Received: 30 July 2019 | Revised: 5 April 2022 | Accepted: 11 July 2022

DOI: 10.1111/rode.12921

WILEY

REGULAR ARTICLE

# On the determinants and interrelationship of components of government spending

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**Funding information**
None

## Abstract

The paper examines the determinants and interrelationship of components of government spending using data for up to 142 countries over the period 1990–2017. We make use of two-way fixed effect estimator with Driscoll-Kraay standard errors, which accounts for cross-sectional dependence and a system generalized method of moments estimator to examine the determinants of components of spending. We then adopt the seemingly unrelated regression estimation technique to examine the interrelationship between government spending types. From our results, there is little evidence of Wagner's Law as the coefficient of income is negative and statistically significant for most measures of spending. Further, we find that a reduction in overall government spending tends to reduce the share of almost all components of government spending except spending on economic services, non-productive spending, and spending on transfers. In examining the interrelationship between government spending types, we find that government spending types under the Classification of Functions of Government (COFOG) classification, which may be described as "pure public goods" and "merit public good provision," have complementary

I thank Christa Brunnschweiler, Edward Anderson, Peter Moffatt, Oliver Morrissey, seminar participants at the University of East Anglia (UEA) and two anonymous referees for valuable comments and suggestions. The author declares the following interests: none. The usual disclaimer applies.

relationships. However, government spending on pure public good vs merit public goods, pure public goods vs economic services, and pure public goods vs transfers could be considered substitutes.

**KEYWORDS**

complementarity, government expenditure composition, substitutability, SURE, Wagner's Law

**JEL CLASSIFICATION**

H10, H50, H60

## 1 | INTRODUCTION

One of the most popular topics within the public finance literature is the study of the determinants of government spending. While early literature concentrates on the determinants of government aggregate (total) spending, recent literature emphasizes the importance of examining the determinants of disaggregated spending (components of government spending).[1] Ultimately, government total spending decisions are simply an aggregation of individual allocations to specific types of spending. Further, components of government spending demonstrate a government's policy emphasis within any budget period, including the short- and long-term spending outlook. In terms of their implications, different components of government spending may have varying effects on macro- and micro-economic outcomes such as economic growth and production. The differing effects can have implications for resource allocation and redistribution within an economy.[2] What is less examined within the literature is the issue of the interrelationship between components of government spending. What makes this important? Consider a fixed level of total spending. Changes in one government spending type within any budget period are likely to occur at the expense of, or complementary to, a corresponding change in another spending type.

The current paper therefore examines the determinants of components of government spending and the interrelationship between components of government spending. The paper considers groupings of components of government spending used within the literature in addition to those available from relevant data sources. In particular, the paper considers spending components under the Classification of Functions of Government (COFOG) and the economic classification of government (ECOG) of the International Monetary Fund (IMF) and Oxley and Martin (1991) classification of spending into pure goods, merit goods, economic services, and social protection. The paper also adopts Kneller et al. (1999) classification of spending into productive and non-productive spending on one hand, and productive entering in flows, productive entering in stocks, and social welfare, on the other hand.

The paper therefore contributes to the existing literature in four main ways. First, we examine the determinants of components of government spending. Second, we examine the interrelationship between components of government spending. Third, we do these using data for more recent years, the period 1990–2017. Further, in addition to traditional components of spending mostly considered under the IMF's COFOG and ECOG classifications, we include other groupings of spending categories. Our estimation covers a sample of both developed and

developing countries, with our sample size ranging between 93 and 142 countries. In terms of estimation methods, we make use of a two-way fixed effect estimator with Driscoll-Kraay standard errors (DK-FE see Driscoll and Kraay, 1998) and the generalized method of moments (GMM) estimation techniques to examine the determinants of spending types. The DK-FE technique considers the possibility of cross-sectional dependence within the data, while the GMM approach accounts for persistence in the data by including the lagged dependent variable as an explanatory variable. We then adopt the seemingly unrelated regression (SURE) estimation technique to examine the interrelationship between government spending types. It is important to note that each component of spending is measured relative to total spending, as we recognize that these components are interdependent via the government budget constraint (see Gemmell et al., 2008).

In terms of the results there is little evidence of Wagner's Law as the coefficient of income is negative and statistically significant for most measures of spending. We, however, find a positive effect of income on spending on environmental protection, which is significant in the context of the current debates on sustainable economic growth and development. We find that components of government spending are price inelastic. Contrary to findings in the existing literature, we find that a reduction in overall government spending tends to reduce the share of almost all components of government spending except spending on economic services, non-productive spending, and spending on transfers. In examining the interrelationship between government spending types, we find that government spending types under the COFOG classification, which may be described as "pure public goods" provision, have complementary relationships. We also find similar complementary relationships between spending on the provision of "merit public goods" such as education, health, recreation, culture and religion, and social protection. We find that government spending on pure public good vs merit public goods, pure public goods vs economic services, and pure public goods vs transfers are substitutes. Spending on merit public goods vs economic services and merit public goods vs transfers are, however, complements. Productive and non-productive government spending are almost perfect substitutes with a correlation coefficient of −0.83. Similarly, investment and consumption spending are almost perfect substitutes with a correlation coefficient of −0.86, while transfers and consumption spending are good complements.

The rest of the paper is structured as follows. A literature review of theoretical and empirical evidence on the determinants of government expenditure is covered in Section 2. Methodology is examined in Section 3. Section 4 is devoted to data description. Estimation results are presented and discussed in Section 5, while conclusions are given in Section 6.

## 2 | LITERATURE REVIEW

Much of the early literature on the determinants of government spending cites national income as a major explanatory variable.[3] The effect of national income on government spending is explained by the so-called Wagner's Law—increases in the levels of national income are expected to lead to increases in government spending as a share of national income (Wagner 1893). Another important determinant of aggregate government spending and its components is overall and specific components of the population. For instance, health, social welfare, and other forms of transfer expenditures are likely to increase as the share of old population in the overall population increases, while education spending increases with increasing share of the young population; changes in total population can affect aggregated and components of

government spending. There may be economies of scale associated with increasing population as the marginal cost of providing public goods may reduce with increasing total population (Alesina and Wacziarg, 1998). The latter notwithstanding, overcrowding and congestion due to increasing urbanization may be associated with increasing social costs and reduced individual welfare, requiring an increase in government spending to restore efficiency.

