Competitive Strategies under FMO and Intermodal Competition*

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1. Introduction

Over the past decade Universal Service Providers (USPs) have become increasingly regulated as their reserved areas have been reduced or eliminated. Indeed, some USPs have already seen their reserved area completely eliminated, and all of the USPs in the EU are scheduled to lose their reserved areas as postal markets are opened up to competition (FMO) in 2011 and 2013. USPs will continue to be required to provide universal service as FMO envisages the retention of the Universal Service Obligation (USO). In addition, there is no sign of reduced regulation to accompany FMO. The situation is clearly paradoxical in that, as postal markets are opened up to competition, regulation is not on the wane but continues to thrive, which is more than can be said for the postal sector. The paradox is usually justified on the grounds that regulation is needed to protect nascent entry from the USP, which is thought to have considerable residual market power. Another justification for regulation is the need to safeguard the USO, thereby offering some protection for small customers. There are inherent tensions between maintaining a USO combined with FMO, which are exacerbated in the face of serious intermodal competition. Despite such tensions, abandoning the current path and eliminating regulation entirely seems highly unlikely. So, this paper will assume FMO along with a USO. The primary focus will be to examine the implications for regulation and strategies for USPs when faced with declining demand for traditional mail products arising from intermodal competition.

The paper will address strategies for USPs within the context of regulatory policies employed in the postal sector primarily in the EU but also elsewhere including the US. It will also draw lessons from other sectors, especially telecommunications. Paradoxically, while telecommunications regulation normally provides few insights into postal regulation, in this case the mistakes made in telecommunications may yield some lessons. A case in point is the misguided attempt to introduce competition into traditional wireline telephony, especially as embodied in the Telecommunications Act of 1996 in the United States. What is now apparent is that technology was changing very rapidly. Intermodal competition from wireless and broadband was making irrelevant attempts to create competition by regulation of the natural monopoly in traditional wireline (the local loop).

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The situation in the postal sector is very different in that its natural monopoly does not arise from significant transactions specific investments and large sunk costs. So, unlike traditional telephony, competition has long been feasible except for one major problem – the USO. This has been a problem from the very beginning of the policy debate on FMO. Since then there has been a gradual attempt to introduce competition and manage the process through regulation. The direction regulation has taken has been problematical and the whole process has been oblivious to the critical lesson provided by telecommunications, namely, the importance of intermodal competition. In telecommunications intermodal competition meant that while traditional telephony was a natural monopoly, the monopoly was worth less and less over time and became hardly worth fighting over. The same trend is apparent in the postal sector when faced with inter-modal competition. For example, USPS, while retaining a solid reserved area, has seen its volume decline dramatically from its peak of 213 billion pieces in 2006 to 177 billion in 2009. Moreover, the decline was precipitous in the last two years as its volume was 212 billion pieces in 2007, only a very slight decline relative to 2006. The pie is now shrinking fast and the monopoly is offering USPS little protection against the cold winds of recession and electronic competition.[1] However, unlike old style TELCOs, who were able to re-invent themselves by entering the business created by the new technologies of wireless and broadband USPs, POs, especially USPS, cannot get into the new technologies. In the US and the EU, these technologies were minimally regulated compared to traditional telephony. So, interest in introducing head-on competition in traditional telephony waned and regulation became less important because of inter-modal competition. The implications of the TELCO case have been lost in the implementation of postal policies. The charge to FMO and increased regulation has continued with government and regulators apparently oblivious to the rapidly declining pie they are attempting to share out. In addition, the big difference is that while the new technologies offered new opportunities to TELCOs, because they could build on their traditional technological platform and customer base, the same does not apply to the postal sector. Parcels and banking are highly competitive, and they offer nothing like the growth potential offered by wireless and broadband. So, USPs have (arguably) a greater public mission than TELCOs, and they have far fewer opportunities for building on their brand or basic services or networks than TELCOs. Moreover, and undoubtedly the most difficult challenge, POs have a serious problem of declining demand not faced by TELCOs.

This paper is concerned with some of the ways POs can respond to the problems of declining demand for their traditional letter products as a result of electronic competition and also the opening up of their markets to competition. The problem cannot be solved in the manner of the TELCOs, who entered the new businesses of wireless and broadband. So, the way ahead was

[1] The current "great recession" has certainly taken a major toll on mail volume. The impact of electronic competition has also been significant. As noted in Veruete-McKay et al. (2010), the magnitude of the decline also varies depending on mail products, content and customer segment. Our focus in this paper will not directly address the source of falling mail volumes, but rather the consequences for a PO's business model and the nature of regulation appropriate in the face of volume drops. Other papers in this conference will be addressing the details of mail volume declines.

not necessarily downward as these new businesses were fast growing and could more than replace the revenue loss in traditional telephony even though this was rapid. For POs the way ahead looks unambiguously gloomy. POs' options are limited. They include: stemming the decline in mail volumes, internal business transformation, more effective responses with E2E and other retail products to the entry of electronic substitutes, restructuring the USO and entry into businesses other than mail. This paper will be concerned with the first of these options. Arguably, this is the first step that POs should take as it addresses the most important issue facing POs, namely, the retention of the benefits of scale economies in delivery Section 2 provides a statement of the problem. Volume declines for POs are serious because, as a network with resultant scale economies, the very benefits that worked in POs' favor as volumes were expanding work against them now. One principal area[2] where volume declines may be reduced is in increased incentives for entrants to use access. So, the central role of access, when delivery economies of scale are significant, is provided in section 3. Section 4 provides examples of how to stem volume declines, in particular, the implications of expanding access, changes in the business model of POs to emphasize the wholesale side of the business and implied regulatory policies. Section 5 is in the nature of concluding comments and implications for policy and future research. An appendix contains proofs and a numerical example.

2. Statement of the problem

POs' volume has grown steadily over many years. As a result they have benefitted from the powerful scale economies that exist in the delivery of mail. This can be illustrated with an example of two routes, an unprofitable Route A and a profitable Route B. Their average revenue or price has remained fairly steady in real terms but their average costs have declined. As Route B is profitable, under FMO it is likely to be subject to both direct competition and intermodal competition. To illustrate the effects of such competition, consider the simple linear cost example used by accountants in break-even analysis, in which total cost $TC = vQ + F$, where F = fixed cost, v = unit variable cost and Q = quantity. Figure 1 shows average costs for this model, with $AC = TC/Q = v + F/Q$, assuming fixed costs of $F= 100$, v = marginal cost = average variable cost = \$1. If there is a constant price of $P = \$4$, then for Route A the PO breaks even where $P = AC$, or around 33 units. Under these assumptions, Route A, although covering total route costs, would contribute nothing to the costs of the USO and other fixed costs of the PO. On the other hand, assuming Route B has a volume of 90 units, the same cost and price assumptions would yield a substantial contribution of approximately \$170 from Route B. For purposes of illustration, this figure of \$170 is assumed to be the fixed cost of the PO including the USO. With growing volume over time, average costs would fall and with a constant price, the contribution from all routes would increase over time.

