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Determinants of the Weight for Leisure in Preferences

Ceyhun Elgin and Emekcan Yucel

Abstract
In this paper, the authors investigate the determinants of weight for leisure in preferences. First, using a dynamic general equilibrium model, they back out the weight for leisure for an unbalanced panel of 52 countries over the period from 1950 to 2009. Then, the authors perform several panel data regressions using the backed-out values of the preference for leisure as the dependent variable. Estimation results imply that trade openness, GDP per-capita and average temperature positively affect the weight for leisure in preferences in a robust manner. The authors also find some evidence about the effect of unionization and unemployment.

JEL C23 C33 J20 J22
Keywords Leisure; preferences; panel data

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1 Introduction

There have been many studies intending to account for the cross-country and time-series differences in hours worked. Among many examples, for example Bell and Freeman (2001) focus on economic inequality as they explain the difference in hours worked between Germany and USA. In a different paper, Prescott (2004) investigates the gap in hours worked between USA and Europe and finds that taxes are among the main determinants of this transatlantic difference. Moreover, McGrattan and Rogerson (2004) investigate the changes in hours worked in the United States between 1950 and 2000 among different demographic groups. Along the same line, Rogerson (2006) builds a quantitative model to explain variations in hours worked in a panel data framework.

While these studies were concerned with the variations in the hours worked and therefore in absolute leisure time, there hasn't been any study in economics literature that focuses on the sources of variations of the weight for leisure in preferences. In a standard (deterministic or stochastic) dynamic macroeconomic model (workhorse of modern macroeconomics) with a representative (or heterogenous) agent, this weight is generally taken to be exogenous to the model being invariant over time and across countries. (See the cited papers above such as Prescott, 2004; McGrattan and Rogerson, 2004; Rogerson, 2006; as well as Smets and Wouters, 2003; Cicek and Elgin, 2010; McGrattan, 2012; Elgin and Oztunali, 2012 and He and Huang, 2013 on entirely different topics.) Using a standard utility function where leisure enters utility in a separable or non-separable way, similar to the discount factor[1], it is customary (mostly for the sake of simplicity) in standard dynamic macroeconomic models to use a constant value for this weight and depending on the exercise to either calibrate it to a country or to match a moment of the data uses in the analysis. However, there is no guarantee that representative agents of different countries in different time periods should have the same value of the weight for leisure in preferences. To address this issue, in this paper, we use a very standard dynamic general equilibrium model to define this weight as a function of various endogenous variables of the model, allow it vary and then try to

[1] Notice that the growing literature on hyperbolic discounting in macroeconomics is a step to allow the discount factor to vary over time.

empirically account for its variations across countries and over time. Our ultimate aim is to provide some insights to why people in some countries value leisure more than others and why the valuation of leisure changes in a given country over time.

The most important issue with a study investigating the weight for leisure in preferences is regarding its measurement. As the valuation of leisure is an abstract concept related to formation of preferences it is not feasible to measure it directly in a macroeconomic context. Therefore, its data is not immediately available to use for empirical analysis. In the microeconomic level, surveys that are asking people to score their leisure valuation can be conducted to construct such data, however scoring standards may differ among individuals and across countries, leading to inconsistent measures. Moreover, it is also very costly to conduct such surveys in a panel of countries where we have both cross-country and time-series variation. To solve this issue we propose and use a novel approach: Our way of measuring the weight for leisure in preferences in this paper is based on solving a simple dynamic macroeconomic model and use one of the equilibrium conditions to obtain the weight for leisure in preferences numerically from the model using observable data. To this end, we use a simple one-sector dynamic general equilibrium model and back out this weight from one of the conditions characterizing this model. Next, once the series of the weight for leisure in preferences is constructed, we run regressions using it as the dependent variable. We also include several variables among the independent variables that we think are likely to affect this weight. Our estimation results imply that GDP per-capita, openness and average temperature positively affect weight of leisure in preferences in a robust manner. Finally, we also find some weak evidence about the effects of unionization and unemployment on this weight.

Our paper has several implications with respect to both economic theory and policy. Our results imply that the weight for leisure in preferences (as we calculate) shows a significant variation over time and across countries. Therefore, from a theoretical point of view, using one single value of this weight and assuming that it is constant across countries and over time, would lead to poorly motivated conclusions. That is, assuming a constant value for this weight across countries and time will possibly lead to over or underprediction of a dynamic macroeconomic model. Moreover, policy recommendations obtained from such theoretical results might also be misleading as they do not account for a varying weight for leisure

preferences. Any results obtained using dynamic macroeconomic models with constant leisure weight will overestimate various factors' (other than this weight) effects on economic outcomes. Therefore, designers of dynamic macroeconomic models should take the results presented in our paper very much into account.

The rest of the paper is organized as follows: Construction of the series of the weight for leisure in preferences and other data are explained in the next section. Empirical methodology for static panel data analysis and panel-VAR is discussed in the Section 3. Section 4 presents and discusses the empirical results. Finally, Section 5 concludes.

