

# STRESSED OUT ON FOUR CONTINENTS: TIME CRUNCH OR YUPPIE KVETCH?

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*Abstract*—Social commentators have pointed to problems of workers who face “time stress”—an absence of sufficient time to accomplish all their tasks. An economic theory views time stress as reflecting how tightly the time constraint binds households. Time stress will be more prevalent in households with higher full earnings and whose members work longer in the market or on “required” homework. Evidence from Australia (2001), Germany (2002), the United States (2003), and Korea (1999) corroborates the theory. Adults in households with higher earnings perceive more time stress for the same amount of time spent in market work and household work. The importance of higher full earnings in generating time stress is not small, particularly in the United States—much is “yuppie kvetch.”

## I. Introduction

**S**UBSTANTIAL attention has been paid (for example, Hochschild, 1997) to the issue of a “time crunch”—a “shortage” of time faced by today’s worker/consumer. This issue generates much concern about the problems of working people, and working couples in particular, who have market jobs and may be unable or unwilling to substitute purchased services for time spent maintaining a household. It is tied to surprise at the failure of annual market work hours to decline (Schor, 1991) and at the increasing fraction of adults who participate in the labor market (so that market work per adult in the United States has probably risen since 1950).<sup>1</sup>

Time stress is a problem analogous to poverty: both reflect scarcity of resources, time in the former case, goods in the latter. The only difference is that in a growing economy the goods constraint will relax over time, while the time constraint cannot. The time crunch will become relatively more binding for more people. Once one thinks about time stress in this economic way, the approach to its study

is immediately apparent: greater time stress will result from an increasing relative abundance of goods, since time and purchased goods are not perfectly substitutable. It is not only the leisure class that will be harried (Linder, 1970). Any group, regardless of its hours of work, will perceive itself under increasing time stress as its ability to purchase market goods increases.

Economists have not studied this problem other than to observe changing patterns of time use. Social psychologists and sociologists have done some research on the subject. Many simply use time-budget surveys to identify demographic correlates of total time spent in market and household production, equating stress (a subjective outcome) with time use (an objective outcome). A few studies (Lochhead, 2002; Holz, 2002) have used small representative surveys (for Canada and Germany, respectively) to relate feelings of time stress to demographic characteristics and hours of market work.

In section II we derive an economic theory of time stress and generate predictions from it. The essential novelty is to link time stress to the shadow price of time, which allows us to treat it in the context of a model of the representative consumer who combines purchased goods with time in household production. Because the outcome is subjective, we test the theory on several data sets, allowing for the possibility that the framing and context of the survey questions incorrectly support or refute the theory. Section III thus discusses a variety of data sets that we use, with results presented in section IV for each of Australia, Germany, the United States, and Korea. Section V explores the relative roles of hours and full earnings in affecting time stress.

## II. An Economic Theory of Time Stress

“Stress” has a large number of dictionary definitions; but the most relevant here is “physical, mental or emotional strain or tension.” Time stress should thus be interpreted as strain or tension that is generated by feelings that the available time is insufficient to accomplish the desired activities. The particular role of a time constraint is clarified if we follow Becker (1965) and Gronau (1980), introduce time explicitly into the model, and view households as producing commodities by combining home time,  $T - H$ , and goods  $X$ . Commodities  $Z_i$  are produced according to the household production functions:

$$Z_i = Z_i(T_i, X_i), \quad i = 1, 2. \quad (1)$$

We assume that the household’s utility function is

$$U(Z_1, Z_2) + V(H_m, H_f),$$

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<sup>1</sup> Newspaper stories, for example <http://www.pressdemo.com/outlook98/stories/39353.html>, discussed the issue and are legion today. Government publications such as <http://www.ed.gov/pubs/PFIE/constrat.html> became noticeable during the 1990s, although Linder (1970) pointed it out a generation earlier.

where the subscripts  $m$  and  $f$  denote the husband and wife, and the  $H_j$  denote market work. The function reflects the disutility of market work, with  $U$  and  $V$  assumed additively separable for simplicity. As usual, we assume that  $V_j < 0$  and  $V_{jj} < 0$ ,  $U_i > 0$  and  $U_{ii} < 0$ . For now we do not examine the internal distribution of consumption within the household, implicitly thus assuming a unitary model of household decision-making.

As is usual in the time-goods model, let household production functions be characterized by fixed coefficients:

$$T_i = t_i Z_i \quad \text{and} \quad X_i = b_i Z_i, \quad i = 1, 2, \quad (2)$$

and let goods prices be  $p_i$ . The household's income, which is entirely spent on the  $X_i$ , is

$$\sum p_i X_i = H_m w_m + H_f w_f + I, \quad (3)$$

where  $I$  is unearned income, and the  $w_j$  are the spouses' wage rates. The household faces this goods constraint and the total time constraint:

$$\sum T_i = T - H_m - H_f. \quad (4)$$

The household's problem is then to maximize

$$U(\cdot) + V(\cdot) + \mu(w_m H_m + w_f H_f + I - p_1 b_1 Z_1 - p_2 b_2 Z_2) + \lambda(T - H_m - H_f - t_1 Z_1 - t_2 Z_2), \quad (5)$$

where  $\mu$  is the Lagrangean multiplier on the goods constraint, and  $\lambda$  is the Lagrangean multiplier on the time constraint. We assume that time stress, a subjective measure, is positively related to the shadow price of time,  $\lambda$ . In order to simplify matters we assume that the husband's hours of market work are fixed, consistent with the widely observed near-zero elasticity of labor supply of married men.

