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Abstract  In the parlance of regulatory economics, “pass through” refers to the effect of a change in an incremental cost – generally, the effect of a change in a regulated input price – on the retail price of a good or service. In this paper we examine pass through with regard to the switched access fees paid by long distance companies to local exchange carriers in the United States. We estimate the degree to which long distance companies pass through differences in access rates to their customers, and we examine whether mandates imposed by regulators on long distance companies to pass through access fee reductions to customers affect the extent of pass through. We evaluate annual panel data on intrastate long-distance revenues, access expenses, and minutes of use from 2004 to 2008 in each of the 50 states in the U.S. using a proprietary and detailed data set. We leverage the fact that some states have accompanied access rate reductions with pass through mandates, and others have not. Using standard multivariate regression techniques our results are consistent with 100% pass through of access rate reductions in states that have undergone regulatory access reform. We also find that a regulatory mandate on long distance companies to pass through access rate reductions has no statistically significant effect on the magnitude of access fee pass through, supporting the economic hypothesis that pass through is driven by incentives for profit maximization and by competitive forces.

JEL Classifications: L51, L96, D22, L98

Keywords: Pass through, Switched access, Pricing, Regulation, Natural experiment

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1. Introduction

In the parlance of regulatory economics, “pass through” refers to the effect of a change in an incremental cost—generally, the effect of a change in a regulated input price—on the retail price of a good or service. Pass through is a topic of interest to economists and policymakers because it is a fundamental principle of microeconomic theory that a profit maximizing company facing an increase (or, resp., decrease) in its incremental cost will rationally increase (resp., decrease) its price to customers. Accordingly, policy initiatives that will increase or decrease a company’s incremental costs of production will tend to have an indirect effect on consumers through the effect on prices. Regulators therefore have a natural interest in determining whether the theoretical effect on customers of a change in a regulated company’s incremental costs is borne out by the behavior of real business firms in the predicted fashion.

The issue is particularly topical for telecommunications carriers, regulators, and customers because of current regulatory reform efforts before the FCC and numerous state commissions aimed at reducing long-embedded cross-subsidies in regulated intercarrier fees for wireline interconnection and reducing the associated distortions to competition between legacy regulated wireline services and services offered over newer technologies including wireless and VoIP. Regulators predictably express concern that reducing intercarrier fees for interconnection will benefit the carriers paying those fees, but with little or no concomitant benefits to consumers in the form of lower prices. The issue can be expressed as the question of whether the carriers paying the relevant fees, to whom they are an incremental cost of production, will “pass through” reductions in those rates to consumers by decreasing retail prices—and if so, by how much. In this paper we examine pass through with regard to the interconnection fees paid by
interexchange carriers ("IXCs," colloquially referred to as "long distance carriers") to wireline local exchange companies for originating or terminating in-state long-distance calls in the United States.

The interconnection fees we study are known as “switched access” rates. Switched access rates are the regulated prices paid by wireline IXCs to wireline local exchange carriers ("LECs") to transport the portion of IXC calls that begin or terminate on the LECs’ networks.\(^1\) Switched access fees, which are assessed largely on a per-minute-of-use basis, are the IXCs’ predominant input cost in the provision of wireline long-distance service and can equal well over half of an IXC’s long-distance revenues.\(^2\)

The existing switched access fee framework in the United States was implemented in 1984 as a result of the AT&T divestiture. This framework initially established switched access rates at very high levels (relative to cost) in order to maintain a cross-subsidy policy that sought to encourage local telephone companies to keep the price of local service below cost (Brock 1994). Switched access fees for originating and terminating interstate long distance calls are regulated by the FCC. The same service rendered for intrastate calls are today under state jurisdiction and are regulated by state regulatory commissions.\(^3\) Shortly after divestiture the

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\(^1\) When the terminating functionality is provided by one LEC to another LEC under a local area calling arrangement, the call-termination functionality provided is the same as the functionality provided to terminate a long distance call, but the intercarrier fee paid is called “reciprocal compensation.” Expenses for reciprocal compensation were not considered in this study

\(^2\) Wireless carriers are also subject to switched access fees, but, at least for the intrastate fees we study in this paper, only in very limited circumstances. FCC regulations require wireless carriers to pay intrastate access fees only for intrastate calls that cross the boundary of a Major Trading Area (“MTA”). MTA’s are typically large, multistate areas with relatively few boundaries within a state. Wireline long distance carriers must pay intrastate access fees for any intrastate call that crosses the boundary of an “exchange,” of which there are typically dozens or even hundreds in a state. Hence, as a practical matter intrastate access fees are far less material to wireless service providers than to wireline long distance carriers

\(^3\) In some states there appear to be no specific rules governing intrastate access rates charged by CLECs, though their interstate rates are governed and capped by the FCC.
FCC began efforts to reduce interstate switched access rates closer to cost.\textsuperscript{4} Likewise, several states have followed the FCC’s lead and have taken steps to reduce intrastate switched access rates. These efforts have progressed slowly and incrementally for well over a decade and are ongoing today. Surrounding these efforts has been a debate regarding whether reductions to switched access fees benefit consumers in the form of reduced prices, or instead provide a windfall gain to the direct recipients of these reduced fees, the long-distance companies. A number of applied economic studies have been performed to address this debate.

There appears to be a consensus in the existing empirical literature that long distance providers do in fact pass through access rate reductions. This result begs the question, however—which to our knowledge is unaddressed in the literature—of the extent to which access pass through is market-driven, as opposed to being driven by regulatory mandates on long distance providers to pass on access fee reductions in lower long-distance prices. This question is of particular importance to regulators, who on the one hand want to insure that access rate reductions benefit customers and not just inure to the bottom line of the long distance companies; and who on the other hand would seek to avoid costly and perhaps futile attempts to enforce a requirement that may be superfluous.

In this paper we explore the effect of intrastate access rate differences across states on retail intrastate toll prices, and the impact of regulator mandates to pass through intrastate access rate reductions on actual access fee pass through. We evaluate annual panel data on intrastate long-distance revenues, access expenses, and minutes of use from 2004 to 2008 in each of the 50 states in the U.S. using a proprietary and detailed data set of AT&T’s long distance company’s

\textsuperscript{4} In more recent years the FCC implemented significant access reforms in May 1997, May 2000, and November 2001 with the releases of its \textit{Access Charge Reform Order}, \textit{CALLS Order}, and \textit{MAG Order}, respectively. Over a four-year period, the per-minute interstate switched access rate declined, on a per toll conversation minute basis, from 6.04¢ in January 1997 to 1.71¢ in January 2002. See, Trends in Telephone Service, (2008), Table 1.2.
expenses and revenues. We leverage the fact that some states impose mandates on long distance companies to pass through access rate reductions and others do not. We also leverage the fact that some states have undergone access reform proceedings while others have not, and that there is meaningful variance in access rates within and between these groups.

