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Do External Grants to District Governments Discourage Own-Revenue Generation?

A Look at Local Public Finance Dynamics in Ghana

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ABSTRACT

Decentralization is expected to lead to greater efficiency in the allocation of public resources, as subnational governments are said to have better information than central government about the needs for and requirements of public services in their jurisdictions, especially in agricultural and rural areas, where information about rural residents' priorities is more limited. This purported benefit of decentralization rests strongly on the assumption that local governments can in fact exercise fiscal discretion to allocate resources. However, local government budgets are commonly dominated by intergovernmental and external transfers, which are often tied to specific investments, and these at times may not match local government priorities. Thus, local governments' fiscal autonomy may ultimately depend on their ability to generate sufficient revenue internally. Panel data on district governments' public finances in Ghana are used to examine the impact of the flow and size of external transfers on districts' internally generated revenues. The evidence suggests that external transfers crowd out local governments' own revenues, which could potentially result in the loss of equity and efficiency gains associated with decentralization. This result points to the need for a careful review of Ghana's fiscal transfer mechanisms in light of the central government's goal of encouraging districts to contribute to rural development through effective local public spending and public service provision.

Keywords: decentralization; Ghana; inter-governmental transfers; local government; internally generated revenues

1. INTRODUCTION

Since the late 1980s, many countries in Africa have started the process of devolving political, administrative, and fiscal responsibilities from central to provincial and local jurisdictions. The motivations of countries for undergoing such a governance change are varied and include a range of political as well as social and economic factors. Even where political factors have been the main drivers in implementing decentralization, strong financial backing from the donor community has usually been founded on equity and efficiency arguments. One of these arguments is that subnational governments have better information (or can obtain information more cheaply) about the local needs for and requirements of public services, and thus a decentralized system will generate greater allocative efficiency in public service provision (Hayek 1945). Additional theoretical outcomes said to result in improved public service provision in a politically and fiscally decentralized system include greater political competition at the local level, leading to more accountable local governments (Crook and Manor 1998), and greater jurisdictional competition arising from citizens choosing their location on the basis of the quality of services (Tiebout 1956).

These and other arguments rest strongly on the assumption that the fiscal aspect of decentralization in fact results in local governments gaining substantial discretion in allocating public resources to competing economic uses in their jurisdictions. This assumption is germane to the realization of the benefits from decentralization discussed above, since these benefits are all predicated on the notion of local governments as capable decisionmakers, able to act upon information and upon the pressures of political and jurisdictional competition. The empirical evidence on the impact of decentralization of governance shows that many aspects of decentralization (including management of local service provision by local authorities and representation of disadvantaged groups in local government) have had positive impacts on several measures of development, including service delivery outcomes, corruption, accountability, and local business development (see review by Bardhan [2002]). Other studies also show negative association between fiscal decentralization and local economic growth (e.g., Zhang and Zou 1996). In general, decentralization can lead to less efficient or less equitable allocation of resources due to elite capture, fiscal disparities, social unrest, and weak local government capacity, among other reasons (see, for example, Bardhan and Mookherjee 2006; Prud'homme 1996; Alemán and Treisman 2005).

In practice, in many developing countries—as in the case of Ghana, which this paper focuses on—local fiscal discretion may be very restricted in the sense that local authorities may have relatively little control even over their own budgets. A substantial share of their revenues is often made up of transfers from upper tiers of government or from donors, and these funds tend to be formally or informally tied to particular activities, projects, or sectors (see, for example, Crook 2003; Ghana 2007; Kokor and Kroës 2000; ISODEC 2005). Revenues that local governments generate themselves, through the tax and fee bases assigned to them, can, in contrast, be used in a completely flexible manner. In this sense, local governments' fiscal autonomy is intimately tied to their ability to generate own resources.

Therefore, an important part of the policy debate around decentralization concerns the question of how local governments can expand their fiscal autonomy by increasing their internally generated funds (IGF) and realize the hypothesized equity and efficiency gains in the local provision of public services. In Ghana, there are a range of potential constraints affecting the ability of district assemblies—the term for Ghana's district-level governing bodies—to expand their IGF. These include incentives that are explicit or implicit in the pattern of intergovernmental and donor transfers, the scope of local governments' revenue assignments, revenue collection capacity, discretion in setting rates on their tax and fee bases, and enforcement of honest revenue-collection practices.

This paper focuses on the first aspect of the potential constraints to expanding IGF, by investigating what impact the flow and size of grants (i.e., central government and donor funds) have had on the incentives of local governments to generate own revenues. With grants comprising the bulk of local governments' total revenues, the incentive effect that grants have on local governments' own

revenues is a critical policy concern in Ghana. The recent Decentralization Policy Review, conducted jointly by the government and donors in Ghana to inform the development of a new decentralization policy by the cabinet, states that

> although the DACF [District Assemblies Common Fund] formulae contains [sic] a small incentive to improve on IGF (very small criteria weight for the so-called 'responsiveness' factor), this is not perceived sufficient to promote improvements in the MMDA [Metropolitan, Municipal, and District Assembly] revenue mobilisation. As indicated in a report from 2000, the incentives to collect revenues may be impacted negatively by the increase in grants. Further studies of this and of the real MMDA revenue potential within the existing legal framework is urgently required. (Ghana 2007)

Research on the crowding effects of IGF by grants is important in at least two ways with regard to how grants, and local revenue generation, may be improved to minimize any negative impacts. Crowding out of IGF by grants will result in the loss of equity and efficiency gains in the local provision of public services to the extent that IGF and grants are not substitutable in terms of local priorities, *ceteris paribus*. Then, local participation in all stages of external project design, implementation, and monitoring and evaluation, for example, would help match the priorities of external funders with local priorities. Even if IGF and grants are substitutable, there can still be erosion of gains to the extent that the unit costs of raising and accounting for IGF and grants differ. In this case, finding ways to reduce costs will be important.

In the next section, we present our conceptual framework and a review of the empirical literature on how external grants, as well as other factors, may affect local revenues. This is followed in Section 3 by an outline of the policy and empirical context for this study, and a discussion of district governments' revenue structure and degree of fiscal autonomy. Section 4 describes the empirical model for determining the effect intergovernmental and external transfers have on districts' incentives for generating own revenues, followed by the empirical results in Section 5. The final section summarizes and offers conclusions.

2. DETERMINANTS OF LOCAL GOVERNMENT REVENUE GENERATION

Whether motivated by policy concerns with regard to how local government fiscal behavior contributes to evolving decentralization, by the benefit incidence of local taxes, or by other factors, the literature has taken an interest in the question of how local tax-generation efforts and revenues respond to intergovernmental transfers. Nearly all quantitative empirical research on this topic, however, involves developed economies, likely due in large part to the scarcity of data on local public finance in developing countries (an "issues" piece for the developing-country context is offered by Bird and Smart [2002]).

A common conceptual foundation for the pathway through which external grants affect local revenues is the median-voter model. Applied in this context, the hypothesis is essentially that grants from upper-tier governments crowd out revenues from local taxes. Assuming an initial optimal balance between local public consumption and private consumption, grants would be passed on to local residents as reductions in local taxes and fees, other factors remaining unchanged (Bradford and Oates 1971).

Several studies using data from developed countries have empirically tested this hypothesis without necessarily explicitly using a median-voter model or laying out the conceptual foundation for how grants may trigger local fiscal behavior. For example, Zhuravskaya (2000) establishes such a crowding-out effect in Russia, where each monetary unit raised in own revenues by a local government is offset by 0.9 units in revenue sources from the higher-tier government, which strongly implies that local governments will have nearly no incentive to exert any tax-generating effort when transfers increase. Wildasin (1984) theoretically examines the pathway of impact of different types of intergovernmental transfers (matching grants versus lump-sum grants) on local taxes.

Buettner and Wildasin (2006) take an integrated approach in which all interrelationships between various local public finance variables—general expenditure, debt service expenditure, intergovernmental grants, and own revenues—are assessed, with minimal imposition of structure on the empirical model. They find that in the United States the adjustment of local governments to an increase in external grants results in reduced subsequent own-revenue generation—a finding broadly consistent with the above hypothesis. In a similarly empirically oriented study, Dahlberg et al. (2007), who focused on econometrically addressing the potential endogeneity of grants, find neither a crowding-in nor a crowding-out effect of intergovernmental transfers on local tax rates, nor on local tax revenues. One of the few studies that refutes the above hypothesis and identifies a positive (crowding-in) effect of higher-tier government aid to local governments on locally generated revenues is the study by Skidmore (1999) on U.S. state and local governments, in which the grants are a control variable and the central issue is the effectiveness of statutory revenue and expenditure limitations in reining in local government size.

Local revenues can also be affected by several factors other than intergovernmental grants. These include other fiscal variables, political economy factors, and other factors that may affect the tax revenue base and the capacity to collect taxes, such as the socioeconomic and demographic characteristics of the jurisdiction of the local government. Regarding the influence of other fiscal factors, Skidmore (1999) and Dye and McGuire (1997) consider how effective an Illinois tax limitation measure was in controlling municipality property taxes. Another important fiscal factor is local expenditures. Using a vector autoregression model on U.S. municipal governments, Holtz-Eakin, Newey, and Rosen (1989) tackle this question by concurrently thinking through the causality and the time-sequence nature of these two variables. De Mello (2002) seeks to measure the effect of local public spending in Brazil on economic growth, by proxying the latter by local per capita tax revenue. Another fiscal policy driver of local own-source revenue that has also been studied is federal deductibility of local taxes (Holtz-Eakin 1992).

Political economy determinants of locally generated revenues have been the subject of much empirical research, again almost exclusively involving industrialized countries. Partisan politics, and the political structure of local government, is considered to be a potentially important influence on local tax and revenue generation. For example, Allers, de Haan, and Sterks (2001) in the case of the Netherlands, and Borge and Rattsø (1997) in the Norwegian context, establish that the political ideology of government influences the level of local taxation: the more left-leaning the government, the more taxation. However,

the studies' findings diverge with regard to the effect of government structure: Larger coalition governments (as opposed to smaller coalitions or one-party governments) are associated with lower taxation in the Dutch context, but with higher tax revenues in the Norwegian case. Solé-Ollé (2006) combines government ideology with the degree of competitiveness of elections to examine hypotheses from two alternative models in the empirical context of Spain. According to the Leviathan hypothesis, governments that face lower levels of competition are more likely to expand government size and extract higher taxes, irrespective of the government's ideological makeup, while the partisanship model proposes that less competition results in higher (lower) tax revenues if the government is more left (right) wing, as less competition implies that the government is less compelled to trade off its own preferences against those of the median voter (Brennan and Buchanan 1980; Boyne 1994).

Natural, socioeconomic, and demographic factors in the jurisdiction of the local government are additional potential determinants of locally generated revenues, especially factors that determine the tax revenue base and the capacity of the local government to collect taxes. Although tax rates and revenue-generation assignments are likely to be the same across different jurisdictions, differences in the above factors will have different effects on the amounts of revenue generated by local governments. For example, jurisdictions with larger deposits of natural resources are more likely to generate greater local revenues through royalties from mining or extraction of the natural resources. The same is likely to apply to jurisdictions with greater nonfarm economic activity and more private residences, through more collection of business license fees, which are mostly levied on firms, and of property taxes, which are levied on private residences. As local residents may to some extent have a say in the level and variety of taxes instituted, the social composition of the jurisdiction along ethnic, religious, or other social lines is another potential factor, although the direction of impact on local revenue generation is ambiguous and likely highly context-specific.

