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Fiscal Decentralisation
and Public Investment: The
Experience of Latin America

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FISCAL DECENTRALISATION AND PUBLIC INVESTMENT: THE EXPERIENCE OF LATIN AMERICA

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ABSTRACT/RÉSUMÉ

Fiscal decentralisation and public investment: The experience of Latin America

Despite large differences across countries, Latin America's average investment-to-GDP ratio and the overall quality of infrastructure in the region are relatively low by international comparison. Empirical evidence on the effects of fiscal decentralisation on investment based on a panel of Latin American countries since the late 1990 suggests that fiscal decentralisation discourages Latin American subnational governments from investing (acquiring fixed assets) and that lower subnational spending on investment is associated with lower economy-wide gross fixed capital formation. Latin American countries will therefore need to face a double challenge of revisiting the current arrangements for decentralised provision that discourage subnational governments from investing, while making the most of decentralisation as a policy lever to raise private investment.

JEL Classification Codes: H54, H77, O54

Keywords: public investment, decentralisation, Latin America

Décentralisation budgétaire et investissement public : L'expérience de l'Amérique latine

Malgré des différences très marquées d'un pays à l'autre, le taux moyen d'investissement par rapport au PIB et la qualité globale des infrastructures de la région sont relativement faibles par comparaison internationale. Les données empiriques concernant les effets de la décentralisation budgétaire sur l'investissement pour un groupe de pays d'Amérique latine depuis la fin des années 90 montrent que la décentralisation budgétaire décourage les administrations infranationales de ces pays d'investir (c'est-à-dire d'acquérir des actifs immobilisés) et que de plus faibles dépenses d'investissement au niveau infranational se répercutent négativement sur la formation brute de capital fixe dans l'ensemble de l'économie. Les pays d'Amérique latine seront donc confrontés à un double défi : revoir les dispositifs actuels de décentralisation qui découragent les investissements des administrations infranationales et tirer le meilleur parti de la décentralisation comme moyen d'action pour accroître l'investissement privé.

Classification JEL : H54, H77, O54

Mots clés : investissement public, décentralisation, Amérique latine

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FISCAL DECENTRALISATION AND PUBLIC INVESTMENT: THE EXPERIENCE OF LATIN AMERICA

Luiz de Mello¹

1. Introduction

Latin America's investment-to-GDP ratio is low by international comparison. Although it has trended upwards in recent years, the region's average share of gross fixed capital formation in GDP – the national accounts' standard gauge of investment activity – is somewhat lower than that of the high-income countries in the OECD area and much lower than that of the fast-growing emerging Asian economies, such as China and India.² Latin American governments also invest relatively little by emerging-market and developing country standards, a feature of Latin American public finances that can be attributed to macroeconomic volatility in the 1980s and 1990s and subsequently fiscal duress. The private sector accounts for the bulk of investment, but its participation in infrastructure development and upgrading is held back by institutional and regulatory constraints.

At the same time, the state of existing infrastructure in most Latin American countries suggests that spending on operations and maintenance is equally low. The region fares relatively poorly in international comparisons on the basis of a host of indicators of infrastructure quality and in terms of surveys of business sentiment. Arguably, a combination of low investment and poor infrastructure quality is holding back growth. In addition, access to infrastructure is unequal among the different social groups, which acts as a drag on social development.

Decentralisation poses challenges for the delivery and financing of investment by the government. Many countries in Latin America have embarked on ambitious decentralisation programmes, often driven by a return to democratic rule in the 1980s, which have devolved a number of expenditure functions, including investment, and revenue sources to the subnational layers of government. Public finance theory nevertheless highlights important difficulties associated with the decentralisation of public investment. In particular, subnational governments are discouraged from financing investments whose benefits are likely to spill over across jurisdictional borders and whose sunk costs are too high for subnational budgets, especially in the presence of constraints on subnational borrowing. Many Latin American countries have failed to put in place arrangements for joint financing and service delivery across and within the different levels of administration that could address these difficulties.

To shed light on the link between decentralisation and investment in Latin America, this paper discusses trends in gross (fixed) capital formation and government spending on investment programmes. The paper also provides some empirical evidence on the effects of decentralisation on investment based on a panel of countries for which data on investment are available from the World Bank's *World Development Indicators* (WDI) and the International Monetary Fund's *Government Finance Statistics* (GFS) databases

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1. I am indebted to the participants of the Workshop on “Relaciones Intergubernamentales y Descentralización en América Latina”, held at ECLAC, Santiago, Chile, on 25-26 November 2009, especially José Roberto Afonso, Giorgio Brosio, Juan Pablo Jiménez and Teresa Ter-Minasian, as well as Douglas Sutherland, for helpful comments and discussions but remain solely responsible for any remaining errors and omissions. The opinions and analyses presented in this paper are mine and do not necessarily reflect those of the OECD or the Organisation's member countries.
 2. To facilitate comparison, for the purpose of this paper, OECD-wide averages exclude Chile and Mexico, the two Latin American countries that are also members of the Organisation.

since the late 1990. The empirical analysis suggests that decentralisation discourages Latin American subnational governments from investing (acquiring fixed assets) and that lower subnational spending on investment is associated with lower economy-wide gross fixed capital formation. Latin American countries will therefore need to face a double challenge of revisiting the current arrangements for decentralised provision that discourage subnational government investment, while making the most of decentralisation as a policy lever to raise private investment.

