In addition to the problems cited above, Warshawsky also assumes that the demographic profile of the entire covered population is a "reasonably mature and stable group" which is "typical of many large companies." While Warshawsky does not disclose the specific age and service characteristics of this group, based on his statements we must assume that it is older and has longer service than the average covered group. (Note that the GAO survey[16] reports that a very significant number of retiree medical programs are sponsored by companies with less than 500 employees.) By utilizing a demographic profile of such age/service characteristics, Warshawsky is undoubtedly overstating aggregate costs still further.

(4) *All three estimates (Warshawsky, GAO and EBRI) are based on out-of-date data.*

After rejecting Warshawsky's estimate due to the serious problems noted above, there still remains the question of why the GAO and EBRI estimates are both slightly higher than the Godwins estimate of aggregate SFAS 106 costs. The simple explanation for this is that retiree medical plans have changed substantially, between the time the data was gathered for the three estimates noted above (1988), and the time period for which plan provision data was collected for the Godwins study (1990). In fact, according to the Hewitt Associates 1990 Survey of Retiree Medical Benefits, 70% of all surveyed companies changed their retiree medical plans in 1988 or 1989. Thus, the Godwins estimate must be regarded as more accurate because it uses more recent information.

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16 General Accounting Office, Employee Benefits, "Extent of Companies' Retiree Health Coverage," GAO/HRD-90-92, March 1990.

SECTION III

RESPONSE TO OBJECTIONS REGARDING MACROECONOMIC ANALYSIS

A. Methodology and Choice of Model

MCI and AT&T raise three questions about the choice of a macroeconomic model and its use in estimating the impact of SFAS 106 on GNP-PI.

MCI Contention - (Page 31)

"Such a model, in its final form, is nothing more than a somewhat advanced spreadsheet model. ... This cannot be viewed as an objective forecasting tool, but rather as a means to legitimize overly simplistic calculations."

Response -

By calling the Godwins model a "somewhat advanced spreadsheet model", MCI means that the model is used to perform "what if" exercises. But a "what if" exercise is exactly what is required to study the impact on GNP-PI of the introduction of SFAS 106. To calculate the differential impact of SFAS 106, we need to ask "what happens to the value of GNP-PI if SFAS 106 is introduced." Any economic model, even a large-scale commercial econometric forecasting model, would have to be put through a "what if" exercise to determine the impact of SFAS 106. The criticism of the Godwins model for being used to perform "what if" exercises is unwarranted.

MCI Contention - (Page 32)

"USTA contends that the model, while not being useful for forecasting macroeconomic activity, can somehow be used for forecasting the differences in macroeconomic activity depending on a shift in an exogenous variable (the multiplicative term used to adjust labor costs for the SFAS-106 impacts.)[41] [footnote not repeated here] This distinction is artificial--if a model cannot be relied upon to forecast the interactions within the economy, how can it be utilized to predict the differences due to some alteration to one value within the model?"

Response - To appreciate the distinction that MCI asserts is artificial, consider a simple example from outside the realm of regulation or economics. Suppose you are planning to take a 500-mile trip by car and you are concerned about how long the drive will take. The length of time will depend on the weather, road constructions along the way, traffic, accidents along the way, whether your car has mechanical trouble, and so on. Owing to the various unpredictable factors, any forecast of the duration of the trip may well be in error by an hour or more.

Now suppose that in planning your trip you want to know how much driving time you can save by packing lunch to eat while driving. If lunch at a fast food restaurant takes about half an hour, you estimate that packing lunch saves about half an hour. This informed guess can be made without having to (1) predict the overall duration of a trip that includes stopping for lunch; and (2) predict the overall duration of a trip that does not include stopping for lunch. You can avoid all of the complicating factors involved in trying to predict the overall duration of the trip. The prediction of the effect on duration of stopping for lunch may not be exactly right. (Indeed if you pack lunch rather than stop for lunch, you will never know if your prediction was right.) However, the forecast error of the effect of stopping for lunch is likely to be much smaller than the forecast error for the overall duration of the trip.

This example illustrates that when estimating the effect on a variable caused by a particular event, it is not necessary to forecast the actual value of that variable. The Godwins model calculates the effect of SFAS 106 on GNP-PI without having to forecast the actual level of GNP-PI.

