a bank or an MFI. To analyze the relationships between property rights and access to credit, regression analysis is again employed. Four independent variables are analyzed: (1) whether a household has an outstanding loan with positive interest, (2) whether a household has borrowed from a formal lender (given that it has an outstanding loan with positive interest), (3) the interest rate paid on loans with positive interest, and (4) the amount borrowed among loans with positive interest. The measure of property rights is the share of owned land held with a paper. In these analyses, property rights are assumed to be exogenous. In principle, better access to credit could affect a household's ability to obtain land titles, for example, through the expensive sporadic titling procedure. However, the feedback link from current outstanding debt to land rights, which have mostly been held for several years, is likely to be weak. As control variables, it is necessary to include measures of household assets, since the ability to offer collateral is an important determinant of access to credit. Both land and non-land wealth are included. Findings reported in Murshid (forthcoming, chap. 9) and Markussen (2007) suggest that the relationship between economic status and use of credit in rural Cambodia is U-shaped: Poor households often borrow to cope with shocks, and to meet short-term production and consumption needs. Middle-income households do not borrow much, while richer households take loans for larger investments or buy expensive consumption goods. To take account of this possibility, land and non-land wealth are entered in both linear and quadratic forms. Ballard and So (2004, Table 6.1b), show that health care is the most common way to use loans in rural Cambodia. To measure health shocks, a variable indicating whether anyone in the household sought health care in the past four weeks is included. The household size, and the age, gender, and education of the household head are also introduced. Finally, all models are estimated with village fixed effects. This is important because the areas where land papers were most likely to be handed out are generally also the areas where formal credit institutions have the strongest outreach.

Table 6 shows the results of estimating conditional (or fixed effects) logit models for having an outstanding loan with positive interest rate, and for having a loan with a formal lender, conditional on having any loan with positive interest. In addition to the village fixed effects, columns 1 and 3 only include the measure of property rights, whereas columns 2 and 4 include the full set of control variables. In all models, the effect of land held with paper is insignificant. Hence, there is no evidence that land papers increase the propensity to use credit or to borrow from formal lenders.

Table 7 shows OLS regressions for the amount borrowed and monthly interest paid on loans with positive interest. The units of analysis in these models are loans, not households. [6] The right-hand-side variables are the same as the ones used in the models for credit use, including village fixed effects. In addition, the interest rate model includes the amount borrowed as an explanatory variable. Twenty-eight loans with recorded monthly interest above 30% are excluded. First, these loans are extreme outliers. Second, even though credit is expensive in rural Cambodia, interest rates above 30% per month are seldom reported in other sources, and we may suspect that some of the recorded numbers result from errors by the respondents or enumerators. The results show a significant, negative effect of land held with paper on interest rates. Households with papers for all their land pay around half a percentage point lower monthly interest than households with no land papers. [7] The effect of land papers on amount borrowed is positive, but insignificant. These results are consistent with the view that property rights improve access to credit, although the estimated effects are of moderate magnitude.

(c) *Land markets*

Section 2 argued that land property rights might decrease transactions costs in land markets, and thereby facilitate a process by which land gets transferred to more productive users. It is difficult to test the hypothesis of a negative effect of property rights on transaction costs directly. For an indirect test, consider the rental market for land. If land papers lead to lower transaction costs, then *ceteris paribus* plots with papers should be traded more often than other plots. Table 1 shows that rental activity is low. Only 3% of plots owned by households are rented out. Plots held with a paper are not more likely than other plots to be rented out. In a conditional logit model with village fixed effects, and controls for household size,

Table 6. *Land ownership documents and use of credit*

	Dependent variable			
	Has outstanding loan		Has outstanding loan with formal lender	
	(All households)		(Households with outstanding, positive interest-debt)	
	Conditional logit	Conditional logit	Conditional logit	Conditional logit
Share of owned land held with paper	−0.123 (1.44)	−0.099 (1.16)	0.025 (0.15)	0.033 (0.18)
Land owned (ha)		−0.024 (1.39)		−0.065 (0.79)
Land owned, squared		0.00006 (1.46)		0.005 (1.50)
Non-land wealth (million riel)		−0.037 (3.84)***		0.026 (2.06)**
Non-land wealth, squared		0.000005 (3.78)***		−0.0001 (2.28)**
Hh size		0.156 (9.40)***		0.016 (0.41)
Female hh head		0.149 (1.83)*		−0.224 (1.26)
Age of head		−0.010 (4.70)***		0.000 (0.06)
Years of schooling of head		−0.025 (2.48)**		0.056 (2.47)**
Sought health care in the last 4 weeks		0.12 (1.77)*		−0.064 (0.45)
Fixed effects	Village	Village	Village	Village
Observations	8,298	8,180	1,386	1,376

Note: Robust *t*-statistics in parentheses. Standard errors are adjusted for clustering at the village level. * Significant at 10%; ** significant at 5%; *** significant at 1%. Only rural households included. Interest free loans are ignored. Note that villages with no variation on the dependent variables are excluded by the conditional logit estimator. Only households with an outstanding loan with positive interest are included in columns three and four.

dependency ratio, and gender and age of the household head, this result is unchanged: there is no effect of land papers on rental activity (results not shown).

It is perhaps more likely to find an effect of land papers on sales market activity. Rental agreements usually take place among household from the same community, and informal mechanisms of contract enforcement may be sufficient in that context. Land sales transactions more often occur between people from different communities, and formal proofs of ownership may therefore play a larger role. Section 6 documents that land papers are associated with higher, perceived land sales values, but this effect is not necessarily a result of lower land market transaction costs. Higher prices may as well result (directly) from increased tenure security or from access to cheaper credit. The data do not allow us to investigate whether plots with papers are more likely than other plots to be traded in the sales market. First, we do not know whether households sold land. Second, while we do know whether they have bought land, we do not know whether the former owner held ownership documents, which is the relevant variable.

Table 7. *Land ownership documents and terms of credit use*

	Dependent variable			
	Monthly interest		Amount (log)	
	OLS	OLS	OLS	OLS
Share of owned land held with paper	−0.52	−0.453	0.092	0.04
	(2.25)**	(1.94)*	(1.38)	(0.63)
Land owned (ha)		−0.042		0.045
		(0.86)		(2.61)***
Land owned, squared		0.0004		−0.0003
		(1.27)		(2.80)***
Non-land wealth (million riel)		−0.045		0.027
		(2.20)**		(5.54)***
Non-land wealth, squared		0.0002		−0.0001
		(2.34)**		(5.06)***
Amount, '000 riel (log)		−0.299		
		(2.56)**		
Hh size		0.078		0.056
		(1.65)*		(3.94)***
Years of schooling of head		−0.072		0.035
		(2.29)**		(4.16)***
Age of head		−0.004		0.003
		(0.56)		(1.42)
Female hh head		0.381		−0.182
		(1.54)		(2.48)**
At least one hh member sought		0.118		0.013
health care in the last 4 weeks		(0.50)		(0.20)
Fixed effects	Village	Village	Village	Village
Observations	2,572	2,546	2,600	2,574
R^2	0.46	0.47	0.42	0.47

Note: Robust *t*-statistics in parentheses. Standard errors are adjusted for clustering at the village level. * significant at 10%; ** significant at 5%; *** significant at 1%. Only rural households included. Interest free loans are ignored. Constant not shown.

8. PROPERTY RIGHTS AND COMMON PROPERTY RESOURCES

Even if it can be shown that land rights have a positive effect on agricultural productivity, concerns about possible adverse effects on the poorest members of communities from introducing private property rights to land should also be considered (see, e.g., Deininger & Feder, 2001, chap. 6). These effects may come about because poor community members often depend on common property resources for their livelihoods, and the availability of these resources may in turn decrease when rigid, private property rights are defined. [8] Indeed, it is easy to imagine that some landowners would seek formal property rights in order to prevent external parties from extracting resources from their land. [9] In this Section, I investigate whether villages with a higher share of agricultural land held with a formal paper have lower availability or more depletion of common property resources than other villages.