2 Data

2.1 Weight for Leisure Preferences

As we mentioned in the previous section, the weight for leisure in preferences is an abstract concept; therefore it is not subject to direct measurement. Hence, neither micro nor macro data are readily available to use in empirical analysis. We therefore build our own series using a dynamic macroeconomic model. This model yields the weight for leisure in preferences as a function of common macroeconomic variables that are already measured. In order to construct the series of the weight for leisure preferences, we use the formula given by the model.

The model we use is a dynamic general equilibrium model with elastic labor supply. We solve the social planner's problem for a representative household who enjoys consumption and leisure. This household lives infinitely, initially endows $K_0 > 0$ units of capital and has a time endowment of $T > 0$ in every period t. Time endowment is divided to two activities: supplying labor (N_t) or enjoying leisure (ℓ_t). The two factors of production are physical capital (K_t) and labor. Hence, the household has the trade-off between working and enjoying leisure, where an additional hour of work increases utility by increasing production and therefore consumption (C_t), and decreases utility by reducing time devoted to leisure. In summary, the representative household solves the following problem in this environment:

$$\begin{aligned} \max_{\{C_t, l_t, I_t, K_{t+1}, N_t\}_{t=0}^{\infty}} \quad & \sum_{t=0}^{\infty} \beta^t U(C_t, \ell_t) \\ \text{s.t.} \quad & C_t + I_t = Y_t \qquad (1) \\ & K_{t+1} = (1-\delta)K_t + I_t \qquad (2) \\ & N_t + \ell_t = T \qquad (3) \end{aligned}$$

In this problem, $0 < \beta < 1$ is the constant discount factor with which household discounts the future and $0 < \delta < 1$ is the depreciation rate of physical capital. Equation (1) demonstrates the feasibility constraint, which implies that the sum of consumption and investment (I_t) is equal to production (Y_t). Equation (2) is the law of motion for physical capital.Finally, equation (3) demonstrates the time constraint, where the sum of time devoted to labor and leisure equals time endowment T.

Solution of this problem requires assuming specific functional forms for the utility function U(.) and production Y(.). Assuming log utility and Cobb-Douglas production function, substituting leisure from Equation (3) into utility function, and substituting investment from Equation (2) into Equation (1) yields:

$$\begin{aligned} \max_{\{C_t, N_t, K_{t+1}\}_{t=0}^{\infty}} \quad & \sum_{t=0}^{\infty} \beta^t [log(C_t) + \phi_t \log(T - N_t)] \\ \text{s.t.} \quad & C_t + K_{t+1} - (1-\delta)K_t = \theta K_t^{\alpha} N_t^{1-\alpha} \qquad (4) \end{aligned}$$

Here ϕ measures how much the household values leisure relative to consumption in utility. This parameter is the one we would like to obtain, as it measures the the weight for leisure preferences. The production function exhibits constant returns to scale, where θ is the total factor productivity.

The maximization problem of the household yields the following first order conditions:

$$\frac{C_{t+1}}{C_t} = \beta[\theta \alpha K_{t+1}^{\alpha-1} N_{t+1}^{1-\alpha} + 1 - \delta] \qquad (5)$$

$$\frac{\phi_t C_t}{T - N_t} = \theta(1-\alpha)K_t^{\alpha} N_t^{-\alpha} \tag{6}$$

Notice that the equation (5) is the standard Euler equation indicating the inter-temporal condition and the equation (6) presents the intra-temporal condition of the household.

Rearranging the intra-temporal condition, one can obtain the weight for leisure in preferences as a function of several variables of the model:

$$\phi_t = (1-\alpha)\frac{\ell_t}{N_t}\frac{Y_t}{C_t} \tag{7}$$

Now that we have the formula for the weight for leisure preferences[2], we can use it to construct the series of this weight. Assuming the existence of a representative household, it is safe to take the aggregate data on the variables defining the weight for leisure preferences and work with aggregate terms. We use GDP as Y_t and multiply GDP by share of consumption in GDP to obtain aggregate consumption data (C_t). We take both GDP and consumption share series from the Penn World Tables (PWT 7.0) for 52 countries in the period from 1950 to 2009. Data on hours worked in a given year in a country provide us with a measure for the distinction between leisure and labor. We take the aggregate hours worked data from the Total Economy Database. We take hours worked as the labor in the model (N_t) and subtract hours worked from total hours, which we find by multiplying hours in a year (i.e. the product of 24 and 365) by employment, to obtain the aggregate leisure time (ℓ_t).[3] For simplicity, we set the capital share α to be 0.35 (and therefore the labor share $1-\alpha$ to be 0.65) for all countries.[4]

[2] We also replicated the same analysis with different constant elasticity of substitution (such as $U(C_t,\ell_t) = [C_t^{\rho} + \phi_t \ell_t^{\rho}]^{\frac{1}{\rho}}$) or constant relative risk aversion utility functions (such as $U(C_t,\ell_t) = \frac{C_t^{1-\gamma}}{1-\gamma} + \phi_t V(\ell_t)$ where $V(\ell_t) = \ell_t$ or $V(\ell_t) = \frac{\ell_t^{1-\theta}}{1-\theta}$) and obtained qualitatively similar results. These results are not reported in the paper due to space constraints; however they are available upon request from the corresponding author.

[3] As dynamic general equilibrium models abstract from unemployment we calculate ℓ_t accordingly.