AT&T Contention - (Page 10)

"Second, Godwins offers no methodology to test the validity of the macroeconomic model's results...If the model parameters and equations do not adequately describe real world data, then any predictions it gives are of little value."

Response -

These comments raise two separate questions: (1) do the model's parameters and equations adequately describe real world data? and (2) how can one test the validity of the model's results about the impact of the introduction of SFAS 106? In answer to the first question, the model's key parameters do describe real world data. The inputs to the model consist of 6 numerical parameters. Two parameters measure the share of labor cost in total cost, and the baseline values of these parameters were chosen to match the actual share of labor cost in total cost in the United States. One parameter measures the share of private sector employment covered by SFAS 106 benefits, and the value of this parameter was chosen to reflect the fact that of the 95.8 million private sector employees, 30.7 million are eligible to have a portion of their medical costs in retirement met by their employer's medical plan, subject to SFAS 106. A fourth parameter measures the percentage by which SFAS 106 directly increases the labor costs of employers that offer post-retirement medical benefits. The baseline value for this parameter was based on the extensive actuarial study in the Godwins Report. A fifth parameter is the wage elasticity of labor supply, and as discussed on page 30 of the Godwins Report, the value of this elasticity was based on a published summary, by Mark R. Killingsworth, of the extensive econometric literature on the elasticity of labor supply. A sixth parameter, the price elasticity of demand, was not based directly on a specific set of data or a specific set of econometric studies. However, econometric studies of demand for various goods tend to find price elasticities on the order

of one, or smaller. (For example, on page 16 of its report submitted in opposition to the direct cases, ETI cites a price elasticity of demand of 0.723 for interstate switched access, in a study by J. Gatto et. al. of AT&T.) Experimentation with the model revealed that (1) the results of the model are not very sensitive to the price elasticity of demand; and (2) higher values of the price elasticity of demand tend to increase the calculated impact of SFAS 106 on GNP-PI. To guard against understating the impact on GNP-PI of the introduction of SFAS 106, it was decided to use a value for this parameter that likely overstates the true value, so a value of 1.5 was used in the baseline case, as explained on page 29 of the Godwins Report.

The second question, which concerns testing the model's results about the impact of SFAS 106, is a conceptual question that would confront <u>any</u> model, not just the Godwins model, used to estimate the impact of SFAS 106 on GNP-PI. As AT&T points out on page 10, "there is no way to independently verify by observation the true change in GNP-PI due to SFAS 106 even after SFAS 106 goes into effect." This quoted sentence is correct, but notice that this sentence is independent of the choice of a model. As explained in the May, 1992 Godwins Response to Paragraph 16 of the FCC Order of Investigation and Suspension (p. 7), it is impossible to directly observe the impact of SFAS 106 on GNP-PI, even after the fact, because we have no way to directly observe what GNP-PI *would have been* in the absence of SFAS 106. This problem is faced by predicted changes based on econometric models as well as changes based on quantitative classical general equilibrium models, such as the one used in the Godwins Report.

AT&T (p. 10) goes on to point out that "standard economic practice is to perform tests whenever a model is based on estimates to see how closely the model mirrors actual data." For example, large-scale commercial econometric forecasting models are designed to forecast the values of various macroeconomic variables. Then the actual values of these variables are compared to the values forecasted by the model, and the difference between the actual and forecasted values is called the forecast error. Statistical properties of forecast errors, such as the root mean square error or the mean absolute forecast error, are then calculated. Although this statistical analysis of forecasts is commonly applied to large-scale econometric models, one should not be misled into thinking that these analyses can test the validity of a model's prediction about a change in a macroeconomic variable (such as GNP-PI), when some aspect of the model is changed (such as the introduction of SFAS 106). Statistical properties of forecast errors can be used to test the accuracy of conditional forecasts[17], but do not address the question of the model's accuracy when predicting the effects of a change in the model's inputs.

We are faced with a choice between a quantitative classical general equilibrium model of the sort used in the Godwins Report and a large-scale commercial econometric forecasting model. Neither type of model has been tested for the validity of the predicted macroeconomic effects resulting from the introduction of SFAS 106. Both types of models

17 Conditional forecasts use assumed future values of various inputs to the model, and thus are "conditional" on these assumed future values.

"fit" their key parameters to real world data: quantitative classical general equilibrium models base their parameters on independent econometric studies and/or calibration of certain parameters to make the values of certain variables match actual data; econometric models estimate the values of their parameters econometrically.

