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IFPRI Discussion Paper 01002

July 2010

Old Problems in the New Solutions?

**Politically Motivated Allocation of Program Benefits and the
“New” Fertilizer Subsidies**

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PARTNERS AND CONTRIBUTORS

IFPRI gratefully acknowledges the generous unrestricted funding from Australia, Canada, China, Denmark, Finland, France, Germany, India, Ireland, Italy, Japan, the Netherlands, Norway, the Philippines, South Africa, Sweden, Switzerland, the United Kingdom, the United States, and the World Bank.

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ABSTRACT

Despite their disappointing performance in the recent past, fertilizer subsidies have re-emerged as a tool in the agricultural strategies of many countries in Sub-Saharan Africa. The new paradigm for fertilizer subsidies calls for use of such mechanisms as vouchers to target benefits to poor smallholders and public-private partnerships to develop private markets. There is some belief that with these innovations, fertilizer subsidy programs will circumvent the deleterious consequences of the programs of the past. However, there has been a glaring lack of innovation in how to prevent politics from dominating the allocation of subsidy program benefits and exacerbating inefficiencies as was the experience in earlier programs. This paper studies how vouchers, which could be used towards the purchase of fertilizer, were distributed amongst districts in Ghana's 2008 fertilizer subsidy program. We find that politics played a significant role in the allocation of vouchers. Higher numbers of vouchers were targeted to districts that the ruling party had lost in the previous presidential elections and more so in districts that had been lost by a higher margin. A district received 2 percent more vouchers for each percentage point by which the ruling party had lost the previous presidential election - this amount is both statistically and numerically significant. The analysis also shows that district poverty levels, which should have been an important consideration in an economic efficiency motivated distribution, were not a statistically significant determinant of districts' voucher allocation. The evidence that vouchers were targeted to areas in which the opposition party received strong support is suggestive of the vouchers being used for vote-buying. This finding raises the caution that despite innovations in implementing fertilizer subsidies, politically motivated allocation of subsidy benefits remains a major potential source of inefficiency.

Keywords: Africa, Ghana, fertilizer, subsidies, politics

ACKNOWLEDGMENTS

I am grateful to Esther Mensah, Kipo Jimah, and Marika Krausova for providing excellent research support. Support from the International Food Policy Research Institute's Ghana Strategy Support Program is gratefully acknowledged. I am thankful for helpful comments from Shashidhara Kolavalli, Xiaobo Zhang, Regina Birner, and Xinshen Diao. All errors are my own.

1. INTRODUCTION

Recent years have seen a re-emergence of fertilizer subsidies in the agricultural strategies of countries in Sub-Saharan Africa (SSA). The Malawian government pioneered the return to large-scale subsidies in 1998 when it started distributing free fertilizer after having discontinued similar programs in the early 1990s.¹ The Nigerian government, which had halted its decades-long involvement in fertilizer subsidization, procurement, and distribution in 1997, resumed its major role in the fertilizer sector in 1999. In 2000, the Zambian government instituted the Food Security Pack program, in which it distributes seeds and fertilizer to households. The Tanzanian state returned to subsidizing fertilizer in 2003 and since 2008 has employed a voucher-based scheme. In 2006, Kenya, which has been touted for successfully developing private agricultural input markets through effective implementation of liberalization policies, also launched a fertilizer subsidy program. In 2008, the government of Ghana instituted a national voucher-based fertilizer subsidy after having been absent from active participation in the sector since liberalization in 1991.

The historical performance of fertilizer subsidies in the prereform periods in SSA was largely disappointing (Morris et al. 2007). The programs had some success in boosting fertilizer use and food production while they were in place, but improvements in yields were always limited (Holmén 2005). Moreover, evidence from empirical studies on the cost effectiveness of the subsidy programs overwhelmingly suggest that the high costs associated with them exceeded their benefits (Morris et al. 2007). Administrative weaknesses resulted in pervasive problems of late delivery of fertilizer, delivery of inappropriate fertilizer, and delivery of incorrect amounts of fertilizer. Rent-seeking activities and political manipulation led to rampant leakages and diversion of fertilizer from intended beneficiaries. The inefficient programs also put unsustainably high fiscal burdens on governments. By diverting resources from complementary investments in education, road infrastructure, and agricultural research and extension, the subsidy programs may have exacerbated the issues of profitability and access that kept fertilizer use low to begin with (Donovan 2004).

The re-emergence of fertilizer subsidies after widespread liberalization and government exit from the sector in SSA has been precipitated by rising food security concerns in recent years. However, there is a general renewed enthusiasm for governments to once more play an active role in providing agricultural inputs in Africa. At the Africa Fertilizer Summit held in 2006 in Abuja, Nigeria, several participants expressed the sentiment that fertilizer subsidies were necessary to increase agricultural productivity in SSA (Morris et al. 2007). Proponents of fertilizer subsidies include such important donors and development partners as the Millennium Villages program and the Alliance for a Green Revolution in Africa (Minot and Benson 2009). There is some belief that with a new subsidy approach that includes innovations in both program implementation and design, the problems that plagued the programs of the past can be avoided.

The new fertilizer subsidy paradigm eschews the old methods of universal subsidies through parastatal monopolies and calls for temporary interventions targeted to poor smallholders and implemented with a consciousness for supporting the private fertilizer market. The use of agricultural input vouchers has emerged as a mechanism for simultaneously targeting subsidies and developing demand in private fertilizer markets as well as encouraging relationships between agricultural input dealers and financial institutions (Gregory 2006; Minot and Benson 2009). Public-private partnerships have also been promoted to encourage government programs to both exploit private-sector efficiencies and avoid distorting the private markets.

All the countries that have returned to subsidizing fertilizer on a large scale have attempted to incorporate one or more of these innovations for improving the efficiency of subsidies. However, the tendency of governments has been to adopt only some of the recommendations (e.g., the Malawi program uses vouchers but the government typically sidelines the private sector in the procurement and

¹ In 2005, the program was reformed from distributing fertilizer to distributing vouchers that could be used toward the purchase of packs of seed and fertilizer for maize and tobacco.

distribution of fertilizer), although by design, it is the aggregate use of the innovations, and not a few elements of the set, that is expected to avoid the downsides of the past fertilizer subsidy programs.

Of paramount concern is the glaring absence of innovation to constrain what was a major source of concern in past fertilizer subsidy programs: political manipulation. Fertilizer subsidies are prone to inefficiencies arising from high costs typically associated with their administration. However, even in the lowest administrative cost scenarios, fertilizer subsidies, unless they are accurately correcting for severe information and credit market failures, are prone to significant deadweight loss. Politics adds another layer to the sources of welfare loss. Holmén (2005, 90) argues that, state agricultural interventions in SSA prior to the structural adjustment period were partly “aimed at development and partly at nation-building, i.e. the consolidation of power.” Government monopolies, subsidies, and high-default credit programs were a way for states to ingratiate themselves with their largely agrarian populations. As such, “malpractices, nepotism and diversion of resources from their intended use were often tolerated” (Holmén 2005, 91). Theories of fiscal federalism (Buchanan, 1950; Samuelson, 1954; Musgrave, 1959; Oates, 1972, 1991, 1997, 1999) show that resource allocation based on political incentives are inefficient. In all likelihood, politics seriously aggravated the inefficiencies of those fertilizer subsidy programs.

In the present day, the typical country in SSA has at least 60 percent of its workforce engaged in agriculture (CIA World Factbook), and fertilizer subsidies still present an alluring appeal to politicians as a way of gaining and maintaining political support. At approximately 8 kilograms per hectare, current average fertilizer use intensity in SSA is an order of magnitude less than that of other developing regions and must rise significantly if the region’s agricultural productivity is to increase (Morris et al. 2007). However, direct price subsidies are only one of many alternatives that can be employed to reduce prices and improve farmers’ access to fertilizer. For instance, investing in road infrastructure, implementing policies that improve the efficiency of ports, eliminating bureaucratic hurdles, and augmenting the performance of the financial system would likely lead to significant fertilizer price reductions in countries in SSA (Donovan 2004). There is evidence from across SSA that product costs only constitute about 50 percent of the total retail price of fertilizer with the bulk of fertilizer prices being constituted by distribution and transportation costs, taxes and other regulatory charges, and finance charges (Chemonics/IFDC 2007). In comparison, the product cost constitutes about 80 percent of the retail price of fertilizer in Thailand where fertilizer use intensity is currently about 96 kilograms per hectare (Chemonics/IFDC 2007; Morris et al, 2007). Nevertheless, the potential political gains of fertilizer subsidies are often viewed as more pronounced than those of the alternative strategies to increase farmers’ access to fertilizer.

Could the discounted role of political incentives to manipulate subsidy programs erase the expected efficiency gains even from programs designed to uphold the gold standard of the “new” subsidy paradigm? This paper begins to answer this question using data from Ghana’s 2008 fertilizer subsidy program. With the international food, energy, and fertilizer price hikes that year there was a sense that a government intervention was warranted. The program, as it was designed, incorporated several of the best practices for a fertilizer subsidy: it was announced to be temporary, running from July to December 2008; there was the prospect for targeting specific beneficiaries as the subsidy was administered through vouchers; and a public–private partnership was arranged in which the sourcing of fertilizer was handled solely by existing fertilizer importers and distribution was by private retail outlets. However, during the actual implementation of the program, there was limited targeting of vouchers. The program was not as market friendly as assumed as over 60 percent of fertilizer retailers were precluded from accepting vouchers because of the rules requiring vouchers to be redeemed from fertilizer importers (IFPRI/ IFDC 2009). Due in part to the late commencement of the subsidy program and intermittent fertilizer shortages, national average redemption rate of vouchers was only 45 percent. Furthermore, though intended to be temporary, the program mushroomed and continued in 2009 even after the food, energy, and fertilizer price crises had subsided.

