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Investment in Transport Infrastructure and its Impact on the Economy of the United States

Scenario analysis

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INTRODUCTION

Surface transportation infrastructure includes roads, highways, railroads, bridges, and transit systems (public transport such as buses, coaches, etc.). It enables people and goods to access markets and services that are essential to America's economic prosperity.¹ In this scenario analysis we will focus on vehicular infrastructure, more specifically transportation of goods, which comprises highways, roads, bridges, and tunnels.²

American transport infrastructure is provided chiefly by the public sector and covered by taxpayers and users of means of transport. Some infrastructure projects are designed, constructed, and maintained by private companies on behalf of the public sector. The federal government and state and local governments are the key players determining which projects to put into practice and how much money to spend on them.³

The importance of the vehicular infrastructure is vast, most significantly for the business and manufacturing sectors. The better the condition of American roads and highways, the more efficient and rapid the transportation and distribution of goods are. Moreover, infrastructure provides services that enhance the quality of life (in terms of economic opportunity, safety, health, etc.) and the economic performance of the United States. It is done by increasing the productivity of capital and labor resulting in reduction of production costs and, by contrast, leading to higher profitability, income, production and employment.⁴

The purpose of this study is to use scenario analysis to show how the state of US infrastructure is affected by the federal government's investment or by the lack of it and what implications it has for the US economy. The chosen time horizon is 2030. The scenario analysis will be conducted using the method of prediction introduced by Clark⁵ that works with three different plausible future scenarios (extrapolation, projection, forecasting) based on the key forces and factors.

This study will be conducted as follows. The introductory part will present the methodology for the scenario analysis, identify the key forces that affect the investment and the state of

¹ "Failure to Act: The Impact of Current Infrastructure Investment on Americas Future Economy", American Society of Civil Engineers 2013 report,

http://www.asce.org/uploadedFiles/Infrastructure/Failure_to_Act/Failure_to_Act_Report.pdf, [2013-04-24], 16.

² "Public Spending on Transportation and Water Infrastructure", Congressional Budget Office 2010 study, <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/119xx/doc11940/11-17-infrastructure.pdf>, [2013-04-24], 4.

³ Ibidem, 13.

⁴ David Alan Aschauer, "Why Is Infrastructure Important?", Federal Reserve Bank of Boston web page, <http://www.bos.frb.org/economic/conf/conf34/conf34b.pdf>, [2013-04-24], 48.

⁵ Robert M. Clark, *Intelligence Analysis: A Target-Centric Approach* (Washington: CQ Press, 2007).

infrastructure. Moreover, this part will stress the importance of infrastructure and the macroeconomic implications of its state. The second part will be dedicated to the current state of the US vehicular infrastructure, it will deal in particular with the current state of roads, highways and bridges. The part presenting scenario analysis will be divided into three sections each of which will present one scenario according to the method used by Clark.

As authors of this study we are well aware that this cannot be an objective study and therefore might be disputed by others. There are various methods how to conduct a scenario analysis. Moreover, others might find other factors more relevant and affecting the analyzed situation. However, the value of the scenario analysis lies in the correct identification of trends and events that influence the studied situation. “Predictions may not come true. But a good prediction (...) has lasting value (...)”⁶ as Clark stresses.

Concerning the sources, we have worked mostly with various reports and studies criticizing the current state and warning about its implications for the future. Even though some of them might be deemed too pessimistic and overstating the current situation in order to ensure more expenditures that they would benefit from (most notably the ASCE), the data they use are widely accepted and others work with them in their studies. Nevertheless, it must be taken into account that some of their inferences might be too radical and might make the predictions look worse than they actually are.

METHODOLOGY

As there is no universally accepted method of developing a scenario analysis, for the purpose of this project a method based on Clark was chosen. Clark suggests an analysis that develops three different scenarios (extrapolation, projection and forecasting). The future analysis stems from the current state of affairs and assesses the main forces that affect the situation and their change, and the possible addition of new forces. What is most valuable about this method is that there is a clear connection between the three scenarios.

In the first scenario, extrapolation, it is assumed that the main forces acting on the target do not change and affect the situation the same way as in the present, thus the future situation is just a continuation of the already existing trends in a certain time period. Extrapolation is most accurate in the short run and relies on the accuracy of the present model.⁷

⁶ Ibidem, 212.

⁷ Ibidem, 199.

Projection presumes that while all the forces still influence the situation as in extrapolation, one of the forces changes. The final scenario, forecasting, assumes that the forces stay the same as in projection, however, there is a new force that alters the situation. This scenario requires a lot of imagination as the new force might be absolutely marginal or might not exist in the current situation.

The third scenario will be based on high-impact/low-probability analysis. We will come up with a rather unlikely event that would, however, have a significant impact on the overall situation and profoundly alter investment patterns. This kind of an analysis rests on the assumption that “mapping out the course of an unlikely, yet plausible, event can uncover hidden relationships between key factors and assumptions.”⁸

The time horizon we have chosen for this scenario analysis is 2030. In the upcoming years a significant change in the trend is unlikely as deterioration of the infrastructure and investments are in their nature a long-term phenomenon. In the time horizon of almost 20 years, however, a high probability that important forces might change or new ones might be added exists.

IMPLICATIONS OF INVESTING IN TRANSPORT INFRASTRUCTURE

Our paper is based on a hypothesis that there is a certain correlation between investing in infrastructure and GDP growth. The correlation does not necessarily mean causation as it often may be extremely difficult to determine all the factors and processes involved (it is sometimes referred to as a “black box”).⁹ There are, however, many economic studies upholding the correlation between investing in (transport) infrastructure and economic growth/productivity.

According to T. R. Lakshmanan, there are not only microeconomic implications of investing in transport infrastructure such as the direct time and cost savings from investment but number of externalities occurs.¹⁰ According to some scholars the market for transport-using companies expands as a result of investment in transport infrastructure, regional specialization increases and the productivity consequently rises too.¹¹ This can further translate into bigger exports. A study

⁸ “A Tradecraft Primer: Structured Analytic Techniques for Improving Intelligence Analysis,” *US Government*, <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/Tradecraft%20Primer-apr09.pdf>, [2013-27-4], 23.