3. DATA AND EMPIRICAL CONTEXT

The analysis draws mainly on three sources of data. At the core is a relatively long panel of data on Ghanaian local governments' public finances, obtained from the Ministry of Local Government, Rural Development, and Environment (MLGRDE). Districts' revenues are available disaggregated by source (revenues from licenses, property taxes, external grants, etc.), and districts' expenditures are disaggregated by economic classification (expenditures on personnel, travel and transport, capital, etc.). The panel spans 11 years (1994–2004) and covers all of Ghana's 110 districts existent at the time of the study.[1]

The other two main sources of data are Ghana's 2003 Core Welfare Indicators Questionnaire (CWIQ) survey and the 2000 Population and Housing Census, which are used primarily to identify district socioeconomic and demographic variables. The CWIQ has a sample size of over 49,000 households and the data are representative at the district level, enabling aggregation of household information to the district level. The Population and Housing Census data, which are representative below the district level, also allow aggregation to the district level. In addition to data from these three primary sources, this paper also draws on data on central government aggregate public expenditure accounts from Ghana's Ministry of Finance and Economic Development and the Controller and Accountant General's Department; data on the District Assemblies Common Fund (DACF), which were obtained from the DACF Administrator's Office; and district-level rainfall data from the Meteorological Services Department.

Locally generated revenues make up only a small, but not negligible, fraction of district assemblies' (DAs') total sources of funds. On average, they constituted 16 percent of total district government revenues over the decade from the mid-1990s to the mid-2000s. This share has not been uniform over time, and the direction of change is surprising. There has been a gradual decline in the IGF component over a decade, from 46 percent in 1994 to 10 percent in 2004. This is not what one would expect in light of consistent, albeit only partially successful, efforts to deepen decentralization in Ghana, including efforts to strengthen the fiscal position of district governments.

In the initial period of Figure 1 (i.e., 1994), internal revenue sources were nearly equal to external funds. This is a feature of the fact that the DACF, which is the main vehicle for intergovernmental transfers, commenced in 1994, and although the constitution stipulated that 5 percent of central government revenues be allocated to the districts in the form of the DACF, it is likely that the financial management infrastructure to disburse the DACF was not yet fully in place in its first year.

[1] After 2004 an additional 28 districts were created by splitting some larger districts, and further splits in 2007 resulted in the current 168 districts.

Figure 1. Components of districts' revenue: internally generated funds (IGF) and external funds

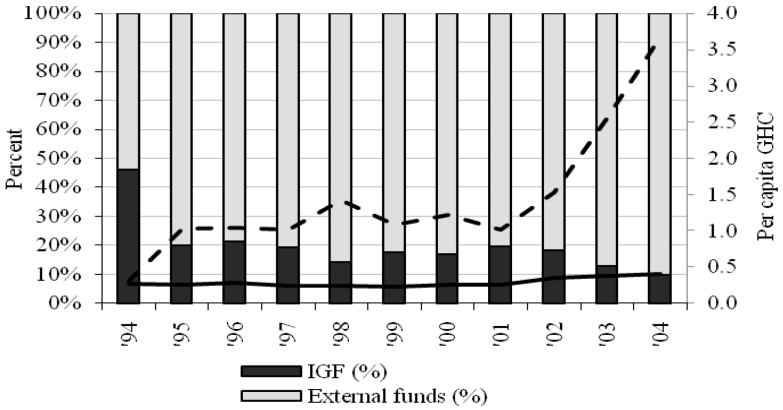


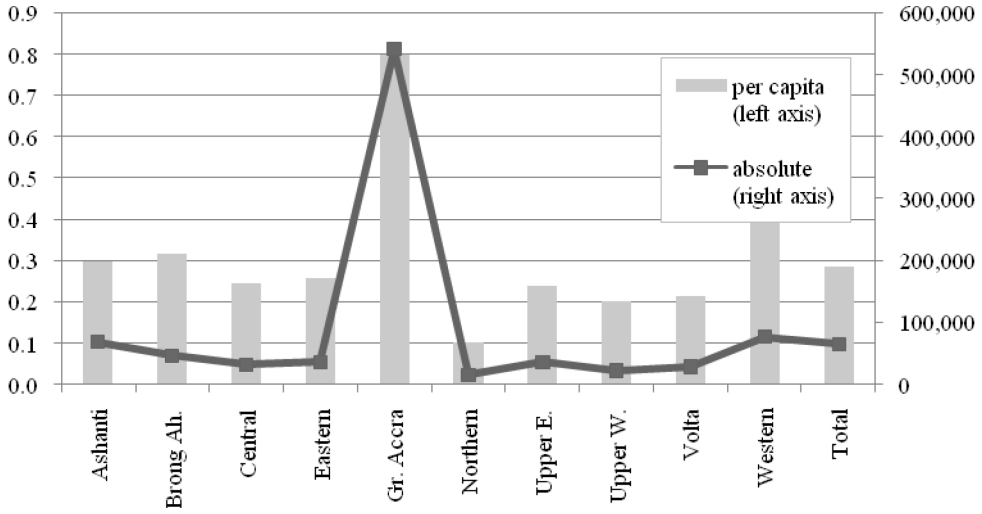
Figure 1 suggests how trends in external and internal revenue sources contributed to the decline in the share of IGF. As the lines (which are measured along the right axis) show, IGF over time was nearly flat, while external funds grew precipitously, especially in 1995 and then again in more recent years. The regional trends of IGF and external transfers, interestingly, closely mirror their aggregate in Figure 1. Per capita IGF is low and flat over time in nearly all regions, and the flow of transfers takes on a trend of rapid increase in the first year and the last few years (see figures in the Appendix).

The relatively low growth in internal revenues and higher growth in external sources of funds for district governments is somewhat suggestive of the greater ease with which transfers and donor resources can be used to increase district governments' budgets, compared to seeking to achieve this goal by incentivizing and strengthening the capacity of DAs to generate more own revenues. In fact, it is mostly in more recent periods that there has been greater policy attention to the low level and stagnation of IGF, as opposed to a sole focus on increasing external transfers to DAs as a means of deepening fiscal decentralization.

As Figure 2 shows, in per capita and absolute terms, the magnitude of average local government-generated revenue is quite small. On average, local governments collect 65,000 GHC of their own revenues annually.[2] In all years in the decade of study, the regional averages of districts' IGF are all under approximately 250,000 GHC. The exceptions are the districts in the Greater Accra region—the highest-income region, dominated by Ghana's capital, Accra—which generate about 5 to 10 times the local revenues of districts in other regions. In per capita terms, IGF amounts to 0.29 GHC per person in the average district. As discussed above, this has not changed substantially over time. IGF increased by less than half, from 0.27 GHC in 1994 to 0.40 GHC a decade later.

[2] 1 GHC (Ghanaian cedi) was approximately equivalent to US$0.69 in 2009.

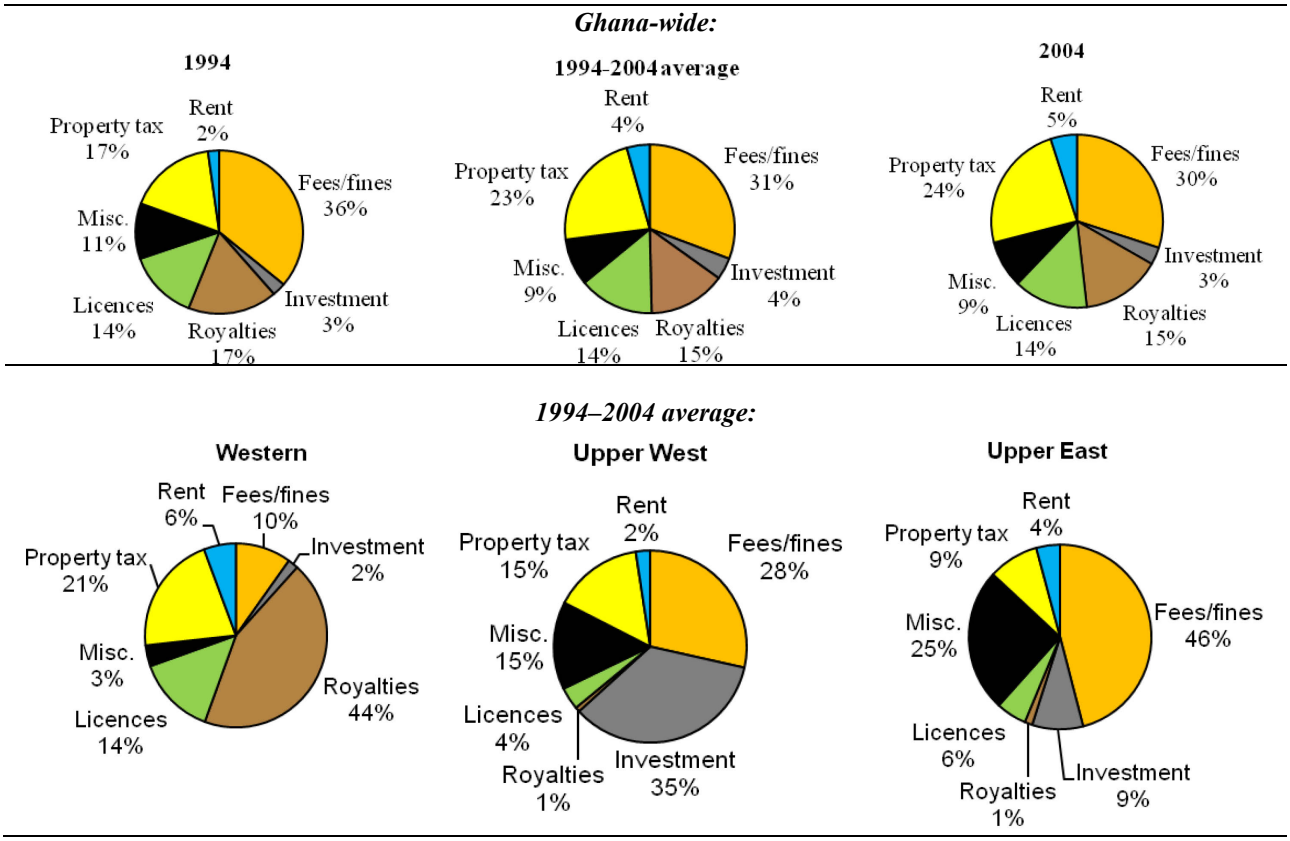
Figure 2. Absolute and per capita amount of districts' internally generated revenues (1994–2004 average, real GHC)



District governments have seven key sources for generating own revenues: property taxes; a head tax levied in a fixed amount from each district resident; royalties from natural resources such as timber and minerals; a range of fees and tolls, such as those charged on market stalls; business licensing; returns from financial investments (e.g., dividends and interest rate earnings on financial capital); and rent collected on DA-owned properties. In contrast, central government has control over all income taxes.

As seen in the top panel of Figure 3, local governments' revenue portfolio has generally not changed substantially over time, and is, in the aggregate, relatively diversified.

