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Can national infrastructure spending reduce local unemployment? Evidence from an Australian roads program

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ABSTRACT

We examine the effect of a federally-funded local infrastructure spending program on local unemployment rates. To address the likely funding endogeneity problem, we exploit variation in spending due to pork-barreling, and find that higher government expenditure on roads substantially reduces local unemployment.

1. Introduction

There remains considerable disagreement as to the impact of government spending programs on economic activity and employment at the national level (see, eg, Edelberg et al., 2002).

This paper takes the macroeconomic literature on fiscal policy as a jumping-off point, to look at a related but neglected question: how do changes in federally allocated infrastructure grants affect local economic activity? Infrastructure spending programs have received much attention for their potential for stimulating overall economic activity, and in particular for creating jobs (Kenyon, 1997). They have played an important role in the response to the recent recession in many countries, including Australia, Canada and the United States.

As with macroeconomic studies, estimating the impact of a spending shock on the local labor market is complicated by the potential endogeneity of spending. We use information on Australian political representation to identify exogenous "pork barrel" spending shocks, which are targeted on the basis of political factors rather than economic conditions.

In a similar spirit, Levitt and Poterba (1999) examined the relationship between a state's representation in the US Congress and per capita income. They found some evidence that jurisdictions represented by powerful politicians experience faster income growth, but were unable to find a relationship between political power and the distribution of federal funds or other policies, leaving them with little to say about why local political power affects growth.

2. Empirical strategy and results

In this paper, we examine how spending on roads changes unemployment rates at the election district level in Australia.[1] Unemployment figures by electorate are derived by the Australian Parliamentary Library from *Small Area Labour Market Data* (based

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[1] Unemployment is the only economic variable for which we have annual data at an election district level. Other variables are only available for electorates in census years.

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Table 1
Summary statistics, by party holding the electorate.

	Overall	National party electorate	Liberal party electorate	Other party electorate
Roads to Recovery spending ($m)	7.845	20.023	8.021	5.119
Unemployment rate in 2001 (%)	6.889	8.486	6.009	7.462
Change in unemployment rate, 2001–2004 (% points)	−1.030	−1.482	−1.072	−0.893
Population density, inverse (km^2 per person)	0.358	0.763	0.373	0.257
Mean taxable income ($)	37,760	32,649	39,773	36,755
Observations	150	14	69	67

on 2006 election boundaries). To minimize measurement error and seasonal effects, we average data over the calendar year.[2]

We focus on spending through the Roads to Recovery program which, commencing in January 2001, provided funding from the federal government to local councils to construct, upgrade or maintain roads that were reaching the end of their economic life. Leigh (2008) tabulated $1.1 billion of funding allocated between January 2001 and June 2005, which comprised approximately 4% of the total expenditure on roads during this period (BITRE, 2006). The funds went to local councils, which managed the projects. Around half the work was done by local councils directly, and half was contracted out. Of this, around 60% of the work done by rural, and 40% of the work done by urban councils was carried out by local contractors (DOTARS/ALGA, 2003). A condition of receipt was that local councils maintain their own spending on roads. As a result, Roads to Recovery was estimated to halve the prior trend decline in the written down current replacement cost of Australian roads. Some councils used it to leverage small amounts of additional funding from state governments, although this was rare (DOTARS/ALGA, 2003).

While road safety improvement was considered the key benefit of the program, the second most-cited benefit was improved local economic activity. It is important, then, to deal with the problem that allocations of funds may be partly determined by local economic conditions. If funds were systematically allocated to more economically depressed areas – which is likely, since the program was designed to reduce backlogs in maintenance and construction at the local level – then we could see higher levels of spending associated with higher or increasing (in relative terms) unemployment. Alternatively, if more funds were allocated to areas with a stronger need for spending due to expectations of stronger future activity, then the opposite would be true. In either case, we need to account for the endogeneity of the funding decision. It is here that political factors play an important role in our analysis.