⁹ T. R. Lakshmanan, “The Broader Economic Consequences of Transport Infrastructure Investments”, *Journal of Transport Geography* 19 (2011), <http://www.sciencedirect.com/science/article/pii/S0966692310000037>, [2013-05-04], 2.

¹⁰ *Ibidem*, 1.

¹¹ *Ibidem*, 9.

According to Lakshmanan, this model especially draws from David Ricardo’s theory of comparative

conducted by Bougheas, Demetriades and Mamuneas also confirms that there is indeed an influence on the economic growth manifesting itself in increased specialization in production but it is retarded because of the initial costs.¹²

FORCES IDENTIFICATION

Clark divides the forces acting on the target into two categories. He identifies forces that are strong and certain that are weighted most heavily in the scenario analysis. On the other hand, there are weak or unpredictable forces which are weighted less.¹³

For the purpose of this study two main forces were identified as key factors that affect the state of the vehicular infrastructure in the US. The first one is the *state of the national economy* as the financial situation and the amount of resources from the federal budget that is available to maintain and improve infrastructure is crucial. On the basis of federal spending there are other possible means of investing in infrastructure whose level depends on the money provided by the government.

The other key factor is the *political willingness* to ensure a decent state of the national infrastructure that would help the US economy to maintain its global competitiveness. Even though this is a key factor it is not an independent variable as it is influenced by other forces such as those listed below.

Moreover, there are other factors that were identified to influence the situation. Those are for example technological development and possible innovation, business lobby, public opinion (it might not be the same as the level of political willingness to invest), developments in the global economy (the US might alter its investment plans according to its relative standing in comparison with other global actors). Time is an obvious factor as “the financial and technical burden of preserving the nation’s highway infrastructure is inevitably growing with increased use and average age”.¹⁴

advantage.

¹² Bougheas Spiros, Demetriades Panicos O., Mamuneas Theofanis P., “Infrastructure, Specialization and Economic Growth”, *The Canadian Journal of Economics/Revue canadienne d’Economie* 33, No. 2 (2000), 507.

¹³ Clark, “Intelligence Analysis”, 177.

¹⁴ “Factors Affecting the State of Our Transportation Infrastructure” (A white paper for participants of the 2007 James L. Oberstar Forum: Our Nation’s Transportation Infrastructure: Heading Towards a Crisis?, October 7–8, 2007 Minneapolis, Minnesota, sponsored by Center for Transportation Studies University of Minnesota), <http://www.cts.umn.edu/events/oberstar/2007/documents/lockwoodpaper.pdf>, [2013-04-4], 17.

CURRENT SITUATION

ROADS AND HIGHWAYS

When examining vehicular infrastructure special attention should be paid to road infrastructure since it represents 45 percent of the total infrastructure need cost. The country's road infrastructure was built many years ago and it is necessary to repair it as soon as possible in order to meet present and future economic demands. In 2010 approximately \$66 billion was spent on road infrastructure whilst experts estimate that \$170 billion was needed in order to reach good standards. This means that there was a \$104 billion gap.¹⁵ President Barack Obama promised to reverse the trend of increasing difference between the road infrastructure expenditures spent and those needed.¹⁶

Highways represent a critical part of the US public infrastructure since the United States as one of the most advanced post-industrial economies depends on speed mobility for both goods and people. There are approximately four million miles of public roads by which 87 percent of personal travel and 70 percent of freight movement are realized. Approximately one quarter of the road infrastructure is paid for by the federal government.¹⁷

There was a decline in real capital spending on infrastructure in the past decade which can be attributed to discrepancy between a steep increase in the cost of construction and a much lower increase in nominal spending calculated by the highway construction price index.¹⁸ Just to maintain highways and bridges would require annual spending to be about 12 percent higher than the current level of spending. By contrast, to improve all highways and bridges to the level where all cost-beneficial investments are made would require an annual investment that is almost 90 percent higher than current annual spending.¹⁹

Deteriorating conditions and output of road infrastructure inflict costs on American businesses as well as households in many ways. Facilities in poor condition lead to growth of operating costs for trucks and cars. Additional costs comprise damage to vehicles from deteriorated roadway surfaces, the imposition of additional miles traveled, time expended to avoid unusable or heavily congested roadways or due to the breakdown of transit vehicles, and the added cost of

¹⁵ Robert W. Burchell, Matthew S. Crosby, Mark Russo, "Infrastructure Need in the United States, 2010-2030: What Is the Level of Need? How Will It Be Paid For?", *Urban Lawyer* 42, No. 4 (Fall 2010): 55.

¹⁶ Peter Baker, John Schwartz, "Obama Pushes Plan to Build Roads and Bridges", *The New York Times*, March 29, 2013, http://www.nytimes.com/2013/03/30/us/politics/obama-promotes-ambitious-plan-to-overhaul-nations-infrastructure.html?ref=politics&_r=0, [2013-04-4].

¹⁷ "Factors Affecting the State", 2.

¹⁸ "Public Spending on Transportation and Water Infrastructure", Congressional Budget Office 2010 study, <http://www.cbo.gov/sites/default/files/cbofiles/ftpdocs/119xx/doc11940/11-17-infrastructure.pdf>, [2013-04-4], 4.