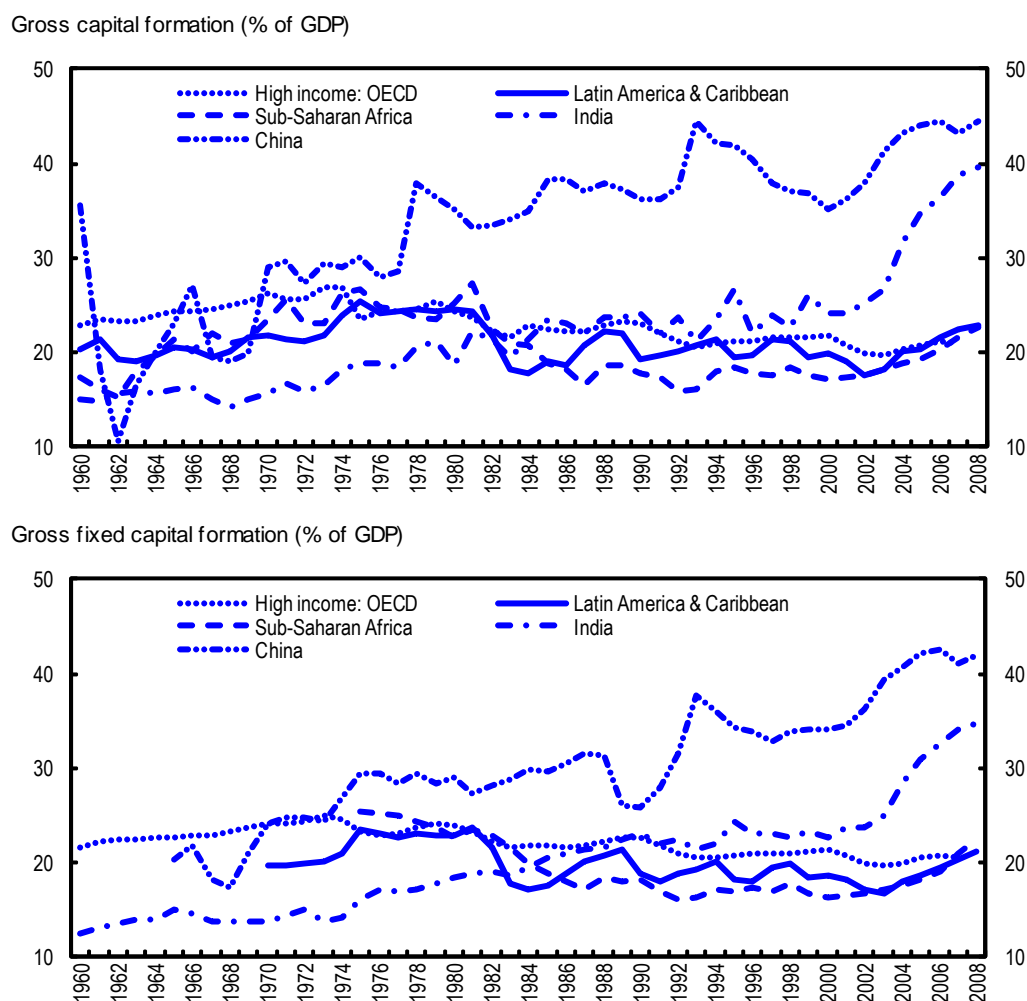
The paper is structured as follows. Section 2 reviews trends in investment spending in Latin America and compares and contrasts these trends with those of OECD countries and emerging-market peers. Section 3 reviews the arguments for and against the decentralisation of investment functions. Section 4 presents the empirical analysis. Section 5 discusses the main empirical findings and draws lessons for Latin America. Section 6 concludes.

2. How does Latin America compare with OECD countries and emerging-market peers?

Trends in investment

Latin American and Caribbean countries invest relatively little by international comparison. Gross fixed capital formation accounted for less than 20% of GDP on average in Latin America from the early 1980s until the mid-2000s, when it began to rise gradually to close to 22% of GDP in 2008 (**Figure 1**). Except for brief periods since 1970, this ratio has been persistently lower than the average of the high-income countries in the OECD area, as well as that of the fast-growing Asian countries, including China and India. To some extent, comparatively low investment-to-GDP ratios reflect the macroeconomic turmoil faced by most of the larger economies in Latin America in the 1980s and early 1990s, characterised by erratic growth and high inflation, which has discouraged investment, especially in infrastructure projects.³ An economic boom during 2003-08 has been accompanied by rising investment-to-GDP ratios.

3. See Rozas (2010), Jiménez and Podestá (2009) and Martner and Tromben (2005) for more information and discussion on trends in Latin America.

Figure 1. Investment trends: International comparisons, 1960-2008

Source: World Bank (*World Development Indicators*).

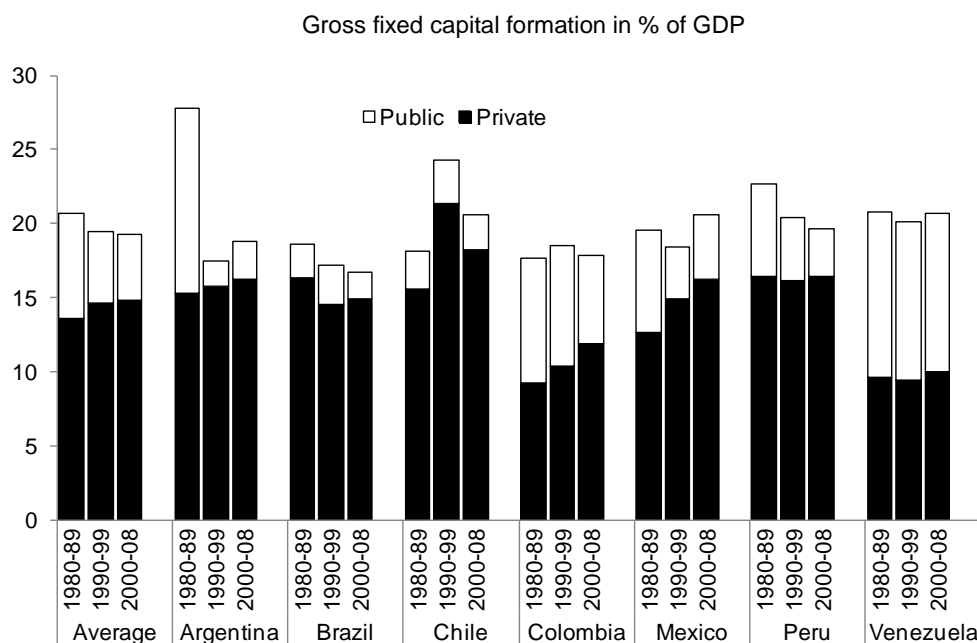
Investment is financed predominantly by the private sector in Latin America and the Caribbean. Government-financed investment accounted for about 4.4% of GDP on average during 2000-08 in the Latin American countries for which information is available from the IMF's *World Economic Outlook* database (**Figure 2**).⁴ Much as in the case of private investment, government spending also trended downward in relation to GDP from the early 1980s until the 2000s. To some extent falling government investment during the 1990s reflects macroeconomic and fiscal adjustment, which often took a toll on capital expenditure, as well as a change in the composition of total investment away from public sources

4. This average is consistent with that computed by Lucioni (2009) for the region based on national-accounts data.

due to increased private-sector participation, including through the privatisation of public enterprises in many of the largest economies in the region.⁵

Information is not readily available on a cross-country comparable basis on the sectoral composition of gross fixed capital formation between infrastructure and non-infrastructure investment. Data on government outlays on operations and maintenance of the infrastructure stock are also difficult to come by. It nevertheless appears on the basis on outcome indicators that an additional side-effect of fiscal duress in the 1990s has been a neglect of basic infrastructures.

Figure 2. Composition of investment across countries, 1980-2008



Source: International Monetary Fund (*World Economic Outlook*).

The quality of infrastructure

Latin America fares poorly in international comparisons of conventional indicators of infrastructure quality. In particular, there are important deficiencies in areas that have a bearing on social development, such as water and sanitation, which affect the health status of the population (**Table 1**). Investment deficiencies may therefore compromise longer-term development targets. This is important because there has been considerable progress over the years in many areas, but a number of countries in Latin America and the Caribbean remain far from the targets set out in the Millennium Development Goals.

5. Privatisation has been more prevalent in sectors such as telecommunications and, to some extent, electricity generation and gas. Other vehicles for private-sector involvement, including concessions, are more common in sectors such as transport (ports, airports, roads and railroads), water and sanitation, and some segments of the electricity sector (Guasch *et al.*, 2008).