This virtuous cycle driven by demand growth goes into reverse as demand declines. Although in the linear model the change in contribution is always the same, in this case \$3 per unit, the

[2] There may be other options open to POs in E2E, but they are not examined in this paper, which concentrates on the role of access.

presence of fixed costs means that, in addition to the loss in revenue, the route has the added burden of requiring each unit to cover greater fixed cost as demand declines. Contrast this with case where there were no fixed costs. In this case, the PO would continue to earn a surplus until volume was zero. Similarly in the case of increasing average costs with a drop in volume a route could still break even as long as price fell by the same amount as average cost. However, with scale economies the only way *ceteris paribus* of breaking even with a volume drop is to raise price. As long as demand is reasonably inelastic this is feasible. The problem with intermodal competition from electronic media is that demand is transferring to new technologies at apparently an increasing rate.

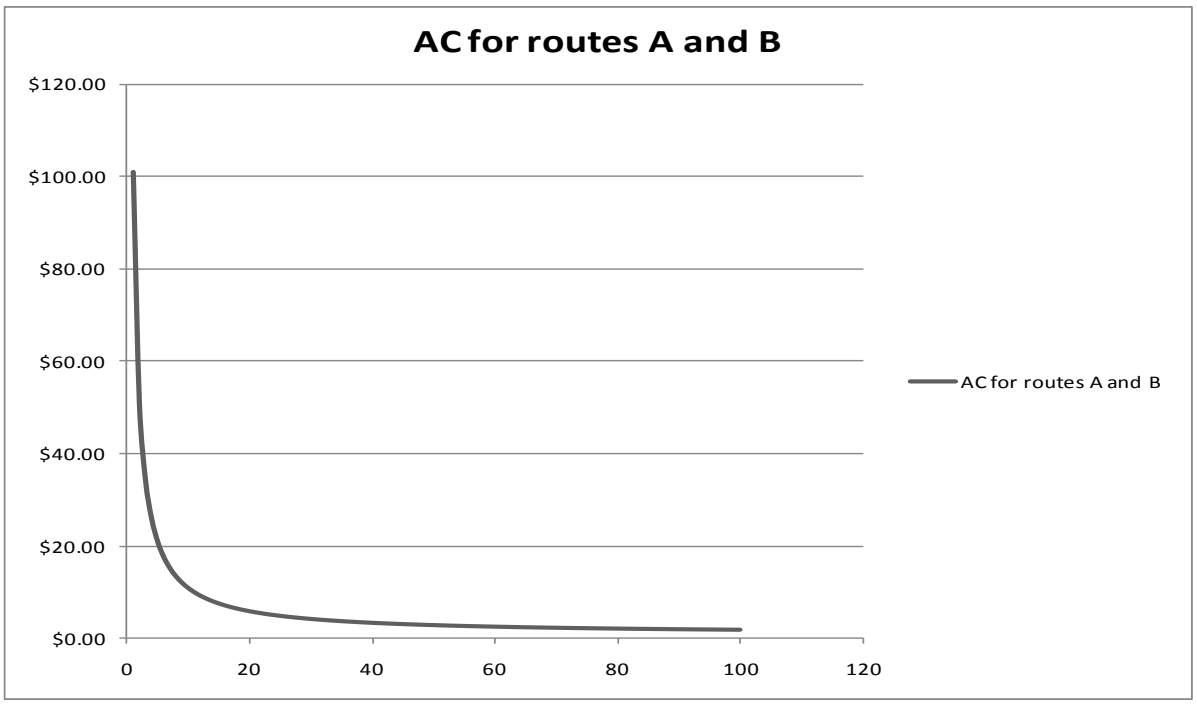

Figure 1: Illustrating Route Profitability for Linear Costs

The simple cost model can be expanded to take into account different route costs and demand price sensitivities. Some routes may have both higher fixed costs and higher variable costs. Even more importantly, because of scale economies, average delivery costs on all routes are driven strongly by volume. For example if volume fell by one unit, Route A would not break even. However, with costs for all routes given as above, the net revenue consequences (i.e., lost contribution) of a unit drop in mail volume would be equal on all routes. The impact of a decline in demand is illustrated in the Table 1 for two routes. Constant elasticity demand functions are employed, with $Q_i = K_i P^{-\eta_i}, K_i > 0, i = \{A, B\}$ and with demand for Route A being more inelastic at 0.4 than on Route B with elasticity of 0.8, but with Route B providing the greater contribution. A target profit of 170 is required to cover the other fixed costs of the PO including the USO. To reflect the uniform price requirement of the USO, prices are raised by the same

amount on both routes so as to break even after the demand decline. The result is that the contribution from Route A would be greater after the price increase; the drop in volume would be larger in absolute and relative terms on the profitable Route B.

Table 1: Impact of a 10 percent Drop in Demand on Both Routes with uniform price adjusted to achieve breakeven

Starting Point			**After Drop in Demand**		
Route	B	A	Route	B	A
K_i	250	50	K_i	225	45
Price	4.75	4.75	Price	5.75	5.75
Demand	71.90	26.81	Demand	55.50	22.35
Route Profit	169.49	0.51	Route Profit	163.78	6.22
Total Profit	170.00		Total Profit	170.00	

The loss resulting from the 10% decline in demand is covered by raising price to $5.75 from $4.75. In this example, volume drops by 4.46 on Route A to 22.35. With the price increase, however, there is a gain in contribution of $5.71 = $6.22 - $0.51 on Route A. Volume drops by 16.40 to 55.50 on Route B, resulting in an equal loss in contribution of $5.71. Breakeven in the face of declining demand is possible here because demand is assumed to be quite inelastic on Route A (an elasticity of 0.4). Even with inelastic demand (an elasticity of 0.8) on Route B, the drop in volume on the profitable Route B takes a big hit because of the higher elasticity. Raising the uniform price means increased contribution from the less profitable routes, but the contribution may be insufficient to make up for the shortfall from the profitable routes. This is the kind of situation that cannot continue as demand is unlikely to remain inelastic on profitable routes, as these routes are going to be subject to greater competition. Somehow, POs need to find a way to address the problems that arise from loss in scale economies as volumes decline, with larger losses in contribution from the hitherto most profitable routes.