Leigh (2008) found clear evidence that Roads to Recovery funding was more generous for districts held by the governing Liberal–National Coalition.[3] Controlling for a quadratic in population density, National Party districts received $6.8 million more funding, while Liberal Party districts received $2.7 million more in funding. Funding does not appear to have been allocated towards marginal districts; if anything, it was more generous for safer districts. Milligan and Smart (2005) find similar results for Canada, and describe how it can be the outcome of a model of legislative bargaining.

Our dependent variable is the change in unemployment rate from 2001 to 2004: across all districts, it fell by 1% point from an average of 6.9% in 2001. Because sparsely populated areas might have received more road funding, we control for a quadratic in the inverse of population density — that is, km^2 per person. The results are robust to adding higher-order terms in density. Summary statistics by the party holding each electorate are in Table 1. In terms of economic performance, electorates held by non-government parties tend to be intermediate between the electorates held by the government coalition partners (the National and Liberal parties).

For each set of controls, we estimate an OLS and an instrumental variables model (Table 2). Column 1 shows the relationship between the change in unemployment and the log of Roads to Recovery spending. Column 2 shows results with road spending instrumented with indicator variables denoting that the district was held by the Liberal or National Party in 2001 (the seat being held by non-government members is the omitted dummy variable). Column 3 shows the first stage results. Columns 4–6 repeat these specifications, adding additional controls: log average taxable income in fiscal year 2000–01, the 2001 unemployment rate, and the change in unemployment over the previous election cycle (1998–2001).

In the OLS specification (Column 1), the coefficient on log road spending is −0.46, indicating that a 10% increase in Roads to Recovery spending is associated with a 0.046% point decrease in the unemployment rate. The instruments are jointly strongly significant, with an F-statistic of 12.91 (Column 3). Using only variation in road spending that comes directly from partisanship, we estimate a coefficient almost twice as large, suggesting that a 10% increase in spending leads to a 0.08% point decrease in the unemployment rate (Column 2). The specifications with additional controls show a similar pattern, with coefficients of −0.36 in the OLS specification (Column 4) and −1.2 in the IV specification (Column 5). The larger IV than OLS estimates suggest that, as speculated, Roads to Recovery funds were distributed to more economically stagnant electorates, so that the OLS results would be biased in a positive direction — that is, to finding a smaller decline in unemployment rates per dollar of infrastructure spending.

As a robustness check, we estimate a placebo regression, where the dependent variable is the change in unemployment from 1998 to 2000, prior to the commencement of the program. We find a small and statistically insignificant association between Roads to Recovery funding and the prior change in unemployment in a district (Table 3).

What do these coefficients imply for estimated job-creation costs? With an average labor force of about 65,000 in each district, a 0.04%–0.12% point fall in the unemployment rate corresponds to an additional 26–78 jobs. At the mean, a 10% increase in Roads to Recovery spending is approximately $800,000 over three years. This suggests that Roads to Recovery created one additional job at a cost of $10,000–$31,000 over a three-year period.

[2] Note that relative to its population, Australia has a much larger labor market survey than the United States. During the period in question, Australia's Labour Force Survey had a monthly sample size of around 50,000 for a population around 20 million. By contrast, the US Current Population Survey had a monthly sample size around 130,000 for a population of about 300 million.

[3] Elections were held on 10 November 2001 and 9 October 2004.

Table 2
Does pork-barrel road expenditure reduce joblessness?