¹⁹ "Factors Affecting the State", 15.

repairing facilities after they have deteriorated, as opposed to preserving them in good condition.²⁰

The 2014 Budget proposal drafted by the Obama Administration proposes a total of \$76.6 billion in discretionary and mandatory funding for the Department of Transportation and additional \$50 billion to crank up economic growth and job creation through instant infrastructure investment. In order not to increase the deficit the 2014 Budget is designed to have a use of savings from overseas military operations for infrastructure. Already in July 2012 Obama signed the Moving Ahead for Progress in the 21st Century Act (MAP-21) by which he reauthorized Federal Aid Highways, Transit formula grants, and highway safety programs.²¹

BRIDGES

Currently, there are more than 600,000 bridges in the United States.²² According to the American Society of Civil Engineers' Report Card on American Infrastructure one in nine bridges is structurally deficient. Two thirds of these bridges are owned by local government, most of them are in rural areas.²³

Structurally deficient bridges may either need repair or complete replacement. Some of them may be unable to accommodate certain means of transport or deal with a potential flooding.²⁴ With the average age of a bridge being 43 years (in 2009) and estimated lifespan of 50 years²⁵ it could seem that in a decade many of US bridges would be on the verge of falling. In reality, cases of bridge collapses are quite rare but in no way unknown in the US history. In the last decade of the 20th century alone, there were ten cases of bridge collapses. The most common cause is natural event. To mention just one of the collapses, in 1983 a part of Mianus River Bridge in Connecticut collapsed and caused loss of three human lives. A list of probable cause of the collapse included "high bearing stresses, a buildup of rust and deformations in the girders".²⁶

As was mentioned above in his budget proposal for the fiscal year 2014 Obama proposes to invest "an additional \$50 billion in immediate investments in 2014 to support critical infrastructure

²⁰ "Failure to Act", 16–17.

²¹ "Budget of the United States Government, Fiscal Year 2014", Office of Management and Budget, www.aau.edu/WorkArea/DownloadAsset.aspx?id=14319, [2013-04-4], 137–139.

²² Burchell, Crosby, Russo, "Infrastructure Need in the United States, 2010-2030".

²³ "2013 Report Card on America's Infrastructure", American Society of Civil Engineers, <http://www.infrastructurereportcard.org/a/#p/bridges/overview>, [2013-04-22].

²⁴ Steve Lockwood, "Our Nation's Transportation Infrastructure: Heading Towards a Crisis?", A white paper for participants of the 2007 James L. Oberstar Forum, *University of Minnesota*, October (2007), 9.

²⁵ "2013 Report Card on America's Infrastructure".
Burchell, Crosby, Russo, "Infrastructure Need in the United States, 2010-2030".

²⁶ Robert E. Tomasson, "Study Says Bad Design Was A Factor in Bridge Collapse," *The New York Times*, July 30 1983.

projects,” among them bridges.²⁷ The AMSCE, however, insists on spending \$20.5 billion annually alone on bridges to eliminate deficiencies by 2028,²⁸ a sum of money no current budget proposal would be willing to invest.²⁹

RAILWAY

Even though the railway is not the focus of this study it should be briefly mentioned to illustrate the current situation in comparative perspective. Freight railway network was deregulated by the Staggers Act of 1980 and is thus maintained with little money from the federal government. Investment has been constant and reached 23 billion dollars in 2012.³⁰ The owners tend to take advantage of the economic downturn; they modernize when materials are relatively cheap and make preparations for the future that seems to be positive for the railway.

American freight rail network is “universally recognized as the best in the world”³¹ and poses a competition threat for the vehicular transport as rail is environmentally friendlier, has better fuel efficiency and lower costs for long distances. Despite a high level of investments, more capacity is needed in order to meet the projected demand in the upcoming years.³²

²⁷ “Budget of the United States 2014”, 137.

²⁸ "2013 Report Card on America's Infrastructure".

²⁹ “Budget of the United States 2014”, 139.

³⁰ “Back on Track”, *The Economist*, April 13, 2013, <http://www.economist.com/news/business/21576136-quiet-success-americas-freight-railways-back-track>, [2013-04-4].

³¹ Elizabeth Dovell, “U.S. Rail Infrastructure”, Council on Foreign Relations, March 7, 2012, <http://www.cfr.org/united-states/us-rail-infrastructure/p27585>, [2013-04-4].

³² Ibidem.

SCENARIO 1 – EXTRAPOLATION

The first scenario is based on extrapolation. It works with the assumption that the leading force (investment in transport infrastructure provided by the federal government) will remain more or less constant in the future.³³ The main argument supporting this scenario is the poor state of US economy. Despite certain signs of recovery the country will still face a huge deficit in decades to come and will try to deal with it partly through continuing cuts in the budget. Moreover, there are issues other than transport infrastructure to be addressed preferentially, the most important one being welfare (mainly Medicare and Medicaid) that will be even more burdensome as the population is getting older. There have already been proposals from the part of Democrats and Republicans how to deal with the deteriorating infrastructure but they all fall short of getting the US transport infrastructure into such a good shape to remain fully competitive.³⁴

Implications for the US economy will be manifold. It is estimated that if investment remains the same, it will slow down the economic growth by 1.2 percent by 2020.³⁵ Causes of this slowing effect on the economy are numerous and quite complex. The poor or insufficient infrastructure will manifest itself in time delays that will have damaging effects, especially for transport-dependent industries (mainly those that rely on just-in-time delivery such as the automotive industry). Insufficient capacity of certain roads will result in more frequent congestions that in 2010 alone allegedly cost \$101 billion.³⁶ Congestions will not only take time but will cause additional energy consumption – in just one year they may cost over \$78 billion that could be otherwise spent on food or other consumer goods and services.³⁷

A survey made in the state of Washington have found out that if congestion in Washington increases by 20 percent, 6 percent of freight-dependent industries (mainly manufacturing, retail and wholesale trade, agriculture and construction) will have to close and 3 percent will relocate. 58

³³ The current level for FY 2013 is \$74 billion with roughly \$42 billion dedicated for the National Highway Administration. In the proposal for FY 2014 the sum is only slightly increased to \$76.6 billion. \$170 annually is, however, estimated to be needed just to repair current roads. (Burchell, Crosby, Russo, “Infrastructure Need in the United States, 2010-2030”.

(Budget of the United States Government, Fiscal Year 2013, Office of Management and Budget, <http://www.gpo.gov/fdsys/pkg/BUDGET-2013-BUD/pdf/BUDGET-2013-BUD-19.pdf>, [2013-05-04], 157.

Budget of the United States Government, Fiscal Year 2014, 137.)