This discussion is in the context of short-run costs. As volumes decline significantly, some route reallocation may take place. This is a means of maintaining volumes on routes and therefore avoiding losses in scale economies. However, such reallocation is not unconstrained and some scale economies will be lost. The other short run and long run adjustment is to follow the TELCO example and expand the product lines that are growing. In the case of POs' postal business this implies more attention to access. POs may be able to reduce the decline in mail by increasing access. Others then share in the value chain, but if competitors provide greater value in the upstream part of the value chain than currently provided by POs, this will increase the volume of access. In addition, POs can design access tariffs that assist them in gaining access volumes.

3. Access, Bypass and Economies of Scale

This section considers the consequences of economies of scale for efficient access and bypass. It shows, *inter alia*, that entrants must have considerable cost advantages if they are to overcome the cost advantages of the PO arising from economies of scale in delivery. Given the existence of the USO, the results here provide some intuition about the conditions under which the Universal Service Provider will be the primary provider of delivery services under FMO. Most of the analysis is for a single delivery zone, but the conclusions drawn for this case apply to multiple delivery zones as long as access prices are allowed to vary across delivery zones.
A single entrant or multiple entrants, denoted E, may compete with the incumbent, denoted I, in either worksharing or bypass or both. It is assumed that the products provided by E and I are imperfect substitutes. It is further assumed that the demand for E's product is not influenced by whether delivery is provided under bypass or access (so there is no downstream differentiation of the products, only upstream differentiation). Given this, E decides whether to bypass I, and provide end-to-end service (E2E), or to use I's delivery network based on a comparison of its total cost of setting up and using its own delivery network to provide access compared with the cost of using I's delivery services under access.

Access tariffs are assumed to be linear (i.e., no volume discounts). Upstream operations may be thought of as being served by a competitive fringe of worksharing consolidators with constant returns to scale for upstream activities. However, downstream activities are assumed to exhibit significant scale economies and therefore bypass, if it occurs, will accommodate at most two firms, I and E.[3] It is further assumed that the threat of entry forces the price of any entrant providing delivery service down to its average cost (i.e., the market is contestable).

The following notation is employed:

C_u^k = upstream costs for $k \in \{E, I\}$

C_d^k = marginal downstream costs for $k \in \{E, I\}$

F^k = fixed cost of entering and maintaining local delivery for $k \in \{E, I\}$

The total cost for providing Q units of E2E service by $k \in \{E, I\}$ is assumed to be of the form:

$$H^k(Q) = (C_u^k + C_d^k)Q + F^k \tag{1}$$

The fixed cost F^k by $k \in \{E, I\}$ is incurred if and only if agent k set ups a delivery network. However, the USO requires I to maintain a delivery network.

Prices and demands are defined as:

[3] The restriction to a single entrant is not restrictive in that if multiple entrants were present, the argument presented on the conditions for the superiority of access vs. bypass would apply *a fortiori* to more than one entrant as long as these additional entrants did not generate sufficient additional volumes to overcome losses in scale economies from dividing the delivery market among more than a single provider.

P^k = price charged for E2E service by $k \in \{E, I\}$

A = price of access, as set by I

$D^k(P^E, P^I)$ = Demand for E2E service provided by $k \in \{E, I\}$

We assume that $D^k(P^E, P^I)$ is decreasing in P^k and increasing in P^m, $m \neq k$.

Since the demand for E's product is not influenced by whether it is provided under bypass or access, E will choose bypass or access depending only on cost considerations. Assuming the entry market is contestable, this implies that the E2E price P^E for E's product will be given by the minimum of I's access price (A) and E's E2E average cost

$$P^E = C_u^E + \text{Min}\left[A, C_d^E + \frac{F^E}{D^E(P^E, P^I)}\right] = \text{Min}\left[C_u^E + A, C_u^E + C_d^E + \frac{F^E}{D^E(P^E, P^I)}\right] \qquad (2)$$

The solution to (2) is denoted by $\hat{P}^E(P^I, A)$.[4] Some properties of this solution can be noted. First, the equilibrium price $\hat{P}^E(P^I, A)$ for entrants is increasing in its costs and in access price A, and decreasing in P^I. There are two regions for this price: (i) when A is sufficiently low, then the minimum is attained at the first quantity in the brackets in (2) and E uses I for access; (ii) when A is sufficiently high, then bypass occurs. By equating the two quantities in brackets in (2) the boundary between these two regions is obtained:

$$A = C_d^E + \frac{F^E}{D^E(\hat{P}^E(P^I, \overline{A}), P^I)} \qquad (3)$$

where $\overline{A}$ is any access price sufficiently large to ensure that bypass occurs. Note that any access price $\overline{A}$ that induces bypass will induce the same level of demand for E, as long as price P^I is held constant. Since $\hat{P}^E(P^I, A)$ is decreasing in P^I, and $D^E(P^E, P^I)$ is decreasing in its first argument and increasing in its second, it is evident that the denominator $D^E(\hat{P}^E(P^I, \overline{A}), P^I)$ in (3) is increasing in P^I so that the set of pairs (P^I, A) solving (3) is downward sloping.

As E's fixed costs F^E increase, the region where bypass is cost effective becomes smaller (in that the access price above which bypass occurs increases). Moreover, when bypass is the cost minimizing choice for E, then it can be verified from (2) that increases in F^E will lead to increases in $\hat{P}^E(P^I, A)$ (until the point at which bypass is no longer cost effective, at which point the access-determined price of $C_u^E + A$ obtains).

[4] It is assumed that if there are multiple solutions to (2), then contestability gives rise to the smallest of the feasible (zero-profit) solutions as the outcome. This reduces to (2) in the event that the solution is unique. See the Appendix for details. The Appendix also includes an illustration of the explicit solution to (2) for the case of linear demands.

First the profit function for I (profits for E will be 0 by our contestability assumption) is formulated and overall welfare. Profits for I will be the profits from its E2E and access services:

$$\Pi^I(P^I, A) = \left(P^I - C_u^I - C_d^I\right)D^I(\hat{P}^E(P^I, A), P^I) + \chi(P^I, A)\left(A - C_d^I\right)D^E(\hat{P}^E(P^I, A), P^I) - F^I \quad (4)$$

where

$$\chi(P^I, A) = \begin{cases} 1 & \text{if } \hat{P}^E(P^I, A) = C_u^E + A \\ 0 & \text{if } \hat{P}^E(P^I, A) < C_u^E + A \end{cases} \quad (5)$$

The indicator variable $\chi(P^I, A)$ defined in (5) equals 1 if and only if E chooses access.

The welfare function[5] is the sum of consumer surplus (willingness-to-pay, WTP, minus payments to providers) and the profits of I and E, i.e.

$$W(P^I, A) = V(D^E, D^I) - P^I D^I - \hat{P}^E(P^I, A)D^E + \Pi(P^I, A) \quad (6)$$

where $V(D^I, D^E)$ is aggregate WTP. The principal result of this section follows (see the Appendix for the proof).