Common property resources account for a significant share of income among Cambodian households, and even more so among poor households (see McKenney & Prom, 2002; World Bank, 2006, chap. 5). Table 8 shows statistics on the availability and depletion of eight different common property resources. The data

Table 8. *Availability and depletion of common property resources*

	Resource is legally available as common property (%)	Resource is currently being depleted through overuse (%)[a]
Open land for cultivation	31.0	39.6
Wood/charcoal to be collected	15.9	72.1
Timber to be taken	3.7	69.8
Fish to catch	34.1	71.9
Bamboo to be taken	5.5	56.0
Open land for grazing	18.1	44.3
Fruit to be picked	5.3	32.3
Wild animals for hunting	2.1	59.0

Note: Only rural villages are included. Observations are weighted to correct for sampling biases. The number of observations ranges from 499 to 572 in the first column, and from 95 to 333 in the second column.
[a] Among villages where the resource is available as common property either legally or illegally.

are collected in the HSES 03/04 village leader questionnaire. The units of analysis are villages. Column one shows data on availability, and column two shows, given that resources are available as common property, how common it is that they are currently being depleted through overuse. Only rural villages are included. It would be highly desirable also to include data on the quantity available of each resource, which is a crucial, potential determinant of the role each resource might play in the livelihoods of rural households. However, this information is not collected in the survey. The table shows that land for cultivation and fish to catch are the most commonly available resources, followed by land for grazing and wood and charcoal to be collected. The second column shows that depletion of resources through overuse is widespread. For most resources, more than half of the villages where the resource is available report that it is currently being depleted. The finding of widespread depletion is consistent with results presented in McKenney and Prom (2002) and Ballard (forthcoming, chap. 7). The main candidate for explaining this phenomenon is population pressure, but the spread of formal property rights can also play a role if it renders fewer resources available as common property.

(a) *Property rights and resource availability*

Table 9 shows the results of conditional logit regressions with dummies for the availability of different common property resources as the dependent variables. [10] The explanatory variables are the proportion of land in the village held with paper (as estimated from the sampled households in the village), population density, defined as the number of people (in hundreds) per hectare of agricultural land, and province fixed effects, which are included to account for differences in geography. If private property rights lead to lower availability of common

Table 9. *Property rights and CPR availability*

	Common property resource (resource legally available = 1)						
	Open land for cultivation	Wood/ charcoal	Timber to be taken	Bamboo to be taken	Open land for grazing	Fruit to be picked	Wild animals for hunting
Share of village land owned with paper	−0.117 (0.35)	−0.53 (1.49)	−0.014 (0.02)	−0.248 (0.45)	−0.854 (2.93)**	0.404 (0.64)	1.533 (1.44)
Population density	−0.12 (1.06)	−0.174 (2.09)**	0.021 (0.24)	−0.01 (0.10)	−0.15 (1.24)	0.069 (0.89)	0.137 (1.13)
Fixed effects	Province	Province	Province	Province	Province	Province	Province
Observations	559	506	331	481	437	422	280

Note: Robust, absolute *z*-statistics in parentheses. * significant at 10%; ** significant at 5%, *** Significant at 1%. Conditional logit regressions. The dependent variables are dummies for availability of CPR in village.

property resources, one would expect the estimated effect of land held with paper to be negative. Indeed five of the estimated coefficients are negative, although only one is significant, namely in the regression for availability of land for grazing. Hence, the analysis weakly supports the claim that formal, private property rights are associated with decreased availability of common property resources.

(b) *Property rights and resource depletion*

Table 10 shows the results of another set of conditional logit regressions, now with indicators for resource depletion as the dependent variables. As in column two of Table 8, only villages where the resources are available as common property, either legally or illegally, are included. The hypothesis of a link between private property rights and resource depletion leads to the expectation of positive coefficients on the land paper-variable. In fact, all the estimated coefficients are insignificantly different from zero, and in five cases the point estimates are negative. Hence, these regressions do not lend any support to the theory of an effect of property rights on common property resource depletion. One possible explanation is that formal property rights are correlated with strong institutions in general, and that these institutions are important for common property resource management. Strong and competent local administrations and courts can lead both to fast implementation of titling programs and to better protection of common property. Unfortunately, a measure of institutional quality at the village level is not available. As expected, the coefficient on population density is usually positive, lending some support to the idea that population pressure leads to resource depletion.

9. CONCLUSION

The effect of land property rights on rural economies is an important and controversial issue in development policy and research. Empirical results are ambiguous. Studies from Africa indicate that formal property rights to land may have no effect in an environment of weak institutions because of low capacity for enforcement. This paper investigated the effects of formal land property rights in an Asian country with low state capacity, namely Cambodia.

The results indicate that the introduction of formal property rights to land in Cambodia have an economically and statistically significant, positive effect on agricultural productivity and land values of owner-operated plots. This suggests that land titling and certification programs can be effective policy instruments, even when the state is weak. This does not mean that state capacity is unimportant, but indicates that titling and certification programs are potentially relevant policy measures even at an early stage of a country's institutional development. There is some evidence that formal property rights are only effective in the least remote regions. This suggests that the success of land titling in more remote regions is contingent on complementary policies to improve infrastructure and market institutions.

I also analyzed the causal mechanisms by which property rights affect agricultural outcomes. No effect on land rental market activity

Table 10. *Property rights and CPR depletion*

	Common property resource (resource is being depleted through overuse = 1)						
	Open land for cultivation	Wood/ charcoal	Timber to be taken	Bamboo to be taken	Open land for grazing	Fruit to be picked	Wild animals for hunting
Share of village land owned with paper	−0.668 (1.38)	0.11 (0.32)	−0.016 (0.03)	0.089 (0.12)	−0.173 (0.29)	−0.111 (0.16)	−0.317 (0.42)
Population density	0.038 (0.62)	0.266 (1.74)*	0.08 (0.63)	−0.181 (0.30)	−0.051 (0.11)	1.265 (2.24)**	0.128 (0.82)
Fixed effects	Province	Province	Province	Province	Province	Province	Province
Observations	288	320	144	105	179	79	101

Note: Robust, absolute z-statistics in parentheses. * Significant at 10%; ** significant at 5%, ***significant at 1%. Conditional logit regressions. The dependent variables are dummies for CPR currently being depleted through overuse. Only villages where the resource is available as common property either legally or illegally are included.

was found, but a moderate effect of land papers on interest rates emerged. This effect, however, is too weak to fully account for the rather strong effect of property rights on productivity and land values. No effects of land papers on the propensity to use credit were found. By default, the "assurance effect" comes into focus. In spite of the fact that only a small share of plots in the HSES are reported to have been affected by disputes, a number of other sources document that land conflict is a salient issue in Cambodia, and is likely to be a concern for many households. Qualitative evidence suggests that land papers can have a significant effect on perceived tenure security. It is therefore plausible that the assurance effect is an important channel through which property rights affect agricultural production. This conclusion contrasts with the findings by Feder and Onchan (1987). They showed that positive effects of formal property rights to land in Thailand (a neighboring country of Cambodia) mainly work through the credit market. This difference is likely to be explained by the fact that credit markets are less developed in Cambodia than in Thailand, where tenure insecurity is also much less prevalent.

Common property resources provide an important basis of livelihoods for poor rural households, and it might be feared that the spread of private property rights would decrease the availability of these resources. This hypothesis has not been tested before. It receives only weak support from the analysis. Given the nature of the data, these results should be treated as indicative rather than conclusive. Future research should focus on collecting more detailed information about the availability of common property resources, and about institutional quality at the local level.

The implications of this paper for the ongoing, large scale titling program currently being implemented in Cambodia under the LMAP project are somewhat ambiguous. On the one hand, the analysis shows that ownership documents have a significant effect on important outcomes. In that sense, there is encouragement to continue and expand the titling efforts. On the other hand, the land ownership documents analyzed in this paper are largely those that already existed prior to the present titling program, and the results indicate that these documents were quite effective. In many cases, the new LMAP titles are handed out to people who had application receipts or similar documents already. I therefore conclude by highlighting the importance of extending coverage to households with no ownership documents.

NOTES

1. An earlier version of this paper was prepared as a background study for the World Bank Report, "*Halving Poverty by 2015? Cambodia Poverty Assessment 2006.*"

2. For surveys, see, e.g., Feder and Nishio (1999), Deininger (2003), and Pande and Udry (2005).

3. Phnom Penh is a fifth zone, but it includes too few observations for meaningful estimation.

4. Some regions in Cambodia have seen a spectacular rise in land prices in recent years. Many commentators interpret the price boom as driven by speculation (Economist, 2007; Oxfam, 2006). If prices are driven by speculation rather than concerns about production, this will weaken the link between land values and productivity. However, variation in prices due to the speculation boom can largely be accounted for by geographical variables (land prices have increased much faster close to towns and major roads than elsewhere), and is therefore taken into account by the village fixed effects in the regressions.

5. 2.3% of landowning, rural households has been exposed to conflict since 1995.

6. 157 households had more than one outstanding loan with positive interest.

7. When the loans with monthly interest above 30% are included, the coefficient on land papers remains negative, but becomes insignificant. Excluding these observations appears sensible.

8. One well-known historical example of this phenomenon is the "enclosure" process in early-industrial England, where land previously available to villagers for cultivation and grazing was fenced in by large landowners to be used exclusively for raising sheep. See Polanyi (1944).

9. To be sure, private property rights are often suggested as the *solution* to the problem of common property resource depletion, rather than a cause of the problem. Private property rights tend to eliminate free

rider problems. However, my analysis focuses on those resources that remain common property. Clearly, private property rights to *other* tracts of land will not decrease free rider problems for these resources, and since the spread of private property rights potentially increases congestion on the remaining common property resources, depletion may follow.

