

Rapid evidence review: Local multiplier effects of changes in public spending

Introduction

This rapid evidence review looks at the impact of changes in public spending on other economic outcomes in local economies.

Shifts in government expenditure affect local economies directly and indirectly. The main direct effect is through the purchase of goods and services locally, or through increased public sector employment. Indirect effects arise if firms providing goods or services to government purchase inputs locally or if workers at suppliers or in the public sector spend locally.

Policymakers often use multipliers to assess the effects of expenditure on other outcomes. These generally draw on 'input-output' models that focus on the positive demand-side effects adjusted for leakages from the local economy.¹ This review takes a different approach, looking at studies that evaluate the impact of public spending on local employment, income, and economic output, using observed responses to calculate local multipliers.

This review is intended to complement our toolkit on <u>local employment multipliers</u>, which looks at the impact of increases in employment.

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Leakage occurs when the effects of a policy spread (or leak) to impact individuals, businesses, or areas which are not the intended target of the policy. In spatial policy, leakage can mean the effects of an intervention in a specific geographic area leak out to impact other areas, for example because some of the spending by public sector employees goes to purchase goods and services from other areas.

Things to consider

Policy lessons

- Evidence suggests that increases in public spending can have multiplier effects on economic outcomes at the local level but there is not always an effect.
- Most of the evidence for this comes from studies looking at stimulus spending or cuts in spending so the extent to which this finding carries over to day-to-day spend is less clear.
- As the evidence base on the local multiplier effects of public spending changes is limited, and mostly not based on business-as-usual expenditure, it would be preferable to use employment multipliers wherever possible. This will require translating spend into jobs before applying the multiplier. The evidence on employment multipliers is summarised in our <u>local employment multipliers toolkit</u>.

Need for more evidence

- Most of the evidence reviewed looks at stimulus spending government channelling public money into projects or activities that it hopes will counteract economic downturns – or scenarios where spend was cut due to external circumstances. We need more evidence on the local economic effects of changes due to 'everyday' spending to help build an understanding of how this spending may affect local outcomes.
- There is a need for evidence from the UK.

Evaluation evidence

What are multipliers?

Multipliers are a concept used by economists to capture the impact that a change in activity in one part of the economy has on other parts of the economy. Different types of multipliers look at the different types of activity.

Employment multipliers capture the effect of increases in employment in part of the economy (for example, the public sector) on other parts of the economy (for example, the private sector). In macroeconomics, income multipliers capture the increase in national income (or output) from a change in investment or spending. This review is concerned with a broader set of local multipliers that look at the effects of changes in government spending on other local economic outcomes. That change may be the result of a deliberate public policy intervention which changes public sector spending, or the result of a shock to spending, for example, caused by a recession and subsequent public sector budgetary cuts.

These multipliers can be expressed in different ways depending on the outcome of interest. For example, a local multiplier could measure the response of local household income to expenditure (for example, how much local average household incomes increase as a result of higher spending in the local area), local employment to expenditure (how many new jobs there are in an areas as a result of increased spending), or other local outcomes to expenditure.

Increases in public expenditure can have a direct effect on local economies through the purchasing of goods or services locally, or by increasing local public sector employment or wages. If businesses acting as suppliers to the public sector purchase their own inputs from other local businesses, this will result in an indirect effect. If public sector workers, or workers at businesses that are suppliers to

the public sector, spend a proportion of their income in the local economy, this will also result in an indirect effect, further increasing local output, employment or wages. Multipliers can be presented as either the indirect effects (for example, for each job directly created by the intervention, an additional 0.8 jobs are created through indirect effects) or as the total effect, including both direct and indirect effects (for the same example, this would be presented as 1.8). The studies in this review present the total effect.² Local multipliers tend to be larger than national multipliers as they do not account for displacement effects between areas.

