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10 Years in
Infrastructure

Toll Roads

10 Years in Toll Roads

A Decade That Underscored Resilience

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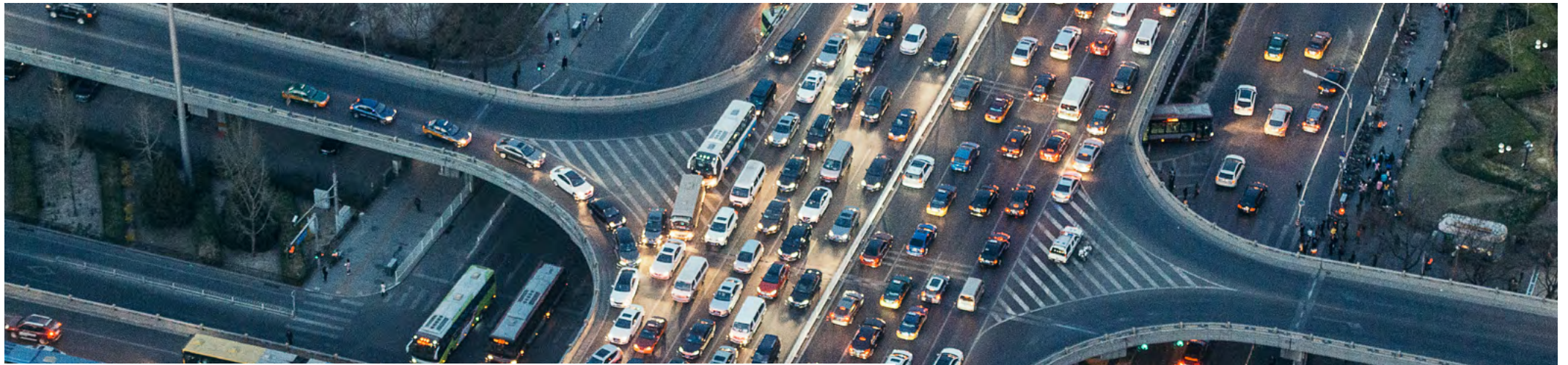
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Resilient Assets: Toll roads have proven relatively stable assets mainly due to dependence on commuter traffic. Their economic performance through the 2007 global financial crisis (GFC), the worst economic crisis since the Great Depression and a valuable gauge of the ability to withstand a stress case, remained strongly correlated to the economy. However, they also demonstrated strong ability to recover using available pricing flexibility. Smaller networks, standalone assets and those exposed to higher levels of freight and leisure traffic proved more vulnerable to economic cycles. Price elasticity was lower than expected. These results validate concepts in Fitch Ratings’ toll-road rating criteria.

Lessons Learned: The past 10 years have reinforced decades of similar experience that forecasting traffic volumes on greenfield toll roads is still a challenge. Individual asset performance can vary significantly and exposure to competition remains a material risk. Large and urban networks proved most resilient. Pricing flexibility, even for weaker assets, has been greater than expected where legal rate-making authority existed. High leverage, aggressive debt structures and political risk are significant risks to investors.

What’s Next: Congestion is a major concern in many urban centers and restrictions on car usage will continue to spread globally. Advances in technology, the expansion of zero-emission vehicles and use of autonomous vehicles are likely to alter the efficiency of vehicle usage and roadway capacity and the way people and goods travel. Rail options will increase as the challenge of the “last mile” – the final leg of the transportation supply chain – which has been the Achilles’ heel of passenger rail, is more easily and cost-effectively solved with more accessible and flexible connections. Investment in modern infrastructure is now critical to incentivize changes in travel behavior that are needed to maximize the social and economic benefits of technological advances. Political will and long-term planning, which may remain elusive, are also key to garnering those benefits.



What Happened - 2007-2017



Growing Cities and Middle Class: The pace of urban population growth outstripped global population growth between 2006 and 2016 (2.2%¹ versus 1.2%¹). The middle-income segment grew 12% over this period, while urban populations expanded by almost 25% – equating to more than 750 million people. These trends are likely to continue in the near to medium term because 80% of the world's population is in non-OECD (largely emerging and less-developed) countries, which have high population growth rates.

Exponential Car Ownership Rates: One of the consequences of these trends is increased mobility, particularly personal transportation. Global car ownership² increased by 44% in 2005-2015, while it has more than doubled in countries excluding the US, Western Europe and Japan, during the period.

US Performance Resilient: The economic impact of the GFC, which was centered in the US, highlighted the exposure to the economy but also the recovery potential of toll-road assets. In the US, the peak-to-trough median decline³ was 5.9% for large networks and more than double at 13.3% for small networks. Revenue from large networks grew by 12.5% over the same period, emphasizing their relative strength, while income from small networks was relatively stable, with rate increases offsetting larger declines in volume.

Europe Survives Double Dip: Fitch-rated European toll roads suffered only modestly in 2008-2009 as the GFC did not emanate from Europe, recording a traffic volume drop of 4% due to the prevalence of light vehicle (LV) traffic and fairly resilient private consumption. The sovereign crisis in 2011-2013 took a heavier toll on several European toll-road issuers, with volumes falling 8% because of a slump in domestic consumption following austerity measures in southern EU countries. Traffic volumes have since recovered, bolstered by a rebound in consumption and industrial production, but 2017 traffic is still 2% below the 2007 peak.

Emerging World Advances: The high rates of traffic growth in emerging-market toll roads slowed during the GFC. Mexico was most affected by its proximity to and economic ties with the US, and experienced a maximum decline of 6.7% on roads with the greatest exposure to US traffic. All of them have recovered fully.

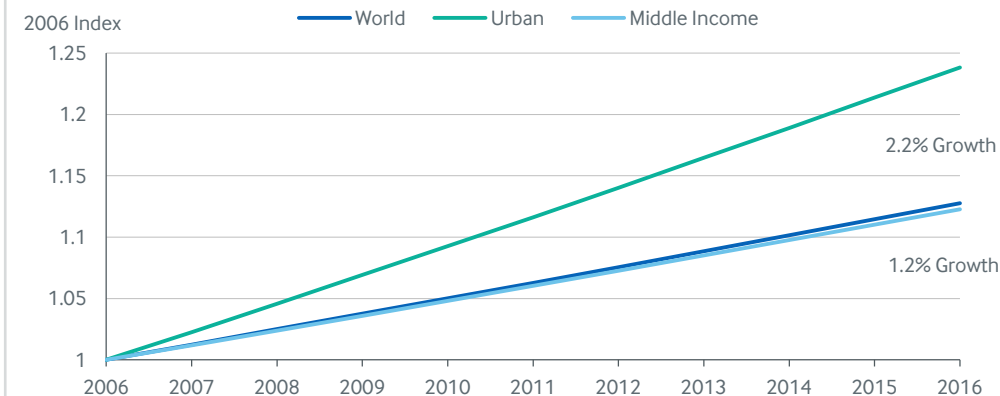
In Brazil, traffic growth on the Brazilian Association of Highway Concessionaires (ABCR) Index slowed to 2.2% in 2009 from more than 6% in 2007-2008 and then rebounded to almost 8%. The ABCR is an index of Brazilian toll-road concessionaires that provides a broad representation of performance.

Brazil has since been affected by a period of domestic economic and subsequent political turmoil, whereby populist policies spurred a fiscal crisis that was exacerbated by a national corruption scandal. The economy declined⁴ by 3.8% in 2015 and by 3.6% in 2016; ABCR traffic fell by 1.9% and 3.6%, respectively.

In China, the Guangzhou Northern Second Ring Expressway (GNSR) in Guangdong Province saw double-digit volume growth throughout the GFC.

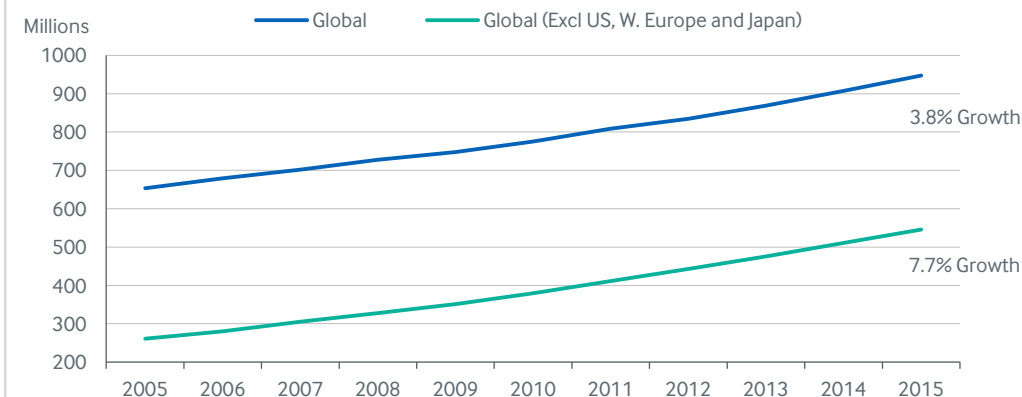
Road Infrastructure Development: The infrastructure base in the developed world is aging and needs investment, especially in the US and parts of Western Europe. High traffic demand coupled with even only slow population growth is putting transport systems under strain. Los Angeles is the city in the world where the most hours are spent in congestion according to the INRIX Global Traffic Scorecard⁵ (2017). Five US cities, including LA, are in the top 10 most-congested conurbations, along with two in Europe (London and Paris). The developing world, by contrast, is faced with infrastructure that is unable to support the rapid growth in population and travel, and while investment there is increasing, it is unable to meet demand. While the developed world dominates the top 10 in the INRIX Global Traffic Scorecard, 11 of the top 25 cities are in emerging markets, and

