

## APPENDIX

In this Appendix we present the results of regressions that exclude one or two out of three decentralization measures. We note, however, that given the statistical significance of these measures in our benchmark regressions, particularly expenditure decentralization and transfer dependence, leaving them out of the equations results in misspecification. This is particularly true when we use only one measure at a time. The system-GMM estimates with only one measure of decentralization included generate low p-values for the Hansen J statistic. Although low p-value for this statistic is often interpreted as undermining the validity of internal instruments, it can instead reflect other forms of model misspecification, which in our case probably results from the exclusion of the remaining fiscal decentralization measures (see Hall 2005).

Tables A1 and A2 present OLS FE and system-GMM estimates, respectively, that include only one or two main measures of fiscal decentralization at a time. Table A3 shows the estimates where we drop either the municipal share of PIT or municipal share of non-PIT taxes. The share of municipal revenue from all taxes is negative and statistically significant in system-GMM specifications (Table A2). As argued in the paragraph above, these equations are probably misspecified. Also, as Table A3 demonstrates, the statistical significance of municipal revenue share comes predominantly from the municipal share of PIT, the revenue from which can be assigned at the unrestricted discretion of the regional government. Moreover, our main finding of the positive effect of expenditure decentralization holds in all specifications in this Appendix.

Table A1. Budget discipline and fiscal decentralization regressions excluding one or two measures of decentralization, 2005-2013 (OLS fixed effects)

Dependent variable: primary budget balance/revenue

| VARIABLES                        | (1)                  | (2)                  | (3)                  | (4)                  | (5)                  | (6)                   |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|
| Expenditure decentralization     | 0.598**<br>(0.255)   |                      |                      | 0.632**<br>(0.240)   | 0.843***<br>(0.286)  |                       |
| Municipal share of all taxes     |                      | 0.110<br>(0.406)     |                      | -0.153<br>(0.389)    |                      | -0.193<br>(0.435)     |
| Transfer dependence              |                      |                      | -0.432***<br>(0.146) |                      | -0.566***<br>(0.166) | -0.458***<br>(0.146)  |
| Consolidated debt/revenue (t-1)  | 0.215**<br>(0.087)   | 0.222**<br>(0.092)   | 0.207**<br>(0.094)   | 0.213**<br>(0.087)   | 0.193**<br>(0.087)   | 0.205**<br>(0.095)    |
| Log of Real per capita GRP (t-1) | -26.263*<br>(15.745) | -29.487*<br>(15.645) | -30.427*<br>(16.180) | -27.049*<br>(14.798) | -24.925<br>(16.311)  | -31.717**<br>(14.864) |
| Share of mining in GRP           | 0.521<br>(0.313)     | 0.553*<br>(0.322)    | 0.558*<br>(0.302)    | 0.490<br>(0.314)     | 0.551*<br>(0.305)    | 0.521<br>(0.317)      |
| Log of population                | 63.531<br>(78.974)   | 94.959<br>(81.432)   | 122.252<br>(75.797)  | 61.554<br>(78.105)   | 86.579<br>(70.890)   | 123.663<br>(74.862)   |
| Growth rate of real GRP          | -0.539<br>(16.722)   | -0.600<br>(15.627)   | 0.765<br>(15.938)    | -2.382<br>(15.936)   | 3.637<br>(17.024)    | -1.497<br>(15.582)    |
| R-squared (within)               | 0.216                | 0.194                | 0.225                | 0.217                | 0.267                | 0.227                 |
| Observations                     | 360                  | 360                  | 360                  | 360                  | 360                  | 360                   |
| Number of regions                | 72                   | 72                   | 72                   | 72                   | 72                   | 72                    |

Notes: Significance levels for coefficient estimates: \*\*\* – 1%; \*\* – 5%; \* – 10%;

Robust standard errors adjusted for clustering by regions are in parentheses;

All regressions contain dummy variables for years

Table A2. Budget discipline and fiscal decentralization regressions excluding one or two measures of decentralization, 2009-2013 (system-GMM)