10. Compared with Table 7, "fish to catch" is left out because the availability of this resource is unlikely to depend on property rights to agricultural land.

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CHAPTER 5:

The Forgotten Property Rights: Restrictions on Land Use in Vietnam

Thomas Markussen, Finn Tarp and Katleen Van den Broeck

Abstract: Studies of land property rights usually focus on tenure security and transfer rights and often ignore rights to determine how to use the land. However, in transition economies such as Vietnam and China, use rights are often limited. Using household data from Vietnam, we find that crop choice restrictions are widespread and prevent crop diversification. We find no direct effect of restrictions on cultivation income, but we uncover an indirect effect working through the returns to land titling. Titles, which in Vietnam entail a comprehensive set of transfer rights, only have a positive effect on income among households facing few restrictions on crop choice.

1. Introduction

Vietnam has undertaken comprehensive reforms to liberalize agriculture and many studies have focused on the effects of liberalization. For example, a range of studies analyze the effects of moves towards privatization of agricultural land management (Do and Iyer 2006, Deininger and Jin 2003, Ravallion and van de Walle 2004, 2005, 2006). However, the reforms are still far from "completed" by Western standards. For example, authorities intervene heavily in farmers' choice of crops. While the land law gives households the right to sell, rent, mortgage, and bequeath their land, many farmers do not have the right to decide what to use their plots for. In our sample, more than 50 percent of plots have restricted crop choice. Our results suggest the restrictions are binding in an economic sense – if they were lifted, many farmers would shift to other crops.

Restrictions may prevent profitable crop diversification, and we hypothesize that restrictions lead to lower income from crop agriculture. Furthermore, restrictions may prevent positive effects of the ongoing land titling program from being realized. Titles potentially encourage investment but some of the most important investments farmers can make in relation to crop agriculture are related to taking up new crops. Planting perennial crops is itself an important investment. It often takes several years before a crop can be harvested. Also, to grow a new crop it is often necessary to invest in land improvements and new equipment. Hence, if crop choice on a plot is restricted, the scope for investment is considerably diminished. Therefore, our second hypothesis is that the effects of land titling are weaker on farms with restricted crop choice than elsewhere.

Results confirm the second hypothesis, but not the first. Land titles have quite strong effects on investment in perennial crops and on income from cultivation on farms with few restrictions, but no discernible effect on highly restricted farms. Crop choice restrictions have a direct, negative effect on investment in perennial crops, but not on income.

In Section 2 we present a short review of the literature on different types of land rights. We then discuss the history and nature of restrictions on crop choice in Vietnam (Section 3). In Section 4 we describe the data set used for the empirical analysis, and Section 5 presents descriptive statistics. Section 6 analyzes the effects of restrictions and land titles on crop choice, and Section 7 investigates the effects of these restrictions and titles on income from cultivation. Section 8 discusses why we find no direct, negative effect of restrictions on income and section 9 concludes.

2. Tenure security, transfer rights and use rights – a short review of the literature

The right to choose which crops to grow is an important aspect of farmer property rights to land. However, most studies on the effects of land rights focus on tenure security and transfer rights, such as the right to sell, rent, mortgage, and bequeath land, rather than rights concerning use (e.g. Feder and Onchan 1987, Place and Hazell 1993, Besley 1995, Hayes et. al. 1997, Braselle et. al. 2002). One reason is probably that use rights are often implied by transfer rights. For example, Braselle et. al. (2004) study a region in Burkina Faso and report that 91.2 percent of farmers surveyed have a permanent right to choose what to grow on their plots, while only about 25 percent have the right to rent or give away the plot. Sales are never allowed. It is virtually never the case that a farmer has the right to transfer a plot, but not the right to choose what to grow. Yet, in Vietnam and other transition economies the situation is sometimes very different. Brandt et. al. (2002) report that in 25 percent of the villages they surveyed in rural China, villagers cannot freely determine what to grow. In addition, 80 to 90 percent of all plots are held as "responsibility land", which implies that households are obliged to deliver set quotas of grain or other specified crops to the commune. Hence farmers are forced to grow these crops on at least some of their land.

In our sample from Vietnam, around 80 percent of plots owned and operated by households are held with a title, known in Vietnam as a Land Use Certificate (LUC),[1] which implies 20 years tenure security for annual crops land (50 years for perennial crops land) and a wide range of transfer rights, but *not* the right to determine use. In fact, crop choice is restricted on 52 percent of the sampled plots. Moreover, the share of plots with restrictions is higher among titled plots (56 percent) than among untitled ones (36 percent). Nevertheless, most studies of land rights in Vietnam analyze the effects of land use certificates, and therefore implicitly focus on tenure security and transfer rights instead of use rights. Deininger and Jin (2003) study the effects of the land market. They find that LUCs facilitate participation in land rental- and sales markets, and that these markets in turn work to transfer land from large to small farms, and from less- to more skilled farmers. Ravallion and van de Walle (2006) find that land market transactions have worked to decrease inefficiencies brought about by the administrative allocation of agricultural land following de-collectivization in the late 1980s and early 1990s. They do not directly study the effects of land rights, but to the extent that land market activities are facilitated by formal transfer rights, their study implies a positive effect of such rights. Do and Iyer (2006) combine province level data on the progress of land titling with

[1] Ironically for a document that assigns private property rights in a communist country, Land Use Certificates are also known as "red books".

household level data from the 1993 and 1998 rounds of the Vietnam Household Living Standards Survey (VHLSS) to study the effects of LUCs, and find that rights have a statistically significant, but economically only moderate effect on investment in perennial crops, and on hours of work in non-agriculture.

The descriptive report by Brandt et. al. (2005), based on the Vietnam Household Living Standards Survey (VHLSS) 2004, contains descriptive statistics on the prevalence of LUCs. The report presents descriptive regressions on land prices, which show that a LUC is associated with a price increase of approximately 23 percent. No statistics are reported on restricted crop choice, since data on restrictions was not collected in the VHLSS. Pingali and Xuan (1992) study the effect of the change from collective farming to "contract farming" implemented in 1981. In the new system farmers were individually responsible for delivering a quota of rice or other crops to the commune, and were entitled to keep any surplus above the quota for own consumption or sale. Hence, the policy change improved farmers' property rights to the harvested crop, not to the land. The paper shows that this program increased productivity.

To our knowledge, ours is the first study to undertake an econometric investigation of the effects of restrictions on crop choice in Vietnam. In fact, we are not aware of any studies at all focusing on this issue in transition economies. For general surveys of the literature on land rights and other policies related to land, see Feder and Nishio (1999), Deininger and Feder (2001), Deininger (2003) and Pande and Udry (2005).

3. Background: History and nature of Vietnamese state intervention in land use management

Many policy areas in Vietnam have been characterized by a gradual process of liberalization since the beginning of the Doi Moi reform program in 1986. Policies on agricultural land use are in some respects an exception. The important Resolution no. 10 in 1988 and the 1993 Land Law nominally granted farmers the right to decide what to grow. As the land law was implemented, however, it was questioned whether farmers in rice growing areas should in fact be allowed to shift to other crops, and the 1998 and 2001 revisions to the land law clarify that changes in land use purpose are only allowed "within the existing physical planning framework adopted by central and local governments" (Vasavakul 2006, p. 226). The formal justification for state intervention in crop choice is now found in the 2003 Land Law (for example article 11, §1 and article 36). When a plot

is held with a LUC, the restrictions are usually written into the certificate, in the sense that the certificate mentions the plot's "land use purpose" (for example "water rice farming" or "cultivation of long term plants"). Restrictions are administered by commune authorities, according to the commune land use plan. The plan is produced by commune authorities, subject to approval at the district level. Formally, households can apply for a change in land use purpose at the district level but in practice it is very difficult for farmers to change or remove restrictions on their plots (Dang Thu Hoai, CIEM, personal communication). At each administrative level, land use plans must be consistent with plans at higher levels. The commune plan must be consistent with the district plan, which must be consistent with the province plan, which again must adhere to the national plan. Hence, the scope for flexibility in relation to land use is limited.

Some anecdotal evidence exists on disputes over land use between farmers and authorities. In the south, conflicts have occurred because farmers were prevented from converting rice fields into shrimp raising farms. In the Red River delta, conflicts are reported to have taken place because farmers were not allowed to grow fruit trees instead of rice (Vasavakul 2006, p. 227).