Global Population



Source: World Bank (Databank), Fitch

Global Car Ownership



Source: International Organization of Motor Vehicle Manufacturers

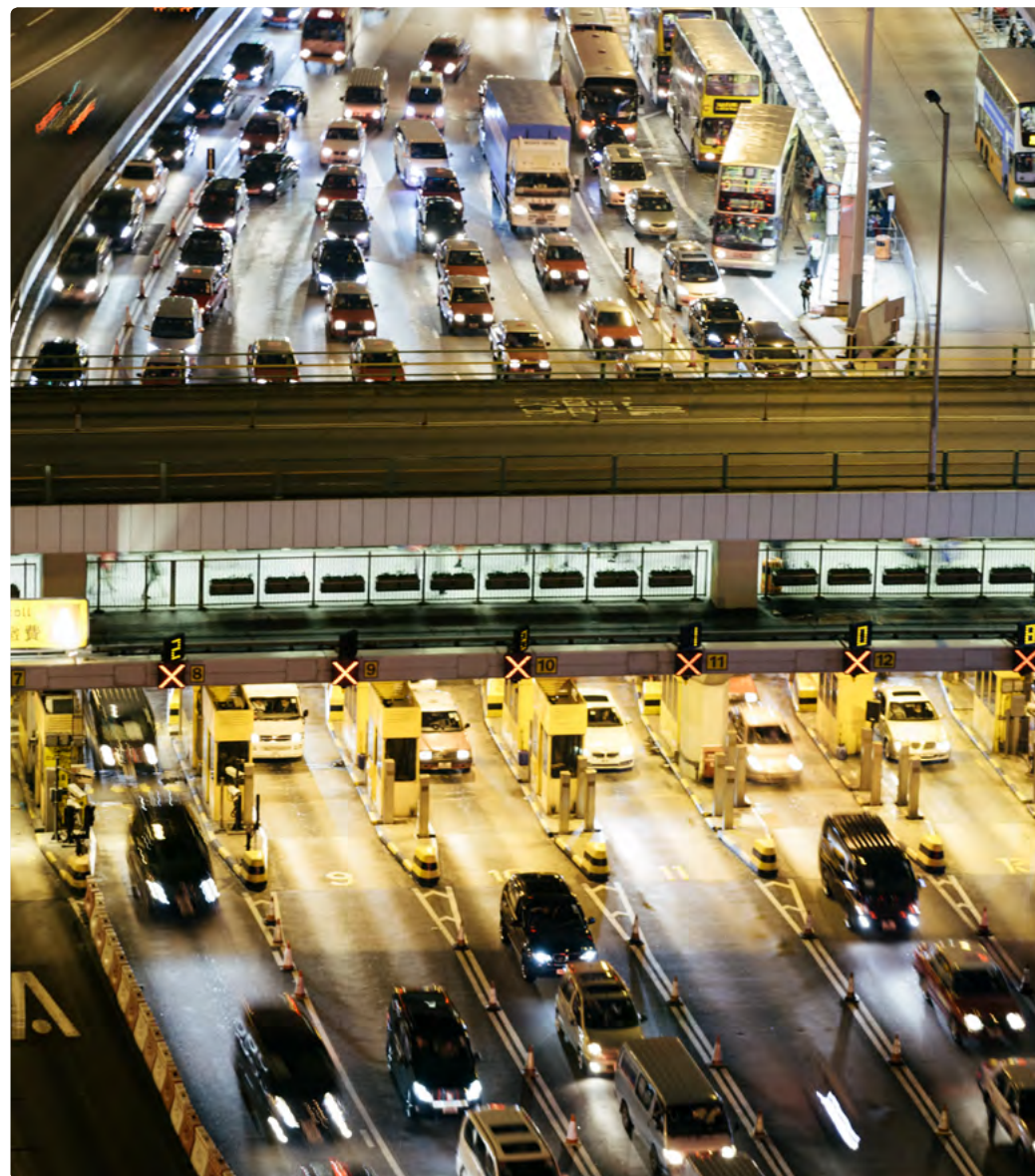
these represent the future of congestion even as they experience large-scale roadway growth, with China and India accounting for about half of this. An analysis by the International Energy Agency⁶ in 2013 said “global road infrastructure is expected to increase by roughly 60% above 2010 levels by 2050 – an increase of roughly 14 million paved lane-km by 2030 and an additional 11 million paved lane-km by 2050.”

Capital Investment Challenges: Infrastructure upgrades and investment are expensive. The developed world has to contend with existing developments, increasing land use and environmental controls, coupled with limited public appetite to shoulder the significant cost without any perceived visible gain. In the developing world, governments are willing to invest in infrastructure but need to attract foreign capital. The burden on a concentrated wealth and tax base that already shoulders considerable social investment constrains the ability to invest at the required pace.

Toll Roads Provide a Solution: The ability of highways, bridges and tunnels to pay for themselves in large part with user fees has therefore become attractive. Toll facilities have been built and expanded in parts of the developed world as a way to rebuild infrastructure and relieve congestion. Developing-world countries have embraced tolls to finance much-needed highway infrastructure and are more willing to build new toll roads than the developed world is to convert an existing road. Most of the new toll roads are financed on a standalone basis using a public-private partnership concession model.

Politics and Taxpayer Distrust: Governments tend to be involved in delivering road infrastructure projects given their size, cost and complexity, but this also means that political whims influence decision-making, route selection, procurement, design and implementation, and legal and commercial deal structure. The short-term nature of an election cycle is not conducive to good, long-term decision making, be it in the developed or the developing world. Poor decisions do have long-term repercussions and reinforce populations’ distrust of government. This affects private equity and debt investors, but mostly taxpayers.

Growing Investor Interest: International equity and debt investor interest in infrastructure (including toll-road projects) in developed and developing markets has grown over the past decade, despite complex political and legal environments in most jurisdictions. Market reports indicate that there is over USD2 trillion in equity and significantly more in debt seeking investments. Investors are attracted by the limited long-term downside risk of core infrastructure investments and the prospect of stable, inflation-linked returns. Many new investors and funds have entered the market, including local emerging market investors. While still being pursued, greenfield toll roads remain a challenge for most investors. Other factors that are keeping investor interest despite intense competition for the limited supply of investments are the promises from governments of large infrastructure plans and the extended period of very low risk-free interest rates that have kept borrowing costs relatively low.



Source:

1 The World Bank (databank)

2 International Organization of Motor Vehicle Manufacturers

3 Fitch

4 International Monetary Fund

5 INRIX Global Traffic Scorecard

6 International Energy Agency, Global Land Transport Infrastructure Requirements (Page 16)

Historical Context

Changing Toll-Road Development: Most roads tended to be government-funded and built until around 2000, and a small sub-set of these was tolled. Over the past 20 years, however, governments increasingly have chosen to transfer the development and operating rights of established and new toll roads to the private sector for a defined period under public-private partnerships. In some cases, there have been near outright sales, such as the Chicago Skyway in the US and 407 ETR in Toronto, Canada. Toll roads built by the private sector may have received some public subsidy to facilitate their viability but are tolled to recoup the cost of construction. This has not always been successful, however, which has resulted in some large defaults or distressed debt exchanges on the initial project-financed debt. For example, the original 1950s financing of the Chicago Skyway, which was the landmark USD1.8 billion transaction in 2004 that re-ignited the PPP discussion in the US, was also a project in default on its original debt. Examples from the past two decades include the original financings of: the Dulles Greenway near Washington, D.C.; the M6 near Birmingham, UK; the M1/M15 in Hungary; a number of the Spanish “radiales” (radial roads) around Madrid; and the Cross City Link and Lane Cove tunnel in Sydney, Australia.

Government Buy Backs: Some toll roads have been bought back by governments, either because the private sector was struggling to support their obligations – such as the South Bay Expressway near San Diego, CA, or the Spanish radial roads – or in the public interest, like the successful SR 91 Express Lanes near Los Angeles, CA that were bought by the Orange County Transportation Authority due to public concern over rapidly rising toll rates.

Toll Roads Can Be Lucrative: Toll roads can be very lucrative, which explains the private sector’s interest in their demand risk-based transactions, despite some large failures. This is especially the case when the private sector has the full flexibility to charge

the market rate. Governments are now aware of this factor and in many cases have chosen to limit toll-rate price growth to inflation. Some governments have even come to regret their decision to provide full flexibility, as with the 407 ETR in Toronto.

Alternative Toll-Road Structures: Concern about toll rate growth has caused some governments to alter their funding models with the private sector. With availability payments, the government transfers the rights to finance, build, operate and maintain the road to a private operator in return for streams of payments for each of these activities, provided the asset is available for use at prescribed operating performance standards. Under the shadow toll model, the government creates bands of payments tied to the volume of traffic on the road. The bands are designed to cushion the forecasting risk and limit the upside benefit to the private party if traffic volumes significantly exceed projections. The government may choose to charge the user for the usage of these assets but takes that risk on its own balance sheet. These approaches increase the likelihood of stable concession arrangements while giving the public sector control over the political aspects of the overall arrangement.

Toll Automation In; Political Risk Not Out: Electronic tolls are easier for the road user, as they avoid handing cash to a booth attendant, and for the operator, which can collect payments more efficiently, increase tolls in increments, help to reduce congestion, increase safety and more readily implement operational improvements by incentivizing driver behavior through time-of-day pricing. Toll collections have been becoming more electronic since 2000. This change is making users less aware of what toll they are being charged, although aggressive expansion of toll roads has caused pushback against tolling. Texas, which went full-out for toll roads for more than a decade, has now established a near moratorium on their construction as voter anger peaked due to the increased cost of travel in major urban centers compared with other parts of the state and the US.



Performance – Macroeconomic Conditions

For Fitch's rated portfolio, the past decade provides an illustration of the strong link between toll-road assets and macroeconomic factors, including GDP, internal consumption and unemployment, as commerce and related jobs create traffic on most toll roads worldwide. The strength of the correlation by region and vehicle type varies, so the selected indicator varies accordingly.

In Europe, the correlation with private consumption is visible on large toll-road networks, such as Atlantia in Italy and Brisa in Portugal, which are broadly representative of their country of operation. Traffic flows during the financial crisis differed substantially between these networks, reflecting national economic conditions and competitive pressures. In most cases, traffic volumes held up quite well at the onset of the GFC as private consumption was quite resilient given the context of low-to-moderate household debt. This was in sharp contrast to the US household debt picture. The subsequent sovereign debt crisis had a greater impact on Europe. Macroeconomic weakness in Portugal and Spain affected Brisa and Abertis, whose road networks were competing with toll-free alternatives. Italian operators experienced a traffic slump between 2012 and 2013 because of a fall in internal demand in response to austerity measures. In France, APRR traffic was more stable than its neighbours because the economic downturn there was less pronounced and because the network is exposed to less competition.

Brazil's economy was less exposed to the effects of the GFC largely because of its more closed nature. Traffic volume grew through the 2000s and the GFC until 2014, when it hit an inflexion point. In order to reduce the impact of the GFC on the economy, the government implemented policies to cut taxes on consumer goods, lower interest rates and loosen credit standards, which led to continued GDP growth in the later years. These policies, however, resulted in higher consumer debt leading to the recent national fiscal and economic crisis. Approximately 70% of the country's roads are in the more populous and economically robust southeast, which accounts for 54% of Brazilian GDP.

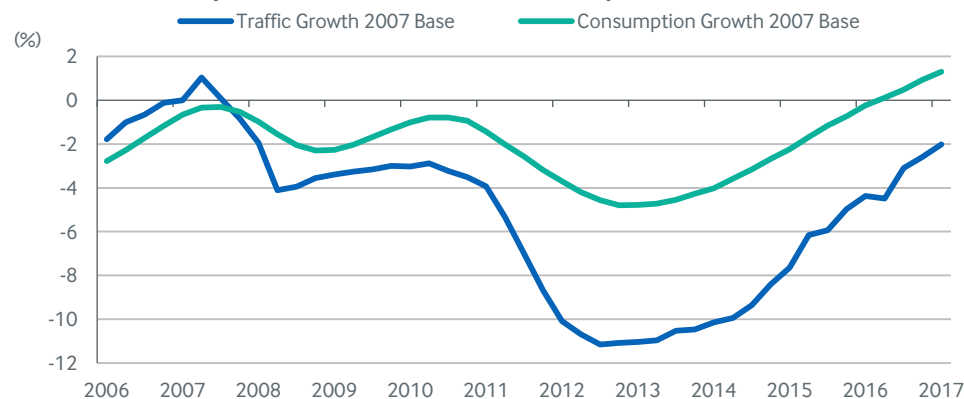
Appendix A provides a more detailed view across major global regions. Appendix B provides a perspective on the new sub-asset class of Managed Lanes that is subject to greater volatility than traditional toll roads.

Validity of the GDP Relationship

The correlation between toll-road performance and GDP is looser when it comes to individual assets, because local factors and project-specific circumstances have greater influence, so these portfolio conclusions need to be tailored to each asset.

