

# **Attachment 4**

Professor Hausman Consumer Benefits Paper

**Consumer Benefits  
of Low Intercarrier Compensation Rates**

**Professor Jerry Hausman, MIT**

## I. Introduction

1. I am the MacDonald Professor of Economics at the Massachusetts Institute of Technology (“MIT”) in Cambridge, Massachusetts. I received a D.Phil. (Ph.D.) in economics from Oxford University in 1973, where I was a Marshall Scholar. My academic specialties are econometrics, the application of statistical methods to economic data, and applied microeconomics, the study of behavior by firms and by consumers. I have published over 170 academic research papers in leading economic journals including the *American Economic Review*, *Econometrica*, and the *Rand (Bell) Journal of Economics*, and I have studied telecommunications markets since the 1970s. Exhibit A sets forth my academic and professional credentials.

2. I have been asked to analyze the likely effects of a Federal Communications Commission (“Commission”) policy establishing, on a national basis, low (near zero) default intercarrier compensation rates. I understand that the Commission is considering such a policy, and that a transition to a uniform, low default per-minute intercarrier compensation rate is part of a compromise proposal to reform the Commission’s intercarrier compensation and universal service programs. Among my findings, I conclude that a Commission policy setting all intercarrier compensation rates near zero would produce a **consumer welfare gain of approximately \$9 billion per year nationwide.**

3. In my analysis below, I first find that past Commission policies that set low intercarrier compensation rates on emerging communications services have led to significant consumer welfare and economic efficiency gains. I find that a policy that sets a default rate for intercarrier compensation near zero would lead to significant gains in consumer welfare, as well as significant efficiency gains for the U.S. economy. My more specific findings include:

- In part as a result of Commission policies reducing intercarrier compensation rates for wireless traffic, consumer surplus from 1996-2008 was approximately \$115 billion per year, or approximately \$64.50 per month, \$744 per year for each cellular subscriber.
- From 1996-2008, economic efficiency increased by \$45.20 per month per cellular subscriber, or \$542 per year. This outcome produced an average annual gain in economic efficiency in this period of approximately \$80.2 billion per year – again in part as a result of Commission policies reducing intercarrier compensation rates for wireless traffic.
- Given that wireless intercarrier compensation rate reductions led to significant benefits for consumers, the consumer welfare gains from a low intercarrier compensation rate on emerging Voice Over Internet Protocol (“VoIP”) traffic would likely also be significant.
- Nearly 100% of input cost reductions from lower intercarrier compensation rates as a result of Commission policy changes have in the past, and would likely in the future, flow through to consumers and result in wireline and wireless price reductions, additional investment and innovation, or both. Regulatory mandates requiring pass-through of such rate reductions would artificially distort the market and potentially would harm consumers.
- A Commission policy setting all intercarrier compensation rates near zero would result in a consumer welfare gain of approximately \$9 billion per year. Of that gain, approximately \$3.81 billion per year is attributable to wireless consumers, and approximately \$4.96 billion per year is attributable to wireline long distance consumers. The opposite also is true; for example, if the Commission’s policies that reduced rates for wireless were traffic were undermined, the result would be significant consumer welfare losses up to and potentially exceeding the gains given the greater significance of wireless services generally.
- Commission policy setting intercarrier compensation rates near zero would also lead to dynamic gains from innovative new products and services, on an additive basis, to consumer welfare and economic efficiency gains. While difficult to measure in dollars on a predictive basis, these gains also benefit consumers in a tangible way and typically are significantly larger than static gains in consumer welfare and economic efficiency.

## **II. Goals and Outcomes of Regulation**

### **A. Identifying and Measuring Effects of Regulation on Consumers**

4. Economists agree that the goal of regulation should be to increase consumer welfare.

Alfred Kahn, in his path-breaking study, The Economics of Regulation, identified “consumer

protection” as one of the chief goals of regulation.<sup>1</sup> In my academic research and in advising regulatory bodies, I have also recommended that consumer welfare be the primary goal of regulation.<sup>2</sup> Thus, consumer welfare should be the focus of regulation, not the protection of firms who compete in regulated industries.

5. Gains in economic efficiency are the chief means of increasing consumer welfare.

Economic efficiency is often considered within the following categories:

- Productive economic efficiency: society makes the best use of its resources and produces the greatest output possible so it is on its production possibility frontier.<sup>3</sup>
- Allocative economic efficiency: relative prices reflect relative costs so that no possible reorganization of production would allow for a “Pareto improvement” (*i.e.*, make no one worse off and some people better off).
- Dynamic economic efficiency: investment incentives are set correctly so that in the long run when capital is flexible society will be on its long run “utility possibility frontier” (*i.e.*, society will achieve maximum consumer welfare. New products and services are created at the “optimal” rate).