³⁴ Jonathan Weisman, “Congress Approves a \$127 Billion Transportation and Student Loan Package”, *The New York Times* (June 29, 2012), <http://www.nytimes.com/2012/06/30/us/politics/congress-approves-transportation-and-student-loan-package.html>, [2013-05-04].

³⁵ “Road to Nowhere: Federal Transportation Infrastructure Policy”, *Renewing America Progress Report and Scorecard* prepared by the Council on Foreign Relations, June 2012, <http://www.cfr.org/united-states/road-nowhere-federal-transportation-infrastructure-policy/p28419>, [2013-05-04], 3.

³⁶ *Ibidem*, 1.

³⁷ John Irons, “Investing in U. S. Infrastructure: Promoting Economic Stimulus and Growth”, EPI Briefing paper no. 217, April 29, 2008, <http://www.gpn.org/bp217/bp217.pdf>, [2013-05-04], 3.

percent will pass the increased cost on its consumers.³⁸

American Society of Civil Engineers states that all the infrastructure deficiencies may paradoxically increase employment as “it may take two jobs to complete the tasks that one job could handle without delays”³⁹ but this also means that the productivity will decrease. Another industry cashing on the transport infrastructure deficiencies are repair shops with around \$67 billion spent on repairing the damages caused by bad conditions of US roads per year.⁴⁰ Last but not least, obsolete roads and highways will mean more car accidents many of them resulting in human losses (there were 33,000 of them in 2010 alone)⁴¹.

In the situation when federal government provides not negligible but highly insufficient amount of money there are several sub-scenarios of what could happen in the horizon of next two decades. It is useful to realize that states are not complete hostages to D.C. politics as the federal government investment comprises only 25 percent of the total cost.⁴² One way to broaden its independent conduct of improving infrastructure is through alternative ways of financing – for example through raising petrol or gas taxes. This solution, however, seems quite anti-growth and would make sense rather when the economic recovery gets better. Moreover, this would mean less money spent on goods and services hence it is unlikely that this will materialize on a considerable scale in at least 5-10 years to come.⁴³

Another solution already making its way through the rigid rules of financing transport infrastructure are joint public-private partnerships.⁴⁴ The defining feature of PPPs is that construction of a facility and its subsequent management is provided by one private entity instead of two different.⁴⁵ It means, in effect, shifting part of the responsibility to private entities. PPPs will

³⁸ “The Impact of Truck Congestions on Washington State’s Economy”, *Washington State Department of Transportation* (June 2012), http://www.wsdot.wa.gov/NR/rdonlyres/4D53B6C5-D1DF-4A3C-9B67-FD90D4847A66/0/June2012_Impact_Freight_Congestion.pdf, [2013-05-03], 2-5.

³⁹ “Failure to Act: The Economic Impact of Current Investment Trends in Surface Transportation Infrastructure”, pdf *American Society of Civil Engineers* (2011) http://www.asce.org/uploadedFiles/Infrastructure/Report_Card/ASCE-FailureToActFinal, [2013-05-04] 5.

⁴⁰ “Infrastructure: A Time for Renewal: America’s Infrastructure Is in a Dire State, Stimulating a Search for Creative Solutions”, *The Economist* (March 16, 2013). <http://www.economist.com/news/special-report/21573285-america-infrastructure-dire-state-stimulating-search-creative-solutions>, [2013-05-04].

⁴¹ “America’s Transport Infrastructure: Life in the Slow Lane”, *The Economist* (April 28, 2011), <http://www.economist.com/node/18620944>, [2013-05-04].

⁴² “Road to Nowhere”, 2.

⁴³ In addition, raising gas taxes may not bring adequate finances to states as the income from petrol taxes as redistributed to states according to the total miles of highway in each state or the distances driven by their residents. (“America’s Transport Infrastructure: Life in the Slow Lane.”.)

⁴⁴ It is referred to them as PPPs.

⁴⁵ Eva Hoppe, Patrick W. Schmitz, “Public-Private Partnership Versus Traditional Procurement: Innovation Incentives and Information Gathering”, *RAND Journal of Economics* 44, No. 1 (Spring 2013), 56.

Currently, 26 states have some sort of PPP legislation (Greg Dierkers, Justin Mattingly, “How States and Territories Fund Transportation: An Overview of Traditional and Nontraditional Strategies,” *NGA Centre for Best Practices* (2009), 12.

become major investment strategy especially in highways construction when collection of tolls will be often done by private companies. The income (a state may for example collect annual fees from private companies or have a certain share of profit) will subsequently be used for maintenance of old roads and building new ones. The collection of tolls will progressively replace gas and petrol taxes that would be even less efficient as more Americans will own cars with lower fuel consumption. States will push for its right to retain the income and will oppose any redistribution on the federal level. Considering that up to \$60 billion are estimated to be gained in one year thanks to private investments,⁴⁶ it seems that it could considerably enhance the current infrastructure with very positive impact on productivity and competitiveness. A potential risk is, however, that an emphasis on profit will replace utility.⁴⁷

Last possible outcome of limited federal investment would be creation of infrastructure bank that would provide federal credit assistance to large projects. It is estimated that “an initial federal infusion of \$10 billion could raise around \$100 billion to \$ 200 billion from capital markets”.⁴⁸ This would be probably less favored by Republican administrations (at least as far as the federal infrastructure bank is concerned) and will be more likely implemented under Democrats.

A bipartisan consensus on how exactly to proceed does not exist. A more rightist/Republican administrations will probably focus on solutions on the state level such as the PPP that is praised for its efficiency.⁴⁹ They could also call for “reducing barriers to investment, such as by repealing costly labor and environmental regulations,” as is suggested in a report by Cato Institute.⁵⁰ It also proposes that states could opt out of the federal gas tax.⁵¹

Whereas infrastructure banks are mainly supported by Democrats and opposed by GOP, it seems that PPP will become the driving force of constructing new facilities under future Democratic administrations as well as the Republican ones as long as the federal investment remains insufficient. Given the need of repairing and maintaining the infrastructure already in place, the state and federal money will be very much limited to improvement rather than construction. Federal money alone can possibly significantly help to revamp the aging infrastructure but in order to achieve better productivity an alternative sources of financing, mainly PPP, will be crucial.