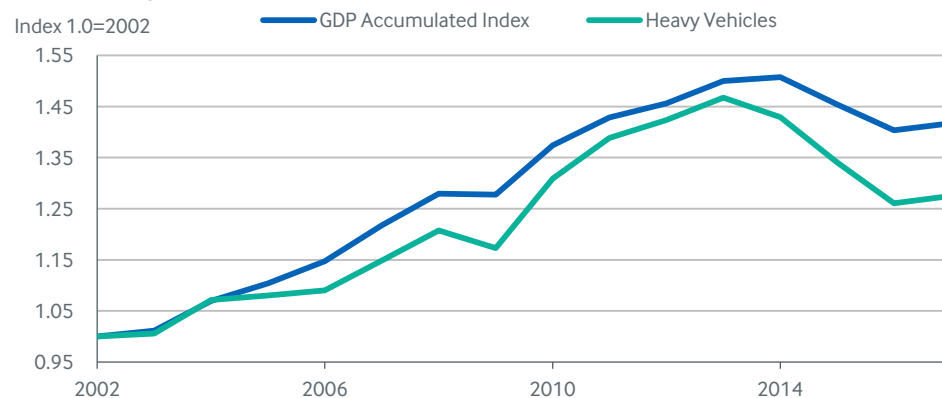
The performance of an asset will vary considerably between toll roads and even for the same asset over time – depending on the regional and local economy, asset type, local network conditions and competition, the frequency and level of toll-rate increases, and government interventions.

Fitch-Rated European Toll-Road Traffic vs Consumption



Source: Issuers, Eurostat, Fitch

Brazil Heavy Vehicles vs GDP



Source: Associação Brasileira de Concessionárias de Rodovias

Performance – Large Versus Small Networks

US

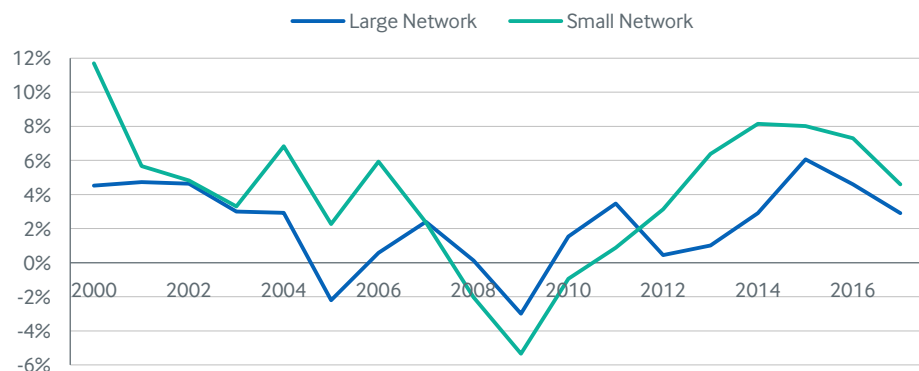
Traffic declines during the 10-year period on large, diversified networks (turnpikes, expressway systems and large bridge systems) were less severe compared to small networks (which include standalone facilities.) The latter are typically less diversified and more exposed to the dynamics of a narrower service area with a limited set of industries and jobs, among other things. Large networks' peak-to-trough decline was 5.9% compared with 13.3% for small networks. Furthermore, large networks recovered from the GFC faster and stronger.

Large networks also experienced stronger median traffic growth: 1.7% CAGR versus 0.4% CAGR over the period.

	Traffic Growth 2007-2017 CAGR
Large Networks Median	1.7%
Small Networks Median	0.4%

Source: Fitch

Large vs Small US Networks



Source: Issuers, Fitch

EMEA

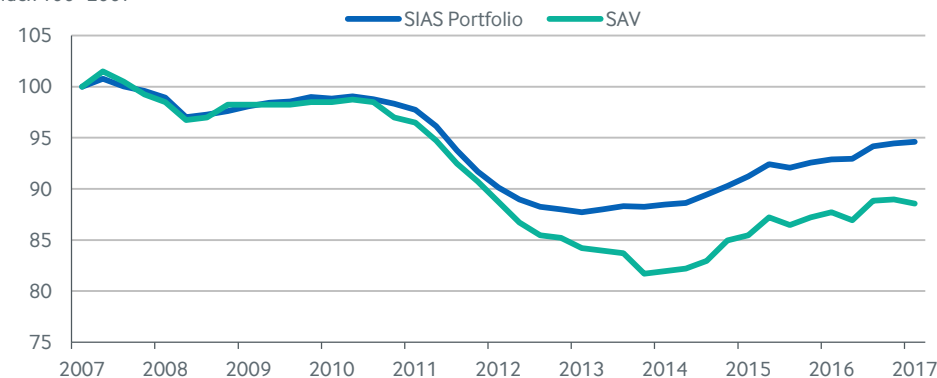
In Europe, large diversified networks also fared better than small ones. A diverse traffic base, comprising intercity, commuter, and domestic/international business-related and recreational travel, with a range of origins and destinations typically make the traffic demand profile more resilient to economic cycles.

The peak-to-trough decline for SIAS, which manages around a 1,350-kilometre portfolio of concessions in north-west Italy, was 12%. By comparison, one of SIAS' concessions, Società Autostrade Valdostane, which manages a 60-kilometre long peripheral stretch of toll road, experienced a peak-to-trough decline of 18%.

Spain experienced a more-severe economic deterioration during the European sovereign crisis than other countries. The existence of toll-free alternatives exacerbated the impact. As a result, declines in traffic for Abertis Infraestructuras, with an extensive network of Spanish assets, were greater even than some smaller networks in other countries. Within Spain, however, Abertis performed better than many of its individual concessions.

Large vs Small European Networks

Index 100=2007



Source: Issuer, Fitch, Società Autostrade Valdostane (SAV)

Performance – Trucks Versus Cars

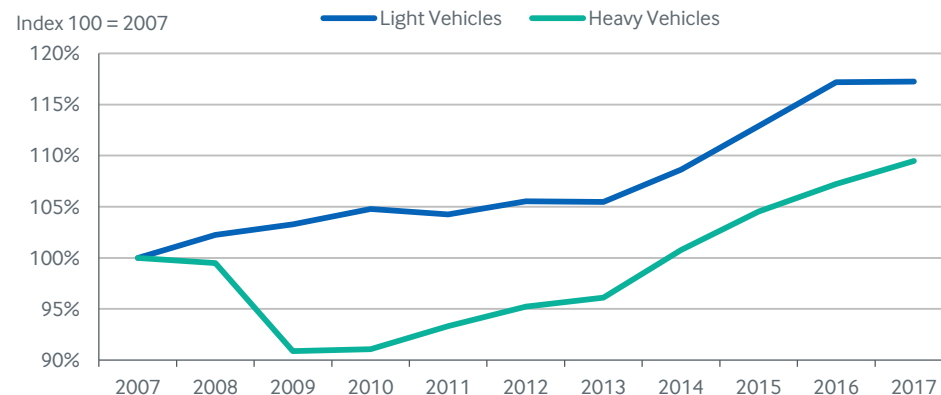
In the US, on major interstate turnpikes with mature traffic profiles, heavy vehicle (HV) traffic tends to be more volatile than light vehicles, which make up the bulk of commuter traffic. Roads that rely more on leisure passenger traffic are liable to volatility that could exceed that of HV-dominated roads; this was the case in Spain during the sovereign crisis.

In the past 10 years, light vehicular (primarily passenger vehicles) traffic on APRR's network in France declined only modestly during the GFC and recovered very quickly, whereas it has taken freight traffic almost 10 years to revert from a large drop to pre-GFC levels.



Select US Facilities - Light vs Heavy Vehicles

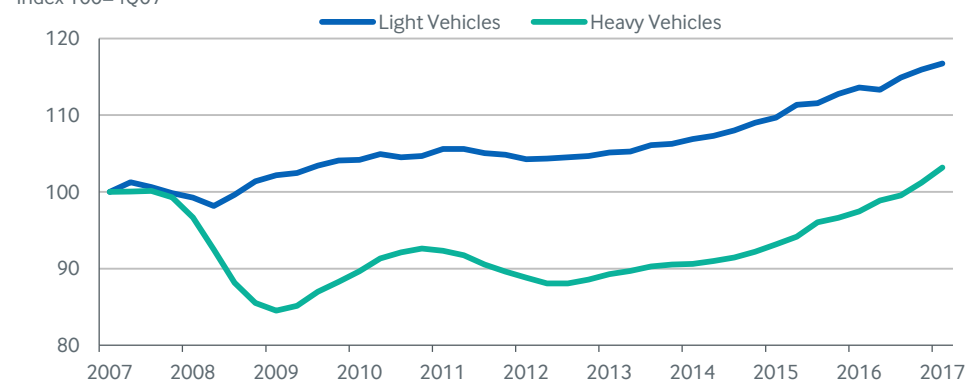
Index 100 = 2007



Source: Issuers, Fitch

APRR Traffic Index (quarterly rolling)

Index 100=4Q07



Source: Issuer, Fitch, Société des Autoroutes Paris-Rhin-Rhône (APRR)

Performance – Price Elasticity

Mature toll roads with mid-range to stronger demand characteristics regularly demonstrate the ability to support rate rises at or above inflation.

US

Price elasticity, i.e. traffic declines when toll rates rise, for most mature systems and standalone facilities is low. The median traffic growth on large US networks was 1.7% between 2007 and 2017, while revenue increased by 5.8% over the same period, for the most part reflecting above-inflationary toll-rate increases and low-to-moderate volatility. For small networks, the 10-year median growth was at 0.4% with a revenue increase of 4.9%. Both large and small networks had sizable above-inflation revenue increases – 250bp and 290bp, respectively. Small networks on average used a greater share of their toll rate-making flexibility, which was arguably lower by definition, leaving them with even less ongoing flexibility than large networks.

The peak-to-trough traffic drop on small US networks during the GFC, which was reflected in most cases during 2006-2010, was 13.3% compared with a decline of 5.9% on large networks. However, toll revenue was flat and up by 10.5%, respectively, due to toll rate increases. With cumulative inflation for that period at 8.6%, actual toll rate impact at 13.3% and 16.4% for small and large networks, respectively, was significantly higher. It is difficult to segregate the impact of the economic downturn from price elasticity due to sizeable toll increases for both facility types. However, the fact that rate increases were high but revenue impact was only marginal is reflective of generally low price elasticity for all these facilities. Individual analysis points to higher elasticity to toll increases on smaller systems (in particular standalone assets) or systems facing a high level of leisure traffic compared to large, diverse networks.

EMEA

Essential assets with low exposure to competition had low price elasticity, i.e. minimal traffic declines while toll rates rose sharply. Tariffs grew by almost 40% on the ABVP-managed Brescia-Padova stretch, a mid-sized key network in northern Italy, between

2005 and 2017 while volumes rose 11%. Most of the tariff increase occurred during the 2009-2013 Italian double-dip recession: tariffs rose 28%, well above the 9% increase in inflation in the same period, while traffic fell 5%, at a time of weakening consumer confidence.