Why does the state impose restrictions on land use? In a sense, it is not surprising that the government of Vietnam makes use of centralized planning. Still, we may ask why an administration which has liberalized in many other fields has chosen to maintain restrictions on land use? Originally, the most important reason was probably concerns about food security. In the early 1980s, Vietnam experienced severe food shortages, and these events continued to affect agricultural policies after the initiation of the Doi Moi reforms in 1986. Today, however, export targets seem to play a bigger role. For example, the Ministry of Planning and Investment's Five Year Socioeconomic Development Plan states that Vietnam should export 3 to 4 million tons of food crop products per year over the period 2006-2010 (p.64). One method for reaching this goal is to restrict farmers to growing rice, the most important food crop for export. Compelling farmers to growing rice is by far the most common restriction on crop choice. The fact that one of the reasons for imposing restrictions is to meet certain production targets means that the government (national and local) has an incentive to impose restrictions on the highest quality land, to maximize the probability that targets are met. Other reasons for restricting land use mentioned by Vietnamese officials include "the fact that local violations [of land use restrictions] may environmentally damage the areas developed for rice growing; that in some areas farmers are not equipped to grow

anything other than rice; and that the state has already invested heavily in irrigating rice land" (Vasavakul 2006, p. 227). For in-depth descriptions of land policies in Vietnam, see Kerkvliet (2006) and Marsh, MacAuley and Hung (2006).

4. Data

We rely on data from the 2006 Vietnam Access to Resources Household Survey (VARHS). The survey was implemented in 12 provinces in Vietnam between July and September 2006. It re-interviewed households sampled for the income- and expenditure modules of the 2002 and 2004 VHLSS in the 12 provinces. For detailed information about sampling procedures, see Van den Broeck and Tarp (2007). Provinces were selected to facilitate the use of the survey as an evaluation tool for Danida supported programs in Vietnam. Seven of the 12 provinces are covered by the Danida business sector support program, and five provinces are covered by the agricultural support program. The provinces supported by the agricultural support program are located in the North West and Central Highlands, so these relatively poor and sparsely populated regions are over-sampled.[2] The sample is not statistically representative at the national level. The survey covered 2,324 households in 466 communes. It includes a household as well as a commune questionnaire. The commune questionnaire was administered to commune officials. The questionnaires were designed in collaboration between the University of Copenhagen and the Institute for Labor Studies and Social Affairs (ILSSA) in Hanoi. The household survey collected detailed plot-level information on property rights (including restrictions on use), land use, irrigation, mode and time of acquisition, and other plot characteristics. It also provides detailed information at the household level on agricultural inputs, outputs and investment in addition to general information about individuals and households.

5. Descriptive statistics

Table 1 presents statistics on the extent and nature of land use restrictions in the VARHS sample. Only plots owned and operated by the interviewed households are included (i.e. plots rented in or out are excluded). Plots used for aquaculture, forestry and residential purposes are excluded. The first line shows that restrictions on crop choice are common. More than half of the plots in the sample are subject to restrictions. These findings contrast with those reported in To, Nguyen and

[2] The sampled provinces are, by region: Red River Delta: Ha Tay. North East: Lao Cai, Phu Tho. North West: Lai Chau, Dien Bien. North Central Coast: Nghe Anh. South Central Coast: Quang Nam, Khanh Hoa. Central Highlands: Dak Lak, Dak Nong, Lam Dong. Mekong River Delta: Long An.

Marsh (2006) who found that only 12 percent of farmers were subject to restrictions. However, their results are based on a much smaller sample than ours (369 households sampled in four provinces). Restrictions are more widespread among households sampled in the north than among those in the south. This resonates with the fact that state intervention in agriculture historically has been more far-reaching in the north than in the south, due to the longer period under communist rule in the north (see Pingali and Xuan 1992 and Benjamin and Brandt 2004).

Table 1 Restrictions on land use, plot level (percent)

	All plots	Region		Plot held with LUC	
		North	South	Yes	No
Crop choice restricted	53.4	59.5	37.9	57.0	37.5
Type of crop choice restriction (only restricted plots included):					
Must grow rice in all seasons	35.7	31.1	54.6	35.2	39.6
Must grow rice in some seasons	56.6	62.4	33.1	57.6	50.2
Other restriction	7.5	6.3	12.4	7.1	10.2
n	9,528	6,858	2,666	7,783	1,745

Note: Only plots owned and operated by the hh are included. Aquaculture-, forestry- and purely residential plots are excluded.

Table 1 also documents that plots with a land use certificate are significantly more likely to be under restrictions than plots without an LUC. The table also tells us about the nature of restrictions on crop choice. Some 36 percent of the plots under restrictions must be sown with rice in all seasons, while 56 percent must be sown with rice in at least some seasons, and eight percent are subject to other restrictions. This clearly brings out the point that the restrictions regime is mainly focused on managing the production of rice.

Table 2 presents several different plot and household characteristics, by restriction status (at the household level, the table distinguishes between households with more, or less, than 50 percent of their operated agricultural area subject to restrictions). This is the first step in our analysis of the effects of restrictions. The median plot size of restricted plots is less than half the median size of non-restricted plots. This reflects the fact that plots prepared for rice cultivation are often small. As we would expect, restricted plots are much more likely to be planted with rice than are non-restricted plots. It is very uncommon to grow perennial crops on restricted plots. The table also presents data on land values (as estimated by the respondents), and median per hectare value of output, income and labor use. The last three variables are measured at the household level. Income

is defined as the value of output minus the value of all purchased inputs. The table shows that value of output and income per hectare are both significantly higher in households with restricted plots than in those with non-restricted plots. At the same time, annual labor input per hectare is also much higher in highly restricted households than in other households, reflecting the labor-intensive nature of rice cultivation. Land values are somewhat higher on restricted plots. Hence, so far the evidence on the effects of restrictions is ambiguous. Restrictions are associated with less diversification away from rice cultivation and with higher use of labor in cultivation. However, restrictions are also associated with higher land productivity and slightly higher land values. In Section 6 and 7 we single out crop choice and cultivation income for further analysis and investigate whether the findings in Table 2 are robust to controlling for commune, household and plot characteristics.

Table 2 Plot- and household characteristics by restriction status

	Crop choice restricted		
Plot level	*Yes*	*No*	n
Median size, sqm	360	880	9,528
Planted exclusively with rice in last 12 months (percent)	69.1	36.2	9,218
Planted exclusively with perennial crops in last 12 months (percent)	1.3	25.9	9,218
Median sales value per ha.	120,000	113,636	7,672
Household level	*>50%*	*<50%*	
Median labor input per ha., days per year	443	274	2,055
Median value of output per ha.	22,356	13,725	2,081
Median income per ha.	12,804	8,025	2,046

Note: All money values are in 000 VND. Income is defined as the value of output minus the value of all purchased inputs. Sales values are estimated by respondents.
In the household level panel, the first column includes households with more than 50 percent of their operated agricultural area subject to crop choice restrictions. The second column includes households with less than 50 percent of their land under restrictions.
Only plots owned and operated by the household are included. Aquaculture-, forestry and purely residential plots are excluded.

Table 3 is the first step in our investigation of interactions between land titling and restrictions. The results are quite striking. The table shows the association between LUC status and five outcome variables, *separately* for restricted- and non-restricted plots/households. On restricted plots, there is only a weak correlation between LUC status and the decision to grow perennial crops. On plots with LUCs as well as on those without, the share of plots with perennials is very low. In contrast, among non-restricted plots, there is a clear, positive association between LUC status and perennial

crops. Plots with a LUC are seven percentage points more likely to be planted with perennials. For labor, output and income per hectare, we see approximately the same pattern. Among highly restricted households, the association between LUC status and the outcome variables is weak. In contrast, among households facing few restrictions there is a strong, positive correlation. For example, median income is 67 percent higher on plots with a LUC than on those without. For land values, the contrast is even starker: there is a strong, positive association between LUC status and value among non-restricted plots, and a clear, *negative* association among restricted plots. However, the results on land values should be treated with some caution because the land sales market is very thin in some regions, making it difficult for respondents to assess prices.

Table 3 Agricultural outcomes by land title- and restriction status

	Crop choice restricted		Crop choice *not* restricted	
Plot level	LUC	No LUC	LUC	No LUC
Planted exclusively with perennial crops in last 12 months (percent)	1.3	1.6	27.5	20.7
Median sales value per ha.	107,859	140,845	150,000	45,455
	Restric > 50%		Restric < 50%	
Household level	LUC > 50%	LUC < 50%	LUC > 50%	LUC < 50%
Median labor input per ha., days per year	443	437	313	220
Median value of output per ha.	22,326	22,512	15,556	8,788
Median income per ha.	12,636	13,371	9,589	5,726

Note: Money values are in 000 VND.
In the household level panel, “Restric>50%” refers to households with more than 50 percent of their operated agricultural area subject to crop choice restrictions. "LUC>50%" refers to households with more than 50 percent of their operated area held with a land use certificate.
Only plots owned and operated by the household are included. Aquaculture-, forestry and purely residential plots are excluded.

These findings are consistent with the view that restrictions on crop choice prevent realization of the returns to land titling because restrictions limit the scope for investment. In Sections 6 and 7 we investigate the robustness of this conclusion.