We find that in the states that have undergone access reform (which we call the “reform states”), the level of pass through for both residential and business toll services is consistent with full (100%) pass through, where by 100% pass through we mean that the reductions in the intrastate toll prices charged by AT&T correspond in equal dollar amount on a per-minute-of-use basis to the reductions in the intrastate access expenses incurred by AT&T. We also find, in what we believe is a unique contribution to the literature, that in the reform group regulator-mandated pass through requirements have no statistically significant impact on the level of access pass through to residential or business customers, supporting the hypothesis that pass through is driven by incentives for profit maximization and by competitive forces. In contrast, we find in the non-reform group states that AT&T passes through most of the access cost reductions to its residential and business toll customers, but not an amount consistent with 100% pass through. This is true even in non-reform states where there is a pass-through mandate.

Finally, we find that the act of undertaking access reform in itself is a meaningful predictor of whether access rate differences will be passed through to consumers: retail toll rates are more sensitive to differences in access rates in states that have undertaken reform than in those that have not, even controlling for the access rates themselves and the presence or absence of a pass through mandate.

We believe that these results have important policy implications. First, we find that access reform does in fact lead to lower retail toll prices to the full measure of the access
reductions, benefiting customers and reducing competitive distortions across technology platforms. Second, regulator-mandated pass through requirements have no measureable effect when imposed in the context of access reform. And third, access reform appears to make the market work better, so that the degree of pass through—i.e., the extent to which high access rates are reflected in correspondingly high toll rates and low access rates are reflected in correspondingly low toll rates-- is higher where there has been reform than where there has not.

The remainder of our paper is organized as follows. In Section 2 we review the literature on pass through and related economic issues, including the literature on incidence of taxation. Section 3 describes the framework for our analysis and Section 4 lays out our empirical design and hypotheses. In Section 5 we present our empirical results. Section 6 provides some comments on the policy implications of our results. We offer concluding comments in Section 7.

2. Review of the Literature

The economic issue of pass through (or equivalent concepts) has been addressed in a number of contexts in the published empirical literature. In general, the debate over pass through concerns the effect of a change in a producer’s incremental costs on the retail price paid by customers. Under standard micro-economic theory, any change in the marginal costs of production will, ordinarily, lead to a change in the corresponding observed retail price paid by customers for the product. “Full” pass through means that retail price changes should fully reflect any changes in the incremental costs of providing the product.

The incentive to modify prices in response to cost changes can be driven by competitive pressures, but is not dependant on competition. Any firm, including a pure monopolist, has an incentive to reduce its price when its incremental costs fall, because at lower incremental costs
profits are higher at lower prices. Under a variety of competitive models, lower incremental costs lead to lower retail prices, but the degree of pass through may be less than, equal to, or greater than 100% depending on the elasticity of demand, shape of the cost function, and competitive conditions. For instance, in the standard model of perfect competition and constant returns to scale, changes in marginal cost are fully passed through to customers and all quantity changes are accommodated through entry and exit. When these assumptions are relaxed, pass through of precisely 100 percent of the change in marginal cost may not hold and could be greater or less than 100%.\(^5\)

Pass through has been evaluated in the Public Economics literature under the rubric of tax incidence.\(^6\) Studies of tax incidence examine how the burden of a particular tax is allocated among consumers through higher product prices, workers through a lower wage rate, or other factors of production through lower rates of return to those factors.

The empirical literature on tax incidence has focused on imperfectly competitive markets. The primary result of these studies is that in imperfectly competitive markets, retail prices tend to “overshift,” i.e., increase by more than the amount of the tax (Fullerton and Metcalf 2002; Poterba 1996). One such study, Besley and Rosen (1999), examine the impact of state and local sales taxes on the prices of a number of grocery items, including bread, shampoo, and carbonated beverages, and find substantial evidence of overshifting. The authors attribute these results to market power in many local grocery markets. Likewise, Harris (1987) examines cigarette prices also finds evidence of overshifting. The author analyzed the change in cigarette prices that

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\(^5\) For example, consider a constant-marginal-revenue demand function of the form \(P = m + c/Q\), and linear marginal cost, so that \(TC = aQ^2\). Then it is elementary to show that for constant per-unit taxes \(t\), an increase in the tax will cause a monopolist to increase price by more (less) than the increase in tax as \(2ac > (<) (m-t)^2\). Even in perfectly competitive markets, the price increase may exceed or fall below the amount of the tax in the long run if there are economies or diseconomies (resp.) of scale.

\(^6\) For example, an entire chapter in the Handbook of Public Economics is dedicated to the study of tax incidence in the field of Public Economics. See, Fullerton and Metcalf (2002).
coincided with a 1983 increase in the federal cigarette excise tax and found that a 9-cent per pack tax led to a price increase of 16-cents per pack.\footnote{Harris (1987), as cited and described in Besley and Rosen (1999); Poterba, (1996).} If the result were symmetric—that is, if the effect of tax decreases corresponded to the effect of tax increases—it would imply that reductions in taxes would lead to price decreases of more that the tax reduction, but the tax incidence literature does not appear to have tested the effects of tax decreases.

A related field of empirical literature has examined pass through “stickiness,” and in particular the asymmetry of this stickiness. Borenstein, Cameron, and Gilbert (1997), using semi-monthly data, find that wholesale gasoline prices respond quickly and fully to crude oil price increases, but do not respond immediately (i.e., within the same two week period as the change in the crude oil price) to crude oil price decreases. The decreases in the crude oil prices are eventually fully passed through to wholesale gasoline prices, but the adjustment takes many weeks. The results of Borenstein et al. (1997) on the asymmetry of the speed of response is corroborated by Peltzman (2000), who considers a wide sample of over 200 consumer and producer goods. In subsequent research, Borenstein and Shepard (2002) find that firms with market power exhibit slower pass through of crude oil price decreases. They also find that supply adjustment costs induce price stickiness. Because adjusting levels of production is costly, firms spread the adjustment over time, by gradually (with a month, in their study) achieving the full quantity increase implied by a decline in cost.