⁴⁶ “Infrastructure: A Time for Renewal”.

⁴⁷ Beverly Bunch, “Preserving the Public Interest in Highway Public-Private Partnerships: A Case Study of the State of Texas”, *Public Budgeting & Finance* (Spring 2012), 42.

⁴⁸ “Road to Nowhere”, 4.

⁴⁹ Chris Edwards, “Infrastructure Investment: A State, Local, and Private Responsibility”, Cato Institute, *Tax & Budget Bulletin*, No. 67 (January 2013), http://www.cato.org/sites/cato.org/files/pubs/pdf/tbb_067.pdf, [2013-05-06].

⁵⁰ *Ibidem*.

⁵¹ *Ibidem*.

SCENARIO 2 – PROJECTION

The second scenario is based on the mechanism of projection. It assumes that all the forces influencing the situation stay the same as in the extrapolation, however, there is a shift in one of the two driving forces classified as critical for the area under examination and that is the *state of the national economy* and subsequently the amount of resources from the federal budget. The scenario works with the option where economic bust is replaced by boom which will make the government stop reducing the deficit and the national debt. On the contrary, economic growth will lead to a constant increase in the budget spending inter alia on transport infrastructure.

We selected this particular force for several reasons. First of all, the US economy already shows some signs of recovery from the crisis of the late 2000s. The unemployment rate went down from 10 percent in October 2009 to 7.5 percent in April 2013.⁵² The GDP growth rate was -3.5 percent in 2009 while in 2011 it was +1.7 percent.⁵³ The economic growth of the United States will thus lead to availability of financial resources for transport infrastructure.

Secondly, the trend of China's rapid economic development, sometimes referred to as the "rise of China", and the Chinese government's massive investments in infrastructure will affect the American federal government's approach to infrastructure investments. China's total infrastructure spending is estimated at staggering 9 percent of its GDP (although, available data sources are not absolutely reliable) compared to the United States which ranks last or second-to-last among OECD countries in transport infrastructure spending as a percentage of GDP. China is still far behind in the rankings of the overall quality of infrastructure. However, it built a highway system similar in size to the US system in fifteen years whereas it took thirty-five years to Americans. Thus the United States will try hard to even up the Chinese in the upcoming years.⁵⁴

Building industry has been in a very bad shape since the bubble burst and caused the most recent housing crisis. With the housing market in deterioration, construction employment went down by more than 360,000 jobs since early 2007.⁵⁵ The federal government, reinforced also by lobby groups, will use the favorable environment of low long-term interest rates, ready building industry labor force, and depressed construction costs⁵⁶ for reviving the building industry and

⁵² "Labor Force Statistics from the Current Population Survey: Unemployment Rate", Bureau of Labor Statistics, http://data.bls.gov/timeseries/LNS14000000?data_tool=XGtable, [2013-05-04].

⁵³ "GDP growth (annual %)", The World Bank web page, <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG>, [2013-05-04].

⁵⁴ "Road to Nowhere", 2.

⁵⁵ Irons, "Investing in U. S. Infrastructure", 4.

⁵⁶ Ibidem, 7.

renovating vehicular infrastructure. Increased investments will provide opportunities to work and build new projects.

The scenario presumes a political willingness to invest. Infrastructure expenditures were already one of the largest components of President Barack Obama's 2009 stimulus package and he considers infrastructure a top priority.⁵⁷ Nevertheless, no matter which political party will be in power in the upcoming years deteriorating state of transport infrastructure will force politicians to increase spending in this sector. It will represent a political consensus. Some signs of such bipartisan agreement are already visible. House Speaker John Boehner has recently said that "[Republicans] are not opposed to responsible spending to repair and improve infrastructure".⁵⁸

The positive effects of the increased investments of the federal government in vehicular infrastructure will be vast (see Table 1).⁵⁹ A dollar spent on infrastructure construction will produce approximately two dollars in ultimate economic output.⁶⁰ Better shape of the transport infrastructure will reduce the travelled distance through less circuitry due to network expansion and expand the transport network capacity which will lead to reduction of congestions.⁶¹ Furthermore, it will have positive impact on transportation safety. The number of accidents will decrease and lives of people will be saved.

The most significant effects will be experienced by transport-dependent industries, specifically those that are dependent on just-in-time delivery as the automotive industry, and freight-dependent industries such as manufacturing, retail and wholesale trade, agriculture and construction. Lower transport costs will improve the efficiency and reduce the prices of production inputs. It will permit companies to expand their market share. The quality of goods and services and the demand for them will augment.⁶² By 2030 the overall effects will be reflected in GDP growth of the United States.

Increased governmental spending in infrastructure construction will also provide more jobs. It is estimated that every \$1 billion spent on transport infrastructure will create 47,000 jobs and up to \$6 billion in additional GDP.⁶³ The newly employed workers will be repairing and building necessary capital assets. It will give work and money to a lot of people and their follow-up

⁵⁷ "Road to Nowhere", 1.

⁵⁸ John Boehner, Speech delivered at the Economic Club of Washington, September 15, 2011, <http://www.speaker.gov/News/DocumentSingle.aspx?DocumentID=260229>, [2013-05-06].

⁵⁹ Lakshmanan, "The broader economic consequences", 9.

⁶⁰ Isabelle Cohen, Thomas Freiling, Eric Robinson, "The Economic Impact and Financing of Infrastructure Spending 2012", Report prepared for Associated Equipment Distributors, <http://www.wm.edu/as/publicpolicy/documents/prs/aed.pdf>, [2013-05-04], 3.

⁶¹ Lakshmanan, "The Broader Economic Consequences", 2.

⁶² Ibidem, 3.

⁶³ Irons, "Investing in U. S. Infrastructure", 3-4.

economic activity will have a positive multiplier effect on the economy.⁶⁴

On the other hand, more advanced vehicular infrastructure will have at the same time some negative external effects. The better and wider roads and highways will be, the more they will be used by drivers which may paradoxically increase congestions and load on bridges. Moreover, the increased circulation of cars will be environmentally unsound by causing air pollution.