6. The first two types of efficiency are often referred to as static efficiency concepts

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<sup>1</sup> A.E. Kahn, The Economics of Regulation, (1970-71, 1988: MIT Press), p. 9.

<sup>2</sup> See, e.g., J. Hausman, “Economic Welfare and Telecommunications Welfare: The E-Rate Policy for Universal Service Subsidies,” *Yale Journal on Regulation*, 1999; “Valuation and the Effect of Regulation on New Services in Telecommunications,” *Brookings Papers on Economic Activity: Microeconomics*, 1997; “A Consumer-Welfare Approach to the Mandatory Unbundling of Telecommunications Networks,” *Yale Law Journal*, 109, 1999; and “Efficiency Effects on the U.S. Economy from Wireless Taxation,” *National Tax Journal*, 53, 2000.

<sup>3</sup> See P. Samuelson and W. Nordhaus, Economics, (McGraw Hill, 12 ed., 1985), pp. 28-29. (“Efficiency is a central (perhaps *the* central concern in economics. Efficiency means there is no waste...” Productive efficiency occurs when society cannot increase the output of one good without cutting back on another. An efficient economy is on its production-possibility frontier.”)

since they hold the capital stock fixed. However, dynamic economic efficiency allows the amount of capital to vary and determines whether the economy has an efficient stock of capital and whether the innovation rate is optimal.

7. Economists have well-accepted tools to measure consumer welfare arising from static economic efficiency. The approach is called a “consumer surplus” calculation, and it has been used in economics for over 100 years. Consumer surplus is the monetary amount (measured in dollars) of the difference between the maximum amount a consumer would be willing to pay to purchase a product, and the market price of the product. For example, a given consumer could be willing to pay \$125 per month for unlimited voice and data cellular service, but the market price might be \$110. In that example, the consumer surplus is \$15 per month, per user.

8. For new products consumer surplus is the difference between the “virtual” (reservation) price for the product where demand would be zero at a particular market price.<sup>4</sup> Thus, for example, the price at which demand for an Apple iPhone which sets demand to zero could be \$1,200. However, an Apple iPhone’s retail price is about \$600, so the consumer surplus is \$600.

9. I have previously used this economic approach in my academic research and publications in telecommunications industry. My related research topics include:

- Consumer welfare effect of Universal Service Fund (USF) subsidies (1998)<sup>5</sup>

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<sup>4</sup> Sir John Hicks pioneered this technique to measure the effect of rationing, and I have used it extensively to value new products. *See, e.g.,* J. Hausman, “Valuation and the Effect of Regulation on New Services in Telecommunications,” *Brookings Papers on Economic Activity: Microeconomics*, 1997; and “Sources of Bias and Solutions to Bias in the CPI,” *Journal of Economic Perspectives*, 17, 2003.

<sup>5</sup> “Economic Welfare and Telecommunications Welfare: The E-Rate Policy for Universal Service Subsidies,” *Yale Journal on Regulation*, 1999.

- Consumer welfare effects of introduction of cell phones (1997, 2002)<sup>6</sup>
- Consumer welfare effects of taxation of cellular revenue (2000)<sup>7</sup>

Numerous other studies have adopted and applied my techniques.

**B. Positive Consumer Benefits from Previous Commission Action to Reduce Intercarrier Compensation Rates**

10. Previous Commission actions to reduce intercarrier compensation rates have led to significant gains in consumer welfare. From 1996-2001 the Commission effectively decreased, for the substantial majority of all wireless traffic, the price of wireless termination to the PSTN to rates that ultimately reached \$0.0007 or below per minute.<sup>8</sup> Over the ensuing period from 1996-2008, consumers benefitted, and will continue to benefit, from these lower intercarrier compensation rates and increased wireless innovation. These innovations include, for example, expansive offerings of digital “One Rate Plan” and other “bucket” rate type plans that consumers widely adopted, as well as effective elimination of national “roaming” charges. Overall, prices

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<sup>6</sup> “Valuation and the Effect of Regulation on New Services in Telecommunications,” *Brookings Papers on Economic Activity: Microeconomics*, 1997; and “Mobile Telephone,” in M. Cave et al. eds., *Handbook of Telecommunications Economics*, 2002.

<sup>7</sup> “Efficiency Effects on the U.S. Economy from Wireless Taxation,” *National Tax Journal*, 53, 2000.