There are several areas of interest to study in Ghana’s experience with reintroducing fertilizer subsidies that can be instructive of the broader outcomes of the “new” fertilizer subsidy programs in other SSA countries. We limit the scope of this paper, however, to the role of political incentives in influencing

the distribution of subsidy benefits amongst the districts in the country. Specifically, we analyze whether a district's political characteristics have any bearing on the number of fertilizer vouchers it received.

In SSA, through a combination of poor recordkeeping, fraudulent activities, and lack of administrative capacity, seldom is it possible to determine how subsidy benefits are allocated across regions, districts, communities or individuals. For instance, in Malawi's subsidy programs, the total number of vouchers printed and distributed is not known (Dorward et al. 2008; Holden and Lundunka 2010). Ghana's 2008 fertilizer subsidy program presents a unique opportunity to observe the role that political influence can play in a fertilizer subsidy even in programs that incorporate the new best practices of fertilizer subsidies. In the Ghanaian political context, the district emerges as the natural unit at which to observe and discuss the political characteristics of an area. We employ a dataset we assembled containing information on the number and types of vouchers received for all but six of Ghana's 138 administrative districts.²

The subsidy vouchers approximate a transfer from the central government to the district, and as such, we look to the literature on tactical redistributive politics to guide our analytical framework. The theoretical literature presents opposing theories of which areas politicians will target for higher transfers. The "swing voter" models (Lindbeck and Weibull 1993; Dixit and Londregan 1996, 1998) predict higher transfers to districts that do not show clear preference for any particular party. On the other hand, the "core supporter" models (Cox and McCubbins 1986) predict that the incumbent party will target more resources to areas where it perceives strong support. In the empirical literature, which political characteristics are most salient, and in which direction intergovernmental transfers have been affected, are also varied. Barkan and Chege (1989), Miguel and Zaidi (2003), and Case (2001) find that governments gave preferential treatment to their core supporters and that higher transfers or resources went to areas in which the incumbent president's vote share was higher the previous election. However, there is also evidence that politicians engage in targeting swing voters, as in Cole (2009) who finds that Indian state governments supplied more subsidized agricultural loans in election years to districts in which they had a narrow margin of victory or a loss. Khemani (2007) and Dahlberg and Johansson (2002) also find evidence of politically aligned agencies targeting benefits to swing voters.

In our empirical analysis, the political characteristics of the districts are captured by variables of relevance in both the "swing voter" and "core supporter" models. We find that beyond economic and demographic considerations, political characteristics are statistically significant determinants of the number of vouchers districts received. Higher numbers of vouchers were targeted to districts that the ruling party had lost in the previous presidential elections, and more so in the districts that had been lost by a higher margin. A district received 2 percent more vouchers for each percentage point by which the ruling party had lost the district. This amount is both statistically and numerically significant, implying 66 percent higher vouchers in a district that the ruling government lost by the average loss margin compared with a similar district it had won. The analysis also showed that district poverty levels, which should have been an important consideration in an economic efficiency-based distribution, were not a statistically significant determinant of districts' voucher allocation. In fact, district poverty levels were negatively correlated with their voucher allocation. Data availability limits the scope of this analysis to political considerations in district-level allocation. However, the finding of political considerations influencing the voucher allocation at the district level suggests that politics will also influence voucher allocation at the individual farmer level.

This evidence of "vote-buying" activity in Ghana's 2008 subsidy program suggests that despite the innovations in design and implementation of fertilizer subsidies, the new programs have the potential to experience at least some of the significant pitfalls of former subsidy programs. The current innovations are not enough to make the new fertilizer subsidy programs economically and socially efficient.

The remainder of the paper is structured as follows. In the next section, we present a brief description of the history of fertilizer subsidies in SSA and discuss the context within which Ghana

² The district is the second tier of Ghana's decentralized structure of government. At the time of the subsidy program, Ghana contained 138 districts. District boundaries have since been redemarcated, and as of 2010, there were 170 districts in Ghana.

instituted a subsidy program in 2008. In Section 3, we describe the timeline of events and the design of the subsidy program, and some observations on how it was actually implemented. In Section 4, we present the data used in the analysis. The empirical evidence is presented in Section 5. In Section 6, we discuss some issues of interpretation of the findings and how they are addressed. Section 7 concludes the paper.

2. CONTEXTUAL BACKGROUND

Fertilizer Subsidies in SSA

From the late 1960s to the 1980s, many governments in SSA actively intervened in the agricultural sector in an effort to increase agricultural productivity and boost food production. Strategies employed were varied and included state farms and irrigation programs (Ghana and Nigeria), collectivization (Nigeria, Ethiopia, and Tanzania), government-subsidized agricultural input credit programs (Zambia, Ethiopia, Ghana, Nigeria, and Kenya), and output market price controls (Malawi, Ghana, and Uganda) (Holmén 2005). However, one strategy that was ubiquitous in SSA in this period was high universal subsidies for fertilizers. These typically took the form of direct price subsidies through centralized state monopolies for procuring and distributing fertilizer, as well as price controls, and pan-territorial fertilizer pricing.

A common objective of such agricultural programs was national food self-sufficiency partly in an effort to ensure food security, but also as a source of national pride (Holmén 2005). In many countries, smallholder farmers were therefore the implicit intended beneficiaries of the fertilizer subsidy programs. Nevertheless, there is widespread evidence that subsidized fertilizer was typically captured by wealthy local elites and politicians. By the nature of the implementation and the lack of recordkeeping of the activities under the subsidy programs, much of that evidence is, however, anecdotal. As is summarized by Holmén (2005): Friss-Hansen (1994, 13) mentions that in Tanzania, “a politically well-connected village could receive more than it demanded [of scarce hybrid maize seed], while other villages received only a fragment of their requirement”; Bazaara and Muhereza (2003, 8) describe that in Uganda’s agricultural programs, the main beneficiaries were politically connected people and political supporters “who had nothing to do with farming”; and Olayide and Idachaba (1987) describe a similar outcome of the agricultural interventions in Nigeria where credit and subsidized inputs were funneled to and captured by “absentee farmers, retired civil servants, and soldiers.” In Zambia also, “the fertilizer that did make its way to farmers often ended up being captured by wealthy farmers who least needed assistance, rather than reaching the smallholders who were supposed to benefit” (Morris et al. 2007, 32).

The agricultural subsidies held immense political appeal because they enabled the construction and sustainment of the clientelistic networks on which the state thrived. The political attractiveness of the subsidy programs is highlighted by the upheaval typically required for the subsidies to be repealed. Gulati and Narayanan (2003) document how political interests have prevented reform in agricultural subsidies in India when evidence shows that such reform is necessary from an efficiency perspective. In SSA, despite the exacerbating effects of agricultural input subsidies on the already precarious fiscal position of many countries, widespread reforms were largely the result of outside donor pressure (Morris et al. 2007). It was not until the structural adjustment period starting in the 1980s that many governments relinquished their monopolies and pursued reforms to privatize the fertilizer sector.

Despite the system inefficiencies, the scale-back or complete curtailment of fertilizer subsidy programs in the late 1980s and 1990s had evident effects on agriculture in SSA. The fertilizer use in several countries, such as Ghana, Malawi, Nigeria, Tanzania, and Zambia, either stagnated or declined. However, the reduced food production and collapse of fertilizer use after the withdrawal of the subsidies does not imply that they should have been maintained. Rather, the evidence suggests that the collapse in fertilizer use resulted from partial implementation, or sometimes nonimplementation, of the reforms that would have brought in the private sector to play the role that the government had vacated. In many countries, despite an official policy of privatization and liberalization to encourage the development of a private agricultural input distribution system, reform was riddled with policies that allowed the government and connected people to maintain control over the fertilizer sector. Jayne et al. (2003) document the following. In Zambia, even though the government relinquished its monopoly on fertilizer procurement and distribution, it distorted the market by continuing to distribute large amounts of fertilizer through local agents, invariably local political elites, in a very-high-default-rate credit program. Similarly, in Ethiopia, after the government limited the monopoly of the parastatal, it continued to play a large role by allowing the formation of regional fertilizer companies by persons with political ties that were then

given preferential treatment in access to foreign exchange for fertilizer importation, and also awarded contracts to supply fertilizer for government programs. Kenya was a notable exception in that fertilizer use increased after the removal of the subsidies; it is also one of the few countries that fully undertook reform and implemented legislation and structures to meaningfully support the private sector.