A closely related contribution is Shelton (2007), who examines the size and composition of government spending. The paper is similar as it uses data disaggregated by category of spending and tests different hypotheses of government spending within a unified specification. The paper finds a positive effect of total population on health spending, a positive effect of the fraction of young population on defense and consumption spending, a positive effect of the fraction of old population on total and consumption spending, and a positive effect of income on defense spending. The paper also finds trade openness has a positive effect on total spending, health and transport spending, as well as wages and salaries. The current paper adds to this by introducing other categories such as pure public goods, merit goods, economic services, and social protection. Also, I consider components of government spending both as shares of GDP and as shares of total spending and introduce complementarity and substitutability.

## 3 | METHODOLOGY

### 3.1 | Panel fixed effect model specification

To examine the determinants of components of government spending, we adopt the following two-way fixed effect estimation equation:

$$Spend_{it} = \alpha + \beta X_{it} + \gamma Year_t + \mu_i + \epsilon_{it} \quad (1)$$

where $Spend_{it}$ is a vector of components of spending, and $i$ and $t$ refer to the country and year, respectively. All spending types are given as shares of total spending. $X_{it}$ refers to our control variables, which are real GDP per capita, the price ratio—ratio of the price level of government consumption to the price level of household consumption, total population, dependency ratio—ratio of the sum of young and old population to total population, urbanization, and total spending as a share of GDP. We include the latter to allow us to interpret the right-hand-side (RHS) variables as the elasticity of the natural logarithm of each dependent variable to GDP with respect to each RHS variable. The elasticity of total spending as a share of GDP is however one plus the estimated elasticities (see Gemmell et al., 2008 for detailed explanations).[4] Country dummy is given by $\mu_i$, while $\epsilon_{it}$ refers to the error term. All variables are used in the natural logarithm form. We estimate Equation 1 using data for the period 1990–2017.

In terms of methods, we first use the two-way fixed effects estimator, which accounts for possible omitted variable bias, which may be from country-specific or time-specific characteristics. Given that the group of countries in our panel data set is independent, heterogeneous, and susceptible to shocks from each other, we account for possible cross-sectional dependence within the data by using Driscoll-Kraay standard errors (DK-SE, see Driscoll and Kraay, 1998; see also Anderson and Obeng, 2021). DK-SEs are heteroscedasticity-consistent and robust to general forms of temporal and cross-sectional dependence and are especially relevant in our case with smaller time dimensions. We then adopt the system-GMM, which allows us to control for contemporaneous endogeneity and persistence by including the lag of the dependent

variable as a control variable (Arellano and Bond, 1991; Blundell and Bond, 1998; Roodman, 2009a, 2009b). Sources of such persistence in the dependent variable may be: (a) previous levels of government spending determining current levels of spending and (2) government spending decisions covering more than one period.

## 3.2 | Seemingly unrelated regression estimation

As stated earlier, we examine the correlations of the residuals of the spending categories to determine the effect of a change in one category of spending on other categories of spending using the SURE model.

A seemingly unrelated regression (SURE) estimation combines several individual relationships connected by correlated disturbances, providing simultaneous regression coefficients in all equations (Moon and Perron, 2006). The estimation procedure adopts the estimates of the variances and covariances of the disturbance terms based on the residuals obtained from an equation-by-equation application of least squares (Zellner, 1962). Two main advantages of using the SUR estimator are that (1) SURE provides efficiency in estimation by combining information on different estimations and (2) SURE allows the imposition and/or the test of restrictions involving parameters within different equations (Zellner, 1962; Moon and Perron, 2006). The coefficients of SUR estimations are at least asymptotically more efficient than those of single equation least-squares estimators. The efficiency gains can be quite substantial if there are no high levels of correlations between independent variables in different equations and if there exist high correlations between disturbance terms in different equations (Zellner, 1962). In some special cases, the efficiency gains may disappear (see Kruskal, 1968; Davidson and Mackinnon, 1993; Greene, 2003; Moon and Perron, 2006). The procedure can be appropriately applied to regression equations where each equation refers to a given classification category and the observations refer to different points in space (Zellner, 1962 pp. 349). Therefore, it is quite appropriate to adopt a SUR estimation in this case since the use of different components of an overall measure of government spending may imply some level of correlation among the equations' disturbances, even though the independent variables may not be highly correlated.

We provide a baseline SURE model as follows: Assume a dependent variable $y_i$ and a vector. $'$ of $K_i$ independent variables given as $x_i = (1,x_{it,1},x_{it,2},\ldots,x_{it,Ki-1})$ for each observable unit $i$, and an unobserved error term, $\mu_{it}$. The index $it$ represents the $t$th observation of the $i$th equation in the system, and $t$ could represent time dimension or may refer to a location in space (Moon and Perron, 2006). Therefore, a typical linear SUR model can be represented by a system of linear regression equations given as[5]

$$'$$

$$y1t = \beta 1\mathrm{x}it + \mu it$$

$$yNt = \beta_N \mathrm{x}Nt + \mu Nt$$

where $i = 1,\ldots,N$ and $t = 1,\ldots,T$, and $L = K_1 + K_N$. This can be further simplified by stacking the observations either in the $t$ dimension or for each $i$ to obtain:

$$Y_t = X_t\beta + U_t \tag{2}$$

where $Y_t = [y_{1t},...,y_{Nt}]$, a block-diagonal matrix of the explanatory variables $x_{1t},...,x_{NT}$ given as $\tilde{X_t} = diag(x_{1t},x_{2t},...,x_{NT})$ on its diagonal, the vector of the coefficients of the explanatory variables given as $\beta = \left[\beta_1', ...\beta_N'\right]'$, and the variance matrix of the error vector defined as $Var(U_t) = \Sigma$.

The classical linear SURE model stated assumes a full rank $K_i$ for $x_i = [x_{i1},...,x_{iT}]$ for each $i = 1,...,N$. It also assumes that the errors are iid over time with zero mean and constant variance, conditional on all the explanatory variables. The matrix is also assumed as positive definite. A SURE model can also be represented as a multivariate regression with parameter restrictions (see Moon and Perron, 2006). The classical SURE model can be estimated using the ordinary least squares estimator, the generalized least squares and feasible estimator, the Gaussian quasi-maximum likelihood estimator, the minimum distance estimator, the Bayes estimator, empirical Bayes estimator, or shrinkage estimators (cf. Moon and Perron, 2006). Extensions can be made to the classical linear SURE model if the assumptions on the disturbance terms stated earlier are not satisfied. Such extensions may be to accommodate autocorrelations and heteroscedasticity, endogenous regressors, vector autoregressions, seemingly unrelated cointegration regressions, and nonlinear SURE (see Moon and Perron, 2006).