One can show that  $\partial\lambda/\partial I > 0$  if

$$w_f U_{11} U_{22} < V_{22} [p_2 b_2 t_2 U_{11} + p_1 b_1 t_1 U_{22}]. \quad (6)$$

The left-hand side of equation (6) is proportional to the change in the marginal utility of an hour of market work by the wife in response to a unit change in the household's unearned income; the right-hand side stands in the same proportion to the change in the marginal utility of an hour of her time at home in response to the same change in unearned income. So long as the value of home time increases more in response to an increase in unearned income than does the value of time in the market, the shadow price of time rises with unearned income. Consider  $\frac{\partial\lambda}{\partial w_m}$  and  $\frac{\partial\lambda}{\partial w_f}$ , the comparative-static effects of changes in wage rates. From the first-order condition, we have

$$\frac{\partial\lambda}{\partial w_m} = H_m \frac{\partial\lambda}{\partial I}, \quad (7a)$$

and

$$\frac{\partial\lambda}{\partial w_f} = \mu + H_f \frac{\partial\lambda}{\partial I}. \quad (7b)$$

Both of these are positive if equation (6) is satisfied. Finally, it is trivial to show that  $\partial\lambda/\partial T < 0$  always.<sup>2</sup>

The results suggest that, if husband's hours of work are held constant, anything that raises the household's income—higher wage rates for either spouse, or additional unearned income—will increase the degree to which the time constraint binds. Obviously hours in the day are fixed, so that the economic meaning of the prediction  $\partial\lambda/\partial T < 0$  cannot be about a pure increase in available time. Rather, anything that makes the household more efficient in its home activities can be viewed as equivalent to an increase in effective time and should reduce the extent to which the time constraint binds.

Relaxing the assumption of fixed hours of work by the husband makes the predictions generally ambiguous. If, as seems consistent with evidence on labor supply elasticities,  $\partial H_m/\partial w_m \geq 0$ , the positive impact of higher husbands' wage rates on  $\lambda$  becomes even larger when his work hours are allowed to vary. The evidence on income effects suggests that  $\partial H_m/\partial I \leq 0$ , so that the ceteris paribus positive impact of increases in unearned income on  $\lambda$  is attenuated by the changes in husbands' work hours that they may induce.

We have implicitly treated the household as being characterized by a unitary model of household decision-making. A massive literature (summarized, for example, by Lundberg and Pollak, 1996) suggests that families are more complex than this. So long as we assume that the household's maximization is a two-step process—determine hours of market work and the amount of the commodities to be produced independent of the sharing rule—the basic predictions of the model do not change if we assume a more complex household decision-making process.

This model describes the effects of several variables on the extent to which the time constraint binds. It presents a theory of the determination of the Lagrangean multiplier on the time constraint,  $\lambda$ . For a given allocation of time to "work" activities, the predictions about the impacts on  $\lambda$  of the  $w_j$ ,  $I$ , and  $T$  can be carried over with minor changes into predictions about their effects on perceived time stress. Anything (such as market work) that reduces time available for producing household commodities will also increase time stress. We are thus equating subjective time stress with the unmeasurable, but predictable, tightness of the time constraint that the household faces. Most important, for a given allocation of time, the time constraint will bind more on members of households with higher full earnings and will lead us to observe a positive relationship between

<sup>2</sup> Theorizing about the determinants of a Lagrangean multiplier is unusual, but see Weinberg (2001).

TABLE 1.—PERCENT DISTRIBUTIONS OF TIME PRESSURE, COUPLES WITH AT LEAST ONE WORKER  
AUSTRALIA 2001, GERMANY 2002, UNITED STATES 2003, AND KOREA 1999

	Australia		Germany		United States		Korea	
	Men	Women	Men	Women	Men	Women	Men	Women
Under time pressure: <sup>a</sup>								
Almost always (always)	10.67	14.72	5.62	5.40	18.82	26.43	28.18	26.34
Often	32.76	35.77	28.67	30.98	23.75	28.07	42.58	42.18
Sometimes	41.89	39.27	38.20	41.74	33.47	29.77		
Rarely (almost never)	13.07	9.15	17.07	13.88	15.33	10.75	20.58	22.82
Never	1.61	1.09	10.44	8.00	8.62	4.98	8.67	8.65
<i>N</i> =	2,869		3,076		1,461	2,009	4,241	
<i>Chi</i> -square of independence	157.91, <i>p</i> < .001		417.77, <i>p</i> < .001				689.87, <i>p</i> < .001	

<sup>a</sup> The question in Australia and the United States is: "How often do you feel rushed or pressed for time?" The responses are: "Almost always, often, sometimes, rarely, never."

The question (in translation) in Germany is: "Think about the last four weeks. How often during this period did it happen that you felt rushed or under time pressure?" The responses are: "Always, often, sometimes, almost never, never."

The question (in translation) in Korea is: "How often do you feel rushed or pressed for time?" The responses are: "Always, often, rarely, never."