6. Crop choice

The first task in a more rigorous analysis of the effects of restrictions is to check more thoroughly whether restrictions do in fact impose binding constraints on farmers – would they grow something else if they were not subject to restrictions? Most restrictions compel farmers to grow rice, but obviously many would plant rice even in the absence of restrictions. Natural conditions in most areas of Vietnam are very well suited to rice cultivation. If restrictions are binding in an economic

sense, there should be a significant, partial correlation between restriction status and the decision to grow rice, even when household and plot characteristics are controlled for. The first column of Table 4 explores whether this is the case. A regression is estimated explaining whether a plot is planted with rice or not. The variable takes the value one only if the plot was planted exclusively with rice in the last 12 months. If we let it also take the value one for plots where rice was planted along with other crops, results are very similar. The measure of restrictions included is whether the plot must be sown with rice in at least some seasons. Household characteristics are controlled by the inclusion of household fixed effects. A number of plot characteristics are also controlled, including the area, slope, mode of acquisition, irrigation status and distance from the family home. We also include a measure of the "quality of land".[3]

Descriptive statistics on all variables used are presented in the appendix. The model is estimated by OLS (a "linear probability model"). The restrictions variable has a large and highly significant effect, indicating that restrictions do impose real constraints on the behavior of farmers. Obviously, we have not controlled for all plot characteristics that may affect the suitability of a plot for rice growing, but we probably capture a large share of this variation, particularly with the slope and irrigation variables. Since most rice grown in Vietnam is "wet rice" (i.e. the crop must grow in water for a part of its life cycle), some of the most important conditions for successful rice cultivation is that plots are flat and have access to water. The finding that restrictions have a strong

[3] Following the 1993 Land Law, most plots in Vietnam were classified for tax purposes. For annual crops land, six categories were defined. For perennial crops land there were five categories. Classification depended on five objective plot characteristics, namely soil quality, location (i.e. distance from residence), terrain (e.g. slope), climate, and irrigation conditions. Higher taxes were due for land in a better category (category one is best). Based on the tax-classification information, we create a unified measure of land quality applying to both annual and perennial crops land. The classification schemes for annual- and perennial land are unified based on the tax rates for each category of land. Hence, in each of the four land quality "classes" we define, approximately the same amount of tax was due for all plots. The four classes on the land quality variable relates to the tax classification scheme in the following way:
Class 1: Category 1 of annual land and category 1 and 2 of perennial land. Tax rates: 550-650 kg rice/ha/year
Class 2: Category 2 and 3 of annual land and category 3 of perennial land. Tax rates: 370-460 kg rice/ha/year
Class 3: Category 4 and 5 of annual land and category 4 of perennial land. Tax rates: 180-280 kg rice/ha/year
Class 4: Category 6 of annual land and category 5 of perennial land. Tax rates: 50-80 kg rice/ha/year.
Source: Le (undated).
The land tax was temporarily abandoned in 2003. For this reason, plots have generally not been re-classified since around 1993/94, although classifications were supposed to be updated every tenth year (Luu Duc Khai, CIEM, personal communication). Since some plot characteristics, such as irrigation conditions, may have changed considerably during the 12-13 years that passed between the time of classification and the survey, the variable is necessarily not a precise measure of land quality. On the other hand, the fact that plots were classified several years ago means classification was not affected by current crop choice or productivity (the dependent variables we consider). We can safely treat it as exogenous. One problem is that a significant number of plots (17 percent) have either not been classified, or the respondent does not know the category of the plot. To avoid losing these plots in the analysis, we include a dummy for unknown land category.

impact on the probability of growing rice is also reported in Van den Broeck, Newman and Tarp (2007).

Table 4 Restrictions, land titles and crop choice

	Dependent variable:				
	Plot planted exclusively with rice	Plot planted with perennial crops			
	Linear prob.	Linear prob.	Linear prob.	2SLS	2SLS
Must grow rice	0.448				
	(26.72)***				
Choice of crop restricted		-0.093	-0.017	-0.039	0.131
		(8.25)***	(0.75)	(3.62)***	(1.89)*
LUC	-0.014	0.108	0.136	0.001	0.142
	(0.64)	(8.18)***	(9.13)***	(0.02)	(1.78)*
Restricted*LUC			-0.092		-0.197
			(4.05)***		(2.55)**
Area of plot, log	0.018	0.031	0.03	0.035	0.034
	(3.31)***	(9.40)***	(9.21)***	(5.82)***	(5.79)***
Slope (rfc: flat)					
Slight	(0.05)	0.10	0.10	0.06	0.06
	(2.69)***	(9.04)***	(8.73)***	(3.76)***	(3.66)***
Medium	(0.16)	0.10	0.11	0.10	0.10
	(6.69)***	(7.20)***	(7.32)***	(3.49)***	(3.72)***
Steep	-0.242	0.251	0.251	0.184	0.186
	(5.22)***	(8.86)***	(8.85)***	(3.34)***	(3.41)***
Mode of acquisition (rfc: given by state)					
Inherited	0.003	0.002	0.004	-0.002	0.009
	(0.15)	(0.13)	(0.30)	(0.08)	(0.42)
Bought	0.004	0.035	0.037	0.015	0.035
	(0.12)	(2.01)**	(2.13)**	(0.58)	(1.32)
Cleared	-0.09	-0.052	-0.046	-0.054	-0.015
	(3.77)***	(3.53)***	(3.14)***	(1.86)*	(0.52)
Exchanged	-0.088	-0.033	-0.041	-0.022	-0.024
	(0.88)	(0.53)	(0.68)	(0.42)	(0.43)
Other	0.042	0.054	0.059	-0.13	-0.106
	(0.35)	(0.74)	(0.79)	(1.62)	(1.37)
Number of seasons with irrigation	0.027	-0.081	-0.081	-0.076	-0.077
	(4.09)***	(20.14)***	(20.13)***	(10.48)***	(10.70)***
Distance from family home, km	0.004	0	0.001	-0.006	-0.004
	(1.36)	(0.11)	(0.32)	(1.84)*	(1.51)
Land quality (rfc: class 1)					
Class 2	0.13	(0.04)	(0.04)	(0.03)	(0.03)
	(6.23)***	(3.45)***	(3.48)***	(2.09)**	(2.01)**
Class 3	0.03	(0.11)	(0.11)	(0.09)	(0.08)
	(1.17)	(7.58)***	(7.57)***	(4.69)***	(4.43)***
Class 4	-0.217	0.119	0.119	0.114	0.124
	(6.80)***	(6.15)***	(6.11)***	(3.14)***	(3.47)***

(Table 4 continued)

Land category unknown	-0.277	0.220	0.216	0.235	0.238
	(10.66)***	(13.59)***	(13.37)***	(8.54)***	(8.85)***
Fixed effects	Household	Household	Household	District	District
Observations	9,221	9,218	9,218	8,382	8,382
R-squared	0.62	0.67	0.68		
F-test of joint significance of instruments in 1st stage regs:					
Redbook				16.85	25.33
Redbook*Restric					9.08

* significant at 10%; ** significant at 5%; *** significant at 1%
In regression 4, standard errors are adjusted for clustering at the commune level in districts with more than one commune.
Only plots owned and operated by the household are included. In the 2SLS regression, LUC is instrumented by the share of annual land titled in the commune where the household resides. Restricted*LUC is instrumented by the interaction between "Restricted" and the share of land titled in the commune.
Constant not shown. In the 2SLS model, a set of household- and commune characteristics are included. These include: Age of head, age of head squared, schooling, gender and ethnicity of head, share of hh's in commune using electricity, and a dummy for the presence of a daily market in the commune (results not shown).

Next, we analyze the effects of restrictions and land titles on the decision to grow perennial (i.e. multi-year) crops. Columns 2 to 5 in Table 4 present the estimates of models explaining whether a plot is planted with perennial crops. The measure of restrictions is an indicator for any restrictions on crop choice. To test the hypothesis that the restrictions affect the returns to land titling, we add an interaction between land use certificates and restrictions in some specifications. In the literature on property rights and agricultural investment, land rights variables are often treated as endogenous (e.g. Besley 1995, Braselle et. al. 2002). There are several reasons for this. First, there may be a reverse, causal relationship from investment to property rights if farmers can improve their claim to a plot of land by investing in it. Second, incentives for seeking to obtain formal property rights are higher on plots with higher soil quality. At the same time, the returns to investment might also be higher on those plots. If soil quality cannot be fully controlled for, this leads to biased estimates of the effects of property rights. Third, more resourceful households may be better able to obtain property rights, and also more likely to invest. Again, if household resources are not properly controlled, biased estimation follows.

In Vietnam, land titling as well as imposition of land use restrictions is generally conducted in a systematic, top-down fashion that does not leave much room for farmers to affect the process.