The phrase “one has to spend money to make money”⁶⁵ aptly expresses substance of the scenario analysis projection. In other words, maintaining, rebuilding, and expanding transport infrastructure enabled by the increased investments permit mobility to improve and goods to be distributed more efficiently which leads to economic growth. And economic growth allows more investment into infrastructure. It is a circle.

SCENARIO 3 – HIGH-IMPACT/LOW-PROBABILITY ANALYSIS

The third scenario works with the same forces as the previous one – it presumes that the US economy is in a good shape and the political willingness to maintain the infrastructure is still present as long as external conditions allow it. This scenario aims to introduce a new force, however, and will be conducted as a high-impact but low-probability analysis showing an unlikely force with a far-reaching impact. It will show how significantly the patterns of investment can alter if the external political situation changes and when the priorities of the US government focus on other areas.

Inspired by the events of the first decade of the 2000s we propose a scenario in which the US would be totally entangled in overseas operations which would drain its budget. The US would direct all its available resources towards the war effort as it would not like to be deemed weak by its global competitors and lose prestige.

As Iran was a target of international sanctions and suspicions about its nuclear program kept growing, one of the Israeli spies that had secretly infiltrated a team of Irani nuclear scientists brought details about the nuclear research to light. According to these pieces of information Iran was just days away from the “point of no return”.⁶⁶ Therefore Israel decided to conduct air strikes against the Irani nuclear facilities and research centers. However, the initial plans did not succeed

⁶⁴ Ibidem, 2.

⁶⁵ Burchell, Crosby, Russo, “Infrastructure Need”, 56.

⁶⁶ Israel presumes that once Iran successfully builds a nuclear bomb there will be no way back as deterrence will not apply any longer. Therefore it strives to stop the nuclear program before it reaches the goal of building a weapon. (Michael Raska, “Iran's Nuclear Ambitions and Israel's Strategic Dilemmas”, *Middle East Institute*, <http://www.mei.nus.edu.sg/publications/irans-nuclear-ambitions-and-israels-strategic-dilemmas>, [2013-05-06].)

and a major war between Israel and Iran and their allies broke out. The US under pressure from the Israeli lobby, afraid of its global position and determined to keep its alliance obligations, decided to support its ally with all its capabilities.

Due to the US engagement abroad its economy and governmental spending therefore underwent a major revolution. The federal government decided to focus almost solely on military spending, transferred more responsibility to the state level and expenditures in all other sectors besides defense were reduced to an absolute minimum that would just ensure keeping them alive.

In order not to let the vehicular infrastructure absolutely deteriorate it was necessary to look for alternative sources of financing. The states could not cover for the federal government as they had to use money proposed for infrastructure to maintain other sectors necessary for basic functioning of the system. Even though some money from the federal government was spent, it was directed to maintain infrastructure that was crucial for the war effort such as the roads and bridges connecting the factories with major airports and ports. However, overall the amount was limited and it was spent just in certain areas.

One of the ways to secure the functioning of the US infrastructure was its privatization. Inspiration might be drawn from the railway sector that underwent deregulation in 1980. There are basically two forms of privatization – transfer of responsibility for already existing structures or letting the private investors to build the structure themselves. Even though this might seem like a radical idea other governments already rely on the private sector to fund transport infrastructure.⁶⁷ Moreover, states such as Virginia, Indiana (The Indiana East-West Toll Road) and others use privatization and transfer the responsibility to build, operate and maintain their highways and roads to private firms.⁶⁸

Privatization not only removes the responsibility to finance the infrastructure but also provides a source of revenue when existing capacities are sold. This money might help to solve budget crunches and allow the state to spend in other areas. Private investors are granted a right to raise and collect toll - everyone pays a certain amount of money for using the private road or bridge.

Proponents of privatization argue that it has many advantages – the private sector delivers more cheaply and more effectively. Experience from other countries shows that privately build projects are more likely to be built on-time and on-budget when compared to contracts signed by

⁶⁷ Chris Edwards, Tad DeHaven, “Privatize Transportation Spending”, Cato Institute, <http://www.cato.org/publications/commentary/privatize-transportation-spending>, [2013-05-06].

⁶⁸ Phineas Baxandall, “Private Roads, Public Costs: The Facts About Toll Road Privatization and How to Protect the Public”, *U. S. PIRG Education Fund*, Spring 2009, <http://cdn.publicinterestnetwork.org/assets/H5Ql0NcoPVeVJwymwlURRw/Private-Roads-Public-Costs.pdf>, [2013-04-4], 9-11.

the government as private companies have more incentives to make profit.⁶⁹ Moreover, due to the existence of competition, the private investors would likely come up with projects that are more innovative and responsive to the needs of traffic and citizens.⁷⁰

Investing in infrastructure might be appealing to various companies but also to pension funds as cash flows are rather predictable and stable which “provides a return over a very long period of time, which matches the pattern of long-term liabilities of these funds”.⁷¹ Furthermore, it would also attract foreign investors that had already won bids for infrastructural projects. Chinese investments play a role in the improvement of US roads and bridges for example in New York, California (Bay Bridge between San Francisco and Oakland) and Alaska.⁷² The current Secretary of state John Kerry suggested that increased Chinese involvement is a “win-win-win” as “it’s a win for the investors, it’s a win for the countries, and ultimately it’s a win for the place where the infrastructure gets built”.⁷³ Foreign companies bring capital and offer job opportunities for local workers but might cause suspicion of not supporting domestic providers and “selling the US”.

On the other hand, privatization also suffers from certain deficiencies. Firstly, a strong legal and contracting system is required. Certain existing projects show that a non-compete clause was inserted into contracts which deprives the state governments of planning projects in the same area and fulfilling other policy goals.⁷⁴ Secondly, privatization would unlikely be a solution for all parts of vehicular infrastructure everywhere. While in areas with heavy traffic the benefits from tolling would be great it is implausible that highways with low traffic would attract the interest of private investors. The investors would focus on generating revenue not public benefits.

