EXHIBIT E1

ANNUAL RATES OF EMPLOYEE SEPARATION FROM SERVICE

MANAGEMENT EMPLOYEES

A. Select Rates of Separation (based on years of service):

Service In Years	Rates of Separation Male	Rates of Separation Female	Service in Years	Rates of Separation Male	Rates of Separation Female
0	.250	.250	5	.060	.060
1	.200	.200	6	.050	.060
2	.100	.100	7	.050	.060
3	.080	.080	8	.050	.060
4	.060	.060			

B. Ultimate Rates of Separation (based on attained age):

Age	Rates of Separation Male	Rates of Separation Female	Age	Rates of Separation Male	Rates of Separation Female
20	-	-	45	.0160	.0180
21	-	-	46	.0145	.0160
22	-	-	47	.0130	.0140
23	-	-	48	.0115	.0120
24	-	-	49	.0100	.0100
25	.0380	.0580	50	.0085	.0100
26	.0370	.0560	51	.0070	.0100
27	.0360	.0540	52	.0055	.0100
28	.0350	.0520	53	.0040	.0100
29	.0340	.0500	54	.0040	.0100
30	.0330	.0480	55	.0040	.0100
31	.0320	.0460	56	.0040	.0110
32	.0310	.0440	57	.0040	.0120
33	.0300	.0420	58	.0040	.0130
34	.0290	.0400	59	.0040	.0140
35	.0280	.0380	60	.0040	.0150
36	.0270	.0360	61	.0040	.0150
37	.0260	.0340	62	.0040	.0150
38	.0250	.0320	63	.0040	.0150
39	.0240	.0300	64	.0040	.0150
40	.0230	.0280			
41	.0220	.0260			
42	.0205	.0240			
43	.0190	.0220			
44	.0175	.0200			

EXHIBIT E2

ANNUAL RATES OF EMPLOYEE SEPARATION FROM SERVICE

NONMANAGEMENT EMPLOYEES

A. Select Rates of Separation (based on years of service):

Service In Years	Rates of Separation Male	Rates of Separation Female	Service in Years	Rates of Separation Male	Rates of Separation Female
0	.530	.400	5	.075	.090
1	.350	.300	6	.070	.080
2	.230	.200	7	.050	.060
3	.120	.130	8	.040	.060
4	.075	.090			

B. Ultimate Rates of Separation (based on attained age):

Age	Rates of Separation Male	Rates of Separation Female	Age	Rates of Separation Male	Rates of Separation Female
20	-	-	45	.0120	.0187
21	-	-	46	.0110	.0170
22	-	-	47	.0100	.0160
23	-	-	48	.0090	.0150
24	-	-	49	.0080	.0140
25	.0320	.0600	50	.0070	.0130
26	.0310	.0600	51	.0060	.0120
27	.0300	.0600	52	.0050	.0110
28	.0290	.0580	53	.0040	.0100
29	.0280	.0550	54	.0030	.0090
30	.0270	.0520	55	.0030	.0100
31	.0260	.0490	56	.0030	.0110
32	.0250	.0460	57	.0030	.0120
33	.0240	.0430	58	.0030	.0130
34	.0230	.0400	59	.0030	.0140
35	.0220	.0370	60	.0030	.0150
36	.0210	.0340	61	.0040	.0160
37	.0200	.0323	62	.0050	.0170
38	.0190	.0306	63	.0060	.0180
39	.0180	.0289	64	.0070	.0190
40	.0170	.0272			
41	.0160	.0255			
42	.0150	.0238			
43	.0140	.0221			
44	.0130	.0204			

EXHIBIT F1

ANNUAL RATES OF SALARY INCREASE

MANAGEMENT EMPLOYEES

Age	Annual Increase	Age	Annual Increase
15	15.50%	40	5.20%
16	15.50	41	5.10
17	15.50	42	5.00
18	14.90	43	4.90
19	14.30	44	4.80
20	13.70	45	4.70
21	13.10	46	4.60
22	12.50	47	4.50
23	11.90	48	4.48
24	11.30	49	4.46
25	10.70	50	4.44
26	10.10	51	4.42
27	9.50	52	4.40
28	8.90	53	4.37
29	8.30	54	4.34
30	7.70	55	4.31
31	7.10	56	4.28
32	6.50	57	4.25
33	6.30	58	4.22
34	6.10	59	4.19
35	5.90	60	4.16
36	5.70	61	4.13
37	5.50	62	4.10
38	5.40	63	4.10
39	5.30	64	4.10