<sup>8</sup> See *Implementation of the Local Competition Provisions in the Telecommunications Act; Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, First Report and Order, 11 FCC Rcd 15499 (1996) (establishing the Commission’s “MTA rule,” which deemed wireless traffic terminated to the PSTN within the same geographically large Metropolitan Trading Area subject to typically lower “local” or “reciprocal compensation” intercarrier compensation rates); and *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996; Intercarrier Compensation for ISP-Bound Traffic*, Order on Remand and Report and Order, 16 FCC Rcd 9151 (2001) (establishing the Commission’s “mirroring rule,” which effectively set the reciprocal compensation rate for most wireless traffic at or below \$0.0007 per minute).

decreased and quantities of use increased over this period in part due to Commission action lowering intercarrier compensation rates. Both outcomes demonstrate increased consumer welfare.

11. More specifically, over the period 1996-2008 the increase in consumer surplus for cellular usage totaled approximately \$64.50 per month or \$774 per year per cellular subscriber.<sup>9</sup> In total the gain in consumer surplus was approximately \$114.5 billion per year over the period using the average number of subscribers of approximately 148 million nationwide over the period.<sup>10</sup> While many economic factors contributed to this gain in consumer surplus, this significant gain arises in part from Commission regulatory policy in decreasing the price of wireless termination to the PSTN. That action caused elimination of most roaming charges and long distance cellular charges. Other Commission actions that contributed to this gain in consumer surplus include Commission spectrum auctions, which increased competition among wireless providers.

12. Economic efficiency also increased significantly as a result of the Commission's action. Economic efficiency increased by \$45.20 per month per cellular subscriber or \$542 per year. Given the average over the period of approximately 148 million cellular subscribers

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<sup>9</sup> Data from Table 20, *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Fifteenth Report, FCC 11-103 (June 27, 2011). Over this period average revenue per minute (price) decreased from \$0.38 per minute to \$0.07 per minute. Average minutes of use increased from 125 minutes per month to 708 minutes per month. This is a lower bound estimate. See, e.g., J. Hausman, "Sources of Bias and Solutions to Bias in the CPI," *Journal of Economic Perspectives*, 17, 2003. It has been estimated that as of Q4 2002 average household cellular minutes exceeded average household landline minutes. See, e.g., "Cell Phone Usage Overtakes Landlines in the US," <http://www.cellular-news.com/story/8773.php>.

<sup>10</sup> See "Wireless Quick Facts," [http://www.ctia.org/media/industry\\_info/index.cfm/AID/10323](http://www.ctia.org/media/industry_info/index.cfm/AID/10323).

nationwide, the average gain in efficiency is approximately \$80.2 billion per year.

13. From an economic perspective Commission policy in reducing intercarrier compensation rates can have major, positive effects on both consumer welfare and economic efficiency.<sup>11</sup> These positive effects on both consumer welfare and economic efficiency – resulting in part from Commission action reducing intercarrier compensation rates – are confirmed by data reflecting the increasing replacement (in whole or in part) of wireline service in favor of wireless service by consumers. Significant change in consumer behavior is a good measure of actual consumer welfare gains and new economic efficiencies realized from shifts in regulatory policy and other market changes. And it is now clear that a significant shift away from wireline and toward wireless voice services has occurred. The most recent survey of cellular users found that 29.7% of all U.S. households subscribed only to cellular service and did not subscribe to wireline service.<sup>12</sup> Further, even among households that also had wireline service, a significant portion received almost all of their calls on cellular telephones. Generally, consumers can be expected to purchase services based on their perception of the services that provide the greatest benefit (consumer welfare) at the lowest relative cost (efficiency).

14. As it did when wireless service emerged, the Commission is currently considering the most appropriate intercarrier compensation rates for another currently developing type of services, namely VoIP services. VoIP is expected to, over the next several years, become the dominant technology for both wireline and wireless voice service. From an economic

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<sup>11</sup> See, e.g., J. Hausman, "Valuation and the Effect of Regulation on New Services in Telecommunications," *Brookings Papers on Economic Activity: Microeconomics*, 1997; and "Mobile Telephone," in M. Cave et al. eds., Handbook of Telecommunications Economics, 2002.

<sup>12</sup> S. Blumberg and J. Luke, "Wireless Substitution: Early Release of Estimates from the National Interview Health Survey, July-December 2010," CDC, June 8, 2011.

perspective, the Commission could reasonably expect to achieve maximum positive effects on both consumer welfare and economic efficiency by setting low – near zero – intercarrier compensation rates for VoIP traffic. Established economic principles, as discussed below, demonstrate that VoIP prices will fall and usage will increase if a key input cost such as intercarrier compensation is kept low or reduced. The demonstrable results of Commission action with respect to wireless intercarrier compensation rates are also strong evidence that consumers will benefit from low intercarrier compensation rates for VoIP traffic.

**C. Policy Considerations Regarding the Overall Intercarrier Compensation System**

15. The Commission should adopt a comprehensive intercarrier compensation policy for a low, default intercarrier compensation rate, similar to its decisions to exempt the wireless industry from a substantial portion of the legacy intercarrier compensation regime. Similar to its wireless policy the Commission is considering changes to its intercarrier regulatory policy and whether to reduce default intercarrier rates. This policy would increase economic efficiency and also consumer welfare.