The only way to maintain vehicular infrastructure in areas that are not attractive for profit-seeking investors would be the active involvement of local communities and private donors. The dire conditions of local roads and a low of possibility of improvement in the sight would likely spur local activity and civil engagement.

The overall effects for the economy are debatable. On the one hand, business would spend

⁶⁹ Edwards, “Infrastructure Investment”.

⁷⁰ Clifford Winston, “The Private Sector Can Improve Infrastructure with Privatization not a Bank”, *Brookings Institution*, September 29, 2010, <http://www.brookings.edu/research/opinions/2010/09/29-infrastructure-privatization-winston>, [2013-05-06].

⁷¹ Edwards, “Infrastructure Investment”.

⁷² “China Fulfills Obama's Infrastructure Pledge”, *Russia Today*, February 18, 2012, <http://rt.com/usa/infrastructure-chinese-us-china-621/>, [2013-05-06].

⁷³ Daniel Halper, “Kerry Welcomes Chinese Investment in America’s Infrastructure”, *The Weekly Standard*, April 14, 2013, http://www.weeklystandard.com/blogs/kerry-welcomes-chinese-investment-americas-infrastructure_716360.html, [2013-05-06].

⁷⁴ Brad Plumer, “More States Privatizing Their Infrastructure. Are They Making a Mistake?”, *The Washington Post*, January 4, 2012, http://www.washingtonpost.com/blogs/wonkblog/post/more-states-privatizing-their-infrastructure-are-they-making-a-mistake/2012/03/31/gIQARtAhnS_blog.html, [2013-05-06].

more money on transportation as it would be required to pay for virtually every kilometer on the road. Moreover, the complete privatization of infrastructure would create a very complex system that would be very difficult for orientation. As virtually every road could be owned by a different entity that could collect toll differently than the others congestions and time delays and other problems would occur which would have negative impact on the US economy. A major agreement among infrastructure owners could save the whole system, however, it is rather unlikely.

On the other hand, if the quality of the privately operated roads was higher it would reduce the costs for business and make transportation easier. However, it remains unclear whether private sector would manage the infrastructure better.⁷⁵

⁷⁵ Dave Jamieson, "Toll Road Privatization: As Ohio Considers It, Indiana Serves As Cautionary Tale", *The Huffington Post*, June 16, 2011, http://www.huffingtonpost.com/2011/06/16/toll-road-privatization_n_878169.html?page=2, [2013-05-06].

CONCLUSION

The aim of this project was to show three scenarios of future development concerning federal investment (or the lack of it) in the vehicular infrastructure and its implications in the time horizon of 2030. As of methodology, scenario analysis by Clark was used to develop three predictive scenarios – extrapolation, projection and forecasting. Three scenarios were analyzed according to the chosen driving forces (the state of economy and political will to invest) and their change.

The first scenario shows what the implications for the transport infrastructure will be if the level of investments from the federal government remains more or less constant in the future. If the federal investment is not matched by alternative state initiatives it will translate into time delays and decreasing productivity especially for the transport-dependent industries. This would have a profound effect on the overall competitiveness of the US economy. One of possible sub-scenarios is creation of the infrastructure bank that would provide loans to projects. Given the mistrust of central projects from the part of Republicans, a different scenario seems more plausible. In this one public and private sectors join in partnership with the private sector bearing the primary responsibility.

The second scenario's presumption is that the federal investment will match the amounts deemed necessary by experts. It will be primarily enabled by economic recovery and follow-up economic growth, efforts to even up the Chinese rise, low long-term interest rates, depressed construction costs, and bipartisan consensus on the need for investments. Subsequently, job opportunities will be created and the purchasing power of people will increase. The advanced infrastructure will influence transport-dependent industries and freight-dependent industries. Their transport costs will be low which will allow companies expand markets. The quality of goods and services will grow as well as the demand for them. Although some negative external effects such as increased level of air pollution will possibly occur, overall, it will result in GDP growth which will in turn enable more investments.

The third scenario that was conducted as low-probability/high-impact analysis is devoted to a future situation in which the US is militarily entangled in a major war in the Middle East and therefore the federal government gives up the responsibility for maintaining infrastructure and transfers it to the hands of the private sector. Privatization of vehicular infrastructure might attract various entities such as pension funds or foreign investors seeking profit. Areas seen as non-rentable would have to be financed from other sources such as private donors or local communities. The impacts on the economy are debatable – expenses would increase as the toll system would be in force and the whole system would be very complicated which would cause additional delays,

however, the quality of infrastructure might be better which business might benefit from.

The value of this project lies in outlining how the future might look like in three different cases. What is more important, however, is identification of factors and forces that affect the federal investment and state of the vehicular infrastructure were and how their qualitative change might influence the overall situation.

