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THE LABOR MARKET IMPACT OF TARGETED INVESTMENTS IN TRANSPORTATION INFRASTRUCTURE

An Analysis of *Transportation for America's* Jobs Proposal

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A year ago Congress passed the American Recovery and Reinvestment Act (ARRA), a $787 billion jobs package designed to mitigate the severity and length of the current recession. One of the key components of the Recovery Act was investments in transportation infrastructure. These investments provided high economic benefits per dollar by putting people back to work and boosting consumer demand.

A year later it is clear that the Recovery Act was successful—the Congressional Budget Office recently reported that the Recovery Act boosted gross domestic product (GDP) by 2.2 percentage points in both the second and third quarter of last year, and most independent analysts conclude that the economy would have lost between 1 and 1.5 million more jobs without the legislation (Bivens 2009).

But with continuing job losses, unemployment projected to rise for at least another six months, and a 10.6 million job gap,[1] it is clear that more needs to be done. This Issue Brief considers the job impacts of infrastructure investments, specifically in terms of the repair and maintenance of highways, bridges, and public transit, the preservation of existing transit jobs and services, and the expansion of access to jobs resulting from enhanced public transportation. This analysis examines a proposal by Transportation for America,[2] which is consistent with the basic job-creation proposals found in EPI's *American Jobs Plan*.

The Transportation for America jobs package would allocate $34.3 billion more to highways, mass transit, high-speed rail, buses, and bike/pedestrian routes. This analysis looks at how many and what kinds of jobs this type of investment would create, and how that mix of jobs compares to the overall economy. It also looks at where these jobs are created by region, state, and urban/suburban/rural.

This Issue Brief finds that:

- Overall, the $34.3 billion jobs package will create approximately 480,000 direct and indirect jobs. This does not include "re-spending" jobs, which would make the job impact considerably higher.

- This investment would disproportionately benefit those hardest hit by the recession, providing a higher proportion of jobs to low-wage workers and workers without a college degree relative to the overall economy.
- The investment would disproportionately create jobs for African Americans and Hispanics relative to their employment levels in the overall economy.

Methodology

The first question that arises in this sort of modeling exercise is how to characterize the policy impulse for the model to analyze. That is, we need to know how federal, state, and local policies will change spending levels overall and across industries. In the current case, these inputs are the investment flows that result from a policy decision to increase infrastructure investments in certain transportation projects.

These investment flows are then inputted into our jobs model. The first step requires judgments both on how much spending is being called for and into which industries the spending flows. Generally, this judgment has been based on research reports, interviews with experts, and other sources to get a sense of how the overall spending package will be allocated to the different industrial sectors identified in our model.

Jobs model

Once inputs have been specified, we use experience gained in previous research merging industrial data on input-output relationships with household-level data on demographic and labor market variables to characterize the job outcomes that would result from the change in industrial mix accompanying increased infrastructure investment.

The jobs model allows us to identify both the (relative) number and type of jobs created for a given amount of spending in a particular industry. It should be noted that these results do not include the re-spending effects that stem from the increased incomes of workers hired as a result of spending. That is, we include, for example, the workers directly hired in the construction industry as well as the workers newly hired by industries that supply construction (heavy equipment, for example), but we do not include the effect of construction and heavy equipment workers subsequently spending their wage income. New waitstaff hired at a diner near a construction site to handle increased demand from the site's workers, for example, are not captured in this structural analysis. Their re-spending effects are generally better captured in the short-run macroeconomic multiplier estimates presented previously.

It is also important to note that these estimates are based on currently existing patterns of employment across sectors. As such, the final results tell us how many and what kinds of jobs would be created with our current economy. However, to the extent that the new investments are aimed at transforming the economy or labor market, our results are not precisely indicative of the true impact. For example, policy restrictions on the kinds or quality of jobs created and specific policy targeting of job creation would lead to different outcomes than estimated here. The numbers presented here compose an estimated baseline for policy makers to consider.

How many jobs?

