

# ***Revisiting African Agriculture: Institutional Change and Productivity Growth***

## Abstract

Africa is largely agrarian and the performance of agriculture shapes the performance of its economies. Building on a recent analysis of total factor productivity growth in African agriculture, we explore the politics underlying the economics of this sector. The introduction of competitive presidential elections in the last decades of the 20<sup>th</sup> Century appears to have altered political incentives, resulting in both sectoral and macroeconomic policy reforms that enhanced the performance of farmers.

# ***1. Introduction***

In the later decades of the 20<sup>th</sup> Century, political institutions in Africa changed. Prior to the late 1980s, open competition for national office was rare: politicians became heads of state either by launching military coups or by consolidating their political backing within the ruling party. Subsequently, most heads of state were instead chosen in elections contested by rival parties that competed to capture political support from a majority of the national electorate.<sup>1</sup> On average, one third of Africa's people work in farming and 70% of its people reside in rural settings. The late-century introduction of electoral competition thus led to the enfranchisement of a rural electorate.

Figure 1 documents the nature and magnitude of these changes. Classifying political systems along a 7-point scale that captures the level of electoral competition, the figure depicts the striking shift towards competitive politics. In the 1970s, the mean lay below 3; by the 21<sup>st</sup> century, it lay above 6.<sup>2</sup>

The decline of the rural sector in the 1970s foreshadowed Africa's economic collapse (World Bank 1981); its current revival lends impetus to its present recovery. It is our claim that the reform of political institutions and the consequent enfranchisement of Africa's farmers shaped the trajectory of economic change in rural Africa.

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<sup>1</sup> For a review of this political transition, see Widner, J., Ed. (1994). Economic Change and Political Liberalization in Sub-Saharan Africa. Baltimore MD, Johns Hopkins University Press.

, Bratton, M. and N. van de Walle (1997). Democratic Experiments in Africa. Cambridge, Cambridge University Press.

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, Josph, R., Ed. (1998). State, Conflict and Democracy in Africa

Boulder, Lynne Rienner.

<sup>2</sup> For details of this index, see below.

Figure 2 highlights the challenge to which this paper responds. It compares the rate of change in total factor productivity in 38 African states, 1961-2007, differentiating between those whose political institutions did and did not allow for electoral competition when choosing the head of state. On average, the figure suggests, countries with electoral contribution experienced a growth of total factor productivity of 1.04% in their agricultural sector, while the average rate was 0.48% per year in countries without.<sup>3</sup> In response to the challenge posed by this figure, we explore the political foundations for economic change in rural Africa.

## ***2. The Literature***

Our paper contributes to the agenda pioneered by Stasavage (2005) and Kudamatsu (2007). Working with data from 44 African countries, 1980-1996, Stasavage (2005) finds that governments chosen in elections openly contested by rival political parties spend more on primary education. Political reform led to higher levels and more geographically dispersed service delivery, he contends. Whereas urban dwellers may prefer a mixture of educational services weighted toward secondary and tertiary schooling, rural dwellers often lack even primary schools. Stasavage therefore interprets the expansion of primary education after the re-introduction of competitive elections as a response to the needs – and demands -- of the rural electorate.

Working with household-level data from 28 African countries, Kudamatsu (2007) finds lower levels of infant and neo-natal mortality for children born following the introduction of competitive elections. As did Stasavage (2005), he attributes the change to improvements in service delivery, as politicians respond to the need to secure votes from an enfranchised citizenry.

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<sup>3</sup> Countries with scores of 6 or above on the EIEC scale (described below) were counted as possessing electoral competition. The difference is significant at P-.0007 using a one-tailed t-statistic.

Note that (Stasavage 2005) relates institutional change to changes in educational policy, but not to changes in educational achievement; and that (Kudamatsu 2007) relates political change to changes in health outcomes but not to changes in health policy. By exploring the impact of institutional reform on both policy reform and economic performance, this article seeks to combine the two. While doing so, it seeks to contribute as well to one of the core themes in both African studies and development studies more broadly: the study of urban bias.

Writing in the 1970s, Michael Lipton (Lipton 1977), exposed the manner in which public policies in South Asia conferred benefits upon urban dwellers while imposing costs upon those living in the rural areas. Pursuing this theme in Africa, (masked) noted the prevalence of similar policies and argued that the ability of Africa's governments to favor the urban areas depended upon their ability to demobilize the rural electorate. By exploring the impact of the re-enfranchisement of farmers and villagers, this paper seeks to advance the study of urban bias an additional step.

Section 3 lays out the basic argument; section 4 situates it within Africa. Section 5 explores possible counter arguments. In Sections 6 and 7, we explore the relationship between institutional reform and policy choice, treating the latter as links between institutional change and total factor productivity growth in agriculture. Section 8 concludes.

### ***3. The General Argument***

The relationship between political reform and economic change in developing countries can be derived from well-established insights into the consumption behavior of poor persons and the structure of their economies on the one hand and from the logic of collective action and party competition on the other.

Engel's law holds that as income rises, the proportion of income spent on food declines; the income elasticity of food consumption is less than unity. From this micro-level regularity a macro-level implication follows: that economic development implies structural change (Kuznets 1966; Chenery and Taylor 1968; Anderson and Hayami 1986; Lindert 1991; Matsuyama 1992). When people are poor, a large percentage of their total expenditure will be devoted to food; absent foreign trade and significant economies of scale in farming, the rural sector therefore will be large. But when people earn higher incomes, the percentage spent on food will be less and, absent a comparative advantage in global markets, the rural sector will then comprise a smaller portion of the economy.

Poor countries therefore exhibit a characteristic political-economic geography. The majority of the population works in farming; it lies widely scattered, each member producing but an infinitesimal percentage of the total agricultural output. A small portion of the population – often less than 10% -- works in manufacturing and service provision and dwells in towns. Because government policies often favor large investments and because of economies of scale in manufacturing, urban firms are often few in number and large in size, and a significant percentage of the urban dwellers therefore derive their incomes from a small number of employers (Little, Scitovsky et al. 1970; Little 1982; for an African example, see (Kaplinsky 1978)). While those who farm are thus dispersed, economically and geographically, those who earn their incomes in the urban sector are not. Spatially, they are concentrated in a few settlements and economically they often labor in enterprises sufficiently large to dominate their markets.

The political implications are immediate and ironic and follow from the logic of collective action (Olson 1971, 1985): In countries with large agricultural populations, farmers form a weak political lobby. Being small, individual farmers in poor countries rationally refrain from expending effort in attempts to influence agricultural prices; not so urban interests, which stand large in their markets. Being widely scattered, farmers face high costs of organizing; concentrated in towns, urban interests find it less

expensive to do so. Urban interests therefore hold a relative advantage as lobbyists in less developed economies. In so far as government policy is influenced by organized groups, in countries with large agricultural sectors, it tends to be adverse toward the interests of farmers (Olson 1971 and 1985; masked).

The result is the choice of public policies that, taken together, constitute “urban bias,” or measures that privilege the incomes of the urban sector at the expense of the rural. Under pressure from urban interests, governments adopt trade policies that protect domestic markets for urban manufacturers while leaving the market for agricultural products open to imports from abroad. The overvaluation of currencies cheapens imports of foreign foodstuffs and lowers the earnings of exporters of cash crops. Government regulations limit exports of raw materials, compelling farmers to sell cotton, vegetables, fruits, and other products to local processors at prices below those that they could secure were they to ship them to foreign buyers. In these and other ways governments intervene so as to shift relative prices in favor of towns and against rural dwellers.

Thus the standard account of urban bias. Central to this interpretation is the absence of electoral competition; interests, it assumes, gain representation solely by lobbying. But what if we now introduce competitive elections? Where representation is achieved through electoral channels and where rural dwellers constitute a large segment of the voting population, then politicians have an incentive to cater to the interests of farmers. The very factors that render farmers weak lobbyists – that they are numerous and spatially dispersed – render them attractive to those competing for an electoral majority (Varshney 1995). The search for political majorities should therefore encourage politicians to resist the political pressures emanating from urban consumers and to champion policies that cater to the interests of the countryside.

