THE EFFECT OF THE WITHDRAWAL OF AUTOMOTIVE LEASING ON THE STATE OF NEW YORK ECONOMY

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PREFACE

Since the infancy of the motor vehicle industry, the market for new vehicle sales in the state of New York has been one of the largest in the United States. In 2002, with almost 919,000 new car and truck registrations, New York ranked fourth among the fifty states. In the same year, 1,238 new-vehicle dealerships in the state sold over $25.5 billion in vehicles and services, and employed 51,639 workers with a payroll of over $2.2 billion. Clearly, automotive dealerships constitute one of the most important retail sectors in the New York state economy.

New York's automotive retail sector encountered a serious challenge in 2003 in the form of vicarious liability risk for companies that lease vehicles within the state. The risk has been assessed by many automotive and finance firms as so serious that a general withdrawal of the leasing option began to occur in March of 2003. Regarded by economists as a restriction of consumer choice in an existing market, such a change often results in negative consequences for the economy. Automotive leasing has always been a popular form of new vehicle acquisition in New York, where the preference for this type of automotive sales is greater than in any other state. In 2002, for example, over 24 percent of new vehicle sales in New York were automotive leases, compared with 14 percent in the total U.S. market.

The purpose of this report is first to estimate the effect of the withdrawal of automotive leasing on automotive retail sales in New York, and second, to evaluate the effect of the loss of the automotive leasing option on the overall state economy. The Center for Automotive Research (CAR) commissioned two economists at Virginia Commonwealth University to estimate the effect of automotive lessor withdrawal on new vehicle sales in New York in 2003. Their study is included as an appendix to this report. CAR also commissioned the Institute of Labor and Industrial Relations (ILIR) at the University of Michigan to evaluate the effect of the elimination of automotive leasing on the New York state

economy. The ILIR researchers incorporate the effect on sales from the Virginia Commonwealth study into their procedure to gauge the effect of the loss of the leasing option on the overall economy of New York.

This study is unique in that there is no prior research on the importance of automotive leasing in a state economy. Our research addresses that issue using the most complete information available and state-of-the-art research tools. We consider this study to be an initial contribution to a subject that is sufficiently important to warrant more attention in future research.

THE EFFECT OF THE WITHDRAWAL OF AUTOMOTIVE LEASING ON THE STATE OF NEW YORK ECONOMY

INTRODUCTION

In 2003, a number of motor vehicle lessors ceased leasing (or increased acquisition fees) in response to the failure of the New York State Legislature to address lessor concerns over elements of the New York vicarious liability law. The purpose of this part of the report is to provide estimates of the annual economic effect on New York if automotive leasing were to cease in that state, with no option for residents to bring in leased vehicles from outside of the state. The estimates are generated from simulations using a state-of-the-art economic model in conjunction with input data and assumptions from various sources, as outlined below. The estimates incorporate the effects on New York of the elimination of leasing in that state, as well as the feedback effects on New York of repercussions in the rest of the United States.

We estimate spin-off effects related to the cessation of automotive leasing in addition to the direct effects on new motor vehicle dealers. Spin-off effects come from two sources: indirect effects, or purchases from local suppliers (for example, auto parts); and expenditure-induced effects, or spending by people who receive income attributable to dealer activity (for example, restaurant workers who serve dealers). It is the sum of these direct and spin-off activities that determines the total effect of the cessation of leasing on the New York state economy.

The results generated for the study reflect the total effect of leasing cessation in New York, focusing on employment by major sector of the state economy (including new vehicle dealers), compensation, population, and Gross Regional Product (a state measure comparable to Gross Domestic Product for the nation). The outcomes differ depending on whether former lessees who then purchase a new vehicle decide to purchase a vehicle comparable to the one they've been

leasing, or a less expensive vehicle. We report a set of results reflecting this distinction, which in turn indicates the sensitivity of the outcomes to the assumptions made about purchase decisions.

The following sections summarize the economic/demographic model and procedures, the input data and assumptions, and the results.

ECONOMIC/DEMOGRAPHIC MODEL AND GENERAL PROCEDURES

To estimate the effect of the cessation of automotive leasing in New York on the state economy, we use an economic/demographic model constructed by Regional Economic Models, Inc. (REMI) of Amherst, Massachusetts, and adapted by our research team for the purposes of this study. The REMI model has been fully documented and peer-reviewed in the professional literature (Treyz 1993, Treyz et al. 1992). The REMI model has been designed particularly for carrying out simulations of the type generated for this study, and has been used extensively for such studies over the past two decades.

The version of the U.S. model system used for this study includes a model of the New York economy and a model of the rest of the United States.[1] This design allows us to simulate the interaction between New York and the rest of the nation, so that interregional migration and trade flows caused by a change in New York are identified, including the feedback effects from the rest of the country. In the real economy, spin-off activity is not generated solely by changes in direct activity within New York, but also by resulting changes in activity in other regions. For example, a decline in vehicle sales in New York could lead to a reduction in vehicle production in Michigan. In turn, assembly facilities in Michigan could trim purchases from auto suppliers in New York. Because of its design, the REMI model is able to provide estimates of the effects of such interregional trade flows, resulting in much more accurate estimates of the effect

[1] Technically, the model of the rest of the United States breaks out a few other individual states, but this is of no consequence to the results presented in this study.

of leasing activity in New York. The model also captures the buying and selling relationships among a fairly detailed breakout of industries, again increasing the accuracy of the results.

The general procedure in estimating the economic effect of the cessation of automotive leasing is to adjust the model so as to remove the vehicle leasing option in New York and then to have the model generate the economywide impact, including the spin-off effects. We begin by generating a baseline simulation for the economies of New York and the rest of the country, before any changes are made. We then generate an alternative simulation in which we remove leasing in New York from the baseline simulation, to determine hypothetically how different the economies would be. The change in activity associated with the removal of leasing in New York constitutes our estimate of the effect of the action.

