Calculating the Crisis – Nationally and Locally

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Goal

The main purpose of this exercise is to ask – where did all those great big numbers in the American Recovery and Reinvestment Plan (ARRP) come from, how were they calculated, and are they reasonable, and how a local calculation might differ from the national?

The amount budgeted (so far) is $787 billion.
- Is there a non-political rationale for this amount?
- What is the size of the hole - the depth and length of the crisis?
- Does the amount proposed fill this hole?

Former President Bill Clinton called the stimulus package –"a Bridge over Troubled Water?"
- How long will take to distribute? How long will its effects last?
- What has to be done as well?
- What is the international dimension?

Rep. John Boehner's questioned, "how spending $50 million for some salt marsh mouse in San Francisco is going to help a struggling auto worker in Ohio?"
- So, it is important to ask what happens at the local level and why?
- Does the answer provide any additional pointers?

Pointer

The effectiveness of the stimulus at the national level will be the sum of local projects. Making the stimulus effective at the local level is not just a matter of ensuring that individual project evaluations are "honest", but also assessing whether different firms, suppliers, hiring practices, and so on, could enhance the "bang for a buck". Small places, like small businesses, can be more selective and agile than larger institutions. In other words, the impact at the local level can be greater than implied by the "averages" so far calculated for the national level, which in turn will make the eventual national impact greater than current estimates.

National/Global Scenarios

First, a few observations on differences between nations, the local, and the national levels.
- Most if not all nations are faced with a similar situation
- Most nations have some kind of bailout package/rescue plan
- Most nations have a "good" and a "bad" scenario that depend on their particular economic and political circumstances.

The "good" scenario

- There is a bail-out package that might bridge the economy for a few years, at best
- The hope is that by this time other policies or factors kick in.
- e.g. financial markets start working again, global demand picks up, societies reconcile themselves to a period of relative hardship, and trust returns to the "market".

This is the good short-run (1-2 years) scenario.
Even if this happens there remains the question of what happens in the mid- and longer-term

The "bad" scenario

In some cases the immediate situation is more critical
Societies are less robust and there is possibility of social unrest
Some have fewer financial resources or confidence from foreign lenders
They face financial collapse, trade protectionism, end of hopes and dreams, military coups, etc.
There is the possibility of contagion – bad scenarios in countries that can't make it spills over into countries that might with concatenated disruptions and a spiraling-down of the world economy.

STIMULUS BREAKDOWN	
FINAL TAB $789 billion	
Infrastructure	$120 billion
Business Tax Cuts	$142 billion
Individual Tax Cuts	$140 billion
Medicaid/States	$87 billion
AMT Patch	$70 billion
Other Aid to States	$67 billion
Aid for Jobless	$60 billion
Energy Efficiency	$40 billion
Health IT	$19 billion
Rural Broadband	$7 billion
Other	$37 billion

Thus, there is an argument/dialogue in most countries
a) insulate against this (bad scenario?),
b) global cooperation by leading powers to coordinate policies (good scenario?).

Much of the discussion is about how big an impact the stimulus might give and when? This involves the concept of the "multiplier" which indicates the total impact of the stimulus on the US economy as a whole after the spending has worked its way through the economy. These multipliers are calculated in a number of ways – not necessarily consistent with the scope and timing of the stimulus or the extreme economic conditions it is supposed to confront.

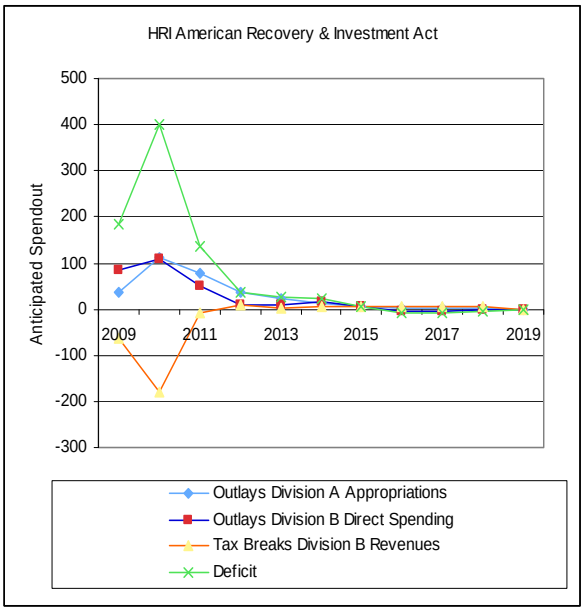
Local Structures and Contrasts

While similar scenarios and impact analyses are used to assess economic impacts at the local level, there are important differences due to empirical, structural, institutional variability across localities, industries, and societies in rich/poor countries, urban/rural regions, etc.

