Declaration of A. Thomas Bozzo and Mark E. Meitzen

Christensen Associates

March 4, 2020

Table of Contents

1. <u>Introduction and Purpose of Declaration</u>

a. <u>Biographical sketches</u>

A. Thomas Bozzo is a Vice President with Christensen Associates, where he has been employed since 1996. Dr. Bozzo has a Bachelor of Arts degree in economics and English from the University of Delaware, and a Ph.D. in economics from the University of Maryland-College Park. His areas of expertise include economic cost measurement; postal, railroad, and telecommunications regulation; and applied econometrics and statistics. He currently leads Christensen Associates' area of practice responsible for clerk and mail handler cost and labor productivity production for the Cost and Revenue Analysis and Annual Compliance Reports. Dr. Bozzo has also been involved with numerous other projects for the Postal Service, focusing on applications of econometrics, sample-based data, and economic cost theory for measurement of costs and productivity for postal activities and products, including Total Factor Productivity and surveys of field operations. Dr. Bozzo has presented testimony on mail processing costs in Dockets No. R2000-1, R2005-1, and R2006-1, and testified on the In-Office Cost System (IOCS) survey instrument design in Docket No. R2006-1. He has consulted for USPS OIG on subjects including a review of Postal Service demand models (Report No. RARC-WP-13-008, May 1, 2013) and an assessment of costs related to provision of service standards. He was a primary author of the Christensen Associates 2008 study of freight railroad competition for the Surface Transportation Board, for which he led the study's econometric analysis of the determinants of rail freight pricing. Dr. Bozzo has also been involved in projects in other practice areas, including sampling studies of electricity demands, econometric analyses of energy efficiency programs, analysis of telecommunications cost models for projects related to universal service proceedings, and a variety of litigation support projects.

Mark E. Meitzen is a Senior Consultant with Christensen Associates, where he has been employed since 1990. Prior to that, he was a regulatory economist at Southwestern Bell Telephone Company (now AT&T) in St. Louis, Missouri, and was a member of the economics faculty at the University of Wisconsin–Milwaukee and Eastern Michigan University. Dr. Meitzen has a Bachelor of Science degree in economics from the University of Wisconsin-Oshkosh, and a Master of Science and a Ph.D. in economics from the University of Wisconsin-Madison. Among his duties at Christensen Associates, he has consulted with firms in several network industries, including the telecommunications, electricity, postal, and railroad industries. Dr. Meitzen has consulted with these industries on a variety of issues including incentive regulation, productivity, costing, and pricing. He has also sponsored testimony on these

issues in regulatory proceedings. Recently, he sponsored total factor productivity studies and testified on incentive regulation issues on behalf of National Grid and Eversource in Massachusetts, and on behalf of EPCOR in Alberta, Canada. In addition, he has analyzed the implications of various Postal reform proposals including the McHugh bill and the President's Commission report. He has also analyzed Postal universal service definitional issues and costing methods. Dr. Meitzen co-authored an internal technical brief on the performance of Postal Service price cap regulation for the USPS Office of Inspector General (OIG). This technical brief is the basis of the USPS OIG whitepaper, *Revisiting the CPI-Only Price Cap* (Report No. RARC-WP-13-007, April 12, 2013)*.*

Dr. Meitzen has co-authored a number of other productivity studies conducted by Christensen Associates, including a recent analysis prepared on behalf of AT&T, which was filed with the Federal Communications Commission. He has also performed numerous analyses for former regional Bell Operating Companies, the United States Telephone Association, the National Cable Television Association, and the Stentor companies in Canada. Dr. Meitzen has analyzed incentive regulation issues for various network industries including the telecommunications, electric utility and postal industries. He also directed the Christensen Associates team that analyzed incentive-regulation options for the privatization of Peru's telecommunications industry. Among the articles and reports that Dr. Meitzen has written are recent articles he co-authored on incentive regulation in the electric utility industry. He has also published articles on total factor productivity, incentive regulation in network industries (electricity, gas, and telecommunications), and cross-subsidization issues in the electric utility industry. Dr. Meitzen was also a principal author of a study of U.S. railroad competition issues commissioned by the U.S. Surface Transportation Board.

b. Purpose of declaration

We were retained by the Postal Service to reply to expert declarations and other comments criticizing elements of the Commission's price cap proposals in Order No. 5337 as inconsistent with incentive regulation principles or practice.[1] These include the declarations of Prof. Willig and of Drs. Neels and Powers on behalf of ANM, et al., addressing matters of price cap theory and X factor implementation; and the February 3, 2020 comments of ACMA and NPPC et al. regarding the implementation of the proposed density and retirement components of the Postal Service price cap.

We discuss Prof. Willig's contention that the only theoretically appropriate form of incentive regulation is a strict "I-X" price cap in the context of a broader price cap

---

[1] Incentive regulation is also called performance-based regulation or PBR; we use the terms interchangeably below.

"alphabet" used in regulatory practice. Prof. Willig—and, by extension, Drs. Neels and Powers—fail to adequately consider that the financial viability of the regulated firm is a critical predicate of any incentive regulation plan, or that the productivity passthrough via the X factor can be positive or negative. In practice, X factors allowing above-inflation price cap limits have been adopted in other industries confronting demand and productivity prospects similar to the Postal Service.

