Global Perspectives on Fiscal Policy and Labor Income-Leisure Choices: Theoretical and Practical Insights

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Abstract

In macroeconomic literature, fiscal policy is considered a powerful tool to achieve sustainable development, full employment, and social well-being in developed and developing societies. For this, public authority uses expansionary and contractionary tax policies to achieve stable growth and employment environment for the stable labor market. This study theoretically and empirically investigates the problem of inference on income-leisure labor preference. Also, it considers the impact of tax and expenditure structure on labor choices regarding working hours under the assumption of neoclassical theory. We use quantile regression analysis to investigate the data set for worldwide, high, and low-income countries from 2000 to 2022, for the macro-level analysis based on the empirical investigation of 123 countries cross-section panel. The outcomes show that when the fiscal authorities impose a regressive form of taxes, it may hurt the labor wages and distribution of income-leisure preferences or the welfare of labor. Similarly, non-labor income hurts labor utility through a large volume of non-development expenditure. However, when the progressive form of taxes is imposed, it may improve the labor utility. At the same time, on the other side, when fiscal authority disburses the development expenditure, it may support the non-labor income through the provision of public goods and services. For practice, the empirical results of quantile regression show that government expenditure has a positive while tax hurts labor supply. Fiscal policy in low-income countries has provided an alternative outcome.

Keywords: Expenditures, Taxes, Labor Choices, Method of Moments Quantile Regression

Introduction

With the emergence of the neoclassical theory, every individual can maximize their utility subject to a given budget, and they can easily select their preferences regarding working and leisure hours. In literature, wage income is the main factor in changing labor choices. Labor chooses more work for more earnings under the assumptions of a perfectly competitive labor market. Perhaps some workers choose fewer working hours because they earn enough money to fill their needs. While those who have lower wage salaries choose more working hours to earn more income for their needs (Blanchard, 2004). When the wage rate falls, two possible outcomes will emerge. The worker may choose to substitute more working hours for leisure hours because the opportunity

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cost of leisure becomes more expensive to meet their smooth consumption of goods (Altonji & Paxson, 1998). However, the high wage tends to higher real income to meet their higher prices. The substitution effect dominates the income effect at a lower wage rate. However, the income effect dominates the substitution effect at the high wage rate because of the backward-bending labor supply curves (Khan & Lang, 1996).

Labor health status and age are essential determinants of leisure and working hours. Older workers are preferred to less working hours because they gain more utility from leisure. In addition, 3 to 4 working hours may cause heart and liver disease at an older stage of workers. The older cohort of the population has suffered from different diseases and spent more leisure time. Other things remain unchanged (Spurgeon et al., 1997). Culture and worker preference play an essential role in determining labor-leisure choices. If people give more value to leisure, the labor supply curve shifts left at any wage rate. Rottenberg (1995) also considered the couple's income behavior. He suggests that leisure hours are positively correlated with the husband's income and negatively related to the wife's income. The non-wage income has a positive impact on the leisure preference of all ages and sex of society. They decided to consume more goods and services; the supply curve was more likely to shift rightwards (Mapira et al., 2017; Xiong, 2024). Public policy is also an essential variable in determining labor choices.

Fiscal variables are divided into categories. One is based on the revenue side, while the other is on the expenditure side. Fiscal policy is one of the significant policy variables to attain labor market efficiency through its various channels. The earlier theory of different types of tax and their impact on labor income-leisure choice does not provide a clear picture. Several utility functions are used to investigate the relationship between various types of taxes and wage income of labor. For example, Mapira et al. (2017) pointed out a large of factors that are considered to directly influence labor choices, such as labor age, gender, health and preferences, and social and cultural norms. The wage rate, income, and substitution effect usually are based on the degree of elasticity of labor supply. Meghir and Phillips (2010) and Keane (2011), among others, investigated the empirical data sets and concluded that the imposition of the tax hurts labor work efforts.

It is generally accepted that public spending has a positive and significant impact on labor income through the provision of public goods and services. The increase in labor income enhances the demand for goods and services which further increases the investment through acceleration effect. While, on the other hand, labor demand increases employment opportunities. In literature, various studies confirm the positive impact of public spending on employment generation such as (Fatas & Mihov, 2001; Burnside & Dollar, 2004; Cavallo et al., 2005; Gali, 1994; Ali & Naeem, 2017; Ali et al., 2021; Ahmad, 2021; Audi & Ali, 2023; Munir et al., 2024). The object of this work is to theoretically as well as empirically investigate the links between fiscal variables and the macroeconomic dynamics of the labor market. The rest of the paper presents the neo-classical theory of labor supply as well as augments this theory regarding the fiscal structure and maximization of labor preferences at the macro level.

Literature Review

Fiscal policy plays a crucial role in shaping labor market outcomes through government spending, tax policy, and public investment (Ahmad & Chaudary, 2016). Numerous studies have employed discrete choice sets that categorize individuals as not working, part-time working, or full-time working (Blundell, 2001; Bingley & Walker, 2001; Ilmakunnas & Pudney, 1990; Keane & Moffitt, 1998; Moffitt, 1984; Cizakca, 2024). However, to accurately capture the intricacies of a complex budget set with non-convexities and discontinuities, a more detailed grid with multiple points per

individual is necessary. In the case of individual-level analysis, such models have been widely utilized (Dickens & Lundberg, 1993; Tummers & Woittiez, 1991; van Soest et al., 1990; Fetene & Kedir, 2024). Van Soest (1995) developed a discrete choice model for family labor supply, which various authors have since refined. These refinements include incorporating fixed costs of working, using information on actual and desired hours of work, and other enhancements (Callan & van Soest, 1996; Euwals & van Soest, 1999; Creedy et al., 2006; Haan, 2006; Karim & Said, 2024).