Given that the equations in our system have identical explanatory variables, we adopt the two-stage least squares approach to the SURE as the results from this approach are similar to those from a three-stage least squares estimations.[6] We determine complementarity/substitutability between government spending types from the correlation matrix of the residuals from the estimates of the SURE model.

## 4 | DATA DESCRIPTION

Our measures of government spending type are considered according to the COFOG (United Nations, 2000) spending groupings. COFOG classifies government spending according to the purpose for which it is used. This makes it independent from the government's organizational structure and allows us to compare the socioeconomic functions of governments between countries and over time (Gemmell et al., 2008). The data used are aggregated at the general government level, avoiding the differential levels of federalism across different countries. There are two levels of the COFOG data. The first level splits government spending into 10 functional categories or groups of spending, while the second level splits each first level of spending into nine subgroups. We include all 10 first-level categories of spending in our study, namely, general public services; public order and safety; defense; health; education; housing and community amenities; economic affairs; environmental protection; recreation, culture, and religion; and social protection. We then group these spending categories into (1) pure goods, merit goods, economic services, and transfers; (2) productive and non-productive; and (3) productive entering in flow, productive entering in stock, economic services, and social welfare. We do these following Oxley and Martin (1991), Saunders (1993), Kneller et al. (1999), and Gemmell et al. (2008). Details of our spending grouping are provided in Table 1. Our explanatory variables remain as described earlier. Data on our explanatory variables are sourced from the World Bank, World Development Indicators (WDI, 2019).

**TABLE 1** Classifications of government spending by function

| Our study | Gemmell et al. (2008) | Oxley and Martin (1991) | Kneller et al. (1999) | Kneller et al. (1999) |
|---|---|---|---|---|
| General public services | Public services | Pure goods | Productive | Productive-flows |
| Public order and safety | | | | |
| Defense | Defense | | | |
| Health | Health | Merit goods | | Health |
| Education | Education | | | Productive-stock |
| Housing and community amenities | Housing | | | |
| Economic affairs | Economic services | Economic services | Non-productive | Economic services |
| | Transport and community | | | |
| Environment | | | | |
| Recreation | Social welfare | Transfers | | Recreation |
| Social protection | | | | Social welfare |
| | | Others | Others | Others |

*Note*: Columns 1–5 refer to the following groupings: (1) our study/COFOG, (2) Gemmell et al. (2008), (3) Oxley and Martin (1991) and Saunders (1993), (4) Kneller et al. (1999) and (5) Kneller et al. (1999), respectively.

## 5 | ESTIMATION RESULTS

In the first subsection, we discuss the estimation results on the determinants of components of government spending followed by the results for the interrelationship between government spending types. Summary statistics are provided in Appendix 1.

### 5.1 | Determinants of government spending

For each component of spending, each set of results includes estimation results from the DK-SE and GMM estimation procedures. In almost all cases, the GMM results pass all the necessary diagnostic tests.

### 5.2 | Main results

Our main results in Table 2 are the estimation results from using all 10 first-level groups of spending under the COFOG classification. The columns of results refer to results for general public services (Pubserv); defense (Defense); public order and safety (Order); economic affairs (Ecoaffa); environmental protection (Environment); housing and community amenities (Housing); health (Health); recreation, cultural, and religious affairs (Recreat); education (Educate); and social protection (Social protection), respectively.

From the results, except economic affairs and environmental protection, we find a negative effect of income on government spending, which is contrary to the expectations of the Wagner's Law. The positive effect of income on economic affairs on environmental protection is, however, typical of countries as national income levels increase. Examples of subgroups of spending on economic affairs include transport and communication, R&D economic affairs, manufacturing, and construction, as well as general economic, commercial, and labor affairs. Environmental protection, on the contrary, includes waste management, wastewater management, pollution abatement, protection of biodiversity and landscape, R&D on environmental protection, among others. These are typical priority areas of countries as their income levels increase.

The results show that government spending on defense, public order and safety, health, recreation, and social protection are price inelastic as shown by the coefficients of the price ratio variable, similar to evidence found by Borcheding et al. (2004).

For the population variable, we find that an increasing population tends to be associated with reduced government spending levels on public order and safety, housing and community amenities, economic affairs, as well as recreation, culture, and religion, suggesting possible evidence of economies of scale in the provision of such government services. The statistically insignificant coefficient of the total population variable for government spending on public services, defense, general public service, health, environmental protection, and social protection confirms these goods as pure public goods (see Borcherding & Deacon, 1972; Bergstrom & Goodman, 1973; and Obeng and Sakyi, 2017).

An increase in the dependency ratio is seen to be associated with an increase in spending on recreation, culture, and religion but a reduced spending on housing, although its effect on economic affairs is unclear (positive for DK-FE but negative for GMM).

The coefficients of the urbanization variable suggest that there are economies of scale in government spending on general public services, defense, economic affairs, and housing and community amenities with increasing urbanization. The coefficient of the urbanization variable on these components of spending is negative and statistically significant. On the contrary, increasing urbanization is associated with increased spending on public order and safety, environmental protection, education, and social protection. The coefficient of the urbanization variable is positive and statistically significant for the latter groups of spending. The findings here could be explained in different ways. Residents of urban communities are likely to provide own security measures to complement government efforts. Private provision of housing and community amenities is likely to be high in urban settlements, which complements government efforts. However, a crowded urban settlement will require higher spending on public order and safety and greater efforts from the government toward environmental protection. Similarly, there will be higher demand for the provision of education and social protection services in urban centers. The largest influence of urbanization is on government spending on social protection, which includes subgroup spendings on old age, sickness and disability, family and children, unemployment, social exclusion, R&D on social protection, and social protection itself.

Contrary to the findings of Sanz and Velazquez (2003) and Gemmell et al. (2008), we find that a reduction in the size of government spending tends to reduce the share of all government spending types. Therefore, no spending type seems protected from cutbacks in overall spending.