Many African economies conform to the conditions that underpin the above argument. Their mean income is less than \$1,000 per annum (constant \$US2000) and in most countries, agriculture remains the largest single industry, employing over a third of the labor force and harboring three quarters of the population. By the logic of the argument advanced thus far, we should therefore expect to see institutional change inducing policy reform in Africa, thus strengthening the incentives for farming.

#### ***4 The Particular Case***

Africa thus fits the scope conditions that bound the general theory of urban bias. As this section will demonstrate, however, a review of the region's history yields a heightened appreciation of the significance of factors left out of that account. The general argument highlights the importance structural characteristics of the domestic political economies of Africa's states; the history of efforts to secure policy reform in Africa underscores the importance of foreign actors and, in particular, institutions that managed Africa's relationship with those who held its debts.<sup>4</sup>

Soon after independence – generally dated at 1960 – open competition for national office was banned in most states in Africa (Collier 1982): As suggested by Figure 1, by 1970, over three-fourths were either no-party (as in the case of military governments) or single-party regimes (see (Ndulu, O'Connell et al. 2008)). (Ndulu and O'Connell 2009) confirm that authoritarian governments tended to favor “control regimes;” they seized or created firms, licensed trade, and regulated prices in key markets. As stressed by masked, such policies favored the interests of the urban-based “development coalition” of workers, industrialists, and public employees while imposing high costs on consumers, most

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<sup>4</sup> Among the most useful discussions remain Mosley, P., J. Harrington, et al., Eds. (1991). Aid and Power. New York and London, Routledge; Please, S. (1984). The Hobbled Giant. Boulder CO, Westview; and Ndulu, B. J., S. A. O'Connell, et al. (2008). The Political Economy of Economic Growth in Africa, 1960-2000. New York, Cambridge University Press.

of whom were farmers. During this era, report after report (World Bank 1981, 1986, 1994) documented not only high levels of urban bias but also of rural decline.

The policies of Africa's governments proved unsustainable and they were compelled to borrow in order to finance them. As a result, the African case began to depart from the general case. For the politics of agricultural policy was no longer purely domestic; it became international.

Initially Africa's governments were buoyed by the desire of banks to on-lend the petrodollars accumulated during the oil price hikes of the 1970s. These price increases soon slowed the growth of the advanced industrial economies, however, thereby lowering Africa's export earnings and thus the ability of its governments to repay their debts. Governments in Europe and North America then intervened, seeking to stabilize the fortunes of the banks that had extended loans to Africa and other developing regions. Toward this end, they tasked the international financial institutions to seek policy changes, particularly ones that would promote exports and reduce imports and so generate the foreign exchange needed for the repayment of debts. Central to these efforts was the reform of the exchange rate; for the depreciation of the local currency would both stimulate exports and reduce imports, thereby facilitating the accumulation of foreign exchange and enhancing the ability of their governments to repay their debts.

Governments in Africa resisted policy change: were they to abandon "control regimes," they would undercut the fortunes of the governing coalition. Increasingly, then, the international financial institutions therefore called for political as well as economic reforms. They called for greater "accountability," which most interpreted as a call for the reintroduction of competitive elections. In this, they were joined by those within Africa who sought to overthrow authoritarian regimes and to restore open competition for political office.



As depicted in Table 1, the process began in French speaking West Africa:<sup>5</sup> In February of 1990, in Benin, local reformers convened a national convention, which legalized opposition parties and called for open elections to fill public offices. In response to events in Benin, the practice spread through neighboring states, then inland and southward, penetrating into Central and Southern Africa.

In this article, we exploit the “natural experiment” dealt us by Africa’s recent political history. On the one hand, we test for the structure of relationships suggested in section 3; i.e. we test for a path that runs from institutional reform to policy change and thence to changes in economic performance. Drawing upon what we learned in Section 4, we test as well for an alternative structure: one in which the relationship between institutional change and policy reform result from the influence of international institutions.

## ***5 Counterarguments***

Among the possible challenges to this effort, one stands out: the assumption of policy- or performance-based voting. If rural dwellers were instead to base their voting decisions on tribal affiliation or to exchange votes for distributive benefits, then the introduction of competitive elections need not influence the policy choices of governments.

### ***a. Ethnicity and Public Policy***

Recent research confirms that ethnic identities do indeed shape voting decisions. But so too, it finds, do policy positions and performance evaluations.

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<sup>5</sup> In 1989 in French-speaking Africa, many drew inspiration from the 1989 bicentennial of the French Revolution. They saw themselves as continuing the struggle for the rights of citizens, launched in Paris two hundred years before.

Drawing on a combination of household data on household incomes and a post-election survey of voting, (Posner and Simon 2002) studied voting behavior in the 1996 elections in Zambia. They compared the behavior of voters in constituencies that had experienced different levels of economic decline. The incumbent government, organized by the Movement for Multiparty Democracy (MMD), was widely regarded as being based on the Bemba-speaking tribes of the Northern and Copperbelt Provinces; the United National Independence Party (UNIP) constituted the dominant opposition group and drew its support from the largely Nyanja-speaking groups in the Eastern Province and nation's capital. Acknowledging the relationship between ethnicity and partisan affiliation, Posner and Simon (2002) also found that voter satisfaction with the economy played an even greater role in voting decisions. Those who "expressed dissatisfaction," they found, "were 10 to 15 percentage points less likely to vote for the incumbent" (p. 319) – an effect of greater magnitude than that associated with ethnic differences.

Posner and Simon (2002) employ data from a post-election survey. Working in Kenya, (Gibson and Long forthcoming) instead employed data from an exit poll, which, they argue, is less vulnerable to faulty recall. They find that in the 2007 elections concerns over government performance and policy issues significantly affected voter decisions. Positive perceptions about the economy and provision of government services predicted strong incumbent support, whereas concerns over unemployment and specific policy issues (including a new constitution, corruption, and political decentralization) led to support for the opposition. Kikuyu strongly favored Mwai Kibaki, himself a Kikuyu, while the Luo strongly favored Raila Odinga, their co-ethnic. But within both communities, dissatisfied voters willingly crossed ethnic lines. In addition, the Kikuyu and Luo constitute a political minority, meaning that for most voters, most of whom were rural dwellers, ethnic identity could play little role in their voting decision.

Similar findings come from Ghana, where national elections are often cast as contest between the Ewe, who back, it is held, the National Democratic Congress (NDC) and the Akan/Ashanti, who are viewed as supporting the National Patriotic Party (NPP). In their study of the 2008 elections in Ghana, (Hoffman and Long 2012) stress the diversity of party identification within these two groups; they also stress the extent to which the parties gain votes from other ethnic groupings, especially since both parties fielded candidates from sub-tribes of the Akan. Unlike Kenya, in Ghana, party identification plays a strong role in voting decisions, they note. But so too did evaluations of the performance of the economy and the competence of the government. As stated by (Hoffman and Long 2012), “demographic and ethnic factors are far less important than respondents beliefs about the parties, candidates, the [government’s] performance, and economic conditions” (p. 24).

Similar findings come from researchers working in other countries, such as South Africa (Mattes and Piombo 1999) and Ethiopia (Ariola 2008), and using other methods, such as survey experiments: (Gibson and Long 2012)). The evidence thus suggests that while ethnic sentiments are politically salient, they are not determinative. Concerns over policies and performance too shape electoral decisions.