Calculating the total number of jobs supported by a given stream of infrastructure investment takes two steps. First, we translate a given amount of infrastructure spending into the number of jobs directly supported in the receiving industries. Second, we then calculate how many jobs are needed to produce the output in supplier industries that expand to support the output generated by the industries directly receiving the investment flows. The construction industry (for example) is a purchaser of cement, steel, heavy equipment, as well as less obvious supplies—such as accounting and legal services. These supplier industries will need to expand to support final output of the construction industry when it expands.[3]

It is important to note that the number of jobs supported by infrastructure spending that is output from the jobs model is a measure of gross, not net, job creation. That is, if a given amount of infrastructure spending supports 1 million jobs in total, this does not mean that the economy as a whole will see a net increase in employment of 1 million. Rather, a portion of these 1 million jobs may be pulled from currently employed sectors of the economy. Again, the macroeconomic multipliers identified in the previous section are far superior in assessing the net job creation impacts of infrastructure spending.

That said, the gross jobs numbers identified in our model do convey important information. For one, they give a good relative ranking of the labor intensity of different kinds of spending and can, by themselves, allow judgments to be made about the best place to engage in investment spending if the goal is to increase the greatest number of job opportunities in the economy. Further, even more important, it is the gross number of jobs created that must be combined with the types of jobs created that will allow researchers to judge how relative labor demand for different sub-populations in the labor market will fare. This point will be made plain in the section below, which examines how the number and type of jobs created through infrastructure spending result in changing demands for workers with different educational attainments.

What kinds of jobs?

To estimate the characteristics of jobs created through infrastructure spending, we use data from the Current Population Survey (CPS) to calculate the share of each industry's employment by relevant categories (gender, race, ethnicity, wage levels, etc.). To ensure we have a large enough sample size, we pool together data from 2005 to 2007.

To match up the CPS data on demographic and labor market variables with the Bureau of Labor Statistics data on industry input-output relationships, we needed to construct a crosswalk between the industry coding schemes used in the respective datasets. This crosswalk was easy to construct as it essentially matches up both the CPS and the BLS industry codes to a third classification system (the North American Industrial Classification System, or NAICS) that maps cleanly onto both the CPS and BLS data. (This crosswalk is available from the authors upon request.)

Next, we simply multiply the number of jobs created in each industry (either through direct spending or through supplier effects) by the industry demographic shares and then sum these up across industries to get the total number of jobs in each category (both direct and supplier jobs) that are created through a given amount of infrastructure spending.

Inputs

This brief projects labor market outputs based on policy impulses that are based on Transportation for America's (T4A) jobs proposal. T4A's spending proposals are displayed below in **Table 1** (by program) and **Table 2** (by category). Each spending proposal is then mapped into an industry corresponding to the Bureau of Labor Statistics (BLS) employment requirements matrix classification system. The BLS code and industry description corresponding to each T4A spending flow is identified in **Table 3**. When a given spending flow would theoretically direct money to more than one BLS industry, we simply split the total spending flow proportionally. So, for transit expansion, the allocations were split between new construction of transit lines and the purchase of new transit rolling stock.

One difficulty with this method is the exceedingly broad BLS industry "construction," which does not capture the differences between commercial vs. residential construction or heavy vs. light construction. It also makes highway/bridge and transit investments appear to have similar job outputs because both share the construction input. This is despite the fact that recent reports have found that transit investments—because less money is spent on land acquisition and more on operations—generally create more jobs than highway or bridge investments (see Heintz et al. 2009; Bernstein et al. 2010; and Economic Development Research Group 2009).

Pipeline issues

One of the arguments against infrastructure jobs packages like the T4A proposal is that only about a fifth of the total highway and transit funds provided by the Recovery Act have actually been spent, suggesting that the system is already struggling to cope with what it has and could not deal with more money in a timely fashion. The pipeline, as the critics say, is full.

This view reveals a deep misunderstanding of both federal transportation investments and the extent of the economic recession.

For most federal programs, the spending does not impact the economy until it is outlayed—that is, physically transferred from the Treasury to the recipient. The federal transportation system, on the other hand, uses a reimbursement mechanism. First the state or regional government decides which project to fund, and after the appropriate federal agency clears the project, the money is obligated (legally bound) to the project and it gets put out for bid. Once a bid is accepted, work can usually begin, but the outlay does not occur until *after* the work has begun.