The general approach here is straightforward, but its actual application is much more complex. Removal of the option to lease vehicles involves a number of implications that have to be sorted out and converted to measurable inputs to the model. The input assumptions and associated measures are summarized in the next section.

INPUT DATA AND ASSUMPTIONS

Baseline Simulation

As noted above, in order to determine how different the New York economy would look absent the option to lease motor vehicles, we first need to establish the value of leased vehicles in New York prior to their removal, and the value of purchased vehicles as an option to leasing. Our monetary calculations use 2002 as the base year. We calculate all of our input data annually from 2002 through 2005, assuming a three-year lease period. We start with annual values for total light vehicle sales in the United States in millions of units, as follows:

2002	16.7
2003	16.6
2004	16.9
2005	17.0

The data for 2002 and 2003 are observed values from government sources (U.S. Department of Commerce, Bureau of Economic Analysis). The projections for 2004–2005 are from the latest forecast release (January 14, 2004) of the Research Seminar in Quantitative Economics at the University of Michigan (Hymans and Crary). To translate this series of U.S. values into a series representing total light vehicle sales in New York, we estimated the share of sales in New York by taking data on new vehicle registrations by state for 2002 (R. L. Polk & Co.) and assuming a constant share through 2005. To estimate the value of these vehicles, we multiplied the number of vehicles sold in New York by the average selling price of a vehicle in New York (National Automobile Dealers Association). Finally, we identified the split in vehicles as 75.4 percent purchased, 24.6 percent leased (R. L. Polk & Co.).

Alternative Simulations

We view the cessation of automotive leasing in New York as affecting the state economy, and by extension, the rest of the U.S. economy, by means of three mechanisms. First, there will be a reduction in new motor vehicle sales in New York and a corresponding reduction in vehicle production outside of New York (currently there are no vehicle assembly plants located in New York, although there are supplier facilities). Second, former lessees who decide to purchase a new vehicle will either purchase a comparable vehicle and make higher payments or will purchase a less expensive vehicle so that their payments remain the same. In the former case, purchasers will spend less on other commodities; in the latter case, purchasers will redistribute their expenditures away from dealers and motor vehicle manufacturers. Third, the cessation of the leasing option in New York (and the assumption that leased vehicles will not be brought in from outside of the state) makes the state a less attractive place to

reside. Details follow on the calculations used to determine input values for each of these three mechanisms.

Reduction in New Motor Vehicle Sales

One consequence of the cessation of automotive leasing in New York is a reduction in new motor vehicle sales in the state. Based on the study carried out at Virginia Commonwealth University for this project (see appendix), we peg the initial effect to be a reduction of 5.4 percent in New York vehicle sales.[2] We assume that this drop in sales will phase out over time as fewer consumers defer purchasing a vehicle. Specifically, we cut the sales reduction in half in each of the following two years (i.e., the estimated reduction is 100 percent in year 1, 50 percent in year 2, and 25 percent in year 3). A slower phase-out would, of course, exacerbate the negative effect on New York. Consistent with other parts of the study, we estimate the corresponding value of lost vehicle sales by multiplying the number of lost units by the average selling price of a vehicle in New York.

Dealer survey data (National Automobile Dealers Association) allow us to identify the portion of the lost revenue from vehicle sales that is suffered by new vehicle dealers (5.7 percent) and the portion that is borne by auto manufacturers and wholesalers (94.3 percent). With the information provided on lost revenue in these sectors, the model identifies the direct and spin-off effects of the lost sales in New York. The spin-off effects are due both to interactions among sectors within the state, and feedback effects on New York from lost auto production elsewhere in the country.

This is not a pure loss to the New York economy, though, as the dollars freed up from reduced vehicle sales are available to be spent on other goods and services, many of which have a higher local content than motor vehicles, such as

[2] Vehicle sales could drop temporarily by more than 5.4 percent with the total cessation of leasing, but we use this estimate as a conservative value that has been statistically determined.

dining and amusements. We account for the re-spending of income freed up from reduced leasing with an additional input to the model. The total amount of income available for re-spending is calculated as the annual lost vehicle sales in New York times the average annual lease rate ($482 per month times 12 months in 2002 dollars, based on the discount rate on a three-year lease; provided by major automotive finance firms). This spending is redistributed in the model across sectors of the economy (other than vehicles) according to consumers' normal spending patterns, as identified in the model. As with the other inputs, the model generates estimates of the spin-off effects on New York from this redistributed spending.

Purchasing of New Motor Vehicles by Former Lessees

The second consequence of the cessation of automotive leasing in New York is that those former lessees who decide to acquire a new vehicle switch from leasing to purchasing. They can decide either to purchase a vehicle comparable to the one they've been leasing and make higher monthly payments, or to purchase a less expensive vehicle. We sought out estimates from auto industry analysts on the split between these two groups, but these estimates were largely speculative. Rather than select an arbitrary value that might affect our qualitative findings, we instead generated two sets of results, one for each purchasing scenario. These two outcomes provide boundary conditions for the results, and also permit an assessment of the sensitivity of the findings, both quantitatively and qualitatively, to the assumptions. We consider the input assumptions in turn for each of these purchasing scenarios.

Under **option 1**, consumers purchase a vehicle comparable to the one they've been leasing and make higher monthly payments. The procedures for determining both the number of leased units in New York and the loss of sales absent the leasing option are outlined above. The difference between these two estimates is the additional vehicles purchased in New York each year by former lessees. These additional vehicle purchases turn out to equal 78 percent of total

former vehicle leases, with the remaining 22 percent transformed into deferred sales.