APPENDIX

TABLE 1

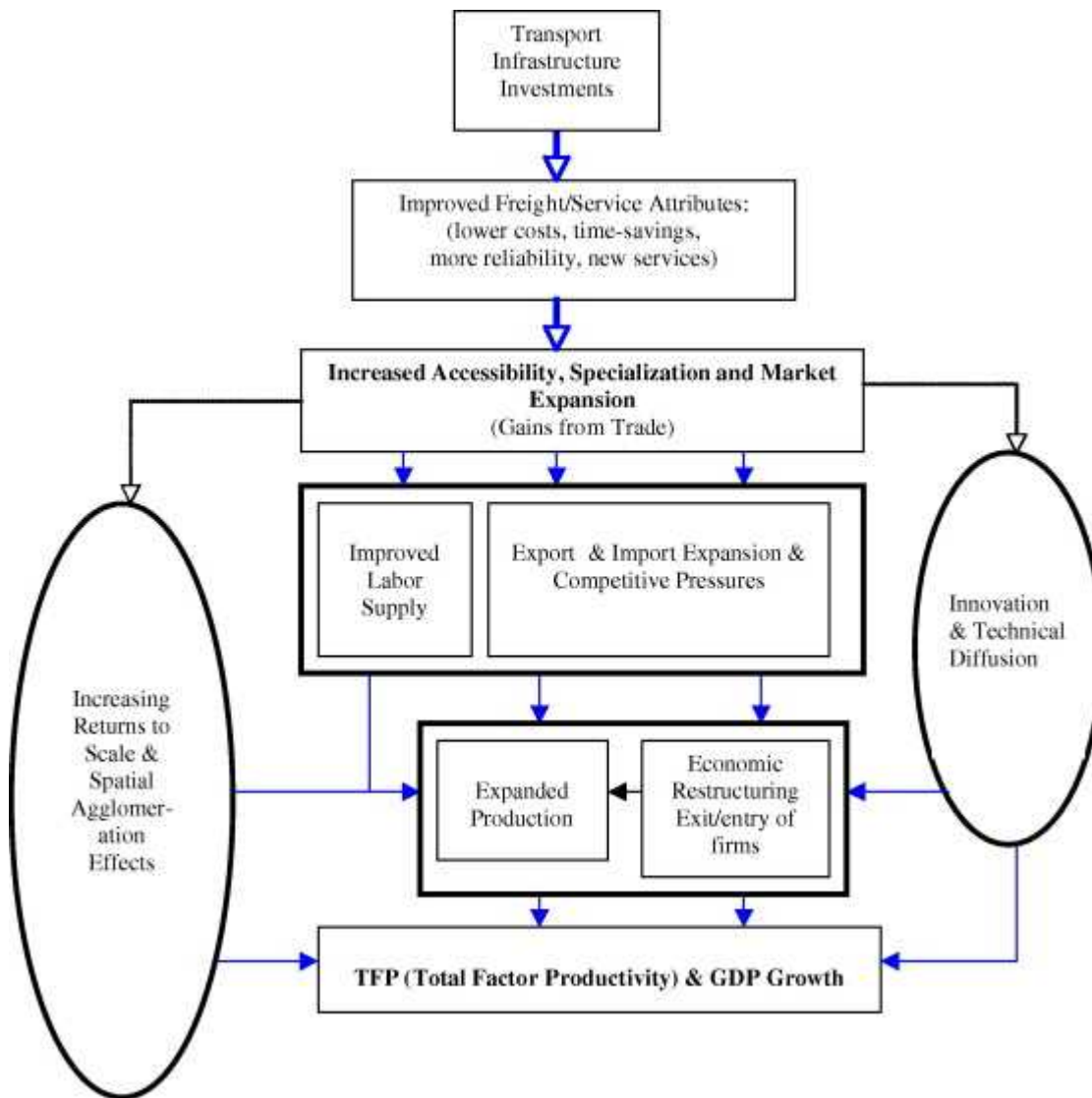
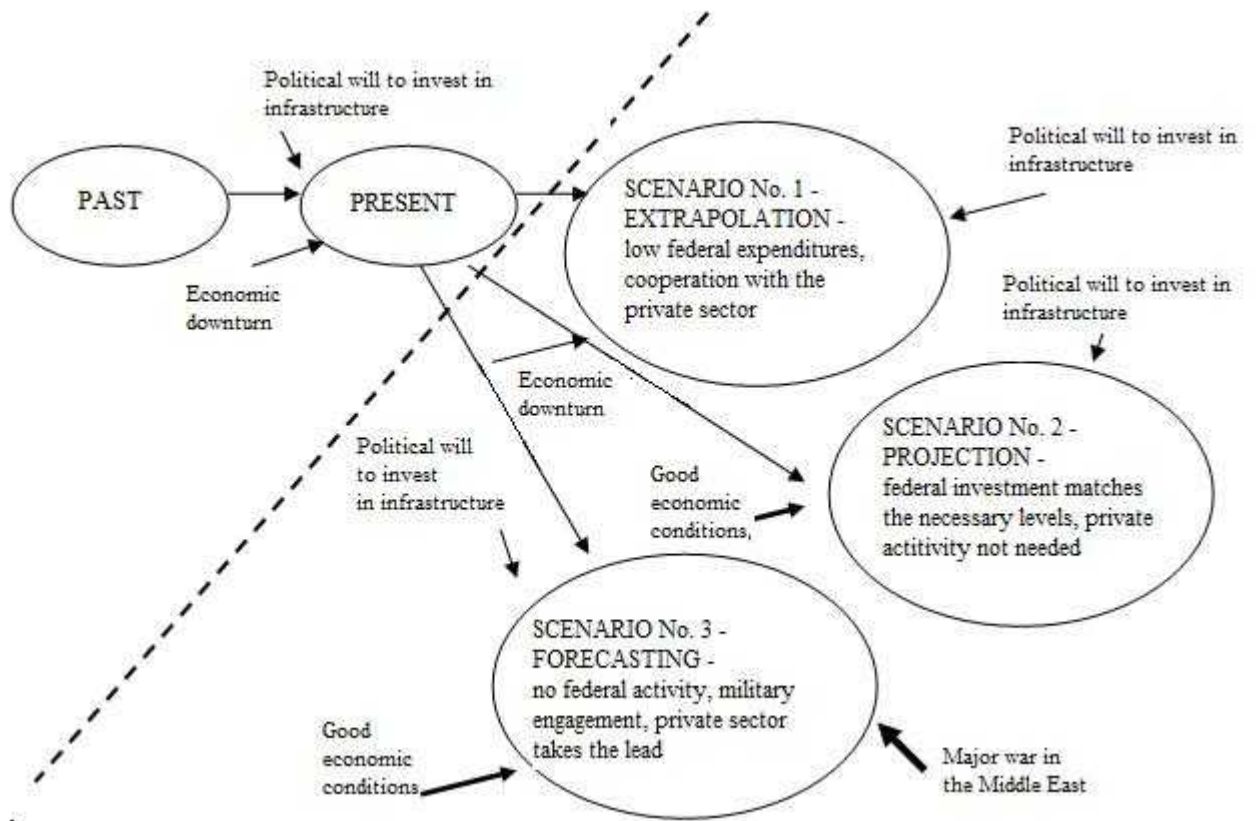


TABLE 2



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