[4] This is value is standard in most of the RBC models. However, as we will demonstrate in Section 4, relaxing this assumption and estimating the labor share for every country does not change our results qualitatively.

2.2 Other Variables

Now that we have obtained the weight for leisure in preferences data, we will use it as the dependent variable in our regressions. Next, we need to determine which variables to include as independent variables fin these regressions. Choosing the variables that are most likely to affect leisure preferences surely depends on economic intuition. We hypothesize that real wages, real GDP per capita, average temperature, unionization, unemployment, young population ratio, openness, and share of government expenditures in GDP are likely to be correlated leisure preferences of households. Notice that all these variables (except average temperature) are heavily used in empirical labor literature as determinants of wages, measures of labor supply such as employment and hours-worked, labor productivity and labor demand.[5] It is remarkably difficult to form a priori expectations on the signs of the coefficients of these explanatory labor market variables. For example, if we assume that the substitution effect of an increase in wages dominate the income effect, labor supply should increase whereas leisure decreases. However, as a result of this reduction in leisure, to smooth utility, the representative household might be better of if the weight of preferences in leisure increases. This would then somewhat compensate the reduction in the utility due to a reduction in leisure. However, since the weight for leisure in preferences is foremost related to labor market dynamics, in our empirical analysis we will check whether and if yes how this variables are specifically related to it. Moreover, as for the average temperature, there is a vast empirical literature on the negative effects of temperature on various economic outcomes including labor market outcomes as well.[6] This is also one of the reasons why the distance of a country from the Equator is a widely used instrumental variable in cross-country regressions.[7]

We take the real GDP per capita (in thousand USD), trade openness (defined as the ratio of the sum of exports and imports to GDP), and share of government expenditures (% GDP) from the Penn World Tables (PWT 7.0) for 52 countries in the period 1950-2009. We obtain the unemployment (unemployed % of labor force)

[5] Among many others, for example see Persky and Tsang (1974), Nickel et al. (2005) , Pascalau (2007 and Elgin and Kuzubas (2012, 2013)

[6] For a recent paper see Dell et al. (2012).

[7] For example, see Hall and Jones (1999).

and young-population ratio (% of the young population with ages between 15-24) from the World Bank World Development Indicators Database (WDI). Olken (2007) provides the average temperature data up to the year 2006. The rest of the series is obtained from WDI. Finally, unionization (% of employment) and real wage (average hourly wage in manufacturing) series come from the Source-OECD Database of the OECD as well as the WDI.[8]

Table 1: Summary Statistics

	Mean	Std. Dev.	Min.	Max.	Obs.
Leisure Preference	3.50	0.85	1.61	8.82	2379
GDP per capita (in 000 USD)	16.76	10.82	1.83	89.81	2379
Openness (% GDP)	62.49	62.01	3.54	443.18	2379
Temperature (°C)	11.94	5.73	1.06	26.71	2066
Unemployment (% Labor Force)	8.00	4.40	0.60	25.57	1213
Real Wage	0.61	0.54	0.00	3.51	2058
Unionization (% Employment)	38.76	19.77	1.08	94.30	1178
Young Pop. Ratio(% Population)	40.46	17.00	15.95	94.57	2043
Gov. Exp.(% GDP)	9.08	3.59	0.99	28.27	2379

Table 1 provides summary statistics of all the data used in the empirical analysis. The complete dataset is an unbalanced panel with 52 countries data spanning from 1950 to 2009.[9]

3 Empirical Methodology

3.1 Panel Data Analysis

As we have observations for 52 countries over the period between 1950 and 2009, we utilize several panel data estimation methods. Since we investigate the determinants of the weight for leisure preferences, we use this weight as the

[8] See Table A1 in the appendix for a summary of the range and sources of all variables.

[9] As one can check from the last column of Table 1, not all the data is available for every single year.

dependent variable and use several other variables as independent variables. In static setting, the panel equation we estimate is of the following form:

$$\phi_{i,t} = \beta_0 + \sum_{k=1}^{n} \beta_k X_{k_{i,t}} + \theta_i + \gamma_t + \varepsilon_{i,t},$$

where for country i in year t, ϕ stands for the weight for leisure in preferences and $X_{k_{i,t}}$ are various explanatory variables included in the regression. Moreover, θ_i and γ_t represent the country and period (in this case year) fixed-effects, respectively and $\varepsilon_{i,t}$ is the error term. In the static case, the Hausman test suggests that we indeed use fixed effects and the Woodridge test gives support for the presence of autocorrelation. Hence, we use fixed effects estimators with AR(1) errors. However, to check the robustness of results in different econometric specifications and to address several econometric issues, we also run regressions using alternative estimation methods as described below:

As one alternative, to address potential endogeneity and mean reverting dynamics, we estimate the following equation in a dynamic panel data setting using the estimator[10] of Arellano and Bond (1991):

$$\phi_{i,t} = \alpha_0 + \alpha_1 \phi_{i,t-1} + \sum_{k=2}^{n} \beta_k X_{k_{i,t}} + \theta_i + \gamma_t + \varepsilon_{i,t},$$

Moreover, we also report regression results using the FE estimator[11] with five-year averaged data and the OLS estimator using the whole time-series averaged cross-country data. The five year-averaged data allows us to get rid of potential business cycle effects on the variables used in regressions, and the OLS estimation is conducted to check the long-run relationship between the weight for leisure

[10] We have also experimented several regressions with the estimator of Arellano and Bover (1995) and obtained qualitatively strikingly similar results. These regressions are available upon request from the corresponding author.