In addition, access to infrastructure is fairly unequally distributed in the region, and area-wide averages mask important differences in access across social groups. Based on evidence for eight Latin American countries, Marchionni and Glutzmann (2010) show that access is extremely concentrated in the upper income quintiles in some cases. For example, in Peru only 1% of households from the poorest quintile have a fixed phone line, against almost 70% of households from the richest quintile. In the case of access to water/sanitation and gas, however, there does not appear to be a strong bias in access across income groups, at least as far as measured on the basis of household expenditure.

Poor infrastructure may hinder economic growth. It is difficult to gauge the effect of investment in general, and infrastructure in particular, on long-term output growth. Causality often runs in the opposite direction, so that growth tends to drive investment, rather than the converse.⁶ But, while empirical evidence is by and large inconclusive in this area, it is fair to argue that efforts to improve infrastructure would also yield a growth dividend to the extent that it promotes productivity gains and reduces production costs.

Table 1. Infrastructure quality indicators: Latin America and OECD, 1989-2008

	Latin America			OECD		
	Mean	Median	Number of countries	Mean	Median	Number of countries
Telecommunications						
Lines (per 100 population)	23.0	21.0	33	40.8	41.6	29
Internet subscriptions (per 100 population)	9.3	5.3	33	22.9	23.6	29
Telephone subscriptions (per 100 population)	110.8	109.8	31	150.4	152.6	29
Cell phone subscriptions (per 100 population)	87.7	91.9	31	109.6	110.4	29
Computer at home (per 100 population)	4.6	2.8	5	49.9	42.6	4
TV (2007)	96.7	96.7	2	97.6	98.3	6
Transport						
Rail (million tons of goods per km)	39140.6	6672.5	10	148118.3	12039.0	24
Rail (million passengers per km)	36910.9	313.0	7	23465.8	6759.0	27
Road density (km of road per sq. km of land area)	135.4	71.7	3	118.8	115.3	16
Paved roads (% of total)	47.7	38.2	3	73.4	79.3	15
Water and sanitation (1970-2008)						
Improved water source (% of population with access)	86.8	91.0	24	99.1	100.0	23
Improved sanitation facilities (% of population with access)	74.7	80.0	24	99.0	100.0	20
Electricity (1970-2008)						
Value lost due to outages (% of sales)	4.1	2.8	18	1.0	0.0	6
Transmission and distribution losses (% of output)	15.6	14.2	21	7.9	7.5	29

Source: World Bank (*World Development Indicators*).

6. Empirical evidence on the direction of causality between investment and GDP growth is by and large inconclusive. Nevertheless, recent empirical analysis based on cointegration and temporal causality techniques suggests that GDP growth tends to cause infrastructure spending in a temporal sense, rather than the converse. Evidence based on structural model suggests that causality in the growth-investment nexus tends to take place via efficiency gains and a reduction of production costs (Estache and Fay, 2007).

3. The role of subnational governments

There are a number of constraints to the full decentralisation of public investment functions to subnational governments, especially in the area of infrastructure development and upgrading. First, the sunk costs associated with public investment are often too high to be fully financed by subnational budgets, whose revenue mobilization and borrowing capacity is lower than that of higher levels of administration. Second, subnational governments may be small; it is therefore difficult for them to make the most of economies of scale and network effects in provision, which tend to be large in the case of investment programmes, especially for infrastructure services. Third, public investment projects often create externality effects, because the benefits they create would also likely accrue to neighbouring jurisdictions, whereas the costs of provision would need to be internalised by the providing jurisdiction.

As a result of these constraints, it is often argued that subnational governments may – and they often do – carry out public investment projects, although financing should be provided at least in part by the centre. Joint financing would allow for dealing with the effects of externalities and economies of scale, which would otherwise discourage subnational provision, and for mobilising the necessary funds that would otherwise overwhelm subnational budgets.

Financing

Many Latin American countries rely on the earmarking of revenue to finance public investment. This is the case of all levels of administration, not only among subnational jurisdictions. In Brazil, revenue from the excise tax on fuels is earmarked for transport, including capital and recurrent spending. In Peru, local governments can only spend funds from the *canon* and *sobrecanon* from natural resources on capital investments. Earmarking is extended to shared revenue in some countries, as is the case of Nicaragua and Paraguay, for example, where a percentage of shared revenue is earmarked for investment in infrastructure. In Guatemala, one-eighth of VAT revenues is earmarked for infrastructure in social and basic services, while a share of the tax on motor vehicle registration is earmarked for maintenance and improvements of roads. In Costa Rica, recent legislation provides for the possibility of increasing transfers to the local governments to assume new competencies, including infrastructure development. In some cases, revenue earmarking is also used as a regional development tool, by favouring investment in economically disadvantaged regions. This is the case, for example, of Ecuador, where a conditional capital investment grant is targeted to the Amazon region. In Mexico, at least 20% of the investment grants (*Fondo de Compensación*) from the federal government must be assigned to the poorest ten states and used by the municipalities of those states.

A reliance on revenue earmarking to finance investment is in contrast with the experience of most OECD countries, where investment projects carried out by subnational governments are often financed through block, conditional or matching grants from higher levels of government. Among Latin American countries, this is also the case of Chile, where financing tends to be provided in the form of central government grants. While recognising that different grants serve different purposes, there is a trend among several OECD countries towards increased flexibility in the grant system, especially in those countries where current arrangements are administratively cumbersome and where local government autonomy is curtailed by restrictive conditionality. The main disadvantage of revenue earmarking is that it complicates expenditure management and discourages efforts to improve the cost-effectiveness of government expenditures, because policymakers are unable to reallocate scarce budgetary resources to cost-effective activities.

In some cases, financing arrangements focus on investment projects and neglect to provide assistance for the recurrent costs of operations and maintenance to jurisdictions that may be unable or unwilling to finance those associated expenditures. For example, Peru attempted to decentralise much of its road

network to provincial and municipal governments but then failed to provide financing for the associated recurrent expenditures (Gutman, 1999). This resulted in a widespread deterioration of the network and, ultimately, recentralization (Burki, Perry, and Dillinger, 1999; Humplick and Moini-Araghi, 1996). In Brazil, federal assistance is now provided to those states that have accepted to take on responsibility for maintaining federal roads in their jurisdictions.