Shifting the focus of this discussion from the voter, consider instead a candidate facing an electorate that is overwhelmingly rural and a rival for their votes. In such a setting, she will find that pro-farm policies weakly dominate those that favor urban consumers. Should the opponent advocate policies that favor consumers, our candidate could secure an electoral advantage by championing the interests of farmers; and should her opponent advocate pro-farm policies, our candidate would find it politic to concur. Note too that should our candidate gain office and be tempted to renege on her pledges, she would then face the prospect having her treachery publicized by her opponent in the next election. In the context of the “stylized facts” that define the problem which we address, electoral competition thus generates incentives on the “supply side” that complement those on the side of the voter to promote pro-farm policies.

Given the composition of Africa's electorate, there is thus ample reason to think that the policies of urban bias, which were sustainable in political systems where representation took the form of lobbying, are not sustainable in political systems based on electoral competition.

### ***b. Clientelism and Public Policy***

A second challenge to our notion of the voting decision comes from the literature on clientelism. (Stokes 2005; Kitschelt and Wilkinson 2006; Diaz-Cayeros and Magaloni 2007) As with claims regarding the power of ethnicity, there is indeed evidence that African voters seek and receive largesse from politicians (Vicente and Wantchekon 2009; Vicente 2010). Insofar as the provision of private goods is effective, it may indeed weaken the incentives for politicians to compete by championing public policies.

Vote buying can be inefficient, however. As stressed by (Stokes 2005), resources devoted to purchasing votes will be wasted if not targeted on voters who lack strong partisan attachments, and information on political sentiments can be costly to obtain. In addition, it is often difficult to determine if votes that have been purchased "stay bought." Most relevant here: with the expansion of the electorate, vote buying becomes more expensive. By the logic of (Bueno de Mesquita, Smith et al. 2003), as the size of the "selectorate" increases, politicians would then find offering public goods relatively more attractive. For this reason too we might expect to see more issue based political competition in the period following the reintroduction of electoral competition in Africa.

As noted above, Stasavage (2005) notes the expansion of primary schools and Kudamatsu (2007) the increase in the life expectancy of infants in the period following the re-introduction of electoral competition. Critics of our argument might regard these increases as a bi-product of efforts to purchase votes through increased public spending. In response to this possibility, we provide measures of policy-induced changes in relative prices; because prices are available to all who trade in markets and because the trades of one person at a particular price are not rivalrous with the trades made by another, the

policies that create them create, in effect, public goods. Were we to find that in efforts to secure votes in a rural electorate, governments adopted policies that shifted prices in favor of farmers, then our results would suggest that the expansion of the electorate elicited the kind of response anticipated by (Bueno de Mesquita, Smith et al. 2003).

## ***6 Initial Evidence***

We focus on the relationship between changes in the manner in which executives were selected, public policy, and economic performance. The evidence comes in two forms. The first is bivariate and addresses (1) the relationship between institutional reform and policy choice and (2) the relationship between policy choice and economic performance. The second is multivariate and is presented in the section that follows.

### ***Political Reform and Public Policy***

We begin with Figure 3, where an index of political institutions runs along the x-axis and measures of government policy appear on the y-axis.<sup>6</sup> While roads, education, and agricultural research require little discussion, our measure of political competition, the black market premium, and sectoral bias do.

When discussing electoral competition, we employ two measures: EIEC, as in Figure 3, and POLCOMP. Developed by Ferree and Singh (2002) and subsequently amended and adopted by the World Bank for its Database of Political Institutions, EIEC—or the Executive Index of Electoral Competition—captures the level of competition attendant the choice of chief executive. It consists of seven levels as follows:

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<sup>6</sup> In each of the regression that graphed onto the scatter plots in Figure 3, the coefficient on the measure of electoral competition is significant at conventional levels of significance. Note the discussion below, which explains why reductions in the black market premium are favorable for agriculture.

Level 1 -- No executive exists

Level 2 -- Executive exists but was not elected

Level 3 -- Executive is elected, but was the sole candidate

Level 4 -- Executive is elected, and multiple candidates competed for the office

Level 5 -- Multiple parties were also able to contest the executive elections

Level 6 -- Candidates from more than one party competed in executive elections, but the President won more than 75% of the vote

Level 7 -- Candidates from more than one party competed in executive elections, but the President won less than 75% of the vote.<sup>7</sup>

Upon occasion, we collapse the scale to form a dummy variable, "electoral competition," that takes the value 1 when the government is rated 6 or above and 0 otherwise.<sup>8</sup> We refer to this "treatment" dummy as ELECOMP.

As a robustness check on ELECOMP, we also employ POLCOMP. Constructed by PolityIV (Jagers and Marchall, 2000), the index runs from 0 to 10:

0- Repressed

1- Suppressed

2- Restricted

3- Imposed

4- Un-institutionalized

5- Transitional from un-institutionalized

6- Factional/Restricted

7- Factional

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<sup>7</sup> See Beck, T., G. Clarke, et al. (2001). "New Tools and New Tests in Comparative Political Economy: The Database of Political Institutions." World Bank Economic Review. Masked.

<sup>8</sup> Others we term "non-competitive" or, more loosely, "authoritarian".

8- Persistent Conflict

9- Limited Conflict

10- Institutionalized

When entered as a binary variable we treat observations that fall in the range 9 or above as “competitive.”

Black markets result when governments misalign their currencies and, in particular, price them too dear in “dollars.”<sup>9</sup> When governments over-value their currencies in official markets, private traders are then willing to exchange “dollars” for local currency in unofficial or black markets. But farmers may not have access street corner markets for foreign exchange. When they sell their produce abroad, they may therefore be compelled to accept the smaller payments made when they surrender their “dollars” for the local currency at the official exchange rate. In addition, they may have to compete against foreign imports of food stuffs, the prices for which have been artificially lowered because they were purchased using “dollars” bought in the official market. When there is a black market premium, then, it signals a misalignment of the official exchange rate in a way that lowers the earnings of farmers.<sup>10</sup>

As our measure of sectoral bias, we employ `NRA_totm`, an index of pricing policies devised by the World Bank. The acronym stands for the nominal rate of assistance for importable agricultural products (Anderson 2010) and provides a measure of the extent to which government policies impact upon the price of goods that, produced locally, could also be purchased in foreign markets. In Africa’s economies, these “importables” would be foodstuffs, such as food grains --rice, maize, and wheat -- and vegetable oils. When the index rises, it signifies that government policies have increased the domestic price above the world price, thus benefitting farmers. Should government policies lower domestic

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<sup>9</sup> We use “dollars” as a generic term for convertible currencies.

<sup>10</sup> See masked,

, Krueger, A. O., M. Schiff, et al., Eds. (1992). The Political Economy of Agricultural Pricing Policies, 5 vols. Baltimore, Published for the World Bank by Johns Hopkins University Press.

prices relative to those in foreign markets,<sup>11</sup> however, then the value of  $NRA\_totm$  will decline, suggesting government support for the interests of urban consumers.  $NRA\_totm$  can thus be regarded as a measure of urban bias.

Should the government manipulate the exchange rate and impose a tariff, then the index can be calculated as:

$$NRA\_totm = \frac{E \times P(1 + t_m) - E \times P}{E \times P}$$

where  $t_m$  is the tariff rate,  $E$  is the exchange rate, and  $P$  is the dollar-denominated world price of the commodity. Our data come from the World Bank, whose researchers further modified the formula to incorporate the impact of additional forms of policy intervention.

Those skeptical of the importance of policy based voting may dismiss the evidence regarding roads and schools, viewing them as evidence of distributive politics; they may even dismiss the evidence on agricultural research, given that research stations must be constructed and staffed and that both measures generate concrete benefits. The black market premium and the price of foodstuffs are non-excludable, however; they affect all who transact in the relevant markets. In that sense, they constitute public goods. As we probe deeper into the relationship between institutional change and policy reform, we therefore focus on those two variables.