There is a recognized need for fertilizer use to increase dramatically in Africa. In 2002, fertilizer nutrient consumption in SSA was only 8 kilograms/hectare (kg/ha) compared to 101 kg/ha in South Asia, where yield rates in cereals are typically two- or threefold those in SSA (Donovan 2004). Although fertilizer is not a panacea for low agricultural productivity, “there is little doubt that fertilizer use must increase in Africa if the region is to meet its agricultural growth targets, poverty reduction goals and environmental sustainability objectives” (Morris et al. 2007, 9). Other than direct price subsidies, alternatives do exist to increase fertilizer use on the continent. Significant reductions in fertilizer retail prices can result from investments in infrastructure at the port and inland transportation and telecommunications networks. Policy changes that improve the functioning of financial markets and the broader macro economy are also expected to reduce fertilizer retail prices. High risk in the profitability of using fertilizer has been identified as one of the reasons for low adoption (Pender, Nkonya, and Rosegrant 2004). Interventions that directly address that issue—such as improving and expanding extension activities to disseminate appropriate fertilizer recommendations, agricultural research to develop crop varieties that are responsive to fertilizer, and investments in complementary technologies like irrigation—would also likely result in increased demand for fertilizer. Reducing postharvest losses and replacing policies and infrastructure that result in rigidities in output markets may also make fertilizer use more attractive over time. Such alternatives invariably require lower administrative costs than those related to fertilizer subsidies and almost all have positive externalities in the rest of the economy. Indeed, some of these alternatives are needed to set the foundation on which fertilizer subsidies can be effective and efficient. Drawing from past experience, it is apparent that subsidies that supported Asia’s Green Revolution were bolstered by “substantial public investment in education, infrastructure (roads and irrigation), and research and extension” (Donovan 2004).

The renewed enthusiasm for governments to play an active role in providing agricultural inputs in Africa is evidenced by the number of countries that have actually reinstated large-scale subsidy programs. Part of the acceptance of fertilizer subsidies despite their deficient past can be explained by the many innovations to address the pitfalls of the past programs. Even though no country has successfully adopted and implemented all the recommendations of the new fertilizer subsidy paradigm, several have made impressive gains, at least in the formulation and design of programs. Fertilizer subsidies of the 21st century are typically no longer universal, and almost all pronounce goals of being targeted to poor farmers. The subsidy programs in Malawi, Nigeria, Tanzania, Zambia, and Kenya have express goals to target subsidies to vulnerable groups, such as female-headed households. Instead of government monopolies to distribute fertilizer, subsidy programs now claim to work to develop demand for private retailers. Government programs use market-based innovations such as bid-tender systems to source fertilizer through the private sector. There has been a proliferation in the use of vouchers (e.g., in Malawi, Ghana, Nigeria, Tanzania, Zambia, and Kenya) to be used toward the purchase of fertilizer instead of distribution of the actual product. However, as in the prior periods, fertilizer subsidy programs still have particular appeal to politicians because of the possibility of manipulating and targeting benefits. Politics comes into play in almost every aspect of the decision to provide a subsidy, the design and the implementation of a fertilizer subsidy program. Despite the innovations in subsidy implementation, it is not clear how the new subsidy programs expect to avoid being overrun by political incentives that worsened the inefficiencies in the past fertilizer subsidy programs.

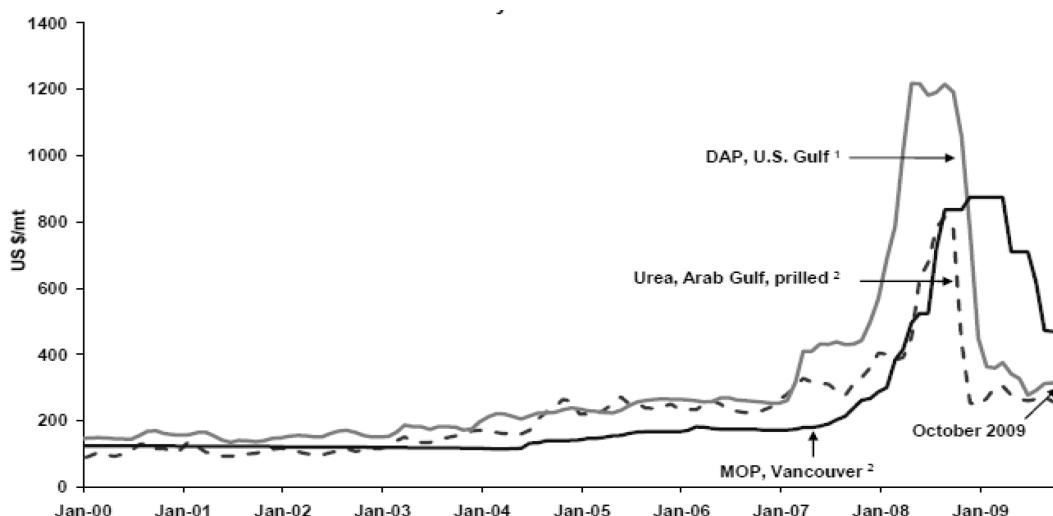
Situational Context of Ghana’s 2008 Fertilizer Subsidy Program

Since liberalization reforms in the fertilizer sector in 1991, there had been no large-scale government intervention in the fertilizer sector in Ghana until 2008. The decision to implement a national subsidy

program in 2008 was justified as a temporary response to the unusual confluence of events in that year that led to simultaneous spikes in global food, energy, and fertilizer prices.

Within the 12 months after January 2007, the average price of a metric ton of urea, the world's most commonly used nitrogen fertilizer, underwent what was then a sharp rise, increasing from US\$272 to \$415.³ However, in 2008, world fertilizer prices soared. In April 2008, a ton of urea cost on average \$452 and then rose to a peak of \$815 in August (Figure 1). In Ghana, fertilizer prices rose in concert with the global prices. The retail price of nitrogen-phosphorous-potassium (NPK) 15:15:15, the most widely used food crop fertilizer in Ghana, increased from 26 Ghana cedis (GH¢) to GH¢ 35 per 50 kg bag, between June 2007 and March 2008 (Ministry of Food and Agriculture 2008).⁴ Food prices in the country also rose rapidly. Between May 2007 and May 2008, the price of the food staple maize rose by an average of 77 percent in the metropolitan areas of Accra and Tamale - during the same period in 2006–2007, maize prices had actually fallen by 2.2 percent.⁵ The prices of other staples such as rice and wheat also spiked.

Figure 1. Monthly averages of global fertilizer FOB prices, 2000–2009



Source: International Fertilizer Development Center.

Notes: FOB = Free on board (average price, with buyer paying freight and insurance to destination port) DAP = diammonium phosphate, MOP = muriate of potash.

Aside from the price crises, 2008 was significant also because presidential and parliamentary elections were scheduled for November of that year.⁶ Since the return to democratic rule in 1992, two parties, the National Democratic Congress (NDC) and the New Patriotic Party (NPP) have dominated politics in Ghana.⁷ The ideologies of the two parties are not very distinct however, the NDC, which garners its core support from a populist base in rural areas, is perceived to have a more center-left bias.

³ Free-on-board average price calculated by the Policy, Trade, and Markets Program of the International Fertilizer Development Center. Henceforth, all dollars are in U.S. dollars.

⁴ GH¢1 was approximately equal to US\$1 at that time.

⁵ Calculated as an average of consumer price index (CPI)-deflated prices in the Accra and Tamale markets as reported by the Ghana Food Price Tracking Database produced by Ministry of Finance and Economic Planning (MOFEP), Ministry of Agriculture (MOFA), and International Food Policy Research Institute (IFPRI)

⁶ In Ghana, a president is elected by national majority rule (50 percent plus one vote) every four years. Members of the unicameral legislature, the Parliament of Ghana, are elected concurrently also for four-year terms.

⁷ The NDC was founded just before the elections in 1992 by Jerry John Rawlings, the head of the military government at the time of democratization. The NPP was also founded around the same time, but it was reconstituted from the United Party that was formed in 1957 by a group of African intellectuals who had fought for the creation of Ghana and its independence from the British.

Support for the NPP is higher among the urban, educated population, and the NPP is often accused of being the party of “elites.” The NDC won the presidency in the 1992 and 1996 elections. In 2000, the NPP came into power in an election that saw the first democratic change of regime in the country in decades. The NPP government was re-elected with a comfortable margin of 8 percent of the votes over the NDC in 2004. However, in 2008 the incumbent NPP was facing what was expected to be a difficult re-election bid. A fertilizer subsidy in that year simultaneously addressed the concerns of food security and showed farmers that the NPP government had empathy for the rural population, who were largely farmers.

Planting was well under way in the entire country when in May 2008 the government announced its intention to subsidize fertilizer as part of its efforts to mitigate the hardship of the population due to high food and fuel costs.⁸ The president made the announcement during an hour-long nationally televised address. The only reference to a fertilizer subsidy was this: “Government will subsidize the cost of fertilizer and ensure effective distribution to farmers to assure a good harvest.” There were no further details publicized regarding what would be subsidized, when the subsidy would take effect, or the design of the program. When the subsidy program was rolled out in early July 2008, it came as a surprise to most of the stakeholders, including district agricultural directors, employees of the Ministry of Food and Agriculture, and farmers (PFAG 2009).

