

COMMUTER RAIL IN NORTH AMERICA

Beginnings

North America has a long tradition of public transportation arguably beginning with Henry Clay's 1815 American System of Development [1], which first suggested the notion of federal subsidies for public transportation projects. In an 1817 speech, John C. Calhoun stated "let us, then, bind the Republic together with a perfect system of roads and canals" [1]. This system would develop rapidly over the following half-century, but as the nation expanded west, away from the Atlantic shores, canals would be increasingly replaced by a system of railroads. Commuter rail has its roots in the railroads of Baltimore, New York, and Chicago.

In the 1820s a group of Baltimore business leaders, eager to compete with the northern cities of Philadelphia and New York were considering the construction of a canal connecting them with internal trade routes along the Ohio River; however, following several enthusiastic letters from his son William regarding the success of the Stockton and Darlington Railroad in Britain, banker George Brown brought forward the idea of building a railroad. With great foresight, the group saw the advantages a railroad had over canals and on February 28th, 1827 the Baltimore and Ohio Railroad (B&O Railroad) was incorporated in the Maryland House of Delegates [1]. This created the first common carrier railroad in North America. Three years later, on July 5th, 1830 the B&O Railroad opened a 12 mi (19.3 km) horse-drawn passenger rail line running four times daily between Pratt Street and Ellicotts Mills [2].

Whether New York or Chicago were the next cities to develop commuter rail is difficult to pinpoint definitively. In New York, the Brooklyn and Jamaica Railroad (B&J Railroad) was created on April 25th, 1832 and began construction of a 10 mi (16.1 km) train line from the East River in Brooklyn to the Queens' neighbourhood of Jamaica [3]. The famous Long Island Rail Road Company (LIRR) was incorporated two years later on April 24th, 1834 [3] with the mandate to operate a rail-ferry-rail system between New York, NY and Boston, MA. In 1836 the B&J Railroad was completed and leased by LIRR, who subsequently built tracks east through the largely unpopulated central plains of Long Island. This system could hardly be considered a "commuter system" as it took approximately 3 ½ hours to travel from Brooklyn, NY to Greenport, NY, not including the additional ferry time and further rail road travel necessary to reach Boston, MA [3]. The LIRR was prosperous until in 1850 a rail road was completed through the previously impassible Connecticut hills making the LIRR system obsolete. The LIRR refocused on providing secondary lines off its main Long Island line to provide commuter rail services to the region. What followed were several decades of competition between the LIRR and several other railroads, which began to develop in the 1860s, and the eventual acquisition of these railroads by the LIRR through the 1870s [3]. Despite these gains in rail assets, the LIRR entered receivership in 1879, and was subsequently purchased by Austin Corbin in 1880 [3]. Under his leadership the railway prospered and expanded to its greatest extents before being purchased by the Pennsylvania Railroad in July 1901.

In the 19th century Chicago was the largest railroad hub in the world; it maintains this monochrome to this day. The first commuter rail system in Chicago was completed by the Galena & Chicago Union Railroad in 1848 between Chicago and Oak Park. This was followed on July 21st, 1856 by the extensive Illinois Central Railroad system, which ran four daily trips between Chicago and

Hyde Park [4]. By the turn of the century there were 13 railroad lines connecting Chicago to its surrounding suburbs. It can be seen from this that passenger railroad service began in New York a decade before the Galena & Chicago Union line was completed, but that the Galena rail line was purposefully developed as commuter rail. In addition, the more extensive Illinois Central, was completed several years before New York decisively began construction of commuter rail lines in the 1860s [4].

A fine line exists between commuter rail and inter-city rail. This is nowhere more evident than in the US Congressional Committee on Transportation and Infrastructure's differentiation. The committee defines commuter rail as "short-haul transportation in metropolitan and suburban areas usually in morning and evening peaks" whereas inter-city rail is defined as not commuter. They state the biggest difference between the two is that commuter rail often contracts out operations, dispatching, and/or maintenance to private operators. This seems an unsatisfactory differentiation as it is based solely on the current operational practices of the two system types, which vary enormously worldwide and even within North America. The first definition based on operational purpose is more satisfying as it encompasses all operators, no matter their operating practices. However, as technology continues to develop this differentiation will continue to erode as previously impractical commuting distances become feasible. For example, the Chinese CRH380A, with an operational speed 350 km/hr (220 mi/hr), makes the 202 km trip from Shanghai to Hangzhou in 45 minutes. This is well within the range of acceptable commuting times.

A distinction should also be made between commuter rail and what is commonly referred to as rapid transit. Rapid transit refers to elevated, at grade, or underground rail service typically used in large metropolitan regions. Rapid transit systems differ from commuter rail in that they run continually throughout the day between closely spaced stations. "Rapid" is a slight misnomer; it is faster than other forms of intraurban public transit (buses, trams, or light rail without grade separation), but commuter rail operates at higher speeds due to fewer stops and typically less adjacent land development. It should be stressed that the efficient operation of each of these transportation systems is integrally linked to the speed and connectivity of its adjoining networks.

Growth of Passenger Rail in Early 20th Century

Prior to the 1970s, commuter railroads were primarily owned and operated by large national freight railroad corporations. Most freight railroads provided passenger rail service, but two of the most significant in commuter rail history are the Pennsylvania and Union Pacific Railroad; Penn and Union Stations are synonymous with most of the great commuter railroad lines in North America from Baltimore and Washington D.C., to Chicago, to New York City. This was a time of great expansion in rail across North America. Railroads came to dominate the movement of freight and passenger rail continued to grow.