	Traffic Peak-to-Trough Impact 2006-2010	Revenue Peak-to-Trough Impact 2006-2010	Inflation (Cumulative) 2006-2010	Toll-Rate Impact 2006-2010
Large Networks Median	-5.9%	10.5%	8.6%	16.4%
Small Networks Median	-13.3%	0%	8.6%	13.3%

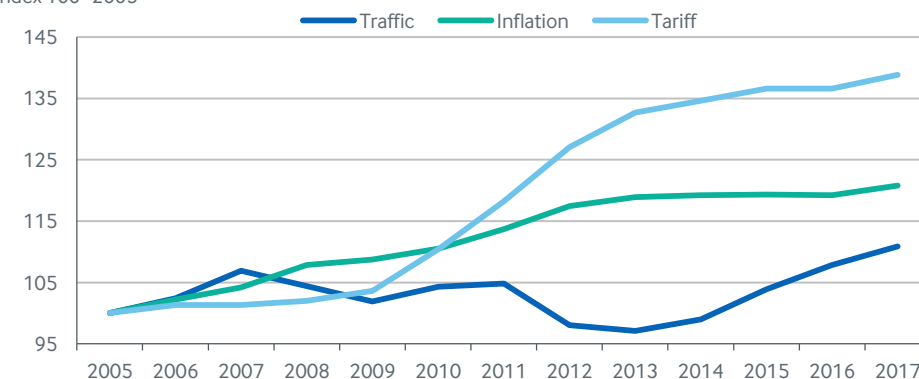
Source: Fitch

	Traffic 2007-2017 CAGR	Revenue 2007-2017 CAGR	Inflation 2007-2017 CAGR	Average Toll Rates Above Inflation 2007-2017
Large Networks Median	1.7%	5.8%	1.6%	250bp
Small Networks Median	0.4%	4.9%	1.6%	290bp

Source: Fitch

Autostrada Brescia Verona Vicenza Padova - Price Elasticity

Index 100=2005



Source: AISCAT, BMI, Interministerial decrees

Performance – Private Versus Public Pricing Incentives

Publicly operated toll networks are prone to political pressure as elected officials are more directly connected to decision-making, so increases in rates, which may be unpopular with the public, can be delayed for political expediency. This can be adverse for revenues to support essential maintenance, capital expenditure and debt-service obligations. Most private concessions that have contractually set inflationary increases are able to raise rates on or close to schedule because the private partner's profit incentive is geared towards maximizing revenue and aligned with the need for timely and proper maintenance and the interests of debtholders. However, private operators are also keen on increasing their business with the government, and so are not immune from such influence.

US

Even though public operators have the legal ability to raise rates they can be constrained by political pressure; however, operators have shown a propensity to build a political consensus to limit the negative impacts of this influence and implement rate increases.

Public authorities also have used above-inflationary increases in times of economic stress – particularly in the past couple of decades given their fiscal requirements and the GFC – to fund major capital investments. The downside for public operators is that they often face delays in doing so, leading to higher costs and tariffs.

EMEA

Toll-road operators operate under a system of regulated price-cap tariffs. The tariff formula sets a limit on the annual increase. Operators are able to delay or apply a lower rise as they see fit to effectively maximize revenue and manage public relations in the long term. Issuers in EU countries have tended to set tariffs at the cap level. Certain tariff systems also compensate for investments and offer some protection against traffic risk.

LatAm

Private concession operators are permitted to increase rates once a year tracking prior-year inflation. In some cases, if national CPI surpasses 5% they can apply an extraordinary increase, with final approval from the grantor. Private operators in Mexico, Brazil and other countries in LatAm have tended to increase tolls as per the contract. They may also apply lower tariffs as a temporary strategy to attract more volume or to manage public expectation. This usually proves to be positive for long-term revenue generation.

Governments also permit larger tariff increases to address unexpected network disruption or to meet investment needs.

- A road in central Mexico has twice been granted extraordinary toll increases. The first was a real-terms rise of 8% in 2012 to compensate for the loss of traffic after the opening of a connection to another highway. The second was the approval in 2016 of an above-inflation increase of 36% to be applied over six years to compensate the concessionaire for additional costs related to construction.
- The State of Mexico granted a 30% toll increase (above inflation) on another road in 2013 to be implemented over four years to support capital investment, reinforce maintenance levels and to close over 40 illegal entrances to the road.

Brazilian concessionaires are generally permitted to apply an annual inflation-linked tariff increase, subject to approval by the grantor. Exceptions to this can occur if the concession agreement is in financial imbalance, which could mean lower or higher tariffs, or the concessionaire agrees to additional investments requiring extraordinary tariff increases, or when there are changes in law. The following actions significantly changed the charging system and increased the cost burden for all users:

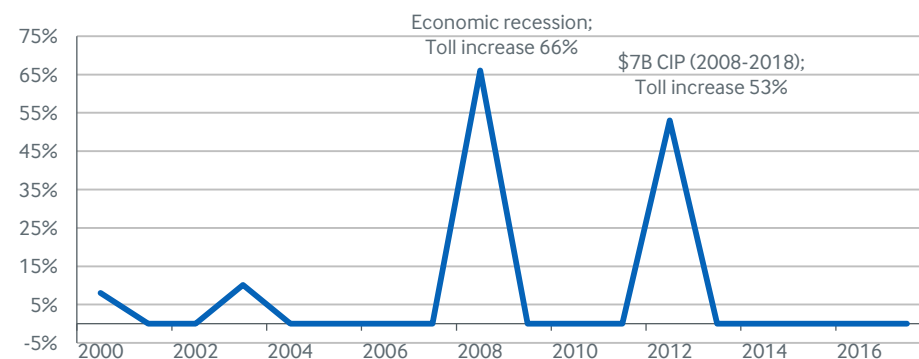
- Strikes in 2013 put political pressure on the local state governments and resulted in the grantor (the state) revoking the annual tariff increase for the toll-road projects in São Paulo. This gave the projects an economic imbalance relative to the original concession agreement. Subsequently, the grantor approved a lower-than-inflation increase for 2014, which was an election year, but also reduced the concession fee payable to 1.5% of toll revenues from 3%, and allowed the charging of suspended axles (truck axles not in use), which increased the toll cost for HV users.
- A subsequent national strike by truck drivers in 2015 led to the federal government changing the law that prohibited the charging of HV suspended axles for all toll roads in the country, except for the ones in the State of São Paulo. The following year, the concessionaires received approval from the grantor (the federal government in this case) for an extraordinary tariffs increase between 8% and 15% for all users. It is not uncommon for the trucking industry to have an inordinately high level

of influence on the government in many countries. In keeping with that precedent, the federal government chose to accede to the truckers' requests and spread the impact of their decision across all users.

- Truck drivers are still making their presence felt. A nationwide strike at the end of May 2018, related to the cost of diesel and certain tolls, paralyzed the country. The federal government has conceded the issue of tolling suspended axles nationally, mainly affecting toll concessions in the economically prosperous state of São Paulo that was exempted in the 2015 strike action. The nature of compensation to the concessionaires – tariffs, extensions or capex adjustments – has not been determined.

In Brazil, there have been some extraordinary increases tied to additional capex obligations; in some cases, these were limited to up to five years' duration. Also, the concession contracts signed after 2013, i.e. Ecoporte and MGO, established tariff readjustments that are tied to the capex made.

New Jersey Turnpike Toll-Rate Growth



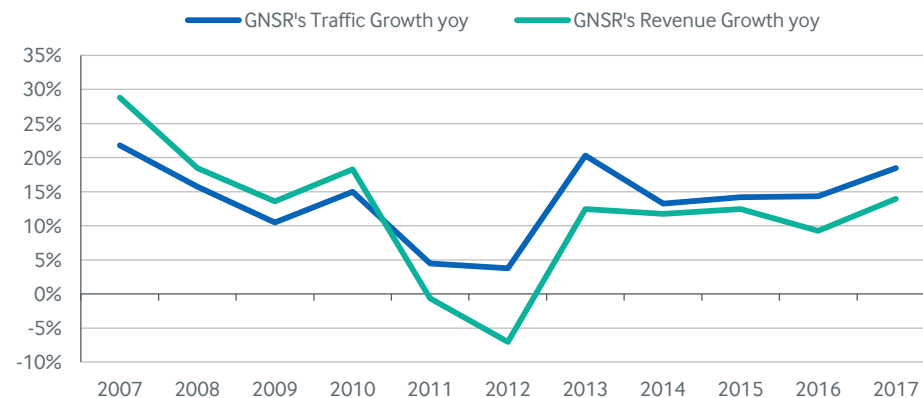
Note: Toll increase for full-length trip, cars using E-ZPass, peak and weekend
Source: Issuer, Fitch

Toll roads owned by the Panamanian government are an exception to permitting inflationary increases. The public entity that is the concessionaire in ENA Norte, ENA Este and ENA Sur has chosen to leave the tolls unchanged for the life of the debt. Fitch believes this because of a public aversion to tariff increases.

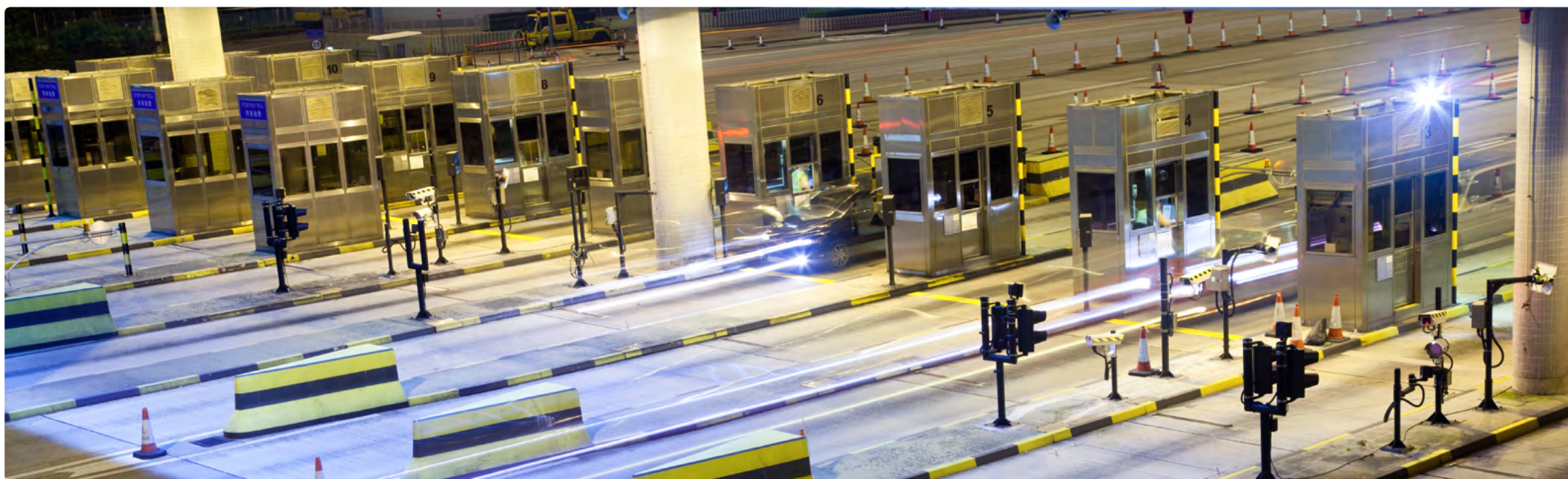
Asia-Pacific

The Chinese government regulates the setting and adjustment of toll rates. The concession agreements do not allow periodic rate increases that track inflation (see chart, where revenue growth largely mirrors traffic growth.) Historically, the provincial government of Guangdong has made infrequent adjustments to toll rates. The asset clearly retains considerable rate-making flexibility to maximize revenues. Toll elasticity is likely to be low given the history of performance and its importance within the regional road network.

GNSR Traffic vs Revenue Growth



Source: Fitch, Yuexiu Transport Infrastructure Limited's Annual Reports



Performance – Infrastructure Renewal Critical for Projects

A timely and prudent life cycle asset-management strategy is an important indicator of a healthy asset. Publicly operated toll-road systems are largely immune to material credit risk stemming solely from poor infrastructure maintenance and renewal, barring significant, lingering structural integrity issues from poor-quality design or construction where cost overruns can be credit adverse. This is mainly due to their ability to raise rates and support the investment even if it is made at a materially higher

cost. However, this is not the case for standalone projects, even publicly operated ones, where the economic capacity to raise rates is more limited. Poor asset maintenance and renewal is even more credit adverse for concessions where there are mandatory performance standards to meet, and where a default could lead to a termination of the concession with less than 100% recovery for lenders.