16. Also, lower rates for all intercarrier compensation will lead to lower prices for consumers, added investment an innovation, or both, as the wireless experience demonstrates. Lower prices and added investment and innovation lead to increased consumer welfare and increased demand and increased output. Economic analysis demonstrates that lower costs are passed through to consumer prices at a minimum rate of 50%, even for a monopolist.<sup>13</sup>

However, as competition increases the percentage of pass-through approaches 100% (and can

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<sup>13</sup> For a discussion *see, e.g.*, J. Bulow and P. Pfleiderer, “A Note on the Effect of Cost Changes on Prices,” *Journal of Political Economy*, 91, 1983; and J. Hausman and G. Leonard, “Efficiencies for the Consumer Viewpoint,” *George Mason Law Review*, 7, 1999. This finding is for a “normal” shaped demand curve that is convex to the origin.

even be greater than 100%). Empirical economic studies typically find pass-through in competitive industries of approximately 100%, especially when the cost change is common to the entire industry.<sup>14</sup> Here, given the degree of competition among cellular carriers and the degree of competition between wireline telephone providers and all intermodal providers such as cable companies, so-called “over-the-top” VoIP services that ride broadband connections, and wireless services, I would expect approximately all of any intercarrier compensation rate decreases to be passed through in lower prices, added investment an innovation or both to consumers.

17. Empirical studies in telecommunications also demonstrate near 100% pass-through. Both Beard et al. (2005) and Aron et al. (2010) find that near 100% pass-through occurred for long distance rates when regulators reduced intercarrier compensation rates.<sup>15</sup> In my own research, Hausman et al. (2002), I found similar results of a flow-through of lower costs into lower prices when the legacy Regional Bell Operating Companies were permitted to provide inter-LATA long distance service.<sup>16</sup>

18. Given the amount of competition present in wireless markets and among wireline telephone and cable companies, I conclude that a regulatory policy requiring that carriers flow through intercarrier compensation reductions would be unnecessary and potentially harmful.

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<sup>14</sup> See J. Poterba, “Retail Price Reactions to Changes in State and Local Sales Taxes,” *National Tax Journal*, 49, 1996; and T. Besley and H. Rosen, “Sales Taxes and Prices: An Empirical Analysis,” *National Tax Journal*, 52, 1999.

<sup>15</sup> R. Beard et al., “The Flow through of Cost Changes in Competitive Telecommunications: Theory and Analysis,” *Empirical Economics*, 30, 2005; and D. Aron, et al., “An Empirical Analysis of Regulator Mandates on the Pass Through of Switched Access Fees for In-State Long Distance Telecommunications in the U.S.,” Oct. 2010.

<sup>16</sup> J. Hausman et al., “Does Bell Company Entry into Long-Distance Telecommunications Benefit Consumers?” *Antitrust Law Journal*, 70, 2002.

Since the significant fixed costs of networks must be recovered through prices, the market will determine the most economically efficient means to recover these fixed costs. Further, the majority of both wireless service (at least for voice services) and wireline long distance service is sold in “bucket plans,” often of the “all you can eat variety,” meaning the price of those plans is generally the only variable that can and will be adjusted by firms when implementing input cost reductions in the telecommunications market.

19. A regulatory mandate that requires flow-through is likely to distort this type of competition in an artificial way and may lead to a reduction of bundled offerings from firms or reduced investment or both. These bundled offerings may be of the “triple play” or even the “quadruple play” type where a bundled price is charged for three or four services and the services do not each have a separate price. These types of bundled offerings have proven to be very popular with consumers. Any regulatory action which limits these types of bundled plans would create economic distortions and decrease both economic efficiency and consumer welfare.

20. Commission policy with respect to input costs in a correct manner is especially important now for the wireless industry. Investment in LTE and other 4G technologies is ongoing and will require billions of dollars of new investment by the cellular industry.<sup>17</sup> LTE will provide significant benefits to consumers. LTE will provide much faster download speeds and less congestion on cellular networks. For example, some LTE specifications provide for 100 Mbps download speeds and 50 Mbps upload speeds, which will allow for content rich applications, including streaming HD video. LTE will also lead to approximately 2-4 times more efficient use of spectrum, compared with the current 3G technologies, CDMA2000 (EVDO) and WCDMA (UMTS), and HSPDA. Given the rapid growth in internet usage on cell phones,

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<sup>17</sup> LTE is often referred to as 3GPP in addition to LTE.

adoption of LTE will be an especially important development.