At the turn of the century the means of propulsion in trains was changing from steam to third-rail electric. In 1905 work began to electrify the LIRR, at the time the largest commuter rail system in North America. With the completion of tunnelling under the Hudson River and Penn Station in 1910, commuters were now able to reach Manhattan by train via the Manhattan Transfer.

Electrification in Chicago followed a similar path. In 1903 an electric streetcar was completed between Indiana and East Chicago under the name “Chicago and Indiana Air Line Railway”. Following financial bankruptcy, the system was purchased in June, 1925 by Samuel Insull and renamed the South Shore and South Bend Railroad. Insull changed the electrification system from AC to DC, thus allowing trains to run continuously over Illinois Central Railroad tracks from Kensington to downtown Chicago. This brought about great increases in ridership and in the 1930s Chicago had the largest public transit system in the world.

Created in 1887, the Interstate Commerce Commission (ICC) had the mandate of regulating the railroad industry, which was considered a natural monopoly at the time. Following the rapid growth of the American highway system in the early 20th century, the use of trucks for freight transportation increased exponentially, and with it the competition between operators. In 1935 the Motor Vehicle Carrier Act gave the ICC authority over the trucking industry, in addition to its regulation of the railroad industry. Passenger rail ridership fell through the Great Depression of the 1930s but rapidly increased through WWII following the termination of all automobile production. In 1944 rail travel reached an all time high of 90 billion passenger miles (144.8 billion passenger kilometres).

The Post War Years

Following the Second World War the North American population and economy were booming and people were increasingly moving out of the city to the suburbs sprouting up around most American cities. With this movement came expansion of the North American highway system and the automobile as a means of commuting. These new suburbs were not built with the population densities necessary for commuter rail to be effective. Through the 1950s passenger rail market was made virtually obsolete by the rapidly developing airline industry. It must be kept in mind that the North America passenger rail market is intrinsically linked to freight rail so industrial competition, which affects freight rail companies, also affects the inter-city and commuter rail markets. In the 1960s and mid-1970s freight rail was under siege from virtually all major fronts due to competition from road, air, water, and pipeline transport. Road and air transport received heavy government planning, promotion, and funding during this time and as a result rail ridership dropped. Between 1960 and 1970 inter-city rail pass mails dropped by 50% from 21.5 billion to 10.9 billion and its share of intercity travel dropped from 2.8% to 0.9%. In contrast, air travel increased by 172% and bus by 9.5% over the same period. Commuter rail did see a modest 1.5% growth over this period but privately operated rail lines could not compete with the federally nurtured auto and air carriers. Most of these commuter rail services were rendered unprofitable due to large investments, heavy taxation, and equipment that only achieved full optimization during a peak period of 2-3 hours in the mornings and evenings.

The Nationalization of North American Rail

The term nationalization is often associated with the federal acquisition of previously private assets or services; however, in this case it also refers to the acquisition by other public entities on a state and local scale. The history of commuter railroads in the 1960s is dominated by bankruptcies and the decisions of the ICC. In 1968, the Pennsylvania Railroad merged with the New York Central Railroad to avoid the bankruptcy of both organizations. The new Penn Central Railroad was subsequently ordered in January 1969 by the ICC to take over operations of the bankrupt New York, New Haven, & Hartford Railroad. This brought together the nation’s three largest passenger rail providers under one roof. Unfortunately, this was not enough as with a

\$100 million debt, Penn Central filed for bankruptcy in June 1970. The decision made by the ICC was likely one of the most significant in commuter rail history and marked a turning point in the philosophy of provision of commuter rail. Penn Central asked that 34 trains to be removed from its schedule each day, in order to eliminate operating and personnel costs. The ICC denied this request, only allowing 14 train trips to be eliminated, based on the grounds that the remaining 20 trains were essential to passenger transportation in the most densely populated region of the country. Penn Central was forced to operate at a loss, the ICC implying the public benefit outweighed the financial losses of Penn Central.

The same story was true for virtually every commuter rail and inter-city rail provider during the 1960s. With an increasing focus on automobile infrastructure development and investment, commuter rail was no longer a lucrative industry to enter. The United States government again saw the benefit in these services and passed a pivotal piece of legislation October 14, 1970. The Rail Passenger Service Act of 1970 created a government-sponsored entity, the National Public Railway Passenger Corporation. Commonly known as Amtrak, it took over responsibility of any railroad services private corporations were unwilling to continue. At its inception on May 1, 1971, Amtrak inherited a debt of \$197 million and 500 trains operating on 53 000 mi (85 300 km) of track, mainly in the northeast corridor. Amtrak pared this service down to 219 daily , and 4 tri-weekly inter-city trains operating over 23 000 mi (37 000 km) of track.