Therefore, concerns about endogeneity of property rights are perhaps less relevant in Vietnam than in many other settings. However, a closer investigation reveals that there is a difference between land use certificates and restrictions. It appears to be extremely difficult for farmers to affect the restrictions imposed upon them in any way (See section 3 above). Therefore, we treat the restrictions variable as exogenous. In the case of LUC issuance, however, there is some scope for households to affect the process. In order to get a LUC, households actively need to register their land. Even though the fee for registration is nominal, some households may have chosen not to do this, either because they did not see a need for the titles, because they were not aware of the titling program, or because they were intimidated by the process (Brandt 2005, section 4). Since the incentive to register is potentially higher for plots with perennial crops, we treat the LUC variable as endogenous.

Several studies have used the mode of plot acquisition as an instrument for property rights (e.g. Besley 1995, Braselle et. al. 2002, Deininger and Castagnini 2004). However, columns 2 and 3 of Table 4 indicate that mode of acquisition is not redundant in the crop choice regression, so this variable will not work as an instrument. Instead, we instrument the titling status of a plot by the share of annual agricultural land titled in the commune where the household resides, excluding the household's own land. This variable should not affect the household's choice of crops. On the other hand, the share of land titled in the commune is an indicator of the vigilance by which land titling programs have been implemented in the commune, which is an exogenous source of variation in the titling status of plots. The interaction between restrictions and LUC is instrumented by the interaction between restrictions and the share of land titled in the commune (Wooldridge 2002, chap. 6, recommends this method of instrumenting an interaction term). Since the instrument is measured at the commune level, household or commune fixed effects cannot be included. Instead, we use district fixed effects, and include a number of controls at the household and commune level (results not shown). The instrumental variables model is estimated by two stage least squares, which implies that a linear probability model is used in both the first- and the second stage regressions (both endogenous variables are binary). 836 observations are lost in this analysis because some communes did not report information on the share of land titled.

Columns 2 and 3 in Table 4 present the OLS estimates of the model with and without the interaction between restrictions and LUC-status, while columns 4 and 5 present the 2SLS results. In

the specifications without the interaction term, restrictions always have a significant, negative effect on the probability of growing perennial crops, as we would expect from the results in column 1. Having a LUC is positively related to growing perennial crops in the OLS model, but in the IV-model, it is negative and completely insignificant. The most notable results emerge from the specifications with the restrictions-LUC interaction. The coefficient on the interaction term is negative and significant, while the main effect of LUC is positive and significant. This indicates that land titles induce investment in perennial crops but that this effect is muted by land use restrictions. The positive effect of titles on investment in perennial crops is also reported by Do and Iyer (2006). However, they conclude that the effect is "not very large in magnitude" (p. 19). The results in Table 4 suggest an explanation why the average effect of titles on investment in perennial crops is only moderate, namely that the causal mechanism underlying the effect of titles is only active on plots with unrestricted crop choice, which is less than half of all plots. On those plots, however, the effect is quite strong. The estimates imply that, all else equal, the share of plots with perennial crops is about 14 percentage points higher among unrestricted plots with LUC than on unrestricted plots without an LUC. Note that the overall share of plots planted with perennial crops is 13 percent. The results indicate that a large part of the potential effect of land titling on investment remains untapped, because the scope for investment is limited by restrictions on crop choice.

7. Income from cultivation

We now turn to an investigation of the effects of crop choice restrictions and land titles on income from cultivation. Why do we look at income and not, for example, physical yields, value of output, profits or land values? Yields are difficult to work with when we consider more than one crop, which is essential in an investigation of the effects of restrictions on crop choice. Income has a more direct effect on household welfare than value of output since net income is a key determinant of the household's ability to consume. Profits (i.e. the value of output minus the value of all inputs, including household labor and capital depreciation) are in theory interesting as an indicator of efficiency, but very difficult to measure accurately. As mentioned above, the data on land values is somewhat problematic, because the land sales market is almost non-existent in some regions of Vietnam, which makes it difficult for households to estimate the sales value of their plots precisely, or even to view this as a meaningful question. Presumably as a result of this, some 20 percent of plots lack data on sales values (we also have data for rental values, but here the number of missing observations is even higher).

Inputs and outputs in cultivation are only measured at the farm level, so we estimate household level regressions. The dependent variable is the log of income per hectare. Income is defined as the value of output minus the value of all purchased inputs. All variable inputs except self-provided manure and household labor are assumed to be purchased. Plot level characteristics are included as shares of the net operated area with a given characteristic, for example the share of the operated area with a LUC, or the share of the operated area with restricted crop choice.

To capture non-purchased inputs we include farm size (log) and household labor, defined as the number of man-days members of the household have spent working in crop-agriculture on their own farm in the past 12 months (log). Age and gender of the household head may affect effective labor supply and total factor productivity and these variables are also included. To proxy for the "abilities" of household members, we include years of schooling of the household head, and a dummy indicating whether the respondent (usually the household head) believes that other people in the village consider him to be a "good farmer".

As mentioned in section 3, the authorities have an incentive to impose restrictions on the most productive land, in order to maximize the probability that production targets are met. Therefore, it is essential to control for land quality in the income model. As in the crop choice models, we include the slope and irrigation status of household plots, and the land quality variable discussed in footnote 3. In the plot level analysis we only included plots owned by the household. In the household level analysis, however, we cannot distinguish between output (and inputs) on owned and rented plots. Therefore, we use inputs and outputs for the whole farm, and control for the share of land rented in. Land rental fees are not subtracted from household income.

Again, we treat restrictions as exogenous and LUCs as endogenous. As in the perennial crops-regressions, we use the share of annual land titled at the commune level, excluding the household's own land, as instruments for LUC-status. Again, the interaction between restrictions and LUCs is instrumented by the interactions between commune level land titling and restrictions.

In the OLS-regressions, we include commune fixed effects. Since the instrument is measured at the commune level, we cannot have commune fixed effects in the IV models. Instead, we use district

fixed effects, and control for infrastructure characteristics at the commune level by including the share of households in the village using electricity, and a dummy indicating whether a daily market is present in the commune.

Table 5 presents the estimates of the income model. The first two regressions present the OLS estimates, with and without the interaction between LUC- and restriction status. The third and fourth columns present the results of the 2SLS estimation. The results generally mirror the descriptive findings reported in Section 5. The main effect of restrictions is always positive, and sometimes statistically significant. Hence, we do not find evidence that there is a direct, negative effect of land use restrictions on productivity, even when we attempt to control for plot- and household characteristics. In particular, labor use is controlled. Higher income on restricted than non-restricted plots reported in table 2 is therefore not simply a result of higher labor input on those plots. The positive effect of restrictions may still be an artifact of a failure to fully control for soil quality and other factors that affect plot yields, as discussed in section 8. However, we can at least tentatively take the results as an indication that there is not a strong, direct link from restrictions to low productivity.

While we find no direct, negative effect of restrictions, the estimates of the coefficient on the interaction between restrictions and LUCs indicate, as in the analysis of perennial crops, that restrictions may have an indirect, negative effect operating through the returns to land titling. In both specifications where the interaction term is included, the main effect of LUC-share is positive, significant and quite high, while the interaction term is negative, significant and also of considerable magnitude. One way to interpret these results is, again, that land titling has a positive effect in an unrestricted environment, but that this effect is muted when crop choice is restricted. However, the result is perhaps even more interesting in the case of income than in the case of crop choice. It is not surprising that titling does not affect crop choice if crop choice is fixed by the authorities. However, land titling might conceivably affect income through a number of other channels than crop choice. Even if a farmer is forced to grow rice, he can still in principle increase his income by investing in land improvements, machinery, education, and so on, and these investments might be cheaper (through access to lower priced credit) or more attractive if the household’s land is titled. The results in Table 5 indicate, however, that investment related to new

crops, or at least to crops other than rice, is in fact the most important channel through which titling affects income – where crop choice is restricted, the effect of titles is small or non-existent.