Dependent variable: Primary balance/revenue

| VARIABLES                        | (1)                 | (2)                 | (3)                  | (4)                 | (5)                  | (6)                  |
|----------------------------------|---------------------|---------------------|----------------------|---------------------|----------------------|----------------------|
| Dependent variable (t-1)         | 0.328***<br>(0.108) | 0.346***<br>(0.128) | 0.366***<br>(0.107)  | 0.324***<br>(0.118) | 0.330***<br>(0.099)  | 0.361***<br>(0.123)  |
| Expenditure decentralization     | 0.652**<br>(0.317)  |                     |                      | 0.746**<br>(0.303)  | 0.854**<br>(0.345)   |                      |
| Municipal share of all taxes     |                     | -0.566*<br>(0.309)  |                      | -0.560**<br>(0.260) |                      | -0.675*<br>(0.389)   |
| Transfer dependence              |                     |                     | -0.698***<br>(0.227) |                     | -0.772***<br>(0.243) | -0.854***<br>(0.256) |
| Consolidated debt/revenue (t-1)  | -0.036<br>(0.090)   | -0.133<br>(0.084)   | -0.071<br>(0.127)    | -0.099<br>(0.082)   | -0.050<br>(0.132)    | -0.163<br>(0.131)    |
| Log of Real per capita GRP (t-1) | 6.765<br>(12.926)   | 0.301<br>(13.834)   | -1.508<br>(16.905)   | -1.684<br>(9.454)   | -9.915<br>(15.717)   | -16.705<br>(16.620)  |
| Share of mining in GRP           | 0.008<br>(0.292)    | 0.123<br>(0.301)    | 0.314<br>(0.355)     | -0.005<br>(0.284)   | 0.281<br>(0.356)     | 0.424<br>(0.379)     |
| Log of population                | 2.394<br>(3.567)    | 2.769<br>(3.848)    | 4.719<br>(5.424)     | 1.405<br>(3.601)    | 3.121<br>(5.191)     | 4.041<br>(6.877)     |
| Growth rate of real GRP          | 17.285<br>(16.132)  | 5.385<br>(14.354)   | 10.313<br>(18.741)   | 12.968<br>(15.047)  | 18.838<br>(17.892)   | 3.650<br>(20.003)    |
| Hansen J p-value                 | 0.073               | 0.038               | 0.064                | 0.034               | 0.215                | 0.668                |
| AR(2) p-value                    | 0.482               | 0.391               | 0.694                | 0.427               | 0.692                | 0.116                |
| Observations                     | 360                 | 360                 | 360                  | 360                 | 360                  | 360                  |
| Number of instruments            | 27                  | 27                  | 27                   | 30                  | 30                   | 30                   |
| Number of regions                | 72                  | 72                  | 72                   | 72                  | 72                   | 72                   |

Notes: Significance levels for coefficient estimates: \*\*\* – 1%; \*\* – 5%; \* – 10%;

Robust standard errors adjusted for clustering by regions are in parentheses;

All regressions contain dummy variables for years

Table A3. Budget discipline and fiscal decentralization excluding some or all measures of municipal revenue shares, 2009-2013

Dependent variable: Primary balance/revenue

| VARIABLES                        | OLS fixed effects    |                      | System-GMM           |                      |
|----------------------------------|----------------------|----------------------|----------------------|----------------------|
|                                  | (1)                  | (2)                  | (3)                  | (4)                  |
| Dependent variable (t-1)         |                      |                      | 0.330***<br>(0.103)  | 0.310***<br>(0.100)  |
| Expenditure decentralization     | 0.888***<br>(0.298)  | 0.866***<br>(0.283)  | 0.859**<br>(0.345)   | 0.883***<br>(0.325)  |
| Municipal share of non-PIT taxes | -0.109<br>(0.396)    |                      | -0.243<br>(0.289)    |                      |
| Municipal share of PIT           |                      | -0.441**<br>(0.175)  |                      | -0.719**<br>(0.327)  |
| Transfer dependence              | -0.586***<br>(0.174) | -0.594***<br>(0.165) | -0.816***<br>(0.252) | -0.790***<br>(0.208) |
| Consolidated debt/revenue (t-1)  | 0.191**<br>(0.085)   | 0.190**<br>(0.088)   | -0.091<br>(0.115)    | -0.061<br>(0.140)    |
| Log of Real per capita GRP (t-1) | -26.002<br>(15.739)  | -21.981<br>(15.493)  | -15.986<br>(11.368)  | -12.648<br>(18.596)  |
| Share of mining in GRP           | 0.541*<br>(0.306)    | 0.552*<br>(0.294)    | 0.342<br>(0.330)     | 0.339<br>(0.374)     |
| Log of population                | 82.927<br>(70.601)   | 96.139<br>(66.686)   | 2.650<br>(5.586)     | 4.031<br>(5.655)     |
| Growth rate of real GRP          | 1.839<br>(17.883)    | 5.001<br>(16.542)    | 18.008<br>(17.586)   | 13.053<br>(20.102)   |
| Hansen J p-value                 |                      |                      | 0.176                | 0.244                |
| AR(2) p-value                    |                      |                      | 0.648                | 0.626                |
| R-squared (within)               | 0.268                | 0.276                |                      |                      |
| Observations                     | 360                  | 360                  | 360                  | 360                  |
| Number of instruments            |                      |                      | 33                   | 33                   |
| Number of regions                | 72                   | 72                   | 72                   | 72                   |

Notes: Significance levels for coefficient estimates: \*\*\* – 1%; \*\* – 5%; \* – 10%;

Robust standard errors adjusted for clustering by regions are in parentheses;

All regressions contain dummy variables for years