The better measure of whether funds have moved through the bureaucratic pipeline is looking at how much money has been obligated. (The difference between obligation and outlays is similar to the difference between writing someone a check and that person actually cashing the check.) Looking at obligation rates, it is clear that the checks—if not the funds themselves—have gone out quickly. Within six months of ARRA enactment, about two-thirds of the highway funds and over 85% of the transit funds had been obligated. As of January 18th, 83% and 89% of the highway and transit funds have been obligated.

Furthermore, those obligation rates would be even higher if not for the fact that bids are coming in much lower than government projections. The Government Accountability Office surveyed 10 states and the District of Columbia and found that in each state, at least half of the contracts were awarded for less than the original estimate (Siggerud 2009). Some states, such as California, Georgia, and Texas, awarded more than 90% of their contracts for less than the original estimate. This is a function of the economic recession, which has lead to lower capital and labor costs and contractors desperate for work. The fact that state and regional governments are having a difficult time obligating all of their funds because contractors are charging less is a good problem to have, and should not be viewed as evidence that the pipeline is full.

But why is the outlay rate lagging far behind the obligation rate? Data provided by the Department of Transportation (DOT) to the House Transportation and Infrastructure Committee suggests that this has more to do with the construction life of the projects selected than with the recipient governments being unable to get projects up and running. For example, if a state decided to fund a few large projects with a long construction timeline, the outlays would lag far behind the obligations because the obligation is up front while the outlays occur over the entire construction life. In contrast, a state that chose to fund many smaller projects that could be completed faster would have a higher outlay rate relative to its obligation rate. The DOT data show that as of November 2009, 79% of the obligated funds were associated with projects under contract, and 71% of the funds were associated with projects that had already begun (or 67% and 60% of the allocated funds, respectively). This suggests that the recipient governments have actually been very good at pushing the money through the pipeline, and that they are ready for another infusion of federal investment dollars.

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Endnotes

1. The number of jobs necessary to return to pre-recession, population-adjusted employment levels is 10.6 million.
2. Transportation for America (T4America.org) is a coalition of housing, business, environmental, public health, transportation, equitable development, and other organizations. Its stated goal is to align national, state, and local transportation policies with an array of issues such as economic opportunity, climate change, energy security, health, housing, and community development.
3. Both the direct and indirect jobs associated with a given amount of spending are derived from the employment requirements matrix (ERM) compiled by the Bureau of Labor Statistics (BLS). The ERM is a 201x201 matrix that uses data on the input-output relationships between industries and industrial employment figures to estimate how many jobs in an industry are supported by a given amount of spending—both direct jobs as well as jobs supported by expanding output of supplier industries.

Reference

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TABLE 1

Transportation for America jobs package

Program	Billions of dollars
Surface transportation program/ "highway"	$0.00
Bridge Repair/Interstate maintenance	8.00
*Transit**	16.00
Amtrak	1.30
Clean Air/Tech	2.00
High-speed rail	2.50
*TIGER Grants***	3.00
Livability/Bike/Pedestrian	1.50
TOTAL	34.30

* Transit split $4 billion for rehab, $2 billion for new starts, $9 billion for capital flexible for operating, and $1 billion for intercity bus.
** TIGER split in equal thirds between new road capacity, transit, and technology.

SOURCE: Transportation for America.

TABLE 2

Transportation for America jobs package, by category

Spending categories	Billions of dollars
Road and bridge rehab	$8.00
Road expansion	0.99
Transit rehab	4.00
Transit expansion	2.99
Transit operating	9.00
Clean air/Technology	2.99
Planning	0.00
Intercity bus	1.00
Intercity/High-speed rail	3.80
Livability/Bike/Pedestrian	1.50
TOTAL	34.27

SOURCE: Transportation for America.