Figure 3. Components of internally generated funds



Still, there are some sources that tend to predominate on average, such as fees (e.g., market stall user fees and parking tolls) and property taxes. Business licenses and permits, and royalties on natural resources, generate a somewhat smaller portion of revenues. Revenue from financial capital, and from rents collected on buildings owned by the DAs, play only a minor role in generating revenue. However, the nationwide relative diversity of local revenue portfolios hides the stronger concentrations visible at the regional levels. The bottom panel of Figure 3 uses the example of three regions in which one revenue source constitutes over one-third of the districts' IGF, with the dominant source differing across these regions. For example, the Western region, which is very rich in timber and mining resources, relies on royalties from natural resources to generate 44% of local revenues (well above the national average of 15%).

The effectiveness of the incentives explicit or implicit in central government and donor grants depends not only on the strength of these incentives but also on the extent to which there is potential to increase internal revenues. Three factors play a role in this potential: first, the extent to which, given the revenue assignments, DAs have discretion in setting rates for taxes and fees; second, the extent to which the revenue-collection effort is constrained by administrative capacity and internal incentives (e.g., compensation design to improve local tax officials' efforts and prevent leakages); and finally, the extent to which extending tax and fee collection either through greater efficiency or higher tax and fee rates encounters the resistance of residents.

The discretion to set tax rates and fees on DAs' revenue bases is reasonably large: With the exception of royalties, for which the central government determines the rates, DAs are permitted to establish the rates and fees on all other revenue sources assigned to them, albeit given ceilings set by

central government (primarily through the MLGRDE).[3] However, even these ceilings have de facto not always been treated as binding: Given that the current ceilings have for the most part not been recalculated for over a decade, there are several instances in which DAs have in practice exceeded them. While autonomy in rate setting is thus not a binding constraint to the potential impact of external incentives for increasing revenues, DA capacity to tap into certain revenue sources does constitute a limitation, especially at the level of the revenue collectors. Ghana (2007) even suggests that the districts' revenue-mobilization capacity is one of the weakest among the various aspects of local financial management. Finally, political resistance to local tax increases is likely to be an issue in Ghana, where local revenue assignments make IGF a relatively visible form of tax, in contrast to income taxes deducted at the source. Such resistance, combined with the fact that the local nature of the spending of these revenues creates greater transparency about the quality of these expenditures, may, however, contribute to more judicious use of these public resources, even where it will likely pose a constraint on the size of local revenues (ISODEC 2004).

Local fiscal autonomy is typically associated with the size of local governments' budgets. That is, the larger (relative to total public spending) the local governments' expenditures, the more one can speak of local fiscal autonomy. While this is true in Ghana as well, in this country's context the issue of fiscal autonomy is, given the prevailing fiscal constellation, just as intimately tied to the relative size of internally generated revenues in districts' revenue portfolios. Nearly all transfers as well as donor finances that are channeled to district governments are more or less narrowly tied to specific types of expenditures or to the implementation of projects. The one revenue source over which districts exercise full discretion—subject, naturally, to limitations arising from specific local expenditure assignments—is internally generated revenues. Therefore, the capacity, legal framework, and incentives that govern own-revenue generation also determine the extent of local governments' fiscal autonomy.

As Figure 1 showed, local governments rely heavily on central government and external funds, as is common in nearly all decentralized countries in Africa. An important component of these funds is the DACF, which makes up slightly more than half of all external sources of revenue. Intergovernmental transfers also include "ceded revenues," which are revenues collected by the central tax agency on behalf of DAs. The transfer of ceded revenues, terminated in 2005, was a more important source of funding in the early years of decentralization, especially before the institution of the DACF. After the introduction of the DACF, ceded revenues played a smaller role in local governments' budgets, and their disbursement was often unreliable in timing and magnitude (Ghana 2007).

A more recently instituted (and by 2006 ended) grant is the Heavily Indebted Poor Countries (HIPC) fund, commenced in 2002 and allocated both to central government ministries as well as to DAs. As Table 1 shows, it constitutes a nonnegligible share of DAs' revenue. The HIPC funds to the districts have allocation criteria, earmarks, and reporting formats that are distinct from those of other sources. There is a lack of clarity on the allocation criteria, however, and therefore it is not clear whether there are explicit incentive mechanisms for districts to develop own sources of revenue.

Donors also have district-specific projects, the funds for which they either channel through the DAs' budgets or maintain off budget. Several districts may not have donor projects for which the funds go through the DAs, but for those that do, donor funds can be a substantial share of revenues. Table 1 captures only such on-budget district donor funds, as data are not available for off-budget external aid to districts.

[3] While DAs can set property tax rates, the revaluation of taxable properties—proper implementation of which would be likely to increase property taxes accruing to DAs—is undertaken by the Land Valuation Board, which is not under the control of the DAs and itself lacks the capacity to execute this task.

Table 1. Average district revenue in 2004, by revenue source

Region	External sources (% of total)					Internal (% of total)	Total (2000 constant GHC)
	Central government			Donor funds*	Total external	IGF	
	Salary transfers	HIPC	DACF				
Ashanti	7.6	18.8	38.4	19.5	84.3	15.7	653,975
Brong Ahafo	13.1	21.6	47.1	7.5	89.3	10.7	471,750
Central	8.1	27.7	50.4	6.0	92.2	7.8	491,149
Eastern	11.1	17.9	51.3	6.2	86.5	13.5	365,634
Greater Accra	11.1	18.1	20.9	0.7	50.9	49.1	1,604,321
Northern	5.1	20.0	65.7	6.5	97.2	2.8	600,811
Upper East	6.6	15.6	41.9	27.7	91.8	8.2	591,765
Upper West	3.3	30.9	36.9	22.8	93.9	6.1	759,999
Volta	6.7	34.3	44.9	6.3	92.1	7.9	489,934
Western	6.8	26.9	41.6	2.1	77.4	22.6	633,756
Ghana	8.1	22.6	43.5	9.8	84.0	16.0	593,781

Notes:

DACF = District Assemblies Common Fund; HIPC = Highly Indebted Poor Countries; IGF = internally generated funds

*While HIPC funds also originate from donor resources, they are disseminated by the central government and thus here reported separately from other donor funds. This category refers to resources from donors going directly to districts.

Despite the attention in the fiscal decentralization policy debate that is given to increasing local fiscal autonomy, the framework for the allocation of intergovernmental transfers and donor funds to the DAs gives only very limited consideration to incentives for own-revenue generation. The DACF is the only outside revenue source that has a built-in incentive scheme, through the formula for its allocation to districts. The allocation formula gives weight to four criteria: (a) equity across districts, which refers simply to a base sum distributed in equal amounts to each district; (b) population density; (c) service pressure, relying mostly on the number of existing facilities and service providers in the education and health sectors; and (d) own-revenue generation. In the weighting scheme for these four criteria, the last criterion receives only 3–5 percent weight for most of the years, as can be seen in Table 2.[4] Thus, the incentive component of the DACF is very weak and appears a priori unlikely, on its own, to have much potential for substantial impact.

[4] The allocation formula is set by the DACF administrator and then annually ratified by parliament, and therefore changes slightly from year to year.

Table 2. Formula weights for criteria for District Assemblies Common Fund (DACF) allocation (%)

Criterion	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Equity	30	30	30	30	35	35	35	35	35	35	60	60	50	50
Population density	15	15	15	15	10	10	10	10	10	5	3	2	5	5
Service pressure	35	35	35	35	35	35	40	40	50	55	35	35	40	40
Own-revenue generation	20	20	20	20	20	20	15	15	5	5	2	3	5	5
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: DACF, various years; Banful (2008).

4. EMPIRICAL APPROACH

The long panel dataset on local governments' finances in Ghana permits us to assess empirically the extent to which revenues received externally have spurred or disincentivized local governments' internal revenue generation, with internal revenues being nearly the sole source of fully discretionary expenditures by districts.

Financial and Nonfinancial Determinants of Districts' Own Revenues

The first model examines the drivers of the magnitude, or level, of IGF, which is hypothesized to be affected by both public financial variables and core district characteristics:

$$\ln(IGF_{it}) = \ln(EXT_{it-1})\,\delta + \ln(\boldsymbol{EXP}_{it-1})\,\gamma + \boldsymbol{x}_i\boldsymbol{\beta} + \boldsymbol{R}_i\lambda + \eta_i + \varepsilon_{it} \quad (1)$$

$EXT_{it\text{-}1}$ represents lagged external (central government and donor) transfers to local governments. The expenditure vector $\boldsymbol{EXP}_{it\text{-}1}$ consists of different types of past expenditures of local governments. The vector $\boldsymbol{x}_i$ is made up of basic economic, demographic, social, and climatic characteristics of district i (and includes unity). Specifically, economic features, reflecting economic welfare and development, are the district poverty rate, the literacy rate, and average access to roads by households in the district; demographic district attributes include the degree of urbanization and population size and density; variables defined as the shares of Ghana's two largest ethnic groups (Akan and Ewe) and Christians in the district represent core social characteristics; and climatic conditions are measured by district rainfall. The region dummies $\boldsymbol{R}_i$ control for region-specific effects. Finally, the composite error term $\eta_i + \varepsilon_{it}$ consists of a district unobserved effect and an idiosyncratic disturbance (see Table 3 for a more detailed description of the variables and their summary statistics).

In including the district characteristics, we are also accounting for the factors—not the central question in this study, but important to take into account—that may influence the size of district IGF through mechanisms other than the incentive effects of external grants and transfers. These mechanisms were discussed in Section 2. For example, local governments' tax and fee bases define an approximate upper bound to how much revenue they can collect. The tax bases in turn are strongly determined by the income levels of the district population, and by district governments' revenue assignments. While data are not available on income levels, districts' poverty levels, included in the model, offer a rough proxy to this. Revenue assignments are naturally the same across districts. But districts with different attributes will have narrower or more expanded tax and fee bases, for the given (universal) revenue assignments. For example, licenses, which are mostly levied on businesses, and property taxes, which are levied on private residences, are predominantly generated in urban areas. Because the extent of urbanization of a district is thus strongly correlated with the relative importance of these revenue sources in the overall IGF portfolio, inclusion of urbanization in the model reflects this dimension of revenue assignments.

Table 3. Variable definition and district-average descriptives

Variable	Description	Mean	Standard deviation
Socioeconomic and physical district characteristics[a]			
sh. urban	Proportion of urban residents	0.30	0.22
pop. density	Persons per km^2 land area	155.61	391.84
pop. size	Population size in 1,000s	171.93	188.76
poverty	Headcount poverty rate[b]	0.47	0.17
rain	Long-term annual rainfall, in mm	1304.81	225.83
no road	Share of households with road not / not easily accessible all year round	0.19	0.16
literacy	Literacy rate	0.50	0.19
Christian	Share of Christian residents	0.66	0.24
ethn. Akan	Share belonging to the Akan ethnic group	0.47	0.35
ethn. Ewe	Share belonging to the Ewe ethnic group	0.13	0.23
R	Vector of region dummies		
*Local public finance variables (all in per capita form, constant 2000 values, GHC * 10,000)*[c]			
REV	Vector of revenue components		
IGF	Internally generated funds		
EXT	Revenues from external sources (central government and donors)		
EXP	Vector of expenditure components		
Personnel-E	Personnel expenditure		
Recurrent-E	Nonpersonnel recurrent expenditure		
Capital-E	Capital expenditure		

Notes:
[a] Unweighted averages across districts. [b] Based on data from the 2003 Core Welfare Indicators Questionnaire and the 2000 Population and Housing Census, drawn from Coulombe (2005). [c] Detailed descriptives on local public finance variables are in Table 1 and Appendix Table A.1.