### 5.2.1 | Alternative classifications of government spending 1

Our first group of alternative classifications of government spending follows Oxley and Martin (1991) and Saunders (1993). Here we classify spending as pure public goods (general public

**TABLE 2** Components of government spending-COFOG (1990–2017)

| | Pubserv | | Defense | | Order | | Ecoaffa | | Environment | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variables | DK-FE 1 | GMM 2 | DK-FE 3 | GMM 4 | DK-FE 5 | GMM 6 | DK-FE 7 | GMM 8 | DK-FE 9 | GMM 10 |
| L.Dependent | | 0.830*** | | 0.964*** | | 0.846*** | | 0.717*** | | 0.774*** |
| | | (0.0230) | | (0.0155) | | (0.0332) | | (0.0507) | | (0.0447) |
| RGDP pc | −0.345*** | −0.0425 | −0.321*** | 0.0636 | −0.783*** | −0.135*** | 0.354* | −0.0707 | 0.578 | 0.180** |
| | (0.121) | (0.0309) | (0.106) | (0.0474) | (0.131) | (0.0470) | (0.207) | (0.0441) | (0.527) | (0.0815) |
| Price ratio | 0.0515 | 0.0131 | 0.0991** | −0.0735*** | 0.132** | −0.0190 | 0.0137 | 0.0108 | 0.154 | 0.0455 |
| | (0.0538) | (0.0331) | (0.0404) | (0.0247) | (0.0473) | (0.0287) | (0.0406) | (0.0276) | (0.181) | (0.0830) |
| Population | −0.548 | 0.0555 | 0.206 | 0.103 | −0.424 | −0.203*** | 0.913 | −0.226** | −0.131 | 0.123 |
| | (0.325) | (0.0848) | (0.334) | (0.0812) | (0.262) | (0.0770) | (0.593) | (0.0896) | (1.785) | (0.208) |
| Dependency | −0.190 | 0.102 | 0.252 | 0.0429 | 0.165 | −0.0699 | 0.659* | −0.178** | 0.502 | 0.0925 |
| | (0.192) | (0.0862) | (0.288) | (0.0524) | (0.219) | (0.0658) | (0.326) | (0.0882) | (1.070) | (0.210) |
| Urbanization | 0.133 | −0.0642* | 0.158 | −0.0469** | 1.089*** | −0.00516 | −0.287 | −0.0970** | 1.748** | −0.125 |
| | (0.176) | (0.0352) | (0.191) | (0.0221) | (0.292) | (0.0383) | (0.238) | (0.0474) | (0.653) | (0.115) |
| Total spend | −0.0628 | −0.0460* | −0.299*** | 0.0487 | −0.532*** | −0.127*** | 0.142 | −0.0378 | −0.0288 | 0.0530 |
| | (0.0854) | (0.0268) | (0.101) | (0.0553) | (0.107) | (0.0460) | (0.213) | (0.0548) | (0.268) | (0.0930) |
| AR(2) | | 0.28(0.778) | | −0.12(0.908) | | −0.51(0.612) | | 0.96(0.339) | | 0.56(0.572) |
| Sargen test | | 1,160.54 (0.000) | | 1,169.05 (0.000) | | 1,290.98 (0.000) | | 1,238.22 (0.000) | | 1,118.78 (0.000) |
| Hansen test | | 99.33(1.000) | | 81.11(1.000) | | 81.00(1.000) | | 80.59(1.000) | | 27,700.49 (0.000) |
| Diff-in Hansen test | | 13.89(0.988) | | 6.46(1.000) | | −0.07(1.000) | | −3.05(1.000) | | |
| Observations | 1,585 | 1,422 | 1,510 | 1,355 | 1,551 | 1,392 | 1,585 | 1,422 | 1,105 | 992 |

TABLE 2 (Continued)

| | Housing | | Health | | Recreat | | Educate | | Social protection | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variables | DK-FE 11 | GMM 12 | DK-FE 13 | GMM 14 | DK-FE 15 | GMM 16 | DK-FE 17 | GMM 18 | DK-FE 19 | GMM 20 |
| L.Dependent | | 0.760*** | | 0.969*** | | 0.856*** | | 0.914*** | | 0.916*** |
| | | (0.0373) | | (0.0144) | | (0.0290) | | (0.0353) | | (0.0196) |
| RGDP pc | −0.125 | −0.248*** | −0.382*** | −0.0596* | −0.663*** | 0.0387 | −0.386*** | −0.0651** | −0.687*** | 0.0327 |
| | (0.188) | (0.0740) | (0.0870) | (0.0333) | (0.118) | (0.0775) | (0.0618) | (0.0295) | (0.108) | (0.0481) |
| Price ratio | −0.184 | −0.0195 | 0.0732** | −0.0117 | 0.160* | −0.00477 | 0.0229 | −0.00936 | −0.0778* | 0.00175 |
| | (0.110) | (0.0569) | (0.0282) | (0.0176) | (0.0813) | (0.0433) | (0.0348) | (0.0141) | (0.0430) | (0.0275) |
| Population | −0.658 | −0.578*** | −0.462 | −0.0180 | 0.0133 | −0.0687 | −0.454** | −0.0285 | 0.419 | −0.0851 |
| | (0.520) | (0.163) | (0.278) | (0.0574) | (0.482) | (0.113) | (0.186) | (0.0443) | (0.606) | (0.0673) |
| Dependency | −1.250** | −0.367** | 0.357 | 0.0806 | 0.622** | −0.0663 | −0.0527 | 0.0802 | −0.207 | −0.101 |
| | (0.492) | (0.154) | (0.210) | (0.0563) | (0.283) | (0.0931) | (0.134) | (0.0533) | (0.346) | (0.0731) |
| Urbanization | −1.336* | −0.00650 | 0.0982 | −0.000244 | 0.285 | 0.0633 | 0.545*** | −0.0289 | 2.649*** | 0.0361 |
| | (0.677) | (0.0691) | (0.200) | (0.0196) | (0.170) | (0.0492) | (0.124) | (0.0199) | (0.588) | (0.0319) |
| Total spend | −0.536*** | −0.201** | −0.387*** | −0.0991** | −0.715*** | 0.0190 | −0.416*** | −0.103*** | −0.540*** | 0.00907 |
| | (0.119) | (0.0791) | (0.0946) | (0.0426) | (0.132) | (0.102) | (0.0538) | (0.0392) | (0.121) | (0.0545) |
| AR(2) | | −0.31(0.755) | | 0.14(0.887) | | −0.85(0.397) | | 0.85(0.394) | | 1.76(0.078) |
| Sargen test | | 1,155.70 (0.000) | | 1,341.61 (0.000) | | 1,193.85 (0.000) | | 1,265.06 (0.000) | | 1,077.08 (0.001) |
| Hansen test | | 90.28(1.000) | | 95.30(1.000) | | 75.24(1.000) | | 92.56(1.000) | | 96.43(1.000) |
| Diff-in Hansen test | | 1.03(1.000) | | 13.84(0.983) | | 1.10(1.000) | | 7.64(1.000) | | 7.28(1.000) |
| Observations | 1,572 | 1,411 | 1,584 | 1,420 | 1,462 | 1,309 | 1,579 | 1,416 | 1,541 | 1,383 |

*Note*: Fixed effect and GMM estimations. All regressions include a constant term. Robust standard errors clustered at the district level are in parenthesis. The dependent variables are measured in real per capita terms. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

services + defense + public order and safety), merit public goods (housing + health + education), economic services (economic affairs + environmental protection + recreation), and transfers (social protection). The results are given in Table 3.