The additional expenditure on purchasing versus leasing amounts to the difference in monthly payments over the payment period. We estimate the extra annual payment to average $2,916 per vehicle in 2002 dollars ($725 per month for purchase, at zero percent interest, minus $482 per month for lease = $243 per month times 12 months = $2,916). The total additional spending on purchasing by former lessees is the product of the number of additional vehicles they purchased in New York and the additional expenditure per vehicle due to purchasing rather than leasing. This option in itself does not result in reduced revenue for the automotive industry since a comparable vehicle is purchased, but it does lead to less expenditure on other goods and services among former lessees to compensate for the additional expense of acquiring a vehicle. This reduced spending is redistributed in the model across sectors of the economy according to consumers' normal spending patterns, and the model generates estimates of the spin-off effects on New York.

Under **option 2**, consumers purchase a new vehicle that is less expensive than the one they've been leasing so that their payments remain the same. This scenario assumes that the number of additional vehicles purchased in New York by former lessees is the same as for option 1, but that the average purchase price falls from $26,095[3] to $17,352 per vehicle (in 2002 dollars). The adjusted average selling price of $17,352 is implied by dividing the estimated total purchase payments of the former lessees by the estimated number of additional units purchased. The automotive industry's lost revenue is equal to the difference in the average selling price across the number of additional vehicles purchased. As in the case above of the reduction in new motor vehicle sales, 5.7 percent of the lost revenue is borne by the dealers, and 94.3 percent by auto manufacturers and wholesalers. Imported vehicles also suffer some lost

[3] The average selling price of a vehicle in New York in 2002 (National Automobile Dealers Assn.).

revenue, in proportion to their share of national vehicle sales.[4] The spin-off effects augment the losses in New York, both the repercussions of the dealer losses within New York and the feedback effect from the losses among manufacturers outside of the state.

Obviously, the most likely outcome is a mixture of the two options. These options provide the range for our estimates. Under **option 3**, we make the neutral assumption that half of the former lessees choose option 1 and half choose option 2. We regard option 3 as providing the best point estimate among our three sets of results, although the precise degree of the split between options 1 and 2 has not been established statistically.

Amenity Effect

The third consequence of the cessation of automotive leasing in New York is a reduction in the amenities available in the state, making it a less attractive place to reside. Consumers lose utility when they do not have the choice to lease vehicles. For instance, the additional utility from leasing might come from the ease of disposing of the vehicle at the end of the lease, including not having to worry about the resale value of the vehicle. Or, the consumer may value the difference between a leased vehicle and a less expensive purchased vehicle at something more than the price difference. The value of that lost utility (in economic terms, the loss of consumer surplus[5]) is a real cost to the state.

The economic model is sufficiently sophisticated to estimate the economic implications of a change in the amenities of a geographic area when provided with estimates of lost consumer surplus. The ideal measure would reflect how much more each individual lessee would be willing to pay to be able to lease a vehicle instead of being obliged to purchase it. Since such a measure is not

[4] We used national statistics because comparable state-level statistics on imports were not available.

[5] Consumer surplus is defined as the difference between what a person would be willing to pay and what actually has to be paid to buy a certain amount of a good.

available, we need to come up with a proxy. We derived several proxy measures of lost consumer surplus, including the acquisition fees that dealerships are adding to the up-front costs of a leased vehicle to cover their insurance liability, and the difference between a dealer's offer for a trade-in and the selling price for a personal transaction (Edmunds.com, Inc.). We settled on a loss of consumer surplus averaging $1,000 per vehicle leased. This estimate is the midpoint of the range of our consumer surplus estimates, and it is also approximately equal to the residual support boost typically provided by the manufacturers on a leased vehicle valued at the average selling price in New York. The per-vehicle estimate is multiplied by the number of vehicles leased to determine the total loss in consumer surplus. The implication of the amenity reduction in New York is that the population of the state would be lower compared with what it would have been with the leasing option, as people relocate across state lines.

State Revenue Effects

Vehicle sales or leases are assumed to be subject to an 8 percent sales tax in New York, while other consumer spending is taxed at an average rate of 4.42 percent (New York State Department of Taxation and Finance). Thus, vehicles are taxed at a higher rate than is other consumer spending on average. Also, purchased vehicles require the sales tax to be paid up front on the full value of the vehicle, unlike leased vehicles where the sales tax is paid monthly on the contractual depreciation of the vehicle's value, amortized over the period of the lease. The implications of this taxation policy on state government revenue and spending are determined by our model for each set of results. (Consumers compensate for their higher sales tax payments by reducing spending on other goods and services.) A summary of the results follows.

RESULTS

The tables in this section show our estimates of the economic effect on New York if automotive leasing were to cease in that state, compared with a situation where

the option to lease is available. The results reflect the total effect of leasing cessation in New York, including the spin-off effects from changes in new-vehicle dealer activity inside the state and the feedback effects from changes in auto-related manufacturing activity outside of the state. The economic effect is represented in the tables by employment in major sectors of the state economy (including new vehicle dealers), compensation, population, and Gross Regional Product.[6] The results are generated annually for the years 2003 to 2005. The results for employment and population are roughly generalizable to any sequence of three years, and are shown as such in the tables to reflect this flexibility. Estimates based on monetary values are calibrated to calendar year 2003 as year 1, as noted in the tables. As mentioned in the previous section, three sets of results are presented, the differences among them reflecting whether former lessees who subsequently purchase a vehicle decide to purchase a comparable vehicle, a less expensive vehicle, or a combination of the two. Each set of results is summarized in turn, the first two sets representing boundary conditions for our estimates.