In the regulatory economics literature, there are a number of empirical studies that estimate the pass through of switched access fees for retail long-distance service. One of the first analyses is by William Taylor and Lester Taylor (1993), who perform a simple comparison of the observed reduction in AT&T’s annual interstate toll revenues to the observed reduction in
AT&T's annual switched access payments from 1984 through July 1992. The authors find that AT&T's interstate toll retail revenues fell by $8.2 billion, while its switched access payments fell by $10.1 billion. This has been interpreted by some authors (Kaserman and Mayo 2002) as consistent with full pass through and by others (Crandall and Waverman 1995) as inconsistent. As explained shortly, however, one cannot conclude that price did or did not fall by the full amount of the decrease in access rates by comparing the change in retail revenues with the change in total access costs, because the change in retail revenues reflects changes in quantity of toll services sold as well as changes in price.

In a subsequent study, building upon the findings of Taylor and Taylor (1993) and extending the data through the first quarter of 1995, William Taylor and Douglas Zona (1997) find similar results: on a nominal basis (i.e., before adjusting for inflation), AT&T’s retail revenues for interstate services fell by $8.521 billion, while its access charge expenditures fell by $10.299 billion. In the Taylor and Taylor (1993) study and the Taylor and Zona (1997) study, the authors conjecture that their findings are the result of regulator-mandated pass-through requirements, rather than voluntary, market-based pass-through decisions. According to Taylor and Zona:

[The evidence] suggests that regulation and the threat of antitrust intervention is the constraining force in the market…[T]he consumer welfare gains that have been realized (perhaps only because the FCC required AT&T to reflect changes in access charges in price) are smaller than the [much larger potential] gains that could have been realized.\(^8\)

However, this statement appears to be based only upon conjecture. Neither the 1997 study nor the previous study by Taylor and Taylor (1993) control for the impact of a regulator mandate on the rate or amount of access pass through.

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A third study addressing access pass through—this one looking specifically at intrastate rates—was conducted by Robert Crandall and Leonard Waverman (1995). Their analysis examined a sample of AT&T’s tariffed intrastate interLATA toll rates and intrastate access charges from 1987-1993, and, consistent with the findings of the studies of interstate long distance rates, determined that reductions in intrastate switched access fees were associated with a reduction in AT&T’s tariffed intrastate interLATA toll rates. They also controlled for the influence of retail rate regulation on pass through and determined that the type of retail pricing flexibility afforded by the state regulator has a significant influence on the extent to which access charge reductions were passed through to AT&T’s tariffed intrastate interLATA prices. The authors concluded that greater retail pricing flexibility increased the amount of access fee pass through; whereas less or no retail pricing flexibility reduced the amount of access fee pass through. Like the earlier studies summarized above, the authors do not consider or control for the impact of a regulator mandate to pass through access rate reductions on the observed amount of access pass through.

A more recent analysis of interstate residential long distance prices by Beard et al. (2005) reinforces earlier findings that access reductions are passed through to consumers through lower long distance prices. Using a number of statistical tests, the authors examined the effects of mandated reductions in interstate switched access charges on average per-minute prices for interstate long-distance services provided by AT&T and MCI from January 1997 through July 1998. The study found nearly 100% pass through of access price reductions by both AT&T and MCI over the period studied.

A third and separate issue unaddressed in the literature is the extent to which access reform itself impacts the level of pass through. The literature on what Kridel et al. (1996) call the
“demonstration effect” suggests that the process of reform might itself alter market conduct, which in turn might lead to increased market-driven pass through. Our study design permits us to test whether the process of reform does in fact have an effect on the behavior of the regulated firm in passing through reductions in regulator-determined costs.

3. The Framework of Analysis

Our study takes advantage of the unique opportunity afforded by the state-level transition to access reform; namely, the requirement in an increasing number of states that the intrastate switched access rates charged by incumbent local exchange companies (“ILECs”), and in many instances by competitive local exchange companies (“CLECs”) be reduced and thereafter correspond to (i.e., “mirror”) interstate switched access rates. We take advantage of the variation in state regulatory policy across states and over time. The analysis is based on proprietary and confidential panel data provided to us by AT&T consisting of annual observations on AT&T’s intrastate long distance services from 2005 to 2008 from all 50 states. We begin by estimating the rate of access pass through, and the effect on access pass through of regulator mandated pass through requirements, in all states that have not undergone access reform (the “non-reform” group) and in states that have undergone access reform (the “reform” group). We then compare the level of access pass through in the non-reform group to the level of access pass through in the reform group. Our study examines state-level data and, thus, unlike the preponderance of previous pass through studies that consider the interstate marketplace, it exploits the differences in regulatory policy across states. To our knowledge, the present study is the first to consider the impacts of access reform and a pass through mandate on the level access pass through.

For purposes of this study, we define “significant intrastate switched access reform” as the adoption and implementation of a requirement that the major ILEC’s intrastate switched
access rates are reduced and thereafter correspond to (i.e., “mirror”) interstate switched access rates. This is a common and reasonably well-defined form of regulatory reform of access rates at the state level.

We first determined whether a state has undergone such reform during or before the time period of our data by reference to internal AT&T documents that memorialize where access reform has occurred. We then examined the relevant state legislation and/or regulatory orders that established the reform to verify that the state had established a mirroring requirement and the timing of the requirement. In some cases, although mirroring had been ordered, it had not been carried out for various reasons, so we also checked to see that the major ILEC in the state did currently have matching rates in the interstate and intrastate jurisdictions.

We posit that pass through can be separated into two distinct phenomena, depending on its cause. Pass through that is motivated by the incentive of the long distance company to modify its prices in response to changes in its incremental costs we refer to as “market-based pass through.” The incentive to modify prices in response to cost changes can be driven by competitive pressures, but is not dependant on competition. Any firm, including a pure monopolist, has an incentive to reduce its price when its incremental costs fall, because at lower incremental costs profits are higher at lower prices. As discussed above, under a variety of competitive models, lower incremental costs lead to lower retail prices, and the theoretical profit maximizing degree of pass through may be less than, equal to, or greater than 100% depending

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9 In some states the mirroring requirement has applied to all ILECs or all LECs, and in some it has applied only to the major ILEC in the state. We treated the state as having undergone significant access reform if the major ILEC was required to mirror whether or not the requirement applied to other LECs as well.