The presence of strict regulatory restrictions on subnational borrowing to finance investment programmes also distinguishes Latin America from the OECD area, where borrowing is allowed in most countries subject to a golden rule (*i.e.*, long-term borrowing is allowed to finance capital expenditure only). Efforts to curtail subnational profligacy, to align subnational fiscal policies with overall macroeconomic objectives and to consolidate fiscal adjustment at all levels of administration are the main reasons for the introduction of tight controls on subnational borrowing in many countries in Latin America. But arrangements vary across countries. In most cases, subnational governments are not allowed to borrow abroad, whereas in those countries where foreign financing is permitted, central government approval is required. Local government borrowing is banned in Chile, Dominican Republic, Ecuador and El Salvador, for example. In other countries, administrative constraints apply, as in the case of required approval by higher levels of government and/or the legislature (e.g., Nicaragua). More flexible arrangements, whereby subnational borrowing is subject to prudential requirements based on debt service parameters, are in place in Argentina, Bolivia, Brazil, Colombia, Ecuador, Mexico and Peru, for example.⁷

Dealing with economies of scale and externalities

Conditionality is often introduced in intergovernmental transfer systems to deal with externalities in subnational government provision. Earmarked or matching grants can be used to ensure that at least part of the costs and benefits of provision can be fully internalised by local residents. This is the case when the share of delivery costs that exceeds the benefits of provision that can be internalised by local residents can be compensated by the donor to the service provider. Of course, in practice, the design of such grants is complicated by the fact that externalities are not directly observable. Matching grants may therefore exceed the level required for mitigating the disincentives for provision arising from cross-border spillovers. These grants may also be complex to administer. Another difficulty associated with matching grants is that they may be underutilised in poorer jurisdictions, where support from higher levels of administration is most needed, because these jurisdictions may be unable to match the volume of resources available to them. As discussed above, revenue earmarking is the most common arrangement for financing investment in Latin America, and experience with matching grants is considerably more limited. Conditional grants are also less common in Latin America than in other parts of the world.

In addition to intergovernmental transfers and grants, horizontal arrangements can be put in place to internalise benefits that straddle jurisdictional borders and reduce provision costs by maximising economies of scale. Experience with such cross-border joint ventures is nevertheless rather limited in Latin America, in contrast with a number of OECD countries, especially in Europe, where various arrangements are in place, especially for transport, urban waste management, water supply, fire fighting and hospital administration. Norway also has an interesting experience with joint ownership of power plants, which allows neighbouring jurisdictions to cut costs in providing energy services. In Latin America, the Brazilian experience with inter-municipal consortia in the area of hospital administration is rather rare in the region.

7. See Martinez-Vazquez (2010) for more information on the different arrangements in place in Latin America and de Mello (2010) for more information on the experience of European countries.

International comparisons

Institutional settings vary a great deal, involving different degrees of subnational participation in the design and financing of investment projects. As a result, conventional decentralisation indicators, such as the share of subnational capital expenditure in total public investment, can be misleading to the extent that subnational autonomy is not taken into consideration. In addition, internationally comparable data are very difficult to come by, even for very crude measures of infrastructure expenditure decentralisation and the associated financial flows across levels of administration, including capital transfers. Despite these caveats, International Monetary Fund's GFS data on the acquisition of fixed assets across the different levels of administration allow for a comparison of the composition of public investment in Latin America and the OECD area. Ideally, because of greater consistency between private and public investment and among the different levels of administration, the national accounts would be a more appropriate source of data than budgetary sources.

On the basis of the indicators presented in **Table 2**, there does not appear to be much difference in the composition of investment across the different layers of government between the Latin American and OECD countries for which information is available, at least as far as the ratio of acquisition of fixed assets to GDP is concerned. Of course, there are limitations to GFS data, including the fact that most countries do not report investment spending for the different layers of administration in a systematic manner and that in some cases investment is carried out through extra-budgetary funds that are not consolidated in the fiscal accounts.

Table 2. Public investment across levels of government

Acquisition of fixed capital in % of GDP, accrual basis, averages since 1995

	General government		Different layers of government					
	Investment	Total outlays	Central		Middle-tier		Local	
			Investment	Total outlays	Investment	Total outlays	Investment	Total outlays
Latin America								
Argentina	1.3	29.6	0.2	19.5	0.8	11.0	0.3	2.4
Chile	1.4	20.5	1.2	20.5	..	..	0.2	2.6
Colombia	1.9	35.9	0.6	33.6	0.4	4.5	0.9	6.1
Mexico ¹	..	..	0.5	15.9	..	7.0	..	1.4
Peru ¹	2.4	19.0	1.2	18.3	0.4	3.2	0.8	2.3
Venezuela ¹	..	..	1.7	25.7	..	..	..	..
OECD								
Italy	0.6	47.8	-0.2	39.0	..	..	0.8	15.0
Japan	1.1	37.8	..	..	..	..	..	..
Spain	1.9	38.6	0.4	27.3	0.8	13.6	0.7	6.1
France	0.7	52.6	0.1	45.5	..	..	0.6	10.4
United Kingdom	0.5	42.0	0.0	38.9	..	..	0.5	12.1
Australia	0.6	34.5	0.1	25.3	0.4	13.9	0.2	2.3
Germany	-0.1	46.5	0.0	30.9	0.0	13.1	-0.1	7.2
Switzerland ¹	2.2	37.4	0.1	20.1	1.1	14.6	1.0	9.6
United States	1.2	36.3	0.1	21.0	..	..	..	..
Canada ¹	2.3	40.7	0.3	18.7	1.0	21.4	1.0	7.4

1. Cash basis.

Source: International Monetary Fund (*Government Finance Statistics*).

4. Empirical evidence

Because of the dearth of data on subnational capital spending, it is difficult to test empirically the extent to which indicators of fiscal decentralisation correlate with trends in subnational investment. Instead, simple investment equations can be estimated to compare the main determinants of investment across the different layers of administration and to distinguish the effect of decentralisation on investment in sub-samples of Latin American and other countries.

Comparison with the literature

The theoretical literature is inconclusive on the possible effects of fiscal decentralisation on investment. The Oatesian and Musgravean tradition of fiscal federalism places limited emphasis on the composition of public investment across the different layers of administration. As discussed above, public investment would be best carried out and financed by higher levels of administration in the presence of economies of scale and spillover/network effects, which would discourage subnational provision and result in a sub-optimal supply of public investment. The theoretical literature also shows that horizontal tax competition, which is likely to arise from the decentralisation of revenue sources to lower levels of administration, could result under certain conditions in sub-optimal investment (Hulten and Schwab, 1997).

By contrast, another strand of literature shows that competition among same-level jurisdictions could affect the composition of expenditure, leading subnational governments to over-invest in public goods that would make their jurisdictions attractive to private investment (Keen and Marchand, 1997). Consistent with this strand of literature, there is some empirical evidence that decentralisation is associated with higher levels of subnational spending on infrastructure projects. The cross-country evidence reported by Estache and Sinha (1995) suggests that more decentralised countries, especially in the developing world, tend to spend more (total and subnational) on infrastructure projects. More recent evidence reported by Kappeler and Väilä (2008) for European countries shows that decentralisation tilts the composition of public investment towards more productive projects, notably infrastructure, a finding that the authors attribute to increased fiscal competition brought about by decentralisation.

Turning to the quality of infrastructure, there does not appear to be a strong correlation between the extent of fiscal decentralisation and the quality of services. On the basis of cross-country data, Humplick and Estache (1995) estimate the impact of decentralisation on the performance of several infrastructure projects, including roads, electricity, and water. Using different measures of decentralisation in each sector, the authors find that at least one performance indicator improved in each sector as a result of decentralisation. Nevertheless, the correlation between decentralisation and performance was not strong in general. This finding is consistent with the raw correlations between the decentralisation indicator used in this paper (the share of central to subnational government revenue or expenditure) and indicators of the quality of infrastructure, which are also rather poor, although revenue decentralization is associated with a lower density of fixed telephone lines in the Latin American sub-sample.