Option 1: Former Lessees Purchase Comparable Vehicles

The results for option 1 are shown in table 1. This option assumes that former lessees who now purchase a vehicle decide to purchase a vehicle comparable to the one they previously leased and make higher monthly payments. Those former lessees who decide to defer purchasing a vehicle (5.4 percent of all lessees) do so at a rate of 100 percent in year 1, 50 percent in year 2, and 25 percent in year 3. Former lessees purchasing a vehicle in a given year reduce their expenditures on other goods and services to compensate for the additional expense of acquiring a vehicle, including higher sales tax payments. Former lessees who defer purchasing a vehicle in a given year, on the other hand, have

[6] Employment represents the total number of private and public sector jobs, including the self-employed. Compensation is classified in the accounts produced by the federal government as labor and proprietors' income, and consists of wage and salary disbursements, fringe benefits, and net incomes of owners of unincorporated businesses. Population includes all residents,

additional income available to be spent on other goods and services. The reduction in amenities due to the loss of consumer choice has a permanent negative effect on the New York economy. The results reported in table 1 reflect the interplay of all of these economic factors.

TABLE 1

Effect on the state of New York of eliminating leasing as an option starting in 2003:
Except for 5.4% who defer purchases for 1 to 3 years,
consumers buy same vehicle, have higher payments, less other spending

	Year 1	Year 2	Year 3
Total employment	–2,718	–8,068	–15,528
Private employment	–6,280	–10,465	–16,173
Manufacturing employment	–377	–610	–953
Private nonmanufacturing employment	–5,903	–9,855	–15,220
Retail trade	–2,520	–3,514	–5,054
New vehicle dealers	–888	–453	–228
Other retail trade	–1,632	–3,061	–4,826
Services	–2,763	–4,692	–7,165
Other private nonmanufacturing	–620	–1,649	–3,001
State and local government employment	3,562	2,397	645
Compensation, millions $	–146.9	–417.0	–818.5
Compensation, millions 1996$	–124.4	–342.3	–659.0
Population	–1,910	–4,695	–8,502
Gross Regional Product, millions 1996$	–132.0	–416.0	–818.7
Government spending, millions 1996$	214.8	145.3	39.6
Consumption, investment, net exports, millions 1996$	–346.8	–561.3	–858.3

Note: Monetary values are calibrated to calendar year 2003 as year 1.

Among the three options discussed in this section, option 1 has the largest negative effect on the New York economy over the three-year period. As shown in table 1, private sector employment declines by 6,280 jobs in year 1, building to a loss of 16,173 jobs in year 3.[7] The job loss reflects the diversion of expenditures away from goods and services with a higher local content and toward motor vehicles, which are produced elsewhere, as former auto lessees who are now purchasing adjust their budgets to accommodate higher vehicle

civilian and military. Gross Regional Product is a state measure comparable to Gross Domestic Product (GDP) for the nation.

[7] Note that the job losses are not cumulative; that is, the job losses in year 1 and year 2 are not added to the losses in year 3 to determine the total job loss in year 3. Instead, the results for each year reflect the difference in the job count without the leasing option in that year compared with the situation where the option to lease is available.

payments. This effect more than offsets the local gains from increased spending on other goods and services among former lessees who choose to defer their vehicle purchase. Employment at new vehicle dealerships declines slightly during the three-year period because of the decision among some of their customers to defer their purchase.

Because the government sector gets additional tax revenue under the leasing-cessation scenario, state and local government employment increases over the period compared with a leasing-available scenario. Vehicles are taxed at a higher rate than is other consumer spending on average, and unlike leased vehicles, the sales tax is paid up front on the full value of purchased vehicles. The increase in government employment, however, is not enough to offset the number of job losses in the private sector.

By the third year, compensation[8] in New York has been reduced by $818.5 million ($659 million in inflation-adjusted 1996 dollars), compared with what it would have been if the leasing option had been allowed to continue. The state's population is smaller than it would have been by 8,502 residents, reflecting the weaker economy and the negative amenity effect resulting from reduced consumer choice.

Option 2: Former Lessees Purchase Less Expensive Vehicles

The results for option 2 are shown in table 2. This option assumes that former lessees who now purchase a vehicle decide to purchase a less expensive vehicle than the one they previously leased to keep their monthly payments the same. In this case, purchasers redistribute their expenditures away from dealers and motor vehicle manufacturers. As shown in table 2, the initial effect on private

[8] This estimate of compensation is prior to deductions for personal income taxes and contributions to social insurance programs, and does not include transfer payments.

sector employment is negative because of sizable job losses at new vehicle dealerships, amounting to 1,944 jobs in year 1. There are smaller job losses in manufacturing associated with the feedback effects on New York auto suppliers due to reduced automotive manufacturing activity outside of the state. In years 2 and 3, the effect on private sector employment turns positive because the additional spending on nonvehicle goods and services by those who defer their vehicle purchase more than offsets the negative effects of reduced automotive revenue. Employment at new vehicle dealerships, however, is significantly reduced throughout the three-year period.

TABLE 2

Effect on the state of New York of eliminating leasing as an option starting in 2003:
Except for 5.4% who defer purchases for 1 to 3 years,
consumers buy less expensive vehicle, have same payments

	Year 1	Year 2	Year 3
Total employment	745	2,480	2,640
Private employment	–1,413	1,252	2,679
Manufacturing employment	–182	–11	65
Private nonmanufacturing employment	–1,231	1,263	2,614
Retail trade	–1,567	–576	–24
New vehicle dealers	–1,944	–1,656	–1,512
Other retail trade	377	1,080	1,488
Services	48	1,208	1,938
Other private nonmanufacturing	288	631	700
State and local government employment	2,158	1,228	–39
Compensation, millions $	4.3	100.5	125.5
Compensation, millions 1996$	4.4	86.9	102.5
Population	–1,014	–1,725	–2,379
Gross Regional Product, millions 1996$	32.5	118.5	129.3
Government spending, millions 1996$	130.1	74.4	–2.4
Consumption, investment, net exports, millions 1996$	–97.6	44.1	131.7

Note: Monetary values are calibrated to calendar year 2003 as year 1.

By the third year, compensation in New York has been increased by $125.5 million ($102.5 million in inflation-adjusted 1996 dollars). The state's population is smaller by 2,379 residents than it would have been, however, again reflecting the negative amenity effect resulting from reduced consumer choice.