10 In some states AT&T was the major ILEC and in others it was not. We control for this fact in our empirical analysis.
on the elasticity of demand, shape of the cost function, and competitive conditions. Under perfect competition with constant returns to scale, pass through would be 100% in the long run.

The second form of pass through is that resulting from a mandate by the state commission or a formal commitment by the local exchange carrier to the regulators to pass through access rate reductions. Such pass through would consist of price reductions that the long distance carrier would not have chosen to make on the basis of its own profit maximization incentives or competitive pressures, but that it makes anyway in order to satisfy a mandate by the commission or commitment it made to the regulators. We estimate the separate effects of these two forms of pass through.

To determine whether a state had a pass-through mandate we reviewed the state statutes, Commission rules and Commission orders for either mandated pass through of access charges and/or Commission ordered examination of toll prices for evidence of full pass through. In addition, AT&T provided us with information on states where AT&T made a commitment to regulators, as part of an access reform proceeding, to reduce retail toll rates in response to lower access charges. We considered a state with an AT&T commitment to the regulator to pass through access reductions to be a state with a regulatory pass through mandate.

Because in the telecommunications marketplace business and residential customers are generally treated distinctly both by carriers and regulators, we conduct our analysis separately for business and for residential toll prices. In what follows, the analysis described is therefore conducted twice, once with respect to business customers and once with respect to residential customers, though for economy of presentation we will not establish differentiating notation.
4. The Empirical Model

The “level of access pass through” refers to the percentage of a reduction in the incremental expense of access to a long distance carrier associated with one minute of toll calling that is reflected in reduced average retail prices for a minute of a toll call. For example, if the incremental intrastate access expense to a long distance provider associated with providing one minute of toll calling declined by 1¢, the rate of pass through would be 100% if the average retail price of intrastate toll service fell by 1¢ per minute. A nuance of this market is that for a typical residential call, there are two access minutes (a terminating access minute and an originating access minute) associated with each toll conversation minute, so a reduction of the access rate by $\frac{1}{2}$¢ per minute would equal a decline in the long distance carrier’s per minute access expense for a minute of toll calling by 1¢. Hence, for residential services, 100% pass through of a decline in access rates of 1¢ would be a decline in the retail toll price of 2¢.\footnote{As we will explain later, on average the number of access minutes associated with a minute of toll calling for business customers is significantly fewer than 2 due to bypass opportunities. Hence, the decline in business prices that would reflect 100% pass through of a 1¢ reduction in access rates must be adjusted for this fact and would be less than 2¢.}

We consider this the most natural definition of pass through. Alternative definitions could refer to the percentage of the total decrease in access expense (as opposed to the per-minute decrease in access expense) resulting from a decrease in access rates that is reflected in a decrease in total retail revenue. We consider this to be a less natural definition because it fails to account for the change in quantity of output that naturally arises from a change in price. Consider the following example: suppose that before an access rate reduction, a company is selling 50 units of output at a retail price of 11. Access expense per minute fall by 1, from 6 to 5, and suppose retail prices therefore fall to 10, causing output to increase to 60. Under this circumstance, total revenue would increase from 550 to 600, and total access expense would not
change—at an access rate of 6, total access cost was 300 (6x50), and at a rate of 5 total access cost is 300 (5x60). Hence, although we would consider this to be full pass through because the per minute retail price decrease would fully reflect (exactly equal) the per minute access expense decrease, there would be an increase in total revenue (because many more units would be sold at the lower price) and no increase in total access cost (because more access units would be purchased, just offsetting the decreased price per unit in this example). Note also that there is no implication that profit would increase, however, if average non-access costs of production are constant through the relevant range of output, the firm’s profits would be the same before and after the decrease in access rates, because the increased revenue would be exactly offset by the increased costs of producing the additional units stimulated by the lower price.

The intrastate access rate for a state j in year t was determined by dividing AT&T’s intrastate switched access expenses in state j in year t by the corresponding minutes of intrastate access in state j in year t. Intrastate access expenses included all traffic sensitive and non-traffic sensitive rate elements associated with switched access.

The average retail price of residential intrastate long distance service for state j in year t was determined by dividing the total residential toll revenue for state j in year t by the number of residential toll conversation minutes in state j in year t. The average retail price of business intrastate long distance service was calculated in the corresponding way. The total toll revenues included any fixed charges such as the “in-state connectivity fee” that is imposed on intrastate toll customers in some states.

To determine the impact of access flow through, we examine the following two reduced form relationships, where the superscripts denote the group to which the coefficient belongs – reform (R) or non-reform (NR):
Reform Group

\[
\text{Retail Price}_{st} = \alpha^R_1 + \alpha^R_2 \text{Access}_{s,t-1} + \alpha^R_3 \text{Mandate}_{st} \times \text{Access}_{s,t-1} + \alpha^R_4 \text{ILEC}_{s} + \alpha^R_5 \text{Year}_{t} + \epsilon_{st}
\]  

(1)

Non-Reform Group

\[
\text{Retail Price}_{st} = \alpha^{NR}_1 + \alpha^{NR}_2 \text{Access}_{s,t-1} + \alpha^{NR}_3 \text{Mandate}_{st} \times \text{Access}_{s,t-1} + \alpha^{NR}_4 \text{ILEC}_{s} + \alpha^{NR}_5 \text{Year}_{t} + \epsilon_{st}
\]  

(2)

Where each variable is defined as:

- \(\text{Retail Price}_{st}\) = Average revenue per minute for residential (or business) intrastate toll service earned by AT&T in state \(s\) in year \(t\);
- \(\text{Access}_{s,t}\) = Average switched access expense per minute for intrastate toll service paid by AT&T in state \(s\) in year \(t\);
- \(\text{Mandate}_{st}\) = Dummy variable equal to one if state \(s\) at in year \(t\) mandates toll providers to reduce retail prices or AT&T has formally committed to reduce retail prices by an amount equal to the reduction in switched access fees, and 0 otherwise;
- \(\text{Mandate}_{st} \times \text{Access}_{s,t}\) = An interaction variable that multiplies the dummy variable \(\text{Mandate}_{st}\) by the variables \(\text{Access}_{s,t}\);
- \(\text{ILEC}_{s}\) = Dummy variable equal to one if AT&T is an incumbent local exchange carrier in state \(s\), and 0 otherwise; and
- \(\text{Year}_{t}\) = A discrete variable equal to the year \(t\).