<u>Theorem on Superiority of Access</u>: Assume in the cost function (1) that $F^E > 0$ so that economies of scale in delivery exist for the Entrant. Consider any E2E and access pricing pair $(\overline{P}^I, \overline{A})$ with $\overline{A} \le \overline{P}^I$ which induces the Entrant to bypass. Suppose that the Entrant's average delivery cost at the resulting demand $D^E(\hat{P}^E(\overline{P}^I, \overline{A}), \overline{P}^I)$ is greater than the Incumbent's marginal cost of delivery C_d^I, namely:

$$C_d^E + \frac{F^E}{D^E(\hat{P}^E(\overline{P}^I, \overline{A}), \overline{P}^I)} > C_d^I \quad (7)$$

Then the pair $(\overline{P}^I, \overline{A})$ is neither profit maximizing nor welfare maximizing. Indeed, if (7) holds, the pair $(\overline{P}^I, \hat{A}(\overline{P}^I))$ dominates $(\overline{P}^I, \overline{A})$ in terms of both profits and welfare, where $\hat{A}(\overline{P}^I)$ is the solution to the following problem at $P^I = \overline{P}^I$:

[5] Alternative welfare functions such as weighted WTP and profits or Minimizing E2E price P^I would not change the basic results derived here. The latter (subject to a breakeven constraint for I) was suggested by Panzar (2003) as one approach to representing the importance of E2E consumer protection and has found applications in several papers since then, e.g. De Donder et al. (2006).

$$\hat{A}(P^I) = \text{Min}\left\{ A \;\middle|\; A \geq C_d^E + \frac{F^E}{D^E(\hat{P}(A, P^I), P^I)}, A \leq P^I \right\} \tag{8}$$

It is shown in the Appendix that the value of $\hat{A}(P^I)$ defined in (8) is the maximum value of access price that does not induce bypass when E2E price is P^I. This Theorem provides the basic condition under which bypass cannot be an efficient solution relative to access. Before discussing the implications of the Theorem, a Corollary to this Theorem indicates an important implication for bypass under FMO.

<u>Corollary</u>: Under the same conditions as the above Theorem, suppose that at expected post-entry volumes E's fixed delivery costs F^E are at least $\theta \in (0,1)$ as a fraction of E's total delivery costs, so that:

$$\frac{F^E}{F^E + C_d^E D^E(\hat{P}^E(P^I, A), P^I)} \geq \theta \tag{9}$$

Then unless $C_d^E \leq (1-\theta) C_d^I$, bypass is not efficient in the sense that, for the same E2E price P^I, lowering the access price A to a level that would just preclude bypass by the entrant would improve both I's profit and overall welfare.

To demonstrate the Corollary, note that if (9) holds, then

$$F^E \geq \theta[F^E + C_d^E D^E(\hat{P}^E(P^I, A), P^I)] \tag{10}$$

So that

$$\frac{F^E}{D^E(\hat{P}^E(P^I, A), P^I)} \geq \frac{\theta}{1-\theta} C_d^E \tag{11}$$

Adding C_d^E to both sides of (11), this implies that

$$C_d^E + \frac{F^E}{D^E(\hat{P}^E(P^I, A), P^I)} \geq \frac{1}{1-\theta} C_d^E \tag{12}$$

From (12), unless $C_d^E \leq (1-\theta) C_d^I$ condition (7) in the Theorem would obtain and bypass would not be efficient. In particular, E would have to have significant advantages in marginal cost of delivery relative to I if bypass is to be an efficient strategy. Moreover, the larger the fixed costs for E of setting up and operating the delivery network, the larger these marginal cost advantages would have to be.

Returning now to the Theorem, the demonstration of this result in the Appendix proceeds by showing that if (7) is valid, then any access price the Incumbent might set that would lead E to bypass would allow, for the same E2E price, a lower access price still greater than I's marginal

delivery cost but which then induces the Entrant to use access rather than bypass. Moreover, at the resulting lowered access price that induces access than bypass, I's profits are increased relative to the prior setting in which bypass was induced. The essential point of the proof is to note that the highest access price that does not induce bypass will lead to almost the same demands for both E and I as a slightly increased access price that leads to bypass. However, under access the inflow of E's total demand into I's delivery channel means a significant reduction in I's average delivery costs due to economies of scale. As shown in the Appendix, this leads to overall cost benefits for I as well as to increased welfare.[6] Of course, E is no better or worse off under either the resulting access or bypass regime as E's profits are zero in both cases because of contestability. An extended example for the case of linear demand is presented in the Appendix to illustrate these results.

It is important to keep the key assumptions underlying the Theorem in mind. These include, foremost, the following: 1) Economies of scale in delivery exist for the Entrant(s); 2) No differentiation in delivery between E and I—differentiation, if any, occurs in the upstream interface between alternative postal providers and customers; 3) There is a contestable delivery market (so sunk costs are minimal in the delivery network), with at most one entrant active in delivery.

Concerning delivery economies of scale, empirical work on postal networks has validated this assumption, e.g. the work on EU Member States reported in Crew et al. (2008). Differentiation in downstream products could develop in terms of alternative delivery frequencies between E and I and in terms of quality differentiation. It should be noted, however, that changes that would lower the perceived quality of E's products (e.g., reduced frequency of delivery) relative to I would only strengthen the result indicating when access would dominate bypass. Thus, if differentiation is to contribute to the efficiency of bypass by entrants, it would have to be in increasing the perceived quality of E's offerings relative to the Incumbent.

It is worth noting that the Theorem only requires economies of scale for Entrants. What are the implications of such economies of scale for I's delivery operations? A little reflection shows that these are important as well. The greater the fixed cost of I's operations, *ceteris paribus*, the more difficult it will be for I to break even (i.e., the smaller the set of feasible (P^I, A) pairs, absent subsidies. Bypass would only further decrease this feasible set by increasing the average cost of I's delivery operations. This would have the same effect as if I's demand decreases, e.g. as a result of intermodal competition. In either of these cases, the benefits of bypass competition (if any) are diminished because of viability concerns for I.

The assumption on a single potential entrant for bypass is not constraining, as splitting the delivery market up further among entrants would only strengthen the result of the Theorem. Similarly, contestability of the market is not fundamental to the logic of the Theorem. If entrants could extract more than a zero profit from delivery operations under bypass (but not in the clearly contestable market upstream), then constraint (3) would yield increases in the equilibrium price $\hat{P}^E(P^I, A)$ required to achieve the increased profit level. This would have the effect of

[6] The same logic also implies that a lower E2E price could be implemented under access than under bypass while still allowing I to breakeven.

decreasing the set of (P^I, A) pairs at which bypass would occur (the reader may think of the additional profits as being added to E's fixed cost F^E). Unless this profit increase was the result of true increases in the perceived value of E's product, this would not enhance the efficiency of bypass relative to access. Indeed, enlarging the set of feasible access prices would only lead to an increased superiority of access relative to bypass.