A principal difference is that a large nation has a fairly complete economic structure (most production activities are represented by a multitude of enterprises) and broad-based relatively robust institutions. Thus, for large economies, statistical averages across sectors and extrapolations through time are often reasonable. Even a relatively large event might appear as a rather small ripple on a long-term trend. The smaller a locality, the more likely it is that development is specialized and lumpy, irregular and crisis-prone. In other words, most small places are in crisis (or incipient crisis) much of the time.

Under normal circumstances, this state is somewhat cushioned by the possibility of outside development or recovery assistance, or migration to other places, and so on. With a more generalized crisis, these options may be less available. There is particular concern that international development assistance might dry up. In the short-run at least – because of the current round of national stimulus packages – localities in richer nations are likely to receive some new assistance.

There is a real quandary that a great deal of the potential at the local level will be wasted because of exaggerated project evaluations, whether "shovel ready "political projects or opportunistic private developer projects, or because other projects will be delayed because of squabbling about their benefits, locally, or inter-regionally.



Fiscal Economic Bank for the Buck

One year $ change in real GDP for a given $ reduction in federal tax revenue or increase in spending

Tax Cuts	
Non-refundable lump-sum tax rebate	1.02
Refundable lump-sum tax rebate	1.26
Temporary tax cuts	
Payroll tax holiday	1.29
Across the board tax cut	1.03
Accelerated depreciation	0.27
Permanent tax cuts	
Extend alternative minimum tax patch	0.48
Make Bush Income Tax Cuts Permanent	0.29
Make Dividend and Capital Gains Tax Cuts Permanent	0.37
Cut in Corporate Tax Rate	0.30
Spending Increases	
Extending UI Benefits	1.64
Temporary Increase in Food Stamps	1.73
General Aid to State Governments	1.36
Increased Infrastructure Spending	1.59

Source: Moody's Economy.com

Purpose of the a Stimulus?

The Center for American Progress (Will Straw and Michael Ettlinger December 5, 2008) provide a fair summary of the goal for a well-designed stimulus package:
a) Stimulus policies should be designed to offer an immediate boost throughout the economy by spurring demand;
b) their purpose is to quickly stall a downward spiral in the economy and give confidence to businesses to invest and hire by restoring demand for their products;
c) but, the consequences of the current downturn are not likely to be reversed quickly by traditional fast-moving stimulus measures;
d) also needed is a recovery program to accelerate the creation of a strong labor market and restore lost jobs over the next two years,
and e) well-designed recovery policies create jobs efficiently—producing many good jobs per dollar of public expenditure—while making investments that further our long-term economic prospects and restore confidence in the nation's future.

Size of the Stimulus and Spend-out

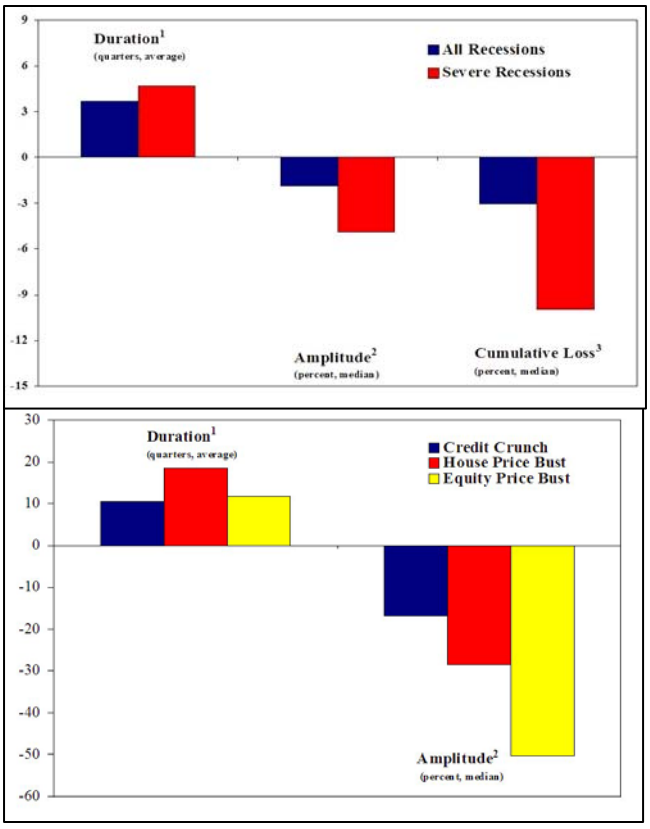
Although there is/was a "growing consensus that stimulus and recovery spending should be on the order of 2 percent to 4 percent of GDP", this appears to be based partly on historical analysis, partly the idea that we understand more economics than we used to, part wishful-thinking. The amount is probably the maximum that would pass muster at this time.

The charts show the level of spending by category and the overall expected spend-out (including revenues) in the $789 billion final ARRP deal struck by House and Senate leaders.