Economists have thoroughly researched labor supply, with several empirical studies and lengthy review papers summarizing their conclusions. Critical reviews include those by Pencavel (1986), Killingsworth and Heckman (1986), Blundell and MaCurdy (1999), Meghir and Phillips (2010), Keane (2011), and Saez et al. (2012). Meghir and Phillips (2010) observe that men's work hours are relatively insensitive to tax incentives, but married women and lone moms are more receptive. Furthermore, taxation and benefits have a significant impact on the decision to work for pay, particularly for women and mothers. Saez et al. (2012) discovered that the compensated elasticity of labor supply is nearly negligible for prime-age males but considerable for married women's labor force participation.

Research on labor supply has produced many viewpoints on elasticity. While some research implies a low compensated elasticity of labor, Keane (2011) contends that men's labor supply may be more elastic than previously anticipated. The evidence largely agrees that raising tax rates diminishes work effort; with Keane (2011) concluding categorically that labor income taxation causes less work. However, Meghir and Phillips (2010) observe that in some situations, a rise in proportionate tax may enhance effort, but this is regarded as an empirical oddity. This viewpoint is mirrored in official government projections of labor supply responses to income taxes (Manski, 2014).

In economics, the standard method for evaluating well-being is to observe the decisions made by rational, utility-maximizing actors. This strategy, known as "revealed preference," gives a measure of well-being referred to as "decision utility." However, for over two decades, some academics have contended that choice utility may need to reflect the well-being associated with specific experiences correctly. Dolan and Kahneman (2008) offer alternative measurements that focus on "experienced utility," such as self-reported happiness, life satisfaction, or mental health. A rising amount of research demonstrates that subjective well-being (SWB) information is more than just noise; it represents individual variations that are strongly related to objective well-being measurements and, to some extent, behavior. Despite this, many economists still see SWB as one of several factors in an individual's total utility function (Rayo & Becker, 2007; Benjamin et al., 2012; Glaeser et al., 2016). Other studies contend that SWB answers, which are often gathered via surveys, are compatible with people's stated preferences (Oswald & Wu, 2010; Decancq et al., 2015).

A burgeoning body of literature has endeavored to address the issue of cross-country differences in labor supply, yielding a plethora of insightful findings. Prescott (2004) posits that disparities in labor supply between the United States and European G7 countries can be attributed solely to variations in taxation. Rogerson (2006) expands on this notion, suggesting that taxes and productivity changes in tandem can account for the evolving patterns in hours worked across countries. In a subsequent study, Rogerson (2008) delves deeper into this hypothesis by examining sectoral data, arguing that the market service sector in Europe failed to expand to the same extent as in the United States due to higher labor taxes in Europe. McDaniel (2011) and Rogerson (2008) incorporate home production into a model similar to Prescott's (2004), attributing changes in hours

worked to shifts in taxes and productivity levels. Bick et al. (2019) reveal that part of the U.S.-Europe difference can be ascribed to educational composition and seasonal sampling disparities. In a separate study, Bick et al. (2018) focus on comparing countries at various stages of development, discovering that the number of hours worked is higher in low-income countries than in high-income countries. Aguiar and Hurst (2007) document a significant increase in leisure hours in the United States over the past two generations. A common thread among these papers (except Bick et al., 2018) is a focus on the temporal aspects of conditions driving labor supply while assuming preferences for leisure, among other factors, remain constant across countries.

Ek (2021) conducts a comprehensive investigation to explore the factors underlying the variation in labor-wedge differences. The study presents three distinct empirical exercises that provide robust support for the notion that cross-sectional labor-wedge differences are, to a significant extent, a reflection of systematic differences in leisure preferences:

1. Cross-country regressions reveal that a cultural measure of preferences for leisure, derived from the world values survey, exhibits greater explanatory power and statistical significance than traditional measures of labor market frictions.
2. An analysis of individual-level data on labor-supply choices of descendants of immigrants in the United States and Sweden, using the epidemiological approach, yields findings consistent with the idea of "inherited" preferences for leisure.
3. The study examines the implications of differences in preferences for cross-country differences in optimal labor taxation and finds that the empirical data confirm the theoretical prediction of a negative association between preferences for leisure and labor taxes, providing an out-of-sample test of the hypothesis.

Akay et al. (2023) identify proxies for various individual and external constraints and demonstrate that these constraints alone can account for over half of the deviations. In our context, these deviations partly result from the revealed preference approach's limitations in capturing labor market rigidities. Therefore, actual and SWB-maximizing hours should be used in conjunction to provide a more comprehensive understanding. Our proposed approach, based on the deviation metric, offers a promising tool for identifying labor market frictions and shedding light on these inefficiencies.