The sample includes both married and unmarried partners in Australia and Germany, married couples only in the United States and Korea, in this and all other tables.

expressed time stress and earnings, holding hours of work constant.

### III. Data Sets for Studying Time Stress

We use data sets from four different countries. Because the samples of single individuals are not very large, we restrict the analyses to male-female partnerships. The first (2001) wave of the Household, Income and Labour Dynamics in Australia (HILDA) survey (Wooden, Freidin, & Watson, 2002) addressed to each adult respondent a questionnaire including, "How often do you feel rushed or pressed for time? Almost always; often; sometimes; rarely; never." The German Socioeconomic Panel (SOEP) (Wagner, Burkhauser, & Behringer, 1993) asked each respondent in its 2002 wave a version of the same question as in the HILDA: "Think about the last four weeks. How often during this period did it happen that you felt rushed or under time pressure? Always; often; sometimes; almost never; never." Finally, the 2003 wave of the U.S. Panel Study of Income Dynamics (PSID) included the same time-stress question as the HILDA. Unlike in Germany and Australia, however, only one respondent per household was asked this question.

None of these data sets reports actual time spent in market work and on household tasks. Instead, respondents state how many hours per day or per week they usually spend in these activities. Thus like any retrospective data that are unconstrained by the need to sum to a fixed available time, they are subject to potential reporting problems. As a robustness check on this potential problem we also use the 1999 Korean Time Use Study (KTUS), which contains two daily time diaries per respondent and also includes the question: "How often do you feel rushed or pressed for time? Always; often; rarely; never." Like all time diary data, individuals are automatically constrained so that the sum of time spent on the day is 24 hours.<sup>3</sup>

<sup>3</sup> Rather than use hours of work on the weekend, for the two-sevenths of the Korean sample that is surveyed then we calculate their daily hours of market work as one-fifth of their reported weekly hours.

Consider first the distributions of responses to the questions about time stress shown in table 1 for all couples with at least one working partner. (The distributions look quite similar if we include only two-worker households.) The table demonstrates the following. (a) The distributions of responses are not narrow—the question distinguishes among people's feelings. (b) Except for Korea, where female labor force participation is much below that of the three western countries, women express more time stress than men. (c) Tests of the jointness of spouses' feelings of time stress strongly reject independence. If one spouse feels pressed for time, the other is more likely to.

For couples with at least one worker, table 2 presents the means of the measures of time use and earnings that we use to capture the central features of the theory in section II.<sup>4</sup> (The descriptors in parentheses define the category for the data from the country on the right side of the table, that is, for Germany and Korea.) Not surprisingly, given lower female labor force participation rates and lower weekly hours for female participants, the data show that the average wife works fewer hours in the market than her partner. This is least pronounced in the United States, where female participation is the highest, and most pronounced in Korea.

Except for the United States, where all time spent in household production (including dependent care) is aggregated, the data on nonmarket time use are disaggregated by type. In all four countries women spend much more time in household production and less time in market work than their husbands. The difference is especially pronounced in Korea and least pronounced in the United States. Wives devote more time to market and household production combined than do their husbands in Australia, Germany, and Korea, and slightly less in the United States.

The most important variables in our model measure the households' full earnings. For Australia we use annual personal income (essentially earnings, in this sample of

<sup>4</sup> The sample size in Australia is substantially smaller than that in table 1, mainly because data on personal income are missing in about 20% of the cases.

TABLE 2.—MEANS AND STANDARD DEVIATIONS OF HOURS AND EARNINGS VARIABLES, COUPLES WITH AT LEAST ONE WORKER AUSTRALIA 2001, GERMANY 2002, UNITED STATES 2003, AND KOREA 1999

	Men	Australia	Women	Men	Germany	Women
Weekly work hours	43.64 (17.58)		22.97 (19.13)	39.38 (17.59)		21.67 (18.19)
Weekly dependent care hours	7.23 (10.71)		14.97 (21.83)	4.62 (8.96)		19.11 (32.76)
Weekly errands, housework (shopping, eating, cleaning) hours	8.93 (8.40)		25.10 (16.72)	9.80 (9.31)		28.70 (14.42)
Gross annual pay A\$ 1,000 (€1,000)	41.017 (35.463)		19.287 (21.065)	33.01 (36.58)		13.26 (22.84)
		United States			Korea	
Weekly (daily) work hours	43.55 (15.98)		30.96 (18.07)	7.65 (3.86)		3.84 (4.15)
Daily dependent care hours				0.24 (0.62)		1.32 (1.70)
Weekly (daily) household care hours	7.80 (7.31)		17.43 (12.81)	0.45 (0.93)		3.71 (1.93)
Gross annual pay US\$1,000 (million won)	46.525 (95.314)		22.163 (27.005)	13.55 (0.62)		4.79 (5.43)

couples with at least one working partner); for Germany we use twelve times gross monthly pay plus extra pay (thirteenth- and fourteenth-month pay, Christmas pay, and vacation bonus), in recognition of German wage-payment institutions. For the United States we use reported gross annual earnings, to match as closely as possible the other two Western data sets (which have no other earnings data available). Each variable was chosen to match as closely as possible the available measures of work hours. Because the KTUS has no information on earnings or income, for Korea we impute earnings.<sup>5</sup>

The resulting averages accord with published reports for both Australia and Germany (Borland, 1999; Gerlach, 1987), as do those for the United States (remembering that the sample includes couples with nonworking wives). Average household pay in Korea matches evidence from extraneous samples. (In the National Survey of Household Income and Expenditures, the average household with earners had an average labor income of 22.48 million won.) The small standard deviations for earnings in Korea are induced by our using imputations and underscore the point that the absence of income or earnings measures means that we necessarily introduce errors into the income variables. The

implied female-male hourly earnings ratio is 0.89 in Australia, but clusters between 0.67 and 0.73 in the other three countries. This difference is consistent with the substantial gender earnings equality in Australia (Gregory et al., 1989) and provides some assurance that (at least at the means) the earnings variables match other evidence.