EXHIBIT F2

ANNUAL RATES OF SALARY INCREASE

NONMANAGEMENT EMPLOYEES

Age	Annual Increase	Age	Annual Increase
15	15.50%	40	5.20%
16	15.50	41	5.10
17	15.50	42	5.00
18	14.90	43	4.90
19	14.30	44	4.80
20	13.70	45	4.70
21	13.10	46	4.60
22	12.50	47	4.50
23	11.90	48	4.48
24	11.30	49	4.46
25	10.70	50	4.44
26	10.10	51	4.42
27	9.50	52	4.40
28	8.90	53	4.37
29	8.30	54	4.34
30	7.70	55	4.31
31	7.10	56	4.28
32	6.50	57	4.25
33	6.30	58	4.22
34	6.10	59	4.19
35	5.90	60	4.16
36	5.70	61	4.13
37	5.50	62	4.10
38	5.40	63	4.10
39	5.30	64	4.10

EXHIBIT G

PERCENTAGE OF ACTIVE AND RETIRED EMPLOYEES MARRIED

Active			Retired		
	Percent Married			Percent Married	
Age Range	M	F	Age Range	M	F
<25	35%	40%	<50	83%	65%
25-29	75	66	50-54	83	63
30-34	88	74	55-59	83	58
35-39	92	78	60-64	84	46
40-44	94	74	65-69	85	34
45-49	95	68	70-74	80	25
50-54	93	60	75-79	73	15
55-59	91	46	80-84	64	7
60-64	89	32	85-89	50	5
65+	84	16	90+	20	2

Males are assumed to be three years older than their female spouses.

EXHIBIT 7

Southwestern Bell Telephone Company Direct Case
CC Docket No. 92-101

Description of Godwins' Macroeconomic Model: Responses to Specific Questions Raised in Paragraph 16 of the Investigation Order

Response to Paragraph 16

of FCC Order of Investigation and Suspension

CC Docket No. 92 - 101

May 26, 1992

Godwins

Paragraph 16 requests information that can be used in a serious impartial evaluation of a macroeconomic model and its results. Ideally, enough information should be provided so that the numerical results produced by a macroeconomic model can be reproduced, or at least checked, by an outside reader with a professional training in economics. In writing the macroeconomic portions of the Godwins report we tried to anticipate the need for reproducibility and included in the report enough information to reproduce the numerical results of the macroeconomic model (See Appendix C of the Godwins report). However, the explanation in Appendix C of the Godwins report is relatively brief, so we will use the opportunity presented by Paragraph 16 to elaborate on various aspects of the macroeconomic model and its calibration.

Before presenting a detailed point-by-point response to items raised in Paragraph 16, it might be helpful to discuss the type of macroeconomic model used in the Godwins report and to contrast this model with conventional large-scale short-run econometric forecasting models. The reason for contrasting the two types of models is that the requests in Paragraph 16 constitute an appropriate set of questions for scrutinizing the results of a conventional large-scale econometric forecasting model. However, some of the questions are not germane for scrutinizing the macroeconomic model used in the Godwins report.

The macroeconomic model used in the Godwins report is a classical general equilibrium model. As discussed in the Godwins report on pp. 26-27, the choice of a type of macroeconomic model for examining the effect on GNP-PI of the introduction of SFAS 106 was guided by a list of five desirable characteristics for a model:

(1) The model should be a multi-sector model allowing for some firms to offer post-retirement health benefits while other firms do not offer such benefits.

(2) The model should explain how production costs are related to the costs of labor and other inputs, and should allow for the possibility of substituting capital for labor as labor becomes more expensive.

(3) The model should provide a specification of the demand for goods related to the overall price level as well as to prices of goods in each sector.

(4) The model should be tractable so that numerical solutions can be computed and readily interpreted.

(5) The model should be internally consistent and based on sound economic foundations.

The classical general equilibrium model used in the Godwins report meets all five of these criteria. However, large-scale commercial econometric models do not meet all of these criteria. In particular, most large-scale commercial econometric models do not meet criteria (4)

and (5). These models typically contain several hundred, or even over a thousand, equations and variables to be forecast. In addition to the sheer difficulty of tracing the effects of so many variables, the forecasts produced by commercial forecasters generally are based also on other factors such as time-series analysis, current data analysis, and "judgment". The fact that the forecasts of these models are based significantly on judgment and current data analysis makes it very difficult for an impartial observer to reproduce the results of these models and obscures the ability to readily interpret the forecasts produced by these commercial forecasters. Commercial large-scale econometric models in general have also been criticized for failure to satisfy criterion (5) that they be internally consistent and based on sound economic foundations. In light of the five desirable characteristics listed above, it was decided that a classical general equilibrium model would be preferable to a large-scale commercial econometric model for the purpose of evaluating the effect on GNP-PI of the introduction of SFAS 106.