Policy appraisal often uses estimated multipliers to help assess the likely impacts of local growth policies. Many of these appraisals use multipliers from 'input-output' models that focus on the positive demand-side effects adjusted for 'leakages' from the local economy (demand that is served by businesses from elsewhere). Less frequently, more complicated 'general equilibrium models' are used for appraisal to allow for the possibility of offsetting price and wage effects.

This rapid evidence review looks at studies that take a different approach by evaluating the impact of changes in public spending on local employment, income, and output, and using this to calculate local multipliers. This lets observed responses to actual changes in public spending tell us about the balance of offsetting forces and the size of the relevant multipliers.

Most of the studies in this rapid evidence review estimate multiplier effects by trying to isolate the impact that a change in public spending has on a specific outcome or outcomes in an area, using comparison against similar areas over the same time frame that did not experience the same change in public spending. Four studies look at stimulus spending, using various techniques to match areas receiving stimulus against similar areas receiving less or no stimulus. Three studies look at cuts to public spending in a similar way. The local multiplier summarises how much local economic outcomes increase when spending increases by a given amount, and vice-versa for studies using reduction in spending.

Understanding the local multiplier effects of changes in public spending

Our evidence reviews use studies with a score of three or above on the Maryland Scientific Methods Scale (SMS), which classifies evaluations based on methodological robustness and implementation.³ Our toolkits and rapid evidence reviews also include studies with a score of two or above when these add to the evidence base.

Our search identified eight evaluations. Four were scored as SMS 4, one as SMS 3, and three as SMS 2. We give more weight to studies with higher scores, and flag those scoring SMS 4 and SMS 3. The annex provides a summary of each study.

The findings are organised by outcome – employment, wages and income, output, and others. Seven studies cover more than one outcome and are referenced more than once.

As always, be cautious when using findings based on a small number of studies.

² Our local employment multipliers toolkit presents multipliers using the other approach (i.e. providing the figure for the indirect effects) so care should be taken when comparing findings across publications.

³ For more information on how we rank the robustness of evaluations, see our introduction to the Maryland Scientific Methods Scale: <u>http://www.whatworksgrowth.org/resources/the-scientific-maryland-scale/</u>

Evidence on local multiplier effects from changes in public spending

Employment

Four studies look at the multiplier effects of public spending on local employment. Three scored SMS 4 and one SMS 3. Increases in public spending in an area may be expected to produce higher employment if the spending leads to new activities or the scaling up of activities that require labour as an input.

Three studies look at the effects of stimulus spending on employment. Two studies evaluate the impacts of US federal stimulus spending through the American Recovery and Reinvestment Act (ARRA), enacted in 2009 as a response to the global financial crisis. One looks at stimulus spending in Germany, also in 2009 as a response to the financial crisis. Two studies find positive effects, and one finds mixed effects.

- IM-1 (SMS 4) finds that, on average, in the first two years after passage of the ARRA, \$100,000 of ARRA stimulus spending leads to an additional 1.88 job-years in recipient US labour market regions (constructed from county-level data and commuter flows, where each region is comprised of the largest county, and then the sum of the remaining counties in the region). The overall impact comprised of 1.03 job-years in the largest county and 0.85 jobyears in spillovers to the other counties in the region.^{4,5}
- IM-2 (SMS 4) assess the impact of a German public stimulus programme focused on investment in energy efficiency improvements to school buildings. Looking at the total effects of investments made between 2009 and 2011, it finds that, on average, €100,000 of spending in a county led to 4.1 job-years created in that three-year period. Around half of the job-year creation is in the construction-related industries, which were the sector most exposed to the policy.⁶
- IM-3 (SMS 3) finds that the strength of the positive employment impacts from ARRA spending at the county level depends on the severity of recession experienced in the county. Over the two years of ARRA spending, an additional \$100,000 of stimulus spending per capita is associated with 2.5 additional job-years per capita in counties that were more severely affected, but no statistically significant impact in counties that were less severely affected. Around two-thirds of the additional job-years come from the private sector (mainly in non-tradeable services and construction) and around one-third the public sector.