Theoretical Framework

Fiscal structure has different types of implications for the economic and social welfare of the society at macro as well as micro levels. Now, we try to evaluate the welfare preferences of labor concerning the neoclassical model of labor-leisure choices with some modification. The primary utility function of labor preferences is considered with fiscal variables. Fiscal policy has two-way effects on labor welfare: taxes cause to reduction in labor income. At the same time, on the other side, government spending enhances labor welfare through the provision of public goods. So, we consider both elements of fiscal policy in the essential utility function of labor under some basic assumptions that an individual can choose to allocate their time to work freely and leisure; jobs and workers are very heterogeneous. The primary utility function is presented below:

$$U = f(L, Ts, Es) \quad 1$$

Where fiscal effect consists of tax structure and expenditure structure U labor utility index stands for an individual's level of satisfaction or happiness, L stands for labor leisure hour consumption, and Ts stands for tax ratio normally considered to hurt labor utility because of reduction in tax ratio regressive form of taxation (Income effect) and Es stand for expenditure ratio (Substitution effect). We assume that fiscal policy is only based on taxes and expenditures other elements of

fiscal policy like debt; non-tax income and deficit financing remain constant. Furthermore, we also assume that more leisure labor has a higher level of satisfaction for a person's utility. Now we explain the constraint of labour as fellow in equation no.2.

$$B = Wh + V - \omega(Ts, Es) \quad 2$$

B, Total budget income of labor informs of wage earning (Wh) and non-labor income (V) with fiscal effect.

h= Total number of working hours

V=Person's wealth other than labor work

$$B = W(T - L) + V - \omega(Ts, Es) \quad 3$$

T stands for the total number of hours assumed 24 hours. We assumed the total number of hours and non-labor income (V) remain constant so the constraint function is as

$$0 = (T + V) - L - \omega(Ts, Es) - B \quad 4$$

Multiply a parameter λ to equation no. 4

$$[(T + V) - L - \omega(Ts, Es) - B]$$

$$\lambda\,(T + V) - \lambda L - \lambda\omega(Ts, Es) - \lambda B] = 0 \quad 5$$

Adding equation 5 into the utility function for the Lagrange multiplier function

$$U(L, Ts, Es, \lambda) = f(L, Ts, Es) + \lambda(T + V) - \lambda L - \lambda\omega(Ts, Es) - \lambda B \quad 6$$

Now, we take partial derivate of the above equation concerning L, Ts, Es, and parameter λ

$$\frac{\partial U}{\partial L} = \frac{\partial f}{\partial L}(L, Ts, Es) + \frac{\partial \lambda}{\partial L}(T + V) - \frac{\partial \lambda}{\partial L}L - \frac{\partial \lambda}{\partial L}\omega(Ts, Es) - \frac{\partial \lambda}{\partial L}B \quad 7$$

$$\frac{\partial U}{\partial L} = f_L + 0 - \lambda - 0 - 0$$

$$\frac{\partial U}{\partial Ts} = \frac{\partial f}{\partial Ts}(L, Ts, Es) + \frac{\partial \lambda}{\partial Ts}(T + V) - \frac{\partial \lambda}{\partial Ts}L - \frac{\partial \lambda}{\partial Ts}\omega(Ts, Es) - \frac{\partial \lambda}{\partial Ts}B \quad 8$$

$$\frac{\partial U}{\partial Ts} = f_{Ts} + 0 - 0 - \lambda\omega Ts - 0$$

$$\frac{\partial U}{\partial Es} = \frac{\partial f}{\partial Es}(L, Ts, Es) + \frac{\partial \lambda}{\partial Es}(T + V) - \frac{\partial \lambda}{\partial Es}L - \frac{\partial \lambda}{\partial Es}\omega(Ts, Es) - \frac{\partial \lambda}{\partial Es}B \quad 9$$

$$\frac{\partial U}{\partial Es} = f_{Es} + 0 - 0 - \lambda\omega Es - 0$$

$$\frac{\partial U}{\partial \lambda} = \frac{\partial f}{\partial \lambda}(L, Ts, Es) + \frac{\partial \lambda}{\partial \lambda}(T + V) - \frac{\partial \lambda}{\partial \lambda}L - \frac{\partial \lambda}{\partial \lambda}\omega(Ts, Es) - \frac{\partial \lambda}{\partial \lambda}B \quad 10$$

$$\frac{\partial U}{\partial \lambda} = 0 + (T + V) - L - \omega(Ts, Es) - B \quad 11$$

Necessary condition for optimization or maximization of consumer welfare put equal to zero first order condition $\frac{\partial U}{\partial \lambda} = 0, \frac{\partial U}{\partial L}$=0, $\frac{\partial U}{\partial Ts} = 0, \frac{\partial U}{\partial Es} = 0$.

$$f_L - \lambda = 0 \quad 12$$

$$f_{Ts} - \lambda\omega Ts = 0 \quad 13$$

$$f_{Es} - \lambda\omega Es = 0 \quad 14$$

$$(T + V) - L - \omega(Ts, Es) - B = 0 \quad 15$$

$$|H| = \begin{vmatrix} U_{LL} & U_{LTs} & U_{LEs} & g_L \\ U_{EsL} & U_{EsE} & U_{EsS} & g_{Es} \\ U_{TsL} & U_{TsE} & U_{TsS} & g_{Ts} \\ g_L & g_{Es} & g_{Ts} & 0 \end{vmatrix} \quad 16$$

Now all first-order condition equations are solving for optimum value simultaneously with the help of the matrix approach because the given system of equations is linear. So, the second-order condition of the Bordered Hession determinant is written as:

$$|H| = \begin{vmatrix} 0 & g_L & g_{Es} & g_{Ts} \\ g_L & U_{LL} & U_{LTs} & U_{LEs} \\ g_{Es} & U_{EsL} & U_{EsE} & U_{EsS} \\ g_{Ts} & U_{TsL} & U_{TsE} & U_{TsS} \end{vmatrix} \quad 17$$

$U_{LL}, U_{LES}, U_{LTs}, \ldots\ldots\ldots\ldots U_{TsL}, U_{TsEs}, U_{EsTs}$, are 2nd order partial derivative of Lagrange multiplier function. Taking constraint