A different strand of literature has delved into the effect of decentralisation on the efficiency of investment. Evidence for Spain (Esteller and Solé, 2005) and Bolivia and Colombia (Faguet, 2004) suggest that decentralisation has made investment decisions more responsive to local preferences and needs, which improves the composition of the capital stock among the sub-national jurisdictions.

Data

The World Bank's WDI database contains information on investment spending (gross fixed capital formation and gross capital formation, which includes changes in inventories) for a variety of developing,

emerging-market and developed countries. The split between private and public investment, and the decomposition of government spending across the different layers of administration, which is important for assessing the effect of various arrangements for financing expenditure in a decentralized setting, are nevertheless not available in the WDI database. To some extent, this deficiency can be remedied by using data available from the International Monetary Fund's GFS database, which provides information on government acquisition of fixed assets for the central, middle-tier and local levels of administration (excluding public enterprises and off-budget expenditures). The GFS series are nevertheless very short, reflecting the transition to a new methodology in 2001 and a dearth of data on subnational finances for the vast majority of countries.

Despite these data deficiencies, it is possible to shed some light on the cross-country determinants of investment using information for a panel of up to 44 countries, including at most 6 Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia and Costa Rica), during the period 1989-2008.

Estimation strategy

The methodology for estimating the effects of decentralisation on investment is simple: the GDP ratios of gross fixed capital formation and government spending (central and subnational levels of administration, separately) on the acquisition of fixed assets are regressed on an intercept, an indicator of decentralisation and a set of control variables.⁸ To proxy for decentralisation, an indicator constructed as the ratio of central to subnational government (middle-tier and/or local governments) total (capital and current) revenue is included among the regressors.⁹

The selection of control variables is guided by the empirical literature and data availability, and include: GDP growth (reflecting the effect of faster growth on the demand for investment), GDP per capita (to proxy for the affordability of investment), the share of agriculture in GDP (to proxy for economic structure and its effect on the demand for investment, especially infrastructure), the ratio of government spending to GDP (to proxy for the size of government), the ratio of FDI to GDP (which reflects supply-side considerations and the availability of external financing for investment projects) and the urbanization rate (reflecting density effects, which are known to affect the price of infrastructure services provided through networks). The control variables are lagged to deal to the extent possible with possible simultaneity. The lagged dependent variable is also included in the regressions, because the investment series tend to be autocorrelated.

A preliminary assessment of the data shows that the decentralisation indicators (expenditure or revenue) correlate poorly with the share of investment (gross capital formation or gross fixed capital formation) in GDP at the 5% level of statistical significance. In the sub-sample of Latin American countries, however, revenue decentralisation is negatively correlated with the shares of gross fixed capital formation and gross capital formation in GDP. There is also a strong positive correlation between revenue

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8. Most of the empirical literature on the determinants of aggregate investment is based on the estimation of growth regressions following the tradition of Barro (1991). In this setting, investment (total or private) depends essentially on the determinants of GDP growth, including human capital, government consumption and initial GDP. Subsequent contributions to the literature have maintained this basic setting, while incorporating other determinants. For example, indicators of macroeconomic uncertainty, which is known to affect investment because of the presence of sunk costs in investment projects, have also been considered in empirical literature (Aizenman and Marion, 1993; Brunetti and Weder, 1997).
 9. The baseline results reported below are fairly robust to the use of gross capital formation as the measure of aggregate investment and the redefinition of the decentralisation indicator for expenditure, rather than revenue.

decentralisation and the share in GDP of subnational government spending on fixed investment, a finding that is driven by the non-OECD and non-Latin American countries in the sample. By contrast, in the sub-sample of Latin American countries, revenue decentralisation correlates strongly with central (rather than subnational) government spending on fixed investment.

The baseline results

The baseline results, reported in **Table 3**, are estimated by fixed effects. On the basis of the Hausman test, the null hypothesis that the fixed effects are uncorrelated with the other regressors is rejected by the data in all specifications at classical levels of significance. As is usual in the empirical literature, the lagged dependent variable is included among the regressors, because the investment or government spending ratios are serially correlated,¹⁰ resulting in the estimation of a dynamic panel. Because it is correlated with the fixed effects, the lagged dependent variable was instrumented using its own lags (two lags) as instruments, and the adequacy of this instrumentation strategy was assessed on the basis of an overidentification test. Due to the dearth of data on subnational government spending, the lagged dependent variable was not instrumented in the regressions using subnational investment as the dependent variable.

The main results of the regressions are as follows. The lagged dependent variables are positively signed and statistically significant in all models. The estimated coefficients (between 0.33 and 0.69) are statistically different from unity and suggest that the impact of the regressors on investment is considerably stronger in the long term than in the short run. For example, if revenue decentralisation were to rise by 1%, the share in GDP of subnational government spending on investment would fall by 0.06 percentage points in the short term and by twice as much in the long term. In addition, gross fixed capital formation and central government spending on investment are unaffected by the extent of revenue decentralisation.

As for the control variables, GDP growth affects gross fixed capital formation positively but not central or subnational government spending on investment. A country's level of development, proxied by GDP per capita, affects gross fixed capital formation and central government spending on investment positively. Nevertheless, subnational government investment seems to be lower, not higher, in wealthier countries. A large share of agriculture in GDP is associated with higher central government investment ratios. The size of government, proxying for the user cost of capital, is associated with lower subnational spending on investment, while having no discernible impact on gross fixed capital formation and central government investment. The availability of external financing, proxied by the ratio of FDI to GDP, does not seem to be a powerful predictor of investment.¹¹ The urbanization rate is positively associated with subnational government investment, which likely reflects the role played by lower levels of administration in the provision of urban amenities.

What about Latin America?

The sub-sample of Latin American countries is too small and the time series are too short for estimating separate regressions to shed further light on the effects of decentralisation on investment in Latin America. Instead, the main variables of interest – the size of government and the revenue decentralisation indicator – were interacted with a dummy variable identifying the sub-sample of Latin

10. This is confirmed on the basis of the Wooldridge test for panel autocorrelation.

11. A related literature shows that decentralisation is detrimental to FDI. For example, Kessing *et al.* (2007) find a significant negative effect of the number of government layers of host countries on the amount of inward FDI these countries receive.

American countries (*i.e.*, the dummy variable takes the value of “1” for the Latin American countries in the sample and “0”, otherwise).

The regression results are instructive. While the main findings are comparable to those of the baseline regressions for the control and the lagged dependent variables, there appears to be significant differences between Latin America and the other countries in the sample with regards to the effect of revenue decentralisation on investment. In particular:

- Revenue decentralisation appears to discourage subnational government investment in Latin America but not in the other countries in the sample. The baseline finding of a negative association between revenue decentralisation and subnational government investment is therefore driven by Latin America. Moreover, revenue decentralisation also discourages gross fixed capital formation in Latin America, while encouraging it in the other countries in the sample. As a result, the baseline finding of no association between revenue decentralisation and gross fixed capital formation is also driven by Latin America.
- The size of government – measured as the ratio of government spending to GDP – discourages subnational government investment in Latin America, unlike the other countries in the sample, a finding that drives the baseline result of a negative association between the size of government and subnational government investment. By contrast, the size of government is a good predictor of gross fixed capital formation in the sub-sample of countries that excludes Latin America. The baseline finding of no association between government size and investment is again driven by Latin America.