Moody's Multipliers

With respect to economic multipliers the Council of Economic Advisors (Romer-Berstein, Jan 9, 2009) assessment plan references estimates from Mark Zandi (Moody Chief Economist.) of income multipliers and impacts based on their "mainstream economic model". These are used for comparison with our own calculations. Note that the indicated GDP per $stimulus is closely related to how it is paid, which determines who gets it (the primary recipients, say unemployed versus corporations). This underpins the distribution of the stimulus as an effort to quickly address the

crisis, but opens criticisms that it is a short-term fix, with inadequate mid-term investment and longer-tem innovation potential.



The Crisis: How long, How deep?

A historical survey by Claessens (and others from the Research Department of the International Monetary Fund, October 2008) appears to be the most detailed recent assessment of the depth of recessions in recent times. Their conclusions appear consistent with the prevailing wisdom, or are possibly responsible for it. They say that "The house and equity "price busts" on top of a "credit crunch" make this an unprecedented crisis for the modern US economy; its real economy effects are thus difficult to assess. They provide data from 122 recessions in 21 advanced nations since 1960. They show that a recession on average lasts about 4 quarters (one year) with substantial variation across episodes — the shortest recession is 2 quarters and the longest 13 quarters. The cumulative loss of a recession is typically about 3 percent of GDP, but this number varies quite a bit across episodes. They also show that episodes of credit crunches and housing busts are often long and deep. A credit crunch typically lasts two and a half years with a 20 percent decline in real credit. A housing bust lasts longer: four and a half years with a 30 percent fall in real house prices. And an equity price bust lasts some 10 quarters with the real value of equities halved.

If the Great Depression is taken as a guide to the "bad" scenario – not unreasonable since the causes of the present "unprecedented" crisis are eerily similar to the 1929 crisis. Shouldn't we be looking at -10%, or -30% hole, rather than -3%, scenarios? During the Great Depression - unemployment rose to 23.6 percent and GNP fell a record 13.4 percent in a single year (1932) and stocks fell 90 percent. This may be why some commentators think the ARRP is only a "down payment."

Paul Krugman, an influential voice, says, in the absence of this program, we could very easily be looking at a 10 percent unemployment rate. (Face the Nation Dec 28 08), but not more, because, he says, we know more, today. Personally, I would question this: the world has become far more interconnected and interdependent since the Crash of 29, while an incredible level of risk-taking on Wall Street was indulged by the Federal Reserve. (From a "complexity/chaos theory" point of view whereby economies undergo systemic non-linear progressive collapse - there is no reason to be complacent.)

In "Bang for the buck (wonkish)" (New York Times January 13, 2009), Krugman makes an interesting point that "The cost of an effective fiscal stimulus, in terms of adding to the government's debt, can (and should) be much less than the headline cost." Using a simple Keynesian macro-economic multiplier approach He argues that the increase in GDP per dollar of added debt — is 3, not 1.5 (as assumed by most economists). Since a key concern about stimulus

is what it will add to government debt, it's this bang for the buck measure, rather than the multiplier, that's relevant. And, he says, "3 sounds a lot better than 1.5." While Krugman certainly has a point - that full feedback should be included in calculations of the impact of the stimulus - with this logic wouldn't we expect him to be calling for a smaller stimulus, if estimates of the size of the hole to be filled were reasonably reliable?

That said, we work below with the published ARRP package.

Text Book Multiplier versus the Global Economy

In practice, calculations of economic impacts derive from a variety of economic models many of which have an Input-Output IO model at their core or drive an IO model. These are widely used at the local level (State, county, small open-economy). In the US, these are invariably scaled-down from the national IO model. Such models allow us to calculate the Multipliers (such as those above). These models (due to Leontief) show the structure of an economy and give the best a picture we have of the income flows between industries, households, government, investors, and overseas. It is primarily an accounting structure with rather rigid assumptions. Obviously, some of the assumed behavioral relationships in this, or any other, model may be even less defensible under present multi-cause crisis conditions, and hardly approaches the complexity of the modern world.

Even under "normal" conditions, economist's forecasts typically owe about 50/50 to their favored empirical model and their best judgment, informed by sophisticated theory, historical parallels, political pressures, and practical experience. This may be as good as it gets! There are many issues with the choice of sectors and activities included, treatment of trade and finance, or government expenditures, In addition, much of the data are out-of-date or dubious.

Boehner's Big Question (The Ball Park (Answer is One Job).

John Boehner, House Republican Leader, the representative of the 8th District of Ohio, on the floor of the House during the stimulus debate asked, "Tell me how spending $50 million for some salt marsh mouse in San Francisco is going to help a struggling auto worker in Ohio?"

Before trying to get a more complete answer as to the possible impact of the ARRP, let's address Boehner's question using some information from a US IO table (see below).