Future infrastructure renewal and capital plans for public systems remain an important consideration as they do affect borrowing and rate-making flexibility. In the US, the New Jersey Turnpike

Authority, the Pennsylvania Turnpike Commission and the Triborough Bridge and Tunnel Authority implemented multibillion-dollar capital programs, but given transfers out of the systems to fund state projects, these agencies have sapped financial strength resulting in less flexibility. Their underlying economic strength and legal rate flexibility are significant mitigants that still justify their high investment-grade ratings but management flexibility is more constrained.

In 2014, Fitch revised its view on infrastructure/renewal risk for the Rhode Island Turnpike and

Bridge Authority, which resulted in the revision of the Outlook to Negative. The revision reflected the increased uncertainty related to the willingness to raise tolls to support much-needed investments in an aging bridge system. This was finally resolved by a new, non-toll revenue source being used to reduce funding dependence on toll revenues for operating and capital investment obligations. Despite these circumstances, the strength of the system and the limited risk from infrastructure renewal risk on a public system (barring a facility being impassible) was underscored, as it maintained 'A' category ratings throughout this episode.



Ratings Impact

The table below provides a perspective on the inherent stability of this asset class over time, especially as it includes the adverse effects of the GFC and the subsequent recovery. There were 35 ratings that were maintained globally throughout the 2007-2017 period. Of these, 25 were toll-road enterprises and 10 were project financings. Despite individual credit impacts of varying degrees on almost every credit, the median rating for this subset marginally improved: for enterprises from 'A' to 'A+' and for standalone projects from 'BBB' to 'BBB+'. The small dataset in part accounts for this counter-intuitive result.

Fitch rated about 50 toll-road debt securities in 2007 and currently rates in excess of 100, including ratings paid-in-full or withdrawn post-2007 and new ratings since added. The median rating of this more dynamic portfolio over the same 10-year period shows a stable enterprise median rating of 'A' and a slightly declining standalone project median rating from 'BBB' to 'BBB-'. This reflects a modestly increasing and leveraged enterprise rating portfolio and a rapidly growing project portfolio with high leverage.

Generally Stable but Some Historical Underperformance: Economic factors and management actions sometimes have resulted in financial weakening and negative rating action. In many cases, these credits have stabilized as the economy did, or through a restructuring. In other cases, the bonds have defaulted.

- In 2013, following a 10% traffic contraction in Italy, the Outlooks on the ratings of Atlantia and Autostrade per l'Italia were revised to Negative, reflecting the deeper and longer-than-expected recession. The Outlook was revised to Stable the following year as a result of a normalization in traffic.
- In 2002, the toll-road asset of the San Joaquin Hills Transportation Corridor Agency in Orange County, CA, in the US was downgraded to 'BB' due to traffic underperforming original projections. The initial rating on issuance in 1997 had been 'BBB'. Management implemented rate increases that were significantly above inflation (6.8% and almost 500bp above inflation) for more than a decade, survived the GFC declines and then initiated a restructuring that extended the life of the debt, causing it to be upgraded back to investment grade.
- In 2010, the toll-road asset of the Foothill/Eastern Transportation Corridor Agency also in Orange County was downgraded to 'BBB-' from 'BBB' due to declines in traffic that would have required above-inflation increases in toll rates to meet the project's growing debt-service obligations. Economic conditions limited the board's ability to implement more-frequent toll rises. The ongoing weakness resulted in the 'BBB-' rating being placed on Rating Watch Negative with a likely downgrade to 'BB+' in the absence of management actions to stabilize the credit. As economic conditions improved,

management accelerated the implementation of toll-rate increases and put in place a debt restructuring that extended the maturity of the bonds that provided more time to ramp up revenues to meet growing debt-service obligations. The bonds were then assigned stable investment-grade ratings.

- Concesionaria Zonalta was built in the 2000s to connect Rocky Point, then a relatively new tourist destination in Mexico, to access roads from the US. Rocky Point attracted retirees primarily from the US who wanted second homes. Rocky Point grew impressively between 2004 and 2007, but in 2008 it was severely affected by the GFC. The area was also caught up in violence related to the Mexican drug war. The traffic CAGR from 2007-2014 was -1.9%, in contrast to expectations of high growth. Traffic has grown since 2015, but current volumes have not yet recovered to pre-GFC levels. The poor performance in 2007-2014 caused significant

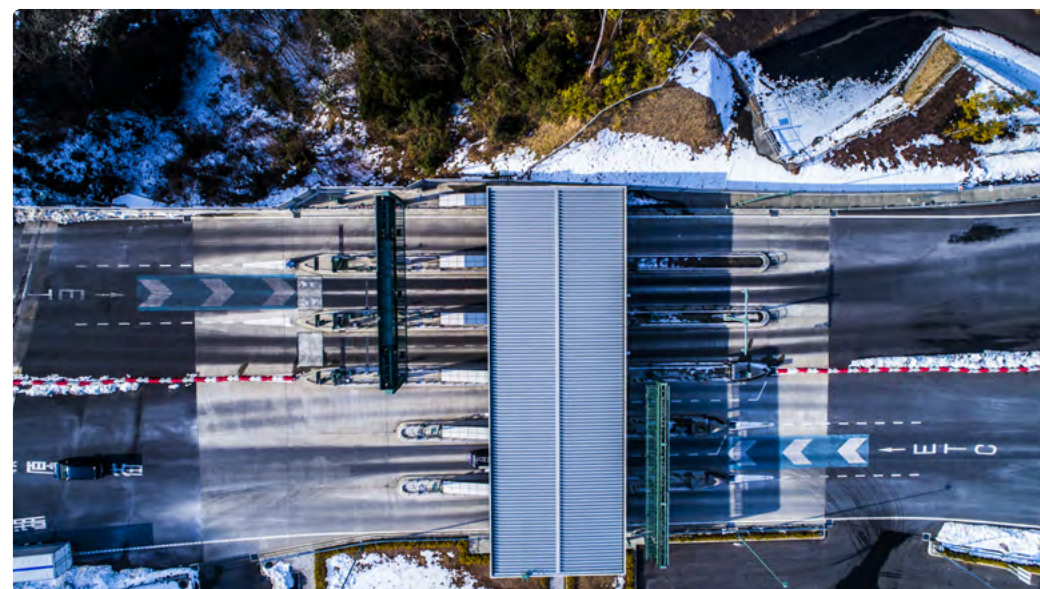
deterioration in the project's credit quality, with multiple downgrades from 'AA(mex)' to 'CC(mex)'. The bonds were then refinanced after the grantor approved a significant extraordinary toll increase.

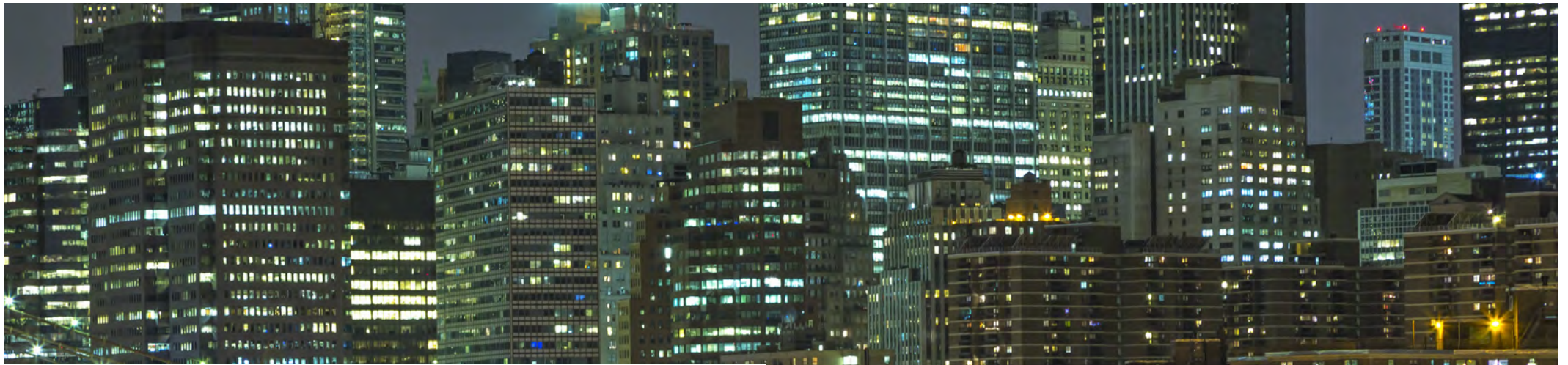
- Garcon Point Bridge, near Pensacola, Florida, underperformed initial 1996 forecasts and experienced volatility as the closure and constraints at competing facilities benefited it in the early to mid-2000s. Then when the network reverted to normal, the more direct and cost-effective routes attracted back the traffic, causing adverse bridge traffic performance. In addition, a 14.4% decline in revenue during the GFC caused the bonds to fully deplete the debt-service reserve fund and ultimately default. The bridge is being operated by the Florida Department of Transportation, which is paying for opex and capex. The bonds are being paid with available funds but are still in default as a settlement with bondholders has been elusive.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Enterprises	A	A	A	A+	A+	A+	A+	A+	A+	A+	A+
Standalone Projects	BBB	BBB	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+	BBB+

Source: Fitch

Note: Enterprises are defined to include public sector toll-road systems and corporate-like toll-road operators. Standalone projects include all single-asset entities that are publicly or privately operated. Includes public international scale ratings that were maintained throughout the 10-year window.





Lessons Learned



Individual Asset Performance Can Vary Significantly

The US has had largely robust growth through much of the past two decades, but the strength of transactions within a country can vary considerably. Analysis of two similar types of assets provides interesting results:

- Volume growth in the Queens-Midtown Tunnel in New York City has been limited since 2000 because of external events and peak-hour capacity constraints while toll revenue has grown at almost 7% a year, largely as a result of toll-rate increases. Another water crossing, the Garcon Point Bridge, experienced post-ramp-up traffic growth of less than 2% and revenue growth slightly above 6% over the same period. Both have monopolistic characteristics and similar revenue performance, but in many other ways are dissimilar.
- The franchise strength of the tunnel in New York outstrips that of the bridge in Florida. The tunnel's capacity constrains traffic performance. Revenue is more reflective of tremendous underlying economic strength, although it is constrained by the government authority's competing goals for the tunnel to be self-supporting and to pass on much-needed surpluses to a sister transit agency, yet be affordable. The tunnel retains strong pricing power, so can respond to an economic downturn or unexpected capital expenditure. The bridge has considerable unused capacity, is much closer to its maximum revenue point, has limited rate-making flexibility and is unable to support any unexpected capital expenditure.

Regional Networks and Urban Assets Most Resilient

The diversity of these networks across countries, underlying latent demand, and economic diversity of metropolitan centers provide considerable stability through economic cycles. It also makes networks less vulnerable to competition as any individual

competitor or event is small in comparison and has only a marginal effect on the enterprise. These roads generally have little volatility in traffic demand over time, and recover relatively quickly after any cyclical shock. They have also demonstrated low demand elasticity following toll-rate increases, i.e. demand has remained fairly constant despite rate rises.