An additional consideration that led to the choice of the classical general equilibrium model is related to the timing of the responses to the introduction of SFAS 106. The classical general equilibrium model is intended to gauge the effects of changes after the economy has returned to equilibrium, which may take several calendar quarters or years. This model does not address the extremely difficult task of predicting the dynamic responses over the short-run. By contrast, large-scale econometric models deliver a series of quarterly forecasts of GNP and other macroeconomic variables. However, in our judgment, short-run dynamic behavior is extremely difficult to forecast. Although these models do produce short-run forecasts, we would be cautious in interpreting the timing implied by these short-run forecasts. We decided to sidestep this difficult problem by using the conservative approach of calculating the impact on the macroeconomy after the economy fully responds to SFAS 106. The sense in which this approach is conservative is that it probably will overstate the short-run impact on macroeconomic variables, and thus helps guard against understating the impact on GNP-PI.

Now we will present a detailed point-by-point response to the issues raised in paragraph 16. We will structure the responses according to the following list of requests in Paragraph 16:

(1) fully describe and document the macroeconomic model, including

- (a) the method of estimation
- (b) parameter estimates
- (c) summary statistics

(2) provide the same information as in (1) for any alternate functional forms that were used

(3) provide the data used to estimate the model

(4) provide the data used in making forecasts from the model

(5) provide the results of any sensitivity analyses performed to determine the effect of using different assumptions.

Response to request (1): fully describe and document the macroeconomic model, including the method of estimation, parameter estimates, and summary statistics.

The macroeconomic model used in the Godwins report is described verbally on pp. 27-28 of the Godwins report, and a complete mathematical derivation and description of the model is presented in Part I of Appendix C, pp. 54-57. In order to apply this mathematical model to the United States, numerical values of the parameters need to be selected. In a conventional large-scale commercial econometric model, the numerical values of the parameters are typically estimated econometrically. For these models, it is important to ask about the method of estimation, the parameter estimates, and summary statistics describing the statistical properties of the parameter estimates and the model forecasts. However, the values of the parameters used in the classical general equilibrium model in the Godwins report were not econometrically estimated in the course of the preparation of the Godwins report. Instead, the numerical values of the model were calibrated so that in the baseline calculation without SFAS 106, the numerical results produced by the model matched U.S. macroeconomic data.

The calibration procedure is described in Part II of Appendix C, pp. 58-59, but here we will present a verbal description of the calibration. The utility function of households contains the following parameters:

α_1 and α_2, which measure the relative desirability to consumers of the goods produced in sectors 1 and 2: The larger is α_1 relative to α_2, the larger is the production of good 1 relative to good 2, and the larger is the share of the labor force employed in sector 1. The values of α_1 and α_2 are chosen so that in the initial equilibrium (before the introduction of SFAS 106) 68% of the labor force is employed in sector 1 (which does not offer SFAS 106 benefits) and 32% of the labor force is employed in sector 2 (which offers SFAS 106 benefits). These figures for the shares of employment in sector 1 and in sector 2 match U.S. data as indicated on page 7 of the Godwins report. (Of the 95.8 million private sector employees, 30.7 million are eligible to have a proportion of their charges in retirement met by their employer's medical plan. Thus, the share of the private sector labor force employed in sector 2 is 30.7 million/95.6 million = 32%.)

θ, which is the elasticity of substitution between the consumption of any two goods: The parameter θ equals the price of elasticity of the demand for goods. This parameter was not estimated nor was

it directly calibrated to data. As stated on page 29 of the Godwins report, a value of 1.5 was used for θ, recognizing that this value most likely overstates the true price elasticity of demand. Experimentation with the value of θ indicated that the impact of SFAS 106 on the GNP-PI increases when the price elasticity of demand increases. (See the table on page 41 of the sensitivity analysis in the Godwins report.) Thus, using a high value of θ would guard against understating the impact of SFAS 106 on the GNP-PI.

η, which is the elasticity of labor supply: The elasticity of labor supply has been estimated econometrically in dozens of studies. Rather than try to estimate this elasticity again for the Godwins study, we referred to surveys of econometric studies of labor supply. The first complete paragraph on page 30 of the Godwins report describes the results of these studies and explains the choice of the value of zero for the labor supply elasticity.