Which type of model should we use? The Godwins Report lists five desirable criteria for a model to be used to study the impact of SFAS 106 on GNP-PI. The quantitative classical general equilibrium model in the Godwins Report satisfies all five of these criteria, but as explained in the May, 1992 Godwins Response to Paragraph 16 of the FCC Order of Investigation and Suspension, large-scale commercial econometric forecasting models fail to satisfy at least two of these criteria.

B. Sensitivity

AT&T raised three questions about the sensitivity of the results.

AT&T Contention - (Page 10)

"Third, the validity of the macroeconomic model is further called into question because of the great sensitivity it exhibits to changes in assumptions. For example, altering the baseline assumption of labor elasticity from zero to an elasticity of 0.1 increases the impact on GNP-PI by more than 400% (a 0.0642% impact vs. the 0.0124% base case impact.)"

Response -

In judging whether the difference between 0.0124% and 0.0642% is large, it is important to look at the magnitudes involved. Both of these numbers are a tiny fraction of 1 percent. True, the larger of these two numbers is 5 times as large as the smaller number, but both of these numbers are essentially zero, and five times zero is still zero. To see that there is no essential difference, suppose that in the absence of SFAS 106, GNP-PI would have a value of 125.0. A 0.0124% increase would result in a GNP-PI of 125.0155, whereas a 0.0642% increase would result in a GNP-PI of 125.0802. GNP-PI is only reported to one decimal place, so the alleged "great sensitivity" amounts to the difference between 125.0 and 125.1 for GNP-PI. Rather than looking unstable, the results appear remarkably robust to this change in parameter value.

Instead of focusing on the sensitivity of the GNP-PI effect, one might want to focus on the percentage of additional SFAS 106 costs "to be met from other sources" reported in columns headed (c) in the sensitivity analysis on page 41 of the Godwins Report. This number is the "bottom line" number. As shown on page 41, in the baseline case, the portion of additional SFAS 106 costs to be met from other sources is 84.8%; increasing the labor supply

elasticity to 0.1 reduces this number to 84.1%. Again, the results are remarkably robust.

AT&T Contention - (Page 11)

"Moreover, Godwins' analysis looks at changes in parameter values on a 'one at a time' basis (p. 38)."

Response -

Section IV of the Godwins Report is devoted entirely to sensitivity analysis, and it presents two tables of results (page 39 and page 41). The table on page 39 focuses only on the sensitivity of GNP-PI to changes in parameter values, and examines these changes in parameter values one at a time. However, the table on page 41, which summarizes the sensitivity analysis for the overall results, does not look at parameter changes one at a time.

Why does the table on page 39 focus on changes in parameter values one a time? It was recognized at the outset that there are 648 possible combinations of parameter values.[18] Rather than grind through all of these combinations, it was decided to first examine the effects of changes in parameter values one at a time to learn which parameters have the largest impact on GNP-PI. As shown on page 39, the direct impact on labor costs in sector 2 and the labor supply elasticity are the two parameters for which GNP-PI exhibits the most sensitivity. Then, having learned that GNP-PI exhibits the greatest sensitivity to these two parameters, the sensitivity analysis for the overall results on page 41 examines all combinations of these two parameters.

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18 Including the baseline values, the Godwins Report examined:
- 2 values of the price elasticity of demand;
- 3 values of labor share in total cost, sector 1;
- 3 values of labor share in total cost, sector 2;
- 3 values of fraction of labor employed in sector 2;
- 3 values of direct impact on labor costs in sector 2;
- 4 values of labor supply elasticity

Thus, there are 2 x 3 x 3 x 3 x 3 x 4 = 648 combinations of parameter values.

It still does not seem to be worthwhile to grind through all 648 combinations, but, in response to AT&T's comment, additional sensitivity analysis was performed to explore parameter values that lead to low values of the percentage of additional SFAS 106 costs to be met from other sources (which is 84.8% in the baseline case). The additional sensitivity analysis was performed as follows: Four of the parameters were each set at the value that led to the largest increase in GNP-PI when the parameters were varied one at a time. (Price elasticity of demand = 3.0; share of labor costs in total cost, sector 1 = 0.78; share of labor costs in total cost, sector 2 = 0.78; initial fraction of labor employed in sector 2 = 0.4.) While these four parameters were set at values that individually contributed to the largest impact on GNP-PI, each of the four values of the labor supply elasticity was examined in combination with each of the three values of the direct impact on labor costs in sector 2. The results of this additional sensitivity analysis are reported in Appendix C. Notice that the lowest value obtained for the percentage of additional SFAS 106 costs to be met from other sources is 60.1%. This number was obtained by combining unlikely and extreme values of all 6 parameters. The chance that all 6 of these parameters simultaneously take on such extreme values is essentially negligible. Whereas the finding in the Godwins Report that 84.8% of additional SFAS 106 costs need to be met from other sources should be regarded as a conservative estimate, the 60.1% figure should be regarded as an unrealistically low underestimate of the amount requiring recovery from other sources.