The 2008 subsidy program included no public tender process for the procurement of subsidized fertilizer; nor did the government attempt to directly import fertilizers for use in the program as in Malawi, Nigeria, Kenya, and Tanzania. In Ghana, the fertilizer sector is completely liberalized and the government is not involved in any major way in procurement, distribution, and retailing of fertilizer. All inorganic fertilizer in the country is imported ready-for-use by private importers with four private companies accounting for essentially 100 percent of the fertilizers on the market.⁹ The government’s decision to rely entirely on the private sector to source and distribute subsidized fertilizers may have been necessitated by the haste with which the program had to be implemented. Nevertheless, various aspects of the program design showed the government’s commitment to supporting the private markets.

It is noteworthy that the NPP government narrowly lost its re-election bid in 2008. The NPP candidate garnered the highest number of votes in the first round but with only 49 percent of the votes, it was shy of the majority rule, prompting a runoff vote against the NDC, which had garnered 48 percent of the vote (Electoral Commission of Ghana). In the runoff, the NDC defeated the NPP by less than 0.01 percent of the votes.

Despite the absence of the stressors that were used to justify the need for a temporary fertilizer subsidy for 2008, the subsidy program was expanded and reinstated in 2009 by the newly elected NDC government. This situation sheds light on the lack of political will to withdraw fertilizer subsidies once they are in place.

⁸ Agriculture is almost entirely rainfed in Ghana, and therefore planting of virtually all types of annual crops follows the rainfall pattern, which is bimodal (March–July and August–November) in the southern areas of the country and unimodal (May–September) in the northern savannah ecological zones (Kombiok 2008; FAO 2005).

⁹ These importers in order of market size are Yara Ghana Ltd. (subsidiary of Yara International ASA) and its partner cocoa fertilizer company Wienco Ghana Ltd.; Golden Stork (subsidiary of SCPA Sivex International); Dizengoff Ghana Ltd. (subsidiary of Balton CP Ltd.); and Chemico Ltd.

3. PROGRAM DESIGN AND ACTUAL IMPLEMENTATION OF GHANA'S 2008 FERTILIZER SUBSIDY

The following description of the program design and implementation is based on the results of fieldwork undertaken by the author in seven districts spread over four of the 10 administrative regions of the country in October 2008.¹⁰ During the field visits, interviews were conducted with seven district agricultural directors, two extension agents in each district, the regional agricultural director for the Brong Ahafo Region, four farmers, and 14 fertilizer retailers.¹¹

On July 2, 2008, the minister for food and agriculture held a press briefing at which he announced a temporary countrywide subsidy on NPK 15:15:15, NPK 23:10:05, sulfate of ammonia, and urea from July 4 to December 31, 2008. Farmers were to receive the subsidy in the form of fertilizer-specific and region-specific vouchers distributed by agricultural extension agents (AEAs). Ordinarily fertilizer prices are set by fertilizer retailers, but as part of the subsidy program, the government and the private fertilizer importers negotiated the price per 50 kg bag in each district capital.¹² The vouchers had face values of approximately 50 percent of the negotiated prices. A voucher could be used toward the purchase of the relevant fertilizer from any retailer in the region of issue that was willing to accept it. The retailer then passed on the redeemed vouchers to an importer (in practice, one with whom it was contracted). The importer in turn was to transmit an invoice for the value of vouchers to the Ministry of Food and Agriculture and receive payment within a week.

The subsidy level was chosen with two objectives: first to return the price farmers paid for fertilizer to the levels prevailing in July 2007, and second to create pan-territorial pricing for fertilizer. There were no specifically articulated goals of the subsidy program, and it did not call for targeting of the vouchers to farmers based on their income or the crop they cultivated. However, the types of fertilizers subsidized were generally not for use on cocoa, the main cash crop in the country. NPK 15:15:15 was already widely used in the country as a basal dressing fertilizer, whereas urea and sulfate of ammonia were the typical top dressing fertilizers. On the other hand, NPK 23:10:05, a special maize formulation and a product of Yara, was largely unknown to farmers before the subsidy program.

The regional agricultural directors convened meetings with their district agricultural directors to inform them about the details of the subsidy program at about the same time that the program was announced to the public.¹³ The district agricultural directors in turn convened meetings with the AEAs either just before or on July 4 to inform them about their roles in the subsidy scheme. AEAs were to distribute vouchers to farmers within their operational areas.¹⁴ After July 2, the supplemental cash amount to be used with vouchers, that is, the price per 50 kg bag for fertilizer purchased with a voucher, was announced widely on radio and television. It was mainly through those announcements that farmers learned that a subsidy program had begun and the details of the program.

Figure 2 shows a timeline of major events in the fertilizer subsidy program. During the peak fertilizer application periods of April, May, and June, subsidized fertilizer was not available. It was on June 30, 2008, that the first batch of vouchers was delivered to the headquarters of the Ministry of Food and Agriculture (MOFA) in Accra from the contracted printer.

¹⁰ At the time of the subsidy, there were 138 administrative districts.

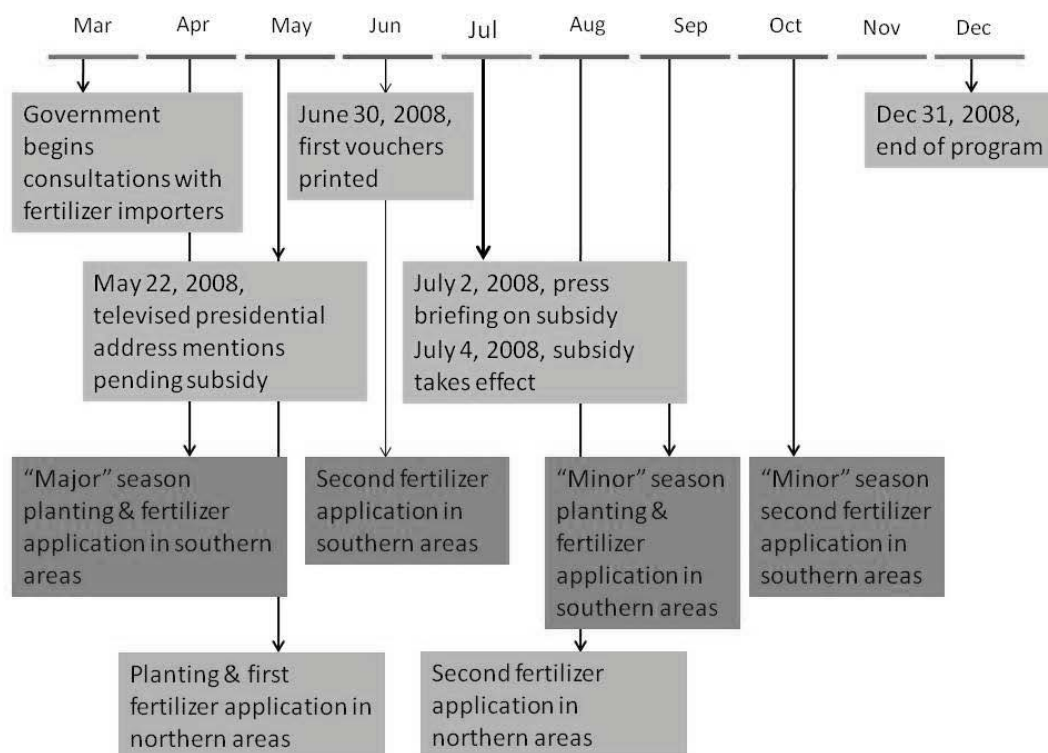
¹¹ Districts visited were Suhum Kraboa Coaltar and Juaben in the Eastern Region; Asante Akim North and Kumasi Metropolitan Area in the Ashanti Region; Sunyani District in the Brong Ahafo Region; and Tamale Metropolitan Area and Tolon Kumbugu in the Northern Region.

¹² The negotiated prices were generally higher than the market prices that had prevailed just before the subsidy program by an average of GH¢ 10.00 and as much as GH¢ 25.00 per bag (Banful 2009).

¹³ Based on personal conversation with the regional agricultural director of the Brong Ahafo Region of Ghana, October 23, 2008.

¹⁴ The Ministry of Food and Agriculture guidelines state that a district should be divided into 32 operational areas each served by one AEA. However, most districts do not have enough agents on staff to allow that many operational areas. The boundaries of operational areas are typically not clearly demarcated and are not easily recognized.

Figure 2. Major events in Ghana’s 2008 fertilizer subsidy program



Source: Banful (2009).

Vouchers were then sent from MOFA’s Accra office to the regional agricultural offices where the regional voucher allocations was distributed among the districts within the region. The regional offices received the total regional allocation in batches, spread out over two to six different dates, over the period from the June 30, 2008, to mid-October 2008. The first consignment of vouchers to the region received on or shortly after June 30, 2008, was typically distributed in the following way. Regional agricultural directors convened meetings of all district agricultural directors in their jurisdiction. At those meetings, through some combination of bargaining and discussion, the vouchers for the region were shared between districts. It appears that this procedure occurred only for the first batch of vouchers and that districts subsequently received vouchers by making requests to the regional agricultural office. Those requests were not necessarily honored, and the number and types of vouchers districts received were typically different from what they had requested.