The vector of public expenditure variables, $\boldsymbol{EXP}_{it\text{-}1}$, consists of an economic decomposition of local government spending into personnel, nonpersonnel recurrent, and capital expenditures. This decomposition has an *a priori* rationale: While internally generated revenue in Ghana's districts for the most part can be spent at the discretion of local governments, it is more often than not used to cover maintenance and other (nonpersonnel) recurrent costs. Since the DACF, an important part of intergovernmental transfers, is supposed to be used primarily for capital investment spending, IGF is frequently not allocated for capital investments, in order to maintain a desirable balance between capital and recurrent expenditures. Some share of salaries is paid through IGF. But as the administrative dimension is perhaps the least complete of the three dimensions of decentralization in Ghana, most civil servants, including those operating at the district level, are still under the management of and compensated through the budget of the central government. This places a check on the extent to which district government revenues, especially IGF, are used for salary expenditures. All this suggests that changes in different types of expenditures may be likely to exert quite different influences on subsequent efforts in local own-revenue generation, and that this differentiation in influence should be accommodated in the empirical model.

We estimate equation (1)—and variations of it in terms of specification and measurement of the dependent variable—using as the primary method the Hausman-Taylor estimation (Hausman and Taylor 1981). This approach addresses limitations that would arise with both random-effects and fixed-effects estimations in the context of this model. Within-group estimation is not able to identify the time-invariant variable $\boldsymbol{x}_i$, which, while not central to the core research question of this paper, is nevertheless of interest. Random-effects models, in contrast, assume that all covariates are uncorrelated with the unobserved

effect η_i, which, if false, leads to inconsistent estimates, and such orthogonality is a stronger assumption than we are willing to impose. In particular, one should be concerned that the overall amount of external grants and transfers local governments are able to attract may plausibly be influenced by a range of district (and district leadership) features that we are not able to capture in our model. This is likely to include a district's political history, especially features that contribute to political connectedness with the central government, as well as the ability and capacity of local governments to draw resources from donors and other sources. We therefore treat the magnitude of external grants and transfers as endogenous in the model, in the sense that it may be correlated with district unobserved effects.

The Hausman-Taylor estimation approach builds on the within-estimators of the time-varying variables, and uses those (included) time-varying and time-fixed variables that are assumed to be uncorrelated with the unobserved effect to instrument for those variables that are potentially correlated with the district effect. The Hausman-Taylor estimates will be compared with those estimates that use the methods the Hausman-Taylor estimation is partially built on—random effects and fixed effects—as well as with pooled ordinary least squares, by way of gaining additional insights into how the respective underlying assumptions of the different methods affect the key results.

Local Financial Dynamics and Growth in Own Revenues

The model in equation (1) examines the drivers of the *levels* of per capita own revenue. This is a useful exercise in that it gives first insights into what may be the core determinants of the extent of a district's fiscal autonomy, which is well approximated by the magnitude of IGF. This empirical endeavor, however, also has some limitations, of both a substantive and a technical nature. First, the level or magnitude of own revenues may feed back to affect districts' economic performance, and thus poverty. This concern in fact does not weigh too heavily, in light of the fact that own revenues are still small relative to districts' overall budgets, and in turn districts' budgets are small relative to the total government spending affecting a given district. Furthermore, any causal line from a district's overall economic performance to district poverty levels can be complex and is not straightforwardly given. Still, the level estimation is saddled with this (albeit mild) endogeneity concern.

Another source of endogeneity to be concerned about, which the model in equation (1) may have mitigated but may fail to eliminate, is that the association between local public spending categories and IGF may be at least in part driven by a budget-size effect: Districts with larger budgets spend more, and budgets are larger when one of the revenue sources (e.g., IGF) is larger, all else being equal. This possible element of simultaneity bias is mitigated in the level equation (1) by using the levels of past, rather than contemporaneous, expenditures as regressors. However, the use of lags in this fashion is usually an incomplete answer to simultaneity bias. Using changes, rather than levels, in the dependent variable deals with this potential endogeneity.

Finally, IGF levels—as opposed to changes in IGF—rely overly on district fixed (or slow-moving) attributes, besides local financial variables. Generally, poorer districts, districts with less administrative government capacity, and so on are conceivably able to generate less own revenue per capita than their more developed counterparts, and these effects may be quite strong relative to the effects emanating from financial variables, such as higher or lower intergovernmental grants. In other words, a better way to ascertain the influence of external grants on internal revenue generation is to consider how *changes* in IGF are affected by revenues from external sources. While the level of a given district's per capita IGF is expected to depend importantly on its nonfinancial attributes, as illustrated above, the growth rate of IGF is less obviously reliant on such factors, and we can concentrate our analysis on local public financial factors. Also, in econometric terms, this frees us to apply estimation methods that are appropriate for the case at hand but that are not able to estimate time-invariant factors.

The model of IGF growth is then:

$$\Delta[\ln(IGF_{it})] = \alpha + \ln(\boldsymbol{EXP}_{it-1})\gamma_1 + \Delta\ln(\boldsymbol{EXP}_{it-1})\,\gamma_2 + \ln(\boldsymbol{REV}_{it-1})\,\delta_1 + \Delta\ln(\boldsymbol{REV}_{it-1})\,\delta_2 + \eta_i + \varepsilon_{it} \quad (2)$$

We allow here for both changes and levels of financial variables to determine IGF growth. With respect to the variable of interest, this implies that we are testing whether districts with higher levels of per capita external transfers and grants experience higher (or lower) IGF growth, and also whether past *increases* in external grants (for a given magnitude of per capita grants) have an IGF-growth boosting or dampening effect.

This model also permits examination of the way different districts' locally generated revenues evolve relative to each other. Specifically, the parameter on the lagged level of local revenues speaks to the nature of convergence (or divergence) of districts' local revenues over time. This specification also introduces a dynamic component, since the variable vector $\Delta \ln(\boldsymbol{REV}_{it\text{-}1})$ includes $\Delta \ln(IGF_{it\text{-}1})$. We thus estimate the model (for those specifications including the lagged dependent variable) using the Arellano-Bond (1991) and the Arellano-Bover (1995) / Blundell-Bond (1998) dynamic estimators. The latter estimator has an advantage over the former in terms of the finite sample means and asymptotic efficiency of the estimator for the lagged dependent variable's parameter, in cases where the true (absolute) value of the parameter is relatively large and the time-series in the panel relatively small. A comparison between the results from these two estimators—as well as other estimators suitable in the case of variations on the model specification—will be presented and results discussed in this light.

5. ESTIMATION RESULTS

Determinants of the Magnitude of IGF

Prior to examining the role of financial transfers and other local government financial factors on districts' own-revenue generation, we first take a look at the relationship between own revenues and core district physical, social, and economic characteristics (Table 4).

Table 4. Internally generated funds and district characteristics[†]

	Ordinary least squares		Random effects	
Dependent variable:	Single-year	3-year average	Single-year	3-year average
sh. urban	0.5093*	0.4887*	0.4002**	0.3804*
	(0.2739)	(0.2649)	(0.199)	(0.2075)
ln(pop. density)	–0.1027	0.0413	0.0515	0.0606
	(0.0623)	(0.0603)	(0.0453)	(0.0472)
ln(pop. size)	–0.2518**	–0.1715*	–0.192***	–0.1944**
	(0.1028)	(0.0995)	(0.0747)	(0.0779)
poverty	–2.1748***	–2.2644***	–1.9168***	–1.9865***
	(0.5215)	(0.5044)	(0.379)	(0.3951)
ln(rain)	–0.1522	0.3165	0.3221	0.3746
	(0.5096)	(0.4929)	(0.3696)	(0.3861)
no road	0.3208	–0.2517	–0.1678	–0.212
	(0.326)	(0.3153)	(0.2368)	(0.247)
literacy	2.183***	1.027	0.5805	0.4631
	(0.8133)	(0.7867)	(0.5914)	(0.6162)
Christian	–1.4002**	–0.839	–0.6868*	–0.5968
	(0.5492)	(0.5312)	(0.4002)	(0.4161)
ethn. Akan	0.0089	–0.3364	–0.0913	–0.0633
	(0.3248)	(0.3142)	(0.2357)	(0.2461)
ethn. Ewe	–0.009	0.1712	0.2014	0.3485
	(0.4184)	(0.4047)	(0.3033)	(0.317)
Western R.	1.2883***	0.7599**	0.6872***	0.5739**
	(0.3667)	(0.3547)	(0.2671)	(0.2778)
Central R.	0.5439	0.1265	0.3847	0.2927
	(0.3395)	(0.3284)	(0.2473)	(0.2572)
Greater Accra R.	1.3732***	0.6922*	1.2094***	1.1106***
	(0.3786)	(0.3662)	(0.2756)	(0.2868)
Volta R.	0.5296	–0.0082	0.2899	0.1639
	(0.3379)	(0.3268)	(0.2454)	(0.256)
Eastern R.	0.5648*	0.0814	0.3211	0.2019
	(0.3254)	(0.3147)	(0.2369)	(0.2465)
Ashanti R.	0.813**	0.3785	0.4871**	0.3863
	(0.3213)	(0.3107)	(0.2341)	(0.2434)
Brong Ahafo R.	0.5958*	0.5066*	0.7236***	0.6508***
	(0.3083)	(0.2982)	(0.225)	(0.2336)
Upper East R.	1.1505***	0.7054***	0.9607***	0.9708***
	(0.2327)	(0.2251)	(0.1692)	(0.1763)
Upper West R.	1.5737***	1.0166***	0.9848***	0.9981***
	(0.2485)	(0.2403)	(0.1812)	(0.1883)
Constant	10.7305***	7.1681**	6.6042**	6.3009**
	(3.6463)	(3.5266)	(2.6442)	(2.7625)
Adj. R^2:	0.69	0.63	Breusch-Pagan (χ^2) 284.81***	601.14***

Notes:

Number of observations: 110. [†]Standard errors are in parentheses; levels of statistical significance: *** 1%, ** 5%,* 10%; all local public finance variables are measured as the natural log of real per capita GHC (10,000s).

The first two columns estimate this relationship using ordinary least squares, and the next two account for district unobserved effects in a random-effects model. In each case, the results regressing the most recent year's (2004's) logged per capita own revenues on district characteristics are contrasted with an equivalent measure of own revenues for the mean of the most recent three years (2002–2004), in order to smooth out possible year-on-year instabilities in revenue collection.

Poorer districts tend to generate lower per capita own revenues, as is seen in the significant results across both ways of measuring own revenue and across both estimation methods. This is not particularly surprising, as the income base for taxation is likely lower in districts with a greater share of residents in poverty. Similarly intuitively, more urbanized districts have greater per capita own revenues. With businesses being an important source of revenue for local governments, through license fees and other fees levied on enterprises, more urbanized districts with their greater prevalence of businesses offer more opportunities for local revenue generation.

The size of the district appears to consistently play a significant role as well, with larger districts generating lower per capita revenues. Both (relative to district size) fixed size of local governments—the number of civil servants, physical capacity of local administration—and the fact that an important share of internally generated revenues derive from sources not associated with taxable income (see Figure 3) are likely to play a role here. It is also of note that, after controlling for this range of factors that are known to vary strongly by region, region effects still play a significant role in explaining the magnitude of districts' internal revenues.

Tables 5a and 5b present the results of model (1), including the local finance variables, with the Hausman-Taylor estimation in Table 5a giving the primary results. The fixed-effects estimation results in Table 5b naturally do not identify the variables used in this model as time-invariant. The results are estimated (in the case of random effects and ordinary least squares) both with and without the control variables, to examine the robustness of the core results to the exclusion of these controls.