One study looks at general federal spending in the US, finding positive effects. IM-4 (SMS 4) uses revisions to population estimates in US counties, which results in changes to levels of federal spending being allocated to them, to assess the impact of that spending on employment growth over three years following the change in spending. It finds that, on average, \$100,000 of federal spending increases employment in recipient US counties by between 2.7 and 3.3 jobs over the three years.

⁴ A job-year refers to a year of employment for one person, so that one job-year means one job for one year for an individual. Two job-years means one job for one individual for two years, not two jobs. Calculating job-years means adding up the average jobs created per year over the total number of years of a programme.

⁵ The US has 3,244 counties (or county equivalents in some states) which are an administrative subdivision below the level of US states. US counties do not have a uniform set of administrative powers or a standard size either in terms of geography or population. On average counties are 3,120 km2, and contain 104,435 inhabitants, but this varies significantly and counties in the western half of the country tend to the larger – for example Los Angeles County has a population of over 10 million, which is more than most US states.

⁶ Germany has 294 rural counties (Kreis or Landkreis) – sometimes translated as districts – which are an administrative subdivision below the level of German states (Länder) and above the level of municipalities (Gemeinden). There are also 107 urban counties (Kreisfreie Städte or Stadtkreise) – sometimes translated as urban districts – which consist of cities of over 100,000 inhabitants. Counties are a form of local government and have responsibilities for a range of public services.

Taken as a whole, these studies suggest that increased public spending can have positive multiplier effects on employment at the local level. The policies chosen, and the economic performance of the area, may influence the size of the multiplier.

Wages and income

Five studies examine the effects of changes in public spending on local wages and income. Two scored SMS 4, one SMS 3, and two SMS 2. Increases in public spending in an area may filter through into higher income for people living in that area if it results in higher employment or wages or involves direct transfers to households.

Two studies look at stimulus spending from ARRA in the US. Both were also discussed in the section on employment effects. One study finds positive effects, and one finds mixed effects.

- IM-1 (SMS 4) finds that, on average, \$100,000 of ARRA stimulus spending in US labour market regions (defined earlier) leads to a cumulative \$114,000 increase in the per-capita wage bill, in the first two years after passage of ARRA. This is composed of \$64,000 in the largest recipient county in the region, and a \$50,000 spillover effect in neighbouring counties.
- IM-3 (SMS 3) finds that, on average, \$100,000 of ARRA stimulus spending per captia leads to a cumulative increase in earnings per capita of \$107,000 over a two-year period following passage of ARRA in counties experiencing a more severe recession, but there was no effect in counties experiencing a less severe recession.

One study looks a general federal spending in the US, finding positive effects. This study was also discussed in the section on employment effects. IM-4 (SMS 4) finds that, on average, \$100,000 of federal spending positively affects personal income (employment earnings, dividends, interest, and rent) growth and leads to a cumulative increase in personal income of between \$119,000 and \$122,000 over the three years after the change in spending from a population estimate revision. The paper finds no evidence of large spillover effects between counties and that multipliers are larger in areas which were more economically depressed.

Two studies look at cuts to public spending. Both find no effect.

- IM-5 uses a change in Italian municipal budgeting for areas of under 5,000 inhabitants which led to a decrease in spending mostly capital spending of around €100 per capita. They find no impact on per capita income, measured via income tax returns, in any of the eight years following a decrease in spending.
- IM-6 finds military base closures in Sweden have no effect on average income growth of residents three and five years post-closure in the municipalities affected.

Overall, the evidence on income effects is mixed. Stimulus and day-to-day spending seems to have moderate positive effects, especially in areas experiencing larger economic recessions, while cuts to public spending do not appear to have effects on local incomes.

It is important to remember that there may be different multiplier effects experienced in response to an increase in spending compared to in response to a decrease in spending because decreases can often be accompanied by offsetting measures. An additional complication is that the evaluation evidence on increasing spend is more robust than that on decreasing spend.