AT&T Contention - (Pages 12-13)

"Because the SFAS 106 accrual is inherently imprecise and measurement of its impact on the economy is extremely difficult to assess, it is not possible to predict the full extent that SFAS 106 will affect prices in the economy generally (as both Godwins and NERA attempt to do).*" [footnote omitted]

Response - The Godwins Report explicitly recognizes that there are uncertainties associated with the calculation of the effects of the introduction of SFAS 106, and deals with these uncertainties in two ways: (1) whenever a decision needs to be made about the numerical value of some data or parameter, the Godwins Report always attempts to err on the side of overstating the impact on GNP-PI of the introduction of SFAS 106. In the macroeconomic analysis, this conservative approach is represented by the choice of baseline values of the price elasticity of demand and the labor supply elasticity that are likely to be higher than the true values of these parameters, as explained on pages 29 and 30, respectively, of the Godwins Report. (In the actuarial analysis, this same conservative approach is noted in footnote 4 on page 16 of this Report.) This conservative approach lends additional support to the finding that SFAS 106 will have a tiny effect on GNP-PI, because even the small effect predicted by Godwins is probably an overstatement of the true effect. (2) Recognizing the uncertainty associated with the data and parameters, Godwins devoted an entire section of its report (Section IV) to sensitivity analysis. Again, the sensitivity analysis lends additional support to the conclusion that the introduction of SFAS 106 has only a tiny effect on GNP-PI.

C. Details of Specification of the Macroeconomic Model

MCI raised three questions concerning the detailed specification of the model.

MCI Contention - (Page 32) MCI asserts that the USTA model assumes among other things "perfect substitutability of capital and labor."

Response - This assertion is plain wrong. The most common measure of the substitutability of capital and labor is the elasticity of substitution between capital and labor. "Perfect substitutability" describes the situation in which the value of this elasticity of substitution is infinite. In the USTA model, the value of this elasticity of substitution is equal to one, rather than infinity, as implied by MCI's assertion.

MCI Contention - (Page 33) MCI states (correctly) that the model "has no international sector."

Response - Every economic model is a simplification of reality. As a practical matter, a usable model must ignore many aspects of reality. The skill in building a good model rests in including those aspects of reality that are quantitatively important for the issues being studied, and in ignoring those aspects of reality that are less quantitatively important for the issues being studied. Despite all the attention that international trade and foreign competition receive in the press, it must be remembered that international trade is a small part of U.S. GNP. In 1991, net exports were equal to 0.5% of GNP in the U.S. (net exports were negative, so it is the magnitude, or absolute value, of net exports that was 0.5% of GNP). Even looking at gross trade flows rather than the net flow, imports accounted for only 10.9% of GNP, and exports accounted for

only 10.4% of GNP in 1991. Thus, the inclusion of an international sector did not seem important to study the impact of SFAS 106, and there is nothing convincing in the MCI statement that would lead to revising this judgment.

MCI Contention - (Page 33) "Finally, although the model is attempting to review a dynamic phenomenon, the structure of the model is static in form."

Response - Rather than being a weakness, the static nature of the model is a virtue. There is quite a bit of disagreement among macroeconomists about the short-run dynamic behavior of the macroeconomy, and indeed economists seem to have a lot of trouble predicting short-run dynamic behavior, such as turning points in the business cycle. Because the prediction of short-run macroeconomic behavior is so difficult, it was decided to avoid this task, and instead to analyze the ultimate effects of SFAS 106 when the economy reaches a new equilibrium. A static model, which simply avoids difficult short-run dynamics, is appropriate for analyzing the ultimate effects of the introduction of SFAS 106. As stated in the Godwins Report (p. 26), "The model is best viewed as a long-run model that fully incorporates the effects of SFAS 106." An additional advantage of focusing on the "long-run" or full effect of SFAS 106 is that it probably overstates the short-run impact on GNP-PI of the introduction of SFAS 106 because, owing to various lags in the economy's adjustment process, short-run effects are generally smaller than long-run effects. This likely overstatement of the impact of SFAS 106 is consistent with the conservative approach of the Godwins Report, which is to guard against understating the impact on GNP-PI of SFAS 106.