#### IV. The Determinants of Time Stress

Our purpose is to link the data on perceived time stress to measures of time use, the scarcity of time for household production, and income used to purchase goods to combine with that time. We restrict the analyses to couples in which at least one of the partners is working in the labor market. None of the results differs qualitatively if we further limit the samples to two-earner couples. As suggested by the theory, in the estimation we hold hours of market work constant and include each partner's earnings during the period. Examining the impact of an additional unit (dollar, euro, or won) of earnings, conditional on hours worked, is equivalent to measuring the impact of an increase in household members' time prices on the assumption of fixed labor supply that we made in deriving the model. In these basic equations we describe perceived time stress by each spouse's hours of market work and pay. In extensions we hold constant hours of dependent care and other household production time, health status, and as many control variables as the different data sets allow.

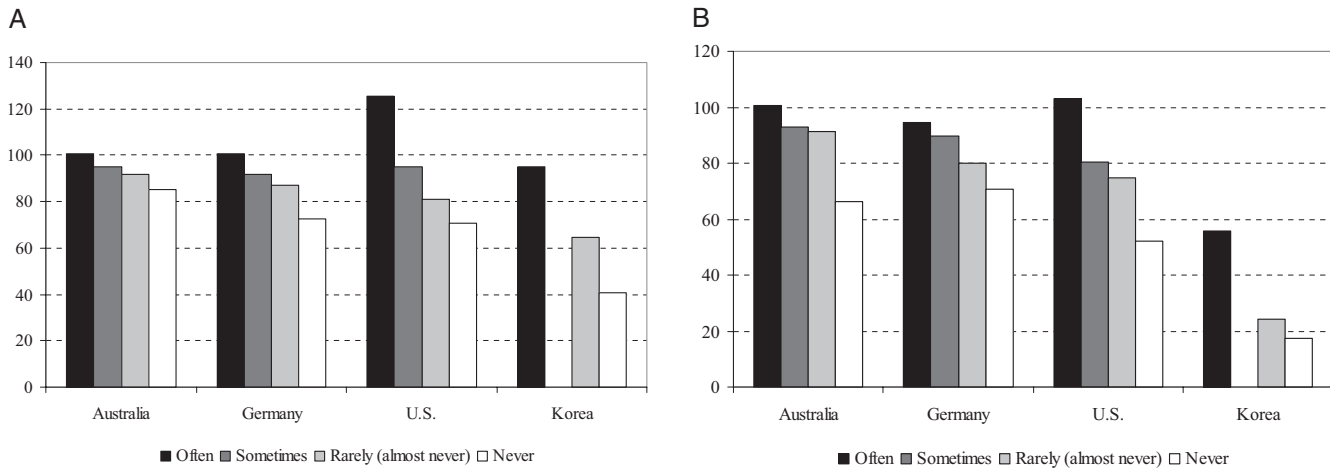
##### A. Basic Results

As a first step figures 1A and 1B present the distributions of average total earnings in each respondent household in each sample by the spouses' expressed time stress. To render

<sup>5</sup> We took a 10% random subsample of the 1999 Korean Wage Structure Survey to estimate standard log-earnings regressions separately by sex for working married persons, including all the variables that might affect wages and that are common to both surveys. The regressions are estimated over 13,353 married men and 2,851 married women, respectively. Each includes quadratics in monthly work hours and age, and vectors of indicators of educational attainment, occupation, and industry. The adjusted  $R^2$  in the equation for men is 0.42, in that for women, 0.53. Annual bonuses, on which the data may be less reliable, are excluded from the earnings variable. Using the parameter estimates, we imputed monthly earnings for each respondent in the KTUS and multiplied by 12 to obtain imputed annual earnings.

FIGURE 1A.—HOUSEHOLD EARNINGS BY TIME STRESS, MEN (EARNINGS = 100 IF ALWAYS STRESSED)  
 FIGURE 1B.—HOUSEHOLD EARNINGS BY TIME STRESS, WOMEN (EARNINGS = 100 IF ALWAYS STRESSED)

NOTE: ONLY THREE BARS ARE INCLUDED FOR KOREA, BECAUSE ANSWERS TO THE TIME-STRESS QUESTION CONTAINED ONLY FOUR CATEGORIES.



the results comparable, for each country/gender group we normalize total household earnings in the most stressed group to equal 100. The figures show no clear pattern in the relation of household earnings to time stress within the two highest categories of stress. In some of the data sets the most stressed spouses have higher household earnings, in others the second-most stressed group does. As we move below those individuals stating that they are always or often stressed for time, however, there is a monotonic decline in earnings in all eight samples. The graph makes it clear that as earnings decrease, sample members in all four countries express less time stress.

