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The Usefulness of US Transportation Service Index for New York State/Metro Area

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16. Abstract <p>Business indices play a critical role in summarizing the business conditions of the economy and indicating the forthcoming of phase changes in business cycle. The useful indices should accurately reflect the business reality and dynamic changes of the economy. In the past decades, significant industry transformation from manufacturing to services has been observed in both New York State/Metro area and the entire nation. The share of goods in US GDP has declined from 54% to 35% and the share of services has increased from 34% to 56% from Q1 1953 to Q2 2003. In New York, the dominance of sugar refining, garment manufacturing, and publishing in early years have also been replaced by growing industries of Finance, Insurance and Real Estate (FIRE) sector. However, before the US Transportation Service Index being developed in 2003, information from services sectors is significantly underrepresented. Among the current four coincident and ten leading indicators of NBER, there is no single index specifically measuring services sectors. In New York, there is no single service index in place to help government agencies and private sectors monitor the dynamics of the business cycle and issue early warning signals. For filling the gap in New York, we propose this study to assess the usefulness of the US Transportation Service Index for New York State/Metro Area and explore the possibility of developing a New York State/Metro Transportation Service Index.</p>					
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The Usefulness of US Transportation Service Index for New York State/Metro Area

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I. Introduction

Business indices play a critical role in summarizing the business conditions of the economy and indicating the forthcoming of phase changes in business cycle. They have been important tools for government agencies and private sectors in their policy making and business planning for the past decades. In the current indicator system of NBER (National Bureau of Economic Research), however, information from services sector is significantly underrepresented. Before the US Transportation Service Index being developed in 2003, among the current four coincident and ten leading indicators, there is no single index specifically measuring services sectors, and most of the indexes have been focused on manufacturing sectors since the inception of NBER. But the reality is that the share of goods in US GDP has declined from 54% to 35% and the share of services has increased from 34% to 56% from Q1 1953 to Q2 2003 (Lahiri and Yao, 2006).

For the New York State/Metro area, a similar industry transformation has been observed in the past decades. In New York City, for instance, the dominance of sugar refining, garment manufacturing, and publishing in early years have been replaced by growing industries of Finance, Insurance and Real Estate (FIRE) sector (Peters, Paaswell and Berechman, 2007). The importance of these services sectors for New York Metro Area is especially exemplified by the most recent sub-prime induced financial crisis and economic recession. However, similar to the US nationwide, there is no single service index in place to help government agencies and private sectors in this area monitor the dynamics of the business cycle and issue early warning signals to the business community and general public.

For filling the gap at the national level, the US Transportation Service Index has been developed by Lahiri, Stekler, Yao, and Young in 2003 (Lahiri, Stekler, Yao, and Young, 2003). The reasons for selecting transportation as the representative of the services sectors are primarily due to: (1) the sizable portion of US GDP that transportation represented (depending upon the definition, from 3.09% for Transportation GDP to 16.5% for Transportation-driven GDP); and (2) its critical function in facilitating economic activities between sectors and across regions. Since then, a monthly US Transportation Service Index has been in use by US Department of Transportation for measuring the economic performance of the transportation sector, and predicting the forthcoming of the turning points of general business cycle.

The purpose of this study is to assess the usefulness of US Transportation Service Index for New York State/Metro Area, explore the possibility of developing a New York State/Metro Transportation Service Index by applying some similar concepts and methodologies used in US Transportation Service Index, and identify the issues related to constructing New York State/Metro Transportation Service Index. Section II describes the US Transportation Service Index. Section III discusses the New York State/Metro economy. Section IV analyzes the usefulness of US Transportation Service Index for New York State/Metro Area, followed by the discussion for the issues related to developing New York Transportation Service Index in Section V. Finally, conclusions are provided in Section VI.

II. US Transportation Services Index

The US Transportation Index can be discussed from the perspectives of components of the transportation sector, data, weights for the components series, index aggregation, the characteristics of the index, and the issues related to the US Transportation Services Index.