As mentioned, equations (1) and (2) are applied separately to residential and business intrastate toll services. In one set of regressions, AT&T’s business intrastate toll service price is regressed on the independent variables specified in equations (1) and (2), and in a separate set of regressions, AT&T’s residential intrastate toll service price is regressed on the same independent variables specified in equations (1) and (2). The data are summarized in Table 1. Five years of data were collected on all 50 states at annual frequencies from 2004 to 2008.
Table 1: Variable Names and Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non-Reform Group (States Without Access Reform)</th>
<th>Reform Group (States With Access Reform)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (Standard Dev.)</td>
<td>Mean (Standard Dev.)</td>
</tr>
<tr>
<td>Business Retail Price^</td>
<td>$0.064 (0.024)</td>
<td>$0.045 (0.013)</td>
</tr>
<tr>
<td>Residential Retail Price^</td>
<td>$0.091 (0.042)</td>
<td>$0.052 (0.016)</td>
</tr>
<tr>
<td>Access^</td>
<td>$0.034 (0.020)</td>
<td>$0.016 (0.007)</td>
</tr>
<tr>
<td>Mandate^^</td>
<td>0.646 (0.480)</td>
<td>0.774 (0.423)</td>
</tr>
<tr>
<td>Mandate * Access^</td>
<td>0.020 (0.020)</td>
<td>0.012 (0.009)</td>
</tr>
<tr>
<td>Year</td>
<td>2006.49 (1.119)</td>
<td>2006.53 (1.137)</td>
</tr>
<tr>
<td>ILEC^</td>
<td>0.299 (0.460)</td>
<td>0.830 (0.379)</td>
</tr>
</tbody>
</table>

^The difference between the group means is significant at the 95% level.
^^The difference between the group means is significant at the 90% level.

Sources: AT&T Proprietary Data

A visual inspection of the descriptive statistics presented in Table 1 makes clear that there are important differences between the non-reform and reform groups. AT&T’s retail prices and access expense are significantly higher in states that have not undergone access reform as compared to states that have undergone access reform. AT&T’s average per minute price for residential and business toll service is 73% and 40% higher, respectively, in states without access reform, and the average per-minute access fee paid by AT&T is over twice as high in states without access reform. Also worth noting is that states without access reform are slightly less likely to impose a mandatory pass through requirement on toll providers (65% vs. 77%). In addition, AT&T is significantly less likely to be an incumbent local exchange carrier in states without access reform (30% vs. 83%).
There are four hypotheses we seek to test. Two hypotheses examine market performance within the non-reform group and reform group, and the same two hypotheses are applied to compare market performance between the two groups. The questions this study seeks to answer are the following:

1. Is access pass through in the non-reform and reform groups complete (100%) or less than complete?
2. Is access pass through in the non-reform group equal to or different from access flow through in the reform group?
3. Is access pass through in the non-reform and reform groups affected by a state mandate that toll providers reduce retail prices by an amount equal to the reduction in switched access fees ("regulator mandated pass through")?
4. Is regulator-mandated pass through in the non-reform group equal to or different from regulator-mandated pass through in the reform group?

The formal statement of each question in the form of a hypothesis is presented below.

**A. Hypothesis Test 1: Market-Based Pass Through**

Hypothesis Test 1 tests whether the level of market-based pass through, as measured by the coefficients $\alpha_2^{NR}$ and $\alpha_2^R$, is consistent with full pass through, holding constant the impact on pass through of a mandatory pass through requirement, $\alpha_2^{NR}$ and $\alpha_2^R$, which are the subjects of Hypothesis Tests 3 and 4.

**Residential equations**

<table>
<thead>
<tr>
<th>H₀: $\alpha_2^{NR} = 2$</th>
<th>H₀: $\alpha_2^R = 2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁: $\alpha_2^{NR} \neq 2$</td>
<td>H₁: $\alpha_2^R \neq 2$</td>
</tr>
</tbody>
</table>

**Business equations**

<table>
<thead>
<tr>
<th>H₀: $\alpha_2^{NR} = 1.00$</th>
<th>H₀: $\alpha_2^R = 1.00$</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₁: $\alpha_2^{NR} \neq 1.00$</td>
<td>H₁: $\alpha_2^R \neq 1.08$</td>
</tr>
</tbody>
</table>

In states with a regulator-mandated pass through requirement, total (market-based plus mandated-based) pass through is determined by testing whether the combined coefficient effects,
(\alpha_2^{NR} + \alpha_3^{NR}) and (\alpha_2^B + \alpha_3^B), exceed 2 and 1.08 in the residential and business intrastate toll markets, respectively.

To understand these hypotheses, we must describe the relationship between toll (retail) minutes and access (wholesale) minutes. When an AT&T customer places a toll call, for each minute of retail service he can consume up to two access minutes: an originating access minute paid by AT&T to the LEC serving the toll customer, and a terminating access minute paid by AT&T to the LEC serving the called party.\textsuperscript{12} If, however, a customer bypasses the originating LEC and connects directly to AT&T’s long distance network (which is typically a business customer who generates large volumes of toll traffic), then that customer will generate only one (terminating) access minute per toll minute, or even zero access minutes per toll minute if the called party is also an AT&T bypass customer. Such an arrangement is called “bypass.” Unfortunately, the access minutes data do not identify the type of customer (business or residential) that generates (causes) the access minute. In our analysis, we make the reasonable and conservative assumption that there is no residential bypass. Therefore, we assume a 1:2 ratio exists between residential retail toll minutes and residential wholesale access minutes. Under that assumption, full pass through would generate a coefficient of two on the access fee variables (\alpha_2^{NR} and \alpha_3^B) in the residential equations (1) and (2).

Based on the assumed residential ratio of 1:2 (toll minute to access minute), the ratio of toll minutes to access minutes for business customers can be derived from the data by subtracting from the access minutes in each state twice the number of residential toll minutes and attributing

\textsuperscript{12} In our data, even if AT&T is the LEC providing originating or terminating access, an access minute sold by AT&T the LEC to AT&T the long distance provider is recorded as an access minute.
the remainder to business calls. The derived average ratio of business toll minutes to business access minutes turns out to be 1:1.08 for both the non-reform group and the reform group. Therefore, full pass through can be inferred by a coefficient of 1.08 on the access fee variables ($\alpha_{2}^{NR}$ and $\alpha_{2}^{F}$) in the business equations (1) and (2).