The planned total number of vouchers for the duration of the program was 600,000 covering 30,000 metric tons of fertilizer, with the total value of subsidy offered amounting to about \$15 million. However, the number of vouchers printed was actually 1,140,850. The distribution of the first 601,400 vouchers printed roughly followed a predetermined distribution pattern of 15 percent each to the Northern and Brong Ahafo regions; 13 percent to the Ashanti Region; 9 percent each to the Upper East, Upper West, Central, Eastern, and Volta regions; and 6 percent each to the Western and Greater Accra regions.¹⁵ However, there was subsequent printing of vouchers for all regions except for the Western, Central, and Greater Accra regions. The distribution of the extra vouchers by fertilizer type and region of redemption did not follow any clear pattern.

¹⁵ Planned distribution sourced from memo to regional agricultural directors from the Ministry of Food and Agriculture, June 2008. Actual distribution from Banful (2009).

The proportion of the vouchers issued to the regions that were actually used to purchase fertilizer under the subsidy program was below 50 percent nationally but varied significantly by region. Anecdotal evidence provides two main reasons why voucher redemption rate was low, and also why it varied across the country. First, the program started too late for some farmers to take advantage, either because they had already bought fertilizer, or, the ideal fertilizer application time for their crops had passed. Second, there were intermittent fertilizer shortages throughout the country some of which likely coincided with the times farmers would have desired to utilize their fertilizer vouchers. Banful (2009) documents that 67 percent of vouchers issued to Northern, Upper East and Upper West regions were redeemed. On the other hand, only 10 percent of the vouchers issued to Western and Central regions were redeemed for fertilizer. Similarly, only 36 percent of the vouchers issued to Brong Ahafo, Ashanti, Eastern, Greater Accra and Volta regions were redeemed. While, there is no district level data available on voucher redemption rates, the variation in redemption rates calculated at regional level indicates that district level redemption rates likely varied as well.

4. DATA

The empirical analysis uses district-level data consisting of demographics, number and type of vouchers received under the 2008 fertilizer subsidy program, and election results.

The data relating to the subsidy program were from a primary data collection effort by the author. Ghana's Ministry of Food and Agriculture has decentralized regional offices in each of the 10 administrative regions of the country, and district offices in each of the districts of the country. In May 2009, a questionnaire was dispatched to the district agricultural directors in each district office requesting information about the number and type of vouchers received, the dates of delivery, and the number and type of vouchers left over as of December 31, 2008. The district agricultural office staff that provided the requested data was also asked to fill out an open-ended comment card. Each of the 10 regional agricultural offices was also asked to provide these same data disaggregated at the district level. This attempt to collect the same information from two different sources was to compensate for possible lapses in recordkeeping at either of the sources. In most regions, the district agricultural offices provided the requested data except for the dates of delivery. In combination with the data obtained from all 10 regional agricultural officers, the resulting dataset was complete for all but six of 138 districts.¹⁶ Based on the records of the Ministry of Food and Agriculture, the total number of vouchers printed and distributed was 1,140,850.¹⁷ Based on the data collection from the district and regional agricultural offices, the total number of vouchers summed to 964,950. This total excludes the number of vouchers received by the six districts on which we have no data. Nevertheless, an estimate of the number of vouchers that each of the districts for which we have no data would have received (based on statistics from other districts in the region) yields a total national number of vouchers that agrees closely with the number expected.

Election results for the 2004 parliamentary and presidential elections were obtained from the headquarters of the Ghana Electoral Commission in Accra. The variables in the dataset include number of registered voters, voter turnout, number of valid votes, political party of each presidential and parliamentary candidate, and number of votes each candidate received. The unit of observation for all of these election data is the constituency level, but the data were further aggregated to the district level. A party is defined as winning a district in the presidential or parliamentary election if it captures a majority of the votes there. It has almost always been the case that the candidate from the NPP or the NDC wins in both the presidential and the parliamentary election. The vote shares of political parties in the parliamentary election, which are reported at the constituency level, are virtually identical to the presidential election results. The analysis therefore focused on presidential election results only. The vote margin between the two dominant parties, the NDC and the NPP, in the presidential election was used as a proxy for electoral competition in the district.

Demographic data such as district population, district area, and percentage of labor force engaged in agriculture were obtained from the 2000 census results published by the Ghana Statistical Services. Measures of poverty used were district-level poverty headcount, poverty gap, and poverty severity developed by Harold Coulombe based on the 2000 census (Coulombe 2005). These demographic and poverty data were disaggregated based on the 110 districts that existed at the time of the census. In the instances where a district had since been split, the data values of the district from which the new districts had been formed were assigned to the new districts.

The area of maize cropped in a district, obtained from the Statistics, Research, and Information Directorate of the Ministry of Food and Agriculture, is used as a measure of district demand for fertilizer. In Ghana, maize is produced and consumed in all agroecological zones and is the food crop that has historically been cultivated on the largest area of land (FAO 2005; Ministry of Food and Agriculture

¹⁶ Data were missing for Bole, Karaga, Nanumba North, and Nanumba South districts in the Northern Region and Amansie West and Builsa in the Ashanti and Upper East regions, respectively.

¹⁷ The author interviewed the accountant in charge of managing the voucher program and the stock keeper in charge of receiving and disbursing vouchers at the Ministry of Food and Agriculture. Additional data were collected until November 17, 2008, by which time the last disbursements had been made.

2009). Additionally, data from an IFPRI/International Fertilizer Development Center (IFDC) census of agricultural input dealers in Ghana confirm the dominant position of maize among crops to which fertilizer is applied.¹⁸ The area of maize cultivated in a district is therefore a reasonable proxy for the demand for the types of fertilizers subsidized.

A summary of the data used in the analysis is shown in Table 1.

Table 1. Summary statistics

Variable	Number of observations	Mean	Standard deviation	Min.	Max.
Number of vouchers ^a	132	7,308	7,093	150	49,550
District population in 2000 ^b	138	137,044	169,386	42,721	1,658,937
Percentage of district labor force engaged in agriculture in 2000 ^b	138	61.91	18.62	3.7	87.2
Farmers* ^b	138	68,351	25,700	12,637	191,944
Vote percentage of ruling government, 2004 elections ^c	138	48.29	20.17	4.24	88.20
Ruling government won district in 2004 elections ^c	138	0.55	0.50	0	1
District area in square kilometers (km ²) ^b	138	1,719	1,792	150	12,955
Doctors per district in 2000 ^b	138	5.55	9.13	1	89
Teachers per district in 2000 ^b	138	600	597.0	54	5,265
Nurses per district in 2000 ^b	138	41.83	91.84	2	959
Enrollment per teacher in district in 2000 ^b	138	44.37	19.48	21.54	110.9
Poverty headcount index ^c	138	0.48	0.18	0.05	138
Poverty gap index ^c	138	0.19	0.11	0.01	138
Poverty severity index ^c	138	0.10	0.07	0.00	138
Maize area cultivated (km ²) in 2007 ^d	138	57.25	58.94	0.70	319.45

Sources: ^a Author's survey; ^b 2000 Population and Housing Census of Ghana. Ghana Statistical Services; ^c Electoral Commission of Ghana; ^d Statistics, Research, and Information Directorate of the Ministry of Food and Agriculture; ^e Coulombe (2005).

Note: All statistics are reported at the district level.

* Number of farmers per district is estimated as the product of the district population and the percentage of the labor engaged in agriculture. No nationally comprehensive district level farmer population data was available.

¹⁸ Vegetables such as tomato, garden egg, pepper, onion, and okro are fed with fertilizers at about the same rate as maize, but the area of each of these crops cultivated is miniscule compared with the acreage of maize.

5. DID POLITICS PLAY ANY ROLE IN THE ALLOCATION OF THE VOUCHERS?

Basic Statistics of Voucher Allocation

Table 2 shows data on vouchers received by districts in each of the 10 administrative regions of Ghana and a ranking of the regions by total number of vouchers to the region, average number of vouchers per district and average number of vouchers available per 1,000 farmers in a district. There was significant regional variation in the number of vouchers a district received. The number of vouchers per district was generally higher in the regions in the northern part of the country. This amount ranged from an average of about 15,000 vouchers per district in the Northern Region to an average of less than 1,000 vouchers per district in the Western Region.

Table 2. Regional voucher allocation

Regions ranked by: Total number of vouchers to region		Regions ranked by: Average number of vouchers per district		Regions ranked by: Average number of vouchers available per 1,000 farmers	
Northern*	206,950	Northern	14,782	Northern	194
Brong Ahafo	193,550	Upper East	11,293	Brong Ahafo	172
Ashanti*	157,500	Brong Ahafo	10,187	Greater Accra	163
Eastern	105,750	Ashanti	7,875	Upper West	147
Upper East*	79,050	Upper West	6,831	Upper East	142
Volta	70,700	Eastern	6,221	Ashanti	105
Upper West	54,650	Greater Accra	5,650	Eastern	97
Central	51,950	Volta	4,713	Volta	89
Greater Accra	33,900	Central	3,996	Central	72
Western	10,650	Western	819	Western	10

Source: Author's survey.

Note: Calculations do not include data for four districts in the Northern Region, two in the Ashanti Region, and one in the Upper East Region.