Dependent variable is the change in the unemployment rate from 2001 to 2004, except Columns 3 and 6 where it is Log (Roads to Recovery spending)						
	Basic			Additional controls		
	[1] OLS	[2] IV	[3] 1st stage	[4] OLS	[5] IV	[6] 1st stage
Log (Roads to Recovery spending)	−0.455***	−0.814*		−0.358**	−1.233***	
	[0.169]	[0.438]		[0.137]	[0.347]	
Population density	0.830**	1.330*	1.191***	0.584**	1.642***	1.079***
	[0.415]	[0.679]	[0.141]	[0.268]	[0.478]	[0.128]
Population density^2	−0.074*	−0.119*	−0.104***	−0.041	−0.133***	−0.092***
	[0.040]	[0.063]	[0.015]	[0.027]	[0.043]	[0.013]
Unemployment rate in 2001				−0.421***	−0.454***	−0.023
				[0.044]	[0.046]	[0.024]
Change in unemployment rate from 1998 to 2001				−0.359***	−0.398***	−0.039
				[0.072]	[0.070]	[0.036]
Log mean taxable income				−1.060**	−2.842***	−1.954***
				[0.524]	[0.955]	[0.333]
Political variables (1st stage only)						
Liberal party seat			0.304***			0.401***
			[0.101]			[0.093]
National party seat			0.874***			0.698***
			[0.184]			[0.165]
Observations	150	150	150	150	150	150
R^2	0.050	0.392	0.901	0.575	0.654	0.927
F-test on excluded instruments			12.91			15.50
			$P < 0.0001$			$P < 0.0001$

Notes: Standard errors in brackets. R^2 is the uncentered R^2 in the IV specifications (Columns 2, 3, 5 and 6). The dependent variable is scaled in percentage points (a 1% point rise in unemployment is +1). Roads spending is total Roads to Recovery spending over the 2001–04 election cycle. Population density is km^2 per person. Excluded instruments in Columns 2 and 4 are indicators for the district being held by the Liberal Party or the National Party after the 2001 election.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

Table 3
Placebo regression.

Dependent variable is the change in the unemployment rate from 1998 to 2000, except Column 3 where it is Log (Roads to Recovery spending)			
	[1] OLS	[2] IV	[3] 1st stage
Final regression results			
Log (Roads to Recovery spending)	−0.148	−0.280	
	[0.104]	[0.271]	
Population density	0.049	0.651	1.26***
	[0.251]	[0.423]	[0.138]
Population density^2	−0.001	−0.054	−0.110***
	[0.024]	[0.039]	[0.014]
Unemployment rate in 1998	−0.187***	−0.163***	0.064***
	[0.029]	[0.029]	[0.018]
Political variables (1st stage only)			
Liberal party seat			0.419***
			[0.102]
National party seat			0.735***
			[0.181]
Observations	150	150	150
R^2	0.321	0.740	0.909
F-test on excluded instruments			14.03
			$P < 0.001$

Notes: Standard errors in brackets. R^2 is the uncentered R^2 in the IV specifications (Columns 2 and 3). The dependent variable is scaled in percentage points (a 1% point rise in unemployment is +1). Roads spending is total Roads to Recovery spending over the 2001–04 election cycle. Population density is km^2 per person. Excluded instruments in Column 2 are indicators for the district being held by the Liberal Party or the National Party after the 2001 election.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

It is possible that in part this substantial job creation could be because better road infrastructure indirectly boosts economic activity, perhaps by reducing transport costs for local businesses. Or the results could be driven by other forms of pork-barrel spending directed towards Liberal–National districts, though controlling for three other pork programs that we are able to observe has very little impact on our results.[4]

3. Conclusion

Using variation in road expenditure driven by partisanship, we estimate the plausible causal impacts of infrastructure spending on local unemployment. Although the available data do not permit us to directly estimate a multiplier, the impacts on unemployment are consistent with large local spillover effects, and provide support for the use of federally funded infrastructure programs to stimulate local employment, at least in the short run. The estimates of the effect on unemployment rates may understate the effect of infrastructure spending on the local economy, since they are net of a (possible) reduction in local government own spending in response to increased federal funding, and of inter-electorate migration.

Because the results show that areas with relatively large pork-barrel driven road spending experienced a greater fall in their unemployment rate relative to the national average, no conclusions can be drawn about whether there were any effects of the program on national economic activity. In particular, if increases in government debt were associated with the expectation of future tax increases and a reduction in current private consumption or investment, then the results would overstate the national effects.

[4] Controlling for total spending on the three other pork programs analyzed in Leigh (2008) makes no substantive difference to our results.

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