Finally, it is important to note that the logic of this Theorem is by no means restricted to a single zone, as long as access prices can be varied according to zone (e.g., following the DAP proposal of Crew and Kleindorfer (2002)). The logic of the proof requires only that the E2E price P^I be fixed (indeed, this E2E price could also vary across zones without affecting the logic of the Theorem). Thus, a key underlying requirement to harvest the efficiencies of access relative to bypass, assuming such efficiencies exist per condition (7) of the Theorem, is that the Incumbent be allowed sufficiently flexible pricing to ward off bypass, requiring only that the access price exceed the marginal cost of the Incumbent.

4. Implications for POs and Regulation

Intermodal competition from electronic media presents a serious threat to the viability of POs as mail volumes decline. It really is the elephant in the room when it comes to threats to the traditional postal business. It is the elephant in that it has the potential to trample down the postal business, if not to death, in a manner that will inflict severe damage. By contrast, the threat from head-on competitors is likely to be much less severe. The shrinking pie from declining volumes means that scale economies in delivery are under pressure. This works against both incumbents and entrants, as there are likely to be fewer routes that have sufficient volume to be of interest to entrants. However, entrants still want to retain their customers and grow their business. As illustrated in the previous sections, under declining volumes, entrants can help stem the decline in mail volumes, which enables POs to retain volume in the form of access that would otherwise be lost. This, in turn, reduces the cost increases that occur as a result of lost volume with scale economies. So, the message of the previous sections is that preserving final delivery volumes, through innovations in both E2E and access products, plays a critical role in times of volume decline arising from intermodal competition.

The analogy with the traditional TELCOs is apparent. They saw traditional service declining but were able to take advantage of scope economies by entry into wireless and broadband.[7] Wireless, in fact, employed the same circuit switching as traditional telephony in a similar manner that access is employed in the postal sector. Wireless used access to landlines through the local loop and also used the long-distance facilities of TELCOs. In the postal sector, a similar logic obtains, but with rather different implications for the business model of the PO. By

[7] Duncan and Cameron (2006)note that the implications of scale economies in the local loop have been fundamental in driving head-to-head competition to maintain volumes in the shrinking fixed-line business. The same type of considerations apply to the traditional mail business, namely, economies of scale driven by high fixed costs.

unbundling, POs are able to take advantage of scope economies. Indeed, access customers bring in more retail business. Thus, if POs retain delivery, this would help to maintain the scale economies from delivery. However, it is clear that the key element of this logic for the postal sector is that POs retain a strong presence in the delivery function, and this implies a shift in emphasis from the retail business to the wholesale business in providing superior access products to major customers, including consolidators and worksharing organizations. This is not to say that the E2E retail business will not also be important, both for reasons of the USO as well as for single-piece mail, which also clearly contributes to ultimate delivery volumes. However, given the relative volumes from retail and wholesale sources, and the threats from direct and from intermodal competition, the access business is now taking on greater strategic importance.

There are a number of reasons for believing that a greater emphasis on the strategic importance of the PO's wholesale business may be beneficial. Access customers are likely to have lower costs and therefore lower prices than POs when it comes to the part of the value chain they provide.[8] In addition, they are likely to be more innovative in designing products that compete more effectively with electronic substitutes. They will be in competition with other entrants and electronic products. Many of them will be small companies, which will have a much greater incentive to innovate than traditional POs, largely because they will retain a greater share of the benefits that arise.

This logic argues that PO survival is closely tied to a greater emphasis on its wholesale business in providing delivery services rather than E2E services. It is an application of the basic notion of comparative advantage. Delivery is where POs have a comparative advantage. POs' ubiquity of delivery also means that POs and delivery companies can work together, with POs selling delivery to delivery companies and buying transportation and logistics. Examples of this kind have been examined by Smith and Vogel (2010) in their discussion of the kind of cooperative and competitive relationships that exist between UPS and USPS.

The notion of PO survival being tied to becoming superior wholesale operations might be extended well beyond the provision of access to include retail outlets. The case of USPS is of particular interest here. USPS (and other POs) face serious problems with uneconomic post offices. The network of post offices is seen as a significant characteristic of the USO. Indeed, for USPS to close a post office requires a process involving its regulator, the Postal Regulatory Commission (PRC). An alternative would be to set up franchises operated as part of an independent retail business. In fact, such businesses, motivated by profit, are likely to be more likely to be proactive in selling postal service than postal clerks in post offices . With the move to greater emphasis on wholesale operations, existing post offices could be used more intensively. A post office could sell not only USPS products, but also FEDEX and UPS products. Similarly, UPS and FEDEX outlets could also be selling USPS products. In the case

[8] There are a number of reasons why this is likely to be the case. These include access to lower priced labor, less restrictive work rules and the absence of powerful scale economies upstream.

of postal franchises there may be no incentive to favor USPS over other carriers. The commission received would drive the franchisee to sell the products of individual carriers. More importantly, the price charged and product attributes would be the drivers of consumer choice. In the language of strategic differentiation (e.g., Hamel and Prahalad, 1990), recognizing and emphasizing the PO's core competency as arising from its wholesale operations in delivery and postal outlets would be not only a major culture change but, for economists, it would be considered a change in incentives. Just as POs would make money by delivering access customers' mail they would also make money in their postal outlets by selling competitors' products. Indeed, the products sold might involve inputs from more than one input. The retail outlet might sell a UPS product where the PO delivers it to a UPS depot, which then gets it in the UPS chain with ultimate delivery provided by the PO. Alternatively, the PO might sell a FEDEX product that FEDEX picks up from the PO, transports and delivers to the final destination. Numerous combinations are possible and once POs see their primary business model as wholesale and access, business innovations in hybrid mail, in differentiated delivery quality, and in many other areas, are likely to be triggered and supported by the PO.

A major question raised by greater emphasis on wholesale operations by POs is the role of regulation and the place of FMO. FMO in Europe is like a train that has left the station. However, E2E competition is unlikely to be widespread as a result of FMO in 2010 for a number of reasons. Scale economies are such powerful drivers of the process that POs will have strong incentives to provide access services at prices that entrants cannot beat. Regulator pro-activity in regulating access should depend on the extent to which POs employ an open access policy. The more open the access policy and the more competitive the access prices, the less the regulator should get involved. Regulators should not get involved in a detailed manner in access pricing, especially when it comes to fixing minimum prices. Generally, as long as the PO sets access prices above marginal costs, and does so in a transparent and non-discriminatory manner, the notion of "the lower the better" applies. Regulators should not place much attention on predation but should be much more concerned with promoting transparency and avoiding discriminatory practices against individual customers or access seekers. As apparent from the results in Section 3, this would imply *inter alia* zonal pricing. The uniform single-piece price provides an effective cap on access prices in the high cost zones. Potential entrants in the low cost zones provide the discipline on prices there. So, if a regulator observes little E2E competition, it does not mean competition is absent, as long as transparent access prices apply and these are based on cost or value dimensions such as volume discounts, collection windows, or delivery service quality differences. However, a regulator might be concerned about competition if little or no E2E competition exists and minimal access is also observed.