Salt Marsh Mice	Amount	Households Stimuluus	Amount
Mouse stimulus $m	$ 50	Household Stimulus $m	$ 245,700
Manuf Jobs per $m SMM Research	1.8	Manufacturing Jobs per $m Hhold income	2.3
Manufacturing Jobs	89.3	Manufacturing Jobs	577,225
Auto Share of Manufacturing	6%	Auto Share of Manufacturing	6%
Auto Jobs	5.52	Auto Jobs	35,666
Ohio Share of Auto	13%	Ohio Share of Auto	13%
Ohio Auto Jobs	0.7	Ohio Auto Jobs	4,458

Total Jobs per $m R&D	39	Total Jobs $m HH	16
Total Jobs from SMM Stimulus	1,962	Total Jobs from Hhold Stimulus	3,920,581

Note: The jobs are Job-Years spread over several years

The answer lies in the circulation of income through the economy that, among other things, requires a lot of mice and some decent cars from the Midwest….so we don't have to import them. Using a simple-minded approach – sub-dividing payments to researchers, to auto industry, to auto workers, and geography suggests about one job-year (spread over 2-3 years1). So, that part of the stimulus creates one job which won't do much to offset auto manufacturing job loss in Ohio. On the other hand, the overall stimulus to households (via tax relief

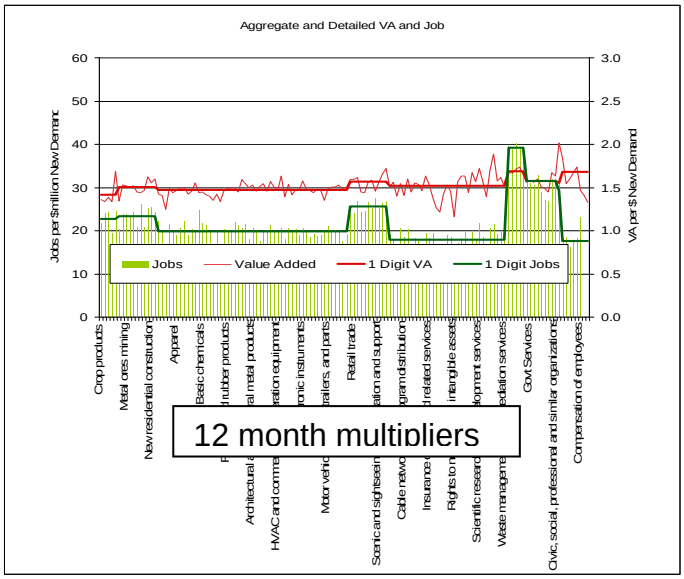
and other transfers) will do a lot more for Ohio auto workers, about 4,500 jobs, and others, directly targeted at the auto-industry even more.

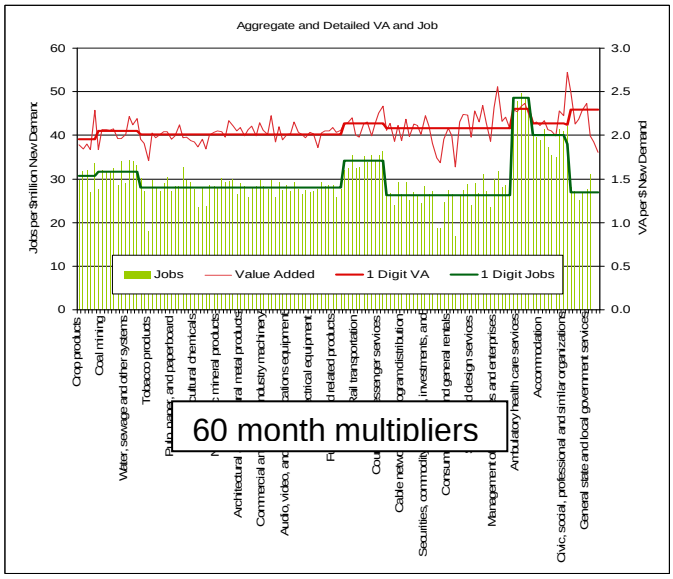
An important point here is that while a given small stimulus designed to address a particular issue at one end of the country might do rather little for another particular segment of another distant community, may be small, the total effect of the nation-wide stimulus may be a significant share the potential impact on any community.

Estimating the National and Local Impacts

The possible impacts of the stimulus package are now calculated in more detail using, first, a US Input Output Table (134 production and government sectors) concocted from BEA "Make", "Use", and "Trade" tables and, second, a multi-county social accounting matrix. An effort has been made to reconcile the results with Moody's and other estimates.