Table 3. Decentralisation and investment: Regression analysis

	Dependent variable:									
	Gross fixed capital formation (log, % of GDP)		Government spending on investment (central government, % of GDP)		Government spending on investment (subnational governments, % of GDP)					
Lagged dependent variable	0.63 ***	0.69 ***	0.40 ***	0.41 ***	0.52 ***	0.33 **				
	(0.063)	(0.062)	(0.129)	(0.128)	(0.152)	(0.130)				
	Baseline determinants									
GDP growth (%)	0.01 ***	0.01 ***	-0.01	0.00	0.03	0.03				
	(0.002)	(0.002)	(0.017)	(0.017)	(0.040)	(0.033)				
GDP per capita (log, in PPP)	0.16 ***	0.13 **	0.91 *	0.90 *	-4.45 ***	-2.25 *				
	(0.054)	(0.053)	(0.497)	(0.498)	(1.445)	(1.268)				
Agriculture value added (log, % of GDP)	-0.03	-0.03	0.42 **	0.41 **	-0.01	0.11				
	(0.023)	(0.022)	(0.190)	(0.190)	(0.352)	(0.289)				
Government spending (log, % of GDP)	0.06	0.07 **	-0.72	-0.62	-1.81 **	-0.69				
	(0.034)	(0.034)	(0.494)	(0.514)	(0.771)	(0.683)				
Decentralisation index (log)	0.00	0.00 *	0.00	0.00	-0.06 **	0.00				
	(0.002)	(0.002)	(0.013)	(0.013)	(0.026)	(0.027)				
FDI (log, % of GDP)	0.01	0.00	0.00	0.00	0.04	0.00				
	(0.004)	(0.004)	(0.028)	(0.028)	(0.044)	(0.038)				
Urban population (log, % of population)	-0.36	-0.36	-0.16	-0.26	68.62 ***	39.76 ***				
	(0.250)	(0.243)	(2.492)	(2.506)	(9.858)	(10.011)				
	Interactions with Latin America dummy									
Government spending (log, % of GDP)		-0.19		-0.87		-6.39 ***				
		(0.159)		(2.750)		(1.440)				
Decentralisation index (log)		-0.03 ***		-0.03		-0.12 **				
		(0.009)		(0.122)		(0.053)				
	Model statistics									
Estimator	FE	FE	FE	FE	FE	FE				
No. of observations	338	338	183	183	62	62				
No. of cross-sectional units	39	39	29	29	9	9				
R ² (within)	0.68	0.70	0.29	0.83	0.71	0.82				
Hausman: Prob > F (<i>p</i> value)	0.00	0.00	0.05	0.10	0.00					
Over-identification test (<i>p</i> value)	0.02	0.04	0.26	0.32	...	...		

Note. All models include an intercept (not reported). Standard errors are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels is denoted respectively by (***), (**), and (*). The lagged dependent variable is instrumented and two lags are used as instruments (except for the subnational government investment model).

Source: Data available from World Bank (*World Development Indicators*) and IMF (*Government Finance Statistics*); and author's estimations.

5. Discussion of the empirical findings: Implications for Latin America

The empirical findings reported above suggest that there are specific characteristics of fiscal decentralisation in Latin America that impinge on investment and distinguish the region from other parts of the world. These characteristics may include, as discussed above, a reliance on revenue earmarking, the presence of strict restrictions on subnational borrowing and limited use of intergovernmental grants and transfers to deal with externality and economies of scale effects in the provision of investment. Of course,

there are important differences in institutional settings among the Latin American countries that should not be neglected. But, as far as the countries in the region share, albeit to different degrees, these main characteristics, two policy challenges can be identified in light of the empirical findings reported above. First, Latin America will need to eliminate the distortions associated with decentralisation that discourage subnational governments from investing and, second, the countries in the region will need to create appropriate conditions to make the most of decentralisation as a policy lever for lifting private investment.

Eliminating the policy distortions that discourage subnational governments from investing

Removing regulatory uncertainty

The assignment of expenditure functions across the different levels of administration is particularly complex, especially in the sectors where investment needs tend to be large. In the case of network industries, which include most infrastructure sectors, regulatory, oversight, financing and service delivery functions are often unbundled and assigned to different layers of administration. This may create an overlap of mandates (which creates uncertainty) and incentives for cost-shifting across the different levels of administration (which discourages governments from investing and the private sector from participating in infrastructure development and upgrading). International experience shows that Latin America is not alone in having to grapple with these issues. Because it is one of the most decentralised countries in Latin America, Brazil offers an interesting example in the case of water and sanitation, a sector where jurisdictional uncertainty among the municipalities, the states and the municipal and state water companies has discouraged both private and public investment. *The key policy challenge in this area is therefore to ensure clarity in the assignment of functions across the different levels of administration.*

Making the most of intergovernmental grants and transfers

As discussed above, most Latin American countries have yet to make full use of intergovernmental grants and transfers to finance investment programmes and to deal with the spillover effects that would discourage subnational investment. *There is therefore scope for greater use of these instruments, especially matching grants, which would have the added advantage of encouraging the recipient jurisdiction to mobilise complementary resources locally.* Experience with horizontal arrangements that could encourage neighbouring jurisdictions to mobilise resources jointly to finance mutually beneficial investment programmes is also limited. *Greater support from higher levels of government, ranging from technical assistance to financing and the establishment of a regulatory framework for such initiatives, would therefore be welcome.*

Tackling predatory tax competition

Subnational governments's ability to invest may be thwarted by an erosion of their revenue base. A case in point is predatory tax competition among the subnational jurisdictions to attract private (often foreign) investment. Of course, a distinction should be made between tax competition that is "desirable", in the sense of acting to constrain an otherwise excessive rise in the subnational tax burden, and that which undermines subnational revenue mobilisation. While plausible, this hypothesis has yet to be validated empirically for the different countries in the region. But, as far as the Brazilian experience is concerned, there is fairly compelling evidence of predatory tax competition in the state-level value added tax (ICMS), whereby the states compete among themselves in a Stackelberg manner (de Mello, 2008). In other words, there appear to be "leaders" among the states, whose moves to change their own tax rates encourage other states to follow suit. To the extent that the reduction in revenue brought about by tax competition leads to underinvestment at the subnational level, revenue decentralization may also discourage private investment and result in a reduction in gross fixed capital formation.