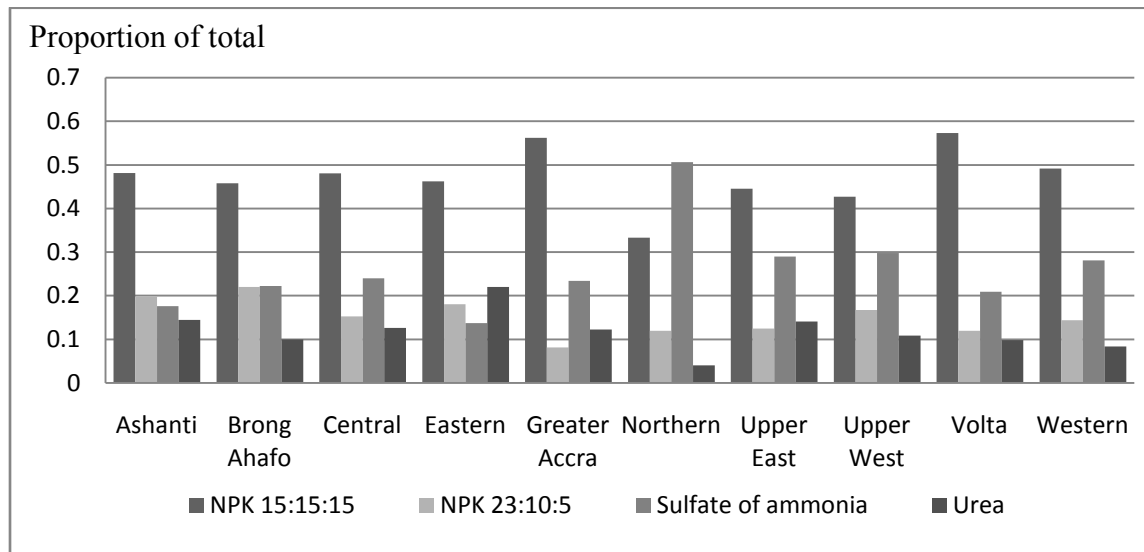
* Total does not include data for some districts in the region.

The approximate number of vouchers available per 1,000 farmers ranged from an average of 200 in districts in the Northern Region to an average of about 10 in districts in the Western Region. Districts in the northern regions of the country generally had a higher number of vouchers available per farmer. The exception is the Greater Accra Region, which is located in the southernmost part of the country but ranks third in terms of the highest average number of vouchers available per 1,000 farmers.

The composition of the total voucher allocation is of interest as the vouchers were fertilizer-specific. The late start of the subsidy program means that discriminating farmers would have preferred the "top dressing" fertilizers like sulfate of ammonia and urea.¹⁹ Figure 3 shows the proportions of the various types of vouchers that made up the voucher allocation for districts within each of Ghana's 10 administrative regions. The data show again that the composition of the vouchers that districts received also varied depending on the region of location. With the exception of districts in the Northern Region, about half of the vouchers districts received were for NPK 15:15:15. In the Northern Region, the majority of the vouchers districts received were for sulfate of ammonia, which would have been highly desirable vouchers.

¹⁹ Apart from urea, which has a recommendation of 50 kg per acre, the recommended application rate of all the other types of subsidized fertilizer is 100 kg per acre. However, urea is typically less preferred among farmers because of the extra labor needed to apply it by burying (Kombiok 2008).

Figure 3. Average composition of fertilizer vouchers received by districts



Source: Author's calculations.

At the regional level of disaggregation, there is too much heterogeneity to determine how political, demographic, agroecological, and agricultural characteristics influenced the distribution. There is clearly a pattern whereby regions in the northern parts of the country received higher numbers of vouchers than those nearer the south. However, even within regions, the amount districts received varied widely.

What Were the Determinants of Voucher Allocations?

Given that vouchers are a form of income support, the distribution of vouchers to districts under a subsidy program is essentially a form of intergovernmental transfer. The district allocation of vouchers was in some sense a measure of the per capita benefits that the central government sought to transfer to the district under the subsidy program. Like any other benefits that can be targeted to specific groups or areas, the vouchers can be tactically distributed to achieve political goals rather than those that maximize economic or welfare outcomes.²⁰ The empirical strategy we employ to test whether political considerations played a role in voucher allocations is to determine whether a district's political characteristics are statistically significant determinants of the number of vouchers it received.

We focus on the district as the main level of analysis for several reasons but primarily because it is the lowest-functioning tier of the decentralized local government structure of Ghana. It is also the most important unit in the political discourse of the country. Much of government activities are concentrated at this level through local government structures called district assemblies.²¹ The district is small enough for there to be considerable homogeneity in the geographic and demographic characteristics of the area it covers. Furthermore, the district is often the lowest level of disaggregation at which demographic, economic, agricultural, and other data are reported.

²⁰ Politically motivated tactical distribution of intergovernmental transfers is typically aimed at maximizing the re-election prospects of the incumbent government.

²¹ District assemblies are formally nonpartisan, but they are always headed by a political appointee of the ruling president. Thirty percent of the assembly comprises appointed members who are also from the political party of the ruling president. The rest of the membership is elected based officially on nonpartisan platforms, but informal party activity plays a major role in the district assembly elections.

The announcement of the subsidy program emphasized its role to support food-crop producers under the burden of increasing fertilizer prices to increase their agricultural productivity. The efficiency of the program would be increased if only demographic, economic, and agricultural activity characteristics of the district are determinants of voucher allocation rather than any political considerations. Under economic efficiency distribution criteria, voucher allocation should be higher to districts with more food-crop agricultural activity and to those with poorer populations among which a subsidy is likely to induce incremental fertilizer use. An econometric specification that would capture the salient determinants of voucher allocation under a purely efficiency-motivated distribution is given by

$$y_i = \alpha_0 + \alpha_1 \text{AREA}_i + \alpha_2 \text{FARMRS}_i + \alpha_3 \text{POVRTY}_i + \alpha_4 \text{ECLGY}_i + \alpha_4 \mathbf{Z}_i + u_i, \quad (1)$$

where y_i is the total number of vouchers received by the district, AREA is a proxy for the agricultural activity in the district and is measured by either the total area of the district in square kilometers or the area of maize that was cultivated in the district in 2007, FARMRS is the number of farmers in the district, POVRTY is a measure for district-level poverty, ECLGY captures district agroecology, and \mathbf{Z}_i is a vector of region-specific dummies. Measures of district agroecology are important because even though the subsidy program started after the optimal fertilizer application periods in all parts of the country, the lateness was more pronounced among districts in the southern parts. A purely economic efficiency basis of distribution may have resulted in vouchers being targeted to districts in the ecological zones in the north. In our regression estimations, ECLGY is captured by the latitude of the centroid of the district. District poverty is measured by the poverty headcount ratio, the poverty gap index, or the poverty severity index. The region dummy variables are included to capture the influence of a district's location on the number of vouchers it receives. They serve as another control for the variation in agroecology and also capture district characteristics correlated with the region of location that are not explicitly controlled for but which could plausibly be determinants in the distribution of vouchers based on economic and welfare efficiency considerations (for example the variety of livelihood opportunities and credit facilities available in the district).

Table 3 shows the estimated coefficients of the regression specification in equation 1. In panel A, the extent of agricultural activity in the district is measured by the number of farmers in the district and the area of maize cropped in the previous planting season. The voucher allocation of the district is increasing in the number of farmers as well as the area of maize cropped. The coefficient estimate suggests that the voucher allocation of the district increases by 6 percent for every additional 10,000 farmers in the district and 0.3 percent for every square kilometer of maize cultivated in the district. The positive coefficients on measures of agricultural activity in the districts suggest that the voucher allocation was at least in part influenced by economic considerations. However, the regression results show that a district's poverty does not influence its voucher allocation in the way that would be expected under a purely efficiency-based distribution pattern. The negative coefficients on measures of district poverty suggest that less-poor districts received more vouchers. Higher voucher allocations to less-poor districts increases the subsidy benefits that displace unsubsidized purchases of fertilizer that would have been made thereby reducing the efficiency of the subsidy program. The coefficients are statistically insignificant, but they show that, at best, a district's poverty was not a primary consideration in its voucher allocation.

In panel B of Table 3, the area of maize cropped is replaced by the total land area of the district as a measure for agricultural productivity. In these regressions as well, the district allocation is increasing in the number of farmers. However, the number of vouchers a district received is decreasing in the total land area versus increasing as would be expected under a distribution pattern based solely on efficiency considerations. However, the coefficients are only marginally significant, and it is possible that total land area is not a suitable proxy for area of food-crop cultivation in a district. As in panel A, the positive coefficients on district latitude show that districts in more northern ecological zones received higher voucher allocation than similar districts in southern ecological zones.