Competition a Major Consideration

The toll-road sector was resilient during the GFC, but performance within the sector has varied because the location and role of the asset in its catchment area determines performance. Toll roads that are built to relieve congestion on other facilities are exposed to competition, prone to volatility, and probably face downside risks during periods of reduced regional traffic, whereas in positive economic times they benefit from the greater network congestion.

Empirical evidence suggests that competition explains much of the severe traffic decline at a Spanish congestion-reliever that was exposed to discretionary, seasonal demand from leisure traffic. The larger corridor's loss in volume was about 15% in 2007-2013. The free road that carries most of the volume lost only about 5%, whereas the congestion-reliever experienced a decline of about 45%.

Forecasting Risk Remains

The ability to forecast traffic on mature toll roads is relatively strong. Socio-economic factors and demographics can cause results to vary from the prediction, but for most experienced forecasters the deviations are slight, so forecasting risk is not a major concern for operators and investors regarding mature assets.

However, forecasting opening-year traffic and ramp-up on greenfield toll roads has long proved more difficult. This has resulted in revenue shortfalls to support major maintenance and debt service. However, recent experience suggests this trend may be changing. A growing number of projects show strong performance relative to original projections, including North Carolina Turnpike (Triangle

Expressway), Central Texas Turnpike System and the Grand Parkway, and recently opened projects, such as the Elizabeth River Crossings in Virginia, and Kentucky Public Transportation Authority's Downtown Crossing. Most recent managed-lanes facilities, which are less proven, have also performed closer to initial projections.

It is too early to call this a meaningful shift in forecasting proficiency – projects like the SH130 near Austin, Texas and Northwest Parkway in the northern Denver area severely underperformed forecasts – but it suggests that forecasters are incorporating a more-conservative assessment to address opening-year and facility ramp-up risks. However, there is not enough data to override operator and investor skepticism that variations between predicted and actual performance could still be large, i.e. 10%-40% from project to project. Only consistent success on a variety of new projects over another decade or more will provide greater confidence that forecasting techniques and input assumptions are more reliable and sustainable.

Initial-year projections on greenfield roads have been a challenge, but longer-term growth forecasts can prove to be conservative. Even when initial traffic volumes are well below forecast, many assets tend to have higher than average rates of growth in the first decade or more before stabilizing, although local conditions and external factors will dictate the degree of catch-up in toll revenue. In addition, for publicly owned assets where the legal ability to raise rates is retained by the operator, above-inflation toll rate increases can narrow the revenue gap even further.

Leverage and Debt Structures Need Tailoring

Leverage can vary significantly between assets, depending on the strength of the Volume Risk assessment. A strong asset such as the Indiana Toll Road supported almost 13x in initial leverage and was rated 'BBB.' Meanwhile, a weaker asset, such as the Rickenbacker Causeway near Miami, Florida, is able to carry only 3x leverage at a 'BBB+' rating level, given its limited though affluent service area. The



strength of the asset can also determine whether it can support a debt structure with considerable bullet debt that includes interest rate and market access risk. The Indiana Toll Road can support such a structure, while the Rickenbacker Causeway with its exposure to a narrow catchment area and to hurricanes and rising ocean levels would be more vulnerable were adverse events to occur.

Moderate leverage along with a forgiving debt structure can allow a project with meaningful forecasting risk to achieve investment-grade ratings. The I77 managed lanes near Charlotte, North Carolina has a weaker Volume Risk assessment, but with projected fully ramped-up year leverage of 7x – which is much lower than the typical managed lanes project in its sponsor's case – and significant liquidity, it was able to achieve a 'BBB-' rating.

A combination of too much leverage and an aggressive debt structure can cause a project that has a very modest forecasting risk to default on its debt.

- The Indiana Toll Road's initial structure on being privatized in 2006 carried USD3.8 billion in debt with accreting swaps to take advantage of the planned above-average toll rate increases. The transaction was affected by the GFC but defaulted not because of too much initial debt or weaker traffic performance but because of the negative mark-to-market value of more than USD2.0 billion on the sizable swaps as interest rates dropped to historical levels.
- American Roads, a transaction pooling four Alabama roads and bridges and the Detroit-Windsor Tunnel, which was also financed around the same time with a similar structure, also defaulted. The risk from the accreting swap structure was compounded by the weaker pool of assets performing more poorly than forecast. None was a greenfield asset, showing that the Volume Risk assessment matters and needs to be reflected in the nature of the forecast and the debt structure.

Pricing Flexibility Greater than Expected

Fitch analysis shows that new projects that are able to set their own toll rates are able to compensate for underperformance through higher rate increases.

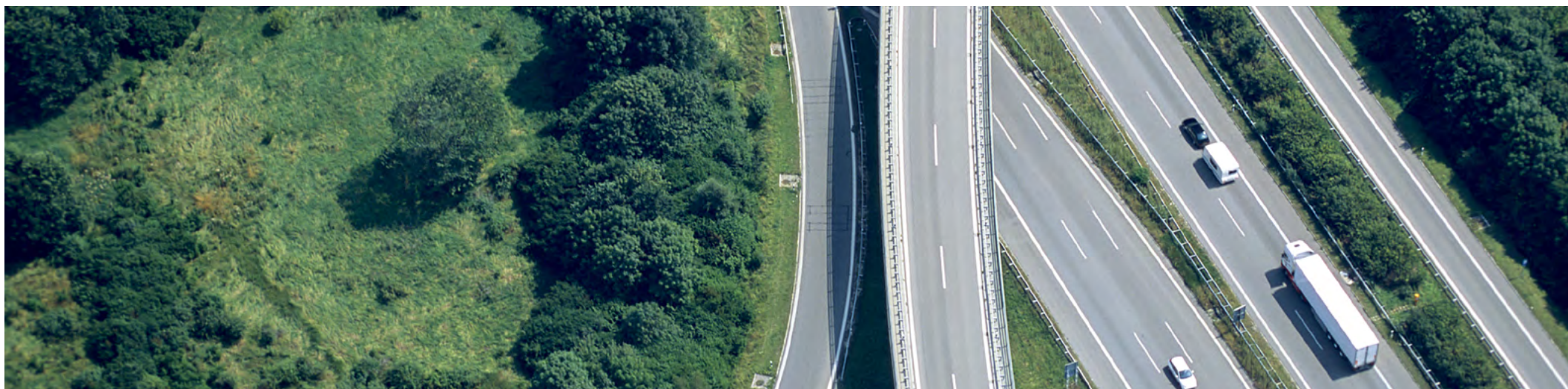
- San Joaquin Hills toll road, a mid-range asset from a Volume Risk standpoint, increased its full-length toll by 44% in fiscal 2000-2005. It recorded an average annual traffic increase of 18% over the period, while toll revenue grew by 57%.
- When Garcon Point Bridge, a weaker asset, increased its toll rate by 25%, traffic fell 8.9% in fiscal 2002 but revenue rose 11.9%. Three years later, when the rate was increased by 20%, traffic grew by 1.2% and toll revenue rose by 28.3%. In both cases, a weaker asset was able to raise revenues well above inflation through rate increases. While hurricane damage to a neighboring facility played a role, the bridge had also clearly strengthened economically.

In Fitch's opinion, systematic annual toll increases similar to those envisaged under private concession arrangements, compared with infrequent but larger increases, would lead to marginally stronger publicly managed toll-road performance.

Political Risk Alive

Tolls are often perceived as double taxation, partly because the public sector runs many entities, which have state-appointed boards. This means they are susceptible to political cycles that ultimately can cause rate-increase delays or cancellations, with a corresponding detrimental effect on revenue.

To mitigate this, some governments have granted concessions to the private sector, which has contractual protections and consequently tends to be timelier in implementing rate rises that generally are in line with inflation. Private operators may also react to adverse political or economic conditions by reducing or delaying increases. In the longer term, their financial flexibility – assuming prudent operating and debt management – should ensure that these decisions do not have a material impact on revenue.





What's Next?

Car Usage Charges and Restrictions

Price-charging programs, designed to tackle growing congestion in major cities by discouraging car usage, are becoming more common. Other systems limit road access: in some large Latin American conurbations, license plates dictate the days when a car can be used. Car ownership in parts of China is discouraged, while Singapore, which recently implemented a freeze on the number of vehicles, imposes very high initial and ongoing registration fees to further discourage ownership, as does Hong Kong. This policy is likely to become more widespread, though may be tempered as autonomous vehicles make road usage more efficient.

Lower/Zero-Emission Vehicles

Toll-road operators will need to enhance the provision and distribution of charging stations to encourage the use of electric vehicles. Governments are likely to implement policies to discourage the use of fossil fuel-powered vehicles in favor of electric or fuel-cell cars. The changeover is likely to have a limited effect on toll-road volumes because one type of car will replace the other over time and because governments cannot affect mobility materially without providing viable replacement options. See the Fitch Wire [Charging Infrastructure Is Needed for Wider EV Adoption](#).

High-Speed Rail

High-speed rail and other fixed-guideway transportation infrastructure could progressively take market share from toll roads. Already there are operational and planned high-speed rail projects that will compete for traffic on regional routes. Furthermore, super-fast systems may also compete with air travel (see our Special Report [A Decade in Airport Ratings](#)). For example, if Hyperloop systems from San Francisco to Los Angeles or Washington DC to New York and Boston are developed, this too could reduce volumes, especially if coupled with autonomous vehicle technology, to make the “last mile” more seamless at either end of the high-speed rail line.

3-D Printing/Drones

3-D printing allows for products to be produced locally – at home or in specialized local stores – so the nature of goods shipped will change. The transportation of finished, packaged products will be replaced by shipments of raw materials to local stores for printing, resulting in more efficient truck and van usage, with a likely reduction in the number of trucks on the road. Drones will increasingly affect local deliveries and small truck journeys will likely decline; however, these changes are unlikely to have a significant impact on toll roads given the local short-distance nature of these trips.

Autonomous Vehicles

Autonomous vehicles are unlikely to have a significant impact on the number of road trips, and by extension their effect on toll roads is likely to be limited. However, despite industry views that the impact on trips may be positive, the outcome is not certain and it may be negative so vigilance is warranted. Full adoption of these vehicles is likely over 20 years from now. Autonomous vehicle usage will affect the number of vehicles owned and reduce idle system capacity. Studies show that cars remain parked on average for 95% of the time. The average US household has two cars, with 35% owning three or more. The convenience of just-in-time transportation will result in fewer cars being owned, but there is uncertainty about the number of trips that will be made using autonomous vehicles compared with now. People will continue to seek to travel for work, business, school and leisure. This would imply a similar level of trips compared to today. However, improving technology will keep changing the nature and increase the efficiency of work and travel, possibly reducing trips to some degree.

21st Century Infrastructure Imperative

Toll-road operators will have to enhance investment in the overall condition of the road and highway network, as well as technology, to allow for the safe and efficient operation of autonomous vehicles and

connected vehicles. The underlying infrastructure needs to achieve minimal standards for operation. The current poor quality of many parts of the non-tolled network may slow the adoption of autonomous vehicles; drivers may still be needed for sub-standard roads or those without the necessary in-built infrastructure to permit high volumes of autonomous vehicles. The costs of upgrading and maintaining road infrastructure will be significant in the US, for example, but may be lower in European countries with well-built networks. The cost of investment could be significant to government balance sheets and in some cases to individual toll-road enterprises or projects.