1. Components of the Transportation Sector

The definition of the industry was based on the North American Industrial Classification System (NAICS), which confirms to the Transportation Satellite Accounts (TSAs) that is associated with National Income and Product Account (NIPA).

Transportation activities generally include household production of transportation services in owner-operated automobiles and in-house as well as for-hire transportation by commercial establishments. In US Transportation Service Index, only for-hire commercial activities were considered for lacking of available monthly data on the other two components.

For-hire transportation includes six subsectors: air, rail, water, truck, transit and ground passenger transportation, and pipeline. But they don't include the subsectors of scenic and sightseeing transportation, support activities for transportation, postal service, and carriers and messengers that are included in NAICS. The six sectors included covers 89.7% to 93.9% of total transportation between 1980 and 2000.

2. Data

The US Transportation Service Index was developed from eight series. Five of these series measure the level of freight activity: trucking tonnage, air revenue ton-miles, rail revenue ton-miles, a waterway tonnage indicator, and pipeline movements of petroleum products and natural gas. The remaining three measure the level of passenger services: air revenue passenger-miles, rail revenue passenger-miles, and national transit ridership. With the exception of pipeline, all data were collected from January 1980 to April 2002. The pipeline data were starting from January 1985 to April 2002. Each series was seasonally adjusted using the Census X-11 program.

3. Weights for the Components Series

The data from eight series were used to construct the US Transportation Service Index. Each series was converted into index number form with 1996 equal to 100. For constructing the Transportation Service Index for the entire transportation sector, each subsector indices were combined by assigning weights to each of the components. The weights measure the relative importance of each subsector to the entire sector.

For constructing the Transportation Service Index, value-added weights from the NIPA was used. Comparing with the weight of gross output, value-added weight is more appropriate because transportation is an intermediate sector whose contribution is calculated as the difference in the values of goods being transported. This definition confirms to the concept of GDP. Weights were obtained from the annually updated “Gross Product by Industry” table published in the Survey of Current Business (November 2001).

4. Fisher Ideal Index

Given the weights, components series were aggregated into one single index using different index methods. As economic theory suggested, the preferred measure of quantity change is a geometric mean of the Laspeyres Index and the Paasche Index. The result is called Fisher Ideal Index. Fisher Ideal Index uses current weight, while the other two use fixed weight which may overstate output growth for the periods after base year and understate growth for periods before the base year, or vice versa.

The Fisher Index is a chain index. Using Fisher Ideal Index, the formula for the growth of monthly transportation indices is as follows:

$$\frac{I_m^A}{I_{m-1}^A} = \sqrt{\frac{\sum_j I_{jm} P_{jy(m-6)}}{\sum_j I_{jm-1} P_{jy(m-6)}} * \frac{\sum_j I_{jm} P_{jy(m+6)}}{\sum_j I_{jm-1} P_{jy(m+6)}}} \quad (1)$$

Where

I_{jm} Is the output index in subsector j in month m ;

$P_{jy(m)}$ is the value-added weight for subsector j in year y ; and $y(m)$ is the year containing the month m .

The US Transportation Index uses annual outputs weighted by previous, current, and next year prices.

5. The Characteristics of the Index

The US Transportation Services Index exhibits several characteristics. First, it shows strong upward trend with a compounded annual growth rate of 2.65% between January 1980 and August 2001. Among the components indices, the cyclical movement of the freight index dominates that in the total US Transportation Services Index.

Second, overall, the US Transportation Services Index led the three NBER defined peaks within the covered period with a considerable lead time (median 16 months). The signals for recovery were almost contemporaneous. And, in general, the strong cyclical changes in transportation output appear to be more synchronized with growth slowdowns rather than full-fledged recessions of the US economy.

Third, if taking a look at the freight and passenger transportation indices separately, it can be found that the cyclical movement of the total US Transportation Services Index is mostly determined by freight movement.

Fourth, freight movement is found to adjust early to the demand and supply shocks in the economy. These adjustments or fluctuations across different sectors can eventually lead to a full-fledged recession or be limited to sectoral cycles. On the other hand, passenger transportation activities are affected when the state of the overall economy has changed due to demand shocks, especially in a recession.