D. Response to Comments of Independent Macroeconomist on the Model and its Results

The statement below represents the entire commentary on the macroeconomic model by an independent economist engaged by MCI.

MCI (Drazen) - (Pages 8-9)

"The USTA study also presents a macroeconomic model to estimate the effect of SFAS 106 on the GNP Price Index (GNP-PI) to see what fraction of costs will be recovered via the increase in GNP-PI. The macroeconomic model is theoretically correct, but a very highly simplified and abstract model of the U.S. economy. For example, there are assumed to be only two aggregate factors of production, total capital and total labor, and the whole economy is assumed to be perfectly competitive. Hence, the true effect of SFAS 106 on the GNP-PI may be significantly different (in a statistical sense, though probably not in order of magnitude) than the figure of 0.0124% that is presented. The true effect on the average wage rate in the economy may also be very different than what the very simple macroeconomic model predicts, both in terms of statistical significance and in terms of order of magnitude."

Response -

This statement is clearly and carefully written by Allan Drazen, a well-respected economist. The remarks below are presented to help non-economists interpret some of the economic jargon used by Drazen.

Drazen's assertion that the "macroeconomic model is theoretically correct" should be regarded as praise, since this judgment comes from a macroeconomist who has published many of his own theoretical models. To an economist, the statement that the model is theoretically correct indicates that the basic economics underlying the model is sound, and that the mathematical formulation of the model is an appropriate formalization of the economics.

Although Drazen certifies the model as theoretically correct, he points out that it is "very highly simplified and abstract." Whether "very highly simplified and

abstract" is a virtue or a vice depends on the benefits and drawbacks associated with simplification and abstraction. In this case, simplification and abstraction has the benefit of allowing the model to be a tractable representation of the important economic phenomena associated with an increase in labor costs, such as that associated with the introduction of SFAS 106. In addition to promoting tractability, the simplification avoids the possibility that irrelevant complications somehow contaminate the model's results.

Drazen's statement focuses on the drawbacks of simplification and abstraction in this case. As will be explained below, a careful reading of Drazen's statement indicates that he thinks that, despite the simplification and abstraction, the Godwins model produced essentially the right answer for the effect on GNP-PI, but he has some doubt about the effect on the wage rate.

The key to understanding Drazen's statement lies in the parenthetical statement in the quote "may be significantly different (in a statistical sense, though probably not in order of magnitude)". Economists often distinguish between two concepts of significance: statistical significance vs. economic significance. For instance, the true effect of something is said to be statistically significantly different from the estimated effect if econometric and/or statistical analyses indicate that we can have a high degree of confidence (usually 95% confidence) that the true effect is different from the estimated effect. It is possible that the estimated effect is very close to the true effect, and yet statistical and/or econometric methods may detect a statistically significant difference; in this case, economists would describe the difference as

statistically significant, but not economically significant.

Drazen's statement indicates that the true effect of SFAS 106 on GNP-PI may be statistically significantly different -- but not economically significantly different -- from the effect estimated by the Godwins model. He states that the true effect on GNP-PI is probably not different, in order of magnitude, from the 0.0124% effect estimated by Godwins. That is, the order of magnitude of the Godwins estimate is tiny, and Drazen does not dispute the finding of a tiny effect on GNP-PI.

The calculated effect of SFAS 106 on the wage rate is almost two orders of magnitude larger than the calculated effect on GNP-PI, and Drazen suggests that the true effect on the wage rate may differ from the calculated effect, both in terms of statistical significance, and in terms of order of magnitude. However, he does not indicate whether the effect calculated by Godwins is likely to be too large or too small.

To summarize, Drazen's remarks about the macroeconomic results of the Godwins Report serve as much to bolster the results as to challenge them. Drazen pronounces the macroeconomic model to be theoretically correct and he notes, but does not challenge, the finding of a tiny impact on GNP-PI. Finally, he does not indicate whether his doubts about the effects on the wage rate would lead him to expect a larger or a smaller effect than is found in the Godwins Report.