The northeast corridor was not the region to see a transfer of railroad assets from the private to public sector due to financial hardships. In 1974, the 6-county Chicago area voted in the Regional Transportation Authority (RTA), a public agency given the task of managing Chicago's metro, bus, and commuter rail systems. The RTA provided a public vessel for federal and state subsidies, but in the beginning did not operate transit. New rail cars were purchased and, from a previously failing system, the RTA created a 22% increase in ridership; ridership peaked at 6.25 billion annual trips during the 1970s. Chicago's commuter rail from south of the 6-counties was facing hardships as well. The Chicago South Shore and South Bend Railroad applied to the ICC for total discontinuance of service in 1976. Following the trend of the time, cessation was delayed to allow the state of Indiana to develop a solution to the issue. In 1977, the state created the Northern Indiana Commuter Transportation District (NICTD) and with federal and state investments the commuter rail service was saved from dissolution. The NICTD ROW, tracks, and all other South Bend Railroad assets were purchased by the state government in 1990 and continues to run for the public benefit rather than profit. It has helped keep a strong economy in Northwest Indiana by giving residents a reliable means of reaching the city of Chicago. With its change in focus ridership increased on the railroad from 1.5 million annual riders in 1978 to 3.25 million in 1999. The creation of transportation districts such as those in the Illinois/Indiana region through the 1970s and 1980s was essential to the continuation of commuter rail services for the public benefit.

THE GROWTH OF COMMUTER RAIL SINCE 1980

Rail transit continued to grow through the 1980/90s. This is normally attributed to the 1979 energy crisis precipitated by the Iranian Revolution and Iraq-Iran War. This led to skyrocketing oil prices and the realization of the fragile nature of our current transportation energy supply. An alternative was sought to SOVs and the concept of transportation demand management was developed in response to a desire for alternatives to increasing capacity. Other urban planning concepts developed during this time that challenged the philosophies of early 20th century planners such as Robert Moses. Strategies favourable to commuter rail, such as Smart growth

and new urbanism, began to develop during this time and in 1992 the Chicago-based advocacy group the Congress for New Urbanism was formed.

In three decades, the number of rail systems nearly tripled in North America from 10 in 1980 to 28 by 2010. Light rail saw an even greater increase during these 30 years, increasing five-fold from 7 to 35 systems. In contrast, only 4 new freight rail lines were added during this time. This new rail construction resulted in a 67% increase in commuter rail ridership, 250% increase in LRT ridership, and a 66% increase in freight traffic.

Chicago

In 1982 RTA purchased the tracks of Rick Island and Milwaukee Railroads, which expanded its control of commuter rail in Chicago. In 1983 the Regional Transportation Authority in Chicago was re-organized with operation being broken up between three operating subsidiaries. The Chicago Transit Authority was put in charge of rapid transit and much of the bus system, Pace was formed as a suburban bus provider, and Metra is the current name of the Chicago regional commuter rail system. The CTA provides 83% of the public transit trips in the 6-county Chicago region. In addition to the Rick Island and Milwaukee routes, Metra indirectly operated seven other lines through purchase-of-service agreements; it eventually bought out these rail companies over the 1980s. Union Pacific owns and operates the three UP lines to this day and Burlington North, now known as BNSF Railway, continues to own and operate the BNSF line.

With ridership increasing by 15% between 1985 and 1995, Metra restored its aging rail stock and began system improvements through its New Start program. New stations were added as population centers grew through the Tax Incrementing Financing District (TIF), which was developed in the 1980s. The most significant result of this program was the 1996 opening of the 53 mi (85.3 km) North Central Service Line from Union Station to Antioch. This was the first new line opened in Chicago since 1926. Reverse commuting has become more common in many North American commuter rail markets. More Chicagoites currently commute to work in Juliett, IL than commute the other direction. Recent focus on transit-oriented development has further increased transit development in the Chicago region. Commuter rail service to Elburn, IL was discontinued in the 1950s due to low ridership but a 2000 residential unit mixed-use development in the area led to service being reintroduced in 2006 on the UP-W Line. Arlington Heights Mayor, Arlene Mulder, stated “the train is the cornerstone” of their community and is encouraging mixed-use development in her town. Arlington Station lies on the UP-NW Line into Chicago and with TIF subsidization a 1200 unit development was recently built near the station.

New York

New York has long been considered a city of rail commuters and for good reason. For decades, the LIRR was the busiest commuter railroad in North America until it was surpassed in 2011 by the 25-year-old Metra-North Railroad. What is incredible about this is that both railroads serve the same city (New York), have annual ridership exceeding 80 million passengers, and this is expected to continue to grow. Major economic development is expected in Nassau and Suffolk including the pedestrian-oriented revitalization project Wyandanch Rising and the Ronkonkoma transit hub. According to Long Island Association President, Kevin Law, these projects will provide the new OD for work and housing needed to give the LIRR the “shot in the arm” the

corridor needs for continued growth. Similar to Metra in Chicago, Metro-North has seen growth in reverse commuting in the communities of White Plains and Stamford, CT.

These are not the only commuter railroads serving New York and certainly not the only ones growing. In 2011, ridership on PATH increased 3.6% to 76.6 million, the highest total the Port Authority has seen since it took over service in 1962. This follows a \$1 billion investment over four years in cars, stations, and signal upgrades. New Jersey Transit operates an expanding rail system into New York with annual ridership of between 60 and 70 million passengers. The Connecticut Shore East Line, operated by Amtrak, saw ridership increase to 400 000 passengers in 2004, a 50% increase from the previous year. This is believed by ConnDOT to be a result of good connections with the expanding Metro-North Railroad.