The results show that government spending on pure public goods, merit public goods, and transfers reduces as income increases, while spending on economic services increases with income. There are economies of scale in the provision of pure and merit goods, but spending on economic services and transfers increases with increases in the total population. The effect of the dependency ratio on economic services provision is unclear. Urbanization is associated with increased spending on transfers and merit goods, although its effect on pure public goods is unclear. Constraints in overall spending are associated with cutbacks on spending on pure public goods, merit goods, and transfers, but spending on economic services tends to be protected.

### 5.2.2 | Alternative classifications of government spending 2

In our second alternative classifications of government spending, we follow Kneller et al. (1991). We use two sets of classifications: (1) productive (general public services + defense + public order and safety + housing and community amenities + health + education) vs non-productive (economic affairs + environmental protection + recreation, culture, and religion + social protection); and (2) productive entering into flow (general public services + defense + public order and safety) vs productive entering into stock (housing + education) vs social welfare (social protection). The results are given in Table 4.

The results show that as income increases non-productive spending increases while productive spending reduces. An increase in total population is associated with an increase in non-productive spending but a decrease in productive spending. Urbanization has a positive effect on both productive and non-productive spending. As total spending increases, governments cut back on productive spending, although what happens to non-productive spending is not significantly different from zero.

In the second set of classifications, we find that increasing income is associated with reduced levels of productive spending entering as flows and as stocks as well as social welfare spending.

The price ratio of productive spending entering as stocks is inelastic. An increase in population leads to a reduction in productive spending entering both as flows and stocks but increased social welfare spending. Dependency ratio has a negative effect on productive spending entering as stocks. The effect of urbanization is positive for social welfare spending but unclear for productive spending entering as flows. Cutbacks in overall spending lead to cutbacks in all the spending types considered here.

### 5.2.3 | Alternative classifications of government spending 3-ECOG

Outside the COFOG classification of spending, we consider the ECOG. This is a classification of general government spending by the economic nature of the transactions. The classification therefore considers the implications of government spending decisions on the economy. We consider three main categories under the ECOG: consumption spending (wages and salaries +-goods and services), investment spending (capital spending), and transfers (social benefits). Here also, we obtain results for both DK-FE and GMM (Table 5).

**TABLE 3** Alternative classifications of government spending 1, 1990–2017

| Variables DK-FE | | Pure | Merit | | Economic services | | | Transfers |
|---|---|---|---|---|---|---|---|---|
| | | GMM | DK-FE | GMM | DK-FE | GMM | DK-FE | GMM |
| 1 | | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| L.Dependent | | 0.893*** | | 0.945*** | | 0.848*** | | 0.943*** |
| | | (0.0190) | | (0.0352) | | (0.0375) | | (0.0175) |
| RGDPpc | −0.491*** | −0.0432* | −0.469*** | −0.0555*** | 0.663*** | −0.0119 | −0.272** | 0.00395 |
| | (0.0529) | (0.0227) | (0.0411) | (0.0206) | (0.125) | (0.0224) | (0.130) | (0.0423) |
| Price ratio | 0.0606 | −0.0133 | −0.0268 | 0.00681 | 0.00503 | 0.0231 | 0.00685 | −0.00306 |
| | (0.0414) | (0.0160) | (0.0291) | (0.0142) | (0.0318) | (0.0191) | (0.0752) | (0.0253) |
| Population | −0.480** | −0.0198 | −0.684*** | −0.0317 | 1.355** | −0.0907 | 1.103* | −0.0249 |
| | (0.178) | (0.0358) | (0.192) | (0.0432) | (0.503) | (0.0588) | (0.626) | (0.0530) |
| Dependency | −0.0650 | 0.0241 | −0.127 | 0.0580 | 0.597** | −0.110** | 0.186 | −0.0146 |
| (0.0940) | | (0.0370) | (0.112) | (0.0422) | (0.258) | (0.0559) | (0.332) | (0.0530) |
| Urbanization | 0.338*** | −0.0332* | 0.182 | 0.00439 | 0.283 | −0.00453 | 1.424*** | 0.0575* |
| (0.0935) | | (0.0174) | (0.140) | (0.0154) | (0.211) | (0.0305) | (0.431) | (0.0300) |
| Total spend | −0.293*** | −0.0460* | −0.450*** | −0.0853*** | 0.420*** | 0.0286 | −0.449*** | −0.0108 |
| (0.0325) | | (0.0257) | (0.0368) | (0.0265) | (0.0868) | (0.0269) | (0.0943) | (0.0501) |
| AR(2) | | 0.70(0.486) | | −0.80(0.424) | | 1.46(0.144) | | 0.78(0.435) |
| Sargen test | | 1,019.52(0.025) | | 1,053.08(0.004) | | 891.67(0.114) | | 966.06(0.207) |
| Hansen test | | 66.07(1.000) | | 69.13(1.000) | | 49.99(1.000) | | 91.35(1.000) |
| Diff-in Hansen test | | 2.83(1.000) | | 0.00(1.000) | | 0.02(1.000) | | |
| Observations | 1,323 | 1,189 | 1,323 | 1,189 | 1,161 | 1,043 | 1,285 | 1,154 |

*Note*: Fixed effect and GMM estimations. All regressions include a constant term. Robust standard errors clustered at the district level are in parenthesis. The dependent variables are measured in real per capita terms. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