Table 3. Economic determinants of the number of vouchers transferred to each district

Panel A	Dependent variable: Ln (vouchers received)					
	1	2	3	4	5	6
Farmers (10,000s)	0.061 (0.038)	0.061 (0.038)	0.064* (0.038)	0.064* (0.038)	0.065* (0.038)	0.065* (0.038)
Maize cropped (km ²)	3.7e-3** (1.7E-03)	3.8e-3** (1.7E-3)	3.6e-3** (1.7E-03)	3.8e-3** (1.7E-3)	3.6e-3** (1.7E-03)	3.8e-3** (1.7E-03)
Poverty headcount ratio	-0.01 (0.10)	0.07 (0.96)				
Poverty gap index			-1.06 (1.81)	-0.76 (1.70)		
Poverty severity index					-2.13 (2.72)	-1.57 (2.53)
Latitude	0.06 (0.19)		0.10 (0.20)		0.12 (0.20)	
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	7.01*** (1.07)	7.67*** (0.47)	6.94*** (1.07)	7.73*** (0.44)	6.84*** (1.08)	7.72*** (0.43)2
R-squared	0.47	0.47	0.47	0.47	0.47	0.47
Panel B	Dependent variable: Ln (vouchers received)					
	1	2	3	4	5	6
Farmers (10,000s)	0.092** (0.039)	0.092** (0.039)	0.098** (0.039)	0.100** (0.039)	0.100** (0.039)	0.100** (0.039)
Total area (km ²)	-9.9E-5 (6.1E-05)	-9.3E-5 (6.1E-5)	-1.1E-4* (6.2E-05)	-1.0E-4 (6.2E-5)	-1.2e-4* (6.28E-05)	-1.06E-04 (6.18E-05)
Poverty headcount ratio	-0.28 (1.01)	-0.08 (0.97)				
Poverty gap index			-2.04 (1.86)	-1.32 (1.74)		
Poverty severity index					-3.94 (2.83)	-2.61 (2.62)
Latitude	0.155 (0.195)		0.218 (0.201)		0.248 (0.202)	
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	6.83*** (1.15)	7.66*** (0.48)	6.53*** (1.18)	7.73*** (0.44)	6.337*** (1.20)	7.710*** (0.44)
R-squared	0.46	0.46	0.47	0.46	0.47	132

Source: Author.

Note: Standard errors are in parentheses. There were 132 observations in all regressions.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

As has been argued, the pattern of voucher allocation is likely to have been influenced by district political characteristics. To test this, we estimate an augmented version of equation 1 in which we include political characteristics of the districts. The district political characteristics that are expected to matter are informed by theories of redistributive politics. The “core supporter” models of Cox and McCubbins (1986) predict that politicians are like risk-averse investors—they will give fewer transfers (vouchers) to districts where opposition to their party is strong, somewhat more to districts that have not shown a clear preference for one party or the other, and the most to districts that clearly support them. Therefore, if the

voucher allocation was manipulated by the ruling party to target its core supporters, we would expect district voucher allocation to be increasing in measures of ruling party support. We use as a measure of the political support for the ruling party the vote share or the dummy variable for whether it won the district in the last presidential election. This leads to a specification given by

$$y_i = \beta_0 + \beta_1 \text{AREA}_i + \beta_2 \text{FARMRS}_i + \beta_3 \text{POVRTY}_i + \beta_4 \text{ECLGY}_i + \beta_5 \text{INCBsupp}_i + \beta_6 \mathbf{Z}_i + u_i, \quad (2)$$

where INCBsupp is a measure of support for the incumbent party in the district given by the vote share of the ruling party or the dummy variable for whether it won the district in the last presidential election. AREA, FARMRS, POVRTY, ECLGY and \mathbf{Z}_i are defined as in equation 1.

A contrasting set of theoretical models (Lindbeck and Weibull 1993; Dixit and Londregan 1996, 1998) predicts that the district political characteristic that matters is the prevalence of “swing voters,” those voters who can be easily swayed (by transfers) to support one party or the other. That framework implies that politicians will target benefits to districts where there is high electoral competition illustrated by a lower margin between the vote shares of the two political parties. We consider the vote margin between the two parties in the last presidential election and vote margin interacted with the identity of the winning political party as salient political characteristics of the district. A positive coefficient on the vote margin in districts that the ruling party has won also suggests targeting of vouchers to core supporters of the ruling party. However, a positive coefficient on the vote margin in a district that the ruling party lost suggests that vouchers were used for vote-buying, that is, an attempt to curry favor with those who had voted for the opposition party. The specification to test this hypothesis is given by equation 3:

$$y_i = \gamma_0 + \gamma_1 \text{AREA}_i + \gamma_2 \text{FARMRS}_i + \gamma_3 \text{POVRTY}_i + \gamma_4 \text{ECLGY}_i + \gamma_5 \text{INCBwinner} + \gamma_6 \text{VTMARG}_i + \gamma_7 \text{INCBwinner}_i * \text{VTMARG}_i + \gamma_8 \mathbf{Z}_i + u_i, \quad (3)$$

where INCBwinner is a dummy for whether the incumbent party won the district in the previous presidential election and VTMARG is the margin by which the presidential election in the district was won. AREA, FARMRS, POVRTY, ECLGY and \mathbf{Z}_i are defined as in equation 1.

Table 4 shows the results of the regressions based on equations 2 and 3. The regression results were similar using all three different measures of district poverty, and therefore we show only the results from the estimation using the poverty severity index. The regressions show strong evidence that politics of the district was a consideration in the allocation of vouchers.

The coefficients on measures of support for the ruling government in columns 1 through 4 present strong evidence against the hypothesis that the incumbent government targeted its supporters for higher vouchers. The coefficients instead suggest that areas that supported the ruling government were disadvantaged. In the regressions in columns 5 and 6, which include the vote margin as the main political characteristic of the district, the positive coefficients on vote margin are strongly statistically significant and in contrast to the negative coefficients that are expected if vouchers were targeted to areas with high electoral competition. In columns 7 and 8, the vote margin interacted with the identity of the winning party, provides more insights into how political considerations played a role. The coefficients on vote margin in those columns show that vouchers were targeted to districts with higher vote margins but only those districts in which the ruling government had lost. The magnitude of the estimate is 2 percent more vouchers for each percentage point of the votes by which the ruling party had lost the district. The vote margin in districts where the ruling party had won did not influence their voucher allocation.

The evidence in Table 4 suggests that vouchers were used in an attempt at vote-buying. The advantage that opposition-supporting districts had was not only statistically significant but also numerically significant. The average difference between the vote share of the incumbent and that of the opposition party in districts that the incumbent had lost was 33 percentage points. A district that the opposition party had won with this vote margin would have received 66 percent higher vouchers than a similar district that the ruling party had won.

Table 4. Political and economic determinants of number of vouchers received

	Dependent variable: Ln (vouchers received)							
	1	2	3	4	5	6	7	8
Ruling party winner	-0.331 (0.252)	-0.343 (0.239)					0.312 (0.383)	0.104 (0.347)
Ruling party vote share			-0.0137* (0.0080)	-0.0140* (0.0079)				
Vote margin					0.015*** (0.006)	0.014** (0.006)	0.0261*** (0.0089)	0.0218*** (0.0083)
Ruling party winner * Vote margin							-0.0214* (0.0121)	-0.0171 (0.0116)
Farmers (10000s)	0.064* (0.037)	0.064* (0.038)	0.069* (0.038)	0.070* (0.038)	0.060 (0.037)	0.060 (0.037)	0.063* (0.037)	0.063* (0.037)
Maize area (km ²)	3.4e-5** (1.7E-3)	3.5e-3** (1.7E-3)	3.0e-5* (1.7E-3)	3.1e-3* (1.E-3)	4.2e-5** (1.7E-3)	4.4e-3*** (1.7E-3)	3.5e-3** (1.7E-3)	3.8e-3** (1.7E-3)
Poverty severity index	-1.94 (2.72)	-1.80 (2.53)	-2.40 (2.70)	-2.03 (2.53)	-2.35 (2.65)	-1.27 (2.48)	-2.61 (2.65)	-1.40 (2.48)
Latitude	0.031 (0.210)		0.079 (0.200)		0.228 (0.200)		0.278 (0.220)	
Region dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	7.64*** (1.24)	7.96*** (0.46)	7.89*** (1.24)	8.33*** (0.55)	5.93*** (1.11)	7.41*** (0.44)	5.60*** (1.39)	6.26*** (0.67)
Observations	132	132	132	132	132	132	132	132
R-squared	0.48	0.48	0.49	0.49	0.50	0.50	0.52	0.51

Source: Author.

Note: Standard errors are in parentheses.

*** $p < 0.01$. ** $p < 0.05$. * $p < 0.1$.

The inclusion of political variables amongst the determinants of vouchers received by a district did not significantly alter the estimated impact of the economic variables. Across the regressions in columns 1 through 8 in Table 4, the coefficients on the farmers in the districts suggest that voucher allocation in a district increased by about 6 percent per every 10,000 farmers. This is the same estimate as in the economic-variables-only specification. As was the estimate when only economic variables were considered, each square kilometer of maize cropped increased the voucher allocation of the district by 0.3 percent. The impact of district poverty on voucher allocation is unchanged from the economic-variables-only specification - less-poor districts received a higher number of vouchers. The fact that the impact of the economic variables on the districts' voucher allocation is not altered by the inclusion of the political variables indicates that correlation between economic variables and political variables does not drive the statistical significance of the coefficients on the political variables. This is more evidence that political characteristics of districts were considered in the voucher allocation independent of any economic characteristics considered.

6. ISSUES THAT MAY CHALLENGE THE FINDINGS AND INTERPRETATIONS

To reach the conclusion that political considerations explain in part the pattern of allocation of vouchers under Ghana's 2008 fertilizer subsidy program, certain assumptions were made. We discuss the justification for those assumptions and explain why they are not likely to be the drivers of our main finding. We also consider alternative interpretations, other than political manipulation, for why the political characteristics of a district are predictors for its voucher allocation.