Table 5 Income from crop agriculture

	Dependent variable: Income from crop agriculture, log			
	OLS	OLS	2SLS	2SLS
Share of land with crop choice resitrictions	0.093	0.353	0.04	0.655
	(1.65)*	(3.39)***	(0.59)	(2.01)**
Share of land with LUC	0.038	0.184	0.631	1.07
	(0.57)	(2.23)**	(2.19)**	(3.03)***
LUC * restrictions		-0.339		-0.806
		(2.97)***		(1.93)*
farm size in ha, log	0.625	0.624	0.619	0.624
	(22.96)***	(22.97)***	(15.44)***	(15.04)***
Hh labor input in crop agriculture, log	0.308	0.309	0.323	0.318
	(10.24)***	(10.30)***	(8.34)***	(8.00)***
Other people think you are good farmer	0.284	0.282	0.293	0.285
	(5.48)***	(5.46)***	(6.03)***	(5.84)***
Years of general education of head, estimated	-0.006	-0.007	-0.004	-0.006
	(1.04)	(1.18)	-0.77	(1.10)
Share of land with slight slope	-0.117	-0.125	-0.238	-0.244
	(1.65)*	(1.77)*	(3.19)***	(3.25)***
Share of land with medium slope	-0.063	-0.06	-0.15	-0.136
	(0.65)	(0.61)	(1.45)	(1.29)
Share of land with steep slope	-0.299	-0.303	-0.337	-0.292
	(2.00)**	(2.04)**	(1.87)*	(1.59)
Share of land irrigated	0.22	0.205	0.302	0.28
	(3.10)***	(2.90)***	(3.88)***	(3.51)***
Share of land class 2	0.039	0.041	-0.035	-0.028
	(0.52)	(0.54)	(0.40)	(0.32)
Share of land class 3	-0.027	-0.012	-0.136	-0.109
	(0.28)	(0.12)	(1.35)	(1.06)
Share of land class 4	-0.421	-0.412	-0.449	-0.396
	(3.28)***	(3.21)***	(2.93)***	(2.50)**
Share of land with unknown category/class	-0.249	-0.25	-0.256	-0.253
	(2.58)***	(2.60)***	(2.30)**	(2.22)**
Female hh head	0.003	0.009	-0.038	-0.03
	(0.05)	(0.20)	(0.69)	(0.54)
Age of head	0.001	0.003	0.000	0.002
	(0.14)	(0.29)	(0.00)	(0.18)
Age of head squared	0.000	0.000	0.000	0.000
	(0.72)	(0.89)	(0.56)	(0.79)
Share of land rented in	0.195	0.131	0.624	0.596
	(1.77)*	(1.17)	(2.58)***	(2.47)**
Daily market			-0.093	-0.092
			(1.40)	(1.41)
Rate of hh using electricity			0.366	0.385
			(2.52)**	(2.55)**
Constant	7.298	7.167	6.359	5.799

(Table 5 continued)

	(26.18)***	(25.46)***	(16.77)***	(12.11)***
Observations	1985	1985	1790	1790
R-squared	0.75	0.75		
F-test of instruments in 1st stage reg				
Red book			23.7	19.4
Red book*restrictions				6.5

Absolute value of t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

In regressions 3 and 4, standard errors are adjusted for commune level clustering in districts with more than one commune. In the same regressions, share of land with LUC is instrumented by the share of annual land titled in the commune, excluding the household's own land. The LUC-restrictions interaction is instrumented by the interaction between restrictions and commune level land titling.

The bottom of the table presents F-statistics for the joint significance of the instruments in the first stage regressions. The instruments are always jointly significant at the five percent level. However, the well-known rule-of-thumb is that the F-values should be at least 10 (Staiger and Stock, 1997). The F-test for the interactions terms in the first stage regression is only 6.5. Hence, we might suspect that the coefficients on LUC-share and its interaction with restrictions is estimated with some bias. Indeed, the estimates of the coefficients on these variables obtained from the 2SLS models appear very high. The estimates in column 4 indicate that a farm going from zero to full titling in a restriction-free environment will experience a more than two-fold increase in income per hectare. This seems like an implausibly strong effect and it indicates that there might be some upward bias in the 2SLS estimates. The quantitative estimates from the OLS regressions are more plausible, implying that titles have only a small, insignificant effect on the average plot, but increase income by about 18 percent on a farm without any restrictions. Still, it strengthens the interpretation that the same, qualitative story emerges from the both OLS and the 2SLS models.

Table 6 shows an alternative way of testing the hypothesis that the effects of land titling depends on restrictions. The sample is split in two groups: those with less than 50 percent of their land under restrictions, and those with more. Then, the model for income per hectare is estimated for each group, with the restrictions variable taken out. The model is estimated by OLS and by 2SLS, again using commune level titling as the instrument for LUC-share. The benefit of this method is that the effects of all variables, not only LUC-share, are allowed to vary between environments with different levels of restrictions. The drawback is the loss in degrees of freedom. The same control

variables as in Table 5 are included (except restrictions and its interaction with LUCs). To save space, the estimated coefficients on these variables are not shown.

Table 6 land titles and income, by restriction status

	Dependent variable: log of income per hectare			
	OLS	OLS	2SLS	2SLS
	Restric.<0.5	Restric.>=0.5	Restric.<0.5	Restric.>=0.5
Share of land with LUC	0.202	-0.188	2.587	-0.149
	(2.09)**	(1.96)*	(3.18)***	(0.50)
Control variables	Yes	Yes	Yes	Yes
Fixed effects	Commune	Commune	District	District
Observations	1,018	967	918	843
R-squared	0.82	0.75		
F-test of joint significance of instrument in 1st stage reg.			10.30	9.20

* significant at 10%; ** significant at 5%; *** significant at 1%
In regressions 3 and 4, standard errors are adjusted for clustering at the commune level in districts with more than one commune. In the 2SLS regressions, LUC is instrumented by the shares of annual land titled in the commune. LUC*Restricted is instrumented by the interactions between commune level titling and "Share of land restricted". The same control variables as in Table 5 are included, except restrictions and the redbook-restrictions interaction (results not shown).

Both the OLS and the 2SLS estimations show a large difference in the effect of land titles between restricted and un-restricted farms. Among farms with few restrictions, LUCs have a quite strong, positive and statistically significant effect. Among highly restricted farms, on the other hand, no positive effect of land titles can be detected at all. In fact, the coefficient on LUCs is significantly negative in the OLS-estimation for the sub-sample of highly restricted households. Hence, this analysis further strengthens the hypothesis that the effect of Land Use Certificates is contingent on restrictions status.

8. Explaining the missing direct effect of restrictions

Here we attempt to explain why our hypothesis of a negative, direct effect of restrictions on cultivation income is not confirmed. In the light of the results in Table 4, the absence of such an effect is somewhat surprising. If restrictions are binding, as indicated by the results in that table, it means that farmers would switch to other crops in the absence of restrictions. There are several possible reasons for wanting to grow other crops than rice, such as a desire to diversify risk, to save labor or to distribute labor requirements more evenly over the year, but the most obvious reason is the expectation that other crops would generate more income.

There could be at least three different explanations for the absent effect of restrictions on income. First, as discussed above, there is reason to believe that restrictions tend to be imposed on land of higher than average quality. As described in section 7, we attempt to control for land quality in a number of ways in the regressions. Nevertheless, some variation in relevant land characteristics may still be left in the residual. Second, even if restrictions prevent profitable crop diversification, they may also have beneficial effects if they solve coordination problems. For example, the yield of rice might be lower if the crop grows in the shadow of tree crops. The use of rice fields for shrimp production might lead to salinization of the soil, making it unsuitable for crop production. Cross-pollination between different varieties of crops might also present collective action problems. These hypotheses are difficult to test with the available data, and call for further research.

Third, we can imagine that restrictions tend to come with certain benefits from the authorities, such as increased access to extension services, irrigation water or price subsidies. The vast majority of households sell their output to private traders, and it therefore seems implausible that households with restrictions are given subsidies on their output prices. How about input prices?

Table 7. Restrictions and the price of chemical fertilizers

	Dependent variable: Unit price of chemical fertilizers, log	
	OLS	OLS
Share of land with restrictions	-0.042	0.004
	(1.52)	(0.16)
Amount of fertilizer purchased, log		-0.104
		(11.28)***
Constant	1.275	1.83
	(82.35)***	(35.67)***
Fixed effects	Commune	Commune
Observations	1,647	1,647
R-squared	0.55	0.59

* significant at 10%; ** significant at 5%; *** significant at 1%
Observations with reported prices of fertilizer less than 1000 VND pr kg. are deemed unrealistic and set to missing.

Table 7 presents results of regression models explaining the unit price paid by each household for chemical fertilizers, which is an important, purchased input.[4] The regressions include commune

[4] 651 households did not report fertilizer prices. 21 households were excluded because they reported prices below 1000 VND per kg., which was deemed unrealistically low. The results do not change substantially if they are included.

fixed effects. The first column shows that, controlling for commune characteristics, restrictions are indeed associated with a lower unit price of fertilizer. However, once the amount of fertilizer purchased is controlled for (in column 2) this effect disappears entirely. It seems that households simply get a quantity discount (prices drop by 10 percent when the purchased amount doubles), and that households under restrictions use more fertilizer than others. Hence, the results do not support the hypothesis that restricted households are subsidized.