Option 3: A Combination of Comparable and Less Expensive Vehicles

The results for option 3 are shown in table 3. This option is a combination of options 1 and 2, where half of the former lessees purchasing a new vehicle buy one comparable to the one they previously leased, and the other half buy a less expensive vehicle. The behavioral and financial assumptions made for options 1 and 2 separately also hold for each of the corresponding groups under option 3. As mentioned previously, we regard option 3 as providing the best point estimate among our three sets of results, although the 50-50 split we have chosen between options 1 and 2 is a neutral assumption and not an estimate, since there is no statistical or survey data available.

TABLE 3

Effect on the state of New York of eliminating leasing as an option starting in 2003:
Except for 5.4% who defer purchases for 1 to 3 years,
half of consumers buy same vehicle, half buy less expensive vehicle

	Year 1	Year 2	Year 3
Total employment	–985	–2,796	–6,447
Private employment	–3,845	–4,608	–6,750
Manufacturing employment	–279	–311	–444
Private nonmanufacturing employment	–3,566	–4,297	–6,306
Retail trade	–2,043	–2,045	–2,539
New vehicle dealers	–1,416	–1,054	–870
Other retail trade	–627	–991	–1,669
Services	–1,357	–1,742	–2,615
Other private nonmanufacturing	–166	–510	–1,152
State and local government employment	2,860	1,812	303
Compensation, millions $	–71.2	–158.3	–346.7
Compensation, millions 1996$	–58.0	–127.7	–280.3
Population	–1,463	–3,213	–5,443
Gross Regional Product, millions 1996$	–49.8	–148.8	–344.9
Government spending, millions 1996$	172.4	109.9	18.6
Consumption, investment, net exports, millions 1996$	–222.2	–258.7	–363.5

Note: Monetary values are calibrated to calendar year 2003 as year 1.

As shown in table 3, the results are, as might be expected, approximately midway between the results presented in tables 1 and 2. Private sector employment declines by 3,845 jobs in year 1 and grows to a loss of 6,750 jobs in year 3. This pattern reflects the increasing diversion of consumer spending

toward the higher monthly payments of purchased vehicles and to pay the higher sales tax incurred, as well as the negative effects of reduced automotive revenue. Employment at new vehicle dealerships is reduced throughout the three-year period. On the other hand, public sector employment increases, especially in the first year, supported by additional tax revenue, but it does not increase nearly enough to counterbalance the number of job losses in the private sector.

By the third year, compensation in New York has been reduced by almost $350 million ($280 million in inflation-adjusted 1996 dollars), compared with what it would have been if the leasing option had been allowed to continue. The state's population is smaller by 5,443 residents than it would have been, reflecting the weaker economy and the negative amenity effect resulting from reduced consumer choice.

SUMMARY OF RESULTS

The results shown in the tables of the previous section, and particularly in table 3, summarize our estimate of the quantitative short-run effect on the New York economy of removing the option to lease automobiles. We assumed for this purpose that all leaseholders have three-year leases, and that when they purchase a vehicle, they take out a three-year loan. Assuming a longer or shorter lease period would change the path of the economic response somewhat, but would not change the fundamental findings. There are three short-run outcomes that are common to all of the result sets considered:

- a decline in employment at new vehicle dealerships
- a decline in the population of the state of New York
- an increase in state and local tax revenue[9]

[9] For option 2, there is a slight decline in government employment and spending in year 3, but an extension of these results indicates that increases are the norm even for this option.

The longer-term outcomes, beyond the average lease period, are governed by a multitude of factors and complications. For instance, the amount of the trade-in value on purchased vehicles would have to be established, along with the pattern of spending of that amount across goods and services, which could include increased spending on upgrades to more expensive vehicles. This would also affect the amount of sales tax revenue collected, and thus the outcomes in the public sector. Some of the assumptions we judge to be appropriate in the short run would need to be reevaluated for the longer term. For example, in the short run, New York's share of national vehicle sales is held constant, whereas in the long run the state share would be more likely to vary. The same is true in the baseline simulation, where the option to lease remains available, with regard to leasing as a share of total sales in New York. Also, New York's amenity effect would have to be adjusted if, down the road, bordering states followed suit and effectively removed the option to lease motor vehicles.

Although the longer-term outcomes are less firmly established, we can make a few general observations based on our experimentation. First, as the economy makes compensating adjustments over longer periods of time, we expect the total employment effect to move toward zero. Second, the employment mix across individual sectors of the New York economy would be altered, with a loss in new vehicle dealer jobs and a gain in public sector jobs. Finally, the loss in population for New York would be permanent as long as bordering states did not adopt the same policies on auto leasing.

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APPENDIX

The Impact of Lessor Withdrawal and Higher Acquisition Fees on New York State Vehicular Registrations

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I. Introduction and Background.

The purpose of the report is to analyze what impact, if any, lessor withdrawal or lessor increases in acquisition fees has had on total vehicle registrations in New York State. In 2003 a number of lessors ceased leasing or increased acquisition fees in response to the New York State Legislature's failure to address lessor concerns over elements of the New York vicarious liability law. Table 1 indicates the dates of lessor withdrawals and increases in acquisition fees. At least one additional lessor has announced their intent to withdraw in January, 2004.

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II. Development of the Econometric Model

To evaluate the impact of lessor withdrawal and increased acquisition fees, we found it necessary to (i) estimate the impact of lessor policy changes and (ii) estimate the impact of these policy changes on total registrations.[10] The necessity of the first step, estimating the impact of lessor policy changes, became evident upon examination of the registration data. Table 2 illustrates this using monthly data on lease penetration[11] in New York for Ford, Lincoln, and Mercury. The official Ford Motor Credit leasing withdrawal date was April 1, but the lease penetration data in Table 2 indicates that there were sizeable declines in lease penetration beginning in February. (A conversation with a New York state Ford Motor dealer indicated that Ford Motor Credit tightened leasing in February.) Hence, we could not measure the impact of withdrawal on total registrations through a simple indicator variable for the date of a lessor withdrawal. An additional important complication was that lessors not tied to a particular make,

[10] Registration data comes from Polk. Total registrations = personal total + business total.
[11] Lease penetration = {(personal leases + business leases)/total registrations}*100.