Flying Cars

Flying cars have the potential to pose a major threat to toll roads if developed successfully and marketed broadly. Roadway capacity ceases to be an issue as airspace capacity is greater. However, this technology faces many challenges, including cost and safety considerations, which make this step-change in travel a more distant prospect than autonomous vehicles. This sector is likely to be highly controlled and regulated, and it is conceivable that regulators may create “air corridors” and charge for the use of this airspace. While not contemplated in most toll-road concessions, the airspace above existing roads could be a natural, and possibly safer, choice for many of these corridors. The ownership cost and the cost of ride-sharing will be greater and possibly out of the reach of average-income earners for a protracted period of time.

Working Remotely

Advances in technology, the ability to monitor productivity more effectively and changes in working practices for some roles mean fewer people are commuting to work on a daily basis; furthermore these factors negate the need for employees to live near major metropolitan centers. Not all jobs are suitable for working remotely and commuting will not cease, so while there is likely to be a fall in toll-road trips, it is unlikely to be a marked drop.

Cost of Capital

The cost of equity and debt has been low for a long time. It is very likely that over the next 10 years inflation will accelerate in Western developed countries and possibly also in some more advanced emerging economies. As the risk-free rate rises, so will hurdle rates for equity returns and debt interest rates. The consequence will be a higher cost for new projects. The impact of these rate changes will be felt on existing toll roads that have expansion obligations or discretionary plans, and also on government balance sheets as project subsidies may need to grow.

Appendix A: Regional Performance and Macroeconomic Trends

US

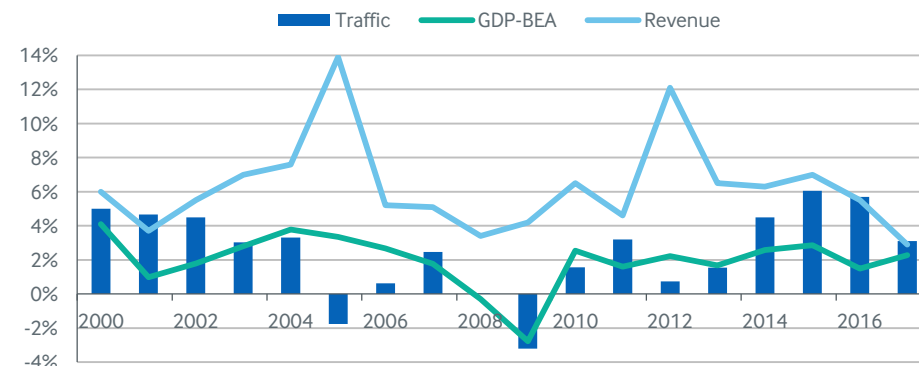
Traffic performance of the Fitch-rated portfolio of 50 projects in the US generally tracks GDP. The US portfolio includes a broad mix of assets – quasi-monopolistic, long-distance intercity roads, monopolistic urban bridge systems and regional expressway systems – that reflects the strength of the local economy, international bridge crossings exposed to cross-border security and trade policy, and standalone roads/bridges/tunnels that are dependent on either more-stable commuter traffic or more-volatile leisure traffic.

US toll roads' ratings remained relatively stable through the economic downturn, reflecting the public ownership of the majority of the assets and the ability to implement above-inflationary toll increases to offset the effects of declining traffic, notably in 2005 and 2012. The correlation with GDP is also evident in the revenue profile that departs from traffic in periods of significant toll increases.

A considerable share of US toll-road traffic reflects LVs, the largest share of which is commuter traffic. This is best illustrated in a comparison of US toll-road traffic volumes with unemployment.

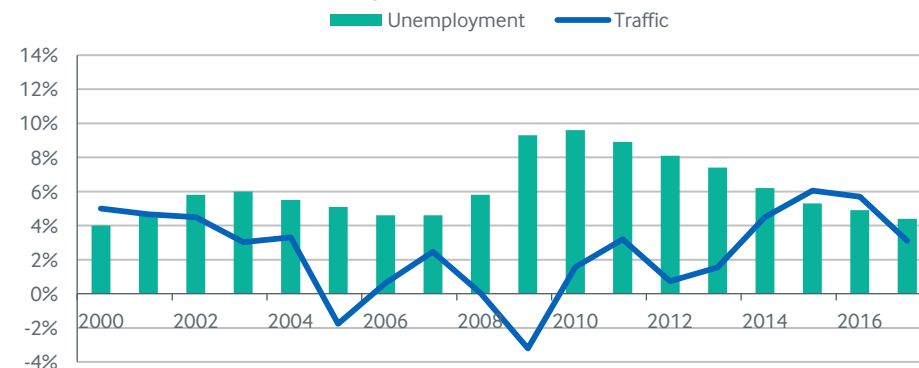


US Toll-Road Traffic & Revenue vs GDP



Source: Issuers, Bureau of Economic Analysis, Fitch

US Toll-Road Traffic vs Unemployment



Source: Issuers, Bureau of Economic Analysis, Fitch

EMEA

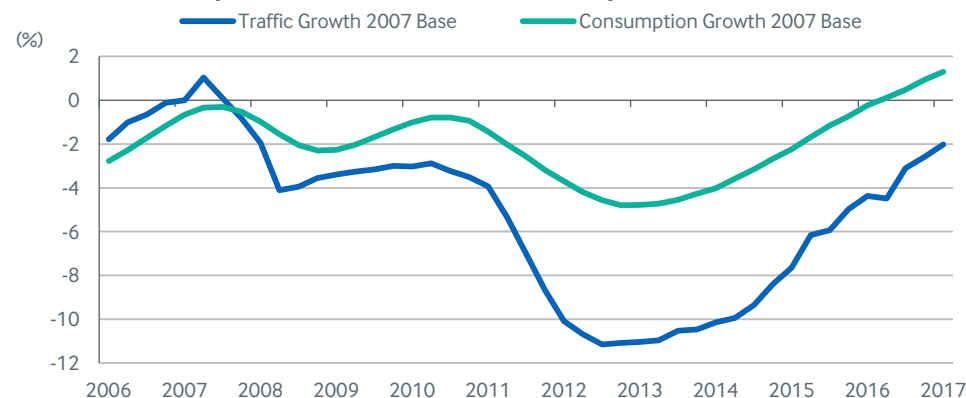
Traffic performance of the Fitch-rated portfolio in EMEA typically tracks private consumption, as LVs make up around 85% of total traffic. The Fitch portfolio predominantly includes large national networks playing a critical role for the mobility of their country and low-to-moderate exposure to competition. Traffic is supported by a diversified mix of commuter, leisure and HV/large truck users covering a mix of short and medium distances.

Most EMEA toll roads are operated under concession agreements with the private sector and consequently have caps on annual rate increases that are usually linked to an inflation measure (e.g. CPI). In some countries – France and Italy – a more-protective regulatory framework may allow tolls to track inflation and also compensate for capex execution, which partially de-link cash-flow generation from traffic underperformance and low inflation.

Traffic flow during the financial crisis differed substantially between peers, reflecting national economic conditions and competitive pressures. Economic weakness in Portugal and Spain affected Brisa and Abertis, whose networks were competing with toll-free alternatives. Italian operators experienced a traffic slump between 2012 and 2013 because of a fall in internal demand in response to austerity measures. In France, APRR traffic was more stable because France experienced a milder economic downturn and the toll-road network is exposed to less competition.



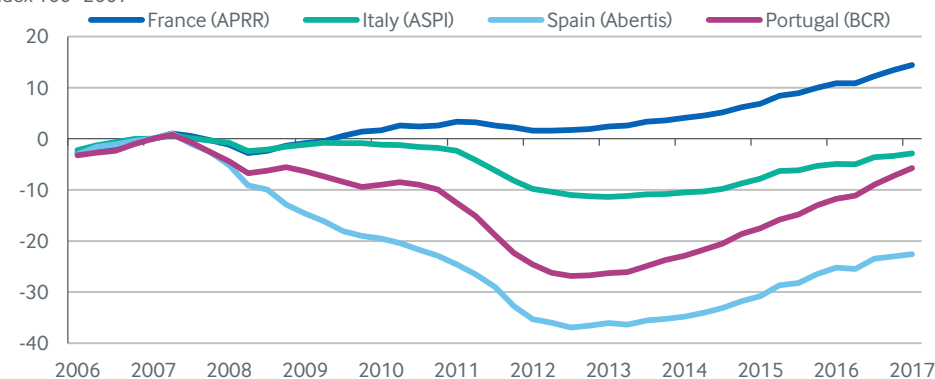
Fitch-Rated European Toll-Road Traffic vs Consumption



Source: Issuers, Eurostat, Fitch

Major European Toll-Road Networks

Index 100=2007



Source: Issuers, Fitch, Société des Autoroutes Paris-Rhin-Rhône (APRR), Autostrade per l'Italia (ASPI), Brisa Concessão Rodoviária (BCR)

LatAm

The second-largest portfolio of Fitch-rated credits is in Mexico, which provides a gauge of LatAm and emerging-market performance. Traffic performance of this portfolio of 15 projects in Mexico generally tracks GDP. The Fitch Mexico portfolio includes a broad mix of assets – standalone projects, small and large networks that are used for a variety of purposes (commercial, leisure, commuting) – and is spread across the country.

A comparison of traffic against unemployment shows a stark correlation: during the GFC, a rise in unemployment had an even more dramatic impact on traffic. As the economy recovered and unemployment fell, there was a rapid rise in traffic volumes.

Brazil provides another perspective, given the more-limited domestic exposure to the effects of the GFC, largely due to the fairly closed nature of the economy. Traffic grew through the 2000s and the GFC until hitting a point of inflexion in 2014. The growth in the later years was due, in part, to government policies implementing lower taxes on consumer goods, lower interest rates and looser credit standards to boost the economy and reduce the impacts of the GFC. This, however, resulted in higher consumer debt, leading to a national fiscal and economic crisis. The ABCR is an index of Brazilian toll-road concessionaries providing a broad

representation of toll-road performance: 70% of the roads are located in the more populous southeast region, which accounts for 54% of Brazilian GDP.

Historically, the concession index of HV in Brazil displayed a very high correlation with GDP, although there were other factors that also affected performance. The changes in fiscal and monetary policies had an effect on traffic, as can be seen with the higher increase in traffic volumes in 2010. In contrast, the index for light (passenger) vehicles shows a closer, but inverse correlation with unemployment rates, which is an indicator with a higher correlation to commuter traffic (a large subset of LVs). The boost in the economy increased overall employment, resulting in a traffic growth consistently above 4% from 2007 to 2014. At the same time, when the economy began to weaken, LV traffic experienced slower growth, lagging GDP. As unemployment increased to record levels, household income dropped and LV traffic declined.