**B. Hypothesis Test 2: Market-Based Pass Through**

Hypothesis Test 2 tests whether there is a statistically significant difference between the level of market-based pass through in states with access reform ($\alpha_{2}^{F}$) and states without access reform ($\alpha_{2}^{NR}$).

<table>
<thead>
<tr>
<th>Residential and Business equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₀: $\alpha_{2}^{NR} = \alpha_{2}^{F}$</td>
</tr>
<tr>
<td>H₁: $\alpha_{2}^{NR} \neq \alpha_{2}^{F}$</td>
</tr>
</tbody>
</table>

**C. Hypothesis Test 3: Regulator Mandated Pass Through**

If regulator-mandated pass through requirements are serving the purpose intended by regulators, we would expect a mandate to have a positive incremental effect on the level of pass through; i.e., $\alpha_{2}^{NR} > 0$ and $\alpha_{2}^{F} > 0$. Alternatively, a regulator-mandated pass through requirement could have the perverse effect of reducing pass through; i.e., $\alpha_{2}^{NR} < 0$ and $\alpha_{2}^{F} < 0$. Hypothesis Test 3 considers both of these possible outcomes and tests whether the imposition of a regulator-mandated pass through requirement has a statistically significant impact (positive or negative) on the level of access pass through, above and beyond the level of market-based pass through.
considered in Hypotheses Test 1, versus the possibility that it has no effect at all ($\alpha_3^{NR} = 0$ and $\alpha_3^B = 0$).

<table>
<thead>
<tr>
<th>Residential and Business equations</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0: $\alpha_3^{NR} = 0$</td>
</tr>
<tr>
<td>H1: $\alpha_3^{NR} \neq 0$</td>
</tr>
<tr>
<td>H0: $\alpha_3^B = 0$</td>
</tr>
<tr>
<td>H1: $\alpha_3^B \neq 0$</td>
</tr>
</tbody>
</table>

**D. Hypothesis Test 4: Regulator-Mandated Pass Through**

Hypothesis Test 4 tests whether there is a statistically significant difference between the level of regulator-mandated pass through in states with access reform ($\alpha_3^R$) and states without access reform ($\alpha_3^{NR}$). It captures the effect of regulatory reform over and above the direct effect of the changes in access rates on retail toll prices. If a regulatory mandate to pass through access rate reductions in fact increases the level of pass through, this coefficient would be positive. We also consider the possibility that a regulatory mandate decreases the level of pass through, in which case the coefficient would be negative. An entirely ineffective mandate would result in a zero coefficient on $\alpha_3^R$.

<table>
<thead>
<tr>
<th>Hypothesis Test 4: Regulator-Mandated Pass Through</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0: $\alpha_3^{NR} = \alpha_3^R$</td>
</tr>
<tr>
<td>H1: $\alpha_3^{NR} \neq \alpha_3^R$</td>
</tr>
</tbody>
</table>

**5. Empirical Results**

We apply a multivariate regression analysis to equations (1) and (2) separately for AT&T’s business toll services and AT&T’s residential toll services. Therefore, the analysis is comprised
of four ordinary-least-squares regression equations. We estimate the equations using a lag structure in which the dependent variable (retail intrastate toll price) in time \( t \) is regressed on the intrastate access rates in time \( t-1 \), on the theory (and consistent with the literature previously discussed) that it takes some time for retail prices to respond to cost changes, combined with the limitation in our data that we have only annual observations and we do not know what month in a given year the access rate changes took effect. The other independent variables are not lagged. In subsection 2A we describe the results from the regressions on residential toll services, and in subsection 2B we describe the results from the regressions on business toll services.

A. Residential Toll Service

Table 2 presents the results from estimation of the reduced form equations (1) and (2), with the average residential toll price per minute as the dependent variable. Where a single number is listed, the variable is restricted to having the same impact across the reform and non-reform groups.\(^{13}\)

<table>
<thead>
<tr>
<th></th>
<th>Non-Reform Group</th>
<th>Reform Group (^{**})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>3.713(^*)</td>
<td>1.977(^*)</td>
</tr>
<tr>
<td>(1.37)</td>
<td>(4.92)</td>
<td></td>
</tr>
<tr>
<td>Access</td>
<td>1.429(^*)</td>
<td>1.977(^*)</td>
</tr>
<tr>
<td>(15.77)</td>
<td>(4.92)</td>
<td></td>
</tr>
<tr>
<td>Mandate*Access</td>
<td>0.243(^*)</td>
<td>-0.368</td>
</tr>
</tbody>
</table>

\(^{13}\) We conducted the analysis in two stages. In the first stage we estimated a reduced form equation that permitted a separate coefficient for each independent variable, including the intercept, as a function of whether it pertained to the non-reform group or the reform group. We then performed joint hypothesis tests on each pair of reform and non-reform coefficients. That is, we tested to determine whether the intercept is statistically different in the non-reform and reform groups, and similarly for all of the other independent variables. In the second stage, in order to increase the efficiency of the regression, we estimated a restricted reduced form equation, where the paired coefficients that failed to reject equality across groups were restricted to a single coefficient estimate. For the paired coefficients that rejected equality across groups no restrictions were placed on the coefficients.
These results demonstrate that for residential toll services, AT&T passes through most of the access cost differences (about 71%) to its residential toll customers in non-reform states. However, AT&T passes through a significantly larger share (point estimate of almost exactly 100%) of access cost reductions to its residential toll customers in states with access reform than in states without access reform.

Furthermore, in states with access reform, imposition of a regulator-mandated pass through requirement does not have a significant incremental impact on the level of access pass through (and the coefficient estimate is negative, which would imply, if it were significant, that a mandate decreases the level of pass through in reform states). In states without access reform, a mandate has a statistically significant effect of increasing the level of pass through.

The coefficients on the variables Year and ILEC are both negative. The negative coefficient on Year indicates that the passage of time has caused residential toll prices to decline, even controlling for (that is, over and above the effect of) reductions in access rates. The coefficient, however, is not statistically significant. The negative coefficient on ILEC is statistically significant and indicates that during the observation period AT&T’s average
residential toll prices were lower in states where it is currently both a toll provider and an ILEC, controlling for access rates.