$(T+V) - L - \omega(Ts, Es) - B = 0$ let g(L, Ts, Es)=0

g(L, Ts, Es)= $(T+V) - L - \omega(Ts, Es) - B$

Now we take partial derivatives concerning L, Ts, Es

$$\frac{\partial g}{\partial L}(L, Ts, Es) = \frac{\partial}{\partial L}(T+V) - L - \omega(Ts, Es) - B \quad 18$$

$$g_L = -1$$

$$\frac{\partial g}{\partial Es}(L, Ts, Es) = \frac{\partial}{\partial Es}(T+V) - L - \omega(Ts, Es) - B \quad 19$$

$$g_L = -\omega Es \qquad \omega Es = \frac{\partial \omega}{\partial Es}(\text{Es}, \text{Ts})$$

$$\frac{\partial g}{\partial Ts}(L, Ts, Es) = \frac{\partial}{\partial Ts}(T+V) - L - \omega(Ts, Es) - B \quad 20$$

$$g_L = -\omega Es \qquad \omega Ts = \frac{\partial \omega}{\partial Ts}(\text{Es}, \text{Ts})$$

Now, we take second-order partial derivate

$$U_{LL} = \frac{\partial U_L}{\partial L} \rightarrow U_{LL} = \frac{\partial}{\partial L}(f_L - \lambda) \rightarrow U_{LL} = f_{LL} \quad 21$$

$$U_{LEs} = \frac{\partial U_L}{\partial Es} \rightarrow U_{LEs} = \frac{\partial}{\partial Es}(f_L - \lambda) \rightarrow U_{LEs} = f_{LEs} \quad 22$$

$$U_{LTs} = \frac{\partial U_L}{\partial Ts} \rightarrow U_{LTs} = \frac{\partial}{\partial Ts}(f_L - \lambda) \rightarrow U_{LTs} = f_{LTs} \quad 23$$

$$U_{EsL} = \frac{\partial U_{Es}}{\partial L} \rightarrow U_{EsL} = \frac{\partial}{\partial L}(f_{Es} - \lambda\omega Es) \rightarrow U_{EsL} = f_{EsL} \quad 24$$

$$U_{EsEs} = \frac{\partial U_{Es}}{\partial Es} \rightarrow U_{EsEs} = \frac{\partial}{\partial L}(f_{Es} - \lambda\omega Es) \rightarrow U_{EsEs} = f_{EsEs} - \lambda\omega \quad 25$$

$$U_{EsTs} = \frac{\partial U_{Es}}{\partial Ts} \rightarrow U_{EsTs} = \frac{\partial}{\partial Ts}(f_{Es} - \lambda\omega Es) \rightarrow U_{EsTs} = f_{EsTs} - \lambda\omega \quad 26$$

$$U_{TsL} = \frac{\partial U_{Ts}}{\partial L} \rightarrow U_{TsL} = \frac{\partial}{\partial L}(f_{Ts} - \lambda\omega Ts) \rightarrow U_{TsL} = f_{TsL} \quad 27$$

$$U_{TsEs} = \frac{\partial U_{Ts}}{\partial Es} \rightarrow U_{TsEs} = \frac{\partial}{\partial Es}(f_{Ts} - \lambda\omega Ts) \rightarrow U_{TsEs} = f_{TsTs} - \lambda\omega \quad 28$$

$$U_{TsTs} = \frac{\partial U_{Ts}}{\partial Ts} \rightarrow U_{TsTs} = \frac{\partial}{\partial Ts}(f_{Ts} - \lambda\omega Ts) \rightarrow U_{TsTs} = f_{TsTs} - \lambda\omega \quad 29$$

$$|H| = \begin{vmatrix} 0 & -1 & \psi_{Es} & \psi_{Ts} \\ -1 & f_{LL} & f_{LEs} & f_{LTs} \\ \psi_{Es} & f_{EsL} & f_{EsEs-\lambda\psi} & f_{EsTs-\lambda\psi} \\ \psi_{Ts} & f_{TsL} & f_{TsEs-\lambda\psi} & f_{TsTs-\lambda\psi} \end{vmatrix} \quad 30$$

The utility maximum condition is that when second-order Bordered Hessian Determents [H] is greater than zero. The above optimization of labor welfare with changes due to fiscal structure. The fiscal structure has many implications for labor income, consumption, and saving but the ultimate goal is related to welfare.

Theorem 1

$|\bar{H}|$ is negative definite iff $\left|\overleftarrow{H_2}\right| > 0$, $\left|\overleftarrow{H_3}\right| < 0$, $\left|\overleftarrow{H_4}\right| > 0$ etc (i.e. the leading principal minors alternate in sign beginning with a positive)

Theorem 2

$|\bar{H}|$ is positive definite iff $\left|\overleftarrow{H_2}\right| < 0$, $\left|\overleftarrow{H_3}\right| < 0$, $\left|\overleftarrow{H_4}\right| < 0$ (i.e. the leading principal minors are all negative)

Now If $\mathfrak{f}_\lambda = \mathfrak{f}_L = \mathfrak{f}_{T_s} = \mathfrak{f}_{E_s} = 0$ and $|\bar{H}|$ is negative definite, then the function $\mathfrak{f}(L, T_s, E_s)$ has a locally constrained maximum at $(L^*, {T_s}^*, {E_s}^*)$.

1. If $\mathfrak{f}_\lambda = \mathfrak{f}_L = \mathfrak{f}_{T_s} = \mathfrak{f}_{E_s} = 0$ and $|\bar{H}|$ is positive definite, then the function $\mathfrak{f}(L, T_s, E_s)$ has a locally constrained minimum at $(L^*, {T_s}^*, {E_s}^*)$.