The primary results show that with the public financial variables accounted for, fewer of the district characteristics emerge as significantly affecting own-revenue size, notably, the degree of urbanization of a district and the poverty rate in the district. Overall, the coefficients are quite robust across the estimation methods, and robust to the exclusion of the control variables. But now we see more differentiation between the models with the dependent variable specified as a year's value versus the three-year moving averages. Tables 5a and 5b exploit the time series structure of the data, unlike Table 4, which presents essentially cross-section results (with the random-effects estimation making use of the time dimension only to control for unobservable district effects). Thus, it is not surprising that the difference in results in the case of the two regressions reflecting the two measures of own-revenue size is more salient here than in the case of the estimation in Table 4.

The results suggest quite consistently across the various estimation methods, which reflect different empirical assumptions, that external grants and transfers taken as a whole do not appear to lead to greater internal revenue generation. On the contrary, especially when considering how transfers in one year affect the subsequent year's own revenues—as opposed to the average of the subsequent three years' own revenues—we see statistically significant evidence of a negative relationship: Transfers appear to discourage rather than encourage internal revenue generation.

Table 5a. External grants and level of internally generated funds, Hausman-Taylor and random-effects estimation†

	Hausman-Taylor		Random effects			
Dependent variable:	Single-year	3-year average	Single-year.		3-year average.	
sh. urban	0.1972	0.2669**	0.213		0.2818**	
	(0.1327)	(0.1325)	(0.1309)		(0.1331)	
pop. density	-0.0304	-0.0152	-0.0197		-0.0056	
	(0.0329)	(0.0324)	(0.0301)		(0.0304)	
pop. size	-0.008	-0.0359	0.0054		-0.0263	
	(0.0528)	(0.052)	(0.0504)		(0.0509)	
poverty	-1.1004***	-1.056***	-1.041***		-1.0036***	
	(0.2602)	(0.2569)	(0.2552)		(0.2569)	
rain	-0.1409	-0.0468	0.2021		0.2544	
	(0.4249)	(0.4054)	(0.2413)		(0.2468)	
no road	-0.1821	-0.1629	-0.2094		-0.1838	
	(0.1589)	(0.1585)	(0.1553)		(0.158)	
literacy	0.4746	0.5293	0.367		0.441	
	(0.4179)	(0.4114)	(0.3906)		(0.3953)	
Christian	-0.3624	-0.3493	-0.3748		-0.3624	
	(0.2686)	(0.2651)	(0.2659)		(0.2673)	
ethn. Akan	-0.0224	-0.0292	-0.0717		-0.0717	
	(0.1616)	(0.1609)	(0.1542)		(0.1573)	
ethn. Ewe	0.1418	0.1094	0.2315		0.1873	
	(0.2215)	(0.2199)	(0.1981)		(0.2027)	
EXT_{it-1}	-0.0245*	-0.0114	-0.0255**	-0.0286**	-0.0117	-0.014
	(0.0127)	(0.0098)	(0.0125)	(0.0126)	(0.0097)	(0.0099)
Personnel-E_{it-1}	0.1124***	0.0323**	0.1135***	0.1271***	0.0328**	0.0387**
	(0.0226)	(0.0159)	(0.0226)	(0.0228)	(0.0159)	(0.0162)
Recurrent-E_{it-1}	0.4727***	0.4793***	0.4759***	0.5176***	0.4797***	0.5102***
	(0.0321)	(0.0245)	(0.0318)	(0.0314)	(0.0245)	(0.0245)
Capital-E_{it-1}	0.0293**	0.0339***	0.0308**	0.0248*	0.0349***	0.0298***
	(0.0128)	(0.0109)	(0.0127)	(0.0128)	(0.0108)	(0.0109)
Western R.	0.5665***	0.5433***	0.5247***	0.8335***	0.5068***	0.8744***
	(0.1885)	(0.185)	(0.1775)	(0.089)	(0.1784)	(0.088)
Central R.	0.23	0.2564	0.2397	0.4043***	0.2641	0.509***
	(0.1662)	(0.1639)	(0.1644)	(0.0865)	(0.1652)	(0.0855)
Greater Accra R.	0.6544***	0.6996***	0.7404***	1.1694***	0.7765***	1.2742***
	(0.2007)	(0.1971)	(0.1835)	(0.1191)	(0.1846)	(0.1157)
Volta R.	0.211	0.2333	0.1757	0.4834***	0.2021	0.5407***
	(0.1681)	(0.1673)	(0.161)	(0.0857)	(0.1638)	(0.085)
Eastern R.	0.2791*	0.2617	0.2561	0.5436***	0.2409	0.6042***
	(0.163)	(0.1607)	(0.1573)	(0.0823)	(0.1584)	(0.0811)
Ashanti R.	0.4021**	0.3917**	0.4075***	0.6755***	0.3965**	0.7357***
	(0.1576)	(0.1554)	(0.1558)	(0.0796)	(0.1565)	(0.0782)
Brong Ahafo R.	0.3489**	0.4031***	0.3946***	0.5513***	0.4429***	0.6562***
	(0.1563)	(0.1528)	(0.1509)	(0.0865)	(0.1505)	(0.0846)
Upper East R.	0.626***	0.6836***	0.6703***	0.5536***	0.7226***	0.6302***
	(0.1207)	(0.119)	(0.1124)	(0.1042)	(0.1134)	(0.1043)
Upper West R.	0.6465***	0.6482***	0.6846***	0.5035***	0.6806***	0.52***
	(0.1291)	(0.1262)	(0.122)	(0.1115)	(0.1219)	(0.1114)
Constant	4.6693	4.3607	2.1088	2.4508***	2.1386	2.9145***
	(3.134)	(2.9728)	(1.741)	(0.223)	(1.778)	(0.1862)
Number of observations	1,028	951	1,028	1,028	951	951
Sargan-Hansen (χ^2):	19.56***	Breusch-Pagan (χ^2):	42.25***	101.31***	253.77***	390.51***

Notes:
†Standard errors are in parentheses; levels of statistical significance: *** 1%, ** 5%,* 10%; all local public finance variables are measured as the natural log of real per capita GHC (10,000s).

Table 5b. External grants and level of internally generated funds, fixed-effects and pooled ordinary least squares estimation†

	Fixed effects		Pooled ordinary least squares			
Dependent variable:	Single-year	3-year average	Single-year		3-year average	
sh. urban			0.1995**		0.2636***	
			(0.0923)		(0.0722)	
pop. density			-0.0228		-0.0125	
			(0.0214)		(0.0167)	
pop. size			0.0225		0.0001	
			(0.0364)		(0.0291)	
poverty			-0.9752***		-0.8816***	
			(0.1825)		(0.1433)	
rain			0.1881		0.233*	
			(0.1683)		(0.1325)	
no road			-0.1989*		-0.177**	
			(0.1091)		(0.0852)	
literacy			0.3305		0.4037*	
			(0.2763)		(0.2148)	
Christian			-0.3356*		-0.3131**	
			(0.1901)		(0.1461)	
ethn. Akan			-0.0605		-0.0634	
			(0.1077)		(0.0844)	
ethn. Ewe			0.2187		0.1683	
			(0.138)		(0.1087)	
EXT_{it-1}	-0.0243*	-0.0106	-0.027**	-0.0354***	-0.0153	-0.0264**
	(0.0126)	(0.0098)	(0.013)	(0.0134)	(0.0111)	(0.0117)
Personnel-E_{it-1}	0.1191***	0.0337**	0.1076***	0.1309***	0.0308*	0.05***
	(0.0238)	(0.0162)	(0.0223)	(0.0227)	(0.017)	(0.0181)
Recurrent-E_{it-1}	0.4128***	0.4476***	0.5341***	0.6175***	0.561***	0.6583***
	(0.0349)	(0.0256)	(0.0304)	(0.0295)	(0.0246)	(0.0246)
Capital-E_{it-1}	0.0272**	0.033***	0.0349***	0.0224*	0.0411***	0.019
	(0.0129)	(0.0109)	(0.0132)	(0.0135)	(0.0122)	(0.0126)
Western R.			0.4947***	0.7545***	0.4818***	0.7596***
			(0.1267)	(0.0627)	(0.0975)	(0.0498)
Central R.			0.2172*	0.3373***	0.2493***	0.4153***
			(0.1176)	(0.0607)	(0.0902)	(0.0478)
Greater Accra R.			0.6917***	1.0218***	0.7168***	1.054***
			(0.1314)	(0.0864)	(0.1013)	(0.0686)
Volta R.			0.1746	0.4319***	0.207**	0.469***
			(0.1131)	(0.0598)	(0.0883)	(0.0471)
Eastern R.			0.2407**	0.4753***	0.2353***	0.5084***
			(0.1123)	(0.0581)	(0.0866)	(0.0457)
Ashanti R.			0.3878***	0.6047***	0.3862***	0.6356***
			(0.1115)	(0.0567)	(0.0857)	(0.0445)
Brong Ahafo R.			0.3566***	0.4647***	0.4029***	0.5323***
			(0.1091)	(0.0617)	(0.0831)	(0.0484)
Upper East R.			0.6398***	0.4964***	0.6839***	0.5512***
			(0.0802)	(0.0714)	(0.0621)	(0.0568)
Upper West R.			0.6567***	0.4567***	0.6375***	0.4591***
			(0.0887)	(0.077)	(0.0681)	(0.0614)
Constant	3.7703***	3.9582***	1.7115	1.8324***	1.5334	2.043***
	(0.2605)	(0.1962)	(1.2235)	(0.2029)	(0.9733)	(0.1784)
No. of observations	1,028	951	1,028	1,028	951	951
F-stat:	62.25***	107.60***	$\bar{R}^2$ 0.64	0.61	0.76	0.72

Notes:
†Standard errors are in parentheses; levels of statistical significance: *** 1%, ** 5%,* 10%; all local public finance variables are measured as the natural log of real per capita GHC (10,000s).

The magnitude of the negative effect is, however, quite small: A 10 percent increase in external transfers to local governments is associated with an approximately one-quarter of a percent drop in own-revenue generation. Not only the broad direction, but also the magnitude of effects, emerges as quite robust across results from different estimation methods. When considering the smoothed measure of own revenues, the effect is less than half that and is for the most part not statistically significant.

The results also show that, in contrast to the effect of external grants, greater past public expenditures incurred by local governments in any category (personnel, nonpersonnel recurrent, or capital spending) are significantly associated with greater subsequent local revenue generation. However, the extent to which greater expenditures result in more own-revenue generation differs importantly by expenditure type. The response of own revenues with respect to past spending is very low in the case of capital expenditures. A 10 percent increase in the latter is associated with an approximately one-third of a percent increase in subsequent own revenues. The response is about three times larger for personnel spending, and the largest response is to nonpersonnel recurrent spending, in which a 10 percent increase is associated with a 4.7 percent increase in local revenues in the subsequent year.

This strong response differentiation by spending category is not surprising, and is in fact quite consistent with the way that revenue sources are linked to expenditure types. As discussed in Section 2, local governments undertake capital investments primarily using the DACF, donor grants, and other external transfers, rather than through IGF. The latter are mostly used for maintenance, operational, and to some extent personnel expenditures. Thus, higher past expenditures in these categories are more likely to invoke greater local revenue mobilization than are increases in past capital expenditures.