New Jersey Transit

Expansion of Commuter Rail to New Markets

With increased pressure on the automobile infrastructure rail transit began to expand into the secondary city markets of North America. The growth of transit in these cities can be exemplified by the northwest cities of Vancouver, BC; Portland, OR; and Seattle, WA. Vancouver's Skytrain system was developed in preparation for the 1986 World Fair. The system was expanded through the early 21st century to include an additional two Skytrain lines. The first link of the Portland MAX rail system, the blue line, was originally constructed in 1986 and expanded in 1998. This link is now known as the Blue Line and since its construction three other light rail lines have been built: the Yellow, Red, and Green Lines. Despite having a short 1 mi (1.61 km) downtown monorail since 1962, Seattle adopted rapid transit much later than its northwest neighbours. Seattle's Link Light Rail Tacoma and Central Link lines were completed in 2009. Skytrain currently has daily ridership of approximately 250 000, MAX has daily ridership of approximately 126 000, and Link of 26 200. Vancouver, Portland, and Seattle all developed regional transit authorities similar to that developed in Chicago in 1974. Vancouver's TransLink was created in 1998, Portland was an early adopter and developed Trimet in 1969, and Seattle's Sound Transit has existed since 1996.

Development of rail transit in these relatively new cities has followed an inverse path to those of the older eastern cities. Rapid metropolitan rail was developed by these rail authorities, later followed by the introduction of commuter rail systems. In 1995 TransLink began operation of the Westcoast Express from the outlying communities of Mission, Maple Ridge, and Pitt Meadows to downtown Vancouver. The Westcoast Express is overseen by TransLink, tracks and operation are provided by CP Rail, and rail cars are provided by ViaRail (Canada's equivalent of Amtrak). Operation began in 2009 of Trimet's WES commuter rail system between downtown Portland and the communities of Beaverton and Wilsonville with connection to MAX at Beaverton. Sound Transit began operation of the south Sounder Commuter Rail line in 2000 with stops in Tacoma, Sumner, and Auburn; it introduced a northern line from Everett in 2003. Of the three regions, Seattle has the most extensive commuter rail system, which with the downtown monorail likely explains the delayed introduction of light rail.

An analysis of commuter rail by a Canadian cannot neglect the systems of Montreal and Toronto. The Agence métropolitaine de transport (AMT) was developed by the Quebec government in

1996 to improve the efficiency of public transportation in Greater Montreal. It forms the umbrella organization for transportation planning in the region and operates Montreal's commuter rail and express bus systems. At its inception, AMT operated two commuter rail lines (Deux-Montagnes and Dorion-Rigaud) and has added three additional rail lines since. It has annual ridership of 15 million passengers, which makes it the 6th largest commuter rail system in North America. In Fall 2007 peak-hour ridership reached a new high: of the 21 Montreal-bound trains during morning peak, 50% of passengers on 18 trains had to stand due to a lack of available seats. The Quebec government subsequently purchased 160 new multi-level cars to increase seating by 43 000 daily seats.

The commuter rail system of southern Ontario has changed owners several times, but has always been a public entity. Government of Ontario Transit (GO Transit) was established May 23, 1967 as a commuter rail system through southern Ontario. Responsibility of the system was transferred to the Greater Toronto Services Board in August 1999 under the management of the Toronto Area Transportation Operating Authority (TATOA). This became a crown corporation under the Greater Toronto Transit Authority in January 2002. GO Transit is composed of 7 rail lines with annual ridership of 62 million. It differs from the other Canadian systems in that it runs commuter bus services during off-peak periods.

Commuter rail grew in other regions of North America as well. In July 2006 the New Mexico DOT began operation of the Rail Runner Express into Albuquerque, NM. The rail system has an exceptionally low annual operating cost of \$10 million dollars and at its inception charged no fare. This attracted 200 000 annual trips, but a flat fare of \$2 was introduced and in 2007 a zone system was established. This was followed two months later by the Music City Star between Nashville and Lebanon, TN. The Nashville Regional Transportation Authority (NRTA) has plans for four additional routes by 2020. The Amtrak operated Virginia Railway Express, which in 2004 was only 11 years old, posted double-digit growth over the 4 year period from 2000-2004 and recorded 16,000 weekday trips. Not to be overshadowed by its east coast competition, Metrolinx of the Southern California Regional Rail Authority currently has daily ridership of 36,000 passengers between 53 stations serving 6 counties. The system is managed by the Southern California Regional Rail Authority and operated by Amtrak.

CURRENT COMMUTER RAIL SYSTEM

The present commuter rail system is composed of a variety of operational structures but it is enlightening to also consider the variety of rail users. As would be expected, 87% of commuter rail users are travelling to and from their place of work. Among those unfamiliar with public transit, it is often associated with those too poor to maintain an automobile; this is not true, especially for commuter rail. The top income quintile spends two and a half times as much on public transit as any other income group and 62.5% of commuter rail users have an income greater than \$50 000. Of Metro-North riders, 62.5% are married and it was found 73% of New Jersey Transit users are homeowners. It is interesting to note that three quarters of NICTD commuters are women, although the reasons for this are purely conjecture. Commuter rail users also travel further than other transit users. In 1993, bus and LRT users were found to travel 3.75 mi (6.0 km) on average, whereas commuter rail users travelled an average of 21.5 mi (34.6 km).

System Structures:

Integration with Freight Rail

Before exploring the differences in commuter rail system structures, it is important to examine how these systems are similar. Commuter rail is typically operated within a regional, self-governing, public transit agency. These systems are operated with a board of directors as quasi-private enterprises. With the failure of private rail corporations in the 20th century, the main source of funding of commuter rail is derived from stable sources from a mix of local, state, and federal government. According to APTA all 18 existing system and 28 planned systems run on tracks shared with freight rail.