The optimization problems we have considered thus far all contain constraints that hold with equality. However, often optimization problems have constraints that take the form of inequalities rather than equalities.

Let $\mathfrak{f}(L, T_s, E_s)$ and $g(L, T_s, E_s)$ be the two functions such that

Maximize $U = \mathfrak{f}(L, T_s, E_s)$

Subject to $g(L, T_s, E_s) \leq 0$

Suppose that the constrained maximum for utility is obtained when $L = L^*, T_s = {T_s}^*, E_s = {E_s}^*$ then we have two cases:

Case-1

$g(L^*, {T_s}^*, {E_s}^*) < 0$

In this case, the constraint is said to be slack at $(L^*, {T_s}^*, {E_s}^*)$. Suppose a continuous function $g(L, T_s, E_s) < 0$ for all the points (L, T_s, E_s) sufficient close to $(L^*, {T_s}^*, {E_s}^*)$;

Then $\mathfrak{f}(L, T_s, E_s) \leq \mathfrak{f}(L^*, {T_s}^*, {E_s}^*) \nvDash (L, T_s, E_s)$.

Hence, at a critical point $(L^*, {T_s}^*, {E_s}^*)$ the function $\mathfrak{f}$ has a local unconstrained maximum.

Case-2

$g(L^*, {T_s}^*, {E_s}^*) = 0$ $(L^*, {T_s}^*, {E_s}^*)$. In particular, the objective function $\mathfrak{f}(L, T_s, E_s)$ subject to constraint $g(L, T_s, E_s) = 0$ is maximized at $(L^*, {T_s}^*, {E_s}^*)$. Hence, there exists a multiplier λ such that the Lagrangian $\mathfrak{f} - \lambda g$ has a critical point $(L^*, {T_s}^*, {E_s}^*)$. Now evoke to $(L^*, {T_s}^*, {E_s}^*)$ that maximizes $\mathfrak{f}(L, T_s, E_s)$ subject to an inequality constraint $g(L, T_s, E_s) \leq 0$, so that the feasible set is much larger than it would be if we had imposed the constraint $additional\ information$ $(L^*, {T_s}^*, {E_s}^*) = 0$at the beginning. This provides us with additional information. If we let $\gamma(b)$ denote the maximal value of $\mathfrak{f}(L, T_s, E_s)$ subject to $g(L, T_s, E_s) = b$.

Then $\mathfrak{f}(L^*, {T_s}^*, {E_s}^*) \geq \gamma(b)$ whenever $b < 0$

But $\mathfrak{f}(L^*, {T_s}^*, {E_s}^*) = \gamma(0)$, so $\gamma(0) \geq \gamma(b)$ whenever $b < 0$;

It follows that $\gamma'(0) \geq 0$.

Now we know that $\gamma'(0)$ is the Langrangian multiplier λ so $\lambda \geq 0$.

Hence, in case-2 the langrangian method holds with the additional information that the multiplier is non-negative.

We can summarise what happens at the constrained maximum $(L^*, {T_s}^*, {E_s}^*)$ as follows:

In case-2 $g(L^*, {T_s}^*, {E_s}^*) = 0$, and there exists a langrangian multiplier λ such that

$$\frac{\partial f}{\partial L} - \lambda \frac{\partial g}{\partial L} = 0$$

$$\frac{\partial f}{\partial T_s} - \lambda \frac{\partial g}{\partial T_s} = 0$$
$$\frac{\partial f}{\partial E_s} - \lambda \frac{\partial g}{\partial E_s} = 0$$
$$\lambda \geq 0$$

In case-1, $g(L^*, T_s^*, E_s^*) < 0$ and the function f has an unconstrained local maximum at (L^*, T_s^*, E_s^*).

Therefore, at that point;

$$\frac{\partial f}{\partial L} - \lambda \frac{\partial g}{\partial L} = 0$$
$$\frac{\partial f}{\partial T_s} - \lambda \frac{\partial g}{\partial T_s} = 0$$
$$\frac{\partial f}{\partial E_s} - \lambda \frac{\partial g}{\partial E_s} = 0$$
$$\lambda = 0$$

These results can be combined as follows:

Proposition

Let the langrangian for problem be defined as;

$\xi(L, T_s, E_s) = f(L, T_s, E_s) - \lambda g(L, T_s, E_s)$ and let $L = L^*$, $T_s = T_s^*$, $E_s = E_s^*$ be solution of problem then there exists a number $\lambda^*$with the following properties:

1. $\frac{\partial}{\partial L} = \frac{\partial}{\partial T_s} = \frac{\partial}{\partial E_s} = 0$ at (L^*, T_s^*, E_s^*).
2. $\lambda^* \geq 0$, $g(L^*, T_s^*, E_s^*) \leq 0$ and at least one of these two quantities is zero.