### **III. Expected Consumer Benefits of Lower Intercarrier Compensation Rates**

21. Consumer benefits from new investment and new innovative products – which create increased dynamic economic efficiency – are significantly greater than the subsidies consumers receive from the economically inefficient framework of universal service subsidies which arise from the intercarrier compensation framework.<sup>18</sup> Similarly, given the ongoing innovation in VoIP, wireless, and other communications technologies, correct regulatory policy is especially important to allow for the maximum increase in dynamic economic efficiency and consumer welfare, which I would expect to arise from the new LTE networks.

22. I now estimate the consumer benefits from the Commission adopting an intercarrier compensation policy that sets low (near zero) intercarrier rates. I first calculate the consumer benefits for wireless. From industry sources I find that the average wireless usage in 2009, which is the latest data available, is 696 minutes per month.<sup>19</sup> The average voice ARPU for the same time period was \$34.34, and the average cost of intercarrier payments I estimate to be \$0.50 per user, per month based on my discussions with industry representatives. To estimate the effect of decreasing the intercarrier rate to near zero, I assume full pass-through given the

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<sup>18</sup> See, e.g., J. Hausman, “Valuation and the Effect of Regulation on New Services in Telecommunications,” *Brookings Papers on Economic Activity: Microeconomics*, 10, 1997. The importance of dynamic economic efficiency was first discovered by Prof. Robert Solow in the 1960s. Prof. Solow received the Nobel Prize in economics for his research. For the economic inefficiencies created by the USF framework, see J. Hausman and H. Shelanski, “Economic Welfare and Telecommunications Welfare: The E-Rate Policy for Universal Service Subsidies,” *Yale Journal on Regulation*, 16, 1999.

<sup>19</sup> Data from Chart 19, *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, Fifteenth Report, FCC 11-103 (June 27, 2011).

degree of competition among cellular carriers. For the elasticity of demand, which increases minutes, I make two estimates. First, I estimate the arc elasticity from the experience of the price decrease observed during 1996-2008, which I discussed above.<sup>20</sup> I estimate the price elasticity to be -1.05. This estimate implies that if the usage price decreases by 1% usage will increase by 1.05%. My other estimate of the usage elasticity arises from a regression log of minutes per month regressed on log price as well as an income variable or a time trend. Here I also used data over the 1993-2008 period. I calculate an elasticity estimate, which is very similar to the other estimate of -0.952 (t-statistic = 7.41). Thus, I find very similar estimates.

23. Using my assumption of full pass-through and the elasticity estimates along with the subscription elasticity of Hausman (1997), I find that consumer surplus increases by \$1.05 per month or \$12.60 per year per cellular subscriber.<sup>21</sup> Using the estimate of 302 million cellular subscribers in 2010, I estimate the aggregate amount of consumer welfare gain is \$3.82 billion per year. Thus, I find a significant gain in consumer welfare from the proposed Commission policy for wireless intercarrier compensation rate reductions.

24. I now do a similar calculation for the change in consumer welfare from wireline long distance usage from a change in intercarrier compensation rates. I again assume full pass-through given the findings of Beard *et al.* (2005) and Aron (2010), which I discussed above. From industry sources, I estimate that the average cost of intercarrier compensation payments is \$1.50 per month per wireline long distance user, and that the ARPU for long distance service is

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<sup>20</sup> The arc elasticity is estimated as the percentage change in quantity divided by the percentage change in price over the period.

<sup>21</sup> See J. Hausman, "Valuation and the Effect of Regulation on New Services in Telecommunications," *Brookings Papers on Economic Activity: Microeconomics*, 10, 1997, for the subscription elasticity estimate; and "Wireless Quick Facts," [http://www.ctia.org/media/industry\\_info/index.cfm/AID/10323](http://www.ctia.org/media/industry_info/index.cfm/AID/10323).

approximately \$9 per month. Minutes of use per month in 2007 were, on average, 136.5 minutes.<sup>22</sup> For the usage elasticity I use an estimate from the economic literature of -0.72.<sup>23</sup> I estimate the increase in consumer surplus to be \$3.64 per month or \$43.71 per year. Based on the number of 2010 wireline subscribers I find that the change in Commission policy would lead to a gain in consumer welfare of about \$4.96 billion per year.<sup>24</sup> Thus the total gain for both wireless and wireline usage is \$8.77 billion per year. This gain of almost \$9 billion per year for U.S. consumers demonstrates the potential importance of the Commission adopting a regulatory policy where intercarrier rates are low (allowing carriers to recover costs primarily from end-users, not implicit subsidies from other carriers) and the removal of the current policy distortion occurs.<sup>25</sup>

25. The above estimates are “static estimates” in the sense that I estimate increases in usage that arise from lower prices. Even larger effects would arise from gains on a dynamic basis. Indeed, dynamic gains from new products or service that result from cost reductions (such as significant intercarrier compensation cost reductions) are typically significantly larger than

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<sup>22</sup> See Table 2.6, “Statistics of Communications Common Carriers,” FCC, [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-301505A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-301505A1.pdf), 2006/2007 edition.