Regarding the proposed price cap components, we show that the density and retirement authority components are theoretically consistent with the price cap alphabet. The density authority arises as a component of the X factor, and is related to conceptually similar cap adjustments initially advanced in the USPS OIG's analysis of price cap modifications. While the adaptive implementation is more consistent with a Y or Z factor adjustment, this is justifiable given the substantially exogenous nature of the adjustment. The retirement authority is more straightforwardly an exogenous cost passthrough without adverse incentive properties, though the formula should be extended to allow for adjustment of the authority after the phase-in period. Finally, while we agree with Prof. Willig that the TFP conditioning of the performance-based authority is inconsistent with incentive regulation theory and practice, the capital funding and service incentive goals are consistent with incentive regulation practice and may be addressed by targeted modifications of the proposal.

2. <u>Willig, Neels, and Powers ignore key features of incentive regulation as it is commonly practiced in advocating for a strict "I-X" price cap system for the Postal Service</u>

The critiques of Prof. Willig and Drs. Neels and Powers are based on an overly abstracted and incomplete price cap theory, ignore important elements of incentive regulation theory and practice, and ignore the PAEA's implementation and history. Incentive regulation has been adapted to a number of different industries and situations in manners that are consistent with regulatory theory despite diverging from the particular vision of incentive regulation espoused by Prof. Willig and Drs. Neels and Powers.

Specifically, Prof. Willig's contention that the Postal Service's price cap should be a strict "I-X" system—and the analysis of Drs. Neels and Powers, which relies on Prof. Willig for its theoretical underpinning—is largely based on Prof. Willig's analysis of the late-1980s telecommunications industry and inappropriately tries to force-fit the telecommunications model of incentive regulation onto the Postal Service. Prof. Willig extensively relies on a 1989 article he co-authored with Prof. William Baumol, "Price Caps: A Rational Means to Protect Telecommunications Consumers and Competition."[2]

---

[2] For example, see Willig Declaration, p. 4, p. 8.

The late-1980s telecommunications industry was a very different industry from the current postal industry or other industries, such as electric utilities, that have adopted some form of incentive regulation. Factors including industry differences in demand growth, productivity growth, and technological change make the telecommunications model of incentive regulation not directly transferrable to industries that do not exhibit similar characteristics.

At the time price cap regulation was adopted in the telecommunications industry in the late 1980s and early 1990s, the industry was characterized by strong demand growth, productivity growth that exceeded overall economy growth by an average of 2 to 3 percent per year, and a long track record of technological innovation.[3] Under these circumstances, the primary regulatory concern was that the benefits of productivity growth and technological change be passed through to telecommunications customers. Other industries where incentive regulation has been implemented, including postal services, operate in a much different environment, featuring stagnant or declining demand and limited opportunities for productivity growth exceeding that of the economy as a whole. The Willig and Neels/Powers analyses of the PAEA system and of Order No. 5337 fail to take these circumstances into account.

Another critical oversight in the analyses of Prof. Willig, and Drs. Neels and Powers, is their failure to acknowledge that incentive regulation is premised on the financial viability of the firm. Prof. Willig only acknowledges as a footnote point that the level of the price cap can be set inappropriately: "A shortcoming of price cap regulation is the possibility that price caps will be set at inappropriate levels." Willig Declaration at 8 (footnote 7). In practice, setting the price cap at <u>appropriate</u> levels entails both (1) setting an appropriate base for a price cap plan in the form of a rate structure that ensures (expected) revenue sufficiency for the firm and (2) periodic review of the plan—typically every four to five years, as acknowledged by Prof. Willig[4]—to ensure the plan is functioning properly. The more-than-ten-year period of the initial PAEA system is, in itself, an extraordinary departure from common incentive regulation practice.

At the time of plan review, rates may be rebased and/or the price cap adjusted to reflect either overearning or underearning by the firm over the course of the plan period. However, the example that Prof. Willig provides to illustrate this statement focuses

---

[3] A discussion of why force-fitting the telco model of incentive regulation onto the electric utility industry was counterproductive can be found in Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "The Alphabet of PBR in Electric Power: Why X Does Not Tell the Whole Story," *The Electricity Journal* (30) 2017. It is widely recognized that incentive regulation is not a "one-size-fits-all" proposition. In general, sound incentive regulation should take in account the unique circumstances of each regulated firm in the design of the PBR plan. See David E. M. Sappington and Dennis L. Weisman, "Seven Myths About Incentive Regulation," in Michael A. Crew, ed., Pricing and Regulatory Innovations Under Increasing Competition and Other Essays, Boston: Kluwer Academic Publishers, 1996, pp. 4-5.

[4] For example, see Willig Declaration, p 7 and p. 9.

solely on a situation where the cap is set too high, allowing the firm to set prices too high.[5] The converse example of a cap being set too low and not allowing the firm to earn sufficient profit or contribution is not discussed, despite its clearer relevance to the experience of persistent net losses under the PAEA system. Price cap regulation of postal services outside the U.S. has seen relaxation or even elimination of price caps in recognition that overly stringent caps failed to provide sufficient revenues to allow for financially sustainable provision of essential services. See Postal Service March 20, 2017 comments, Appendix E at 18-24. Moreover, such rebasing and plan adjustment require that the actual performance of the firm over the plan period be used in the process. Absent perfect foresight or dumb luck, incentive regulation plans do not operate at the level of remove from the actual circumstances of regulated firms that Prof Willig holds out as an ideal.