Finally, on average, the US Transportation Services Index led the NBER defined growth cycles with a lead time of six months at peaks and five months at troughs with almost no false signals.

6. The Issues related to the US Transportation Services Index

The US Transportation Services Index yields a valid measure of output in the transportation industry. However, some data problems may need to be noticed and the refinements in the indices may be necessary to improve in the future.

First, the index only measures the transportation in the services sector of the industry. The activities involved in the production of transportation equipment and construction of transportation infrastructure are not included.

Second, within the services sector, only for-hire transportation is included. The activities involved in intrafirm (in-house) and household transportation (HPTS) have been excluded.

Third, the waterborne component of the index only includes internal waterway traffic. It does not include deep seas, Great Lakes, coastal trade and cruise travel.

Finally, monthly data on national transit ridership are only available on a quarterly basis and lag by four months. Other monthly data are sometimes available with a lag of one to three months. For the purpose of releasing the index with a usual lag of one or two months, some of the latest monthly data must be forecasted on a provisional basis.

III. New York State/Metro Economy

1. Geographic Allocations

New York State appears to function with at least four major economic regions:

The Northern Gateway covers the area from North of Albany to East of Syracuse. There are relatively lower levels of economic activity in this area due to the allocation of a significant amount of land to Adirondacks State Park as well as its relative remoteness from port facilities.

The Capital Region has a growing base of nanotechnology as well as significant employment in the government and academic sector.

The Western Region has a long history of manufacturing that has largely be in decline for the last 50 years. This region faces with an aging population and a lack of significant job opportunities for young residents. The region is well located in terms of access to international commerce with Canada. However, the international maritime port facilities are subject to seasonal closure due to icing conditions (typically closed from last week in December until third week in March each year).

Finally, the Downstate Region, with a rather vibrant economy based largely on the finance sector as well as health care and creative industries, struggles to maintain its position in the national as well as worldwide economy. New York City traditionally had significant manufacturing employment, however, much of that has disappeared in the last 50 years and has not be replaced in the outer boroughs by new industry.

2. Primary Industries

New York State has been observed significant industry transformations in the past 50 years. The dominance of manufacturing industry has been replaced by growing industries of services. As an example shown in Table 1 below, in terms of the number of establishment of the business entities in 2006, about 85% of the establishments are in the services sector. Among them, 14.92% is retail trade, 11.40% is professional, scientific and technical services, 10.22% is health care and social assistance, and about 10.13% is other services except for public administration. In addition, Wholesale trade takes about 6.76%, real estate and rental and leasing takes about 6.3%, finance and insurance takes about 5.6%, and transportation and warehousing takes about

2.31%. In contrast, construction sector and manufacturing sector only count for 9.13% and 3.65%, respectively.

Table 1: 2006 New York Industry Distribution

Industry Code	Industry Code Description	Total Establishments	Percentage
-----	Total	515950	100.00%
44----	Retail trade	76982	14.92%
54----	Professional, scientific & technical services	58818	11.40%
62----	Health care and social assistance	52743	10.22%
81----	Other services (except public administration)	52276	10.13%
23----	Construction	47089	9.13%
72----	Accommodation & food services	42493	8.24%
42----	Wholesale trade	34864	6.76%
53----	Real estate & rental & leasing	32488	6.30%
52----	Finance & insurance	28904	5.60%
56----	Admin, support, waste mgt, remediation services	23955	4.64%
31----	Manufacturing	18812	3.65%
48----	Transportation & warehousing	11920	2.31%
51----	Information	11344	2.20%
71----	Arts, entertainment & recreation	10902	2.11%
61----	Educational services	6334	1.23%
55----	Management of companies & enterprises	2448	0.47%
99----	Unclassified establishments	1997	0.39%
11----	Forestry, fishing, hunting, and agriculture support	598	0.12%
22----	Utilities	588	0.11%
21----	Mining	395	0.08%