### ***Policy Change and Economic Performance***

Turning to the second set of data – that portrayed in Figure 4 -- we can view the differences we observe in the time profiles of change in total factor productivity as suggestive of the impact of differences in public policy. By this measure, up to 30% of the quality adjusted average rate of TFP growth can be arguably be attributed to differences in the level of the black market premium. Figure 5

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<sup>11</sup> As by conferring import subsidies or over valuing the domestic currency.



reproduces this analysis using NRA\_totm, our second policy variable. The data suggest that differences in the domestic price of food stuffs may “account for” roughly 16% of the estimated average growth rate of TFP. In both cases, the difference between the mean rates of growth is significant at greater than the .10-level.

## ***7. Multivariate Estimates***

Thus far we have amassed presumptive evidence in support of our argument: Changes in political institutions relate, we have seen, to changes in public policies, and changes in public policies, in turn, associate with changes in in the performance of agriculture. In this section, we make use of multivariate methods, which enable us to refine and deepen our analysis. We begin by describing in greater detail our key dependent variable – growth rates of agricultural TFP. Table 2 defines the other variables employed in the analyses.

Our estimates for TFP growth are drawn from a recent paper by masked who combines data from 44 countries over 46 years (1961-2007) to generate estimates of changes in total factor productivity in African agriculture. Using aggregate crop output figures for each country, and Africa-specific prices and PPP exchange rates,<sup>12</sup> masked derives his estimates from a semi-parametric specification of a constant returns to scale Cobb-Douglass production function:

$$(1) \quad y_i(t) = c + \sum_{j=2}^k \beta_j x_{ij}(t) + \sum_{j=1}^k \lambda_j z_{ij}(t) + \sum_{j=1}^m \gamma_j p_{ij}(t) + g(TD(s)) + \sum_{h=1}^{n-1} \varphi_h CD_h + \varepsilon_i(t)$$

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<sup>12</sup> masked constructs these aggregates from crop-specific output data published by the Food and Agricultural Organization of the UN. Other studies simply employ the FAO’s pre-constructed output aggregates, which are based on global prices and exchange rates. Masked’s estimates thus more closely reflect the circumstances actually faced by Africa’s farmers.

where  $y_i(t)$  is aggregate crop output for country  $i$  in year  $t$ ,  $x_{ij}(t)$  is a vector of  $j$  conventional agricultural inputs (land, chemical fertilizer, tractors, and livestock),  $z_{ij}(t)$  are quality shifters associated with these inputs (average years of schooling to adjust labor quality, as well as rainfall and irrigated land share to adjust for the quality of land),  $p_{ij}(t)$  are other potential explanations for TFP growth (to include political competition),  $TD$  are annual time dummies, and  $CD$  are country dummies. All variables are in logs, normalized by the size of the labor force in agriculture.

This semi-parametric specification effectively partials out the linear effects of the conventional inputs and country dummies, measuring TFP growth with a non-parametric kernel regression of output on the annual time dummies,  $\hat{g}(TD(s))$ .<sup>13</sup> For arbitrarily small changes in time, the rate of TFP growth can be derived by differentiating  $\hat{g}(TD(s))$ :

$$(2) \quad \text{Instantaneous rate of TFP growth} = \frac{\partial \hat{g}(TD(s))}{\partial s}$$

The “baseline” estimates (shown in the cross-country aggregates in Figure 6) exclude the adjustments for input quality contained in the vector  $z$ . Masked re-estimates the function while adjusting for land quality (by controlling for the effect of annual rainfall and irrigated land share), and then re-estimate it once again while adjusting as well for labor quality (by controlling for average years of schooling). The adjustments help to differentiate between productivity increases resulting from the use of improved inputs from those that result from increases in the efficiency with inputs are employed.

The TFP estimates are derived from an original aggregation of crop-specific outputs in each country based on commodity prices specific to the African countries included in the sample. Masked calculates these output aggregates as Paasche indices, applying to all years the prices from the final year to avoid TFP estimates spuriously resulting from increases in price over time. The estimates pertain to specific

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<sup>13</sup> Yatchew (2003) provides comprehensive detail on semi-parametric regression.

crops. Masked provides extensive detail regarding the underlying data, the aggregation of individual crop outputs, potential sources of measurement error, and the TFP estimation procedure used to derive our dependent variable.

To identify the impact of electoral competition on agricultural productivity growth, we construct a difference-in-difference model. Given that the treatment, political reform, occurred at different times in different countries, our model takes the form of a fixed effects regression with individual year dummies:

$$(4) \quad Y_{it} = \alpha_i + \lambda_t + \delta D_{it} + X'_{it}\beta + \varepsilon_{it}$$

where  $Y_{it}$  is the growth rate of agricultural productivity in country  $i$  in year  $t$ ,  $\alpha_i$  are time-invariant unobservable country effects,  $\lambda_t$  are year dummies,  $X$  is a vector of observed covariates,  $D_{it}$  is a dummy equal to one for each country-year observation in which there is electoral competition, and  $\delta$  is the causal effect of electoral competition on agricultural TFP growth (which we assume to be a constant).<sup>14</sup>

Table 3 presents our key findings. Column 1 demonstrates that variation over the full EIEC scale bears a positive and significant relationship with variation in the growth of agricultural TFP. Our central hypothesis pertains, however, to the effect of party competition. Returning to the description of EIEC and POLCOMP above, we group those observations that score 5 or less on the EIEC scale into one category – “non-competitive” or “authoritarian” -- and those that score 6 or higher in another

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<sup>14</sup> We adjust all standard errors for clustering at the country level, in keeping with the cautions advocated by Bertrand, Duflo, and Mullainathan (2004) regarding serial correlation in difference-in-difference models.

“competitive”; for POLCOMP, we follow Epstein et al. (2006) in choosing 9 as the equivalent cutpoint. In columns 2-8, we employ these binary measures.

As can be seen, we find that economies ruled by governments chosen in competitive political systems exhibit levels of TFP growth 0.55 to 0.9 percentage points higher than do those ruled by authoritarian regimes. Columns 3-4 suggest that the result is robust to the inclusion of control variables: civil conflict, the average level of electoral competition in bordering states, and rural population share. Civil conflict was endemic in late century Africa, with 40% of countries experiencing at least one year of civil war between 1960 and 2000. Noting their occurrence enables us to control for the possibility that political competition affects TFP growth through its impact on political stability (Snyder and Mansfield 2000). If electoral competition were to generate strong political or economic forces, then their impact could spill across political boundaries. By controlling for the lagged average of the degree of electoral competition in each country’s neighbors, we control for this possibility as well. Lastly, rural population share relates closely to the level of development, other correlates of which bear upon productive efficiency. By including a measure of the relative size of the rural population, we thereby control for the impact of these unobserved variables.

A major threat to these estimates remains: that the effect may precede the treatment.<sup>15</sup> Analyzing the sequence of treatment and effect requires country-level disaggregation. In column 7 we therefore add country-specific time trends to our set of control variables, modifying equation (4) to read:

$$(5) \quad Y_{it} = \alpha_{0i} + \alpha_{1i}t + \lambda_t + \delta D_{it} + X'_{it}\beta + \varepsilon_{it}$$

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<sup>15</sup> Note that one cannot judge this sequence from the previous figures, which aggregate across all countries in the sample.

where  $\alpha_{0i}$  remains a country-specific intercept and  $\alpha_{1i}$  is a country-specific trend coefficient multiplying the time trend  $t$ . As can be seen, the result is a small reduction in the point estimate for the effect of electoral competition on agricultural TFP growth, which remains statistically significant at the .05-level.

As an additional robustness test we seek to ensure that past treatment causes the current effects while future treatment does not. To address this possibility, we follow Angrist and Pischke (2009) who invoke a form of Granger causality:

$$(6) \quad Y_{it} = \alpha_i + \lambda_t + \sum_{\tau=0}^m \delta_{-\tau} D_{i,t-\tau} + \sum_{\tau=1}^q \delta_{+\tau} D_{i,t+\tau} + X'_{it} \beta + \varepsilon_{it}$$

The model allows for  $m$  lags (post-treatment effects) and  $q$  leads (anticipatory effect). Figure 7 graphs the coefficient estimates of these post- and pre-treatment effects for  $m = q = 4$  leads and the lags surrounding the year in which each country transitioned into a system of competitive elections. The results indicate no significant anticipatory effect on changes in agricultural productivity. The difference between the mean coefficients before and after political transition is 0.56 percentage points, a magnitude consistent with the estimates in Table 3.