Most estimates use fairly aggregated sectors (e.g. "agriculture", construction", and so on, but within these broad sectors is a wide variation. The broad 1-digit sectors appear to have characteristic income multipliers (value-added per dollar new demand) and employment impacts (jobs per million dollars new demand). This suggests that for some purposes such as getting a rough idea of the

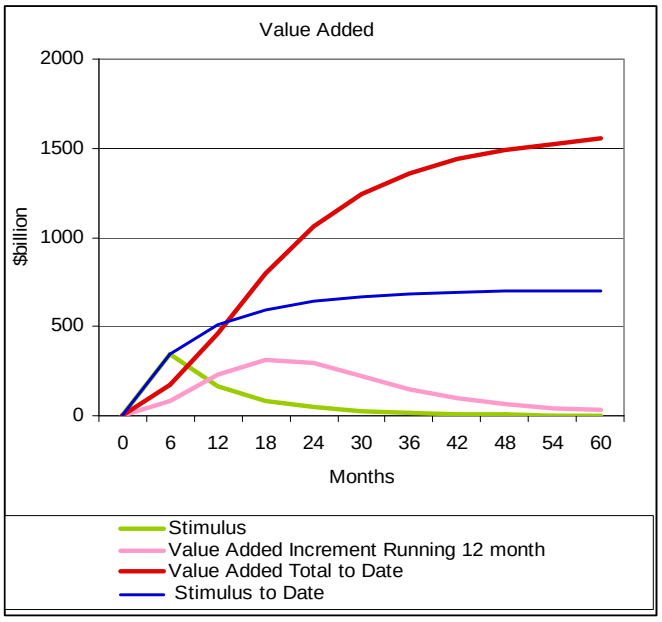


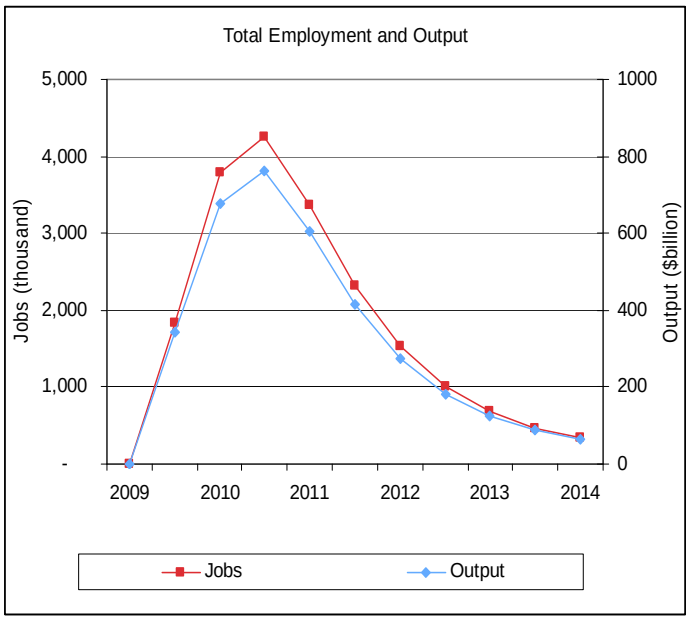


national impacts it may be reasonable to use 1 digit figures (like Moody) , or even to take a average across all sectors (like Krugman).

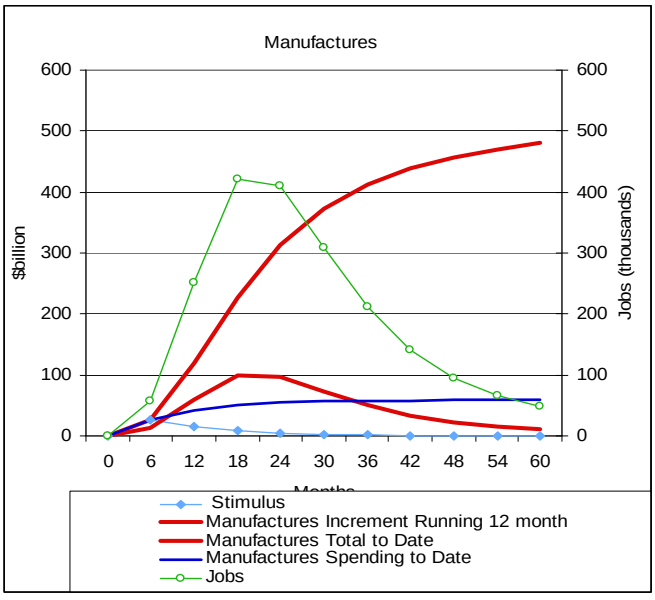
However, there are also considerable variations within broadly defined sectors and this variation gets greater the finer the sector definitions or the more specific the enterprise. Moreover, new enterprises and sub-sectors are unlikely, or old enterprises in new circumstances, are not well represented in the historical data. At the local level the variability is far higher and the statistical and temporal reliability of the data even less - doubtful if many numbers are better than 10%. Thus, estimating the consequences of new projects in crisis scenarios is a challenge – use best possible data on projects plus a robust aggregate local IO model, and plan for a residual uncertainty. That said, this suggests that care in selecting projects to be funded, and the way they are carried out, could deliver above-average benefits in terms of both local and national criteria.