Source: U.S. Census Bureau

3. Future Trend

New York City Mayor Michael Bloomberg has expressed his view for the future of the New York City in his release in 2007: A Greener and Greater New York. For the greener city target, the fundamental base of mass transit in the region, coupled with the high urban density in the nation, exhibits great potential to develop the New York City to be the greenest city in the nation and world. For the greater city target, New York also shows tremendous possibility. As the world economy globalizes, the nation's ports may rise again in prominence and the great natural

advantage of New York City's harbor may once again play an important part in New York State destiny. In either way, transportation industry will be a key for the future of New York.

IV. Developing a Transportation Service Index for New York State/Metro Area

As discussed in the earlier sections, no matter from national perspective or from New York perspective, industry transformation has been observed for the past decades. Predominance of traditional manufacturing industries has been replaced by the fast growing services industries. As a consequence, the economic/business indices that monitor, measure, and summarize the economic/business conditions should reflect this new reality. However, as mentioned earlier, before the US Transportation Services Index being developed in 2003, no services indices have been used nationwide in the NBER indicator system. For New York, even until now, no single service index has been developed in helping government agencies and private sector in this area for their policy making and business decisions, even though what people here are facing and involved on a daily basis is a regional and national economy with predominance of services industries.

It seems to us that it is imperative for New York to develop a services index (or indices). The well designed and developed index/indices can help: (1) better monitor and measure the business activities in terms of accuracy and timeliness in a region with predominance of services; (2) better predict the phase changes in business cycle chronologies to allow government agencies and private sector to have lead time to take pre-caution or anti-business cycle actions to eliminate or reduce the possible damages that business downturn may cause.

In this regard, developing New York State/Metro Transportation Services Index seems an appropriate choice. First, more than 85% of the New York establishments are services providers, as indicated in the earlier sections. Second, transportation is an industry connecting different sectors (both services and manufacturing sectors) and across regions. Third, nationwide index – US transportation Services Index – can provide an important reference for constructing the regional transportation services index.

The usefulness or importance of US transportation Services Index for developing a New York Transportation Index can be viewed from the following areas:

- (1) It pinpoints the importance of developing a services index to better reflect the changing reality of today's economy;
- (2) It further highlights why a transportation services index should be first developed to represent the services sectors which dominant the economy;
- (3) It provides the structure and major components of a transportation index;
- (4) It demonstrates the road map for how technically the index can be constructed; and
- (5) It analyzes the role that the index can play in monitoring the daily economy and predicting the business cycle chronologies.

Of course, the usefulness of the US Transportation Services Index for the New York does not imply that the US Transportation Services Index can be simply applied to New York without any changes or modifications. Despite the limitations of the US Transportation Services Index as discussed in Section II, the New York economy is quite different from national average in many aspects. Most notably, while national average percentage of importance of services is about 56%, the percentage of services for New York would be much higher. In addition, the freight transportation is dominant in the transportation sector nationwide. But for New York, given the much higher degree of dominance of services, passenger transit should be expected to have much higher weight. Furthermore, international cargo was not included in the US Transportation Services Index due to nationwide data availability. But for New York, the inclusion or exclusion of this piece of data could make significant difference for its accuracy in monitoring and measuring the New York economy.

V. The Issues for Developing a New York Transportation Service Index

Developing a New York Transportation Services Index is a formidable task. It requires thorough understanding about New York's economy, transportation industry in general and transportation in New York in particular, the relationship between the transportation sector and the rest of the economy nationwide and statewide, and related technical issues for constructing the index. Business indices are the ones based on the data and empirical studies. Therefore, in addition to the lengthy time required, data availability could also be a challenge. In general, we think the following issues that should be addressed when developing the New York Transportation Services Index:

First is the selection of variables. While all six sector variables included in the US Transportation Services Index - air, rail, water, truck, transit and ground passenger transportation, and pipeline – are good candidates for New York Transportation Services Index, additional variables could be considered as well. For examples,