In addition to rebasing and plan adjustments <u>between</u> review periods, a number of other adjustment mechanisms that rely on information on actual firm performance are often used <u>within</u> plan periods. While such mechanisms may not always meet the standard of maximizing productive efficiency compared to an idealized price cap model, they address the operating environment of the regulated firm or regulatory goals that go beyond productive efficiency, just as the full set of objectives and factors for the PAEA ratemaking system encompasses regulatory goals beyond efficiency. The critiques of Prof. Willig and Drs. Neels and Powers give little consideration to broader regulatory objectives these price cap mechanisms are intended to address. Examples of such mechanisms include Y and Z factors, earnings sharing mechanisms (ESMs), and supplemental capital (K) factors are all within-plan adjustments that rely on actual performance or events, rather than representing forward-looking targets.[6] In addition, performance-based components of price caps are implemented to incentivize firm behavior as to regulatory goals, such as quality of service, for which a pure I – X price cap formula may provide disincentives. As is shown in Section 4, below, the Commission's proposed price cap modifications fit within this broader "alphabet" of incentive regulation plan features.

- Y and Z factors adjust a price cap for exogenous events outside the control of the regulated firm and not reflected in the values embedded in the I – X formula.[7] A Y factor adjusts for recurring exogenous events (e.g., transmission charges in

---

[5] Willig Declaration, p. 8, footnote 7.

[6] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "The Alphabet of PBR in Electric Power: Why X Does Not Tell the Whole Story," *The Electricity Journal* (30) 2017, p.31; *Revisiting the CPI-Only Price Cap* (Report No. RARC-WP-13-007, April 12, 2013); Mark E. Meitzen, "Determination of the Second-Generation X Factor for the AUC Price Cap Plan for Alberta Electric Distribution Companies," March 21, 2016.

[7] Although Y and Z factors were part of the telecommunications price cap plans implemented by the Federal Communications Commission, they are not discussed by Prof. Willig or Drs. Neels and Powers. See Federal Communications Commission, Report and Order and Second Further Notice, 4 FCC Rcd 2873 (1989).

electric distribution) and a Z factor adjusts for one-time exogenous events (e.g., changes in tax or environmental policy). While Y and Z factors pass through costs of service to ratepayers, the exogenous nature of the costs means Y and Z factors do not affect the efficiency incentives of price caps. Passing through exogenous costs prevents external factors from increasing or decreasing the cap's stringency over the term of a price cap plan.

- ESMs adjust the price cap for deviations (positive or negative) in the regulated firm's actual earnings from its authorized rate of return. Typically, there is a "dead band" around the authorized rate of return in which there is no cap adjustment; once actual earnings fall outside the dead band (either positive or negative), the cap is adjusted.[8]

- A supplemental capital (K) factor adjusts the $I - X$ index depending on the capital financing requirements of the regulated firm. There are a number of variations of the K factor, and when used in conjunction with an $I - X$ index, the K factor is an acknowledgement that the $I - X$ formula may not provide the firm sufficient revenues to fund necessary capital investments.

In contrast to typical plan periods of four to five years and plan adjustment mechanisms available within this period, the PAEA had an initial period of at least ten years. What makes this period even more extraordinary is that, aside from the exigent rate case, it did not, *a priori*, allow for within-period adjustments to keep the plan "on track." Even if the PAEA price cap was properly calibrated at the beginning of the plan, with a formal (and not merely implied) determination that CPI – 0 was an appropriate calibration of the X factor at the time, a ten-year period without a mechanism to perform mid-course corrections is outside the realm of standard practice. Although Prof. Willig repeatedly makes reference to a plan period of four or five years,[9] neither he nor Drs. Neels and Powers acknowledges the atypical structure of the PAEA or its impact on the Postal Service.

In summary, the analysis and recommendations of Prof. Willig, and Drs. Neels and Powers, lack necessary context and inappropriately attempt to force-fit a stylized telecommunications version of price caps without consideration of important differences between the telecommunications and postal industries or regulatory goals other than economic efficiency. As such, their comments regarding application of price caps to the Postal Service do not meaningfully contribute to the PAEA review.

---

[8] For example, there may be a dead band of 200 basis points above and below the authorized rate of return where there is no sharing and, once the 200 basis points is exceeded (either positive or negative) the cap is adjusted for above- or below-band earnings.

[9] For example, see Willig Declaration, p. 7 ("In price cap theory, X should be open to renegotiation at stipulated intervals, such as every **4 or 5 years.**"), and p. 9 ("X … would remain in in effect for an **extended period of time, such as 4-5 years.**") [emphasis added].

3. <u>Willig, Neels, and Powers fail to seriously consider the likelihood that a negative X factor would result from a calibration exercise for the Postal Service's price cap</u>

A common theme and misperception is that the X factor in the I – X formula *must* be positive, meaning that the I – X formula produces changes that are less than the inflation rate, I.[10] This is yet another example of trying to force-fit the telco-style price cap onto industries with different characteristics than telecommunications. However, the requirement of a positive X factor is neither a theoretical requirement nor a universal practice; not only is a negative X factor theoretically feasible,[11] it has also been implemented in recent electric distribution proceedings[12] and has been used in other industries including postal. Moreover, even in cases where the stated X has been positive, it has often been the case that, once other elements of the incentive regulation plan have been accounted for (e.g., supplemental capital factors), actual rates have increased at a rate greater than inflation, implying that the *effective* X factor is negative.[13]

When an economy-wide inflation index such as the CPI is used as the inflation factor, the X factor formula is comprised of a differential in TFP growth between the regulated industry and the overall economy, $(TFP_I − TFP_E)$, plus a differential in input price growth between the overall economy and the industry, $(W_E − W_I)$. Thus:

$X = (TFP_I − TFP_E) + (W_E − W_I)$ [14]

As one can see from the X factor formula above, aside from industry productivity growth being negative, there are a variety of industry and economy-wide productivity and input price growth combinations that could yield a negative X factor. Moreover, given that the X factor is a measurement of industry performance relative to economy-wide performance, some industries will outperform the economy and others will underperform the economy.