Within our analytical framework, we make the assumption that the political goals of the ruling party in the presidential election are manifested in the pattern of allocations at the district level. Even though we discuss vouchers being transferred from the central government to the districts, the process in actuality includes several players who may also have their own political and other motivations (such as economic rents) for distributing vouchers the way they did. However, we argue that in the political context of Ghana, all the players in the chain through which vouchers are transferred from the headquarters of the Ministry of Food and Agriculture in Accra to the district agricultural offices, have incentives that are aligned with the politicians' in the ruling party. The regional allocation is implicitly determined by the number of region-specific vouchers printed. It is reasonable to assume that for reasons such as planning and budgeting, the decision on the number and kinds of vouchers to be printed would have been reviewed by several top-level members of the government. Those ministers and other members of the ruling executive would have been able to influence the regional distribution in a way that supported the political interests of the party through which they had gained their offices.

We showed that the region of location was an important predictor of the number of vouchers a district received. Once vouchers reached the regional agricultural offices, they were distributed among districts based on some discretionary criteria. Again, we argue that at this stage of distribution, any political manipulation would have been in line with the goals of the ruling party. The regional agricultural directors, who either personally or through their proxies decide the district allocation, are de facto political appointees of the ruling government. Any proxy for a regional agricultural director, perhaps the stock keeper or the disbursing financial officer at the regional level, reports either formally or informally to the regional agricultural director. There is therefore no incentive for the regional agricultural directors or their proxy to distribute vouchers in a way that would not meet with the approval of the ruling party. The question remains as to how the wishes of the ruling party were conveyed to the people distributing vouchers at the regional agricultural offices. We do not have an answer that details the mechanism but one can conjecture several plausible scenarios. For instance, there could have been informal verbal directives and unspoken cues to those in charge of allocating vouchers to the districts.

A challenge can be raised to our choice of the total number of vouchers a district received as a measure of the benefit a district received from the voucher program. For starters, the vouchers were fertilizer-specific and some types of vouchers may have been more valuable to farmers than others. There were also different cash supplements for the vouchers depending on which fertilizer was being purchased.²² It is possible that the benefit that districts perceived of their allocation was not just the total number but the composition. We elect to focus on the total number of vouchers because it is the most straightforward measure—any other measure would require a space- and time-varying quantification of how farmers in the districts trade off price versus ease of application, versus type of fertilizer. We are confident that total number of vouchers is at least a good proxy for the benefit that a district received from the voucher program based on anecdotal evidence that farmers were glad to receive any voucher.

A related challenge may be raised to our use of the number of vouchers received by the district, instead of the number of vouchers actually used, as the measure of the benefit to the district. The national-level redemption rates of about 45 percent of vouchers by the conclusion of the planting seasons camouflage remarkably wide variation in regional redemption rates. For example, the redemption rate for NPK 15:15:15 was only 8 percent in the Western Region compared with 69 percent in the Northern

²²The announced subsidized price to farmers in district capitals was GH¢ 26, GH¢ 26, GH¢ 24, and GH¢ 18 for urea, NPK 15:15:15, NPK 23:10:05, and sulfate of ammonia, respectively.

Region (Banful 2009). We argue that the varying redemption rates do not alter our conclusion that the political characteristics of districts played an important role in allocation of subsidy benefits for the following reason. It would have been a considerable coordination- and data-intensive effort for the government to accurately anticipate the voucher redemption rate in each district so that it could ostensibly show support for the district by allocating a higher number of vouchers than the subsidy benefits that they were actually willing to make available to residents of the district. It is possible that due to the late start of subsidy program, lower redemption rates may have been more likely for districts in some agroecological zones than in others. However, anecdotal evidence from our fieldwork suggests that fertilizer shortages of varying severity contributed significantly to the variation in voucher redemption rates. With fertilizer distribution left to the private sector, and minimal data about the agricultural input dealer network, it is unlikely that the government could have known how and when product shortages could hit each district. Without prior knowledge of exactly how the redemption rates would differ across districts, it was not possible for the government to anticipate the number of fertilizer vouchers transferred to district that would actually be used. The total number of vouchers transferred to the district still remains the better measure of how much subsidy benefits the government sought to transfer to the district. It was a reasonable assumption for the government, as we have assumed, that the more vouchers a district got, the more subsidy benefits its residents would receive.

Political manipulation of a transfer program can take many forms, and other dimensions of manipulation exist that we have not considered. In our analysis, we have not broached the timing of the release of vouchers to the district during the subsidy program. It is known that districts did not receive their voucher allocation in one bulk disbursement but on several dates during the subsidy program. Fertilizer application is time sensitive, and a district that received a higher number of vouchers toward the end of the planting season may have been less well off than a district that received a lower number of vouchers but earlier in the planting season. We do not have an accurate record of when districts received their voucher allocation, and so do not consider this in our analysis.

We make the implicit assumption that the number of vouchers available for farmers resident in a district is no more than what was allocated to the district. Our results would be corrupted if in fact the government made allocations to the districts expecting that vouchers allocated to one district could be distributed to residents of another district. That concern is allayed due to the subsidy design, which called for extension agents to distribute vouchers only to farmers within their operational area. Farmers from within the district, in whose interest it was to guard their district allocation fiercely, policed who got a voucher, and it is not likely that there was significant leakage of voucher allocation from one district to another. Furthermore, since any leakage was not explicitly anticipated, the total voucher allocation to the district still remains a measure of the benefits the ruling party sought to make available there.

It can be argued that our main finding—that vouchers were used for vote-buying and targeted to opposition districts—can be explained by other factors based on efficiency considerations. We find this argument highly unlikely. Such efficiency considerations would first have had to be omitted from the economic variables we control for, and second, would have to be perfectly correlated with the vote margin in districts. It is hard to think of any economic efficiency variable that has both of these properties. The estimates on the economic efficiency variables that we did include, such as the number of farmers, the district poverty, and the area of food cropped, were all robust to the inclusion of political variables. It is unlikely then that any other omitted economic variables are perfectly correlated to the political variables of interest.

One could argue that even though the political characteristics of a district are determinants of its voucher allocation, that does not suggest that the ruling party systematically influenced voucher allocations. Perhaps the political manipulation was at the district level, where members of Parliament or other politically influential people at the district independently lobbied for higher voucher allocation. The observed allocation pattern could result if lobbying for vouchers were more aggressively pursued or more successful in districts where the ruling government had lost by a higher margin. This scenario is unlikely as it is in the interest of all incumbent politicians to lobby for benefits for their constituents, especially in an election year. There is no a priori reason to expect that members of Parliament in opposition districts

lobbied more strongly than members of Parliament affiliated with the ruling government. If lobbying was the way in which voucher allocation was determined, it would be more likely for members of the ruling government party to be able to extract more generous voucher allocations from the government instead of the pattern observed. Our interpretation that the political manipulation was orchestrated from the ruling party at the center fits the data and is a more likely scenario.

7. CONCLUSION

Malawi, Ghana, Nigeria, Kenya, Tanzania, and Uganda are just some of the countries in SSA that have returned to large-scale government interventions to promote fertilizer use following a period of liberalization and government exit from the fertilizer sector. This is despite experience from the recent past in which fertilizer subsidy programs were inefficient and placed unsustainably high fiscal burdens on governments. Many of the past programs also suffered compounding inefficiencies caused by distribution of subsidy benefits based on political instead of economic and welfare considerations.

The new paradigm of fertilizer subsidies emphasizes the need for benefits to be targeted to poor smallholders through the use of such mechanisms as vouchers and for subsidy programs to bolster private markets through public–private partnerships in their implementation. These innovations have emboldened the increasing acceptance of fertilizer subsidies as a necessary tool to increase agricultural productivity in SSA. Although such innovations address some of the sources of inefficiency of past subsidy programs, they do not address how to prevent political manipulation of subsidy benefits as was typical in past programs.

In this paper, we employ a unique dataset that provides information about how vouchers, entitling residents to the program benefits, were allocated across districts in Ghana’s 2008 fertilizer subsidy program. The subsidy program incorporated several of the innovations in fertilizer subsidy implementation.

We combine district-level data on vouchers received with election data to determine how the political characteristics of districts affected their voucher allocations. In our empirical analysis, the political characteristics of the districts are captured by variables of relevance in both the “swing voter” and “core supporter” models. We find that political characteristics of the districts are a statistically significant determinant of the number of vouchers received controlling for agroecology and district demographics. However, we do not find that vouchers are targeted to the government supporters as has been the case in some other programs. Rather we find that vouchers are used in an attempt at vote-buying. Higher numbers of vouchers were targeted to districts that the ruling party had lost in the previous presidential elections, and more so in the districts that had been lost by a higher margin. A district received 2 percent more vouchers for each percentage point by which the ruling party had lost the district. This amount is both statistically and numerically significant; a district at the average loss margin for the ruling government received 66 percent more vouchers than a similar district that the ruling government had won. The analysis also shows that contrary to what one would expect under a purely efficiency-based allocation, poorer districts received relatively fewer vouchers.

This evidence suggests that despite innovations in the design and implementation of fertilizer subsidies, political capture, a major source of inefficiency of subsidy programs of the past, remains unresolved. Until viable innovations emerge that prevent political manipulation, the new subsidy programs have the potential to experience at least some of the significant pitfalls of subsidy programs from the past.

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