The greatest determining factor in commuter rail operational structure is its relationship with freight rail, specifically scheduling and dispatching. Freight rail owns approximately 41% of the tracks used by passenger rail, transit agencies 18%, and the remaining 41% is shared ownership track. Priority can partly be dependent on demand; Metro-North in New York and Coaster in San Francisco don't have freight during peak hours to compete with. In contrast, 43% of transit agencies have programs in place wherein freight operators agree not to run trains during peak commuting times in return for a monetary incentive. This arises from the pressure on freight to maintain speeds competitive with trucking, which means on the 82% of track where freight has a stake commuter rail has lower priority. Commuter rail does accrue some benefit from this system. The ROW and infrastructure is largely in place and overhead costs are shared between passenger rail providers and freight operators. This means lower operating costs than subways and buses, not to mention a lower environmental footprint.

Commuter rail operators often coordinate schedules with bus and rapid train operators, which would be exceptionally complex if passenger rail remained under private freight rail ownership. Under the current system, these commuter rail operators are able to easily integrate their schedules and even stations with rapid transit and bus operators. This is largely due to these systems existing under common regional transit umbrella organizations. The increased integration and ease of use afforded is likely a major contributing factor to the increased ridership of the past 50 years. Breaking commuter rail into locally managed systems affords easy management of fares, finance allocation, and standard service practises.

Despite recent structural changes, North America lags behind European and Asian markets in passenger rail efficiency and ridership. In contrast, the freight system of North America has always been the best in the world in terms of efficiency, innovation, and profitability. This brings one to wonder what upgrades in the North American system are necessary to bring the system to the level of service other markets have enjoyed for several decades.

Comparison with Other Regions – Daron Acemoglu and Institutional Differences

- History section looks good for length and content
- Provide more detailed analysis of institutional differences
- Future growth prospects. Why should it occur? Changes in the demanded mode, climate change, building up rather than out, distances/times remain longer than inner city subway so comfort and services should be higher

In comparing the development of commuter rail in North America to other markets, we will take as a basis the work of Daron Acemoglu and James Robinson on institutional structures. Acemoglu and Robinson have argued that political and economic institutions have been a major driver of long-run growth and inequality. A key example they cite is the differential development of Mexico and the United States following European colonization - summarized briefly below for illustration of its application to the present analysis. Upon arrival in Mexico, Europeans found a dense indigenous population who could be subjugated into performing manual labour for the development of colonies. Following upheavals in Spain in the early 19th century, Mexican settlers emancipated from Spanish rule in order to maintain unequal distributions of wealth and strong control over the population. British settlers of North America faced a very different landscape as indigenous populations were low and settlers were forced to perform much of the work independently. All settlers were given land, for which they were given sole responsibility over maintenance and cultivation. Independence from British rule therefore occurred for the purposes of insuring independent control of land rights and autonomy in government.

We can apply a similar historical logic to analysis the reason for differences in the development of commuter rail in North America and Europe, as well as the more recent developments in China. At the time when passenger rail was developing in Europe, the United States remained a sparsely populated nation. Following the 1880 census, Francis Walker and Henry Gannett published a study entitled “Movements of Population – 1790 to 1880” in which they outline the westward expansion of the population. They document the population density within each census division over the first ten censuses of the country. It quickly becomes obvious examining these maps that during a time when passenger rail was exploding in Europe, the United States lacked the density for such considerations – except in small pockets along the north-eastern coast and what is now San Francisco. Railroads built during this time were developed for the movement of freight across the great expanse of the central plains. By the time the United States had developed sufficient population densities to warrant commuter rail investment, rail infrastructure was firmly in the hands private companies who built the system out to meet the needs of goods movement during the process of settlement.

A critical factor in comparing the North American and European markets is the difference in the period and manner in which they developed. When rail was introduced as a means of passenger transport America was still a burgeoning nation. The American Civil War did not occur until the 1860s and the majority of the continent was an underdeveloped frontier. In contrast, the European continent had been densely populated for several centuries. North America remains a sparsely populated continent in contrast to Europe. The 1958 introduction of airline jets therefore had a measurably greater impact on the North American inter-city transport market. Throughout these changes the freight rail system of North America remained an effective method of moving goods and therefore great improvements were not made in this system. Freight rail owners of passenger rail services in North America saw no need to sink funding into improvements into commuter rail upgrades. Europe did not have this interconnection between their freight and passenger markets and with their shorter inter-city distances could aggressively pursue high speed rail as an alternative to air travel. With systems already largely in place for movement of freight, European markets could more easily introduce dedicated passenger rail lines.

European passenger rail faced another problem. A nationally owned passenger rail corporation would be created and given ownership of the tracks, rail cars, and operation of the entire system. This allowed for complete control of the rail market throughout the country. Recent efforts to address this issue are largely focused on the unbundling of services. This is a concept now mandated in the European Union. It involves the the separation of train control from ROW possession. Track ownership, as is the case in nearly all infrastructure, is a natural monopoly. Separating the potentially competitive market of operation from track ownership allows for market competition to develop.