Data and Methods and Econometrics Methodology

Following the study's objectives and literature, this study considers macroeconomic labor supply determinants. To investigate the influence on the growth of labor supply (LFG: Growth rate of total Labor force) for a large number of countries for a worldwide sample of lower-income, middle-income, and high-income. The main determinants such as fiscal expenditure (EXP: Government Expense as a share of GDP) and tax (TAX: as a share of GDP). Whereas

The selection of the sample of countries and variables of the 123 countries is based on the availability of pooled data. Table 1 provides the descriptions of the variables and data information

Table 1: Description of Variables

Variable	Description	Source
LFG	Growth of Labor force	ILO estimate
TAX	Tax revenue (% of GDP)	World Bank (WDI)
EXP	Expense (% of GDP)	World Bank (WDI)
W	Wage and salaried workers, total (% of total employment	ILO estimate
POPg	Population, growth (annual %)	World Bank (WDI)
PCg	GDP per capita growth	World Bank (WDI)
INF	GDP deflator (base year varies by country)	World Bank (WDI)

Econometric Model and Data

The neoclassical model of labor supply is a fundamental concept in labor economics, focusing on how individuals decide the amount of labor to supply based on their preferences, constraints, and the trade-offs they face between labor and leisure. Here's an outline of the model:

$$LFG = f(W, P) \quad (31)$$

Drawing from the supply of labor model we also include wage rate and inflation in the model to make it more inclusive. Hence the new model is as follows:

$$LFG = f(W, P, Tax, Exp, POPG, PCG) \quad (32)$$

We have transformed data and variables into an econometrics model to avoid the issue of omitted variables bias.

$$LFG_{\ it} = \beta_1 + \beta_2 W_{\ it} + \beta_3 INF_{\ it} + \beta_4 Tax_{\ it} + \beta_5 Exp_{\ it} + \beta_6 POPg_{\ it} + \beta_7 PCg_{\ it} + u_t \quad (33)$$

whereas LFG is labor force growth, W is wage rate, INF is inflation rate, and Tax is tax revenue as a share of GDP. We have gauged (Exp) by using indices of Expenditures. POPg is the population growth rate, and PCg is the per capita growth of respective countries over times 2000 to 2022. The unbalanced data set of 123 countries is employed to investigate the labor force growth rate[5].

The selection of variables and data seems to be heterogeneous due to this we employ Quantile Regression which has been widely used for investigating the socio-economics analysis during the last decades. This method of regression is more updated due to its properties. This method is more appropriate against ordinary Least Square OLS regression because it can capture the traditional means-based regression. Second this method provides different quantile-wise coefficients and also provides quantile-wise mean-based. Due to such proprieties, it is used for outliers, more skewered, controls non-normal residual problems, and better treats the heterogeneity in the files of business, financial series, macroeconomics problems, trade, and development. The basic form of the quantile regression equation is:

$$Q(\tau) = \beta_0(\tau) + \beta_1(\tau)X_1 + \beta_2(\tau)X_2 + \ldots + \beta_p(\tau)X_p$$

where:

$Q(\tau)$ represents the conditional quantile of the dependent variable at the quantile level τ.

$\beta_0(\tau)$, $\beta_1(\tau)$, $\beta_2(\tau)$, ..., $\beta_p(\tau)$ are the coefficients of the quantile regression model specific to the quantile τ.

X_1, X_2, ..., X_p are the independent variables or predictors. p represents the number of predictors in the model. The coefficients $\beta_0(\tau)$, $\beta_1(\tau)$, $\beta_2(\tau)$, ..., $\beta_p(\tau)$ are estimated using various methods, such as least absolute deviation (LAD) estimation, iteratively reweighted least squares (IRLS), or direct optimization techniques. The goal is to find the coefficients that minimize the specified loss function associated with the quantile of interest. Quantile regression allows for the estimation of different quantiles of the conditional distribution, not just the mean. By estimating the coefficients for various quantiles, we can understand how the relationships between the predictors and the response variable change across different parts of the distribution. It's important to note that quantile regression does not assume a specific functional form for the relationship between the predictors and the quantiles of the dependent variable. Therefore, the coefficients obtained from quantile regression provide a flexible and comprehensive understanding of the conditional distribution of the response variable.

[5]*The list of the countries is reported in appendix A. The selection of the countries on the availability of the data. While some variables have missing observations due to this, we used the extrapolation method to extract the missing value panel quantile approach. Furthermore, the selections of the high-income and low-income countries are based on the WDI as suggested by the World Bank.*

Quantile regression is especially useful when dealing with unusual distribution characteristics datasets. In our study, we opted to employ Machado and Silva (2019) approach, also known as the Method of Moments Quantile Regression MMQR method of moments quantile regression due to the non-uniform distribution of our data. This novel method looks into the distributional and heterogeneous aspects of quantile values, as highlighted by Sarkodie and Strezov (2019). Quantile regression is used when we want to examine the relationship between variables at different points or quantiles of the conditional distribution of the dependent variable. Unlike ordinary least squares (OLS) regression, which focuses on the conditional mean, quantile regression allows us to analyze how different quantiles of the response variable are affected by the predictors. Here are some reasons why quantile regression is useful in outlier data, for heterogeneous effect.

Results and Discussion

The results of the correlation matrix are given in the table 2. The correlation between government expenditure EXP and labor supply LFD is 0.0194, indicating a statistically significant positive relationship. The correlation between population growth and GDP per capita growth has a positive and significant correlation with labor supply. The correlation coefficient is .005 and 0.014 respectively which is statistically significant at the 1 percent level. However, the correlations between inflation and tax rates are negative. The correlation coefficient is -0.03 and 0.025 respectively which is statistically significant at the 1 percent level. The overall results of the correlation show that all of the selected explanatory variables i.e. inflation INF, population growth POPG, Per capita income, taxes TAX, and wage rate (W) have a significant correlation with labor supply. At the same time, these explanatory variables do have not a high correlation with each other which generates the issue of multicollinearity among them. Thus, the selected model is best to use for further empirical analysis.