To test the robustness of our estimates to our choice of institutional measures, column 8 repeats the full specification of column 7, but uses POLCOMP instead of ELECOMP. Here, too, we find a positive effect, just significant at the .10-level.

Table 3 thus suggests that the relationship suggested in Figure 2 is not an artifact of the data. It appears to be sufficiently “real” as to warrant efforts at explanation.

### ***Mediating Variables***

Changes in political institutions, we contend, altered political incentives such that African policymakers adopted policies that favored the interests of agriculture. In search of additional evidence

for this argument, we return to the relationship between electoral competition and the nominal rate of protection for agricultural importables on the one hand and the black market premium on the other, marshaling multivariate methods where previously (see Figure 3) we had contented ourselves with bivariate relationships.

Recall our suggestion that the relationship between institutional change and policy reform may run along two paths. One arose from features common to poor countries: where agriculture constitutes the foundation of the greater economy, a shift from authoritarian governance to electoral competition would be likely to induce a shift in policy in favor of agriculture. The other emerged from Africa's specific history and centers on the role of international creditors, who influenced both policy choice and institutional reform. As we shall see, in this section, we find evidence for both, the logic of the first applying to pricing policies; that of the second, to policies that affect the exchange rate.

Table 4 presents results for pricing policies. We test both of our treatment indicators of institutional change in the same difference-in-difference approach taken in the previous table. Columns 1-4 show that both ELECOMP and PARCOMP910 are associated with higher prices for food crops. Note that the introduction of country-specific trends lowers the magnitude of the coefficient on ELECOMP and renders it statistically insignificant.

While we believe the risk of reverse causality (in the sense that NRA\_totm would cause electoral competitiveness) is minimal, we remain keenly aware of the possible impact of excluded variables. As suggested above, pressure from the donor community represents a prime candidate for such a variable: as elaborated below, it credibly could account for the co-variation of electoral competitiveness and policy support for domestic food producers. We therefore introduce a dummy variable indicating whether a country in a given year was under any form of agreement with the IMF. Columns 5-6 repeat

the specifications of columns 2-4. Inclusion of this variable yields little change in the relationship between electoral competition and government pricing policies.

There is an additional concern, however: that IMF agreements are not randomly distributed across countries. In columns 7-8 we therefore estimate a two-stage model in which we, as do others (e.g. Easterly 2005), instrument for IMF agreements using each country's level of US military assistance and previous colonial status.<sup>16</sup> In these final models, both of our indicators of electoral competition enter positively and are statistically significant, providing reasonably robust evidence that transitions to electoral competition improved incentives for African farmers.

Turning to exchange rate policy, recall that international financial institutions pushed for changes that would enhance Africa's access to foreign exchange and therefore its ability to repay its debts. In response to the reluctance of Africa's incumbent regimes to abandon failed policies, moreover, they sought to alter Africa's political institutions. While the outcome of the disputes over the exchange rate were as consequential for Africa's farmers as was the outcome of conflict over pricing policy, the structure of the political game that produced such changes may have significantly differed. The possibility arises that institutional and policy reform may again covary, but that they may do so because they are joint responses to external pressures from those seeking the repayment of Africa's debts.

Table 5 applies the same estimation strategy that was used in Table 4.<sup>17</sup> In this case, however, our indicators of electoral competition perform poorly. ELECOMP is marginally significant in reducing black market premia in column 1; yet, neither indicator of electoral competition plays a role in subsequent

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<sup>16</sup> The F-tests of excluded instruments on 2SLS versions of the regressions on columns 7 and 8 present no concern for weak instruments.

<sup>17</sup> We restrict this sample to exclude countries of the CFA zone, as they do not control their own foreign-exchange regimes and electoral competition should have no effect.

estimates. Rather, we find at least suggestive evidence that entering into an IMF agreement is associated with reductions in BMP. The coefficient on the IMF variable is negative and significant in columns 5-6; in the fixed effects estimates, it is not significant when US military aid and colonial origin are used to instrument for IMF programs (columns 7-8).

Thus far, we have employed a fixed effects specification. Doing so has enabled us to maintain our difference-in-difference approach, while also eliminating the possible impact of variables omitted from our estimates. The cost of doing so is that we have been unable to make use of most of the variation in our data, which originates from cross-sectional rather than from the temporal sequence. To be noted as well is that a Hausman test of a fixed vs a random effects specification suggests that the latter is to be preferred. While continuing to rest our case on the evidence drawn from fixed effects specifications, we therefore report the coefficients generated by a random, two stage, least squares model. The coefficients generated by that model (column 8) suggest that adjustments to the exchange rate are closely related to being under the oversight of the international Monetary Fund.

Changes in the `NRA_totm` suggest that following the introduction of electoral competition, governments altered public policies in ways that led to increased prices in domestically produced foodstuffs relative to prices in international markets. In the case of the exchange rate, it may have been donor pressures that led to policy reform and to institutional reform as well. And indeed, as we have seen, Africa's creditors viewed political reform not only as desirable for its own sake, but also as a means of altering its governments' commitment to policies that had slowed the growth of the continent and reduced the prospects for the repayment of its debts, and therefore strove for both policy and institutional reform.



## 9 Conclusions

In the late 20<sup>th</sup> Century, Africa changed. In many countries, political competition replaced authoritarian rule. Governments that had intervened in markets in favor of urban consumers altered their policies, resulting in stronger incentives for farming. And farmers appear to have responded, making more productive use of land, labor, and other inputs.

It is our argument that these changes are related and, more specifically, that improvements in African agriculture rest in significant part on political foundations. In the case of pricing policies, we find evidence that changes in institutions produced changes in public policies and that these, in turn, related to changes in the behavior of farmers. In the case of the exchange rate, we find once again that policy reform and political reform went together, albeit initially, at least, for reasons having to do with the influence of foreign banks rather than the influence of rural voters. While the paths may differ, both appear to have generated a similar “equilibrium:” pro-farm policies, locked in by majoritarian political institutions, in countries that are largely rural. Indeed, insofar as exchange rate policies must be credible to be effective, the change in institutions may have proved an important complement to policy change, rendering rational beliefs that the reform would endure.

While the path of exchange rate reform differs from that

In doing so, we focus on what many regard as the core challenge to Africa’s economic development: the performance of its rural economy. Building on a recent analysis of agricultural productivity growth in Africa, we employ a difference-in difference approach and conclude that the introduction of electoral competition was systematically related to an increase of between 0.5 and 1.0 percentage points in the growth rate of total factor productivity in African agriculture. We find that the transition to electoral

competition led to significant increases in the rate of protection offered Africa's food-producers. The magnitude of this effect appears to have been greater in settings with larger rural majorities. Less persuasively, we also found evidence that electoral competition led to improved macroeconomic policy, thus leading to higher domestic prices for food producers. Taken together, the evidence suggests that the search for rural majorities led to changes in government policies, which in turn strengthened the incentives for farming in Africa.