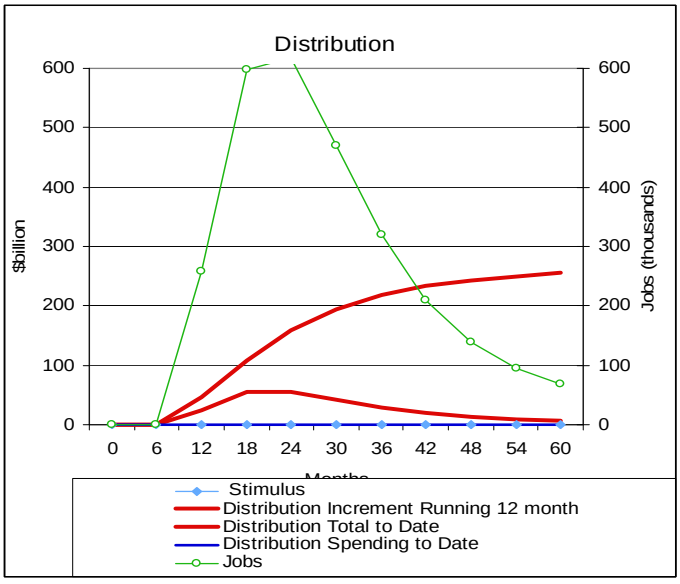
Spend-out and Spending Delays





Whatever the amounts, there are delays in distributing the appropriations (spend-out) and further delays in recipents spending new income. Both kinds of lags slow the process down. Some expenditures are fairly fast (say, just-in-time businesses) , and others rather slow (such as government dependent on annual budget cycles). Because of this, the multiplier and impacts from any given increment, build up over time. Thus, a version of Krugman's "wonky multiplier" comes

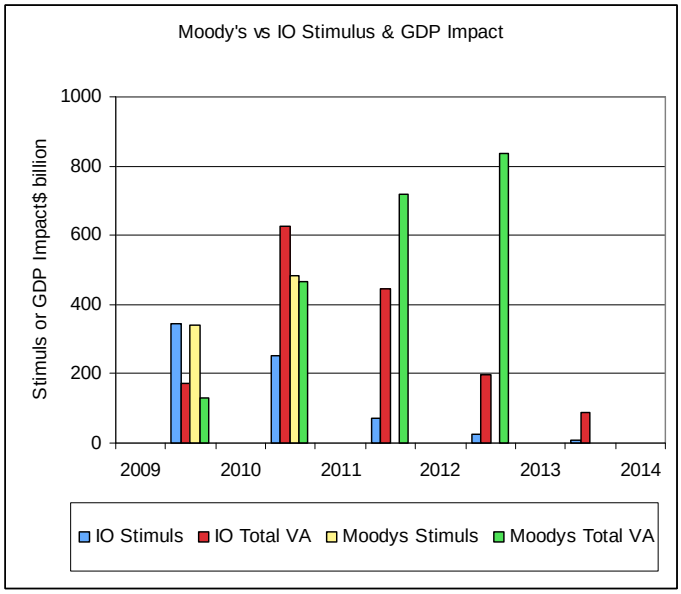




into play since feedback into the economy via government receipts and autonomous spending eventually adds to the multiplier (unlike in the classical Keynesian multiplier).

The upshot is that spending appropriations spent at any given quarter have an impact on all suceeding quarters. The estimates of GDP and employment shown are based on published distribution by item and calander quarter of the ARRP given earlier. Note that the economy-wide

impacts lag well behind the spend-out schedule, but decline rapidly by end 2010. Similar profiles can be calculated for all sectors such as manufacturing or distribution (retail, etc).