- (1) Per capita lane miles: As proposed by Kim (2006), per capita lane miles may offer some guidance regarding the supply of transportation services in region.
- (2) Congestion metric – 1: Congestion functions as a disamenity for a given region, and also represents some degree of estimate of demand for transportation services. The Federal Highway Administration (FHWA) studied congestion and its impacts on regional economics in terms of productivity and input cost.
- (3) Freight transportation cost: Freight transportation cost could provide an understanding from an operational perspective the costs that are faced by regional business. The American Transportation Research Institute (ATRI) collects data on highway user taxes and state taxes on rolling stock in the trucking industry.
- (4) Employment in warehousing and distribution: Warehousing employment, payroll and wages offer an interesting opportunity to explore the relative performance of the

transportation system at a very low level of economic aggregation. The Bureau of Labor Statistics provides annual estimates of the employment in various sectors at the county level.

- (5) Automobile share of traffic on congested facilities
- (6) Toll burden: Tolls represent a burden in terms of cost to producers in a region. Unless the toll structure allows for better provision of highway services, it is highly likely that this added cost will decrease the competitiveness of a given region. In fact, additional toll burden may render a particular region economically unusable, depending upon the industry.
- (7) Road hours closed due to snow/ice conditions: New York State is located in the Snow Belt, and performance of the road network is a key to attracting business to New York region. There has been a long pattern of migration of jobs toward the Sun Belt – regions in the South East and Western United States. These regions face limited extreme icing and snow events, so their highway network is available on a consistent basis.

The final selection of the variables, of course, will be conducted by empirical studies. Many econometric issues such as co-linearity also need to be concerned.

Second is the data availability issue. Given the value of the selected variables in monitoring the regional economy and predicting the phase changes in the business cycle for the region, data availability could be a challenge that includes the data availability for the entire period or just for certain episodes of the time. In the case that the data is not available, some estimates or forecasts may be needed.

Third is the indexing methodologies including weight determination and aggregation of the index from each component. As discussed earlier, weighting schedule could be different if the focus of the index is different (quantity or value). Similarly, different indexing methodology could produce different results. As mentioned in Section II, Laspeyres index may overstate output growth for the periods after base year and understate growth for periods before the base year using fixed weight, while Paasche index may just lead to the opposite results. In contrast, using current weight, Fisher Ideal Index, as a geometric mean of the Laspeyres Index and the Paasche Index, may achieve a better performance.

IV. Conclusion

In conclusion, this study assessed the usefulness of US Transportation Services Index for New York State/Metro Area for the possibility of developing a New York Transportation Services Index. First, the US Transportation Services Index was developed in 2003 in response to the lack of representation of services sectors in the NBER indicator system at the time while the US

economy has transferred from a manufacturing dominant one to a service oriented one during the past decades. As one of the most services concentrated areas in the US, New York has been observed a similar transformation process, to an even higher degree. Unfortunately, however, there is also a missing of a services index in the New York's economic monitoring and measuring system. As a consequence, developing a New York Transportation Services Index is not just necessary, is imperative.

Second, for developing New York Transportation Services Index, US Transportation Services Index may provide a valuable bench mark for reference in terms of the structure of the index, variable selections, weight determination, indexing methodologies, and correlation analysis of the transportation index and business cycle chronologies.

Third, developing New York Transportation Services Index is not simply copying the US Transportation Services Index with New York data. New York, in many ways, is different from the rest or average of the nation. As a highly service concentrated area, the importance of the transportation could be much higher than the national average as represented by the US Transportation Services Index.

Finally, developing New York Transportation Services Index is a formidable task. It requires thorough study and understanding of the New York economy and linkage between the transportation and other sectors of the region's economy. In addition, lengthy time would be needed for conducting this empirical experiment; and data collection and estimation (if data not available) could be a challenge as well. But most importantly, sufficient funding needs to be in place for data purchasing, software purchasing, or manpower hiring. With all these issues being mentioned, investment in developing New York Transportation Services Index should be reasonably expected to generate tremendous values for the future of New York economy.

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