- In Japan, specifically Tokyo, the system has been largely privatized operators for decades with Japan Rail operating six vertically integrated operators separated geographically
- Railways have built department stores/hotels near principal stations and increase revenues
 - Set fares just high enough to recover operating costs since retail ventures need rail to compete with other retail districts
 - Trains built with no seats running every 2 ½ minutes with people crushed in would seem unsustainable anywhere else where automobile viable (*important to remember*)
 - JR companies privatized when profitable (feds sold shares)
 - 3 JR companies still subsidized
 -

A concept now mandated in the European Union, but yet to catch on

- “Unbundling” process is separating train control from ROW possession, now mandated in EU
 - This separates ROW (monopoly) from potentially competitive market of operations
 - Separates based on function rather than considering it as asset
 - **Infrastructure Maintenance and Construction** includes all activities that support the railway’s fixed infrastructure but does not involve operating trains or facilities. This typically includes track, signal, and structural maintenance, and engineering.
 - **Service Operations** includes all carrier core functions, typically encompassing service design, scheduling, crewing, supervision, dispatching, cleaning, capital planning, marketing, and revenue collection.
 - **Vehicle Maintenance and Procurement** supports the rail vehicles, but excludes operating them. Typically, this includes heavy maintenance, rehabilitation, procurement, engineering, and design.
- US and Canada have not done this, but rather separated from freight through operating agreements and track ownership changes
- Best system in NA is to have railroad retain control of core functions: service/scheduling, crewing, dispatching, capital planning, and marketing
 - Maintenance and operations may be contracted out

- System in Vancouver with SkyTrain where TransLink plans and BCRTC operates two train lines in Vancouver and SNC Lavalin the third
- West Coast express operated by CP Rail, tracks owned by CPR, and carriages/locomotives maintained by ViaRail
- Key is that agency maintains overall control and oversight
- Purchase of Service contract means commuter agency pays a host railroad to run trains on mutually agreed upon schedule with host providing operating crews (usually Amtrak or freight company) The case with Metra BNSF and UP lines in Chicago and MARC in Washington/Baltimore
- Trackage rights agreement is when agency pays for privilege of running trains on host railroad's tracks with agency employees including Metra's SW and NC services in Chicago and NJT and SEPTA on Amtrak's NE Corridor
- Since 1970s several agencies have purchased lines from freight and freight pays. LIRR, Chicago Rock Isl. District and several in Boston, NJ, and Philly
- Another system is the Mass. Lines owned by MBTA and dispatched by Amtrak (between Boston and RI state line) because MBTA considers intercity service so important
- Chicago has developed Chicago Transportation Coordination Office to allow supervisors from all operators to be on hand in Metra dispatching center. Has reduced delays due to freight interference by 50%
- EU has mandated infrastructure separation for Europe's national railways, which historically owned tracks and operated trains throughout country
 - Infrastructure separation has faced challenges in Europe (Netherlands has seen reliability decline since 2001/Sweden have faced issues and Germany cautiously pursuing)
 - Need to work on maximizing value rather than minimizing cost (*always the problem with privatizing*)

Economic Investments

- In 2009, \$57.1b in revenue of which \$38.8b was for agency operations and \$18.2b for capital programs
 - Revenue includes directly generated revenues (fares, taxes generated by agency, advertising, parking, etc.), local revenue from taxes, state revenue from taxes/fees, and federal from government funds
 - 33% comes from state/federal typically
- Local/regional sales taxes dedicated to transit have grown 275% over past 15 years
- Federal funding in form of Federal Transit Administration programs but funds can be appropriated from Federal Highways Administration programs as well
 - TIGERS (Transportation investment generating economic recovery) program has provided \$225 million from FY 2009 to FY 2011
 - Including all U.S. DOT sources, transit received \$12.2 billion in FY 2010
 - New Starts Program funds new capacity projects and has invested \$1.5b in 2007-2011
- In 2009 feds gave 42% for capital investment, 14% state, and 44% local/transit sources
 - Shows feds handle larger share of capital but most operating must be funded by local and direct
- He thinks part of funding issue is lack of federal dedicated funding scheme

- Caused by resistance of rural regions not wanting money going to urban transit systems
- Road builders considered strongest lobbyists in NA by many
 - As car efficiency standards pushed up, set fee they get per gallon sold goes down so fewer gallons sold mean revenue for transit goes down. Greater struggle for public transit to fight in smaller revenue pool
 - Points to environmental benefits as area needing more focus
- Per capita expenditure lower on rail than roads (\$6.2m/km to double track of Tri-rail line, but \$31m/km to add lane in recent Florida road project)
- Private-public partnerships in regard to sale of land near rail for retail big help
- Increased focus on mixed land-use has contributed to increased rail use on Tri-rail and most other systems
- Airlines suffering in recent years contributes to rail growth
- Divergence of short/long-run elasticities can help explain cycles of falling public transit ridership, fare increases, and service elimination
- Found long-run response to price and service changes 2.6X larger than short-run responses
- Twelve year \$6.5b project to improve transit in Denver-Boulder/Aurora region
- RRIF program implemented in 1998 to provide funding for rehabilitation of railway infrastructure
- Fiscal year 2004-2009 MBTA built \$325m North Station “superstation” which connects two heavy rail lines (Green line and Orange) and five commuter rail lines underground
 - Located near Boston Garden
 - MBTA had 468 route mile rail system and 798 000 daily boardings
- Budget included \$1.7b from 04-09 capital program but article was written in 2004
 - *Has the additional money been provided through ARRA?*
 - *Yes! Including the \$9m Fitchburg Commuter Rail Line project and \$319m total*
 - *Project includes doubling of tracks to create 12% improvement in speed*

MISCONCEPTIONS AND MISINFORMATION

Roads have always been public and have never operated at a profit.