There are options for encouraging salutary tax completion, while preventing predatory practices. In particular:

- Where applicable, *subnational government autonomy in tax matters should be limited to setting tax rates, preferably within bounds set nationally, rather than bases*. Nevertheless, the experience of Brazil illustrates the difficulties of achieving these objectives in a country where subnational governments enjoy considerable autonomy in tax matters. Although the municipalities are no longer free to set the base of their sales tax (ISS) and can only set ISS rates within bounds set in law, legislation has yet to be approved to unify the state-level VAT code. Currently, changes in ICMS legislation, including those related to tax incentives, need to be agreed unanimously by the states, a requirement that has often been breached and resulted in lengthy legal disputes.
- *Autonomy to grant tax expenditures, which narrow tax bases and reduce effective tax rates, should also be curtailed*. Jiménez and Podestá (2010) estimate tax expenditures (all levels of government) to account for 2-2.3% of GDP in Argentina, Brazil and Peru; 3.5% of GDP in Colombia; and 5-5.9% of GDP in Chile and Mexico. This is all the more important because the empirical literature shows that tax incentives are weak determinants of investment decisions by multinational enterprises.¹² The deadweight losses associated with tax expenditures are therefore high.

Creating incentives to tap underutilised revenue sources

Subnational governments' own tax bases may be underutilised as a result of perverse incentives brought about by decentralisation. There is a large body of empirical evidence on "common pool" problems associated with reliance on shared revenue to finance subnational provision.¹³ Under certain conditions, subnational governments face the incentive to underutilise their own tax bases in favour of shared revenue, because in doing so they can export part of the delivery costs to other jurisdictions. These untapped revenue sources include not only local property taxes, which tend to be underutilised in general, not only in Latin America, but also user charges for infrastructure services. This is despite the fact that subnational governments enjoy ample autonomy in most Latin American countries to introduce user charges and fees for services. The scope for cost recovery through the introduction of user charges also varies across sectors and subsectors. Of course, there are reasons why these revenue sources are underutilised, including distributional and political-economy considerations, that go beyond the perverse incentives that may arise with decentralised provision. To mitigate these problems, *incentives can be created for subnational governments to fully utilise their tax bases, not least by rewarding tax effort in revenue sharing arrangements*.

Dealing with competing demands on subnational budgets

Decentralisation has taken place in many Latin American countries at the same time as political liberalisation and the emergence of associated social demands that have created claims on the government. A strengthening of social safety nets and emphasis on redistributive policies – while laudable in a continent with a notoriously skewed distribution of income – have resulted in a sharp rise in social spending in a number of countries, including Brazil, Chile, Colombia and Mexico. At the same time, the need to secure long-term funding for these programmes has resulted in a proliferation of revenue earmarking and mandated spending provisions. Government investment has therefore suffered not only due to the emergence of competing demands for scarce budgetary resources, especially in the social area, but also

12. See Jiménez and Podestá (2009) for a survey of the literature and discussions.

13. See de Mello (2000) for a review of the literature and empirical evidence.

through greater budgetary rigidity, which distorts the composition of spending at the expense of public investment.¹⁴ Budgetary rigidity also exacerbates the pro-cyclicality of government investment by making capital outlays the easiest expenditure item to cut in periods of fiscal duress. Because budgetary rigidities constrain the ability of subnational governments to allocate budgetary resources to programmes that may be more cost-effective than the protected ones, including possibly investment, *a comprehensive review of the existing arrangements is in order*. Such a review – and subsequent corrective measures – would also have the advantage of identifying “hidden” fiscal space, which could allow for hiking cost-effective investment.

Making the most of decentralisation to encourage private investment

The results of the regressions reported above show that the deleterious effect of revenue decentralisation on subnational government investment is not compensated in Latin America by higher central government or private-sector investment, given an overall negative impact of revenue decentralisation on gross fixed capital formation. This is disturbing, because decentralisation is found to encourage gross fixed capital formation in countries other than those in Latin America, while leaving government spending unaffected. This suggests that, again, there may be features of fiscal decentralisation in Latin America that are detrimental to private-sector investment.

Making product market regulations more pro-investment

There is a growing body of empirical evidence on the effects of pro-competition regulations in product markets on economic performance, especially productivity and growth.¹⁵ Most of this literature focuses on economy-wide regulations, rather than on variations in regulations across the different subnational jurisdictions, which can be substantial, especially in federal countries. In some cases, there may be entry, ownership, pricing and market structure impediments to private sector involvement in investment programmes. Cross-country comparison on the basis of the OECD indicator of restrictiveness of regulations in network industries shows that OECD countries have on average less burdensome regulatory regimes than the Latin American countries for which information is available (Brazil, Chile and Mexico). In particular, entry restrictions are particularly stringent in Mexico in telecommunications, electricity and gas (**Figure 3**). Impediments are also particularly stringent in Latin America in transport, especially rail, a sector that also tends to be fairly protected in OECD countries. Obstacles to private-sector involvement also reflect FDI regimes, which tend to be less pro-investment in Latin America than in the OECD area on average (**Figure 4**).¹⁶ *To the extent that sectoral regulations are under the purview of subnational levels of government, as is the case to some extent in Brazil in a number of network industries, there is scope for removing restrictions that hold back private investment.*

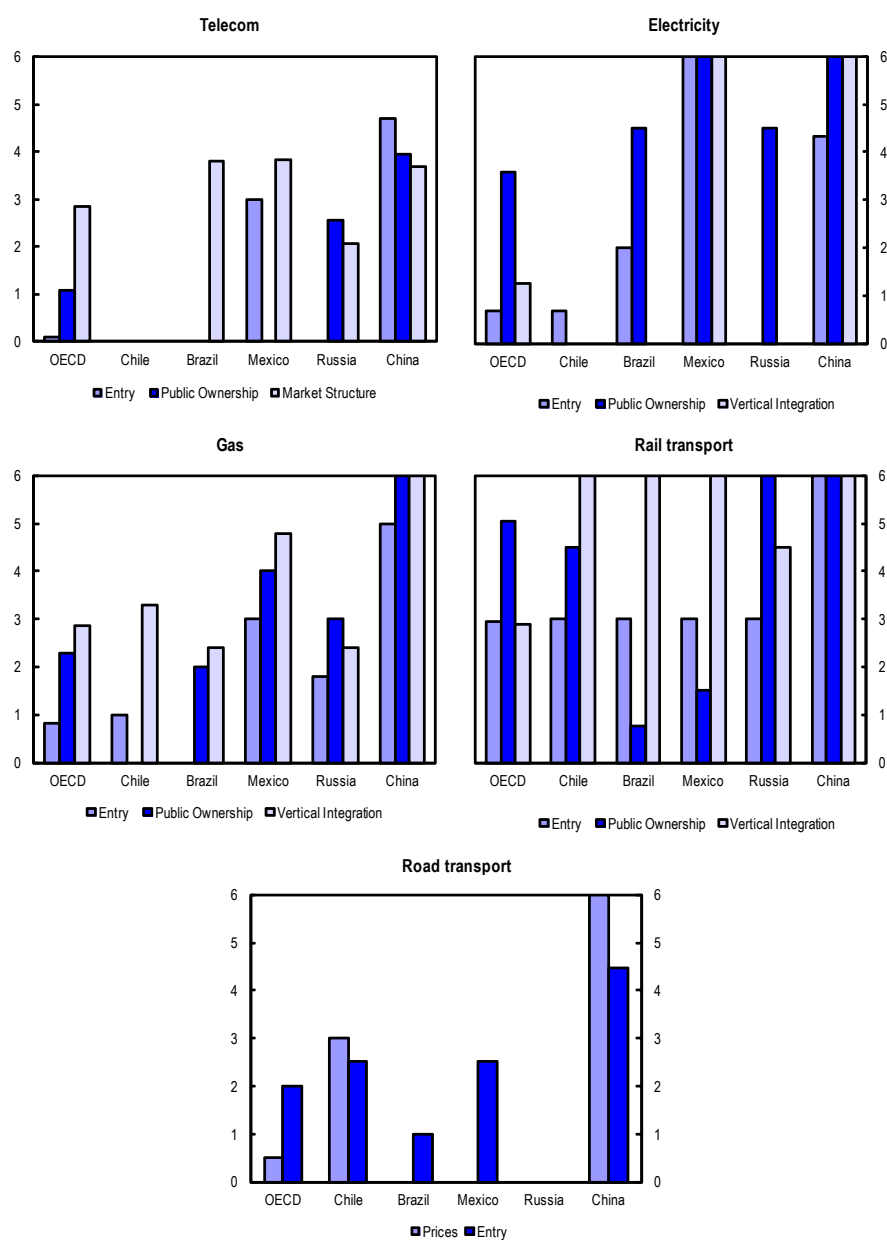
14. See Allier (2006) and Centragolo *et al.* (2010) for an overview of budget rigidities and fiscal space in Latin America, and Afonso *et al.* (2005) for the case of Brazil.