Interestingly, POs may not necessarily see the importance of encouraging access, through both pricing and the technical conditions offered to access seekers. POs may still have a monopoly mindset and attempt to use their residual market power to keep competitors out by restricting access. For example, a PO under FMO might choose to exploit residual market power by discriminatory access policies directed against access customers, who were also in the E2E business. The impact of this in the face of volume declines brought about by intermodal competition would be to lose further volume. The PO, by discouraging access, would be further reducing its own scale economies resulting in higher E2E prices and further volume declines as

intermodal competition looks more attractive. Thus, paradoxically, even though profit considerations should drive a PO to encourage access, regulators may need to stimulate demand-enhancing access policies to the extent that the PO retains a monopoly mindset. However, the regulator should keep in mind the threat of the elephant in regulating access. A PO's policy of restricting the development of access might be successful short-term in curbing entry, but at the price of being overwhelmed by the elephant of electronic competition in the long run. A regulator should aim to prevent the abuse of residual market power mainly because of a concern for the damage the elephant can do if left unchecked rather than considerations for the welfare of potential entrants.

5. Summary and Concluding Comments

Volume decline from intermodal (electronic) competition is much more serious than anything faced by POs in their history. Unlike previous kinds of competition, very little complementarity evident between mail and electronic substitutes has been observed. The telephone did not mean that people dramatically cut back on sending letters. Electronic competition hits letters head on. The only apparent relief it provides is in increased parcel traffic through eRetailing. Even here, competitors are likely to compete effectively with POs. However, for eRetailing deliveries to households, competitors may see the advantages of offering a lower priced service using the PO delivery network.

This paper has argued that delivery excellence is the quintessential core competence of USPs and that maintaining delivery volumes, from both E2E and access customers, should therefore be a central strategic priority of POs in their traditional mail business. While the retail business will continue to be important for reasons of the USO and single-piece mailers, given the nature of growing intermodal competition, the focus here is on wholesale access customers as the key strategic priority. We have also argued that regulation of access should be minimal and regulators should intervene if PO access policies fall short of encouraging access. Future research might involve developing principles underlying efficient zonal access pricing. Other issues include the role to be played by quantity discounts and other means of encouraging larger customers to continue to use delivery services. Finally, POs should understand the dangers of reducing quality. Attempts by POs to cut delivery frequency nationwide, notably, the proposal by USPS to reduce delivery to five days a week nationwide may be playing into the hands of competitors. POs need to be careful about making their products less attractive than those of their competitors. POs that focus on serving their access customers effectively are going to need to consider carefully the attributes of their access products. If access is the future for POs, they and their regulators need to understand the importance of promoting it. Cost cutting by itself does not address the fundamental issue of volume. Moreover, it may adversely affect volume to the extent that it lowers quality or other demand drivers. On the other hand encouraging the growth of access directly addresses the problem of volume on delivery economies of scale.. The effective demise of postal service does not have to occur soon if POs are proactive in developing access. By allowing flexible and zonal access pricing, subject to transparency and non-discrimination, regulators can help to promote a climate in which access and wholesale operations of the PO can grow, while simultaneously promoting customer-focused innovations in their E2E retail operations to preserve single-piece volumes. However, POs should solve their

problems themselves and not rely on their regulators for more than setting the stage for effective marketing of customer-focused services, with greater focus on the wholesale side of their business.

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Appendix

This appendix proves the "Theorem on Superiority of Access" and provides details on the linear demand case corresponding to the general analysis in Section 3.

<u>Proof of Access Theorem</u>

Let us first define the solution for E's price under contestability.

$$\hat{P}^E(P^I, A) = \begin{cases} C_u^E + A \quad \text{if } \operatorname{Max}\{\Pi_B^E(P^E, P^I) \,|\, P^E \geq 0\} < 0 \\ \operatorname{Min}\left[C_u^E + A,\, C_u^E + C_d^E + \dfrac{F^E}{D^E(\ddot{P}^E(P^I), P^I)}\right] \text{ else} \end{cases} \tag{A1}$$

where $\Pi_B^E(P^E, P^I) = (P^E - C_u^E - C_d^E)D^E(P^E, P^I) - F^E$ are E's profits under bypass and where $\ddot{P}^E(P^I)$ is defined by

$$\ddot{P}^E(P^I) = \operatorname{Min}\left\{P^E \;\middle|\; P^E \geq C_u^E + C_d^E + \frac{F^E}{D^E(P^E, P^I)}\right\} \tag{A2}$$

By continuity, the minimum in (A2), if it exists, occurs where the constraint in (A2) holds as an equality, i.e., where $\Pi^E(P^E, P^I) = 0$. Moreover, the solution to (A2) exists precisely when $\operatorname{Max}\{\Pi^E(P^E, P^I) \,|\, P^E \geq 0\} \geq 0$, since the objective function is continuous in (A2) and the constraint set is closed, bounded below and non-empty, the latter because E's profit-maximizing solution under bypass satisfies the constraint in (A2).

For any $P^I \geq 0$ for which bypass is feasible, i.e. for which $\operatorname{Max}\{\Pi^E(P^E, P^I) \,|\, P^E \geq 0\} \geq 0$, define $\hat{A}(P^I)$ as the maximum price not exceeding P^I at which access still occurs when E2E price is P^I. This can be seen to be the solution to:

$$\hat{A}(P^I) = \operatorname{Inf}\left\{A \;\middle|\; 0 \leq A \leq P^I;\, A \geq C_d^E + \frac{F^E}{D^E(\ddot{P}^E(P^I), P^I)}\right\} \tag{A3}$$

$\hat{A}(P^I)$ is well defined since D^E and $\ddot{P}^E(P^I)$ are continuous and the maximization region in (A1) is compact and non-empty. It is non-empty because $A^* = P^{E*} - C_u^E$ is one feasible access price in (A3), where P^{E*} solves $\operatorname{Max}\{\Pi^E(P^E, P^I) \,|\, P^E \geq 0\}$. To see that $\hat{A}(P^I)$ is the maximum price not exceeding P^I at which access occurs, note first that $\hat{A}(P^I)$ does induce access since equality must obtain by continuity in both (A2) and (A3), so that

$$\hat{A}(P^I) + C_u^E = \ddot{P}^E(P^I) = C_u^E + C_d^E + \frac{F^E}{D^E(\ddot{P}^E(P^I), P^I)} \tag{A4}$$