J. P. Morgan – Chase Manhattan, Bank One, and U. S. Bank, withdrew at various dates. Their withdrawal could potentially impact all makes.

To overcome this difficulty, we estimated a model for lease penetration in New York using data from 2002: New York lease penetration by make was regressed on New Jersey lease penetration and United States (sans New York and New Jersey) lease penetration:

$$(1)\ NY\ Lease\ Penetration_{it} = \gamma_i NJ\ Lease\ Penetration_{it} + \lambda_i US\ Lease\ Penetration + u_{it},$$

for i = 1, ..., 34 (i.e., parameters for each make) and t= 1, ..., 12 months of 2002, and where u_{it} represents the error term. This model was then used to predict New York lease penetration for January – September of 2003 (using the available 2003 lease penetration data for New Jersey and the United States less New York and New Jersey), and to construct a variable, lease penetration discrepancy, representing the difference between actual lease penetration in New York in 2003 and predicted lease penetration.

Table 3 illustrates the lease penetration discrepancy for the most recent month for which registration data was available, September, 2003. For example, in the first entry in Table 3, Acura had a lease penetration of 5.7%, but was predicted to have a lease penetration of 43.8% based on model (1). Hence, the lease penetration discrepancy is 38.1%. Note that Table 3 also shows some negative lease discrepancy values; there are small negative values for Mercedes-Benz, Subaru, and Volvo, and a larger value for Jaguar. We believe this is consistent with the facts: Jaguar dealers had known for several months that their manufacturer financed lease option was to be terminated; one would expect to see some dealers have increased leasing, warning potential customers that the leasing option is to be curtailed Further, there may have been some prospective lessees who turned to dealers where the lease option continued to be readily available.

Measuring the impact of lessor withdrawal and acquisition fees using the lease penetration discrepancy, our model to estimate the impact on total registrations is based on the year-on-year growth rate of total registrations:

$$(2)\ \Delta \ln Total\ registrations_{ist} = \alpha_i + \delta_t + \beta_1 Lease\ Penetration\ Discrepancy_{ist} + \beta_2 \Delta Unemployment\ \ rate_{st} + \beta_3 \Delta Unemployment\ rate_{st-1} + \beta_4 \Delta \ln Personal\ Income_{st-3} + \beta_5 \Delta \ln Personal\ Income_{st-4} + + \beta_6 \Delta \ln Personal\ Income_{st-5} + \varepsilon_{ist}$$

for makes i, states s (New York, New Jersey, and Pennsylvania), and time periods t. Note that:

- $\Delta \ln Total\ registrations_{ist}$ is the year-on-year growth rate of total registrations,

  $= \ln Total\ registrations_{ist} - \ln Total\ registrations_{ist-12}$ (natural log of monthly registrations minus the corresponding value from the previous year).
- α_i is a fixed-effect for make i, allowing for each make to have a different year-on-year growth rate
- δ_t is a fixed-effect for a time period allowing for idiosyncratic effects on sales common across makes and states
- $Lease\ Penetration\ Discrepancy_{ist}$ is the lease penetration discrepancy as described on the previous page (and equals zero for New Jersey and Pennsylvania in all periods and equals zero for New York in all time periods prior to 2003).
- $\Delta Unemployment\ rate_{st}$ is the year-on-year change in the monthly unemployment rate for state s in period t (which is common for all makes in a state). Note that the lagged difference in unemployment rates is also included in the model.[12]

[12] State unemployment rates were obtained from the Bureau of Labor Statistics (www.bls.gov).

- $\Delta \ln Personal\ Income_{st-3}$ is the thrice-lagged year-on-year growth rate of personal income for state s (again common for all makes in a state). Note that a total of three lagged differences of ln *Personal Income* are included in the model.[13]
- ε_{ist} is the error term.

Note that in model (2) the parameter β_1 indicates the effect of the lease penetration discrepancy on total registrations: the coefficient estimates the proportional change in total registrations per one-percentage point increase in the lease penetration discrepancy. Correct inferences about the statistical significance of the lease penetration discrepancy depends on correctly estimating the standard error for the coefficient. Heteroskedasticity (unequal error variances for different sample points) will bias the estimates of the standard error. We estimate the model in two different ways to address possible heteroskedasticity.

(i) Weighted least squares. We assume that the variance of the error term is *inversely* related to the sum of total registrations over the sample period. That is, we assume that the error variance for the year-on-year growth rate of total registrations for, say, Ford, is smaller than that of Isuzu or Suzuki and estimate weighting the data with weights proportional to the sum of total registrations over the sample period.

(ii) Heteroskedasticity-robust estimation. An alternate method of addressing the problem of unequal error variances is heteroskedasticity-robust estimation. In this method, each individual error term is weighted differently depending on the values of all the regressors.[14]

[13] State quarterly personal income was obtained from the U.S. Department of Commerce, Bureau of Economic Analysis Regional Economic Accounts (www.bea.gov). Quarterly personal income was only available through the second quarter of 2003. Quarterly values were interpolated to monthly values using the proportional Denton method which imposes the constraint that the monthly values correspond to the quarterly totals. See A. Bloem, R. Dippelsman, and N. Maehle, *Quarterly National Accounts Manual: Concepts, Data Sources, and Compilation*, International Monetary Fund, 2001.

Finally, we note that we estimate model (2) separately for luxury makes (Acura, Audi, BMW, Cadillac, Infiniti, Jaguar, Land Rover, Lexus, Lincoln, Mercedes-Benz, Porsche, Saab, Volvo) and other makes.