[11] In this case, the Hausman test again favors the FE estimator against its alternatives.

preferences and the regressors. These regressions also allow us to check whether our results are robust to different econometric specifications[12].

Furthermore, we also perform sensitivity analyses by omitting and transforming some variables that are associated with weight for leisure in preferences directly through its formula.[13]

3.2 Panel-VAR

In addition to the static and dynamic panel data estimations, utilizing the relatively long time-series dimension of our dataset we will also use a panel-data vector autoregression (VAR) methodology. As well known, this method extends the traditional VAR approach to a panel data setting and allows us to control for individual level unobserved heterogeneity which might contaminate the empirical results if not controlled for. In the estimated model, we will pose the following specification:

$$y_{it} = \sum_{j=1}^{p} \beta_j y_{i,t-j} + \sum_{j=1}^{p} \delta_j x_{i,t-j} + f_i + s_{c,t} + \upsilon_{it} \tag{8}$$

Applying the VAR methodology to panel data presents a problem associated with lagged dependent variables in both fixed and random effects settings. In order to address this problem we use the methodology proposed by Holtz-Eakin (1988). In the traditional VAR, one needs to impose the restriction that the data generating process is the same for each cross-section of observation which is hardly met in practice. Therefore, in order to control for individual level heterogeneity we introduce fixed effects, f_i in the model. In the VAR setting, because of the

[12] There might be potential issues created by a dataset with large N and relatively large T in our case. However, we nevertheless conduct regression here with several different estimators and try to obtain a coherent results consistent across different estimators.

[13] One final issue is regarding the fact that the variable measuring the weight for leisure in preferences is constructed through a calibration procedure. Since this two-step procedure can generate distorted standard errors, a bootstrap procedure might be needed here. We acknowledge this need and have run several regressions with AR (1) and GMM estimations using standard errors obtained with a bootstrapping procedure. As our results are very robust to this procedure, for space constraints we decided not to report these results; however refer the interested reader to the corresponding author.

dynamic nature of the estimation, lagged dependent variables are correlated with the disturbance term. For the fixed effect estimator transformation of variables eliminates f_i however, the regressor $y_{it-1} - \bar{y}_{i.-1}$, with $\bar{y}_{i.-1} = \sum_{t=p+1}^{T} y_{it-1}/(T-p)$, will still be correlated with the error term $v_{it} - \bar{v}_{i.}$, where $\bar{v}_{i.} = \sum_{t=p+1}^{T} v_{it}/(T-p)$, because y_{it-1} is correlated with $\bar{v}_{i.}$ by construction. Therefore, the mean-differencing procedure commonly used to eliminate fixed effects would create biased coefficients especially with a limited number of time-series observations. In order to eliminate this problem, we use forward mean-differencing, known as the 'Helmert procedure". This procedure only subtracts the mean of all the future observations available for each country-year. This transformation satisfies the orthogonality assumption between transformed variables and lagged regressors. Therefore, we can use lagged dependent variables as instruments and estimate the coefficients by system GMM. (see Love and Zicchino (2006) and Arellano and Bover (1995) for more details.). We also include time dummies for each country in order to capture country level shocks to macroeconomic conditions. These dummies are eliminated by subtracting the means of each variable calculated for each country-year.[14]

A model with individual effects that relaxes the time stationarity assumption is the one we use in our estimation, where we modify the empirical model as follows:

$$y_{it} = \alpha_{0t} + \sum_{j=1}^{m} \alpha_{jt} y_{i,t-j} + \sum_{j=1}^{m} \gamma_j x_{i,t-j} + f_i + u_{it} \tag{9}$$

where y and x's will be the endogenous variables we use in our specification and f_i is the unobserved individual effect.

Finally, once the estimation is done, we analyze impulse-response functions and also present variance decompositions. Following Love and Zicchino (2006) we

[14] Surely, one needs to check whether the series used in the Panel-VAR analysis do have a unit root, and provided that they one, they do not have a cointegration relationship. We have conducted several panel unit root test including a second-generation one by Pesaran (2007) and then also a cointegration test by Westerlund (2007). Our results indicated the existence of a unit-root for all the four series used in the Panel-VAR analysis; however absence of cointegration could not be rejected. We do not report these results as they are not central to our analysis; however they are available upon request from the corresponding author.

calculate standard errors of the impulse functions generating confidence intervals using Monte-Carlo simulations.[15]

4 Empirical Results

4.1 Static Panel Data Analysis

Table 2: Preference for Leisure and Explanatory Variables - Fixed Effects AR(1)