<sup>23</sup> This is the “Taylor estimate” which was found approximately in many studies of the long distance industry. See, e.g., W. Taylor and L.D. Taylor, “Postdivestiture Long-Distance Competition in the United States,” *American Economic Review*, 83, 1993.

<sup>24</sup> See FCC, “Local Telephone Competition: Status as of June, 30, 2010,” [http://fjallfoss.fcc.gov/edocs\\_public/attachmatch/DOC-305297A1.pdf](http://fjallfoss.fcc.gov/edocs_public/attachmatch/DOC-305297A1.pdf) (Mar. 2011).

<sup>25</sup> These wireline consumer welfare gains (but not the gains on the wireless side) would be reduced to the extent wireline providers increase end-user prices to make up for lost intercarrier revenue. However, in at least a substantial portion of the country, competitive pressures would likely constrain many firms from increasing end-user rates by amounts equal to the lost intercarrier compensation revenue. Moreover, as discussed below, the *dynamic* consumer welfare gains associated with the greater pricing efficiency can be expected to be substantial – possibly greater than the static gain calculated above.

static gains in consumer welfare as my academic research has demonstrated.<sup>26</sup> While it is difficult to predict successful new services, I consider two new applications which might well be successful new applications. The first potential application is “voice-to-text” emails, or “text-to-voice” emails.<sup>27</sup> Subscribers may prefer one type of email over the other type of email depending on their circumstances. While driving an automobile, for example, a person cannot use text emails, but the use of voice emails may be acceptable, especially for non-complicated subjects. Also, a person may prefer to respond to text emails on a smartphone using voice emails which would then be delivered as a voice email and could be changed to a text email if the receiver wanted to do so. Another potential application is to use voice as means of personal authentication for use in financial applications.<sup>28</sup> The ability to recognize a “voice print” potentially offers greater security than the use of a password or PIN number, which can be “hacked” with sufficient computer time in some cases. By asking a person to say a random chosen password word the ability to bypass a security system becomes much more difficult.

26. Decreased input costs can make a new service possible which will satisfy consumer demand. For example, reduced long distance costs led to cellular service plans that eliminated out of region long distance charges. These new plans were very popular with consumers and are now chosen by nearly all post-paid cellular customers.

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<sup>26</sup> See, e.g., J. Hausman, “Mobile Telephone,” in M. Cave et al. eds., Handbook of Telecommunications Economics, 2002. There I estimated that cell phones as a new product in 1999 I estimate that cellular telephone as a new product led to a consumer welfare gain of \$111 billion per year.

<sup>27</sup> These services have recently begun to be offered. See, e.g., “Google voice: Text message to email,” <http://www.google.com/support/voice/bin/answer.py?hl=en&answer=160203>.

<sup>28</sup> See, e.g., “How Biometrics Works: Voiceprints,” <http://science.howstuffworks.com/biometrics3.htm>.

27. To demonstrate how new applications can lead to significant gains in consumer welfare, I assume a yearly revenue average of \$36 per subscriber (\$3 per month) for each of these applications, and a take-up rate of 25%. I assume an elasticity of -1.2 and estimate a conservative lower bound consumer surplus amount. For just one new application, such as the voice-to-text and reverse email, I find the gain in consumer surplus to be \$1.3 billion per year.<sup>29</sup> Consumers benefit from these services, which is demonstrated by their willingness to purchase the services with their new features. Thus, dynamic efficiency gains from innovation that leads to successful new products and services typically creates large gains in consumer surplus and economic efficiency as academic research has demonstrated.

#### **IV. Conclusion**

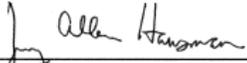
28. The Commission should reform the intercarrier compensation regime and establish low, near zero intercarrier compensation rates for all traffic. The Commission followed that approach in the recent past with wireless traffic, and that led to significant gains in consumer welfare and economic efficiency. Technology is changing again as carriers switch from circuit-switched technology to wireless and VoIP services. The Commission should once again align rates more closely with costs by setting intercarrier compensation rates to near zero. My estimates here demonstrate significant gains in consumer welfare for both wireless users and wireline users – which is especially important as an increasing proportion of households use only wireless. Thus, a policy that encourages the transition to next generation technology and greater use of VoIP will create significant welfare gains for consumers and efficiency gains for the U.S. economy.

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<sup>29</sup> There would also be a significant gain in producer surplus here as well. Thus the gain in economic efficiency would be significantly larger.

This concludes my paper. I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct.