E. Response to Ad Hoc Users

The criticisms of the macroeconomic analysis in the Godwins Report presented in The Opposition of the Ad Hoc Telecommunications Users Committee to Direct Cases is simply a summary of criticisms made in a report prepared by Economics and Technology, Inc. (ETI) for the International Communications Association. To avoid repetition, we will not separately respond to the Opposition of the Ad Hoc Telecommunications Users Committee report, and to the ETI report. Instead, we will respond only to the ETI report. Responding to the ETI report presents a special challenge. Unlike the oppositions filed by AT&T, MCI, and the remainder of the Ad Hoc Users filing, the report submitted by ETI is unprofessional in both its tone and its substance. When reading the assertions that appear instead of reasoned economic analysis, one wonders why ETI chose to write the report this way. Was it the result of an inability to understand the economic analysis in the Godwins Report, or was it the result of a deliberate attempt to misrepresent and distort the report? Regardless of the reason, ETI's reckless assertions have been entered into the record, so it is necessary to set them straight.

ETI asserts on page 13 of its report that the Godwins Report contains at least six fatal flaws. The first alleged fatal flaw deals with the role of calibration, and the remaining five alleged fatal flaws are numbered 1 - 5 on page 15 of the ETI report.

ETI Contention - (Page 14)

"In the Godwins model, the key numbers which determine the results are simply invented. They are made up. ... A quote from Appendix C-5 of the Godwins Report illustrates the process:

> The model is *calibrated* so that in the absence of FAS-106 it yields an allocation of labor across sectors...It is also *calibrated* such that in the absence of FAS-106, all nominal prices are equal to one." [emphasis added by ETI]

Response - Several comments are in order. First, let's look at what ETI omitted from the quoted passage from the Godwins Report where the ellipsis appears after "labor across sectors." The following words were left out: "that matches the actual allocation of labor across sectors." [emphasis added] Now why were these nine words omitted by ETI? Certainly not because they took up too much extra space. And certainly not because these nine words were not germane to the point ETI was trying to make. Quite the contrary--these nine words indicate that the numbers were not made up or invented; the numerical values of the parameters were chosen so that the share of workers eligible for SFAS 106 benefits in the model would equal the actual share in the U.S. economy. That is, these nine words prove the opposite of ETI's assertion, and ETI simply chose to suppress them.

Second, the passage quoted from the Godwins Report states that in the initial equilibrium, before the introduction of SFAS 106, all nominal prices are set equal to one. It seems that the authors of the ETI report regard this as an invented number. However, there is a difference between a price index and the price of a specific good measured in local currency. GNP-PI is a price index, and like all indexes, a single specific numerical value of the index is meaningless, unless the scale or base is specified. The value of an index in a base year is entirely arbitrary, and to make the interpretation of the numbers simple, the price indexes were normalized so that the price index in the initial situation had a value of one. The concept of normalization should be familiar to anyone with graduate training in economics, and there is no meaningful sense in which normalization should be interpreted as "inventing numbers."

Third, ETI italicizes the word "calibrated" twice in the quoted passage, as if to emphasize that "calibrated" means "invented" or "made up." The problem is that the authors of the ETI report do not appear to know what calibration is. They ask the question on page 14: "What is this calibration?" Then they assert that calibration does not involve real economic data, and they cite as proof the fact that the term calibration is not used in standard econometrics textbooks. The problem is that the authors looked in the wrong place to find out about calibration. The right place to look is in the macroeconomics literature, in particular the burgeoning literature on quantitative general equilibrium macroeconomic models. An influential paper that uses calibration and is already becoming a classic in this literature is Edward C. Prescott's "Theory Ahead of Business Cycle Measurement," Quarterly Review, Federal Reserve Bank of Minneapolis, Fall 1986, pp. 9-22. Calibration is at the frontier of quantitative macroeconomics and has not yet filtered into many undergraduate textbooks. However, calibration is described in Chapter 11 of Macroeconomics by Andrew B. Abel and Ben S. Bernanke, Addison-Wesley Publishing Co., 1992, a book co-authored by one of the authors of the Godwins Report and used at dozens of leading colleges and universities.