**TABLE 4** Alternative classifications of government spending 2, 1990–2017

| | Productive | | Non-productive | | Productive flow | | Productive stock | | Social welfare | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DK-FE | GMM | DK-FE | GMM | DK-FE | GMM | DK-FE | GMM | DK-FE | GMM |
| **Variables** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| L.Dependent | | 0.886*** | | 0.927*** | | 0.893*** | | 0.798*** | | 0.943*** |
| | | (0.0346) | | (0.0238) | | (0.0190) | | (0.0436) | | (0.0175) |
| RGDP pc | −0.472*** | −0.0415* | 0.345** | 0.0201 | −0.491*** | −0.0432* | −0.419*** | −0.108** | −0.272** | 0.00395 |
| | (0.0386) | (0.0245) | (0.139) | (0.0202) | (0.0529) | (0.0227) | (0.0591) | (0.0519) | (0.130) | (0.0423) |
| Price ratio | 0.0415 | −0.00418 | −0.0514 | 0.0216* | 0.0606 | −0.0133 | −0.0574* | −0.0146 | 0.00685 | −0.00306 |
| | (0.0257) | (0.0111) | (0.0438) | (0.0115) | (0.0414) | (0.0160) | (0.0334) | (0.0294) | (0.0752) | (0.0253) |
| Population | −0.587*** | −0.0178 | 1.099** | −0.0188 | −0.480** | −0.0198 | −0.747*** | −0.0855 | 1.103* | −0.0249 |
| | (0.156) | (0.0230) | (0.467) | (0.0302) | (0.178) | (0.0358) | (0.222) | (0.101) | (0.626) | (0.0530) |
| Dependency | −0.112 | 0.0296 | 0.470** | −0.0642** | −0.0650 | 0.0241 | −0.426*** | −0.0172 | 0.186 | −0.0146 |
| | (0.0761) | (0.0215) | (0.204) | (0.0321) | (0.0940) | (0.0370) | (0.125) | (0.0979) | (0.332) | (0.0530) |
| Urbanization | 0.265*** | −0.0103 | 0.485** | 0.0440** | 0.338*** | −0.0332* | 0.0966 | −0.00139 | 1.424*** | 0.0575* |
| | (0.0751) | (0.0124) | (0.202) | (0.0193) | (0.0935) | (0.0174) | (0.160) | (0.0407) | (0.431) | (0.0300) |
| Total spend | −0.334*** | −0.0471* | 0.117 | 0.0464** | −0.293*** | −0.0460* | −0.423*** | −0.0459 | −0.449*** | −0.0108 |
| | (0.0274) | (0.0268) | (0.104) | (0.0204) | (0.0325) | (0.0257) | (0.0451) | (0.0518) | (0.0943) | (0.0501) |
| AR(2) | | 0.64(0.524) | | 0.17(0.868) | | 0.70(0.486) | | 1.41(0.157) | | 0.78(0.435) |
| Sargen test | | 1,017.66 (0.028) | | 964.88 (0.002) | | 1,019.52 (0.025) | | 1,249.83 (0.000) | | 966.06 (0.207) |
| Hansen test | | 74.73(1.000) | | 63.52(1.000) | | 66.07(1.000) | | 98.45(1.000) | | 91.35(1.000) |
| Diff-in Hansen | T | | | | | 2.83(1.000) | | 0.00(1.000) | | |
| Observations | 1,323 | 1,189 | 1,161 | 1,043 | 1,323 | 1,189 | 1,323 | 1,837 | 1,285 | 1,154 |

*Note*: Fixed effect and GMM estimations. All regressions include a constant term. Robust standard errors clustered at the district level are in parenthesis. The dependent variables are measured in real per capita terms. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

**TABLE 5** Alternative classifications of government spending 3—ECOG, 1990–2017

| | Consumption | | Investment | | Transfers | |
|---|---|---|---|---|---|---|
| | DK-FE | GMM | DK-FE | GMM | DK-FE | GMM |
| **Variables** | **1** | **2** | **3** | **4** | **5** | **6** |
| L.Dependent | | 0.907*** | | 0.798*** | | 0.871*** |
| | | (0.0394) | | (0.0436) | | (0.0227) |
| RGDP pc | −0.0773** | −0.000365 | 0.0431 | −0.108** | 0.824** | 0.110** |
| | (0.0359) | (0.00909) | (0.174) | (0.0519) | (0.319) | (0.0428) |
| Price ratio | 0.0355** | −0.00119 | −0.103 | −0.0146 | −0.159** | −0.0271 |
| | (0.0149) | (0.00680) | (0.0764) | (0.0294) | (0.0762) | (0.0487) |
| Population | −0.154 | −0.00235 | −1.012** | −0.0855 | 1.892 | −0.0717 |
| | (0.101) | (0.0210) | (0.367) | (0.101) | (1.262) | (0.122) |
| Dependency | −0.105* | 0.0154 | −0.0980 | −0.0172 | 0.761 | −0.141 |
| | (0.0527) | (0.0181) | (0.168) | (0.0979) | (0.746) | (0.116) |
| Urbanization | 0.151*** | −0.0107 | −0.375*** | −0.00139 | 0.167 | 0.0211 |
| | (0.0501) | (0.00756) | (0.111) | (0.0407) | (0.178) | (0.0350) |
| Total spend | −0.0161 | −0.0206** | −0.265 | −0.0459 | 0.539** | 0.0522 |
| | (0.0358) | (0.00915) | (0.181) | (0.0518) | (0.234) | (0.0366) |
| AR(2) | | 1.51(0.130) | | 1.41(0.157) | | 0.08(0.935) |
| Sargen test | | 1,348.35 (0.000) | | 1,249.83 (0.000) | | 1,201.04 (0.000) |
| Hansen test | | 107.27(1.000) | | 98.45(1.000) | | 84.80(1.000) |
| Diff-in Hansen test | | 9.29(1.000) | | 0.00(1.000) | | −12.66(1.000) |
| Observations | 2,045 | 1,879 | 2,016 | 1,837 | 1,638 | 1,491 |

*Note*: Fixed effect and GMM estimations. All regressions include a constant term. Robust standard errors clustered at the district level are in parenthesis. The dependent variables are measured in real per capita terms. ***, **, * represent statistical significance at 1%, 5%, and 10% levels, respectively.

The results in Table 5 show evidence of Wagner's Law for government spending on transfers, but consumption and investment spending reduces with income. Both consumption and transfer spending have inelastic price ratio. Increasing total population is associated with reduced investment spending, while increasing dependency ratio leads to reduced consumption spending. Urbanization is associated with increased consumption spending but reduced investment spending. As overall spending increases, governments tend to cut back on consumption spending in favor of transfer spending.

## 5.3 | Interrelationship between government spending types

Next, we examine the results for the interrelationship between government spending types from the SURE model. In all cases, the Breusch and Pagan (1980) LM statistic confirm the validity of

the correlation estimates obtained; that is, the coefficients obtained are indeed independent. We obtain results for all the groups of spending discussed earlier. There is a complementary relationship where the correlation of the residuals of any two spending categories is positive, and a substituting relationship if otherwise. A complementary relationship implies spending on one category leads to corresponding spending on the other, while a substituting relationship suggests changes in one category of spending occurs at the expense of the other category of spending. While including total spending as an explanatory variable in our DK-FE and GMM estimations shows the implications of changes in overall spending for individual components of spending, our results here show evidence on the effects of changes in a government's emphasis on a particular type of spending on other types of spending. In other words, what may be the competing or complementary demands on decisions on specific categories of spending?