Dep. var.: ϕ

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita	0.05*	0.02*	0.04*	0.04*	0.04*	0.04*	0.04*	0.05*
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Real Wage		0.69	0.70	0.60	0.61	0.68	0.69	0.46***
		(0.63)	(0.63)	(0.54)	(0.54)	(0.58)	(0.55)	(0.25)
Openness			38.90*	38.13*	38.14*	38.15*	21.17**	23.13*
			(7.61)	(8.05)	(8.08)	(8.08)	(10.60)	(8.74)
Temperature				76.79**	91.50**	86.65**	86.42***	91.95**
				(31.72)	(44.01)	(43.91)	(44.18)	(44.35)
Young Pop. Ratio					170.12**	174.15**	191.71*	195.03*
					(76.12)	(75.36)	(70.54)	(68.00)
Gov. Exp./GDP						200.71	201.14	226.62
						(151.12)	(140.15)	(138.36)
Unionization							198.11	226.62
							(140.13)	(138.36)
Unemployment								71.72***
								(47.27)
R-squared	0.14	0.12	0.22	0.21	0.23	0.25	0.26	0.28
Observations	2327	2006	2006	2006	2006	2006	1120	1101
F-Test	359.84	121.36	91.25	64.32	39.13	32.20	30.18	28.17

All panel regressions include a country and period fixed effect. Robust standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% confidence levels, respectively. In all regressions a constant is also included but not reported.

[15] Reported results are based on 1000 Monte-Carlo simulations. Results are qualitatively similar when one performs different numbers of simulations.

Estimation results for the benchmark case are represented in Table 2. Robustly significant variables are GDP per capita, openness, average temperature, and young population ratio. In the final regression unemployment is also significant and estimated coefficient signs are positive for all independent variables.

Next, Table 3 shows the Arellano-Bond estimation results using the GMM estimator a la Arellano and Bond (1991). In all cases, as indicated by their respective p-values, results of the Hansen J-test and the AR(2) tests are satisfactory so we can conclude that the instruments are valid and there is no second order autocorrelation. Robustly significant variables in GMM regressions are GDP per capita, openness, average temperature, and unionization. Again, similar to Table 2, in the final regression unemployment is also significant and estimated coefficient signs are positive for all significant independent variables.

Next, in Table 4 we report results of the cross-country OLS regressions which we have conduted using time-series average data for each of the 52 countries. Qualitatively, the results reported in Table 4 are strikingly similar to those reported in Table 3. Robustly significant variables in cross-country OLS regressions are GDP per capita, openness, average temperature, and unionization, all having a positive estimated coefficient. Different from Table 2 and 3, the estimates coefficient of unemployment is not significant.

As an additional robustness check, in Table 5 we report regressions using the FE estimator with five-year-averaged data. Robustly significant variables in this regression are GDP per capita, openness, and average temperature, all having a positive estimated coefficient.

As a final robustness check, Table 6 presents the results of the case where labor share in the formula of the weight for leisure preferences is estimated for each country instead of taking it constant.[16] In this case, GDP per capita, openness, and average temperature have significant and positive estimated coefficients.

Assessing the results altogether, GDP per capita, openness and average temperature seem to be the significant variables positively affecting weight for leisure preferences, independent of the estimation methodology. Certain regressions also

[16] Here for each of the 52 countries, we estimate the labor share for each country by estimating the production function. Here, we utilize the significant variation of the labor share across countries, which is also suggested by Gollin (2002) among some others. Please contact the corresponding author for more details about the estimated labor share series.

Table 3: Preference for Leisure and Explanatory Variables - Arellano-Bond

Dep. var.: ϕ

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita	0.08*	0.05*	0.04*	0.04*	0.04*	0.04*	0.04*	0.03*
	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)
Real Wage		0.39	0.38	0.39	0.41	0.48	0.10	0.16
		(0.23)	(0.22)	(0.24)	(0.24)	(0.44)	(0.15)	(0.25)
Openness			8.90*	8.13*	18.14*	13.12*	11.17**	13.13*
			(1.61)	(2.05)	(4.08)	(4.08)	(3.60)	(2.74)
Temperature				86.79**	88.51**	86.66**	85.18***	80.99**
				(41.72)	(42.01)	(41.91)	(43.18)	(40.10)
Young Pop. Ratio					7.90	8.15	8.11	8.03
					(9.50)	(9.36)	(9.54)	(9.70)
Gov. Exp./GDP						-21.13	-21.19	-26.62
						(53.27)	(41.52)	(38.19)
Unionization							21.10*	22.12*
							(4.13)	(4.36)
Unemployment								21.72***
								(11.27)
Observations	2325	2005	2005	2056	2005	2005	1146	634
Hansen J-Test	0.31	0.29	0.45	0.40	0.44	0.48	0.15	0.19
AR(2) Test	0.16	0.18	0.19	0.21	0.18	0.24	0.23	0.22

All panel regressions include a country and period fixed effect. Robust standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% confidence levels, respectively. In all regressions a constant and one-period lagged ϕ are also included but their coefficients are not reported.

suggest that unemployment, unionization and young population ratio are also positively correlated with the weight for leisure but this result is not robust to different cases and estimation methods. Among these, unionization is significant in a number of regressions but its coefficient sign is both positive and negative in different cases.