Calibration is an alternative method to direct econometric estimation for choosing numerical values of parameters in a macroeconomic model. In calibrated models, numerical values may be based on econometric estimation of microeconomic data and/or they may be chosen so that variables in the model match actual values of real economic data. Both of these techniques were used in the model in the Godwins Report. For instance, the parameters of the

production functions were calibrated so that the share of labor cost in total cost matched the actual share of labor in total cost in the U.S. economy. Contrary to the assertion in the first paragraph on page 14 of the ETI report ["Another key factor, the labor supply elasticity, the response of labor supplied to real wage changes, is assumed to be 0.00, again a number simply invented for the purposes of their report."], the value of the labor supply elasticity was based on a multitude of econometric studies. The first complete paragraph on page 30 of the Godwins Report discusses the summary by Mark R. Killingsworth of the extensive econometric literature on the elasticity of labor supply. Each of the many studies finds different numerical values for this elasticity, and it seems pointless to try to pick one of the estimates in one of the studies. It is even more pointless to econometrically estimate this elasticity independently, given the multitude of existing estimates. The sensible approach is to observe that the estimates tend to show a small, even slightly negative, elasticity. Because the impact of SFAS 106 on the GNP-PI is larger for higher labor supply elasticities, a value of 0.0 was chosen so as not to understate the impact on GNP-PI. Furthermore, the sensitivity analysis explored the effect of even higher values of this elasticity.

It should be acknowledged that the value of one parameter, the price elasticity of demand, was not directly calibrated from a specific set of data or a specific set of econometric studies. The value of this parameter was chosen by observing that econometric studies of the demands for various goods tend to find price elasticities of demand on the order of one, or smaller. For instance, the ETI report on page 16 cites a price elasticity of demand of 0.723 for interstate switched access in a study by

J. Gatto, et. al. of AT&T. Because price elasticities of demand tend to be smaller for broader categories of goods, the price elasticities of demand for sectors 1 and 2 in the Godwins model (which account for about 2/3 and 1/3 of private sector output, respectively) are most likely smaller than one. The baseline calculation used an elasticity of 1.5 because experimentation with the model indicated that the effect of SFAS 106 on GNP-PI is (1) not very sensitive to the price elasticity of demand, and (2) higher for higher values of the price elasticity of demand. Therefore, to provide a cushion against understating the effects on GNP-PI, the value of the price elasticity of demand was purposely set higher than the likely true value of this elasticity.

The ETI report complains that only "after much evasion" (p. 14) did the May, 1992 Godwins Response to Paragraph 16 of the FCC Order of Investigation and Suspension admit that its model is not econometrically estimated. The first paragraph of the May Response states that the original Godwins Report contained enough information so that a well-trained professional economist could reproduce the numerical results of the macroeconomic model. The second paragraph begins by pointing out that it would be helpful to contrast the model in the Godwins Report with conventional large-scale short-run econometric forecasting models. This is clearly not evasive.

Having addressed the ETI report's misrepresentation of calibration, we now discuss the five numbered alleged flaws.

ETI Contention - (Page 16) "Godwins choose (sic) the wrong kind of model to evaluate the effects of FAS 106."

Response - According to ETI, a large-scale commercial econometric model would have been preferable to a classical general equilibrium model for the purpose of analyzing the impact of SFAS 106. The May, 1992 Godwins Response to Paragraph 16 of the FCC Order of Investigation and Suspension has already addressed in detail the choice of a classical general equilibrium model rather than a large-scale commercial econometric forecasting model. ETI has already complained on page 14 that that response contained "duplication of material from the February report" so that discussion will not be repeated here. It should be noted, however, that the Godwins Report listed five desirable criteria for a model to use in addressing the impact of SFAS 106. The classical general equilibrium model used in the Godwins Report meets all five of these criteria, but as pointed out in the Godwins Response to Paragraph 16, large-scale commercial econometric forecasting models fail to meet at least two of these criteria.

ETI's discussion on pages 16-18 adds nothing of substance to the issue of choosing an appropriate type of model. The distinction drawn on page 16 between mathematical models and models explicitly designed to be estimated with actual data again reveals the authors' ignorance of the burgeoning macroeconomic literature on quantitative general equilibrium models. (See especially the sentence on page 16: "They are designed and studied to investigate a concept qualitatively *not quantitatively*." [italics in original]). The authors waste a few paragraphs on pages 17 and 18 deriding the monopolistic competition in the Blanchard-Kiyotaki model. Apparently they have failed to realize that monopolistic competition is one aspect of the

Blanchard-Kiyotaki model that is not present in the adaptation of this model used in the Godwins Report.