Output

Two studies look at the impact of changes in public spending on local economic output (i.e. the value of goods and services produced in local economy). One scored SMS 4 and one SMS 2. Increases in public spending in an area may produce higher output in the same area, if that spending leads to more economic activity or higher productivity.

The evidence suggests mixed effects.

- IM-7 (SMS 4) uses dismissal of Italian city councils due to corruption to measure the impact of sudden and unanticipated cuts to local public infrastructure spending on local output, measured using Gross Value Added (GVA) per capita. It finds that a cut in local infrastructure investment equivalent to one percent of GVA per capita leads to a 1.5 percent reduction in GVA per capita.
- IM-8 considers the impact of public stimulus investment projects in 1990s Japan on prefecture-level Gross Domestic Product (GDP) per capita. These stimulus projects involved a mix of capital and revenue spending, transfers and tax measures. The study finds the average multiplier was between 0.6 and 0.8, depending on the specification used. This means the increase in GDP per capita was smaller than the increase in public spending. City government projects produced an average multiplier of 1.0, prefecture-level government projects 0.7, and central government projects between 0.34 and 0.37. Additionally, the focus of the spending mattered transfers to businesses produce an output multiplier of 5.6, followed by public construction at 1.4, while transfers to households or government personnel have negative multiplier effects.

Given the small number of studies and their mixed effects, more evidence is needed.

Other impacts

Four studies (all previously mentioned) look at other impacts.

- IM-2 (SMS 4) finds that, on average, €100,000 of stimulus spending in counties in Germany led to a 1.9 person-year reduction in unemployment.
- IM-6 considers the impact of Swedish military base closures and associated reductions in local public spending – on the net migration rate in the Swedish municipalities affected by closure. It finds that base closure has no effect on total net migration over three or five years post-closure.
- IM-7 finds tighter budget regulations imposed on Italian municipalities of under 5,000 habitants in 2013 increase municipal budget surpluses by about 0.5 percent of municipal income, primarily achieved through reduced capital expenditures.
- IM-8 finds that public stimulus investment in Japan financed by local governments was associated with increases in local government tax revenues, while this was not the case for public investment financed by the central government.

Annex: Evidence on local multiplier effects from changes in public spending

For this rapid evidence review, we looked for evaluation evidence of local multipliers arising from changes in public spending. We focused on evidence from OECD countries, published in English. We considered any study providing before-and-after comparisons or cross-sectional studies controlling for differences between areas. We also included more robust studies that compare changes in outcomes in treated areas with changes in outcomes in similar non-treated areas, or that use an instrumental variable approach.

We found eight studies. Four scored SMS 4, one SMS 3, and three SMS 2. In summarising the evidence, we place greater emphasis on studies that used more robust methods. Three studies look at the US, two at Italy, and one each at Germany, Japan, and Sweden.

Studies

IM-1 (SMS 4, US) evaluates the impact of stimulus spending on US counties and their neighbouring counties between 2009 and 2012. The study covers the American Recovery and Reinvestment Act (ARRA) passed in 2009 – a \$840 billion federal stimulus programme that aimed to counter the 2007 to 2009 recession by funding infrastructure, education, and other sectors across 1,293 local labour markets over a two-year period to boost employment and economic activity. Data is sourced from the Quarterly Census of Employment and Wages (QCEW), which covers approximately 98 percent of US jobs, and ARRA spending data from quarterly reports from recovery.gov. The study constructs local sets of economically interdependent labour market regions using cross-county commuting data from the 2000 Journey to Work Survey, where each region is comprised of the largest county, and then the sum of the remaining counties in the region. Using a two-stage least squares methodology with instrumental variables, the study estimates both direct effects on the largest county, and spillover effects on neighbouring counties making up the rest of the region, of ARRA spending on wage bills and employment. The study finds that every dollar spent through the ARRA increased the wage bill by \$1.14 over two years, comprising a effect of approximately \$0.64 in the largest county and a spillover effect of about \$0.50 in surrounding counties. The study also finds that each million dollars spent creates approximately 18.7 job-years, translating to a cost of \$53,305 per job created or saved over two years, split over 10.2 job-years in the directly affected county and 8.5 job-years in neighbouring counties.