IGF Growth and Dynamics

The analysis thus far has considered the financial and nonfinancial factors that may influence the magnitude of per capita internal revenue funds generated by local governments. For the technical as well as substantive reasons discussed earlier, in light of our central interest in the way intergovernmental and other external transfers to local governments may influence their incentive to generate local revenues, it is useful to examine as well how financial factors affect the *growth*, or changes, in IGF. The results of this set of estimations are presented in Table 6.

In further seeking to control for the budget-size effect, which may intrude on consistent estimation of the influence of the variables of interest on IGF, we include here among the covariates also past IGF: In addition to using changes in rather than levels of IGF as the dependent variable, controlling for past IGF further reduces the possibility that any positive effects of past expenditures on IGF are a result of (upward) bias due to simultaneity.

Table 6 presents different specifications in terms of levels and/or changes in the lagged covariates, and checks the robustness of the core findings to variations in the estimation method. In the presence of lagged values of (the growth of) own revenue, the primary estimation results are derived from the Arellano-Bond and Blundell-Bond estimation methods, and are presented in the top panel of Table 6.

Table 6. External grants and growth of internally generated funds[†]

	A	B	C	A	B	C
	Blundell-Bond			Arellano-Bond		
Δ IGF_{it-1}	-0.0944*	-0.158***	-0.626***	0.0267	-0.0893**	-0.238***
	(0.055)	(0.0465)	(0.044)	(0.0497)	(0.0454	(0.0673)
Δ EXT_{it-1}	-0.0023	-0.0304**	-0.0312**	-0.0065	-0.0353**	-0.0679**
	(0.0221	(0.0151)	(0.0128)	(0.0229)	(0.0168	(0.0332)
Δ Recurrent-E_{it-1}	0.0008	0.1284**	0.2347***	-0.0173	0.1585***	-0.0679
	(0.0745	(0.0544)	(0.0606)	(0.0655)	(0.0494	(0.1412)
Δ Personnel-E_{it-1}	-0.0141	0.0373	0.0668	-0.0414	0.0326	0.1445
	(0.0426	(0.0425)	(0.054)	(0.0403)	(0.0409	(0.112)
Δ Capital-E_{it-1}	0.031	0.014	0.0121	0.0388*	0.0204	-0.0217
	(0.0245	(0.015)	(0.0149)	(0.022)	(0.0151	(0.0271)
IGF_{it-1}	-0.6454***	-0.4253***		-0.9367***	-0.6235***	
	(0.0767	(0.0582)		(0.0732)	(0.0621	
EXT_{it-1}	-0.0441	-0.0026		-0.0295	0.0152	
	(0.0386	(0.0296)		(0.0403)	(0.0328	
Recurrent-E_{it-1}	0.3515***			0.3468***		
	(0.0823			(0.0873)		
Personnel-E_{it-1}	0.1349***			0.1897***		
	(0.0373			(0.0409)		
Capital-E_{it-1}	-0.0446			-0.0381		
	(0.0333			(0.0281)		
Constant	2.2253***	3.3564***	0.0671***	3.8938***	4.7142***	0.0737***
	(0.5438	(0.474)	(0.0141)	(0.5289)	(0.5316	(0.0189)
AB Test, order 1:	-6.74***	-6.65***	-6.11***	-6.29***	-6.65***	-5.87***
2:	0.05	0.5	-4.73***	1.3	0.5	-1.09
	Fixed Effects			Pooled Ordinary Least Squares		
Δ IGF_{it-1}	0.0356	-0.0686	-0.4025***	-0.2038***	-0.2929***	-0.3823***
	(0.0478	(0.0418)	(0.0458)	(0.0367)	(0.034)	(0.033)
Δ EXT_{it-1}	-0.0076	-0.042***	-0.0291**	-0.0115	-0.0333**	-0.0318***
	(0.0194	(0.0149)	(0.0134)	(0.017)	(0.0148	(0.0114)
Δ Recurrent-E_{it-1}	-0.0146	0.173***	0.1852***	0.059	0.1907***	0.1914***
	(0.0608	(0.0504)	(0.0604)	(0.0434)	(0.0363	(0.0375)
Δ Personnel-E_{it-1}	-0.0186	0.045	0.0509	0.0119	0.0419	0.0442
	(0.0379	(0.0368)	(0.0451)	(0.0315)	(0.0302	(0.0312)
Δ Capital-E_{it-1}	0.0301	0.0194	0.0054	0.0209	0.0081	0.0063
	(0.0193	(0.0142)	(0.0165)	(0.0146)	(0.0112	(0.0114)
IGF_{it-1}	-0.9163***	-0.6433***		-0.3863***	-0.1765***	
	(0.0603	(0.0502)		(0.0419)	(0.0228	
EXT_{it-1}	-0.0226	0.0275		-0.0301	0.0027	
	(0.0312	(0.0254)		(0.0221)	(0.0185	
Recurrent-E_{it-1}	0.3523***			0.2539***		
	(0.0736			(0.0511)		
Personnel-E_{it-1}	0.1526***			0.0756***		
	(0.0343			(0.0258)		
Capital-E_{it-1}	-0.0248			-0.0318		
	(0.0233			(0.0205)		
Constant	3.7902***	4.7518***	0.0642***	1.1558***	1.3958***	0.0643***
	(0.4248	(0.4375)	(0.0081)	(0.2455)	(0.2367	(0.0151)
F-stat	46.98***	45.26***	20.75***	26.91***	30.63***	28.94***
Adj. R^2				0.23	0.19	0.14

Notes:
Number of observations: 889. [†]Standard errors are in parentheses; levels of statistical significance: *** 1%, ** 5%,* 10%; all local public finance variables are measured as the natural log of real per capita GHC (10,000s).

Column A presents the primary results, in which the potential effect on IGF growth of both levels of and adjustments to the public financial variables are accounted for. These results show no evidence that either higher levels or higher adjustments of external grants spur own-revenue growth in Ghana. If anything, the effect points (albeit only tenuously) in the other direction. Consistently with our findings in the level equation, the more pronounced drivers of IGF growth are past increases in public spending on nonpersonnel recurrent spending and, to a somewhat lesser extent, salary expenditures. This suggests that our earlier caveat on the potentially misleading reasons why we see a positive coefficient on local expenditures may have been relatively conservative. And, as before, capital spending increases have a weakly negative effect on locally generated revenue growth. Finally, there is also evidence of convergence in local governments' internally generated revenues. Higher-IGF districts expand their IGF significantly more slowly.

Also on a methodological note, the results suggest that the Blundell-Bond estimation in the case of this empirical analysis is an improvement over the Arellano-Bond method, confirming the choice of the former as the primary results. Blundell and Bond (1998) show in Monte Carlo simulation that when the true parameter value of the lagged dependent variable is relatively large, the number of time periods in the panel moderate, and the number of panels not too large, the system-generalised method of moments (GMM) estimator can reduce both finite sample bias that would obtain in the difference-GMM estimation, as well as improve on the precision of the estimator. While in our empirical case the key elements do not raise large concerns about the difference-GMM estimator—the (absolute) value of the lagged dependent variable is not close to 1 and the number of time series is not very small—still the evidence from the Blundell and Bond simulation shows that the system-GMM estimator offers better consistency and variance properties, with these improvements simply being smaller in such a scenario. Indeed, we find in Table 6 that the absolute value of the lagged dependent variable coefficient estimate is large in the system-GMM estimation across all specifications, and its statistical significance higher.

Columns B and C present alternate specifications, which show to what extent these results are affected by the exclusion of the level variables not of central interest (B) and the inclusion of only the change variables (C). The main effect of these changes to variable specification is to sharpen evidence on the adverse effect of external funds on IGF, showing now that acceleration in the growth of external transfers leads to statistically significant decelerated IGF growth.

Effect of External Grants Disaggregated by the Two Time Ranges

As seen in Figure 1, the time trend of external grants displays two rather distinct periods: Aggregate external grants to local government fluctuate from 1994 until 2001, without any discernable upward or downward trend. But after 2001, this revenue source for local governments sees a steady increase. This may reflect a change in the policy focus of the new incoming government at around that time with regard to resource allocation to local governments. Ghana was ruled by the National Democratic Council (NDC) from 1992 to 2000, and then by the New Patriotic Party (NPP) until after the end of the study period.

While it is difficult to establish with certainty whether a shift in policy focus effected by a change in party rule is responsible for the change in the time pattern of external grants, this pattern warrants an econometric investigation of the effect of external grants on own-revenue generation separately for the two time ranges. Tables 7 and 8 present these results, examining the determinants of the level and the growth of IGF, respectively. While these regressions mirror those in Tables 5 (single-year regressions) and 6, respectively, for Table 7 only the coefficients on the public financial variables are displayed to economize on space.

Table 7. External grants and level of internally generated funds, time-disaggregated regressions†

	Hausman-Taylor	Random effects		Fixed effects	Pooled ordinary least squares	
	[1]	[1]	[2]	[1]	[1]	[2]
Pre-2001						
EXT_{it-1}	0.0145	0.0068	0.0035	0.0095	0.0024	-0.0074
	(0.0182)	(0.0176)	(0.0178)	(0.018)	(0.0184)	(0.0188)
Personnel-E_{it-1}	-0.0408	-0.0285	-0.0047	-0.0563 *	-0.009	0.028
	(0.0308)	(0.0301)	(0.0303)	(0.0335)	(0.0295)	(0.0295)
Recurrent-E_{it-1}	0.4702 ***	0.5056 ***	0.5485 ***	0.3663 ***	0.583 ***	0.6439 ***
	(0.0459)	(0.0441)	(0.0429)	(0.0526)	(0.0415)	(0.0396)
Capital-E_{it-1}	0.0044	0.0144	0.0115	0.009	0.0193	0.0146
	(0.0177)	(0.0173)	(0.0174)	(0.0178)	(0.018)	(0.0184)
Sargan-H. (χ^2):	20.53 ***			$\bar{R}^2$:	0.62	0.59
Breusch-P. (χ^2):		28.85 ***	46.66 ***	F-stat: 12.31 ***	44.0 ***	68.34 ***
Post-2001						
EXT_{it-1}	-0.0567 ***	-0.0528 ***	-0.0577 ***	-0.0498 ***	-0.0516 ***	-0.058 ***
	(0.0192)	(0.0183)	(0.019)	(0.0191)	(0.0195)	(0.0211)
Personnel-E_{it-1}	0.1387 ***	0.1488 ***	0.1826 ***	0.113 *	0.16 ***	0.2021 ***
	(0.0539)	(0.0532)	(0.0539)	(0.0624)	(0.0531)	(0.0538)
Recurrent-E_{it-1}	0.272 ***	0.3039 ***	0.3844 ***	0.1155 *	0.3794 ***	0.5065 ***
	(0.0574)	(0.0557)	(0.0562)	(0.0689)	(0.0545)	(0.0544)
Capital-E_{it-1}	0.0361 *	0.0333 *	0.0171	0.0432 **	0.028	-0.0001
	(0.0198)	(0.0199)	(0.0205)	(0.0209)	(0.0211)	(0.0223)
Sargan-H. (χ^2):	—			$\bar{R}^2$	0.66	0.60
Breusch-P. (χ^2):		7.77 ***	17.51 ***	F-stat: 5.04 ***	28.43 ***	37.90 ***

Notes:
District socioeconomic characteristics [1] included; [2] not included.
Number of observations: 598 pre-2001; 322 post-2001. †Standard errors are in parentheses; levels of statistical significance: *** 1%, ** 5%,* 10%; all local public finance variables are measured as the natural log of real per capita GHC (10,000s).