---

[10] Neels and Powers, p. 20: "It is for this reason that most price cap regulation schemes take the form of price index minus X, where X, a reduction in price increase authority, accounts for – and assures – the transfer to consumers a portion of the benefits of productivity growth."

[11] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "The Alphabet of PBR in Electric Power: Why X Does Not Tell the Whole Story*,*" *The Electricity Journal* (30) 2017; and Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "Debunking the Mythology of PBR in Electric Power*,*" *The Electricity Journal* (31) 2018. Also, Dr. Willing does acknowledge in footnote 5 (p. 7) that X can be negative.

[12] Massachusetts Department of Public Utilities, Order DPU 17-05, November 30, 2017 (Eversource Order); and Massachusetts Department of Public Utilities Order DPU 18-150, September 30, 2019 (National Grid Order).

[13] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "The Alphabet of PBR in Electric Power: Why X Does Not Tell the Whole Story*,*" *The Electricity Journal* (30) 2017.

[14] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "The Alphabet of PBR in Electric Power: Why X Does Not Tell the Whole Story*,*" *The Electricity Journal* (30) 2017, p. 33.

It bears emphasizing what X does *not* represent: a target for a firm's (or industry's) own productivity performance in isolation. Rather, as shown by the formula above, X represents the differential between the firm's (or industry's) productivity growth and that of the general economy. In essence, X calibrates the cap's inherent efficiency incentives to reflect realistic expectations for the regulated firm or industry. Once the productivity differential is set in the price cap, the firm's incentive is to improve productivity, as increasing TFP will increase the firm's net income (or reduce its net loss) regardless of the sign or value of X. If X is positive (i.e., the firm or industry is expected to outperform the economy), then the incentive is to outperform the general economy by an even greater margin; if X is negative (i.e., the firm or industry is expected to underperform relative to the economy), then the incentive is to bend its proverbial curve even closer toward that of the economy. In other words, productivity incentives depend less on whether X is positive or negative than on the imposition of the price cap itself.

If there are no productivity or input price advantages of the industry relative to the overall economy, there are no explicit savings or "X factor dividend" to share with consumers. However, even if the X factor is negative, consumers still benefit from greater efficiency incentives of incentive regulation versus cost of service regulation. Again, efficiency incentives do not depend on whether X is positive or negative; a negative X factor does not diminish utility efficiency incentives (albeit the end result may be less negative productivity growth rather than more positive productivity growth):

> The objective in an incentive regulation regime is to provide the regulated firm with incentives to eliminate X inefficiency or slack, the difference between actual and maximum attainable TFP growth. This objective is largely independent of whether the X factor is positive or negative. The value of X sets a ceiling on prices or revenues (depending on the type of cap) and the incentives the plan provide for the firm to behave efficiently are independent of the value of X. The sign of X (positive, negative or zero) does not influence the firm's incentives to discover and implement cost savings under this form of regulation. These cost savings are a source of benefit for consumers. The superior incentives of incentive regulation derive from the fact that the linkage between prices/revenues and costs is not as direct as it is under traditional rate-of-return regulation and not because of any particular value of the X factor.[15]

The X factor is meant to reflect the hypothetical path of prices in a competitive industry relative to economy-wide prices. As stated in one of Dr. Meitzen's *Electricity Journal* articles:

---

[15] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "Debunking the Mythology of PBR in Electric Power," *The Electricity Journal* (31) 2018, p. 44.

> There is no theorem in economics that states that productivity growth for an industry must be positive. In fact, many industries exhibit negative productivity growth over prolonged periods. Whether TFP growth or the X factor is positive or negative is not a theoretical matter, but an empirical one.[16]

Negative X factors are neither unprecedented nor uncommon. When the full impact of allowed rate or revenue increases on consumers' final bills is considered, many utilities are allowed increases that exceed the rate of inflation, such that the implied X factor is significantly negative. Thus, a negative X factor simply describes what occurs in many circumstances: utilities are allowed rate or revenue increases above the rate of inflation, sometimes substantially so.[17]

In addition to the recent negative X factors adopted in electric distribution in the state of Massachusetts, examples of negative X factors include index formulas for power transmission in Australia, U.S. oil pipelines, and postal services in Germany and France. These other network industries share many common features with each other and the Postal Service: there are significant "fixed" costs (i.e., costs that do not vary with volumetric outputs), capital requirements, pressures from competition or other effective substitutes, and declining output and/or negative TFP growth. Furthermore, these industries typically have relatively slow rates of technological change, and many are subject to carrier-of-last-resort obligations.[18]

4. The Commission's proposed density and retirement price cap authority components are justifiable on incentive regulation terms

    a. The Commission's proposed density-based authority is justified as a component of a correctly specified X factor, and substantially consistent with the "Hybrid Cap" proposed by USPS OIG

Commenters and declarants oppose the Commission's proposed density authority on a number of grounds. At one extreme, ACMA characterizes the density-based price cap authority as "illogically conceived and without foundation." ACMA Comments at 4-10.