1. **Hypothesis Test Results for Residential Service**

The first hypothesis test (Hypothesis 1: Market-Based Pass Through) asks whether the coefficient estimates on Access, $\alpha^R_2 = 1.977$ for the reform group and $\alpha^NR_2 = 1.429$ for the non-reform group, are consistent with full pass through. Both estimates are highly statistically significant. Testing whether the coefficients are significantly different from the full pass through rate of 2, we conclude that in reform states access rate reductions were in fact fully passed through to residential consumers on average, as a result of the market mechanism. In the non-reform states, we find that total pass through, even combining the effect of the market and any mandates or commitments, is less than 100%. That is, we reject the hypothesis that $\alpha^R_2 = 2$.

We also tested and reject the hypothesis that $(\alpha^R_2 + \alpha^NR_2) = 2$.

The second hypothesis test (Hypothesis 2: Market-Based Pass Through) asks whether the coefficient estimates on Access for the two groups (reform and non-reform states) are (statistically) significantly different from each other. We reject the hypothesis that the coefficients are the same—or equivalently, we find that the difference between the two estimates on Access for the reform group and non-reform group is statistically significant. We conclude that pass through rates are significantly higher in states that have undertaken access reform than in those that have not. This implies that in states that have not undertaken access reform, residential customers’ retail toll prices are less sensitive to differences in access rates than they are in reform states, even if there is a pass through requirement.
The third hypothesis test (Hypothesis 3: Regulator-Mandated Pass Through) asks whether the coefficient estimates on Mandate*Access, $\hat{\beta}_m = -0.368$ for the reform group, and $\hat{\beta}_m^R = 0.243$ for the non-reform group, are different from zero. This is equivalent to asking whether the imposition of a regulator-mandated pass through requirement has a statistically significant impact on the level of access pass through. In the residential regressions, the coefficient estimate for the non-reform group is statistically significant, whereas the coefficient estimate for the reform group is not statistically significant. We conclude that in states that have undergone access reform, a mandate does not have an impact on the degree of pass through to residential customers. In states that have not undertaken access reform, a pass through mandate appears to have an positive incremental impact on pass through (on the degree to which retail prices are sensitive to differences in access rates across states and time), but combined with our earlier-discussed results, indicates that in states that have not undertaken access reform an access mandate is not sufficient to result in full pass through of access rate changes. It appears that the way to achieve full pass through to residential customers is to conduct access reform, and issuing a pass through mandate is neither necessary (in reform states, where it is ineffective) nor sufficient (in non-reform states, where it is not enough) to achieve the same end.

The fourth hypothesis test (Hypothesis 4: Regulator-Mandated Pass Through) asks whether the impact of a regulator-mandated pass through requirement is significantly different across groups. The results indicate that we cannot reject the hypothesis that a mandate has the same effect across groups. However, the results also indicate that although the effect of the mandate is positive and significant (albeit inadequate to achieve full pass through) for business services in non-reform states, in reform states it is significantly more likely that the effect of mandates on pass through to business prices is negative than that it is positive.
B. Business Toll Service

Table 3 presents the results from estimation of the reduced form equations (1) and (2), with the average business toll price per minute as the dependent variable. Where a single number is listed, the variable is restricted to having the same impact across the reform and non-reform groups, as discussed earlier.
Table 3:  
Ordinary Least Squares Regression  
Dependent Variable: Average Business Toll Price per Minute  
(t-statistics in parenthesis)

<table>
<thead>
<tr>
<th></th>
<th>Non-Reform Group</th>
<th>Reform Group**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>5.802*</td>
<td>0.808*</td>
</tr>
<tr>
<td></td>
<td>(3.13)</td>
<td>(2.94)</td>
</tr>
<tr>
<td>Access</td>
<td>0.811*</td>
<td>0.808*</td>
</tr>
<tr>
<td></td>
<td>(13.10)</td>
<td>(2.94)</td>
</tr>
<tr>
<td>Mandate*Access</td>
<td>-0.085</td>
<td>-0.002</td>
</tr>
<tr>
<td></td>
<td>(-1.36)</td>
<td>(-0.01)</td>
</tr>
<tr>
<td>Year</td>
<td>-0.003^</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-3.11)</td>
<td></td>
</tr>
<tr>
<td>ILEC</td>
<td>-0.011*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-4.31)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>147</td>
<td>53</td>
</tr>
<tr>
<td>F-statistic</td>
<td>49.15</td>
<td></td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.604</td>
<td></td>
</tr>
<tr>
<td>Adj. R-Squared</td>
<td>0.592</td>
<td></td>
</tr>
</tbody>
</table>

*Significant at the 95% level.

*Non-Reform Group States  –  
AK, AL, AR, AZ, CA, CO, CT, DE, FL, HI, IA, ID, LA, MD, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM (2005-07), NY, OK, OR, PA, RI, SC, SD, UT, VA, VT, WA, WV, WY.

**Reform Group States –  
GA, IL, IN, KS, KY, MA, ME, MI, NM (2008), NV, OH, TN, TX, WI.

As in the residential analysis, the estimated coefficients on the Access variable in the business markets support the conclusion that both in reform and non-reform states, access reductions are passed through to customers in the form of lower prices. The coefficients on the mandate variable are negative in both the reform and non-reform states (and in the in residential regression for the reform states as well) which, if significant, would imply that regulatory mandates have the perverse effect of decreasing the degree of pass through. However, these coefficients are not statistically significant, indicating that we cannot reject the hypothesis that there is no significant change in the level of pass through to business customers caused by the imposition of a regulator-mandated pass through requirement, and this is true in states with
access reform and (unlike in the residential regressions) states without access reform. The coefficient on the variable Year is negative and statistically significant, indicating that the passage of time caused business toll prices to decline relative to access rates. This result may indicate (inter alia) an increase in competitive pressure on margins in toll business markets, and/or it may indicate decreases in non-access-related costs of providing business long distance. The coefficient on the variable ILEC is also negative and statistically significant, indicating that AT&T’s intrastate business toll rates are lower in states in which it is an ILEC than in states in which it is not an ILEC, all else equal.