ETI Contention - (Page 18) "The key numerical parameters of the model are invented by Godwins and not estimated from any economic database."

Response - There is nothing new in this false assertion that has not already been addressed in this Supplemental Report. All of this material in this false assertion is a repetition based on the ignorance of calibration by the authors of the ETI Report.

ETI Contention - (Page 19) "The Godwins model erroneously assumes that workers do not evaluate the value from post-retirement benefits and that employers do not view these benefits as current costs."

Response - Page 19 of the ETI report states "The fundamental Godwins assumption is that employers who pay these post-retirement benefits do not now consider them labor costs." This quoted sentence presumably means that the Godwins Report assumes that, in the absence of SFAS 106, employers do not recognize post-retirement benefits as current costs. The reason for this assumption is that the Godwins Report attempted to take a conservative approach wherever possible. In this particular context, conservative means guarding against understating the impact of SFAS 106 on GNP-PI. Equivalently, the approach was to err on the side of overstating the impact on GNP-PI. Now if one argues that in the absence of SFAS 106 employers and employees fully recognize post-retirement benefits, then the introduction of SFAS 106 would have no effect on any prices, and the GNP-PI would be unaffected. Thus, GNP-PI would provide absolutely no recovery to Price Cap LECs who would then be entitled to seek 100% recovery of the increase in costs due to SFAS 106 because Price Cap LECs have not been able to recover these costs in the past.

However, to the extent that SFAS 106 formalizes and focuses attention on future post-retirement liabilities, and to the extent that firms carry larger liabilities on their balance sheets and thus face higher costs of borrowing, the introduction of SFAS 106 will lead to an increase in recognized current costs. How large is the increase in costs? As explained above, the conservative approach dictates that we overstate the effect of SFAS 106 on GNP-PI, so for macroeconomic purposes we treat all of the additional SFAS 106 expense as a cost.

ETI Contention - (Page 20)

"Next, the Godwins model incorrectly uses an outdated functional form to represent the production function for the economy."

Response -

Although the Cobb-Douglas production function was first used more than 60 years ago, it is still widely used in quantitative economic analysis, and one of its major predictions -- that factor shares are constant over time -- seems to hold up well in U.S. data. It is true that during the 1970s there was a flurry of activity to generalize the Cobb-Douglas production function, and this flurry included estimation of the translog production function cited in footnote 48 of the ETI report. The translog production function is considerably more general than the Cobb-Douglas production function, but this added generality comes at a cost. The translog production function has many more parameters to estimate or calibrate, and the quality of aggregate data on inputs may be sufficiently poor to make estimates of these additional parameters unreliable. It is worth noting that when these additional parameters are equal to zero, the translog production function becomes a Cobb-Douglas production function. In practice, estimates of many of these additional parameters have large standard errors and are not significantly different from zero at

standard confidence levels (see Ernst R. Berndt, The Practice of Econometrics: Classic and Contemporary, Reading Massachusetts: Addison-Wesley Publishing Co., 1990, Table 9.2 p. 473). In addition, the estimated elasticity of substitution between capital and labor, in a four-factor translog production function presented by Berndt on p. 475, is 0.97, which is very close to the elasticity of substitution of 1.0 that is characteristic of the Cobb-Douglas production function.

The ETI report closes its criticism of the use of the Cobb-Douglas production function on page 21 with the sentence, "Although it is not clear how significant the bias is from the use of the Cobb-Douglas model, it is clear that the analysis involves simplified assumptions dating back over 60 years." It is worth noting that not only does the ETI report admit that the significance of the bias is unclear, it does not speculate on the direction of any bias. The only thing that is clear to the authors of the ETI report is that the Cobb-Douglas production function is over 60 years old. Interestingly enough, the source cited in the ETI report states that the translog production function introduced in 1970 is "identical to the production function considered by Heady several decades earlier." (Berndt, p. 458)

Perhaps the best response to the criticism raised by the ETI report is contained in a 1988 book by Zvi Griliches (former Chairman of the Department of Economics at Harvard University, 1984 Vice President of the American Economic Association, 1965 winner of the John Bates Clark Medal for the best economist under the age of 40, and Fellow of the Econometric Society whose distinguished career has been devoted to the study of productivity): "There is also the issue of functional form for the estimated production