Table 2: Correlation Matrix Worldwide

Variables	LFG	EXP	INFG	POPG	PCG	TAX	W
LFG	1						
EXP	0.019439	1					
INF	-0.003783	-0.08512	1				
POPG	0.005910	-0.01980	0.00072	1			
PCG	0.014074	0.30546	-0.13487	-0.0147	1		
TAX	-0.025046	0.652631	-0.09080	-0.02251	0.30621	1	
W	0.038247	0.52422	-0.11168	-0.03721	0.59790	0.36211	1

The results indicate that all the variables are integrated into Level 1 reported in table 3. LF and POPG are stationary at level, however level of significance is 1%. These results predict we can explore the long-run equilibrium relationship among the variables. Since all the variables are stationary, it is essential to determine whether a cointegration relationship exists among them.

The outcomes of the cross-section panel unit root assessments are presented in Table 3. Notably, some of the variables exhibiting stationarity at level I(0), while others showing stationarity in their first differences I(1) indicate integration at either the level or the first order of integration. In our study, we opted to employ Machado and Silva (2019) approach, also known as the MMQR method of moments quantile regression due to the non-uniform distribution of our data.

Table 3: Results of Panel Unit Root

At levels					
	LLI	IPS	Fisher ADF	Fisher PP	Bruiting
LF	-24.14***	-59.408	2.202	468.46	7.114
EXP	2.25	-2.423*	-2.654**	12.34***	4.783
INF	0.345	-0.311	-2.432**	0.721	1.231
POPg	-6.13***	-7.496***	0.681	145.7***	22.89***
PCG	0.143	-0.101	-0.213	6.710	7.434
TAX	-0.245	-1.453	-1.214	12.74	13.17
W	-0.321	1.267	1.467	5.793	2.324
First difference					
LF	-85.29***	-77.01***	1063.9***	92.14***	12.22***
EXP	-68.44***	-64.70***	1011.5***	73.68***	81.565***
INF	-71.5***	-66.98***	1204.4***	92.10***	11.202***
POPg	-10.64***	-44.789***	993.0***	55.26***	15.90***
PCG	- 50.01***	-50.05***	1208.6***	73.68***	11.37***
TAX	-43.28***	-66.70***	1227.0***	92.14***	14.2***
W	-74.45***	-62.69***	795.81***	73.67***	07.37***

Note[6] the level of significance *, **,*** Statically significant at 10%, 5%, 1 level

The results of MMQR Quaintile regression are described in table 4. The reported results reveal that most variables are positively associated with the labor force. Specifically, a one-unit increase in government expenditure endorses the labor force by 0.033–0.035%, and these estimates are statistically significant at the 1% level. This shows that government expenditures directly contribute to the labor supply worldwide, during a recession, government expenditures or tax cuts can boost economic activity, leading to job creation and potentially increasing labor supply as more job opportunities become available. On the other hand, government designing welfare programs requires balancing the need to support low-income individuals while not excessively discouraging labor market participation. The magnitude of influence varies across quantiles, with the impact increasing from lower quantiles (Q 0.25) to upper quantiles. While the positive relationship in the lower quantiles suggests that government expenditure or non-wage income supports the labor demand and long-term economic growth, the significance of this effect increases in the upper quantiles (Altonji & Paxson, 1998). Similarly, it is important to note that population growth and per capita, which represent the growth and development level of countries, have significant and direct influence over labor supply worldwide. A one-unit increase in population and per capita results in a labor supply increase of 2.034–3.99 % at the 1% level of significance. These findings are consistent with earlier research (Fatas & Mihov, 2001; Burnside et al., 2004; Cavallo, 2005; Gali et al., 2007), highlighting the positive impact of POPg and PCg on LF (labor supply).

Another important variable is tax which is negatively linked with labor supply. An increase of 1 unit in tax leads to a labor force decrease of -0.023–0.045 units across all quantiles. The significance level is 1% across all quantiles (Q0.25 -Q0.95), with the magnitude and significance

[6]*LLC, Breitung, and IPS represent the panel unit root tests of Levin et al. (2002), Breitung (2000), Im Pesaran and Shin (2003), respectively. Fisher-ADF and Fisher-PP represent the Maddala and Wu (1999) Fisher-ADF and Fisher-PP panel unit root tests.*

levels increasing from lower to upper quantiles. These findings align with previous studies McDaniel (2011) and Rogerson (2008), demonstrating a negative relationship between the tax labor force. Further, INF inflation is found to have no clear-cut ideas about labor supply. The coefficient of inflation has a different effect on labor supply in all quantiles. When the Inflation rate is high, workers might offer more labor to maintain their standard of living. This could increase the labor supply. In the substitution effect, if inflation leads to higher nominal wages, some workers might choose to work fewer hours as they can maintain their living standards with less labor.

Table 4: Worldwide Perspective

Variables	Quantiles								
	10th	20th	30th	40th	50th	60th	70th	80th	90th
EXP	0.032***	0.0338***	0.035***	0.0333***	0.334***	0.029***	0.207***	0.032***	0.034***
	[3.420]	[5.345]	[8.334]	[8.101]	[7.999]	[7.485]	[6.246]	[4.863]	[5.25]
INF	-0.0062***	-0.087***	0.0232	0.0039	-0.0015	-0.0032	0.0092	0.0063*	-0.0038**
	[-13.685]	[14.721]	[0.092]	0.0282]	[-0.323]	[-0.532]	[0.502]	[-1.93]	[-4.192]
POP	2.5023	2.882	3.074	3.293	3.484	3.566	3.636	3.74E5	3.993
	[1.451]	[0.312]	[0.331]	[0.372]	[0.398]	[0.4598]	[0.4834]	[0.398]	[0.415]
PCG	3.043***	2.070 ***	1.70 ***	1.472 ***	1.257*	7.444***	4.452	9.496	-1.933*
	[5.234]	[7.231]	[7.932]	[5.302]	[7.712]	[2.698]	[1.52]	[0.973]	[-0.912]
TAX	-0.030***	-0.045***	-0.030***	-0.0232**	-0.015*	-0.016***	-0.011**	-0.031***	-0.053***
	[-4.327]	[-9.882]	[-3.899]	[-2.445]	[-1.953]	[-1.974]	[-2.113]	[-3.842]	[-6.923]
W	0.0235**	0.02***	0.021***	0.024***	0.027***	0.0227***	0.018***	0.0118***	0.003
	[4.435]	[5.196]	[9.298]	[9.912]	[12.29]	[12.55]	[8.354]	[3.812]	[0.796]