1. Hypothesis Test Results for Business Services
The first hypothesis test for the business equations (Hypothesis 1a: Market-Based Pass Through) asks whether the coefficient estimates on Access, $\beta^R$ for the reform group and $\beta^{NR}$ for the non-reform group, are consistent with full pass through. As with the residential analysis, we cannot reject the hypothesis that the level of pass through in reform states is 100% (that is, one cannot reject the hypothesis that the coefficient is different from 1.08), but we can conclude that the degree of market-based pass through to business rates in the non-reform states is less than 100%. Hence, although the best (i.e., point) estimate of pass through in reform states implies about 75% pass through, we also find that in states with access reform we cannot reject the hypothesis that on average, AT&T passes through 100% of its access expense reductions to its business toll customers. However, in states that have not undergone access reform, the results reject full pass through.\(^{14}\)

\(^{14}\) The coefficient estimates for market-based pass through for the reform and non-reform states are similar. The reason that we reject full pass through for non-reform states and cannot reject full pass through for reform states is that the standard error on the coefficient estimate in the reform states is larger (and
The second hypothesis test (Hypothesis 2: Market-Based Pass Through) asks whether the coefficient estimates on Access for the two groups (reform and non-reform states) are (statistically) significantly different from each other. We cannot reject the hypothesis that the coefficients are equal to each other, meaning that for business customers, we cannot reject the hypothesis that the degree of pass through is the same in reform and non-reform states.

The third hypothesis test (Hypothesis 2a: Regulator-Mandated Pass Through) asks whether the coefficient estimates on Mandate*Access, $\hat{\beta}_2^R = -0.002$ for the reform group and $\hat{\beta}_2^{NR} = -0.085$ for the non-reform group, are different from zero. The results indicate that the imposition of a regulator-mandated pass through requirement does not have a statistically significant impact on the level of access pass through in either the reform states or the non-reform states. We conclude that imposing a pass through requirement does not in fact increase the amount of pass through to business customers, either in reform states—where the market causes 100% pass through in any event, or in non-reform states—where the market forces significant but not complete pass through.

The fourth hypothesis test (Hypothesis 4: Regulator-Mandated Pass Through) asks whether the impact of a regulator-mandated pass through requirement is significantly different in the reform states from the effect in the non-reform states. The results indicate that we cannot reject the hypothesis that mandates have the same effect across groups. We conclude that there is no measurable difference in the effect on business toll rates of a pass through mandate in reform and non-reform states—and, as explained, the point estimate is negative but statistically indistinguishable from zero in both cases.
6. Policy implications for pass through mandates

The results indicate that regulatory pass through mandates are both ineffective and unnecessary for purposes of achieving regulatory objectives of generating consumer benefits from decreases in regulated costs as part of a regulatory reform effort. Whether such mandates are affirmatively ill-advised, however, depends on whether there are costs involved in imposing and attempting to enforce such mandates, either in the form of enforcement costs, or in the form of perverse unintended consequences of the mandate. The fact that in three of four instances the measured effect of a pass through mandate, while not statistically significant, is negative, suggests the possibility of a (weakly) net negative effect by which pass through mandates reduce rather than increasing pass through.

The two avenues by which pass through mandates could, in principle, be detrimental to social welfare are interrelated. A highly prescriptive mandate that dictates specifically how prices are to be reduced may interfere with the way that access rate reductions are passed through to most effectively meet customer demand, and may not have the desired effect because they cannot account for the demand response by consumers. And second, the less the form of the mandate interferes with market-driven pricing, the more costly it would likely be in terms of regulator resources to measure and verify. Both of these difficulties arise in part from the same market phenomenon, relating to the complexities of retail prices for telecom services.

A rational long distance provider will respond to a reduction in access rates by reducing retail prices, but how it reduces its retail prices could take many forms. For example, it could offer discounts on existing plans; it could focus greater resources on encouraging new customers to purchase existing discounted rate plans; it could focus greater resources on encouraging customers to switch from existing higher-priced to lower-priced rate plans; it could introduce
new rate plans while keeping the old ones; it could grandfather certain higher-priced existing rate plans while not introducing new plans; it could reduce volume-sensitive (per minute) rates on existing plans; it could reduce non-volume-sensitive rates on existing plans; it could increase the number of minutes offered for a given flat price; it could expand the times of day in which lower rates apply; or any number of other possibilities. Any or all of these rate changes would decrease the average price paid by customers for long distance services.

The potential impediments to enforcing a pass through mandate derive from the empirical difficulties for a regulator to determine for a single observation (that is, for a single state or a single carrier) whether that carrier’s prices at some relevant ex post time are, on average, lower by an amount equal to the average per unit decline in access rates vis à vis the average prices ex ante the access rate reduction, controlling for any exogenous changes in costs.

An alternative to the regulator conducting a statistical analysis of average prices in order to determine whether full pass through has been achieved would be to impose a prescriptive requirement on certain prices, the change in which could be clearly observed. If the mandate is highly prescriptive (for example, that specific regulator-identified price plans must be reduced by a certain amount), it may be more readily determined whether the mandate was complied with; but at the cost of greater potential distortion and interference with the ability of the carriers to establish pricing plans that respond to each other and to market demand—and potentially with a lower degree of pass through over all. If the mandate is less prescriptive (for example, requiring that the access reduction be passed through on average, in whatever way the carrier deems most appropriate), it would be expected to have less distorting effect on pricing strategies, and permit the carrier to fully respond to market forces, but it would be more costly for the regulator to determine whether the mandate was complied with.
7. **Conclusions**

Theory predicts that firms in a competitive market will pass through to consumers reductions in their costs and our results are consistent with the predictions of theory. We find that in states that have undergone access reform, access rate reductions are fully passed through whether or not there is a regulatory mandate to do so. Regulators nevertheless exhibit in many cases a predilection for imposing such mandates, whether for political reasons or because they believe in a belt-and-suspenders approach to ensuring that consumers benefit from regulatory changes. There are reasons to believe that prescriptive pass through mandates may not be benign, however, and would affirmatively harm consumers by distorting pricing decisions. Future research remains to estimate empirically the magnitude of such harms, if any, to the extent they are measureable.

We also find that undertaking access reform in itself appears to improve the functioning of the market so that retail toll rates are more sensitive to differences in access rates in states that have undertaken reform than in those that have not. One hypothesis for this result is that the attention focused on the long distance carriers in the process of access reform induces more responsive retail pricing, with or without a mandate. An alternative explanation is that state commissions undertake reform in states in which the long distance market is already functioning robustly, or that states with commissions that have a more market-oriented commission are more likely to engage in access reform and also are more likely to be states with more robustly functioning markets. We have not attempted to develop a methodology for testing whether one of these hypotheses better explains the results.
References