As the economy seems to have reached the bottom of the economic cycle, the unemployment rate has begun to stabilize, with an expectation for growth in both heavy and light vehicular traffic. Source: Issuers, Fitch, Associação Brasileira de Concessionárias de Rodovias

See charts on page 23

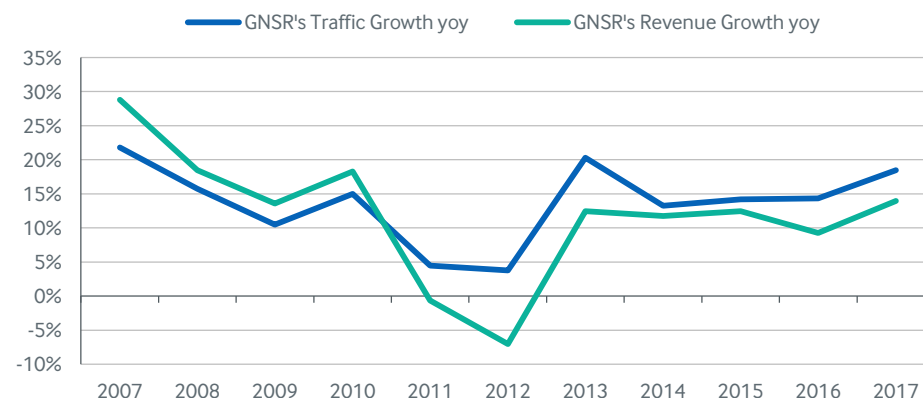
Asia-Pacific

A broad portfolio of data is not available. However, China is representative of the high growth rates seen in a number of countries in Asia-Pacific, so a look at Guangzhou Northern Second Ring Expressway provides a microcosm of major urban roads. For the past decade, robust economic growth and a rapid rise in car ownership has boosted GNSR's traffic. The overall trend of traffic growth, while having a positive correlation, has been more volatile than GDP and car ownership growth, remaining positive

even through the GFC. Externalities that affected performance also played a role in creating volatility, such as restrictions by urban governments on new car purchases in 2012 in this region and expanding those restrictions further in 2015 so that they are not unlike those used by other governments (Singapore, for example) to control congestion and pollution. In addition, the regulatory framework in China lacks transparency. Unilateral measures taken by the government, such as toll exemptions and discounts, have boosted toll-road volumes but dented toll-paying traffic counts and revenue.

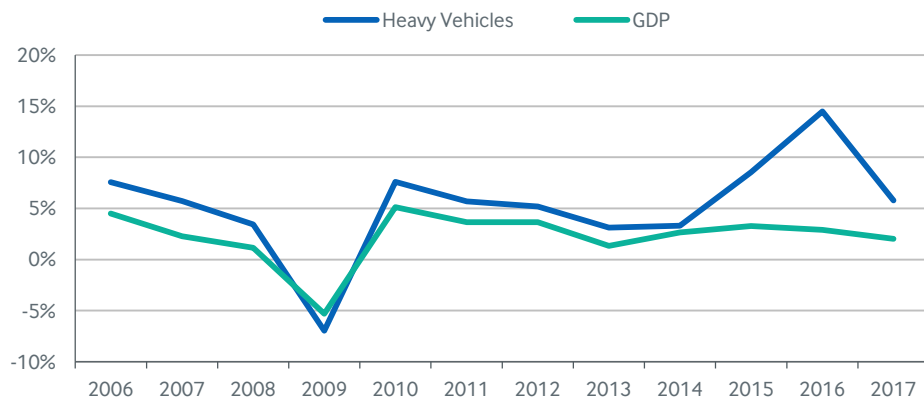


GNSR Traffic vs Revenue Growth



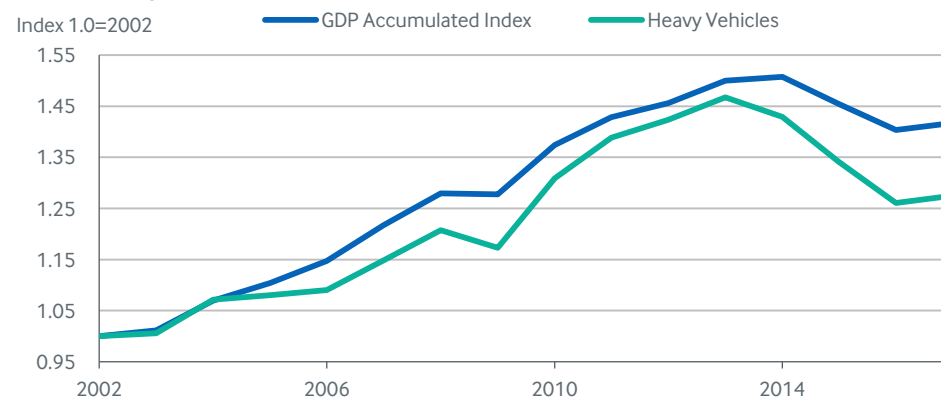
Source: Fitch, Yuexiu Transport Infrastructure Limited's Annual Reports

Mexico Heavy Vehicles vs GDP



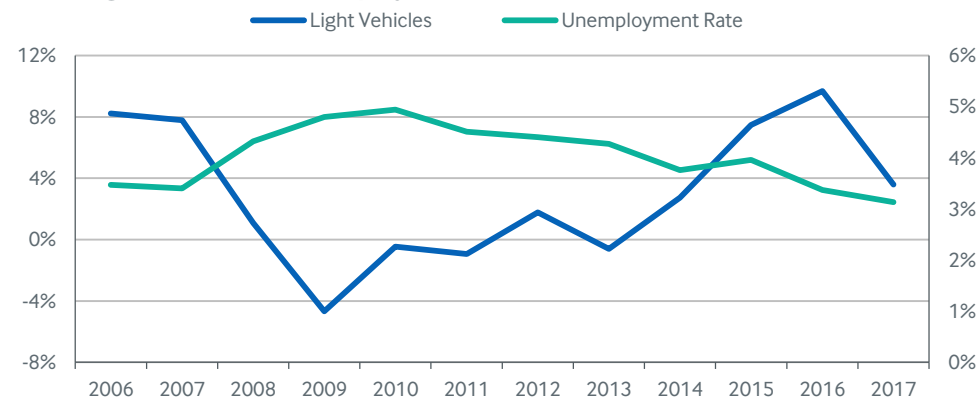
Source: Issuers, Fitch

Brazil Heavy Vehicles vs GDP



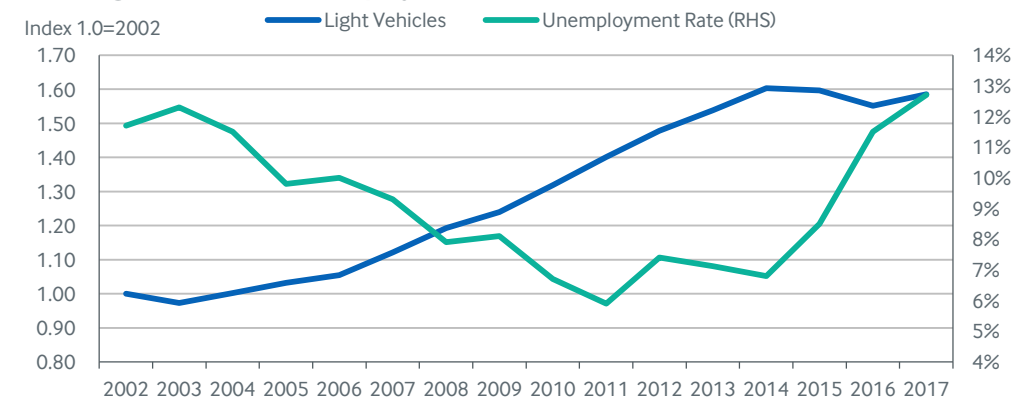
Source: Associação Brasileira de Concessionárias de Rodovias

Mexico Light Vehicles vs Unemployment



Source: Issuers, Fitch

Brazil Light Vehicles vs Unemployment



Source: Associação Brasileira de Concessionárias de Rodovias

Appendix B: Performance – Managed Lanes

Managed Lanes are a US phenomenon that began with the construction of the State Route 91 Express Lanes (SR91EL) in Orange County, CA, that opened in 1996. These lanes provide tolled capacity in the middle of a free road and as such are the most-exposed to competition. They tend to be built in corridors that have existing, primarily peak-hour congestion so the exposure is largely to steady-state pricing levels. They are vulnerable to changes in free-lane capacity and economic cycles, and benefit from constraints in the free lanes, which usually occur during roadworks.

SR91 has experienced all these effects over the past 20 years:

- The traffic and toll-revenue chart shows the limited growth potential when volume growth is largely confined to commuting hours, and the potential volatility from economic cycles, which can be severe: between 2007 and 2009, volumes dropped by more than 18%. The presence of next-door competition would have suggested an even greater impact on price, but actual experience indicated a much smaller 11% drop in toll revenue. The willingness to pay at these facilities proved greater than expected.
- Pricing power on these facilities generally should exceed inflation. The data indicate that despite significant capacity expansions over the course of the past 20 years, the facility was able to raise rates on average at 185bps above inflation. Were the expansions not to have occurred, the above-inflationary increases would likely have been much greater.
- The relative immediate impact of economic cycles can be seen. Orange County, CA, personal income (a proxy for GDP) dropped by 6% between 2007 and 2009 while SR91EL traffic dropped by 18%.
- While free lane construction caused short-term benefits for the managed lanes, it also resulted

in immediate adverse traffic impacts once the lane was open and construction completed.

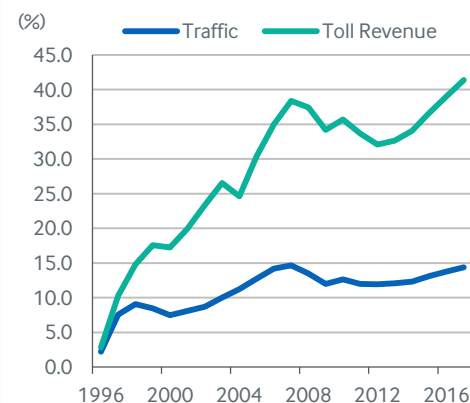
- The rapid rise in SR91EL traffic since late 2016 corresponds with the positive economic performance of the past 12-18 months, and we expect a sizable impact on price and revenue if this continues. However, since the spring of 2017, the opening of the connecting SR-91 managed lanes owned by Riverside County Transportation Commission has likely had a more-pronounced impact on the SR91EL.
- This SR91EL extension represents the first expansion of a major managed-lane asset. Its performance has been counter to Fitch's expectations, which were that added capacity would eliminate bottlenecks and reduce the value of the lanes. An initial assessment by the operator indicates that latent demand for transportation capacity and a sustained high willingness to pay seem to be the reasons for this performance. Additional data and further study of the factors will be necessary before any extrapolation to other managed-lanes networks will be justified.

SR 91 - Impact of Economic Cycles & Capacity Expansion



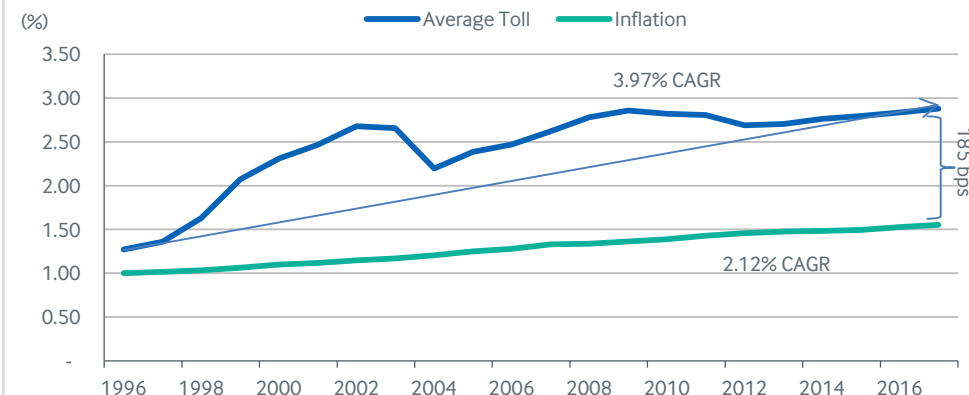
Source: Issuer, Fitch

SR 91 - Express Lanes Traffic & Revenue



Source: Issuer, Fitch

SR 91 Express Lanes Toll-Rate Growth



Source: Issuer, Fitch

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