Among consistently significant regressors, the positive relationship between GDP per capita and weight of leisure in preferences could be explained by the fact that richer countries have a higher ability to afford leisure. Hence, their valuation

Table 4: Preference for Leisure and Explanatory Variables: Cross-Country OLS Regressions

Dep. var.: ϕ								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita	0.10*	0.06*	0.06*	0.06*	0.07*	0.07*	0.07*	0.06*
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Real Wage		0.29	0.26	0.30	0.31	0.33	0.30	0.32
		(0.21)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)	(0.20)
Openness			9.03*	9.09*	9.09*	9.11*	9.17*	9.13*
			(2.26)	(2.25)	(2.28)	(2.29)	(2.06)	(2.08)
Temperature				70.10**	70.15**	70.16**	70.18**	70.19**
				(31.04)	(32.01)	(31.99)	(31.04)	(30.10)
Young Pop. Ratio					7.40	7.38	7.21	7.19
					(9.45)	(9.45)	(9.49)	(9.65)
Gov. Exp./GDP						-17.19	-17.27	-16.82
						(24.28)	(23.25)	(24.19)
Unionization							11.10**	10.19**
							(4.53)	(4.96)
Unemployment								13.20
								(11.27)
R-squared	0.25	0.26	0.39	0.46	0.46	0.47	0.53	0.54
Observations	52	52	52	52	52	52	52	52
F-Test	8.40	7.86	7.69	7.62	7.13	6.80	6.69	6.17

Robust standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% confidence levels, respectively. In all regressions a constant is included but its coefficient is not reported.

of leisure relative to consumption is higher than poorer countries. [17] Surely, one should mention that the increase in GDP per-capita might reflect an increase in the price of leisure (similar to wage) and therefore create both an income and substitution effect, increasing and reducing leisure, respectively. However, our

[17] Considering that the formula we used to back out leisure preference includes GDP in its numerator, one might suspect that the positive relationship between GDP per capita and ϕ we observe in these regressions might be true by definition. To deal with this, using a nonlinear transformation, we also have run regressions with GDP per capita-squared among the independent variables. Results are qualitatively similar in these estimations.

Table 5: Preference for Leisure and Explanatory Variables - Fixed Effects Five-Year Average Data

Dep. var.: ϕ

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita	0.06*	0.04*	0.03*	0.03*	0.03*	0.03*	0.05*	0.06*
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
Real Wage		0.59	0.65	0.66	0.69	0.70	0.66	0.81***
		(0.63)	(0.63)	(0.49)	(0.49)	(0.48)	(0.55)	(0.43)
Openness			27.60*	28.01*	28.04*	28.05*	31.10*	29.99*
			(5.60)	(5.55)	(6.08)	(6.05)	(6.10)	(6.14)
Temperature				79.99*	80.05*	81.19*	83.20*	82.10*
				(20.14)	(24.00)	(23.03)	(24.19)	(24.33)
Young Pop. Ratio					89.04**	84.15***	70.11	55.09
					(46.23)	(45.31)	(45.54)	(44.01)
Gov. Exp./GDP						70.04	71.19	73.24
						(101.12)	(100.04)	(101.16)
Unionization							90.10	101.10***
							(70.20)	(62.13)
Unemployment								41.19
								(37.11)
R-squared	0.37	0.37	0.51	0.65	0.69	0.69	0.70	0.70
Observations	465	401	401	401	401	401	224	220
F-Test	139.84	60.36	56.25	53.20	37.13	28.10	16.08	10.03

All panel regressions include a country and period fixed effect. Robust standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% confidence levels, respectively. In all regressions a constant is also included but not reported.

analysis indicates that the income effect seems to be the dominant one here as GDP per-capita and weight for leisure preferences are positively correlated.[18]

Moreover, our regressions also indicate that the positive relationship between openness and weight of leisure in preferences is quite strong. That is a higher

[18] Surely, one can argue that the results might be biased by the use of a log-utility in which substitution and income effect generally cancel out. However, notice that the usual income and substitution effect analysis does not apply here. It is very much true that the level of leisure in richer countries tend to be higher (since leisure is a normal good); however here in our case it is not the level of leisure we are analyzing. It is the weight for leisure in preferences.

Table 6: Preference for Leisure and Explanatory Variables - Fixed Effects AR(1) with Estimated Labor Share

Dep. var.: ϕ

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP per capita	0.05*	0.06*	0.05*	0.05*	0.06*	0.06*	0.05*	0.06*
	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Real Wage		0.29	0.18	0.10	0.11	0.12	0.19	0.16
		(0.23)	(0.13)	(0.14)	(0.14)	(0.14)	(0.55)	(0.25)
Openness			38.10*	37.99*	35.14*	38.11*	17.12**	13.13*
			(10.61)	(10.05)	(10.08)	(10.09)	(7.60)	(4.74)
Temperature				80.79**	81.31**	84.12**	89.11**	101.04**
				(40.02)	(34.01)	(41.21)	(43.01)	(44.30)
Young Pop. Ratio					-29.10	-17.15	-17.21	-21.13
					(26.07)	(41.33)	(52.19)	(40.02)
Gov. Exp./GDP						12.90	10.83	12.67
						(12.59)	(10.52)	(10.87)
Unionization							28.11	-20.10
							(30.19)	(38.61)
Unemployment								-2.99
								(37.27)
R-squared	0.10	0.10	0.23	0.29	0.30	0.30	0.29	0.29
Observations	2104	1812	1812	1812	1812	1812	1100	617
F-Test	234.47	100.19	97.38	51.10	41.13	33.21	20.10	18.17

All panel regressions include a country and period fixed effect. Robust standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% confidence levels, respectively. In all regressions a constant is also included but not reported.