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Table 1. The Diffusion of Political Reform

Country	Date	Duration	Election		Outcome: Incumbent	
			Month	F&F?	Ousted	Retained
Benin	Feb-90	1 week	Feb-91	yes	√	
			Mar-96	yes	√	
Congo	Feb-91	3 months	Aug-92	yes	√	
Gabon	Mar-90	3 weeks	Dec-93	no		√
Mali	Jul-91	2 weeks	Apr-92	yes	√	
Niger	Jul-91	6 weeks	Feb-93	yes	√	
Burkina Faso	Aug-91	2 months	Dec-91	no		√
Ghana	Aug-91	7 months	Dec-92	yes		√
Togo	Aug-91	1 month	Aug-93	no		√
Zaire	Aug-91	1 year	--	--		
CAR	Oct-91	2 months	Aug-92	yes	√	
Chad	Jan-93	3 months	Jun-96	no		√

Table 2. Variables and Descriptive Statistics

<u>Variable</u>	<u>Obs</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Min</u>	<u>Max</u>	<u>Source:</u>
Agricultural TFP Growth	1494	0.614	2.117	-7.694	8.247	Block (2010)
Dummy=1 if Exec. Index of Electoral Competition >6	1460	0.427	0.495	0.000	1.000	Beck and Clarke (2009)
Neighbors' Executive Index of Electoral Competition	1230	4.289	1.586	1.500	7.000	Based on Beck & Clarke (2009)
Relative Rate of Assistance (RRA)	642	-0.279	0.299	-0.946	1.295	Anderson and Valenzuela (2008)
Black Market Premium on Foreign Exchange	1321	1.361	3.436	-6.908	6.122	World Devt Indicators (2009)
Civil War dummy	2162	0.166	0.372	0.000	1.000	Sambanis and Doyle (2006)
Rural Population Share	2064	71.713	16.410	12.700	97.960	World Devt Indicators (2009)

Countries for which we have estimates of agricultural TFP growth (boldface indicates the existence of data for RRA for that country): Angola, Benin, Botswana, Burkina Faso, Burundi, **Cameroon**, Central African Republic, Democratic Republic of Congo, **Côte d'Ivoire**, Equatorial Guinea, Gabon, Gambia, **Ghana**, Guinea, Guinea-Bissau, **Kenya**, Malawi, Mali, Mauritania, Mauritius, **Mozambique**, Niger, **Nigeria**, Rwanda, **Senegal**, Seychelles, Sierra Leone, Somalia, **South Africa**, Swaziland, **Tanzania**, Togo, **Uganda**, **Zimbabwe**.

Table 3. Effect of Electoral Competition on Agricultural TFP Growth

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIAB	FE	FE	FE	FE	FE	FE	FE	FE
LES								
eiec	0.170*							
	(0.0909)							
elecomp		0.744*	0.911**	0.780*	0.655	0.828**	0.548**	
		(0.432)	(0.362)	(0.433)	(0.457)	(0.362)	(0.218)	
rurpopshr			-			-	-0.0552	-0.0344
			0.159***			0.158***		
			(0.0373)			(0.0354)	(0.198)	(0.205)
civwar				-0.452		-0.163	-0.226	-0.111
				(0.493)		(0.394)	(0.150)	(0.160)
L.nbreiec					0.294*	0.313*	0.193	0.221
					(0.155)	(0.155)	(0.125)	(0.138)
polcomp9								0.439*
								(0.263)
Constant	-0.376	0.0377	10.48***	0.0800	-1.598*	8.567***	53.26	9.858



	(0.709)	(0.552)	(2.449)	(0.593)	(0.881)	(2.402)	(260.3)	(266.9)
Observations	635	635	635	635	635	635	635	605
R-squared	0.129	0.126	0.308	0.139	0.150	0.336	0.677	0.672
Number of codes	27	27	27	27	27	27	27	27
Std Errors Clustered at Country-level	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country-Specific Trends	NO	NO	NO	NO	NO	NO	YES	YES

---

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4. Effect of Electoral Competition on Nominal Rate of Assistance to Agricultural Importables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLE	FE	FE	FE	FE	FE	FE	FE-2SLS	FE-2SLS
S								
elecomp	0.198**	0.0697			0.0752		0.0999*	
	(0.0701)	(0.0594)			(0.0552)		(0.0563)	
polcomp			0.297*	0.202**		0.158**		0.236**
910			(0.152)	(0.0808)		*	(0.0535)	(0.119)
rurpopsh	-0.00259	0.0148	0.0171	0.0274*	0.0174	0.0261*	0.0391	0.0669
r	(0.0238)	(0.0182)	(0.0240)	(0.0134)	(0.0168)	(0.0140)	(0.0420)	(0.0550)
civwar	-0.119	-0.0496	-0.0557	-0.0753	-0.0726	-0.0594	-0.0287	-0.0391
	(0.101)	(0.0545)	(0.0837)	(0.0544)	(0.0596)	(0.0590)	(0.0541)	(0.0613)
Under					0.0147	0.00263	-0.456	-0.593
IMF					(0.0385)	(0.0407)	(0.345)	(0.423)

Constant	0.149 (1.550)	-17.00 (21.35)	-1.084 (1.605)	-17.91 (16.14)	-16.96 (19.74)	-25.36 (15.72)	-65.77 (50.25)	-96.40 (63.90)
Observations	548	548	678	678	510	510	335	335
R-squared	0.109	0.451	0.125	0.510	0.464	0.468		
Number of codes	18	18	18	18	18	18	18	18
Std Errors Clustered at Country-level	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Country-specific Trends	NO	YES	NO	YES	YES	YES	YES	YES

---

Robust standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 5. Effect of Electoral Competition and International Pressure on (log) Black Market Premium

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	FE	FE	FE	FE	FE	FE	FE- 2SLS	FE- 2SLS	RE- 2SLS
elecomp	-	-0.244			-0.184		0.353		
	0.843*								
	(0.432)	(0.363)			(0.340)		(0.395)		
polcomp			-0.367	0.516		0.617		0.868*	0.342
910			(0.403)	(0.485)		(0.547)		(0.516)	(0.411)
									)
under					-	-	0.902	-0.644	-
					0.771***	0.786***			2.070**
					(0.224)	(0.220)	(1.186)	(1.053)	(0.864)
									)
Constant	4.070*	648.4*	1.564*	363.7*	663.3*	679.9*	724.3*	420.7*	
	**	**	**	**	**	**	**	**	
	(0.320)	(33.21)	(0.467)	(28.76)	(35.33)	(35.81)	(106.3)	(98.34)	

Observations	686	686	836	836	594	594	390	415	415
R-squared	0.739	0.825	0.766	0.810	0.830	0.830			
Number of codes	33	33	32	32	30	30	31	29	29
Std Errors Clustered at Country-level	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Country-specific Trends	NO	YES	NO	YES	YES	YES	YES	YES	YES

---

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Figure 1: Index of Political Competition



Source: Beck and Clarke (2009); Harvard University Africa Research Project

(<http://africa.gov.harvard.edu/>).



Figure 2. Agricultural TFP Growth Profile for Country-Years With and Without Electoral Competition

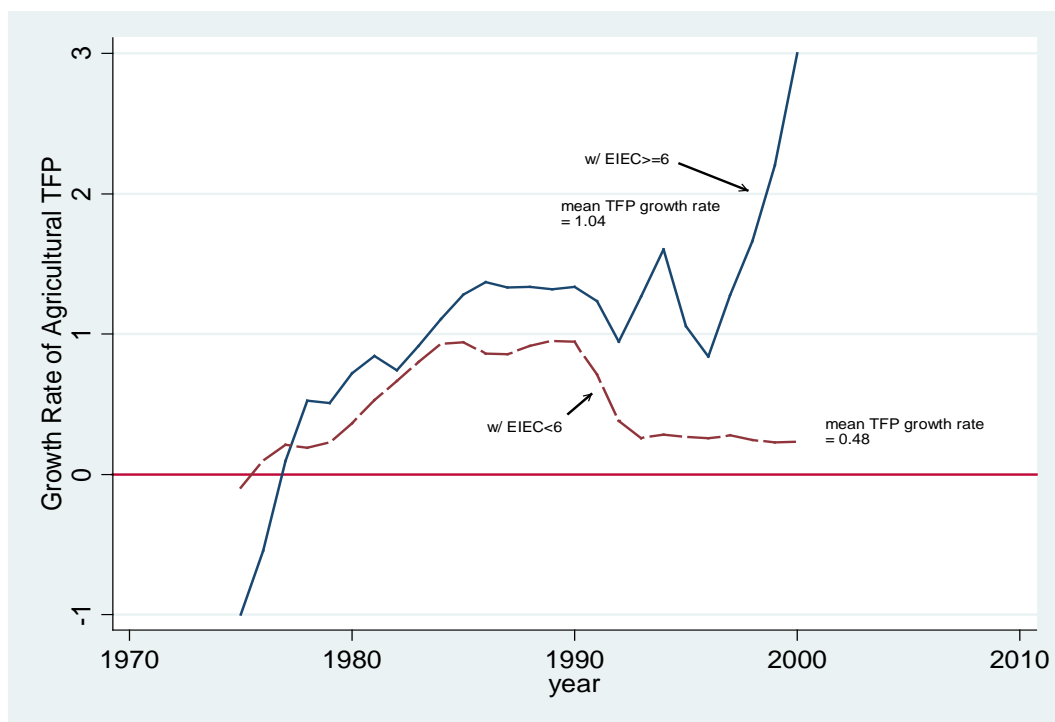


Figure 3.

