Evaluating Economic Impacts from Transportation Investments in Israel

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Background

- Israel has a transport appraisal guidance, known as Nohal Prat
- Nohal Prat does not currently take into account the fact that transport investment can and do create positive long-term real effects in the economy
- Nohal Prat uses two approaches: GDP and welfare economy
- This research is an “equivalent” to EIA, but its attempt to incorporate “other” benefits – is unique in Israel – therefore, avoiding double counting is a prime necessity

Research Structure

- **Research question**: What additional effects (apart from traditional direct effects) does a transportation investment have?
- Observing the phenomenon – including survey and literature review
- Model development
- Calibration to the Israeli experience
- Model Implementation – incl. choosing project types to operate it on
- **Focus in this research – real GDP effects (after construction) while avoiding double counting.**

Observing the Phenomenon

Observing the Phenomenon

- Once the firm has decided to relocate – it is not always because of transport projects
- Other reasons can include availability of land, tax breaks, industrial park managers, proximity to “anchor plants” (Intel)
- We conducted a survey among plant managers, industrial parks, government grant applications, etc.
- We discovered that under *ceteris paribus* firms will prefer relocating to where the **transport project reduces their costs**
- This finding was in line with many firm location theories
- If the firm has major freight haulage – they do prefer locating in a centrally strategic area with transport facilities

General Economic Model

- A firm does not relocate if it does not expect to "gain" from it (i.e. increased profits)
- Once there is increased profits it will allow the firm to invest – i.e. possibly new employment
- So, we are looking for a model which will "explain" changes in labor supply as a result of a transportation project
- One of the classic models in this respect is the Wider Economic Benefits (WEB) model of the UK Department for Transport

Model Development

Model Choice

- DfT's WEB model is part of the Transport Appraisal Guidance in the UK
- DfT TAG is quite similar to Nohal Prat in Israel, so it was a natural choice
- WEB has been tried and tested in several locales
- Documentation readily available
- Quite easily implemented with available data sources in Israel

WEB Model Description

- The WEB model identifies **3** major new benefits
  - Agglomeration – higher productivity (WI1)
  - Benefits from increased competition (WI3)
  - Changes in Labor Supply (WI4)
- Our research concentrates on WI4
- It uses basic economic theory – changes in transport cost will change employment as a function of labor supply elasticity
- The changes in transport cost must be from the **user's** point of view (i.e. including taxes)
- The transportation project must be in an area with low labor force participation or higher-than-average unemployment

Steps in WEB Model

- Transportation project decreases cost
- This decreased cost will allow firms to employ more people
- These new employees gain a salary, from which the government gains taxes (both direct and indirect)
- These new taxes can be used to increase public welfare which would not have occurred if there were no transportation investment

Israel WEB Model Elements

- Estimating transportation cost – from the user's point of view
- Estimating elasticity of labor supply with regard to transportation costs
- Salary of new entrants into the labor market
- Translating into GDP and jobs
- From new GDP, estimate tax take
- The tax take is the additional government expenditure which can increase welfare, and is not included in current Nohal Prat practice in Israel and is therefore not considered to be **double counting**!

Implementation and Calibration

Transportation Costs

- Increased employment – therefore rides to and from work
- Using actual out-of-pocket costs
  - Nohal Prat has vehicle operating costs without taxes and subsidies, and is based on vehicle speed and other variables
  - Taxes factor added on gasoline, labor, parts (around 50% in Israel)
- Value of time – use user's perceived value of time, based on a logit model and surveys implemented in Israel
- Estimate transportation costs with/without project using 4-step models or other means

Elasticity of Labor Supply

- First attempt – to estimate it through the survey
- Problem – plant managers didn't know or did not differentiate between employment increase which resulted from transport that could be isolated from other reasons of employment increase
- Solution – use Berechman and Paaswell's model (2002) of simultaneous equations calibrated to the Israeli experience in southern Israel
- Elasticity with regard to transport for different values ranges between 0.11 and 0.19 – in line with other research around the world

Estimating New Employment

- Implementing transportation project will cause reduction in out-of-pocket costs
- Evaluate % reduction in user costs (A)
- Multiply A by elasticity multiplied by existing number of employees will give new employees (permits zone-specific employment, calibration, implementation)
- We assumed that these new employees will earn Israeli minimum wage (very conservative assumption)

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Increased Welfare (Tax Take)

- Multiplying the new labor entrants by GDP-to-wage factor (currently 2.5 in Israel) will give GDP
- Multiply GDP by % of taxes will give the new tax revenue which resulted from the transportation project
- This can be implemented in one of two ways –
  - Since the transportation project is usually a government expenditure and the tax revenue is a government income, then, in terms of present value, it's a smaller outlay for the government
  - Add the tax revenue to the benefit stream

Area of influence /Project Selection

- Technically, this model can be implemented mathematically on any transport project
- On a macroeconomic scale, the new employment on small projects can be minimal
- Therefore, we decided to implement it only on large scale projects, which influence major areas (such as Tel Aviv district) – both public transit and freeway/highway projects
- The area of influence is decided upon by mileage radiuses
- The farther the specific area is, the smaller the influence

Implementation in Israel

- Major road project in Israel – Road No. 431 from Modiin to Rishon LeZion and from there to Ayalon Freeway
- Average elasticity in influence area – 15.6%
- Employment increase – about 865 new workers (an increase of about 11% in the steady state growth of employment), as a permanent increase
- Benefit increase of about $4 million a year (about 2% additional benefits)
- GDP increase of about $30 million a year

Summary

- Putting Israel on the map in terms of WEB / EIA
- Model framework which presents why traditional benefits (savings in time and vehicle operating costs) are not the sole influences of a transportation project
- The model includes the classic elements of EIA – GDP, jobs, wages, tax revenue
- Easy to implement with available data sources
- Different projects in different areas have different effects – model allows for diversification
- Is not a “black box” model

Thank you!

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