Table 8 Restrictions and access to extension services and irrigation

	Dependent variable:					
	Hh used extension services in last 12 months=1	Share of land irrigated	Hh dependent on public or cooperative irrigation=1	Always sufficient irrigation water=1	Irrigation water always timely=1	Never too much water from irrig. system=1
	All households			Households dependent on public or coop. irrigation		
Share of land with restrictions	-0.03	0.171	0.187	0.044	0.008	-0.089
	(0.86)	(8.46)***	(8.12)***	(1.17)	(0.22)	(2.08)**
Constant	0.425	0.59	0.552	0.369	0.575	0.601
	(23.05)***	(55.37)***	(45.63)***	(15.24)***	(24.61)***	(22.05)***
Fixed effects	Commune	Commune	Commune	Commune	Commune	Commune
Observations	2081	2081	2081	1324	1324	1324
R-squared	0.38	0.65	0.72	0.55	0.59	0.45

All models are estimated with OLS.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 8 shows the effect of restrictions on access to extension services and irrigation in OLS regressions with commune fixed effects. The share of land with restricted crop choice is not positively related to the probability of using extension services. In contrast, restricted farms are much more likely to have access to irrigation. In particular, they are more likely to use public or cooperative irrigation infrastructure. This might be the result of either i) a higher tendency for irrigated plots to be put under restrictions, or ii) a higher willingness on part of the authorities to supply irrigation water to restricted plots. Note, however, that access to irrigation is already controlled for in the income regressions. The VARHS survey collected information on the perceived quality of irrigation services among households dependent on public or cooperative irrigation. The last three columns of Table 8 show that there is no significant relationship between restrictions and the perceived quality of these services. In fact, restricted households are somewhat *less* likely than other households to report that their plots are never flooded with excessive amounts

of water from the irrigation system. Hence, among households who receive public or cooperative irrigation, there is no tendency for restricted households to report higher than average satisfaction with the quality of the irrigation system.

Table 9 Restrictions, hybrid seeds and the number of cropping seasons

	Dependent variable:			
	Hh used hybrid seeds in at least one season in the last 12 months		Number of harvests in last 12 months	
Must grow rice in at least some seasons	0.077	0.076	0.365	0.347
	(5.15)***	(5.18)***	(11.10)***	(10.73)***
Plot has irrigation facilities				0.278
				(12.55)***
Number of rice harvests in last 12 months		0.085		
		(9.15)***		
Constant	0.297	0.144	1.864	1.633
	(45.58)***	(8.07)***	(129.41)***	(70.17)***
Fixed effects	Household	Household	Household	Household
Observations	6,205	6,205	6,205	6,205
R-squared	0.92	0.92	0.72	0.73

All models are estimated with OLS.
Only plots planted with rice in at least some seasons are included.
* significant at 10%; ** significant at 5%; *** significant at 1%

An important determinant of rice yields is the type of seeds used. In particular, the introduction of "hybrid" seeds is an important factor behind the improvement of rice yields experienced in Vietnam over recent decades. Table 9 shows the effects of restrictions on the probability that a plot is sown with hybrid seeds in at least one season in the last 12 months, using OLS regressions at the plot level with household fixed effects. The regressions only include plots sown with rice in at least some seasons. The measure of restrictions used is an indicator for the restriction that the plot must be sown with rice in at least some seasons. The results show that restricted plots are more likely to be sown with hybrid seeds than other plots. This indicates that better seeds are supplied to restricted plots than to other plots, either because authorities favor these plots or because restricted plots are more likely to be endowed with characteristics necessary for successful use of hybrid seeds, such as irrigation.

Another crucial determinant of annual crop yields is the number of times the plot is harvested in a year. Again using only plots sown with rice, Table 9 shows that the number of harvests is significantly higher on restricted plots than on other plots. This also holds when the availability of irrigation is controlled. This indicates that plots of higher quality are indeed more likely to be put under restrictions than other plots. When the average number of harvests per year on a household's plots and the average number of seasons with hybrid rice are added to the income regressions, the coefficient on restrictions drops moderately. However, all point estimates of the effect of restrictions remain positive.

In sum, the evidence indicates that restricted households do not obtain better prices of fertilizer or better access to extension services. Restricted plots are more likely to be irrigated, but the quality of irrigation services is not perceived to be higher on restricted plots than on other irrigated plots. Restricted plots are more likely to be sown with hybrid seeds and the number of harvests per year on restricted plots is higher than on other plots. It seems that plots of higher quality, in terms of irrigation as well as other factors, are more likely to be put under restrictions, and that restricted plots might be supplied with higher quality seeds than other plots. However, even when we attempt to control for these factors in the income model, we still find no negative effects of restrictions.

9. Conclusion

This paper demonstrates that restrictions on crop choice are common in Vietnamese agriculture. Restrictions are more prevalent in the North than in the South, although they are found in both regions. Restrictions impose real constraints on the behavior of farmers, and because most restrictions compel farmers to grow rice, they prevent agricultural diversification. Specifically, restrictions on land use work as a barrier to investment in perennial crops.

We find no direct, negative effect of restrictions on income from cultivation. However, we find that restrictions have an indirect, negative effect working through the returns to land titling. More than three out of four agricultural plots in Vietnam now have a land use certificate, and it is hoped that this strengthening of formal property rights will lead to increases in productivity, because titling potentially increases households' willingness and ability to invest. The results presented in this paper indicate that land titles do indeed have a positive and quite strong effect on investment in

perennial crops, and on income from cultivation. However, this effect is only found among farms facing few restrictions on crop choice. On highly restricted farms, titling makes no difference.

The results indicate that land use restrictions should not be ignored in analyses of land policies in Vietnam and other transition economies, most notably China, where restrictions on crop choice are also common. In these economies, the tendency in the literature to focus on transfer rights instead of use rights should be re-considered.

In terms of policy recommendations, the results do not provide a basis for recommending a comprehensive dismantling of state intervention in Vietnamese agriculture. The failure to find a direct, negative effect of restrictions on income suggests (tentatively) that the intervention regime does not lead to large inefficiencies. However, the negative interaction uncovered between the restrictions regime and the land titling program indicates that there are negative synergies between different elements of agricultural policy, and that a goal for future policy making should be to avoid such inconsistencies. For example, it might be optimal to lift restrictions on crop choice, in order to allow the full returns to land titling to be realized. The state could in parallel continue to intervene in other ways to solve collective action problems such as cross-pollination issues, pollution, investment in major infrastructure, management of large irrigation schemes and dissemination of information.

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Appendix

Table A1 Descriptive statistics, plot level

Variable	*Mean*	*Std. Dev.*
Choice of crop restricted	0.53	0.50
Must grow rice in all seasons	0.19	0.39
Must grow rice in some seasons	0.30	0.46
Other restriction	0.04	0.20
Area, ha.	0.16	0.50
Planted exclusively with rice in last 12 months	0.54	0.50
Planted exclusively with perennials in last 12 months	0.13	0.33
Sales value, 000 VND	507,012	1,619,545
Has LUC	0.82	0.39
Slope:		
Flat	0.68	0.47
Slight slope	0.18	0.39
Medium slope	0.12	0.32
Steep slope	0.02	0.13
Mode of acquisition:		
Given by state	0.67	0.47
Inherited	0.12	0.33
Bought	0.07	0.25
Cleared	0.13	0.34
Exchanges	0.00	0.06
Other mode of acquisition	0.00	0.04
Land quality:		
Class 1	0.11	0.31
Class 2	0.43	0.50
Class 3	0.23	0.42
Class 4	0.06	0.23
Class unknown	0.17	0.38
Number of seasons irrigated, last 12 months	1.41	1.02
Distance from family home, km.	1.02	2.29
Number of harvests in last 12 months	1.84	0.66
Planted with hybrid seeds rice in at least one season in last 12 months	0.21	0.41

n=9,532. Only plots owned and operated by the hh are included.
Aquaculture-, forestry- and purely residential plots are excluded.

Table A2 Descriptive statistics, household level

Variable	*Mean*	*Std. Dev.*
Northern Vietnam	0.60	0.49
Income per ha, 00 VND (log)	9.17	0.87
Farm size, ha. (log)	-0.91	1.14
Hh labor, days per ha. per year (log)	4.84	0.86
Hh used extension services in las 12 months	0.42	0.49
Other people think respondent is a good farmer	0.13	0.33
Years of schooling of hh head	5.82	3.81
Female hh head	0.18	0.38
Age of head	49.90	13.31
Share of land rented	0.06	0.17
Price of fertilizer, 000 VND/kg. (log)	1.23	0.43
Amount of fertilizer used in last 12 months, kg (log)	5.57	1.24
Uses public or cooperative irrigation infrastructure	0.65	0.48
Never too little irrigation water from from public/coop. ir. facilities	0.26	0.44
Irrigation water always available when needed	0.38	0.48
Never too much irrigation water from from public/coop. ir. facilities	0.35	0.48

n=1976. Only the households included in the first regression in table 5 are included.

Table A3 Descriptive statistics, commune level

Variable	Mean	Std. Dev.
Commune has land use plan	0.71	0.46
Plan regulates crop choice	0.60	0.49
Plan regulates crop choice in all seasons	0.41	0.49
Plan regulates choice of rice seed	0.36	0.48
Share of annual land with LUC	0.76	0.30
Share of households using electricity	0.83	0.24
Daily market present	0.48	0.50

n=458, except share of annual land titled (n=450).