- Amtrak had 2.31% of intercity travel market in 1995 but 45% of New York-Washington segment of Northeast corridor business travel

This was before introduction of higher speed trains in 1999

- Traditional measure of strength of passenger rail marketplace is number of railcars acquired
 - Railway Age’s survey showed 2012 commuter rail purchases of 369 cars and total railcar expenditures of \$3b, and this on the 15th day of the year
 - Have a backlog of 4502 new/rebuilds nationwide, which is substantially higher than pre-recession levels

Looking at recession years articles (~2008-2010) gave impression industry was dropping, but recent data shows this is not true

- With federal government facing pressure to reduce taxes/spending agencies are feeling pressure
 - NY MTA reduced train operations system-wide in 2011 to meet budget shortfalls and gave \$12.5b budget
 - Allowed construction of new commuter/subway systems for first time in 60 years!!
- East side access project will give direct access to grand central/penn station and first expansion of this system in over 100 years
 - Expected completion is 2019☺
- Rail receiving a greater share of funding now (especially under ObamaRail)
- Since roads, air, inland water infrastructure mostly in public domain, these organizations were free from investment in immobile capital assets. Maintenance costs much larger than fuel surcharges cover. Users enjoy flexible cost burden of “pay only or mostly as you operate” rather than “pay as you own, whether you operate or not”

Compared with Bus Only cities, Large Rail cities have:

- • 400% higher per capita transit ridership (589 versus 118 annual passenger-miles).
- • 887% higher the transit commute mode split (13.4% versus 2.7%).
- • 36% lower per capita traffic fatalities (7.5 versus 11.7 deaths per 100,000 residents).
- • 14% lower per capita consumer transportation expenditures (\$448 average annual savings), despite residents’ higher incomes.
- • 19% smaller portion of household budgets devoted to transport (12.0% versus 14.9%).
- • 21% lower per capita motor vehicle mileage (1,958 fewer annual miles).
- • 33% lower transit operating costs per passenger-mile (42¢ versus 63¢).
- • 58% higher transit service cost recovery (38% versus 24%).

Many of these benefits result from rail’s ability to create more accessible land use patterns and more diverse transport systems, which reduce per capita vehicle ownership and mileage. These additional benefits should be considered when evaluating rail transit. Rail transit does have a cost. Rail transit requires about \$12.5 billion annually in public subsidy, which averages about \$90 additional dollars annually per rail transit city resident compared with Bus Only cities. These extra costs are offset several times over by economic benefits, including \$19.4 billion in congestion costs savings, \$8.0 billion in roadway cost savings, \$12.1 billion in parking cost savings, \$22.6 billion in consumer cost saving, and \$5.6 billion in reduced crash damages.

- Even in 1990s it was identified that highways receiving substantially more funding and priority than other transportation sources and that land use was ineffective
- In 97 US gov. appropriated 20.3b for hwys but only 4.63b for rail
 - People did not see subsidy of hwys as more hidden than cost of riding train and strength of auto lobby vs. rail lobby means people constantly see rail costs brought forward by auto lobby
- Illinois DOT estimates they would have to add 33 new highway lanes without Metra
 - Nearly impossible to do giving land constraints
- Designed with 40 to 50 year horizon. *This long term planning was virtually non-existent or highly inaccurate until recent decades. This has allowed for more effective planning of system improvements/expansions.*

- *Data skewed because looking at all traffic. Train doing much better in commuter rail (work to home) but could do better in inter-city if speed/comfort increased*
 - *David Lehlbach at Oliver Wyman Rail Planning*

HIGH SPEED RAIL

- Average vehicle speed of 31 mph
- 11 corridors designated under 1991 Intermodal Surface Transportation Efficiency Act and Transportation Equity Act for the 21st Century (1998)
 - Includes links into Canada at Vancouver and Montreal
 - *Not built but important to note that the corridors have been designated and land would largely be in place*
- Amtrak trip in early 2012 between Chicago and Kalamazoo, Michigan reached top speed of 110 mph (177 kph), fastest speed outside the north-east corridor
- Director of passenger and freight programs for Federal Railroad Administration says “sometimes the key to going fast is not going slow”
 - Most of ObamaRail funding going towards increasing top speeds from 79 mph to 110 mph using wireless safety tech, in Illinois 200 miles of track rebuilt between Chicago and St. Louis with sturdier concrete ties
 - In upstate NY, NC, Washington state second tracks are being added to alleviate bottlenecks with freight trains
 - Eventually will translate to faster overall speeds so train faster than automobile
- APTA predicts total intercity/high speed rail passenger trips will increase from current 30m to more than 200m by 2040
- Foreign interests from China (China Railway Construction Corporation), who are building an extensive network there have shown interest in investing in California HSR system
 - *A marked shift in US infrastructure investment and overall investment shifts worldwide*
 - Japanese have also shown interest in investing with loans

American Recovery and Reinvestment Act of 2009

- Outlines grants given to FRA for creation of HSR intercity systems
- Gov. Ed Rendell (Pennsylvania) stated “The only way that high speed rail really works is with dedicated tracks. It can’t share tracks with freight rail, it can’t share tracks with commuter rail...If China can spend \$300b in ten years, I believe we can spend \$100b and take 30 years”
-