Moreover, for any ε>0, $\hat{A}(P^I)+\varepsilon$ induces bypass since

$$\hat{A}(P^I)+\varepsilon+C_u^E > \ddot{P}^E(P^I) = C_u^E + C_d^E + \frac{F^E}{D^E(\ddot{P}^E(P^I),P^I)} \tag{A5}$$

Thus, $\hat{A}(P^I)$ is indeed the maximum value of A at which access is induced at E2E price P^I. With these preliminaries accomplished, to show the claim of the Theorem, take any pair $(\bar{P}^I,\bar{A})$ satisfying (7) that induces bypass. Construct an alternative price pair that dominates $(\bar{P}^I,\bar{A})$. It will be shown that the pair $(\bar{P}^I,\hat{A}(\bar{P}^I))$ dominates $(\bar{P}^I,\bar{A})$ in terms of both profits and welfare.

Since $\bar{A}\le\bar{P}^I$ is a feasible access price which gives rise to bypass, and since $\hat{A}(P^I)$ is the maximum value of A at which access (rather than bypass) occurs at E2E price P^I, we have $\hat{P}^E(\bar{P}^I,\hat{A}(\bar{P}^I)) = C_u^E+\hat{A}(\bar{P}^I)$ and $\hat{A}(\bar{P}^I)<\bar{A}\le\bar{P}^I$. Thus, for ε > 0, with $\hat{A}(\bar{P}^I)+\varepsilon<\bar{A}\le\bar{P}^I$, the pair $(\bar{P}^I,\hat{A}(\bar{P}^I)+\varepsilon)$ also gives rise to bypass. Moreover, if the E2E price $\bar{P}^I$ is fixed, then any pair $(\bar{P}^I,A)$ giving rise to bypass generates the same demands for E and I, so that

$$D^k(\hat{P}^E(\bar{P}^I,\hat{A}(\bar{P}^I)+\varepsilon),\bar{P}^I) = D^k(\hat{P}^E(\bar{P}^I,\bar{A}),\bar{P}^I), \quad k\in\{E,I\} \tag{A6}$$

Thus, consumer surplus in (6) is identical at both $(\bar{P}^I,\hat{A}(\bar{P}^I)+\varepsilon)$ and $(\bar{P}^I,\bar{A})$, so in order to prove the claim of the Theorem, it is necessary only to verify that I's profits are greater at $(\bar{P}^I,\hat{A}(\bar{P}^I))$ than at $(\bar{P}^I,\bar{A})$. Assuming the hypothesis (7) of the Theorem holds, from (A6) and the fact that bypass occurs at $(\bar{P}^I,\hat{A}(\bar{P}^I)+\varepsilon)$, we have

$$\hat{A}(P^I)+\varepsilon > C_d^E + \frac{F^E}{D^E(\hat{P}^E(\bar{P}^I,\hat{A}(\bar{P}^I)+\varepsilon),\bar{P}^I)} = C_d^E + \frac{F^E}{D^E(\hat{P}^E(\bar{P}^I,\bar{A}),\bar{P}^I)} > C_d^I \tag{A7}$$

with the equality following from (A6) and the final inequality following from (7). Letting ε go to zero, we see that if (7) holds, then $\hat{A}(P^I) > C_d^I$ and profits, defined in (4), are therefore greater at $(\bar{P}^I,\hat{A}(\bar{P}^I))$ than at $(\bar{P}^I,\bar{A})$. Clearly, welfare is also increased since demands are unaltered in this change as are E's profits (which are zero both before and after the change). This demonstrates the Theorem.

<u>Linear Demand</u>

The linear demand case has the form:

$$D^k(P^E,P^I) = \alpha^k - \beta^k P^k + \gamma P^m,\ k,m\in\{E,I\}, k\neq m \tag{A8}$$

where α^k,β^k,γ are all positive and $\beta^k>\gamma$ for $k\in\{E,I\}$.

From (A1), assuming the entry market is contestable, the E2E price $\hat{P}^E(P^I, A)$ for E's product will be given by the minimum of I's access price (A) and E's E2E average cost

$$P^E = \text{Min}\left[C_u^E + A, C_u^E + C_d^E + \frac{F^E}{D^E(P^E, P^I)}\right] \tag{A9}$$

For any (P^I, A) the solution to (A9) when the delivery market is contestable[9] is:

$$\hat{P}^E(P^I, A) = \begin{cases} C_u^E + A & \text{if } S(P^I)^2 < 4\beta^E T(P^I) \\ \text{Min}\left[C_u^E + A, \dfrac{S(P^I) - \sqrt{S(P^I)^2 - 4\beta^E T(P^I)}}{2\beta^E}\right] & \text{else} \end{cases} \tag{A10}$$

where

$$S(P^I) = \alpha^E + \gamma P^I + \beta^E(C_u^E + C_d^E); \quad T(P^I) = (C_u^E + C_d^E)(\alpha^E + \gamma P^I) + F^E \tag{A11}$$

so that:

$$S(P^I)^2 - 4\beta^E T(P^I) = (D^E(C_u^E + C_d^E, P^I))^2 - 4\beta^E F^E \tag{A12}$$

which is positive when F^E is sufficiently small. From (A12), we see that whenever the fixed costs F^E are large then the second term in the minimum operator in (A10) increases relative to the first and makes bypass less and less likely. For F^E sufficiently large, (A12) becomes negative and $\hat{P}^E(P^I, A)$ is then equal to $C_u^E + A$, as specified in (A10).

It can be verified from (A10)-(A12) that the equilibrium price $\hat{P}^E(P^I, A)$ for entrants is increasing in its costs and in access price A, and decreasing in P^I. As E's fixed costs F^E increase, the region where bypass is cost effective becomes smaller (in that the minimum access price above which bypass occurs increases). Moreover, when bypass is the cost minimizing choice for E, then increases in F^E will lead to increases in $\hat{P}^E(P^I, A)$ (until the point at which bypass is no longer cost effective, at which point the access-determined price of $C_u^E + A$ obtains).