Before presenting our findings on the impact of the lease penetration discrepancy, it is useful to characterize the size of the year-on-year growth rates of total registrations. Year-on-year growth rates in monthly registrations for September of 2003 are presented in Table 4. Note that the growth rate for Acura in New York is 0.058, representing the difference in the natural log of total registrations for September, 2003 compared to September, 2002. To transform the growth rates to ordinary percentage changes, we take the exponent, subtract 1, and multiply by 100. For example, for Acura, the percentage change is 5.97% (= 100*(exp(0.058) –1)). Note that the effect of this transformation is much larger as the year-on-year growth rates become larger in magnitude; for example, the year-on-year growth rate for Acura in Pennsylvania is 0.227 so the percentage change is 25.48% (again, = 100*(exp(0.227) –1)).

The principal finding of the study is contained in Table 5. Table 5 contains 8 estimates (and the standard errors) of the parameter β_1 which indicates the change in year-on-year growth rate of total registrations per one percentage point increase in lease penetration discrepancy. Demonstrating the stability of the estimate of the parameter β_1, the estimates are very similar in size whether we use data on year-on-year growth rates for 2002 and 2003 or for 2003 alone, *and* whether we apply weighted least squares or heteroskedasticity-robust estimation. In each of the eight models the coefficient estimate is highly significant (p-value<0.001).

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[14] For example, see Chapter 4 of J. Wooldridge, *Econometric Analysis of Cross-Section and Panel Data*, 2002.

The estimates of the parameter β_1 in Table 5 are quite similar for luxury and other makes. The ultimate impact on the makes, however, is necessarily different in relative terms as luxury makes have a larger lease penetration.

To indicate the extent of the impact on total registrations, Table 6 shows actual registrations in New York in September, 2003, the lease penetration discrepancy (as in Table 3), and the estimated difference in registrations due to the lease penetration discrepancy.[15] In total there were 97,967 registrations in New York in September, 2003; the sum of the estimated difference in registrations by make in that month is –5,272. Hence, these estimates would suggest that 5.4% fewer vehicles were delivered in New York as a result of the change in leasing policy.

III. Additional Considerations.

The curtailment of leasing in New York state can be expected to have a definite impact on both state and local tax revenues and on the consumer welfare of New York residents. We discuss each aspect briefly below.

Between 1990 and early 2003, the number of units leased annually in the United States increased from approximately 0.75 to 3.0 million. Over the 1998-2001 period vehicle leases on an annual basis averaged approximately 4 million units, with 85 percent being between 36 and 48 month duration. Each New York state lease generated a taxable transaction. Unlike a vehicle purchase, a vehicle lease insures an additional taxable transaction at the lease conclusion. Either the leased vehicle is returned, and another new or used vehicle is bought or leased, or the lessee

[15] The estimates in Table 6 are based on the coefficient estimates in the lower left of Table 5 – weighted least squares over the sample period of 2003. Were we to instead apply the parameter

exercises their option to purchase their present vehicle. Under either scenario a taxable transaction occurs. A number of industry analysts have pointed out the surprising stability of the U.S. new vehicle industry during the recent period of macroeconomic weakness was in a significant way the result of 1998-2000 period lessees, forced into the new vehicle market, either as a buyer or lessee, as their current leases expired. Few lessees exercised their purchase options, as the contracted purchase price generally far exceeded its value in used vehicle markets. Thus the unexpected strength of the new vehicle market since 2000. If leasing had been curtailed in New York state over the 1998-2001 period, sales tax revenues would have declined even further than they did. Vehicle leasing acted as a stabilizing force for New York sales tax revenue.

New York state residents are worse off as a result of curtailment of the leasing option. Most lessees choose that option because it permits them to lower their monthly payments by up to 50%, *ceteris paribus*. To approximate the same monthly payment on a purchase, one would need to select a significantly lower-priced vehicle. To the extent that some consumers prefer the lease option, curtailment of that option clearly decreases their welfare.

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estimates from the heteroskedasticity-robust estimation, the estimated difference in registrations in Table 6 would be somewhat larger in magnitude.

Table 1. Lessors Withdrawing or Increasing Acquisition Fees in New York State, 2003.[a]

Action	Effective date:
Withdrawal from Leasing Entirely	
GMAC[b]	May 1
FMCC[c]	April 1[d]
American Honda Finance	July 1
J. P. Morgan – Chase Manhattan	July 1
Bank One	April 1
U. S. Bank	May 1
Increased acquisition fees	
Daimler-Chrysler	May 1
BMW Financial Services	August 1
Toyota Financial Services	April 1
GMAC[a]	March 1

[a] Information on lessor activity was obtained from the Greater New York City Automobile Dealers' Association, the New York Automobile Dealers' Association, and several New York City metro dealers.
[b] GMAC increased acquisition fees in March and withdrew from leasing in May.
[c] FMCC affiliate Primus, which is the factory finance arm for Ford's Jaguar, Land Rover, Mazda, and Volvo, has announced intent to withdraw in January, 2004.
[d] The April 1 date was obtained from a New York dealer and is consistent with the lease penetration data. We note, however, a representative at the New York Automobile Dealers' Association indicated the date was July 15.

Table 2. January-September Lease Penetration in the State of New York in 2003 for Ford, Lincoln, and Mercury.

Month	FORD	LINCOLN	MERCURY
January	14.2	43.2	16.5
February	9.2	24.7	17.0
March	6.3	19.3	10.1
April	2.1	8.2	3.7
May	1.3	4.4	2.5
June	1.5	1.6	1.5
July	0.9	1.9	1.2
August	0.4	0.4	0.2
September	0.2	0.4	0.6

Table 3. Lease Penetration in New York in September, 2003: Illustration of the Effect of Vicarious Liability on Lease Penetrations and Lease Penetration Discrepancy.