15. See for example, de Mello and Padoan (2010) for a review of the empirical evidence.

16. See Kalinova *et al.* (2010) for more information and an updated of the indicator.

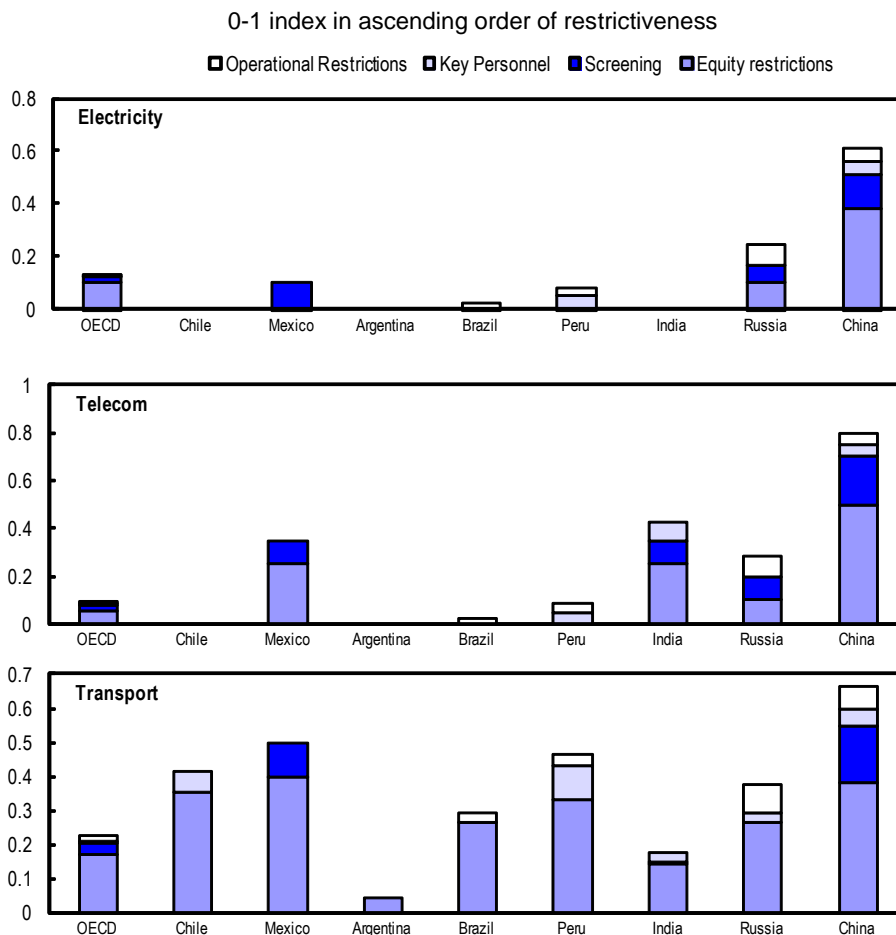
Figure 3. Product market regulations: Network industries, 2008

0-6 index in ascending order of restrictiveness



Source: OECD.

Figure 4. Foreign direct investment restrictiveness: International comparisons, 2010



Source: OECD.

Avoiding costly regulatory arbitrage

Predatory tax competition among the subnational jurisdictions to attract investment, discussed above, creates room for regulatory arbitrage by investors, at least as far as tax matters are concerned. But uncertainty about other aspects of regulation, including at the sectoral level, across the different subnational jurisdictions imposes costs on investors, which may ultimately discourage investment. The case of water/sanitation in Brazil, noted above, is a case in point. *It is therefore desirable to make subnational regulations as transparent as possible.*

Alternative forms of participation

Subnational governments have experimented with alternative modalities to encourage private sector participation, including public-private partnerships (PPPs) and concessions. In Brazil, for example, several states were pioneering in setting a regulatory framework for PPPs, often ahead of the federal government. The country also has considerable experience with concessions at the subnational level. These alternative investment modalities require considerable technical capacity, which is in many cases beyond subnational governments' means. Among the key challenges to be addressed when designing PPP contracts is the need for appropriate risk sharing between the private sector and the government. In the case of concessions, the

level of subsidisation needed to ensure adequate cost recovery poses important design challenges. These matters are discussed in Jiménez and Podestá (2009), for example.

6. Conclusions

A combination of low investment and poor infrastructure begs the question of how much Latin American countries should invest.¹⁷ The economic literature is rather limited in this area, reflecting to a large extent a dearth of long time series on investment spending, even in the OECD area, which are needed for assessing the effect of investment on economic performance, including GDP growth and social outcomes. Based on standard growth accounting, it is possible to compute the increment in the investment-to-GDP ratio that would be needed to lift an economy's potential growth, while keeping the rates of growth of other factors of production and multifactor productivity unchanged. But this mechanical computation fails to take on board the interactions between investment and productivity and efficiency in the use of capital, for example, as well as the tradeoffs that need to be considered for financing an increment in investment.

The empirical evidence reported in this paper suggests that, controlling for other cross-country determinants of investment, there may be specific features of fiscal decentralisation in Latin America that discourage subnational governments from investing. Regulatory uncertainty in the assignment of expenditure functions across the different levels of administration, the design of intergovernmental grants and transfers that makes it difficult to finance investment projects jointly by different spheres of government and institutional constraints on subnational financial management, including borrowing for investment purposes, are likely to be among the impediments to higher subnational investment in the region. There is therefore ample room for policy reform, depending on country conditions and institutional settings, so that decentralisation may be used as an instrument for raising productivity-enhancing investment in support of stronger growth.

17. See Fay and Yepes (2003) for estimations of investment needs in Latin America.

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