### 5.3.1 | Interrelationship between government spending types—COFOG

The results for the COFOG groups of spending are given in Table 6. We find a complementary relationship between government spending on general public service, and defense and public order and safety spending. These are elements of pure public goods provision. Therefore, increasing the former is associated with corresponding increases in the latter groups of spending. All other types of spending are substitutes for general and public service spending, implying a reduction in the former as all other types of spending increase.

Defense spending has a complementary relationship with general public service, public order and safety, economic affairs, and housing but a substituting relationship with all others.

In addition to the above relationships, public order and safety has a complementary relationship with economic affairs, housing and community amenities, and education, but a substituting relationship with environmental protection, health, recreation, and social protection.

Government spending on economic affairs has a complementary relationship with housing and education but a substituting relationship with environment, health, recreation, and social protection.

Spending on environmental protection has a substituting relationship with spending on health but a complementary relationship with spending on health, recreation, education, and social protection.

Spending on housing has a substituting relationship with spending on health and social protection, but a complementary relationship with spending on recreation and education.

We find that spending on health is complemented by spending on recreation, education, and social protection. Spending on recreation is complemented by spending on education and social protection. Spending on education is complemented by spending on social protection.

In sum, from the correlation matrix, the biggest complements seem to be health spending and social protection spending, while the biggest substitutes seem to be general public services spending and social protection spending.

### 5.3.2 | Interrelationship between government spending types, alternative 1

Next, we discuss the results for the interrelationship between spending on pure public goods, merit public goods, economic services, and transfers. The results are given in Table 7.

**TABLE 6** Correlation matrix of SURE estimates for COFOG groups of spending

| | Pubserv | Defense | Order | Ecoaffa | Env | Housing | Health | Recreat | Educate | Socprot |
|---|---|---|---|---|---|---|---|---|---|---|
| Pubserv | 1 | | | | | | | | | |
| Defense | 0.0792 | 1 | | | | | | | | |
| Order | 0.1133 | 0.243 | 1 | | | | | | | |
| Ecoaffa | −0.1173 | 0.0161 | 0.2078 | 1 | | | | | | |
| Env | −0.3434 | −0.3647 | −0.0926 | −0.0495 | 1 | | | | | |
| Housing | −0.0692 | 0.0935 | 0.3184 | 0.2463 | −0.0148 | 1 | | | | |
| Health | −0.4248 | −0.4448 | −0.0842 | −0.2485 | 0.4819 | −0.0314 | 1 | | | |
| Recreat | −0.3669 | −0.3536 | −0.1218 | −0.106 | 0.3841 | 0.0434 | 0.3837 | 1 | | |
| Educate | −0.1076 | −0.1434 | 0.3151 | 0.0517 | 0.1719 | 0.2357 | 0.3291 | 0.1368 | 1 | |
| Socprot | −0.5392 | −0.3146 | −0.2250 | −0.2386 | 0.4872 | −0.1298 | 0.5645 | 0.3806 | 0.0415 | 1 |

*Note*: Breusch-Pagan test of independence 3,996.937(0.0000).

**TABLE 7** Correlation matrix of SURE estimates for alternative 1

| | Pure | Merit | Econ Serv | Transfers |
|---|---|---|---|---|
| Pure | 1 | | | |
| Merit | −0.3625 | 1 | | |
| Econ Serv | −0.1555 | 0.1307 | 1 | |
| Transfers | −0.6882 | 0.2789 | −0.1665 | 1 |

*Note*: Breusch-Pagan test of independence 973.555(0.0000).

**TABLE 8** Correlation matrix of SURE estimates for alternative 2

| | Productive | Non-productive | |
|---|---|---|---|
| Productive | 1 | | |
| Non-productive | −0.8272 | 1 | |
| | **Productive flow** | **Productive stock** | **Social welfare** |
| Productive flow | 1 | | |
| Productive stock | −0.0042 | 1 | |
| Social welfare | −0.6844 | −0.0187 | 1 |

*Note*: Breusch-Pagan test of independence 905.284(0.000) and 680.565(0.000), respectively.

The results show that government spending on pure public goods seems to compete with spending on merit goods, economic services, and transfers, as shown by the negative correlation. Spending on merit goods is complemented by corresponding spending on economic services and transfers. Spending on economic services and transfers are, however, substitutes. Here also, the biggest complements are spending on merit goods and transfer spending, while the biggest substitutes are spending on pure goods and transfer spending.

### 5.3.3 | Interrelationship between government spending types, alternative 2

The results in Table 8 show a substituting relationship between productive and non-productive spending. There is a substituting relationship between productive spending entering as flow and productive spending entering; and productive spending entering as flows and social welfare spending. There is a substituting relationship between productive spending entering as stock and social welfare spending.

### 5.3.4 | Interrelationship between government spending types, alternative 3—ECOG

Finally, we discuss the results for the ECOG categories of spending shown in Table 9. The results show a complementary relationship between transfers and consumption spending but a substituting relationship between transfers and investment spending, and consumption and investment spending.

**TABLE 9** Correlation matrix of SURE estimates for alternative 3—ECOG

| | Transfers | Consumption | Investment |
|---|---|---|---|
| Transfers | 1 | | |
| Consumption | 0.6032 | 1 | |
| Investment | −0.5078 | −0.8610 | 1 |

*Note*: Breusch-Pagan test of independence 2,566.293(0.000).

## 6 | CONCLUSIONS

This paper examines the determinants and interrelationship of components of government spending using data for up to 142 countries over the period 1990–2017. We make use of two-way fixed effect estimator with Driscoll-Kraay standard errors, which accounts for cross-sectional dependence and a system GMMs estimator to examine the determinants of components of spending. We then adopt the SURE estimation technique to examine the interrelationship between government spending types. Our categories of spending are based on the Classification of Functions of Government (COFOG) and a further grouping based on evidence from existing literature. In the latter, we consider spending on pure public goods, merit goods, economic services, and transfers, in addition to production spending, non-productive spending, productive spending entering as flows, productive spending entering as stocks, as well as social welfare spending. We then use additional spending categories from the ECOG spending such as consumption, investment, and transfer spending.

From our results, there is little evidence of Wagner's Law as the coefficient of income is negative and statistically significant for most measures of spending. Our finding of a positive effect of income on spending on environmental protection is, however, significant in the context of the current debates on sustainable economic growth and development. We find that components of government spending are price inelastic. The effects of total population, the dependency ratio, and urbanization, however, depend on the type of government spending under consideration. Contrary to findings in the existing literature, we find that a reduction in overall government spending tend to reduce the share of almost all components of government spending except spending on economic services, non-productive spending, and spending on transfers.