Make	Lease Penetration	Predicted Lease Penetration	Lease Penetration Discrepancy
ACURA	5.7	43.8	38.1
AUDI	48.4	55.5	7.1
BMW	67.6	71.7	4.1
BUICK	0.4	5.6	5.2
CADILLAC	0.3	16.2	15.9
CHEVROLET	0.7	8.3	7.5
CHRYSLER	2.4	15.2	12.8
DODGE	0.2	4.5	4.3
FORD	0.2	7.5	7.3
GMC	0.1	7.6	7.5
HONDA	0.9	20.7	19.8
HYUNDAI	0.0	0.0	0.0
INFINITI	48.4	49.1	0.7
ISUZU	0.0	5.8	5.8
JAGUAR	59.9	41.4	-18.5
JEEP	6.1	16.5	10.4
KIA	0.0	0.0	0.0
LAND ROVER	21.6	28.1	6.5
LEXUS	13.9	34.7	20.8
LINCOLN	0.4	10.9	10.5
MAZDA	0.0	3.5	3.5
MERCEDES-BENZ	49.1	47.0	-2.1
MERCURY	0.6	6.7	6.1
MITSUBISHI	23.0	23.9	0.9
NISSAN	30.4	29.9	-0.4
PONTIAC	2.4	15.5	13.1
PORSCHE	31.3	35.4	4.1
SAAB	0.4	17.8	17.5
SATURN	0.1	2.9	2.8
SUBARU	7.4	7.2	-0.2
SUZUKI	0.0	1.2	1.2
TOYOTA	3.8	10.1	6.4
VOLKSWAGEN	19.0	29.1	10.1
VOLVO	35.3	35.0	-0.3

Table 4. Year-on-Year Growth Rate of Total Registrations, By Make, for New York, New Jersey, and Pennsylvania, September 2003.

Make	NY	NJ	PA
ACURA	0.058	0.003	0.227
AUDI	0.092	-0.088	0.038
BMW	0.017	-0.137	-0.280
BUICK	-0.145	0.005	-0.202
CADILLAC	0.240	0.260	0.059
CHEVROLET	0.265	0.108	0.211
CHRYSLER	-0.238	-0.143	-0.090
DODGE	-0.191	-0.024	0.026
FORD	-0.035	0.159	0.063
GMC	0.205	0.133	0.194
HONDA	0.095	0.095	0.202
HYUNDAI	0.192	0.297	0.237
INFINITI	0.350	0.235	0.526
ISUZU	-0.653	-0.101	-0.346
JAGUAR	0.277	-0.033	-0.154
JEEP	-0.046	0.000	0.174
KIA	0.170	0.139	0.152
LAND ROVER	0.117	0.264	0.264
LEXUS	0.063	-0.048	0.203
LINCOLN	0.093	0.030	-0.089
MAZDA	-0.086	0.099	0.058
MERCEDES-BENZ	-0.011	-0.112	0.108
MERCURY	-0.015	-0.011	-0.147
MITSUBISHI	0.335	-0.004	-0.063
NISSAN	0.084	-0.033	0.197
PONTIAC	0.085	0.101	-0.072
PORSCHE	0.498	0.254	0.042
SAAB	0.415	0.670	0.600
SATURN	-0.006	-0.194	-0.162
SUBARU	0.021	-0.173	0.141
SUZUKI	-0.319	-0.134	-0.076
TOYOTA	0.145	0.081	0.134
VOLKSWAGEN	0.097	-0.061	-0.126
VOLVO	0.011	-0.097	0.210

Table 5. Estimates of the Effect of a One Percentage Point Increase in Lease Penetration Discrepancy on the Year-on-Year Growth Rate of Total Registrations.[a]

	Estimation Method			
	Weighted Least Squares		Heteroskedasticity-Robust	
Sample Period	Luxury	Other	Luxury	Other
2002.1-2003.9	-0.005*	-0.007***	-0.007**	-0.012***
	(0.002)	(0.002)	(0.002)	(0.002)
2003.1-2003.9	-0.006**	-0.007***	-0.009***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.003)

[a] Standard errors in parentheses below the coefficients
* Significant at the 5% level
** Significant at the 1% level
*** Significant at the 0.1% level

Table 6. Registrations in New York in September, 2003: Total Registrations and the Estimated Difference in Registrations due to Lease Penetration Discrepancy.

Make	Registrations	Lease Penetration Discrepancy	Estimated Difference in Registrations
ACURA	1,630	38.1	-379
AUDI	923	7.1	-40
BMW	1,639	4.1	-41
BUICK	2,013	5.2	-75
CADILLAC	1,335	15.9	-130
CHEVROLET	12,264	7.5	-656
CHRYSLER	1,844	12.8	-167
DODGE	4,410	4.3	-135
FORD	12,316	7.3	-637
GMC	2,815	7.5	-150
HONDA	9,638	19.8	-1,356
HYUNDAI	4,361	0	-1
INFINITI	1,017	0.7	-4
ISUZU	89	5.8	-4
JAGUAR	765	-18.5	86
JEEP	3,644	10.4	-268
KIA	1,269	0	0
LAND ROVER	426	6.5	-17
LEXUS	1,709	20.8	-217
LINCOLN	1,104	10.5	-71
MAZDA	1,199	3.5	-30
MERCEDES-BENZ	1,882	-2.1	24
MERCURY	1,299	6.1	-56
MITSUBISHI	1,452	0.9	-9
NISSAN	5,820	-0.4	17
PONTIAC	2,268	13.1	-211
PORSCHE	227	4.1	-6
SAAB	530	17.5	-56
SATURN	1,578	2.8	-32
SUBARU	2,121	-0.2	3
SUZUKI	295	1.2	-3
TOYOTA	10,266	6.4	-464
VOLKSWAGEN	2,641	10.1	-189
VOLVO	1,178	-0.3	2