A picture that is consistent across the estimation methods, specifications, and measures of IGF emerges: The core result—namely, that rather than encouraging own-revenue generation, external financial flows to local governments seem to follow a pattern that ultimately discourages own-revenue generation—is strongly driven by the financial patterns in the latter years of the 11-year period, during which external grants steadily and rapidly increased. Across all the regressions represented in Tables 7 and 8, the effect of external grants is nonsignificant and very small in magnitude prior to 2001, whereas statistical significance of this effect is established post-2001, and the coefficient estimates are clearly higher (in absolute value) than—in the primary estimations and specifications, nearly double—the estimates in the regression over the full time range. A comparison of these results with the estimation over the full time range suggests that the latter are importantly driven by effects in the post-2001 years, although the results for the period prior to 2001 do not run directly counter to the basic finding that external grants do not work to encourage greater own-revenue generation by local governments.

Table 8. External grants and growth of internally generated funds, time-disaggregated regressions[†]

	Pre-2001				*Post-2001*			
	Blundell-Bond		**Arellano-Bond**		**Blundell-Bond**		**Arellano-Bond**	
Δ IGF_{it-1}	-0.026	-0.0765	0.0844	-0.0039	-0.1632 *	-0.1624 *	0.2409	-0.0221
	(0.0587)	(0.0558)	(0.059)	(0.0545)	(0.0922)	(0.0906)	(0.1779)	(0.1711)
Δ EXT_{it-1}	0.0107	0.0047	0.0173	0.0169	-0.1311 *	-0.1135	-0.092	-0.1401 ***
	(0.0236)	(0.0193)	(0.0248)	(0.0185)	(0.0696)	(0.0714)	(0.0615)	(0.0534)
Δ Recurrent-E_{it-1}	-0.0431	0.0836	-0.0377	0.114 **	-0.2586 *	-0.1345	-0.2031 *	-0.0969
	(0.0669)	(0.0545)	(0.0704)	(0.0505)	(0.1408)	(0.0983)	(0.1148)	(0.0886)
Δ Personnel-E_{it-1}	0.0748	0.094 ***	0.0971 *	0.1045 ***	0.1593	0.115	0.0966	0.0558
	(0.0471)	(0.0366)	(0.0497)	(0.0352)	(0.1357)	(0.0777)	(0.0894)	(0.0374)
Δ Capital-E_{it-1}	0.0371	0.0249	0.0374	0.0223	-0.0036	-0.0204	-0.0229	-0.0256
	(0.0257)	(0.0224)	(0.0256)	(0.0203)	(0.0372)	(0.0234)	(0.0264)	(0.0229)
IGF_{it-1}	-0.681 ***	-0.5075 ***	-0.9687 ***	-0.7136 ***	-0.5712 ***	-0.4194 **	-1.7009 ***	-0.922 *
	(0.1028)	(0.0931)	(0.1291)	(0.0942)	(0.219)	(0.2136)	(0.4588)	(0.4741)
EXT_{it-1}	-0.0264	-0.0205	-0.0331	-0.0399	0.0892	0.0786	0.0536	0.1645 *
	(0.039)	(0.0309)	(0.0518)	(0.0391)	(0.0795)	(0.0813)	(0.1064)	(0.0982)
Recurrent-E_{it-1}	0.4546 ***		0.4178 **		0.752 ***		0.2125	
	(0.12)		(0.1638)		(0.2011)		(0.2398)	
Personnel-E_{it-1}	-0.0055		0.0083		-0.161		-0.1489	
	(0.0607)		(0.0757)		(0.2586)		(0.2875)	
Capital-E_{it-1}	-0.0529		-0.0494		-0.1228		0.1941	
	(0.0331)		(0.0451)		(0.086)		(0.145)	
Constant	2.6217 ***	4.0514 ***	5.0162 ***	5.8015 ***	0.5779	2.7287	10.7701 ***	5.8783 *
	(0.7211)	(0.7789)	(0.8015)	(0.8025)	(1.5079)	(1.664)	(3.3903)	(3.1516)
AB Test, order 1:	-4.14 ***	-3.89 ***	-3.64 ***	-3.64 ***	—	—	—	—
2:	0.21	0.18	1.57	1.17				

Notes:

[†]The number of years in the second time frame is too low to calculate the Arellano-Bond test statistics. Standard errors are in parenthesis; levels of statistical significance: *** 1%, ** 5%, * 10%; all local public finance variables are measured as the natural log of real per capita GHC (10,000s).

6. SUMMARY AND CONCLUSIONS

The main motivation for decentralization, namely, that subnational governments are better placed to allocate public resources more efficiently and effectively, is often supported by the argument that subnational governments have better information about the needs for and requirements of public services in their jurisdictions. This argument in favor of decentralization rests strongly on the assumption that local governments have a substantial degree of fiscal autonomy and are able to use local discretion in resource allocation. However, the fiscal responsibilities of local governments often remain quite circumscribed, and their budgets are often dominated by external transfers that are usually tied to specific investments that may not match the priorities of local governments. Therefore, local governments' fiscal autonomy is intimately tied to their IGF.

Using 1994–2004 panel data on all 110[5] district governments' public finances (revenues from different sources and different types of public expenditures) and other district-level data, this paper examined the impact of the flow and size of externally generated revenues (from central government and donors) on local governments' own-generated revenues, or IGF—an issue that has become a critical policy concern in Ghana.

We find that greater past external transfers are significantly and negatively associated with local governments' levels of IGF: District governments with higher externally generated revenues tend to have significantly lower levels, as well as experience slower subsequent growth in, internally generated revenues. (However, while the negative sign in the latter relationship is consistently present across estimation methods and specifications, the effects of transfers on the *growth* of IGF are statistically not as strong as the level effect.) Therefore, the nature of the flow of local governments' external sources of revenue appears to discourage rather than encourage their internal revenue generation. The analysis suggests that this result is strongly driven by intergovernmental transfer patterns, especially in the latter years (from 2001 onward) of the time period under study.

The results also show that greater past public expenditures by local governments are significantly associated with greater subsequent local revenue generation, but this effect is strongly differentiated by expenditure type. The response of own revenues with respect to past spending is very low in the case of capital expenditures, is substantially larger for personnel spending, and is by far the largest with respect to nonpersonnel recurrent spending. This strong response differentiation by spending category is quite consistent with the way that revenue sources are linked to expenditure types: Local governments undertake capital investments primarily using external transfers, while internally generated revenues are mostly used for maintenance, operational, and, to a lesser extent, personnel expenditures. Thus, higher past expenditures in these categories are more likely to invoke greater local revenue mobilization than are increases in past capital expenditures.

Assuming that subnational governments are better placed to allocate public resources more efficiently and effectively, local governments' lack of fiscal autonomy compromises Ghana's development agenda in using public expenditures for promoting growth and equitable distribution. Increasing the discretionary component of transfers to local governments would be one way of increasing their fiscal autonomy. Involving local governments in all stages of program and project design, implementation, and monitoring and evaluation would help match the priorities of external funders with local priorities. The crowding out of IGF by grants may also reflect the relative absence of accountability associated with grants compared to IGF. Thus, making local governments accountable to their jurisdictions for all sources of revenue will be important, as decentralization is fundamentally about making governance at the local level more responsive to the felt needs of the large majority of the population.

[5] This refers to the number of districts existing during the period under study.

APPENDIX: SUPPLEMENTARY FIGURES AND TABLE

Figure A.1. Evolution of internally generated funds (IGF) and external transfers in Ghana's regions