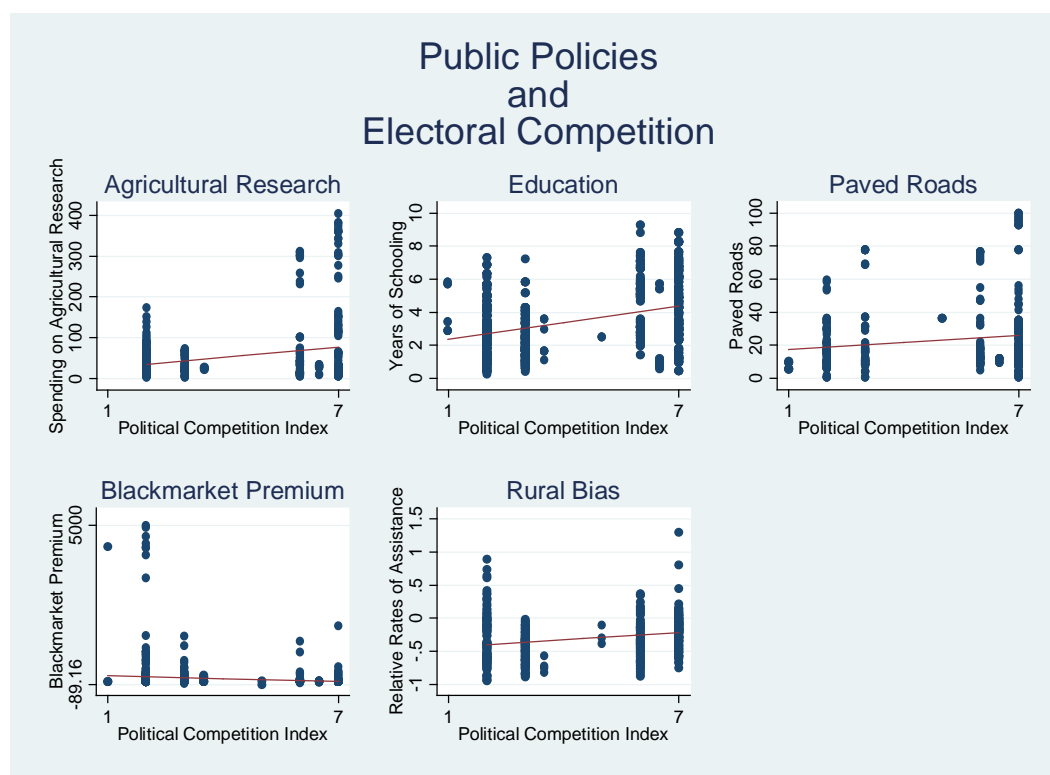


Figure 4. The Effect of Block Market Premium on Agricultural TFP Growth Rates

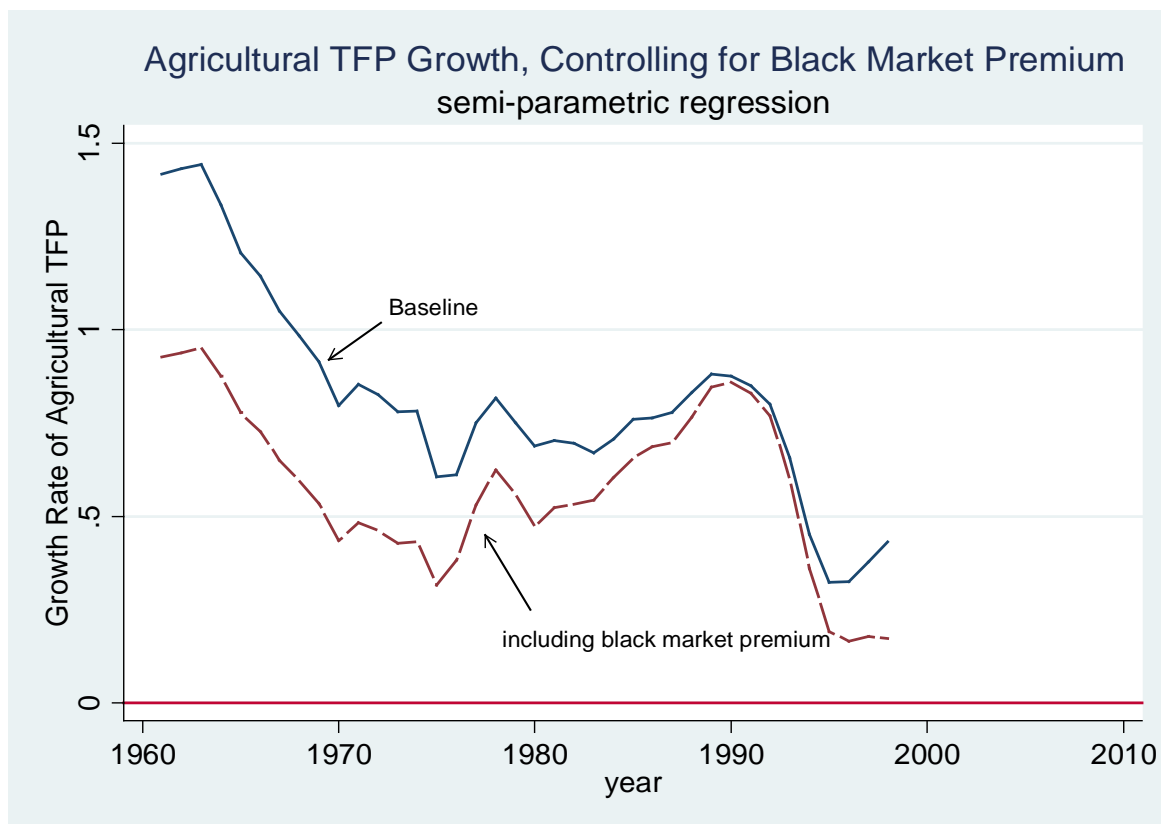
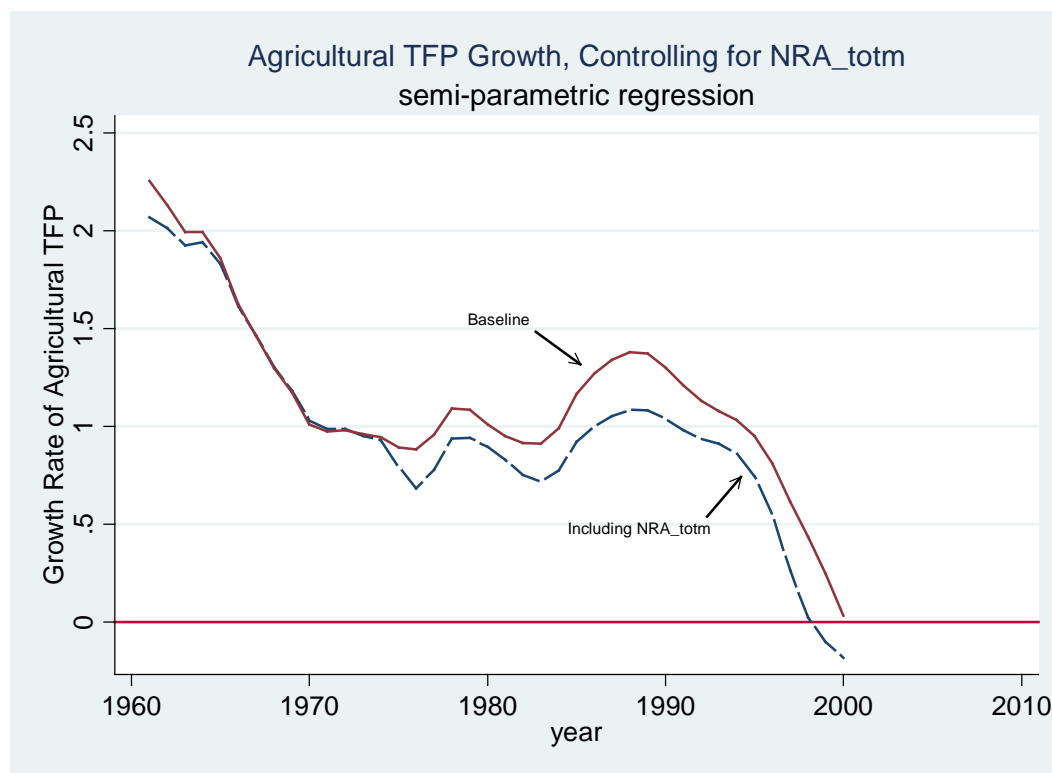
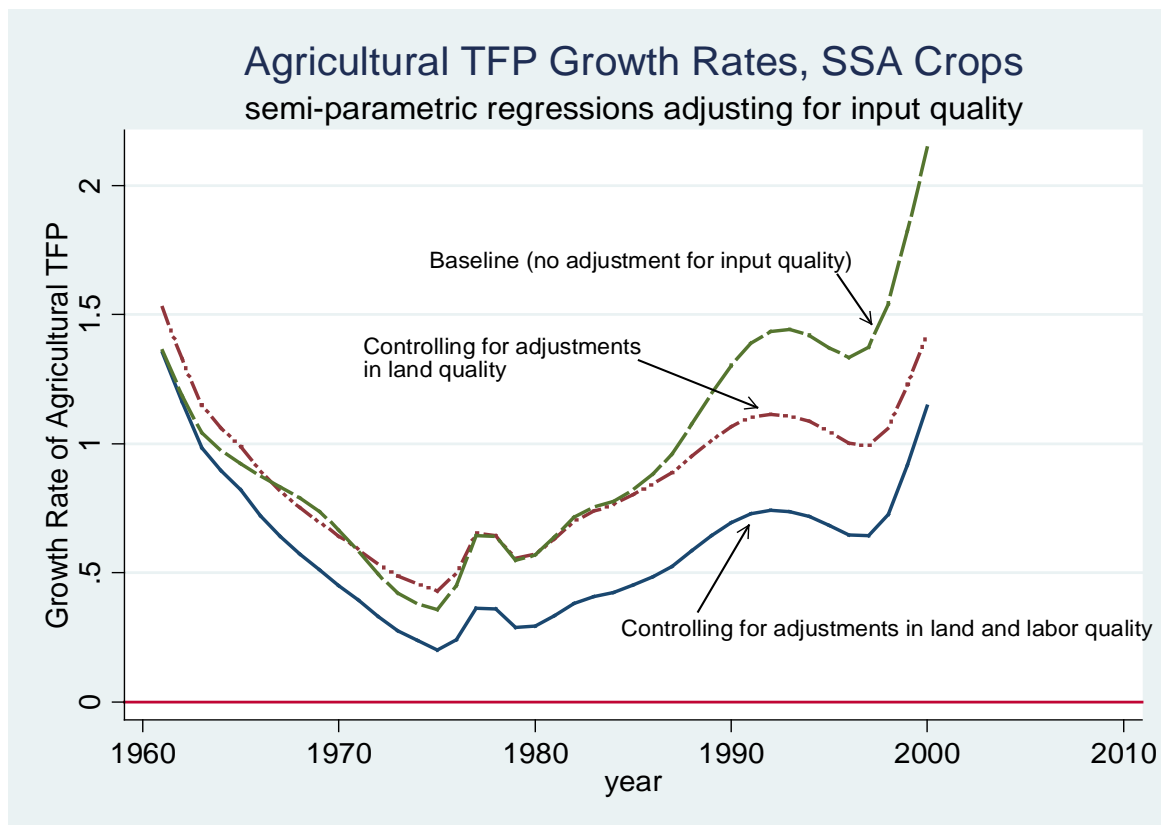


Figure 5. Effect of Nominal Rate of Assistance to Agricultural Importables on Agricultural TFP Growth