IM-2 (SMS 4, Germany) assesses the impact of a German public stimulus programme on countylevel employment outcomes. The study focuses on a €15.8 billion stimulus implemented from 2009 to 2011 which required that at least 65 percent of funds were used to improve energy efficiency in school buildings. Data for 2007 to 2013 is from the German Federal Employment Agency and an administrative database of the 42,530 projects financed by the programme from the Federal Ministry of Finance. The study uses a difference-in-differences methodology with county and time fixed effects. The study finds that the stimulus has a positive effect on employment, particularly during 2010 and 2011, with €100,000 of investment creating about 1.5 jobs in 2010 and 2.5 jobs in 2011. Overall, these investments generate approximately 4.1 job-years per €100,000 spent between 2009 and 2011 at an average cost of €24,400 per job-year. The employment effects are most pronounced in construction and non-tradeable sectors, where treated industries accounted for about 1.8 job-years per €100,000 investment. Unemployment also decreases, with €100,000 reducing unemployment by about 1.9 person-years on average during the years when the programme is active. IM-3 (SMS 3, US) evaluates the effects of fiscal stimulus on local employment, earnings, and output in US counties between 2009 and 2012. The study focuses on the effects of expenditure variation in the American Recovery and Reinvestment Act (ARRA) across US counties, and whether the impact of this spending depends on the severity of the recession ('excess capacity') - measured as the absolute value of the largest observed one-year reduction in industry shift-share predicted employment in the county from 2006 or 2007 to 2008. ARRA was a \$840 billion federal stimulus programme that aimed to counter the 2007 to 2009 recession by funding infrastructure, education, and other sectors across 1,293 local labour markets over a two-year period to boost employment and economic activity. The analysis uses guarterly county-level employment and earnings data from the Quarterly Census of Employment and Wages (QCEW) provided by the Bureau of Labor Statistics, along with stimulus expenditure data from ARRA recipient-reported records on recovery.gov. Additional control variables are sourced from Census Bureau intercensal population estimates, the 2000 Census, and Home Mortgage Disclosure Act (HMDA) loan origination data. The study uses county-level fixed-effects panel regressions to measure the impact of stimulus spending over two years (eight quarters) following passage of ARRA. In counties with high excess capacity, the stimulus effect is substantially stronger than in counties with low excess capacity, with an increased in spending of \$100,000 per capita resulting in an increase of 2.5 job-years per capita (an estimated overall employment increase of 8.2 percentage points over two years) and a cumulative increase of \$107,000 in wage bill per person. In counties with low excess capacity, the impact is smaller and statistically insignificant (i.e. there is no effect).

IM-4 (SMS 4, US) evaluates the effects of federal spending on local economic outcomes. Federal agencies allocate a number of different funding streams based on local population, and use annual population estimates or Census counts depending on the availability and timeliness of the latter. The study uses discrepancies between annual population estimates and Census population counts - which they refer to as a census shock - as a way to estimate the impact of increase to federal spending resulting from increases to the local population estimate after a census shock. They estimate effects over three years, with a starting point two years following the population revision (as there is a two-year lag for changes in federal spending from the census shock itself). The study uses county population estimates from the Census Bureau from 1970 to 2009, Vital Statistics of the U.S. for births and deaths, IRS migration data, federal spending information from the Consolidated Federal Funds Reports, and county-level income and employment data from the Bureau of Economic Analysis. Using an instrumental variables analysis, the study finds that increased spending from a census shock produces an employment response of 27 to 33 new jobs per \$1 million over the three years following the increase in spending, corresponding to a cost per job in the range of \$30,000 to \$36,000. The personal income multiplier is estimated as between 1.9 and 2.2 for the same \$1 million of spending.