Date: July 25, 2011

  
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Jerry Allen Hausman

# **Exhibit A**



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**EDUCATION:** OXFORD UNIVERSITY

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A.B. (Summa Cum Laude), 1968

**THESIS:** "A Theoretical and Empirical Study of Vintage Investment and Production in Great Britain,"  
Oxford University, 1973.

**FELLOWSHIPS, HONORS AND AWARDS:**

Phi Beta Kappa

Marshall Scholar at Oxford, 1970-1972

Scholarship at Nuffield College, Oxford, 1971-1972

Fellow, Econometric Society, 1979

Frisch Medal of the Econometric Society, 1980

Fisher-Schultz Lecture for the Econometric Society, 1982

John Bates Clark Award of the American Economic Association, 1985

Smith Lectures, Brigham Young University 1986

Jacob Marschak Lecture for the Econometric Society, 1988

Hooker Lectures, Macmaster University 1989

Fellow, National Academy of Social Insurance, 1990

American Academy of Arts and Sciences, 1991

Fellow, Journal of Econometrics, 1998

Shann Memorial Lecture for the Australian Economics Society, 2003

Cenmap International Fellow, University College London, 2004

Honorary Professor, Xiamen University, 2005

Biennial Medal of the Modeling and Simulation Society of Australia and New Zealand, 2005

Fellow, Modeling and Simulation Society of Australia and New Zealand, 2005

Condliffe Memorial Lecture, University of Canterbury, NZ, 2005

Keynote Lecture, Far East Meetings of Econometric Society, Beijing 2006

Keynote Speaker, ACCC Conference, Australia, 2006

Keynote Speaker, Panel Data Conference, Xiamen China, 2007

Keynote Speaker, FTC/Northwestern Antitrust Conference, 2008

Honorary Fellow, Nuffield College, Oxford University, 2008

Journal of Applied Econometrics Lectures, 2009

Leigh Lecture, Washington State University, 2009

MIT UEA Teaching Award, 2009

Journal of Financial Economics "All Star Paper", 2009

Honorary Advisory Board, Chang Mai University, Thailand, 2009-

Honorary Degree, Chang Mai University, Thailand 2010

Keynote Speaker, UC Berkeley Conference on Mobile Telecommunications, 2010

Keynote Speaker, Xiamen University (China) conference on 30 Years of Specification Tests, 2010

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**EMPLOYMENT:**

**MASSACHUSETTS INSTITUTE OF TECHNOLOGY**  
 1992- John and Jennie S. MacDonald Professor  
 1979- Professor, Department of Economics  
 1976-79 Associate Professor, Department of Economics  
 1973-76 Assistant Professor, Department of Economics  
 1972-73 Visiting Scholar, Department of Economics

**VISITING APPOINTMENTS:**

1986-87 Visiting Professor, Harvard Business School  
 1982-83 Visiting Professor, Harvard University Department of Economics  
 Visiting Positions: University of Washington, Australian National University, Ecole Normale Supérieure, Oxford University, University of Sydney, Wuhan University, Beijing University, University of Western Australia, University College London, Uppsala University, Xiamen University, Sorbonne

**U.S. ARMY, ANCHORAGE, ALASKA**

1968-70 Corps of Engineers

**PROFESSIONAL ACTIVITIES:**

Associate Editor, Bell Journal of Economics, 1974-1983  
 Associate Editor, Rand Journal of Economics, 1984-1988  
 Associate Editor, Econometrica, 1978-1987  
 Reviewer, Mathematical Reviews, 1978-1980  
 American Editor, Review of Economic Studies, 1979-82  
 Associate Editor, Journal of Public Economics, 1982-1998  
 Associate Editor, Journal of Applied Econometrics, 1985-1993, 2009-  
 Advisory Editor, Economics Research Network and Social Science Research , 1998-  
 Advisory Editor, Journal of Sports Economics, 1999-  
 Advisory Editor, Journal of Competition Law & Economics, 2004-  
 Advisory Editor, Journal of Applied Economics, 2005-  
 Member of MIT Center for Energy and Environmental Policy Research, 1973-1995  
 Research Associate, National Bureau of Economic Research, 1979-  
 Member, American Statistical Association Committee on Energy Statistics, 1981-1984  
 Special Witness (Master) for the Honorable John R. Bartels, U.S. District Court for the Eastern District of New York in Carter vs. Newsday, Inc., 1981-82  
 Member of Governor's Advisory Council (Massachusetts) for Revenue and Taxation, 1984-1992  
 Member, Committee on National Statistics, 1985-1990  
 Member, National Academy of Social Insurance, 1990-  
 Member, Committee to Revise U.S. Trade Statistics 1990-1992  
 Director, MIT Telecommunications Economics Research Program, 1988-  
 Board of Directors, Theseus Institute, France Telecom University, 1988-1995  
 Member, Conference on Income and Wealth, National Bureau of Economic Research, 1992-  
 Member, Committee on the Future of Boston, 1998  
 Member, GAO Expert Panel to advise USDA on Econometric Models of Cattle Prices, 2001-2  
 Advisor, China Ministry of Information on Telecommunications Regulation, 2002-2006  
 Member, FTC Panel on Merger Evaluation, 2005