ObamaRail

- High speed rail initiative – many call it ObamaRail- turned out to be less than advertised but 700 mi system in California going ahead with speeds over 200mph
 - Will connect san diego and LA with san fran and Sacramento
 - Gov. Jerry Brown supporter, despite critics, which is large factor in continuation

- Amtrak has come with 30 year, \$117b, plan to have high speed rail in NE corridor using Acela Express cars
 - Amtrak had highest ridership in history in 2011 of 30.2 million pass
 - Not largest issue facing Amtrak as it ran 1225 trains in 30 day period, of which 51% were on time
 - Some debate over how much is fault of Amtrak and of impatient freight operators
- Hearing on California's High-Speed Rail Plan: Skyrocketing Costs & Project Concerns
- Two significant congressional legislative motions in relation to this:
 - Rep. Devin Nunes (R-CA) the San Joaquin Valley Transportation Enhancement Act of 2011 would allow State of Cali. To redirect federal HSR funding to finance roadway improvements along state route 99
 - Rep Kevin McCarthy (R-CA) Freeze availability of federal funding for HSR in Cali. Until September 30, 2012 and re-evaluate program.
 - They found 59% of voters would not approve an additional bond package if it were put to a vote and 31% would approve
 - American Recovery and Reinvestment Act (ARRA) designated \$48b for new and existing DOT programs
 - FRA historically had mandate of safety, but in 2008 was expanded to include HSR implementation
 - Only 1% of funding had been spent as of March 2011 and \$5.4b of \$8b for HSR given. Gives opportunity for re-evaluation
 - OST's TIGER allocated \$1.5b to 51 recipients and as of April 1, 2011 only 3.6% had been spent but it was on track to fully obligate funding by September 30, 2011
 - Northeast region constitutes 260m commuter/intercity trips per year
 - And overwhelming, the response came back as, "No, we don't want it to be less than that," and it perplexed them. So they looked at it even closer. Well, why, exactly? And the average commuter said, "An hour and 15 minutes gives me time to get on the train, get my coffee, set up my computer, and I get about an hour's work done. If you have 55 minutes, I get my coffee, I sit at my computer, I got maybe 40, 35 minutes." So they rejected it. **Congressman Bill Shuster**
 - Found HSR funding of 2009 not typically for HSR, but for improvements of systems to increase speed/efficiency
 - In 2005 Association of Train Operating Companies predicted 1/3 increase in next decade (2015)
 - Predicted capacity of rail would run out by 2011 without further investment (*ObamaRail good?!*)

Florida

- \$7.5b of stimulus package in US went to transit, causing operators to order new trains and invest in upgrading infrastructure
- Additional \$8b pledged to developing high speed rail network in US
- New Jersey transit announced March 2, 2010 forced to cut 200 jobs to address \$300m budget gap in 2010/2011. San Francisco's "Muni" faced similar problem with \$56.4m deficit

- Tri-Rail executive director, Joseph Giulietti, stated in 2010 International rail journal article that south florida demand is evident because no more room to build roads and rail only real solution to regions congestion issues
 - Started as temporary measure while I-95/Florida Turnpike built in 1989, but by 1998 the 108km system was expanded to 114km and tracks doubled in 2006
- 2003, South Florida Regional Transportation Authority, set up to allow 3 counties to work together as single entity to create multi-modal solution
- Ridership increased to 14000 in 2009 from 13000 in 2008
 - Many people moving into S Florida from SA and Europe who expect mass transit systems (Giulietti)
- Florida working with railroad giant CSX Transportation to build railroad through central Florida to Orlando
 - Working with CSX to improve freight at same time including new CSX logistics center
 - State paid \$491m for use of CSC A-Line ROW and giving \$318m to CSX for improvement of S-Line for freight traffic moved from A-Line
- Expect 1500-2000 an hour or 4000-5000 daily, by 2030 expect 11000 passengers per day

FUTURE OF COMMUTER RAIL IN NORTH AMERICA

- Changes in land-use planning, public perception, demand for environmental alternatives, growing congestion, lack of functionality of hwys
- Eliminates 10-30% CO2 emissions of household (CO2 pricing in future)
- Property values found to increase by 45% for apartments and double for many office building according to Transit Cooperative Research Program study
- Saves \$9000/year, which is crucial to middle class families and with rising fuel prices savings will only grow
- After the economy collapsed in 2008, reforms were more aimed at ensuring the health of banks and Wall Street than the preservation of intact ecosystems, human communities, and Main Street”
- As of November 2011, driving had fallen to 1999 levels (adjusting for population growth)
 - Even in economic growth after recession, sustained decline in driving during period of economic growth is unprecedented in 41 year period analyzed by Doug Short of Advisor Perspectives
- Center for Neighborhood Technology reported in March, 2012 that households had seen transportation costs double since 2000 in 29 metro areas
- Continued growth in overall transit with decline in auto ownership among youth (BBC article)
- Texas A&M Transportation Institute ranks Chicago #3 in nation for congestion
 - 58 hours/year sitting in traffic, 150m gallons fuel costing each traveler approx. \$1000 annually sitting in traffic
- Chicago Metropolis 2020 estimates this will increase to 160 hours by 2020

CONCLUSION!!!

- President of policy for American Public Transportation Authority in DC says “state of rail is growing and is increasingly appealing to cities across the country”

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