The subjective nature of the responses and the desire to make the results comparable across the four countries suggest that we combine the categories “always” or “often” stressed into one, and the other three categories into another to create the binary dependent variable “stressed for time.” As table 1 showed, there is clearly some correlation of the partners’ reported time stress. This is unsurprising given our theory, as the household time constraint becomes more binding when each partner’s full income increases. Thus in describing time stress for each partner, we include both partners’ hours of market work and earnings. Even this approach cannot account for unobservable intra-household relationships that may be generating the correlations of spouses’ time stress. To deal with this problem we estimate the models for Australia, Germany, and Korea using a bivariate probit, acknowledging that the disturbances in the partners’ responses may be correlated. This cannot be done for the United States, where only one respondent per couple answered the time-stress question, so there we estimate separate probits for respondent husbands and wives.

Table 3 presents estimates of the bivariate probits and (for the United States) probits relating whether the respondent is always or often stressed for time to the measures of hours of market work and earnings. The coefficients on the latter thus

measure the impact of increases in full earnings. For all countries the data are recalculated so that the estimates are based on weekly work hours and monthly earnings. Also included for each respondent are measures of his/her partner’s hours of market work and earnings.<sup>6</sup>

The central contribution of economic analysis to the discussion of time stress is its emphasis on the role of command over market goods in generating stress. The crucial prediction of our model is that, other things equal, respondents in households whose members’ full earnings are higher will state that they are more stressed for time. That result is what we find generally. Eight of the sixteen parameter estimates on the earnings measures are positive and statistically significant, and the three negative estimates all are below their standard errors. In all countries except Australia, increases in the husband’s full earnings raise his wife’s time stress. This striking result is difficult to explain outside the model of section II, as it implies that increased command over goods and the time it takes to produce commodities in the household combine to generate increased time stress.

Additional hours of market work clearly raise time stress—the estimates are positive and significant for both genders in all four countries. Except for women in Australia and Germany, however, increases in one’s spouse’s market work hours generate no significant change in time stress.<sup>7</sup> Finally, the estimates of  $\rho$ , the correlation of the distur-

<sup>6</sup> We reestimated the equations for each country using ordered probits describing all possible responses to the questions on time stress in each survey. In nearly all cases, the coefficients on each spouse’s earnings in the ordered probits were more significant statistically than those in the bivariate or simple probits.

<sup>7</sup> We also modified the model to include quadratics in own hours of market work. While the quadratic terms were sometimes significant statistically, their signs were not uniform across the equations, and the respecifications did not alter our conclusions about the role of full earnings.

TABLE 3.—BASIC MODEL, DETERMINANTS OF TIME STRESS, COUPLES WITH AT LEAST ONE WORKER  
 AUSTRALIA 2001, GERMANY 2002, KOREA 1999, AND UNITED STATES 2003  
 (DEPENDENT VARIABLE IS WHETHER STRESSED ALMOST ALWAYS OR OFTEN)<sup>a</sup>

	Weekly Hours		Monthly Earnings		$\rho$	$\chi^2$ (df)
	Own	Partner	Own	Partner		
Bivariate probits:						
Australia ( $N = 2,347$ )						
Men	.0195 (.0018)	-.0039 (.0021)	.0018 (.0098)	.0661 (.0227)	.237 (.032)	219.60 (8)
Women	.0096 (.0021)	.0066 (.0018)	.0334 (.0224)	-.0056 (.0097)		
Germany ( $N = 3,006$ )						
Men	.0222 (.0017)	.0005 (.0016)	.0216 (.0089)	.0060 (.0159)	.311 (.029)	337.84 (8)
Women	.0151 (.0016)	.0037 (.0014)	-.0165 (.0179)	.0238 (.0081)		
Korea ( $N = 4,241$ )						
Men	.0052 (.0003)	.0005 (.0004)	.0586 (.0157)	.0449 (.0240)	.398 (.027)	1090.3 (8)
Women	.0043 (.0004)	-.00002 (.0003)	.1490 (.0228)	.0410 (.0155)		
Probits:						
United States						
Men ( $N = 1,461$ )	.0172 (.0024)	.0017 (.0024)	.0226 (.0081)	-.0041 (.0181)		83.42 (4)
Women ( $N = 2,009$ )	.0106 (.0020)	.0026 (.0017)	.0515 (.0180)	.0168 (.0078)		93.54 (4)

<sup>a</sup> Coefficient estimates for the bivariate probits and (for the United States) probits here and in tables 4 and 5. Standard errors are in parentheses here and in tables 4 and 5. The only variables included in the equations are those whose coefficients and standard errors are listed here.

bances, are positive and highly significant statistically, but the unexplained joint effects are not very large.

### B. Adding Common Controls

In section II we wrote the production functions  $Z$  as identical across households, which much research has shown to be incorrect. An important determinant of the productivity of time in the household is its members' health (Grossman, 1972). Better health makes one more efficient in producing commodities, effectively raising the productivity of time and thus reducing time stress (and financial stress as well). Thus for theoretical reasons, and because health is correlated with full earnings and work hours, we account for differences in health in describing time stress. Also, various demographic variables, such as family composition, age, location, and others, may affect time stress and be correlated with full earnings. Finally, ignoring different uses of time within the household, such as between household production and leisure, may be generating specification biases, so we use information on these too.