(smaller) trade openness is associated with a larger (smaller) weight for leisure preferences. One reason for this might be that international trade might enhance technological progress through comparative advantage and allow for higher utility with more leisure by increasing the weight fro leisure preferences. In line with this reasoning, Walsh (1956) provides a simple model to illustrate this idea and claims that citizens of a country recently opened up to trade '*...produce less than before of one or both commodities, and to take advantage of the new opportunities offered them through the opening of trade by enjoying more leisure."* Another reason might be that countries with a larger trade openness, i.e. higher competitiveness, might

fosters an environment that allows for greater leisure focus quicker accrual of survival necessities, which in turn frees more time for leisure activities. (Gulev and Dukaric, 2010)

Perhaps the most intriguing result of the paper is that average temperature is positively correlated with leisure preference. This result is also very valuable in that it implies causation in one direction: Since average temperature is exogenous, it is not reasonable to claim that leisure preference causes temperature. Therefore, it is safe to suggest that higher temperature causes the rise in preference for leisure. This result is in line with the economic geography literature including but not limited to Nordhaus (2006) and Dell et al. (2012). This literature generally suggests that a higher temperature i.e. a warmer climate is associated with lower GDP per-capita, growth, labor productivity and consumption. This result is compatible with our results suggesting that the representative agent has a larger weight for leisure in preferences (therefore relatively a lower weight for consumption) in countries where the average temperature is higher.

4.2 Panel-VAR

Table 7: Main Results of the Panel-VAR Model

Response of	Response to			
	Leisure(-1)	Openness (-1)	GDP per-capita (-1)	Unionization (-1)
Leisure	1.02*	0.003*	0.0003	0.002**
	(0.03)	(0.001)	(0.03)	(0.001)
Openness	2.34	1.26*	0.003	0.17*
	(1.74)	(0.10)	(0.02)	(0.07)
GDP per-capita	6.71	0.50**	0.11*	0.47*
	(5.22)	(0.23)	(0.06)	(0.19)
Unionization	-0.24	-0.04**	-0.004	0.94*
	(0.35)	(0.02)	(0.004)	(0.02)

Standard errors are reported in parentheses. *, **, *** denote 1, 5 and 10% confidence levels, respectively. In all regressions a constant is also included but not reported.

Table 8: Variance Decompositions

	Leisure	Openness	GDP per-capita	Unionization
Leisure	0.77	0.22	0.01	0.01
Openness	0.64	0.35	0.00	0.01
GDP per-capita	0.67	0.30	0.02	0.01
Unionization	0.64	0.33	0.00	0.03
Leisure	0.72	0.26	0.01	0.01
Openness	0.62	0.36	0.01	0.01
GDP per-capita	0.69	0.30	0.00	0.01
Unionization	0.65	0.32	0.01	0.02

Percent of variation in the row variable (10 and 5 periods ahead in the top and bottom panels, respectively) explained by column variable.

Table 7 reports the estimated coefficients of the system once the fixed effects and the country-time dummy variables are removed. What we observe from Table 7 is that the shocks to openness and unionization create positive responses of the weight for leisure preferences. Next, in Table 8 we present variance decompositions corresponding to the estimations presented in Table 7. We observe that openness explain explains more of the variation in leisure preferences 10 or 5 periods ahead in our sample, compared to GDP per-capita and unionization. Moreover, the Panel-VAR analysis rules out GDP per-capita as a factor which, when given a shock, creates a positive response in weight for leisure preferences. Therefore, the Panel-VAR analysis puts trade openness forward as the most important variable affecting the weight for leisure preferences. Moreover, we should also notice that the 77 or 72 % of the variation of leisure is explained by shocks to itself. This, along with the fact that the R-squared values of Table 2 never exceed 0.28, suggest there is still a significantly large room for other factors that potentially might account for variation in leisure preferences.

5 Concluding Remarks

In this paper, we investigated the determinants of weight for leisure in preferences. First, using a dynamic general equilibrium model, we backed out this weight for an unbalanced panel of 52 countries for the period from 1950 to 2009. Then, we performed several panel data regressions using the backed-out values of this weight as the dependent variable. Estimation results implied that GDP per capita, openness and average temperature positively affect the weight for leisure in preferences in a robust manner.

As we mentioned earlier, our results have several theoretical and policy oriented implications. Our results imply that this weight which in the existing literature is generally assumed to be constant as well as exogenous to the model, is correlated with certain endogenous variables as well as average temperature. Therefore, results and recommendations of theoretical models assuming a constant and invariant weight for leisure preferences might be misleading as they do not account for its variation.

Moreover, we also believe that, further research has given an increasing attention on the theoretical mechanisms behind our observations. Considering that the weight of leisure preferences is not time or cross-section invariant and is significantly correlated with other variables, such an analysis would require building a theoretical model with an endogenous weight for leisure in preferences. There should also be a focus on how this weight is related to several other macroeconomic variables, similar to our results. These we leave to future research.