In examining the interrelationship between government spending types, we find that government spending types under the COFOG classification, which may be described as "pure public goods" provision, have complementary relationships. That is, increases in the allocation in one reflect in increases in the allocation to the others. Examples of these are spending on general public services, public order and safety, as well as defense. We also find similar complementary relationships between spending on the provision of "merit public goods" such as education, health, recreation, culture and religion, and social protection. We find that government spending on pure public good vs merit public goods, pure public goods vs economic services, and pure public goods vs transfers are substitutes. Spending on merit public goods vs economic services and merit public goods vs transfers are, however, complements. Productive and non-productive government spending are almost perfect substitutes with a correlation coefficient of −0.83. Similarly, investment and consumption spending are almost perfect substitutes with a correlation coefficient of −0.86, while transfers and consumption spending are good complements.

The current paper therefore provides evidence (1) on the determinants of government spending, (2) the implications of variations in overall spending for components of spending, (3) in addition to evidence on the implications of changes in government emphasis on one or more components of spending on other components of spending. We therefore clearly demonstrate the importance of considering the nuances in government spending decision making.

## ENDNOTES

[1] Early literature on the subject matter includes Baumol (1967), Musgrave (1969a), Borcherding and Deacon (1972), Bergstrom and Goodman (1973), Musgrave and Musgrave (1984), and Henrekson (1993). See Facchini (2014) for a detailed list of literature on the subject matter.

[2] See Aschauer (1989), Barro (1990), Devarajan et al. (1996), Tanzi and Zee (1997), as well as Bose et al. (2007) on the effects of government spending on economic growth; Fan et al. (2008) on the effects of government spending on production, resource allocation and redistribution, and economic growth; as well as Salameh (2000), Fan et al. (2000), Fan and Rao (2008), and Fan et al. (2004) on the effects of government spending on poverty. Other earlier studies include Peacock and Wiseman (1961), Borcherding (1985), and Scartascini and Crain (2021).

[3] Early literature on the subject matter includes Baumol (1967), Musgrave (1969b), Borcherding and Deacon (1972), Bergstrom and Goodman (1973), Musgrave and Musgrave (1984), and Henrekson (1993). See Facchini (2014) for a detailed list of literature on the subject matter.

[4] Let $ln(G_{fit})$ represent each component of spending in country $i$ at time $t$, and $G_{it}$ represents total spending for respective countries and times. If $ln(G_{fit}) = \alpha + ...\beta lnX_{it}... + \gamma ln(G_{it}/Y_{it})$ where $Y_{it}$ represents GDP. Since $ln(G_{fit}/G_{it}) = ln(G_{fit}/Y_{it}) - ln(G_{it}/Y_{it})$, then $ln(G_{fit}/Y_{it}) = \alpha + ...\beta lnX_{it}... + (1 + \gamma)ln(G_{it}/Y_{it})$ (Gemmell et al., 2008).

[5] Adopted from Moon and Perron (2006). For proofs and further reading, see Zellner and Huang (1962), Zellner (1963,1972), Kakwani (1967), Kmenta and Gilbert (1968), Phillips (1977), Srivastava and Giles (1987), Kmenta (1971),Srivastava and Maekawa (1995), and Fiebig (2001)

[6] Like Gemmell et al. (2008), I find similar results (available upon request) with 3SLS.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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**How to cite this article:** Obeng, S. K. (2022). On the determinants and interrelationship of components of government spending. *Review of Development Economics*, *26*(4), 2414–2435. https://doi.org/10.1111/rode.12921

# APPENDIX A

**APPENDIX 1** Summary statistics

| Variable | Obs. | Mean | SD | Min. | Max. |
|---|---|---|---|---|---|
| *Components of spending* | | | | | |
| Public service | 1,777 | 0.218394 | 0.134669 | 0.007166 | 1.079166 |
| Defense | 1,777 | 0.065434 | 0.071162 | 0 | 0.681983 |
| Order and safety | 1,777 | 0.055467 | 0.03104 | 0 | 0.297239 |
| Economic affairs | 1,777 | 0.144536 | 0.080243 | 0.008049 | 0.569015 |
| Environmental protection | 1,427 | 0.013842 | 0.015513 | −0.00755 | 0.202916 |
| Housing | 1,777 | 0.031486 | 0.0286 | −0.00162 | 0.207056 |
| Health | 1,777 | 0.102665 | 0.046884 | 0 | 0.31989 |
| Recreation | 1,777 | 0.019779 | 0.016225 | 0 | 0.165913 |
| Education | 1,777 | 0.137802 | 0.050281 | 0 | 0.411707 |
| Social protection | 1,777 | 0.214073 | 0.150051 | 0 | 0.620256 |
| Pure | 1,502 | 0.325824 | 0.166316 | 0.088603 | 1.419488 |
| Merit | 1,502 | 0.276494 | 0.085005 | 0.008488 | 0.869352 |
| Transfers | 1,502 | 0.231473 | 0.147105 | 0 | 0.624502 |
| Productive | 1,502 | 0.602318 | 0.169236 | 0.30867 | 2.089416 |
| Non-productive | 1,323 | 0.423718 | 0.131434 | 0.033208 | 0.710952 |
| Economic services | 1,323 | 0.174858 | 0.07721 | 0.02008 | 0.701705 |
| Productive flow | 1,502 | 0.325824 | 0.166316 | 0.088603 | 1.419488 |
| Productive stock | 1,502 | 0.169463 | 0.069587 | 0.006409 | 0.695577 |
| Social welfare | 1,502 | 0.231473 | 0.147105 | 0 | 0.624502 |
| Consumption | 2,348 | 0.883232 | 0.138515 | 0.133435 | 2.068068 |
| Investment | 2,348 | 0.140428 | 0.125347 | −1.06807 | 0.866565 |
| Transfers | 2,099 | 0.206382 | 0.157743 | 0 | 0.613103 |
| *Controls* | | | | | |
| Real GDP pc | 4,520 | 14,702.26 | 17,103.32 | 142.3924 | 159,825.7 |
| Price ratio | 4,520 | 0.924777 | 0.721065 | 0.011078 | 27.34553 |
| Dependency | 5,423 | 0.000043 | 9.57E-05 | 1.96E-08 | 0.000612 |
| Population | 6,059 | 2.95E + 07 | 1.20E + 08 | 9,003 | 1.39E + 09 |
| Urbanization | 6,014 | 56.61354 | 24.54796 | 5.416 | 100 |
| Total expenditure | 2,065 | 0.003206 | 0.01123 | 1.71E-06 | 0.156064 |