The research strategy is to reestimate the models in table 3, first adding just the health measures, then the measures of nonmarket time use, then various combinations of demographic and other variables. To save space, in table 4 we present only the estimates of models that contain all these measures, including the demographic and other variables

that are commonly available in the four countries' data sets, as the results are similar when only subsets of them are included. Adding all these controls has no important qualitative effects on the size and statistical significance of the estimated impacts of full earnings on time stress. The central conclusion, that people with a higher value of time are more stressed for time, is unaltered in these expanded specifications.

The results in table 4 corroborate the implication that factors that generate greater efficiency in producing commodities at home are equivalent to increases in endowments of goods and time and lead, other things equal, to a reduction in time stress. In the three countries for which self-reported health measures are available, being in better health has a generally negative and significant effect on time stress, conditional on work hours and full earnings. Moving from poor or fair to at least good health in Australia reduces time stress by approximately the same amount as do ten-hour reductions in weekly market work; the relative impact of good health is even larger in Germany and the United States.

Additional time spent in household production (dependent care and housework) increases women's perceived time stress significantly in Australia and Germany but not elsewhere. It has some effect for men in a few cases, but there are fewer statistically significant impacts. Most

TABLE 4.—EXPANDED MODELS, DETERMINANTS OF TIME STRESS, COUPLES WITH AT LEAST ONE WORKER  
 AUSTRALIA 2001, GERMANY 2002, KOREA 1999, AND UNITED STATES 2003  
 (DEPENDENT VARIABLE IS WHETHER STRESSED ALMOST ALWAYS OR OFTEN)<sup>a</sup>

	Weekly Hours		Monthly Earnings		Time In:		Health	$\rho$	$\chi^2(df)$
	Own	Partner	Own	Partner	Dep. Care	Housework	Good		
Bivariate probits:									
Australia ( $N = 2,347$ )									
Men	.0225 (.0026)	-.0005 (.0032)	-.0027 (.0103)	.0622 (.0230)	.0105 (.0032)	.0023 (.0035)	-.1961 (.0569)	.186 (.034)	437.81 (40)
Women	.0172 (.0032)	.0058 (.0025)	.0359 (.0230)	-.0055 (.0103)	.0039 (.0016)	.0062 (.0019)	-.2104 (.0585)		
Germany ( $N = 3,006$ )									
Men	.0283 (.0031)	.0022 (.0029)	.0258 (.0093)	.0166 (.0157)	-.0366 (.0240)	-.0069 (.0221)	-.4048 (.0788)	.305 (.030)	571.58 (42)
Women	.0251 (.0028)	.0027 (.0030)	-.0030 (.0150)	.0291 (.0084)	.0274 (.0068)	.0189 (.0141)	-.3959 (.0737)		
Korea ( $N = 4,241$ )									
Men	.0051 (.0004)	.0004 (.0004)	.0683 (.0158)	.0396 (.0241)	-.0026 (.0022)	.0031 (.0013)		.402 (.027)	1,154.2 (24)
Women	-.0002 (.0003)	.0057 (.0004)	.0363 (.0156)	.1581 (.0229)	.0031 (.0017)	-.0004 (.0012)			
Probits:									
United States									
Men ( $N = 1,461$ )	.0127 (.0026)	.0021 (.0027)	.0253 (.0086)	.0024 (.0190)		-.0013 (.0050)	-.0127 (.0820)		148.31 (18)
Women ( $N = 2,009$ )	.0122 (.0022)	-.0007 (.0019)	.0660 (.0198)	.0169 (.0083)		.0013 (.0026)	-.0810 (.0665)		181.25 (18)

<sup>a</sup> Here and in table 5 the equation system for Australia also includes indicators of health status, days of market work, immigrant status, residence in one of the five major cities, married versus partnered, age, number of children under age six and number of school-age children. Also included are measures of the spouse/partner's health status, days of market work, age, and weekly hours of dependent care and errands/housework.

Here and in table 5 the equation system for Germany also contains indicators of residence in the former East Germany, location in a city with population above 100,000, whether a worker is self-employed, married versus partnered, age, whether the youngest child is under age six and a continuous measure of the number of children. Also included are measures of the spouse/partner's health status, days of market work, age, and weekly hours of dependent care and errands/housework.

The Korean equation system also includes the number of household members age ten or over, and indicators for the presence of pre-school-age children, residence in Seoul, and residence in metropolitan cities except Seoul. Also included are measures of the spouse's weekly hours of dependent care and household care.

In the probits describing the U.S. PSID we also include the number of children under six, and six to seventeen, indicators of city size and major region, an indicator of race (African-American or not), the person's age, the age and health status of her/his spouse and the spouse's weekly hours of housework.

important, the effects on time stress of additional hours devoted to household production (and implicitly shifted away from leisure and personal care) are generally much smaller than the estimated impacts of increased market work hours.

### C. Additional Tests, Robustness Checks, and Extensions

We have restricted ourselves to specifications that allow the greatest commonality across the data sets in order to test the main prediction of the model—that, other things equal, people with higher full earnings will feel more time stress. A large variety of alternative specifications suggest themselves. We examine these on those data sets that allow the testing.