**PUBLICATIONS:****I. Econometrics**

- "Minimum Mean Square Estimators and Robust Regression," *Oxford Bulletin of Statistics*, April 1974.
- "Minimum Distance and Maximum Likelihood Estimation of Structural Models in Econometrics," delivered at the *European Econometric Congress, Grenoble: August 1974*.
- "Full-Information Instrumental Variable Estimation of Simultaneous Equation Models," *Annals of Economic and Social Measurement*, vol. 3, 641-652, October 1974.
- "Estimation and Inference in Nonlinear Structural Models," *Annals of Economic and Social Measurement*, 653-665, October 1975. (with E. Berndt, R.E. Hall, and B.H. Hall)
- "An Instrumental Variable Approach to Full-Information Estimators in Linear and Certain Nonlinear Econometric Models," *Econometrica*, Vol. 43(4), 727-738, 1975.
- "Simultaneous Equations with Errors in Variables," *Journal of Econometrics* 5, 1977.
- "Social Experimentation, Truncated Distributions, and Efficient Estimation," *Econometrica*, Vol. 45(4), 919-938, 1977. (with D. Wise)
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- "Attrition Bias in Experimental and Panel Data: The Gary Income Maintenance Experiment," with D. Wise, *Econometrica*, vol. 47(2), 455-473, 1979.
- "Missing Data and Self Selection in Large Panels," *Annales de l'INSEE*, April 1978. (with Z. Griliches and B.H. Hall)
- "Stratification on Endogenous Variables and Estimation," in *The Analysis of Discrete Economic Data*, ed. C. Manski and D. McFadden, MIT Press, 1981. (with D. Wise)
- "Les modèles probit de choix qualitatifs," ("Alternative Conditional Probit Specifications for qualitative Choice.") (English Version), September 1977; EPRI report on discrete choice models, *Cahiers du Seminar d'Econometrie*, 1980.
- "The Econometrics of Labor Supply on Convex Budget Sets," *Economics Letters*, vol. 3(2), 171-174, 1979.
- "Panel Data and Unobservable Individual Effects," *Econometrica*, vol. 49(6), 1377-1398, 1981. (with W. Taylor)
- "Comparing Specification Tests and Classical Tests," *Economics Letters*, 1981.
- "The Effect of Time on Economic Experiments," invited paper at Fifth World Econometrics Conference, August 1980; in *Advances in Econometrics*, ed. W. Hildebrand, Cambridge University Press, 1982.
- "Sample Design Considerations for the Vermont TOD Use Survey," with John Trimble, *Journal of Public Use Data*, 9, 1981.
- "Identification in Simultaneous Equations Systems with Covariance Restrictions: An Instrumental Variables

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- "Stochastic Problems in the Simulation of Labor Supply," in *Tax Simulation Models*, ed. M. Feldstein, University of Chicago Press, 1983.
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- "Specification and Estimation of Simultaneous Equation Models," in *Handbook of Econometrics*, ed. Z. Griliches and M. Intriligator, vol. 1, 1983.
- "Full-Information Estimators," in Kotz-Johnson, *Encyclopedia of Statistical Science*, vol. 3, 1983
- "Instrumental Variable Estimation," in Kotz-Johnson, *Encyclopedia of Statistical Science*, vol. 4, 1984
- "Specification Tests for the Multinomial Logit Model," with D. McFadden, *Econometrica*, vol. 52(5), 1219-1240. 1984.
- "Econometric Models for Count Data with an Application to the Patents R&D Relationship," *Econometrica*, vol. 52(4), 909-938. 1984.(with Z. Griliches and B. Hall)
- "The Econometrics of Nonlinear Budget Sets," Fisher-Shultz lecture for the Econometric Society, Dublin: 1982; *Econometrica*, vol. 53(6) 1255-1282, 1985.
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- "Testing with Heteroskedasticity and Many Instruments", with W. Newey T. Woutersen, J. Chao, and N. Swanson, January 2011
- "A Bayesian Semi-Parametric Duration Model with Unobserved Heterogeneity", with M. Burda & M. Harding,, May 2011

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- "Discontinuous Budget Constraints and Estimation: The Demand for Housing," with D. Wise, Review of Economic Studies, vol. 7(146), 75-96. January 1980.
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### **III. Applied Micro Models**

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