Source : Block (2010)

Figure 6. Agricultural TFP Growth Rates Adjusted for Input Quality



Source: Block (2010)

Figure 7. Agricultural TFP Growth Rates Before & After Transition to Competitive Elections (ELECOMP)

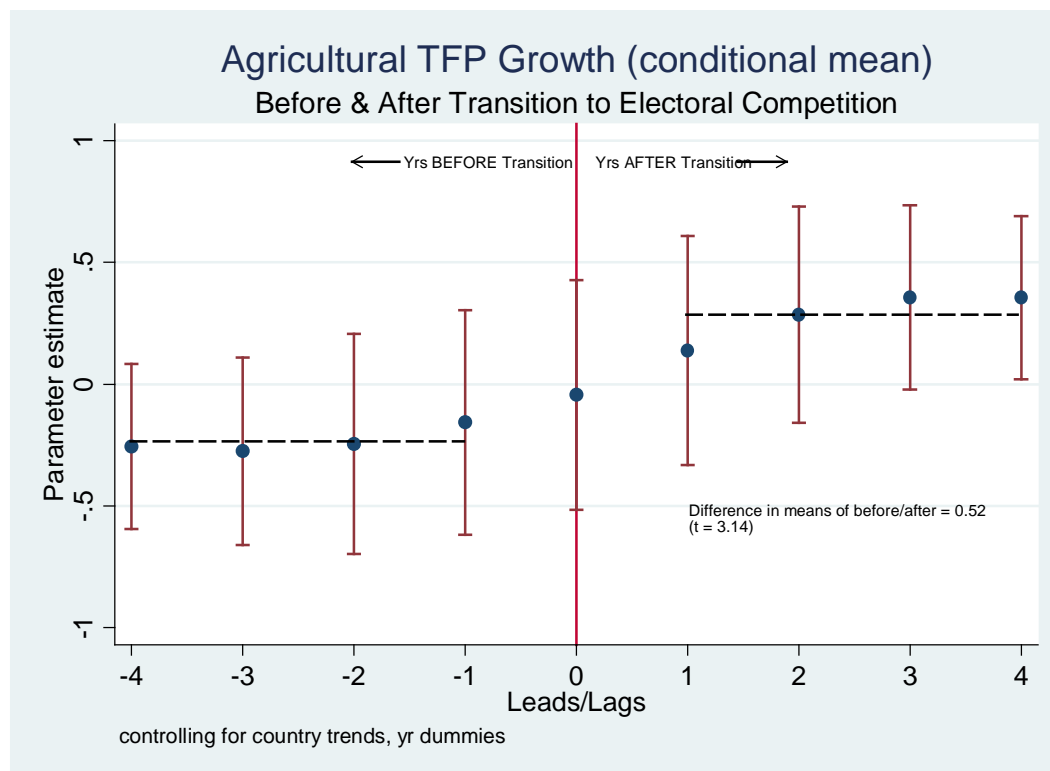


Figure 8. Black Market Premium Before &amp; After Entering IMF Agreement