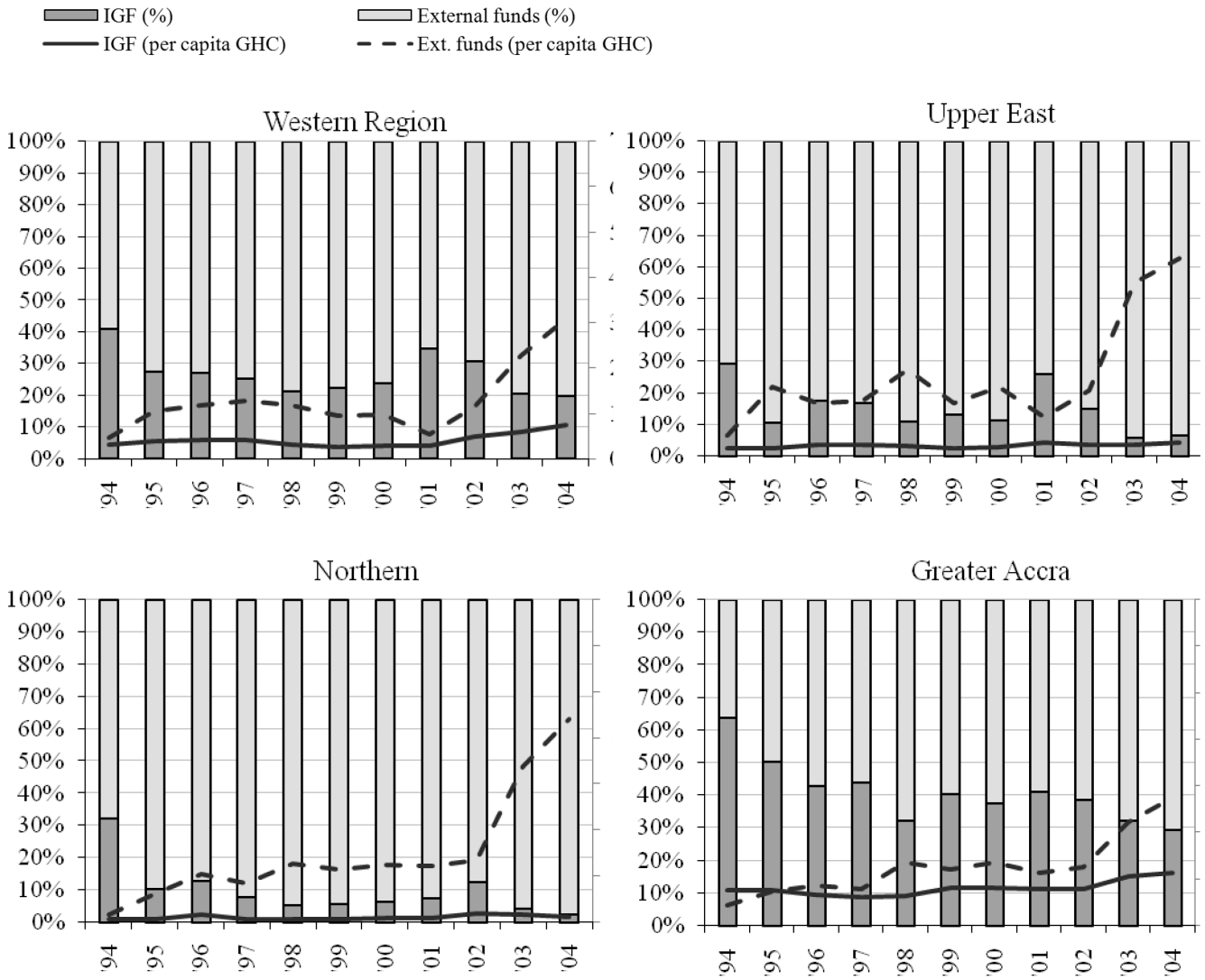


Figure A.1. Continued

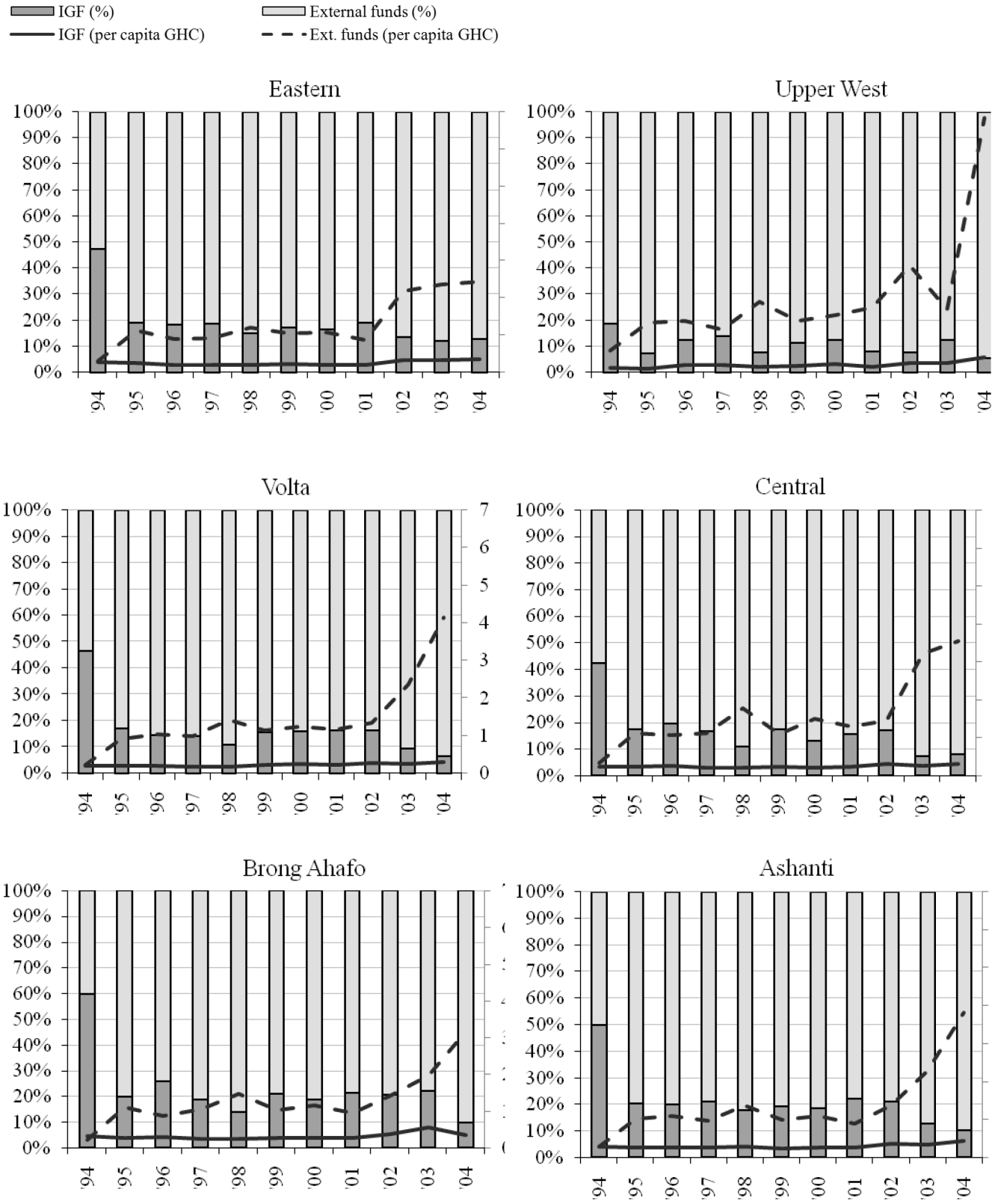


Table A.1. District per capita expenditures and revenues (average by region, real GHC)

Year	Expenditure			Revenue		Expenditure			Revenue	
	Capital	Personnel	Nonpers. recurrent	External grants	Internally generated funds	Capital	Personnel	Nonpers. recurrent	External grants	Internally generated funds
	Ashanti					***Northern***				
1994	0.1690	0.1266	0.1874	0.2944	0.2949	0.0824	0.0771	0.0804	0.1657	0.0792
1995	0.9771	0.1175	0.1611	1.0159	0.2598	0.5001	5.1554	0.0880	0.6189	0.0730
1996	0.9907	0.1308	0.2732	1.0856	0.2739	1.0672	0.1077	0.1066	1.0434	0.1546
1997	0.8964	0.1362	0.1577	0.9700	0.2608	0.7264	0.0932	0.0792	0.8420	0.0715
1998	3.3735	0.1798	0.1819	1.3735	0.3024	0.8252	0.1178	0.0878	1.2723	0.0715
1999	1.0475	0.2108	0.1734	1.0047	0.2394	0.9138	0.1271	0.1015	1.1402	0.0693
2000	0.9951	0.2361	0.1745	1.1043	0.2551	1.1720	0.1487	0.0945	1.2551	0.0867
2001	0.5896	0.2535	0.1688	0.8914	0.2538	2.4633	0.1620	0.1196	1.2234	0.1004
2002	1.1760	0.2849	0.2208	1.3681	0.3643	1.2836	0.1988	0.1096	1.3424	0.1910
2003	2.0834	0.3098	0.2400	2.2772	0.3412	2.5997	0.2122	0.1390	3.3762	0.1598
2004	3.6305	0.3362	0.2747	3.8083	0.4443	2.9905	0.2405	0.1101	4.4170	0.1130
	Brong Ahafo					***Upper East***				
1994	0.1764	0.1375	0.2030	0.2215	0.3305	0.3513	0.1065	0.1542	0.4554	0.1899
1995	0.9694	0.0992	0.1838	1.1223	0.2801	1.3873	0.0899	0.1234	1.5369	0.1858
1996	1.2465	0.1700	0.1998	0.8788	0.3055	1.3245	0.1381	0.1430	1.1845	0.2529
1997	0.8892	0.2414	0.1770	1.0655	0.2477	1.0631	0.1842	0.1453	1.2391	0.2521
1998	0.9478	0.3078	0.2330	1.4743	0.2418	1.3461	0.2220	0.1988	1.9157	0.2376
1999	0.8992	0.3299	0.2221	1.0276	0.2719	1.0596	0.2346	0.1512	1.1710	0.1818
2000	0.9068	0.3483	0.1966	1.1519	0.2654	1.2384	0.2994	0.1574	1.5244	0.1996
2001	0.7049	0.3829	0.1944	0.9652	0.2619	0.7774	0.2512	0.1292	0.8669	0.3064
2002	1.2416	0.3999	0.2949	1.4193	0.3680	1.3631	0.2899	0.1864	1.4665	0.2578
2003	2.1648	0.4375	0.2567	1.9838	0.5611	3.1660	0.2002	0.2060	3.8501	0.2496
2004	2.7835	0.4683	0.2465	3.1774	0.3505	4.7072	0.3158	0.1956	4.3894	0.3081
	Central					***Upper West***				
1994	0.2552	0.1467	0.1997	0.3211	0.2357	0.1632	0.0768	0.0956	0.5733	0.1331
1995	1.0134	0.1204	0.1772	1.1075	0.2292	1.2305	0.0644	0.1147	1.3086	0.1049
1996	0.9916	0.1636	0.1623	1.0711	0.2599	1.1928	0.0923	0.1255	1.3762	0.1944
1997	0.9591	0.1876	0.1477	1.1146	0.2233	1.2648	0.1811	0.1258	1.1466	0.1883
1998	1.2189	0.2574	0.1745	1.7668	0.2143	1.3596	0.1402	0.1319	1.8922	0.1553
1999	0.7765	0.2871	0.2000	1.0964	0.2300	1.4091	0.2320	0.1800	1.3669	0.1738
2000	1.1817	0.3169	0.1670	1.4914	0.2238	1.3114	0.2314	0.1441	1.5387	0.2222
2001	0.6660	0.3674	0.1968	1.2853	0.2355	1.7432	0.1826	0.1022	1.7335	0.1511
2002	1.1508	0.3827	0.2257	1.4301	0.2886	2.5508	0.2924	0.1687	2.8738	0.2455
2003	2.4745	0.3669	0.2139	3.2308	0.2510	4.2243	0.2834	0.1654	1.6792	0.2378
2004	3.2944	0.4056	0.2363	3.5506	0.2974	6.9584	0.2759	0.2558	6.8348	0.3891
	Eastern					***Volta***				
1994	0.1750	0.1266	0.1905	0.2969	0.2699	0.1793	0.0901	0.1590	0.2223	0.1940
1995	1.2153	0.1059	0.1391	1.1283	0.2643	0.8463	0.0728	0.1105	0.9039	0.1853
1996	0.8337	0.1186	0.1565	0.8989	0.2023	1.0967	0.1078	0.1186	1.0459	0.1797
1997	0.7922	0.1545	0.1360	0.9069	0.2090	0.8053	0.1321	0.1114	0.9935	0.1656
1998	1.0109	0.1707	0.1805	1.2012	0.2127	1.1483	0.1831	0.1428	1.4052	0.1762
1999	0.8226	0.2500	0.1956	1.0518	0.2221	1.1591	0.2278	0.1588	1.1457	0.2153
2000	0.8914	0.2870	0.1774	1.0812	0.2131	1.0583	0.2823	0.1685	1.2288	0.2331
2001	0.8206	0.2827	0.1725	0.8662	0.2064	0.7911	0.2820	0.2108	1.1649	0.2290
2002	0.9215	0.3049	0.2156	2.1792	0.3451	1.0887	0.3097	0.2120	1.3364	0.2618
2003	1.8793	0.3347	0.2390	2.3638	0.3278	2.0425	0.3263	0.1863	2.3441	0.2427
2004	2.3233	0.3744	0.3241	2.4341	0.3599	4.1048	0.3559	0.2102	4.1329	0.3005
	Greater Accra					***Western***				
1994	0.2385	0.2499	0.3768	0.4366	0.7708	0.2161	0.1150	0.1682	0.4760	0.3298
1995	1.1159	0.2308	0.3355	0.7363	0.7463	1.0127	0.1865	0.2306	1.0462	0.3958
1996	1.1533	0.2868	0.3396	0.8604	0.6472	1.2866	0.2219	0.2298	1.1869	0.4400
1997	0.9922	0.2610	0.3272	0.7735	0.6078	1.1435	0.2251	0.2027	1.2802	0.4342
1998	1.2611	0.2373	0.3702	1.3457	0.6413	1.0448	0.1800	0.1710	1.1960	0.3255
1999	1.1105	0.3464	0.5263	1.1932	0.8045	0.9320	0.1943	0.1685	0.9567	0.2760
2000	1.1496	0.3799	0.5113	1.3414	0.8033	0.9616	0.2205	0.1801	0.9931	0.3085
2001	0.6317	0.3586	0.4524	1.1211	0.7781	0.6142	0.2350	0.2058	0.5549	0.2943
2002	0.9992	0.4488	0.6490	1.2598	0.7960	1.1022	0.2980	0.3041	1.1620	0.5150
2003	1.5256	0.5586	0.7433	2.2263	1.0571	1.9002	0.3104	0.3415	2.2854	0.5927

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