TABLE 3

Model inputs

Spending category	BLS classification		Allocation ($ billions)	Share (% of total)
	Title	*Code*		
Road and bridge rehab				
	Construction	15	$8.00	23 %
Road expansion				
	Construction	15	0.99	3
Transit rehab				
	Construction	15	2.00	6
	Railroad rolling stock manufacturing	92	2.00	**6**
Transit expansion				
	Construction	15	1.00	**3**
	Railroad rolling stock manufacturing	92	1.00	**3**
	Local government passenger transit	186	1.00	**3**
Transit operating				
	Transit and ground passenger transportation	106	4.50	**13**
	Local government passenger transit	186	4.50	**13**
Clean air/Technology				
	Scientific research and development services	134	2.99	**9**
Intercity bus				
	Motor vehicle manufacturing	88	0.50	**1**
	Transit and ground passenger transportation	106	0.50	**1**
Intercity/High-speed rail				
	Railroad rolling stock manufacturing	92	1.90	**6**
	Transit and ground passenger transportation	106	1.90	**6**
Livability/Bike/Pedestrian				
	Architectural, engineering, and related services	130	0.75	**2**
	Construction	15	0.75	**2**

SOURCE: Authors' analysis of Transportation for America jobs proposal.

TABLE 4

Direct and indirect jobs supported through the Transportation for America jobs package

	Direct	Indirect	Total	Direct	Indirect (% of total)	Total	Overall economy
Totals	231,882	247,338	479,220	48%	52%	100%	
Gender							
Male	173,981	156,318	330,299	75	63	69	60%
Female	57,901	91,020	148,921	25	37	31	40
Race							
White	142,442	159,045	301,487	61	64	63	67
Black	32,484	36,884	69,368	14	15	14	11
Hispanic	45,170	36,672	81,842	19	15	17	15
Asian	8,132	10,799	18,931	4	4	4	4
Other	3,727	4,048	7,776	2	2	2	2
Union status							
Covered	37,494	29,957	67,451	16	12	14	12
Non-covered	194,408	217,411	411,820	84	88	86	88
Education							
Less than high school	38,459	28,191	66,650	17	11	14	11
High school only	90,287	88,573	178,861	39	36	37	31
Some college	61,099	70,670	131,768	26	29	27	30
BA or greater	42,037	59,904	101,941	18	24	21	28
Wage quintiles							
First (lowest)	36,004	46,365	82,369	16	19	17	19
Second	56,322	55,160	111,483	24	22	23	21
Middle	54,620	54,189	108,809	24	22	23	20
Fourth	46,763	48,806	95,569	20	20	20	20
Fifth (highest)	38,205	42,866	81,071	16	17	17	20

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TABLE 4 (CONT.)

Direct and indirect jobs supported through the Transportation for America jobs package

	Direct	Indirect	Total	Direct	Indirect	Total	Overall Economy
				(% of total)			
Region							
Northeast	61,143	58,576	119,719	26%	24%	25%	18%
Midwest	45,580	57,306	102,886	20	23	21	23
South	75,189	79,128	154,317	32	32	32	35
West	49,970	52,327	102,298	22	21	21	23
Central city status							
In centcity of MSA	69,213	73,247	142,460	30	30	30	27
In MSA, not centcity	100,594	107,447	208,041	43	43	43	44
Not in MSA	32,047	33,272	65,319	14	13	14	14
Not identified	30,028	33,371	63,399	13	13	13	14

MSA=Metropolitan Statistical Area.

SOURCE: Author's analysis of BLS and Census data.

TABLE 5

Direct and indirect jobs by state

Region	Total	Construction	Manufacturing
Northeast			
Maine	1,790	366	218
New Hampshire	2,282	323	280
Vermont	1,032	193	129
Massachusetts	12,675	1,653	1,060
Rhode Island	2,042	255	178
Connecticut	7,772	816	694
New York	47,338	4,508	1,978
New Jersey	19,006	2,063	1,107
Pennsylvania	26,531	3,202	2,385
Delaware	1,353	287	117
Maryland	9,177	2,034	475
District of Columbia	947	146	6
Midwest			
Ohio	14,974	2,628	2,739
Indiana	8,679	1,800	1,934
Illinois	27,108	3,229	2,442
Michigan	12,119	1,924	2,130
Wisconsin	9,664	1,477	1,824
Minnesota	8,505	1,375	1,241
Iowa	4,011	914	844
Missouri	10,526	1,770	1,071
North Dakota	840	260	98
South Dakota	916	263	158
Nebraska	2,833	565	376
Kansas	3,875	806	694

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TABLE 5 (CONT.)