We can amplify the discussion on page 30 by pointing out that there is an important difference between the response of labor supply to a *temporary* change in the real wage and a *permanent* change in the real wage. Economists explain the difference by using the concepts of an income effect and a substitution effect. An increase in the real wage increases the reward for working and causes people to substitute some of their time away from leisure toward working. Thus, the substitution effect of an increase in the real wage is an increase in labor supply. In addition, an increase in the real wage makes workers wealthier and reduces the need to work (or equivalently makes workers able to afford more leisure and less labor). This effect, known as the income effect, means that workers will reduce their labor supply in response to an increase in the real wage. Thus, the income effect and the substitution effect work in opposite directions: the substitution effect increases labor supply and the income effect reduces labor supply when the real wage increases. For a temporary increase in the real wage, the worker does not become very much wealthier and the income effect is relatively small. The income effect is likely to be smaller than the substitution effect and thus workers would be likely to increase labor supply in response to a temporary increase in the real wage. In contrast, for a permanent increase in the real wage, the income effect is likely to be relatively large. If the income effect is larger than the substitution effect, then workers will reduce their labor supply in response to a permanent increase in the real wage, which is a negative labor supply elasticity.

The introduction of SFAS 106 is a permanent change and thus any effects on the real wage are to be regarded as permanent effects rather than temporary effects. Thus, in choosing a value of the labor supply elasticity, it is appropriate to use the elasticity describing the response to a permanent change in the real wage. The econometric estimates described on page 30 of the Godwins

report refer to permanent wage changes, and the use of income and substitution effects explains why these estimated elasticities are somewhat negative. The impact of SFAS 106 on the GNP-PI is larger for higher labor supply elasticities, and the labor supply elasticity was set to zero in the baseline calculation to guard against understating the impact on the GNP-PI.

γ, which is the share of nominal expenditure devoted to produced goods: Given the calibration of the other parameters of the model, the value of γ does not affect the calculated effects of SFAS 106 on GNP-PI or the wage rate. As explained in Part II of Appendix C of the Godwins report, the model is calibrated so that in the absence of SFAS 106, prices in all sectors and the GNP-PI are normalized to equal 1.0. With this normalization, the value of γ becomes completely irrelevant to the numerical results of the model.

ϕ, which measures the disutility of labor: With the specification of the utility function in equation (A1) in Appendix C of the Godwins report, the labor supply curve has a constant elasticity with respect to the real wage. With a constant elasticity with respect to the real wage, the labor supply curve depends on only two parameters: the elasticity of labor supply and a location parameter. The elasticity of labor supply has already been discussed. The location parameter was chosen to make labor supply equal to labor demand as indicated in equation (B9) in Part II of Appendix C in the Godwins report. Given the labor supply elasticity and the location parameter, the numerical value of the parameter ϕ is irrelevant.

The production function contains the following parameters:

ρ_1 and ρ_2, which are the shares of labor cost in value added in sectors 1 and 2 respectively: In the baseline calculations, each of these parameters is set equal to 0.64 which is the share of labor cost in value added for the U.S. economy as a whole.

A_1 and A_2, which are productivity parameters in sectors 1 and 2 respectively: These parameters affect the demand for labor in each sector. They are calibrated so that when labor supply equals labor demand, 68% of the labor force is employed in sector 1 and 32% of the labor force is employed in sector 2. The details of this calibration are contained in Part II of Appendix C, pp. 58-59.

Response to request (2): provide the same information as in (1) for any alternate functional forms that were used.

Experimentation with different functional forms and different parameter values involves a fundamental tension. On the one hand,

experimentation with different functional forms and different parameter values offers the benefit of learning how robust the results are to various changes in the model. On the other hand, experimentation may allow the researcher to go on a "fishing expedition", fishing for the functional forms and parameter values that deliver the most pleasing result. We tried to strike the appropriate balance by not experimenting with functional forms (except as described below) and by reporting the results of experimentation with parameter values in the sensitivity analysis.

The only change in the model that might be construed as a change in functional form occurred while the model was in a developmental stage before Godwins was engaged by USTA. In the developmental stage, the original (simpler) functional form for labor supply assumed that the labor supply elasticity must be zero. However, we modified the labor supply function to its current form to allow the labor supply elasticity to be either zero or nonzero. In a sense, this change was not really a change in functional form because the original labor supply function is a special case of the labor supply function used in the Godwins report. The baseline calculations use a value of zero for the labor supply elasticity, but we decided to allow for nonzero labor supply elasticities so that we could perform a sensitivity analysis on the labor supply elasticity. The results of the sensitivity analysis are reported in section IV of the Godwins report.