---

[16] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "Debunking the Mythology of PBR in Electric Power," *The Electricity Journal* (31) 2018, p. 43.

[17] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "The Alphabet of PBR in Electric Power: Why X Does Not Tell the Whole Story," *The Electricity Journal* (30) 2017.

[18] Mark E. Meitzen, Philip E. Schoech and Dennis L. Weisman, "Debunking the Mythology of PBR in Electric Power," *The Electricity Journal* (31) 2018, p. 44.

In contrast, Prof. Willig concedes that "it could be appropriate for a price cap system to account for declining volume," without elaborating on the potentially appropriate circumstances; his most substantive criticism is that the adjustment is not "prospective." Willig Decl. at 11 (para. 20). NPPC et al., among others, contend that the network-related cost changes the density authority is intended to recover are controllable.[19] NPPC and Drs. Neels and Powers further argue that the use of the ratio of institutional cost to total cost in the proposed formula yields an excessive adjustment relative to the magnitude of network-related costs.[20] These criticisms are largely made without reference to any formal analytical basis for a density adjustment to the price cap, perhaps in part because the Commission itself did not offer a more formal derivation of its formula along with its qualitative discussion of differences with the density adjustments previously proposed by the Postal Service and the Public Representative.

In fact, following the USPS OIG price cap analysis, the Commission's density formula can be derived as a component of a price cap's X factor that arises from the presence of a non-revenue-generating network component of output. An implication of this foundation for the Commission's density authority is that it is also appropriate for the formula to incorporate a broader measure of network effects on total costs of the Postal Service than the delivery-focused alternatives discussed by Drs. Neels and Powers as well as other commenters. The Commission's adaptive implementation of the formula is justifiable as, in essence, a Y or Z factor. While this eliminates a prospective formula's element of risk-sharing that Prof. Willig views as desirable, eliminating the risk also has potential benefits for both sides that bolster the case for an adaptive formula. We address these issues below.

As we noted in Section 3, above, when the inflation index for a price cap is a measure such as CPI, the X factor may be expressed as the sum of two components: a productivity differential between the regulated industry and the economy as a whole, and an input price differential between the industry and the economy:

$$X = \left(\frac{\dot{T}_I}{T_I} - \frac{\dot{T}_E}{T_E}\right) + \left(\frac{\dot{W}_E}{W_E} - \frac{\dot{W}_I}{W_I}\right)$$

T denotes total factor productivity; W denotes a measure of input prices; the subscripts I and E represent the regulated industry (or firm) and the aggregate economy, respectively; dots above variables represent derivatives with respect to time. The components of the X factor determine the expected difference in the path of prices versus the inflation index for the regulated entity under a hypothetical competitive market structure. As shown in the USPS OIG white paper,[21] the X factor may be derived from a breakeven (zero economic profit) condition for the industry or regulated

---

[19] See, e.g., NPPC et al. Feb. 3, 2020 Comments at p. 26.

[20] See Neels/Powers Declaration at p. 28; NPPC et al. Feb. 3, 2020 Comments at pp. 30-32.

[21] See RARC-WP-13-007, Appendix A for a more comprehensive derivation.

entity. In other words, the X factor does not, in itself, reset rates to the breakeven level; that must be done via a separate mechanism. A properly calibrated X factor allows the regulated entity to remain at breakeven, provided that it achieves the targeted levels of productivity and input price growth.

Note that the output growth in the TFP measure for the purpose of price cap calibration includes only the billed portion of output:[22]

$$\frac{\dot{T}}{T} = \frac{\dot{Y}}{Y} - \frac{\dot{M}}{M}$$

where Y denotes billed output, M denotes the quantity of total input, and the subscript *I* has been dropped. This measure is distinct from the usual postal TFP measure to characterize efficiency, which incorporates the unbilled network component of output and may be written as:

$$\frac{\dot{T'}}{T'} = \varepsilon_Y \frac{\dot{Y}}{Y} + \varepsilon_N \frac{\dot{N}}{N} - \frac{\dot{M}}{M}.$$

The density adjustment arises as the differential between the measures T and T′, reflecting the difference in the rates of growth in billed versus total output relative to total input. The X factor may be rewritten as:

$$X = \left(\frac{\dot{W}_E}{W_E} - \frac{\dot{W}_I}{W_I}\right) + \left(\frac{\dot{T'}}{T'} - \frac{\dot{T}_E}{T_E}\right) + \left(\frac{\dot{T}}{T} - \frac{\dot{T'}}{T'}\right)$$

$$X = \left(\frac{\dot{W}_E}{W_E} - \frac{\dot{W}_I}{W_I}\right) + \left(\frac{\dot{T'}}{T'} - \frac{\dot{T}_E}{T_E}\right) + \left((1 - \varepsilon_Y)\frac{\dot{Y}}{Y} - \varepsilon_N \frac{\dot{N}}{N}\right)$$

In the Commission's proposed price cap formula, the first two terms of the X factor are zero (or omitted from the formula), as in the CPI-only cap. Thus, it retains the implicit assumption that postal input price growth will track overall input price growth in the economy. Second, setting the second term to zero means that the effective TFP target under the Commission's proposal remains the overall TFP growth rate in the economy. Neither assumption necessarily is true. For example, the Postal Service is labor intensive and faces constraints in the wage-setting process that may lead to systematic differences between its input price growth and that of the economy. Similarly, the demand conditions and technological opportunities facing the Postal Service make it questionable whether it is realistic for Postal Service TFP to track economy-wide