Comparison with Moody's and CEA

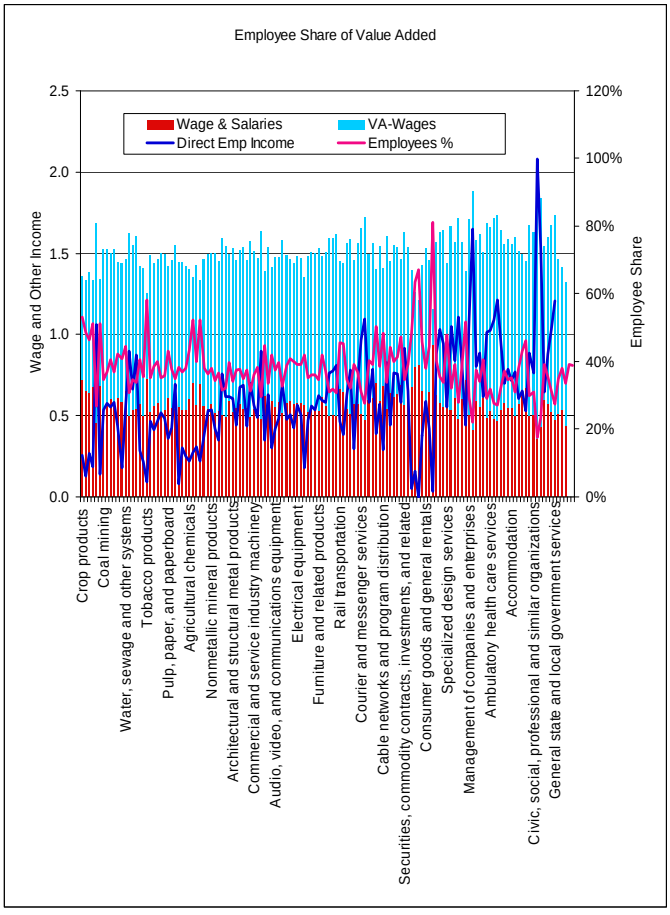
The estimates above are broadly similar to Moody's and the CEA for 2009-2011 but differ from Moody's because

a) they assumed a larger stimulus and a faster spend-out; and b) the Moody "mainstream" model presumes that the stimulus will promote reinvestment, or other initiatives (such as the Bank bailout) will kick in.

Other processes such as reinvestment due to an upturn in demand, or new innovations and production cycles, tend to take much longer, and are even more difficult to predict (i.e. even more unreliable).

Income Variability?

At the detailed level, the variability in distribution (measured as, say the wage versus surplus share of value added) depends first on the composition of direct spending by sectors, and second by the structure/leakages of/from the US economy.

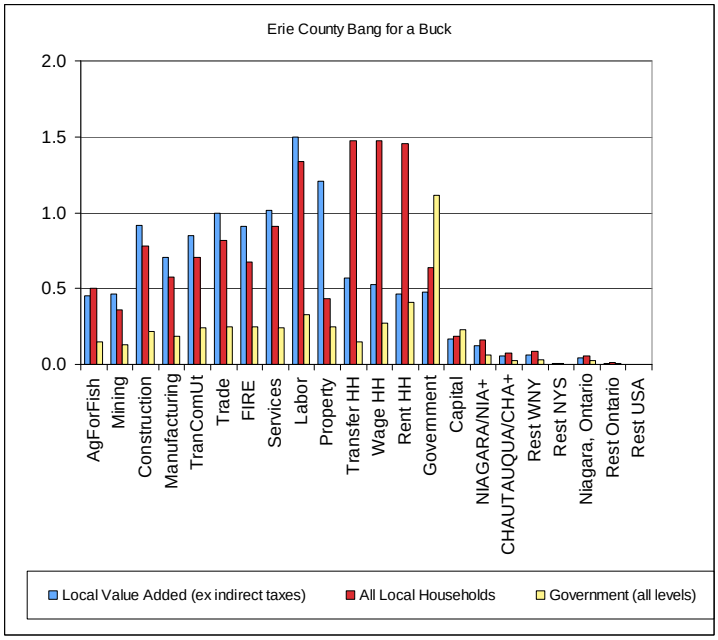


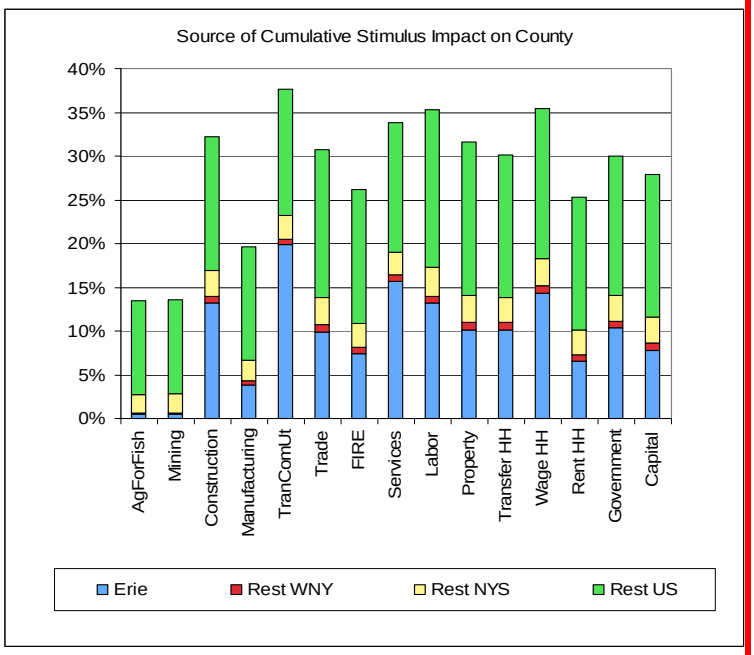
Small Economy/Community-level Social Accounts

It was noted earlier that the Moody multipliers vary according to the type of spending (income support, tax breaks, and so on). This is because, different income classes or other categories have different expenditure habits – typically, low-income families spend more locally (on food etc) and more quickly. Both these processes become more pronounced at the local or small-economy level.