The functional form used for the production functions is the Cobb-Douglas production function. This functional form is perhaps the most widely used functional form for production functions.

The functional form of the utility function was chosen so that the elasticity of labor supply and the price elasticity of demand for each good are all constant. Various constant values of these elasticities were used in the sensitivity analysis. The functional form of the utility function was also chosen to incorporate the effects on demand of the aggregate price level as well as the individual sector prices.

Response to request (3): provide the data used to estimate the model.

As explained above, the model used in the Godwins report is not an econometric model. The choice of values for various parameters was described in response to request (1).

Response to request (4): provide the data used in making forecasts from the model.

Conventional large-scale commercial econometric models are frequently used to make short-run macroeconomic forecasts of a variety of macroeconomic variables. The forecasts are *conditional* forecasts which means that the forecasts depend on the assumed future values of various input variables to the model. For such models, it is important to examine the data used in making forecasts from the model as well as

summary statistics describing historical forecast accuracy (which is related to request (1c) above).

The macroeconomic model in the Godwins report is not a conventional short-run forecasting model. The only additional data that is used to calculate the macroeconomic effects of the introduction of SFAS 106 is the direct percentage increase in labor costs for firms in sector 2. In the baseline calculations a value of 3% is used for the direct percentage increase in labor costs for firms in sector 2. In the sensitivity analysis values of 2% and 5% are also used.

Summary statistics are often used to gauge the forecasting accuracy of conventional short-run econometric forecasting models, but such statistics are not appropriate in the case of the macroeconomic model used in the Godwins report. Short-run econometric forecasting models produce forecasts of a variety of economic variables and, after the fact, the accuracy or forecast error of each forecast can be evaluated. For instance, a model could be used in 1992 to forecast GNP-PI in 1993. Then after we learn what the actual value of GNP-PI turns out to be in 1993, we can calculate the forecast error as the difference between the forecasted value of GNP-PI and the actual value of GNP-PI. Then after several years, the accuracy of the forecasts can be gauged by appropriate summary statistics of the forecast errors.

The model in the Godwins report is not a forecasting model in the same sense as the large-scale commercial econometric models. The model is not designed to forecast the actual level of GNP-PI. Instead it is designed to estimate the *change* in the level of GNP-PI that results from the introduction of SFAS 106. That is, the model is designed to calculate the difference between the actual value of GNP-PI after the introduction of SFAS 106 and the value of GNP-PI that *would have prevailed* if SFAS 106 were not introduced. Even after the fact, when we observe the actual value of GNP-PI in the presence of SFAS 106, we will not be able to assess the accuracy of the model in the standard way. Remember that the model produces an estimate of how much different GNP-PI is as a result of the introduction of SFAS 106. To assess the accuracy of this estimate we would need to know the actual level of GNP-PI after the introduction of SFAS 106 and we would also need to know the value that GNP-PI would have had if SFAS 106 were not introduced. Even after the fact, we cannot observe or directly measure the level that GNP-PI would have taken in the absence of SFAS 106. Thus traditional measures of forecast accuracy cannot be used to assess the accuracy of the model in the Godwins report.

Three additional remarks are in order at this point. First, the model is specifically designed not to be a forecasting model but instead to focus on how much different GNP-PI is as a result of the introduction of SFAS 106. This focus is exactly the question at issue in the Godwins report.

Second, the fact that the model in the Godwins report cannot be evaluated by the traditional measures of forecast accuracy does not mean

that the model cannot be checked against reality. The parameters in the model were calibrated so that the values of labor share of total cost, and the share of employment covered by SFAS 106 produced by the model matched up with actual values of these numbers.

Third, our confidence in the model's numerical results is bolstered by the sensitivity analysis which indicates that our results are quite robust to changes in the values of the model's parameters.

Response to request (5): provide the results of any sensitivity analyses performed to determine the effect of using different assumptions.

As mentioned above, Section IV of the Godwins report, pp. 34-43, is devoted to the sensitivity analysis. In particular, pp. 37-39 specifically discuss the sensitivity analysis of the macroeconomic model. The numerical results of the sensitivity analysis are presented in the table on page 41.

CERTIFICATE OF SERVICE

I, Tracey L. Doneff, hereby certify that the foregoing "Direct Case of Southwestern Bell Telephone Company" in Docket No. 92-101, has been served this 1st day of June to the Parties of Record.

Tracey L. Doneff

Tracey L. Doneff

June 1, 1992

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