---

[22] See, e.g., Laurits R. Christensen, Philip E. Schoech, and Mark E. Meitzen, Total Factor Productivity in the Telecommunications Industry, in International Handbook on Telecommunications Economics, G. Madden and S. Savage, eds., 2003; Meitzen, et al., "Debunking the Mythology" at 43.

productivity. The assumptions needed to set these components of the X factor to zero are aggressive, even in the presence of the density adjustment.[23]

The density adjustment in the USPS OIG hybrid cap assumes constant returns to scale, such that $\varepsilon_Y + \varepsilon_N = 1$,[24] in which case the density adjustment is:

$$\varepsilon_N \left(\frac{\dot{Y}}{Y} - \frac{\dot{N}}{N} \right) \Leftrightarrow (1 - \varepsilon_Y) \left(\frac{\dot{Y}}{Y} - \frac{\dot{N}}{N} \right)$$

However, the rate of change of a ratio is equal to the difference in the rate of change in the numerator and denominator. Thus, if density D=Y/N, then

$$\frac{\dot{D}}{D} = \frac{\dot{Y}}{Y} - \frac{\dot{N}}{N}$$

and

$$(1 - \varepsilon_Y) \left(\frac{\dot{Y}}{Y} - \frac{\dot{N}}{N} \right) = (1 - \varepsilon_Y) \left(\frac{\dot{D}}{D} \right)$$

In discrete time, the equation above is approximate; such that

$$(1 - \varepsilon_Y) \left(\frac{Y}{Y_{t-1}} - \frac{N_t}{N_{t-1}} \right) \cong (1 - \varepsilon_Y) \left(\frac{D_t}{D_{t-1}} - 1 \right)$$

Thus, the primary differences between the Commission's formula for the density authority and the Postal Service's proposed density adjustment are (1) the substitution of an unweighted measure of volume change for the revenue-weighted volume change in the Postal Service's proposal and (2) the lack of symmetry in the Commission's formula in the event that density were to increase.[25] In both formulas, delivery points serve as the network measure,[26] and the ratio of institutional cost to total cost serves to represent the cost elasticity term 1-ε_Y.

---

[23] Normally, the process of calibrating the X factor would include empirical study of both matters to provide a valid basis for setting those X factor components to zero.

[24] Constant returns to scale are imposed in the econometric model underlying the TFP weights because the unrestricted elasticity of scale does not differ significantly from 1.

[25] The differences with the volume adjustment proposed by Prof. Brennan on behalf of the Public Representative are more substantial. The Brennan formula does not account for growth in network-related costs and includes terms to account for the effects of demand elasticities on the net revenue yielded by the formula.

[26] The Public Representative notes small differences between delivery points as measured in the TFP tables, which the Commission proposes to use in its formula, and other Postal Service reports. Public Representative Comments at 12-13. The TFP data and the other Postal Service reports use the same underlying data. The differences are due to TFP using delivery points averaged over the fiscal year, while the other reports provide an end-of-year snapshot of delivery points.

An institutional cost ratio from the CRA is an appropriate proxy for the elasticity term since $1-\varepsilon_Y$ is, effectively, the system fraction of non-volume-variable costs:

$$VVC = \varepsilon_Y \cdot TC \Longrightarrow 1 - \varepsilon_Y = (TC - VVC)/TC,$$

where TC is total cost and VVC is volume-variable cost. An institutional cost to total cost ratio based on attributable (i.e., incremental) costs, rather than VVC, will slightly underestimate $1-\varepsilon_Y$, as attributable costs include inframarginal costs not in VVC. Therefore, comments to the effect that the use of the institutional cost ratio yields an excessive density adjustment are unfounded.[27]

The preceding analysis also implies that the claim by Drs. Neels and Powers that the density authority "embeds a positive feedback loop" in the price cap structure is overstated. Neels/Powers Decl. at 9. To be certain, the density authority does respond to volume losses, including those induced by above-CPI price increases.[28] This aspect of the density authority is necessary to ensure that the density adjustment provides the intended revenue yield.[29] However, the effect is not a self-reinforcing feedback loop, as Drs. Neels and Powers claim. The induced volume loss is:

$$(\Delta Y)_{induced} = \varepsilon_D (\Delta P - CPI)_{t-1},$$

where ε_D is the demand elasticity. The lagged effect on cap authority is:

$$(1 - \varepsilon_Y)|\varepsilon_D|(\Delta P - CPI)_{t-1},$$

noting that both $\varepsilon_D < 1$ and $(1-\varepsilon_Y) < 1$. Based on FY2019 values (volume-weighted demand elasticity of -0.402 and an institutional cost share of 43.9 percent), the lagged effect is 17.6% of the previous period's (average) above-CPI price increase. For example, the use of 2.5 percentage points of above-CPI rate authority would induce 0.44 percentage points of density authority in the following year. Iterating the formula, it is clear that the induced effects for subsequent years would rapidly diminish unless the product $(1 - \varepsilon_Y)|\varepsilon_D| > 1$, a condition that would only hold if demands were highly

---

[27] Considered from the perspective of the network elasticity ε_N, the adjustment includes direct and indirect effects of network growth on total costs of the Postal Service, not only costs of delivery components. As Prof. Bradley explains in his declaration, even direct effects of delivery points in CRA cost models are not limited to delivery cost components. See Bradley Declaration, March 4, 2020, at pp. 3-5. While not tied to CRA results, the econometric estimate of the network elasticity used in TFP is based on a regression using total Postal Service input as the dependent variable. See PRC LR-RM2017-3-NP1, Appendix 3-4 (memorandum explaining econometric estimation of network and output cost elasticities for TFP). Thus, the TFP network elasticity implicitly encompasses effects of network growth on any cost component.