Many small communities and developing nations face poverty and distribution issues, or rural/urban disparities. To address these issues, they (or, more usually, the agencies working with them) construct social accounting matrices by adding household and financial personal income flows to the IO table.

With a bit of effort, it is possible to do this for the US, or any small US territory (such as a county or community). However, to get an estimate of the full impact of the stimulus on the locality, it is necessary to account for flows and feedbacks to and from the rest of the country. This is especially true for small localities since a great deal of their multiplier effect derives from regional neighbors and trade networks, flows to and from State and Federal government, and so on. The illustration here is for Erie County, NY, taking account of neighbor-county, inter-regional and overseas transactions.





The first chart shows the multiplier effects of a dollar income to each sector, including households and government). It shows, for example, that, in the short-run (say, 12 months), the income transfer component of the stimulus provides a double whammy; typically more is spent locally and faster. However, over a longer horizon this effect diminishes.

It also shows that every dollar spent outside the county makes small contribution to the county value added (this is the Boehner effect, explained earlier). On the other hand, most of the dollars are spent in other parts of the US: collectively, the overall the impact of these non-local contribution is considerable. Indeed, over a 5 year-horizon, more than half the local impact is due to stimulus. Since local allocations are not yet known, in this example, the national stimulus is prorated by activity and geography.

<u>Pointers for Policy?</u>

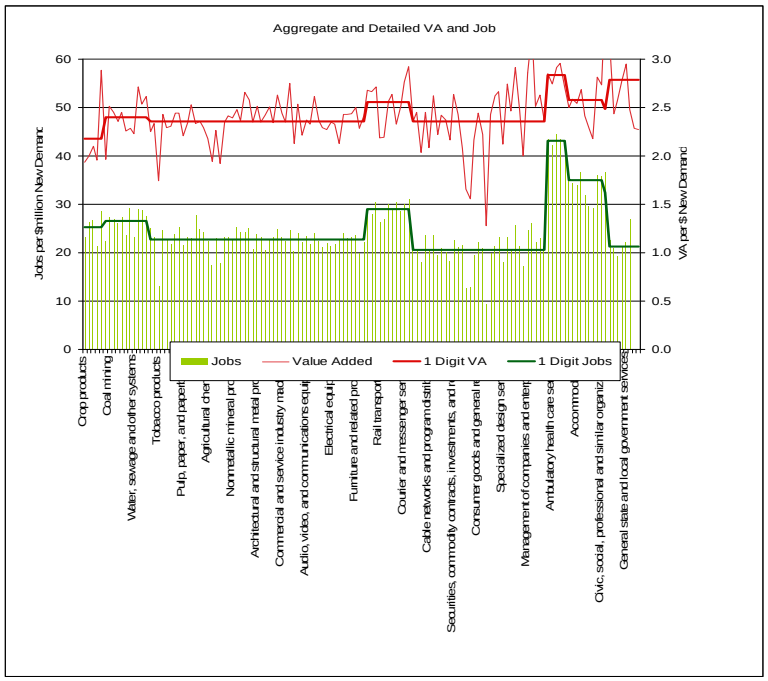
At the end of the day, the effectiveness at the national level is the sum of local projects. Making the stimulus effective at the local level is not just a matter of ensuring that individual project evaluations are “honest”, but also assessing whether different firms, suppliers, hiring practices, and so on, could enhance the “bang for a buck”. In other words, the impact at the local level can be greater than implied by the “averages” so far calculated for the national level, which in turn will make the eventual national impact greater.

Local policy-makers should ask, for example, how and whether the project adds to the overall efficiency of the local and national economy (as opposed to providing short-term jobs), whether it is

synergistic with other projects, promotes competitiveness and new investment in the mid-term, and whether it enhances and innovation that can deliver the economy from recession.

Wonking in the Rest of the World

Similar outside-economy feedbacks apply to the US within the world-as-a-whole, in the same way that for a small county within the US.



Leaving aside the various crisis measures instigated in other nations, it is possible to speculate about the implications of these linkages, as they affect the workings of the US stimulus. For this, Rest-of-the World income leakages and feedback are added to the US IO. Comparing with previous charts, this appears to a) reduce US employment benefits compared to earlier charts, b) increase US value added (although some of that is now repatriated overseas), and c) increase variability across sectors. All or none of which may, or may not be, plausible, but the numbers are probably no more wonky than others?