Direct and indirect jobs by state

Region	Total	Construction	Manufacturing
South			
Virginia	13,621	2,782	980
West Virginia	1,506	481	208
North Carolina	11,894	2,958	1,905
South Carolina	6,921	1,430	898
Georgia	13,365	2,563	1,512
Florida	25,705	6,422	1,381
Kentucky	5,107	1,053	907
Tennessee	7,882	1,508	1,340
Alabama	6,541	1,362	1,054
Mississippi	3,272	759	592
Arkansas	5,092	705	676
Louisiana	3,865	1,695	564
Oklahoma	4,084	946	558
Texas	33,910	8,407	3,422
West			
Montana	862	373	74
Idaho	2,142	566	235
Wyoming	567	354	37
Colorado	7,237	2,018	534
New Mexico	2,201	716	130
Arizona	8,931	2,351	646
Utah	3,508	1,138	467
Nevada	5,865	1,468	179
Washington	9,902	2,521	1,078
Oregon	6,204	1,184	722
California	51,658	9,838	5,278
Alaska	685	217	49
Hawaii	2,121	430	55
TOTAL	480,643	89,103	49,660

SOURCE: Authors' analysis of BLS and Census data.

TABLE 6A

Jobs by broad industries and occupations

Broad industries and occupations	Direct	Indirect	Total
Totals	231,882	247,338	479,220
Broad industries			
Natural resources and mining	0	2,485	2,485
Construction	88,153	950	89,103
Manufacturing – total	19,084	30,575	49,660
Wholesale trade	0	13,343	13,343
Retail trade	0	13,314	13,314
Information	0	3,272	3,272
Financial activities	0	8,199	8,199
Professional and business services	16,289	26,164	42,453
Education services	0	459	459
Leisure and hospitality	0	4,798	4,798
Other services	0	17,905	17,905
Utilities	0	990	990
Transportation and warehousing	75,604	69,893	145,497
Government – Total	32,752	51,500	84,252
Broad occupations			
Management, business, and finance	23,767	33,147	56,913
Professional	18,508	28,303	46,811
Service	8,873	18,658	27,532
Sales & related	4,605	20,175	24,780
Office & admin support	19,569	34,330	53,898
Farm, fish, forest	62	770	832
Construction & extraction	63,956	5,551	69,507
Install, maintain & repair	12,220	12,849	25,069
Production	17,932	29,380	47,311
Transport	61,979	63,544	125,522

SOURCE: Authors' analysis of BLS and Census data.

TABLE 6B

Jobs by broad industies and occupations

Industry breakouts	Direct	Indirect	Total
Totals	231,882	247,338	479,220
Industry breakouts			
Truck transportation	0	4,418	4,418
Rail transportation	0	660	660
Transit			
Transit and ground	75,604	60,358	135,962
Local govt transit	32,752	42,767	75,519
Warehousing	0	1,420	1,420
Construction	88,153	950	89,103
Manufacturing			
Cement and concrete	0	1,841	1,841
Iron and steel mills	0	731	731
Steel product	0	415	415
Aluminum	0	253	253
Nonferrous metal	0	377	377
Industrial machinery	0	43	43
Metalworking machinery	0	125	125
Engine, turbine and power transmission	0	263	263
Motor vehicle	468	7	475
Motor vehicle body and trailer	0	62	62
Motor vehicle parts	0	2,229	2,229
Railroad rolling stock	18,616	287	18,903
Other transportation	0	22	22
Ports			
Water transportation	0	46	46
Support activities for transportation	0	1,294	1,294

SOURCE: Authors' analysis of BLS and Census data.