[28] See USPS Feb. 3, 2020 Comments, Appendix A, at p. 1.

[29] Appendix A of the Postal Service's February 3, 2020 comments discusses a similar issue in connection with the proposed retirement rate authority.

elastic.[30] In the case of elastic demands, of course, the Postal Service would not be able to increase revenues by increasing real prices in the first place. This condition is highly improbable: even in the scenario presented by Drs. Neels and Powers in which actual demand elasticities were twice the measured values—a situation for which they provide no evidence—market dominant demands would remain inelastic overall.

Thus, contrary to ACMA's claims, the density authority's derivation as a component of the X factor gives it a clear foundation within the incentive-regulation alphabet.

As for Prof. Willig's forward-looking ideal, that ideal misperceives the purpose of the density authority, which is to treat changes in density as exogenous events affecting net income to be passed through to ratepayers.[31] The adaptive implementation in the Commission's proposal has minimal adverse incentive properties, given that the formula's components are largely exogenous. Network growth, as measured by delivery point growth, is clearly driven by demographic factors and general economic conditions beyond the Postal Service's control. Demands for postal services, and changes in those demands, likewise are largely derived from the demand for products and services outside the postal sector.[32] Finally, while the Postal Service has some control over its costs, its ability to shed network-related costs is constrained by its universal service obligation and other business model restrictions. The exogenous nature of the forces driving changes in mail density, and of the constraints on the Postal Service's ability to adapt to those changes, justifies the Commission's adjustment of the cap for such changes on a Y or Z factor basis.

Finally, in eliminating the risk of a prospective formula, the adaptive density authority formula proposed by the Commission has some potential benefits to both mailers and the Postal Service. Compared with Prof. Willig's preferred prospective target, the adaptive formula will be more robust to unexpected economic downturns: it would automatically provide additional rate authority, whereas a forecast-based target might under- or overestimate the probability and magnitude of a recession. Conversely, in the event that mail volumes were to stabilize, or at least decline less than forecasted, the adaptive density authority formula would automatically reduce the additional cap space. In both cases, the odds are lower that the price cap would need to be recalibrated in or

---

[30] The second-year effect would be 3.12% of the original above-CPI increase (= 0.176^2) and the third-year effect would be 0.055% (= 0.176^3).

[31] While the density authority is derived as a component of the X factor, the adaptive implementation makes the Commission proposal more similar to a Y- or Z-factor.

[32] See., e.g., Bozzo, A. Thomas et al., "Is demand for market-dominant products of the United States Postal Service becoming more own-price elastic?" p. 29. In Crew, Michael A. and Timothy J. Brennan (eds.), The Role of the Postal and Delivery Sector in a Digital Age. It may stand to reason that volume of competitive products would be more responsive to the Postal Service's marketing efforts than that of market dominant products, but competitive products' contribution to total volume growth as used in the Commission's formula is small.

before the next system review, thereby providing more predictability and stability to all stakeholders than a forecast-based approach.[33]

b. <u>The proposed retirement authority implements a pass-through of exogenous costs and has no adverse incentive properties</u>

In addition to phasing in an increase in the rate base to cover certain retirement-benefits expenses, the retirement rate authority proposed in Order No. 5337 would reflect changes in those expenses, at least during the five-year phase-in period. Retirement expenses change for reasons either entirely external to the Postal Service (e.g., decisions by the Office of Personnel Management Board of Actuaries) or with only an indirect connection to Postal Service performance. As such, changes in such expenses are consistent with the sort of cost changes that incentive regulation plans, in practice, pass through to ratepayers via Y- or Z-factors. Nevertheless, Prof. Willig objects that "[t]his retirement-based authority is similarly tied to volume movements YOY, such that if volume falls the retirement price authority rises to enable payment of that year's amortization. Of course, as with the density adder, this feature is adverse to incentives to preserve volume and violates price cap principles."[34]

Prof. Willig's criticism is incorrect. What he describes as the retirement authority's tie to "volume movements" is, presumably, the scaling of the amortization costs to revenue to determine the price cap authority to recover the costs. While this scaling determines the allowable rate of price increases under the retirement authority, it does not affect the amount of revenue permitted by the authority. Indeed, the scaling is necessary to maintain a sufficient revenue yield to cover the targeted expenses. Consequently, the retirement authority does not introduce a dependency of revenue generated to cover amortization costs on changes in volume. As such, the retirement authority does not introduce a disincentive to preserve volume.

The main limitation of the Commission's proposal as a Z-factor implementation is that it does not provide for adjustments to the retirement rate authority after the completion of the 5-year phase-in period. The absence of a subsequent adjustment mechanism raises the possibility, if not probability, of over- or under-recovery of amortization costs as those costs are subsequently revalued. Likewise, a permanent mechanism would allow the retirement authority to be reduced or eliminated if legislation were to be

---

[33] Some calibration may nonetheless be necessary, particularly if the Commission retains the "lesser of two formulas" approach to the density authority proposed in Order No. 5337 and criticized in the Postal Service's initial comments.