While no data are available on exogenous variables that might generate convincing instruments for full earnings and work hours to remove any simultaneity between time stress and full income, we can use lagged variables to generate instruments in the German and U.S. data. We use year 2000 earnings and market work hours (calculated the same way as in tables 2–4) to create instruments for the measures of

full earnings and hours. We reestimate the bivariate probits and probits over all households that responded to the 2000 and 2002 SOEP surveys and the 2001 and 2003 PSID waves. The results are shown in table 5. All the estimated coefficients on earnings exceed the corresponding coefficients in table 4 (and also those in equations estimated over these same reduced samples), and the coefficients were generally more significant statistically. The estimates indicate that one possible concern about simultaneity is not a problem. From these two data sets one can infer that the noninstrumented estimates in tables 3 and 4 understate the impact of increased full earnings.<sup>8</sup>

We obtained the Korean data mainly to examine whether using time diaries, which constrain reported times allocated to different activities to sum to 24 hours per day, instead of recall data affects the results. We reestimated the Korean bivariate probits replacing the time-diary measures of market work with recall-type responses. As expected given the

<sup>8</sup> If we include only these instrumental variables with no controls, the results are barely changed.

TABLE 5.—IV ESTIMATES OF THE DETERMINANTS OF TIME STRESS, COUPLES WITH AT LEAST ONE WORKER  
GERMANY 2002 AND UNITED STATES 2003  
(DEPENDENT VARIABLE IS WHETHER STRESSED ALMOST ALWAYS OR OFTEN)<sup>a</sup>

	Weekly Hours		Monthly Earnings		$\rho$	$\chi^2(df)$
	Own	Partner	Own	Partner		
	IV estimates (using year 2000 earnings and hours)					
Germany ( <i>N</i> = 2,453)						
Men	.0107 (.0031)	-.0024 (.0028)	.0609 (.0170)	.0496 (.0284)	.295 (.033)	382.37 (42)
Women	.0065 (.0028)	-.0018 (.0030)	.0070 (.0273)	.0754 (.0174)		
United States						
Men ( <i>N</i> = 1,390)	.0181 (.0042)	.0003 (.0036)	.0258 (.0082)	.0063 (.0235)		143.92 (18)
Women ( <i>N</i> = 1,779)	.0066 (.0033)	.0011 (.0030)	.1320 (.0345)	.0182 (.0081)		136.81 (18)

<sup>a</sup> The control variables included in these equations are identical to those included in the equations for which the results are presented in table 4.

measurement errors that are likely in data on hours that are not constrained to sum to a fixed amount, the parameter estimates were not quite so significantly nonzero, and their implied impacts on time stress were slightly lower. The estimated coefficients on the earnings measures were hardly affected. Overall these additional results suggest that using recall-type measures of hours for the other three countries instead of diary measures that are not available does not induce upward biases in the parameter estimates.

The measures of health are inherently subjective, so that we are relating a subjective measure (perceived time stress) to another subjective measure (self-reported health). Also, they are based on current health, not long-term efficiency in the household. The former concern cannot be circumvented, but the positive correlation between good health and full earnings suggests that any bias that it may induce in the estimated coefficients on the earnings variables is negative.<sup>9</sup> In reestimates of the extended model, excluding measures of health increased the estimated impacts of earnings on time stress. On the latter problem, using year 2000 perceived health instead of its current value from the German data, we find that the estimated effects of each spouse's earnings on time stress increase.

Among the potential misspecifications of the estimating equations are several that would arise outside an economic model. For example, what if high-pressure occupations generate more time stress? Strong evidence against this possibility is provided by the positive impacts of husbands' full earnings on wives' time stress in three of the four countries. We can explore this further for Australia and the United States, however, by adding vectors of one-digit occupational indicators to the bivariate probit and probits. We reject the hypothesis that this vector as a whole is zero for Australia, but not for the United States. Including it reduces only slightly the estimated impacts of the measures

of own full earnings on perceived time stress in both countries.

The estimates exclude one possibly stressful activity—commuting time—that may be correlated with earnings. To examine whether this exclusion affects our results, we respecified the basic equations for Australia and Korea, the two countries for which data on hours spent commuting were available. For Australia, commuting time had positive but insignificant effects on time stress and no qualitative impact on the estimated conditional effects of additional earnings. In Korea, increased commuting time did raise time stress significantly, but again had no effects on the estimated impact of higher full earnings.

One might argue that we have only shown that adults in families with higher full earnings complain a lot—higher earnings per hour may lead people to complain about everything or may be correlated with complaints in a variety of areas. If that is true, higher-income people will be more likely to complain about their incomes than other people, other things equal. In the theory in section II, the Lagrangean multiplier  $\mu$  on the income constraint becomes less binding as full incomes rise. Following the same argument that linked predictions about impacts on  $\lambda$  to changes in incomes, we can link increases in full earnings to effects on  $\mu$  and infer that they will reduce people's income stress. People in households with higher full earnings will perceive more time stress but should be less likely to feel that their incomes are inadequate.