IM-5 (SMS 2, Italy) examines the effects of cuts to public spending on per capita income. The study uses the introduction of tighter budget regulations imposed in 2013 on Italian municipalities of under 5,000 habitants (the Domestic Stability Pact, or DSP). The DSP was applied to municipalities above 5,000 inhabitants between 2001 and 2012 and was extended to municipalities with population between 1,000 and 5,000 inhabitants from 2013 onward. The data used is comprised of balance sheets from municipalities from 1998 to 2018, collected by the Italian Ministry of the Interior, and income tax declarations at municipality level from the Italian Ministry of Finance. Using a regression discontinuity ('difference-in-discontinuities') methodology and using municipalities above the 5,000 inhabitants cut-off as a comparison group, the study finds the tighter budget rules of DSP increase municipal net budget surplus by approximately €100 per capita (about 0.5 percent of municipal income), primarily achieved through reduced capital expenditures. The study finds changes in

expenditure have no effect on per capita income in any of the eight years post-DSP.7

IM-6 (SMS 2, Sweden) assesses the effects of military base closures on regional income growth rates and net migration in Sweden between 1983 and 1998. Data comes from a Statistics Sweden panel of 31 Swedish municipalities which either had a military base during the whole period 1983 to 1998 or were affected by a base closure in that period. The study uses this to construct a regional growth model, estimated using a two-stage least squares regression. Results for municipalities experiencing closure are compared against these averages at three and five years post-closure. The study finds that base closures have no effect on the average income growth rate and net migration rate over three and five years post-closure.

IM-7 (SMS 4, Italy) examines the impact of cuts to public spending on local economic output in Italy in the 1990s. The study uses an anti-corruption law in Italy that mandates the dismissal of city councils due to Mafia infiltration, leading to unanticipated cuts in local public spending. Data comprises annual observations of output and public investment spending across 95 Italian provinces from 1990 to 1999. Using an instrumental variable methodology, the study finds that a cut in local public infrastructure spending equivalent to one percent of GVA per capita leads to a 1.5 percent reduction in GVA per capita.

IM-8 (SMS 2, Japan) examines the impact of local government spending on economic output and public finances in Japan. The study focuses on 47 prefectures from 1990 to 2000 (a period marked by financial crisis). Data is sourced from the Japan Statistical Yearbook. Using a dynamic panel data model with fixed effects and system-generalised method of moments (GMM) estimation techniques, the study finds a public investment to GDP per capita multiplier of between 0.6 and 0.8, depending on the specification used. This means the increase in GDP per capita was smaller than the increase in public spending. The study also finds that local government-financed public investment is more effective than central government-financed investment, with an average multiplier of 1.0 for city government investments, 0.7 for prefecture government investments, and between 0.34 and 0.37 for central government investments. The focus of spending also had different effects, with transfers to businesses producing an output multiplier of 5.6, and public construction 1.4, while transfers to households or government personnel resulting in a decline in GDP per capita. The study also breaks down the drivers of the increase in GDP per capita, finding that transfers to businesses have a positive effect on total employment (0.04), hours worked (0.19), wages (0.16), and private investment (2.43), but a negative effect on private consumption (-1.11). Social assistance spending had a negative effect on employment (-0.02), no effect on hours worked, a negative effect on wages (-0.15), a negative effect on private investment (-3.04), but a positive effect on private consumption (4.36). Public construction spending had positive effects on employment (0.01), on hours worked (0.08), on wages (0.05), and on private investment (0.29), and a negative effect on private consumption (-0.37). The study also finds public investment by local government contributes to increases in local government tax revenues, while central government investments do not have this effect.

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This study scores SMS 2 because, while using an instrumental variables method to estimate the impact on municipal budget surplus, for the impact on income (which is the outcome of interest for this rapid evidence review) it is not sufficiently clear how the instrumental variable was implemented and therefore how robust an estimate it produced.

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