[34] See Willig Declaration p. 13 (footnote 16).

enacted outside of the phase-in period that relieved the Postal Service of some or all of the amortization payments.[35]

Finally, commenters claim that the amortization costs are in the current rate base because retirement benefits costs of similar magnitude were part of the revenue requirement in the final cost-of-service rate case, Docket No. R2006-1.[36] These arguments ignore the significant erosion of the R2006 rate base for the current set of market dominant products. Indeed, actual FY2008 mail and services revenue ($74.2 billion) was already some $2.8 billion short of the TY2008 forecast of $77.0 billion from Docket No. R2006-1.[37] Excluding products subsequently transferred to the competitive group, market dominant revenues subsequently declined by nearly $15 billion through FY2019. Under these circumstances, it is clear that expenses intended to be recovered from the revenues of current market dominant products at the volume peak cannot all be covered by the revenues from remaining volumes more than a decade later. From the perspective of applied incentive regulation, this underscores the unusual nature of the lengthy initial PAEA CPI price cap periods. Had the PAEA system been reviewed on the roughly 5-year schedule typical of other regulated industries, it would be extraordinary for such a review to have ignored the effects of demand decline on the viability of the price cap system.

c. <u>The linking of the performance-based authority to TFP is inconsistent with incentive regulation principles, but modified components of rate authority for capital expenditures and service performance would be justifiable</u>

The performance-based authority proposed in Order No. 5337 would condition an additional percentage point of price cap authority on the simultaneous annual achievement of two conditions: maintaining service standards and growing TFP above the prior year's index level. Prof. Willig criticizes this part of the proposal as creating disincentives to maximizing productivity growth, contrary to the usual aims of incentive regulation, and as an inappropriate backward-looking true-up. Willig Declaration at 15-17. He proposes a "CPI minus X" approach as an alternative. Id. at 17. In addition, he suggests the Commission's aim of generating revenue for capital investment departs from "the teachings and goals of standard price cap theory." Id.

Prof. Willig is correct that the TFP condition on the performance-based authority runs counter to standard goals of incentive regulation, and we agree that a central feature of

---

[35] The Commission's formulas otherwise accommodate changes in the amortization costs within the phase-in period.

[36] See, e.g., NPPC et al., Feb. 3, 2020 Comments at p. 44.

[37] Compare Total All Mail and Services Revenue in Docket No. ACR2008, USPS-FY08-1, FY08PublicCRA.xls with Docket No. R2006-1, Opinion and Recommended Decision, Appendix G at 1.

price cap plans is that productivity growth is intended to be its own reward. However, he neglects to consider that his preferred I – X approach could provide additional rate authority above CPI, when properly calibrated. As shown above in section 4a, the traditional X factor formula includes terms representing expected input price and productivity differentials between the regulated firm (or industry) and the economy, in addition to the term that gives rise to the density-based authority. While Postal Service TFP growth largely kept pace with productivity growth in the economy in the decade prior to the enactment of PAEA and in the post-PAEA period (in which economy-wide productivity also slowed down relative to the pre-PAEA era), it is not obvious that Postal Service productivity can or should be expected to keep pace with the overall economy going forward. In addition, while the merits of potential changes to TFP measurement discussed in Mr. Fisher's declaration and the Northwest Postal Consulting reports are debatable, the reality that analytical choices in the system will inevitably have some effects on measured TFP growth implies that it is inappropriate to base the performance-based authority on a knife-edge TFP criterion.

However, the Commission's stated aims of providing liquidity for needed infrastructure investment and encouraging the maintenance of service levels are justifiable, and price cap adjustments to meet those aims are implemented by other regulators. Prof. Willig's critique fails to acknowledge that capital funding supplements to price cap systems are implemented by regulators in practice. See, e.g., USPS Comments (Mar. 1, 2018) at 90-95. As a capital funding mechanism, the TFP condition can lead to adverse results. TFP changes can be influenced significantly by external factors, such as demand and cost shocks, in addition to (and potentially offsetting) the effects of management efforts to improve productivity through cost controls. The TFP condition thus can make the authority unavailable, albeit with a lag, following periods in which external factors cause poor productivity performance and reduce net income (or increase net losses) for the Postal Service. This effect would be compounded by proposals advanced in the comments to require TFP to exceed its level at the outset of the price-cap period, which would further make funding unavailable in a post-recession recovery, precisely when TFP gains have historically tended to be strongest. Implementing a K-factor to provide a limited (but unconditional) amount of revenue towards a capital funding goal would be a more appropriate method than a TFP-linked price cap component.

Finally, targeted incentives aimed at service performance and other regulatory goals also are features of performance-based regulation in practice.[38] The use of targeted incentives recognizes that the cost-saving incentives of price cap systems can work at

---

[38] See, *e.g.,* Mark Newton Lowry & Tim Woolf, *Performance-Based Regulation in a High Distributed Energy Resources Future*, Lawrence Berkeley National Laboratory, Report No. 3 (2016); Melissa Whited et al., *Utility Performance Incentive Mechanisms: A Handbook for Regulators*, Western Interstate Energy Board (2015).

cross purposes to other regulatory goals. In this regard, the separate component of the authority for maintaining service standards is arguably closer to regulatory practice than the combined authority proposed in Order No. 5337.