References

1. Arellano, M. and Bond, S. (1991). Some Test of Specification for Panel Data: Monte Carlo Evidence and Application to Employment Equations. *Review of Economic Studies* 58: 277-297.

2. Arellano, M. and Bover, O. (1995). Another Look at the Instrumental Variables Estimation of Error Components Models. *Journal of Econometrics*, 68, 29-51.

3. Bell, L.A. and Freeman, R.B. (2001). The incentive for working hard: explaining hours worked differences in the US and Germany *Labour Economics*, 8, 181-202.

4. Dell, M., Jones, B. F., and Olken, B. A. (2012). Temperature Shocks and Economic Growth: Evidence from the Last Half Century, *American Economic Journal: Macroeconomics*, 4 (3), 66-95.

5. Cicek, D. and Elgin, C. Not-quite-great depressions of Turkey: A quantitative analysis of economic growth over 1968-2004. *Economic Modelling*, 28 (6), 2691-2700.

6. Elgin, C. and Kuzubas, T. U. (2012). Wage-Productivity Gap in Turkish Manufacturing Sector, *Iktisat Isletme ve Finans* 27 (316), 09-31.

7. Elgin, C. and Kuzubas, T.U. (2013). Wage-Productivity Gap in OECD Economies. *Economics: The Open-Access, Open-Assessment E-Journal*, Vol. 7, 2013-21. http://dx.doi.org/10.5018/economics-ejournal.ja.2013-21

8. Elgin, C. and Oztunali, O. (2012). Shadow Economies all around the World: Model Based Estimates, Bogazici University Department of Economics Working Papers, 2012 (5).

9. Gollin, D. (2002). Getting Income Shares Right. *Journal of Political Economy*, 110 (2), 458- 474.

10. Gulev, R. E and Dukaric, G. (2010). Exploring the connectivity between work inclinations and country competitiveness levels: a cross-country analysis. *International Journal of Sustainable Economy*, 2 (2), 127-143.

11. Hall, R.E. and Jones, C. I. (1999). Why Do some Countries Produce so Much More Output Per Worker Than Others? *Quarterly Journal of Economics*, 114: 83-116.

12. He, H. and Huang, K. x.d. (2013) Why Do Americans Spend So Much More on Health Care than Europeans?–A General Equilibrium Macroeconomic Analysis. Vanderbilt University Department of Economics Working Papers, 13-00005.

13. Holtz-Eakin, D., Newey, W. K. and Rosen, H. S. (1988). Estimating Vector Autoregressions with Panel Data, *Econometrica*, 56, 1371-95.

14. Love, I. and Zicchino, L. (2006). Financial development and dynamic investment behavior: Evidence from panel VAR, *The Quarterly Review of Economics and Finance*, 46(2),190-210.

15. McGrattan, E.R. and Rogerson, R. (2004). Changes in hours worked, 1950-2000. *Federal Reserve Bank of Minneapolis Quarterly Review*, 28(1), 14-33.

16. McGrattan, E. R. (2012). Transition to FDI openness: reconciling theory and evidence. *Review of Economic Dynamics*, 15, 437-458.

17. Nickel, S., Nunziata, L. and Ochel, W. (2005). Unemployment in the OECD since the 1960s. What do we know? *Economic Journal*, 115, 1-27.

18. Nordhaus, W. (2006). Geography and Macroeconomics: New Data and Findings, *Proceedings of the National Academy of Science* 103, 3510-3517, 2006.

19. Pascalau R. (2007). Productivity Shocks, Unemployment Persistence, and the Adjustment of Real Wages in OECD Countries. MPRA Paper No. 7222.

20. Persky, J., and Tsang H., (1974). Pigouvian Exploitation of Labor, The *Review of Economics and Statistics*, 56, 1, 52-57.

21. Pesaran, M. H. (2007) A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence. *Journal of Applied Econometrics* 27 (2), 265-312.

22. Prescott, E.C. (2004). Why do Americans work so much more than Europeans? *Federal Reserve Bank of Minneapolis Quarterly Review*, 28(1), 2-13.

23. Rogerson, R. (2006). Understanding differences in hours worked. *Review of Economic Dynamics*, 9 (3), 365-409.

24. SW Smets, F. and Wouters, R. (2003). An Estimates Dynamic Stochastic General Equilibrium Model of the Euro Area. *Journal of the European Economic Association*1 (5), 1123-1175.

25. Walsh Walsh, V. C. (1956). Leisure and International Trade. *Economica*, 21 (91), 253-260.

26. Westerlund, J. (2007). Testing for Error Correction in Panel Data. *Oxford Bulletin of Economics and Statistics*, 69 (6), 709-748.

Appendix

Table A1: Data Sources

Variable	Range	Source
GDP per-capita	1950-2009	Penn World Tables 7.0
Openness	1950-2009	Penn World Tables 7.0
Temperature	1950-2009	Olken (2007) and World Development Indicators
Unemployment	1960-2009	World Development Indicators
Real Wage	1955-2009	Source-OECD Database and World Development Indicators
Unionization	1960-2009	Source-OECD Database
Young Pop. Ratio	1960-2009	World Development Indicators
Gov. Exp.	1950-2009	Penn World Tables 7.0