Since our contestability assumption implies that profits for E will be zero, the welfare function is the sum of consumer willingness-to-pay (WTP) and profits of I, i.e.

$$W(P^I, A) = V(D^E, D^I) - \hat{P}^E(P^I, A)D^E - P^I D^I + \Pi^I(P^I, A) \tag{A13}$$

[9] For the linear demand case, the solution to (A9) involves a quadratic equation, with 0, 1 or 2 roots. When there are 0 roots, the profit maximizing solution under bypass leads to negative profits, so that from (A1) P^E is given by A + C_u^E; when there is 1 root (a double root) it is the minimum of the two quantities in (A9) that matters; and when there are two roots, it is only the smaller of the two which can survive in a contestable market. These facts are embodied in (A1)-(A2) and (A10).

where Π^I is given in (4) and $V(D^I, D^E)$ is aggregate WTP. For the linear demand case (A8), this takes the well-known quadratic form:[10]

$$V(D^E, D^I) = -\frac{a^E}{2}(D^E)^2 - \frac{a^I}{2}(D^I)^2 + b^E D^E + b^I D^I - eD^E D^I \tag{A14}$$

with the positive coefficients a^k, b^k, e corresponding to the demand equations (A8) given by

$$a^k = \frac{\beta^m}{\Delta}; \quad b^k = \frac{\alpha^k \beta^m + \alpha^m \gamma}{\Delta}; \quad e = \frac{\gamma}{\Delta}; \quad k, m \in \{E, I\}; k \neq m \tag{A15}$$

with $\Delta = \beta^E \beta^I - \gamma^2 > 0$. In particular, when the coefficients of the WTP function are specified by (A14) then the consumer maximization problem:

$$\text{Max}\{V(D^E, D^I) - P^E D^E - P^I D^I \,\big|\, D^E, D^I\} \tag{A16}$$

yields the demand functions (A8). Consider an example corresponding to the following parameter values:

Parameter	E	I
α^k	100	150
β^k	2.0	1.5
γ	0.5	0.5
C_u^k	8	10
C_d^k	16	20
F^k	500	1000

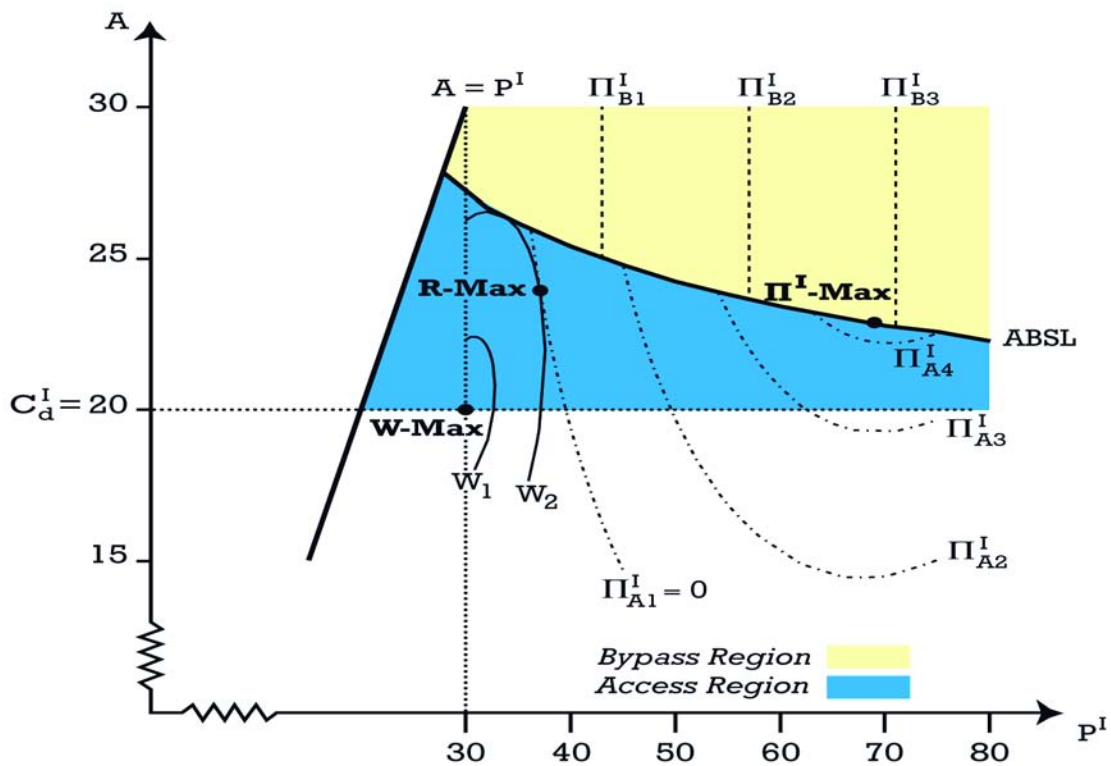
The solutions are provided below.

Objective	P^I	A	$\hat{P}^E(P^I, A)$	Value of Profit	Value of Welfare
Profit	68.95	22.88	30.88	1,624.49	5,285.53
Welfare	30.00	20.00	28.00	- 1,000.00	6,375.36
Ramsey	37.11	23.94	31.94	0.00	6.335.91

These solutions are shown in the following figure. First note that access price A must be no greater than the E2E price P^I so the feasible region is below the line $A = P^I$. As expected, the welfare-

[10] See, e.g., DeDonder et al. (2001) for a derivation.

optimal solution is to set prices equal to marginal cost (which results in E using access). The results in this figure underscore the basic point made in Section 3 concerning profit and welfare in relation to access and bypass. In particular, just above the line Access-Bypass Separation Line (ABSL) in the figure, bypass occurs and just below it access occurs. From the perspective of E, and its customers, there is little difference in crossing ABSL, as prices change only negligibly[11] and demand functions are continuous. However, the effect on I's costs is significant: above the ABSL, E's demands are serviced by E's bypass network., while below ABSL, these demands all revert to I to deliver, and they therefore contribute to decreasing I's average delivery cost. It is precisely this lump-sum contribution of added volumes to I's delivery function that give rise to the profit and welfare superiority of access over bypass in this case.



ABSL = Access-Bypass Separation Line. Above this line only bypass occurs, and on it or below it only access occurs. The profit-maximizing point is on ABSL. ABSL is defined through (A10)-(A12) by: $A = -C_u^E + \left(S(P^I) - \sqrt{S(P^I)^2 - 4\beta^E F^E}\right) / \left(2\beta^E\right)$

Π^I_{Ai} = Iso-profit contours in Access Region, where: $0 = \Pi^I_{A1} < ... < \Pi^I_{A4} < \Pi^I$ - Max

Π^I_{Bi} = Iso-profit contours in Bypass Region, where: $\Pi^I_{B1} < \Pi^I_{B2} < \Pi^I_{B3} < \Pi^I$ - Max

W_i = Iso-welfare contours, where : W-Max $> W_1 > W_2$ = R-Max (Ramsey Solution)

Figure 2: Illustrating Access and Bypass for Linear Demand

[11] Note that E's price is constant for any given price P^I in the bypass region, including just above the line ABSL. The only effect in this region of changes in I's price are on E's demand, and therefore on E's resulting breakeven price as determined by (A9). Changing access price A has no effect on either E or I in the bypass region.