The Australian and German surveys ask respondents, "How satisfied are you with your financial situation [household income]," with responses on an eleven-point scale. We estimated ordered probits describing satisfaction with income, including the same regressors as in table 4. The results make it clear that respondents with higher earnings, conditional on hours of market work, are more satisfied with their household incomes than other people. Not surprisingly too, members of those house-

<sup>9</sup> Some evidence (Butler et al., 1987) suggests that for workers, objective measures are very highly correlated with self-reported health.

holds exhibit greater satisfaction with life, other things equal. As we have shown, higher full earnings increase our proxy for the shadow value of time, but they lower a proxy for the shadow value of goods and increase a proxy for the level of the value function.

### V. Crunch or Kvetch?

The results show that additional hours of market work increase perceived time stress. They also demonstrate the fundamental economic point that, holding hours of market and household work constant, additional earnings—and thus a higher value of time—also lead to greater time stress. People do perceive themselves as being in a time crunch, but they are kvetching partly because they have too much money given the time that they have chosen to leave over from market work to combine with their incomes. This kvetching does not mean that people could enhance their utility by giving up income: we assume that they are maximizing utility but are simply unhappy about the limits on their available time.

The interesting question is the relative importance of the effects of limits on time and increases in income on perceived time stress. We use the results in table 4 along with statistics describing the underlying variables to estimate the relative impacts of increases in market hours and earnings on the probability of stating one is stressed for time. Consider

$$\Delta_{YH} = -\beta_Y \Delta Y / \beta_H \Delta H, \quad (8)$$

where the  $\beta$  are the estimated bivariate probit coefficients (probit coefficients in the case of the United States), and  $\Delta Y$  and  $\Delta H$  are changes along the quantiles of the distributions of each spouse's hours and the sum of spouses' earnings. We present calculations for changes from the 25th to the 75th percentiles, the 10th to the 90th percentiles, and one standard deviation of the underlying variables. For all countries except Korea this is straightforward: we just use the distributions for the particular samples used in the estimation. Because we imputed earnings in the Korean data, we assume that the earnings distribution in this sample exhibits the same inequality as in the Korean National Survey of Household Income and Expenditures and use the sample means and the parameters of that distribution to simulate the impact of changes in earnings.<sup>10</sup>

Table 6 presents estimates of  $\Delta_{YH}$  for the four countries. They demonstrate that increases along the distribution of hours of market work produce greater increases in perceived time stress than increases across the same quantiles of the distribution of household earnings. Nonetheless, increases in full earnings do substantially increase time stress. Because the definition of time stress differs among the four

TABLE 6.— $\Delta_{YH}$  (RATIO OF EFFECT ON PERCEIVED TIME STRESS OF AN EQUIVALENT CHANGE IN HOUSEHOLD EARNINGS TO THAT OF MARKET WORK HOURS) FOUR COUNTRIES<sup>a</sup>

	Australia	Germany	Korea	United States
Males				
25th→75th percentile	0.29	0.20	0.26	0.44
10th→90th percentile	0.19	0.08	0.25	0.27
One standard deviation	0.17	0.16	0.31	0.56
Females				
25th→75th percentile	0.02	0.07	0.26	0.36
10th→90th percentile	0.04	0.15	0.42	0.43
One standard deviation	0.04	0.19	0.42	0.83

<sup>a</sup>Calculated from table 4 and sample descriptive statistics.

countries, as do the distributions of hours of work and income, comparisons across the data sets are highly tentative. The greater relative importance of earnings differences in the United States may, however, explain why the notion of time crunch is discussed more widely here.

Although the comparisons in table 6 implicitly treat increases in hours of work and in full earnings as exogenous, the former surely are not. So long as labor supply curves are upward sloping, even these comparisons mean that we are understating the relative importance of increases in full earnings in generating complaints about being stressed for time. In the end we cannot really answer whether there is a time crunch or whether the complaints are yuppie kvetching. We can be certain, however, that at least some of the complaints result from differences across households in their members' full earnings.

### VI. Conclusions

We have proposed an economic theory that yields predictions about the impact of additional income on individuals' perceived time stress and have tested the model on a variety of data sets covering four developed economies. The results are qualitatively remarkably consistent across countries: while additional market work does generate more time stress, additional earnings, holding hours of market and home work fixed, also increase time stress. The relative sizes of these effects vary, but the impact of higher full earnings is greater in the United States than elsewhere.

The results suggest that at least some of the concern about a time crunch may be misplaced. Complaints about insufficient time come disproportionately from higher full-income families, partly because their members choose to work more hours, partly too because they have higher incomes to spend during the same amount of nonwork time. Whether one should be concerned about these complaints or simply view them as yuppie kvetching is a matter of values.

The theoretical model and most of the empirical analyses have yielded some surprising results, and also some mysteries that call for additional research that can profit from economic thinking. The analysis can be extended to consider satisfaction with income in a more rigorous way than has been seen in the burgeoning economics and immense psychology literatures. More important, however, thinking

<sup>10</sup>Quantile differences in earnings in Korea in the late 1980s look similar to those in Western Europe (Topel, 1999); and the survey data on which we base the simulations look very much like those in Topel.

about the predictions for subjective psychological outcomes that result from consumers' utility maximization is something that should be useful in a variety of areas that are widely discussed in the other social sciences, that concern many laypeople, and to which economists have paid very little attention.

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