[ ] represents the t- t-statics values of the estimated coefficients
***, ** shows the level of significance at 1% and 5% respectively

The case of high-income countries is reported in Table 5. The results reveal that most variables are positively associated with the labor force. Specifically, a one-unit increase in government expenditure endorses the labor force by 0.44–0.97%, and these estimates are statistically significant at the 1% level. This shows that government expenditures directly contribute to the labor supply especially in high-income countries because these nations have better welfare programs and social welfare programs. The magnitude of influence varies across quantiles, with the impact increasing from lower quantiles (Q 0.95) to upper quantiles. While the positive relationship in the lower quantiles suggests that government expenditure or non-wage income supports labor demand and long-term economic growth, the significance of this effect increases in the upper quantiles.

The important to note that population growth has a significant negative influence over labor supply in high-income countries. A one-unit increase in population in a labor supply decrease of -2.034–4.99 % at the 1% level of significance. These findings are not consistent with earlier research (Fatas & Mihov, 2001; Burnside et al., 2004; Cavallo, 2005; Gali et al., 2007), highlighting the positive impact of POPg and PCg on LF (labor supply). The main reasons in most of the developed nations such as an aging population results in a smaller proportion of the population being of working age, which can lead to a shrinking labor force. This trend can constrain economic growth and increase the dependency ratio (the ratio of the non-working-age population to the working-age population). One more thing is that automation and technological advancements can impact labor supply by reducing the demand for certain types of jobs while increasing the demand for others.

All other variables behaviors as the above variables such as tax rate, wage, and per capita may increase the labor supply due to an increase in investment, technology growth, and development.

Table 5: High-income Countries

Variables	Quantiles								
	10th	20th	30th	40th	50th	60th	70th	80th	90th
EXP	0.4484*** [2.8367]	0.5910*** [4.445]	0.5269*** [6.414]	0.0599** * [4.331]	0.4853** * [5.229]	0.778*** [6.685]	0.967*** [5.246]	0.915*** [5.346]	0.234*** [4.63]
INF	0.0117*** [3.682]	0.008** [2.123]	0.0117*** [3.592]	0.0075 [0.764]	0.0051 [1.502]	0.004 [1.432]	0.001 [0.523]	-0.0073** [-1.96]	-0.0852** [-2.962]
POPG	-2.682*** [-12.45]	-2.863*** [-16.72]	-3.083*** [-16.61]	-3.355*** [-13.37]	-3.423*** [-15.398]	-3.551*** [-17.59]	-3.62E2 [-20.14]	-3.751*** [-23.39]	-4.082*** [-24.25]
PCG	1.442 *** [3.435]	1.273 *** [3.891]	1.422 *** [3.922]	1.33E *** [4.614]	1.092*** [4.012]	1.141*** [4.698]	6.141* [1.832]	5.142* [1.247]	-5.34E [0.912]
TAX	-0.0236** [-2.029]	-0.005*** [-2.002]	0.02027 [-3.899]	-0.0232** [-1.925]	0.0334*** [4.133]	0.0301*** [3.721]	0.031** [3.232]	0.0411*** [5.253]	0.035*** [3.963]
W	0.2402** [1.983]	0.6495*** [3.812]	0.4297*** [7.203]	0.153*** [10.912]	0.4842*** [12.04]	0.4034*** [12.55]	0.737*** [19.354]	0.8441*** [20.12]	0.057*** [11.796]

[ ] represents the t- t-statics values of the estimated coefficients
***, ** shows the level of significance at 1% and 5% respectively

When we regress the regression for low-income countries (See table 6) many low-income nations experience high fertility rates due to various factors such as limited access to family planning, cultural norms, and lower levels of female education. a significant portion of the population in low-income countries is young, creating a large base for future labor supply (ur Rehman et al, 2023). Rapid population growth increases the labor supply as more young people enter the working age. All variables have positive and significant impacts on labor supply because of poverty and the necessity for basic needs, a large informal sector of agricultural dominance, and labor market rigidities. Due to this the labor supply is highly inelastic or less responsive to changes in wage rate, inflation, and tax rate. The nut-shell, fiscal policy affects labor supply through multiple channels, including taxation, government spending, and long-term investments in human capital and infrastructure. In low-income countries, labor supply does not respond to a neoclassical theory of labor supply. According to classical theory, the supply of labor is positively related to wage rates. As wages increase, more individuals are willing to work (the substitution effect makes leisure more expensive), thus increasing the labor supply. The minimum wage can increase the supply of labor for low-wage workers in developing countries.

Table 6: Low-income Countries

Variables	Quantiles								
	10th	20th	30th	40th	50th	60th	70th	80th	90th
EXP	-0.022*** [-2.67]	-0.03*** [-2.685]	-0.031*** [-3.494]	-0.033*** [-4.401]	-0.029*** [-3.456]	-0.028** [-2.518]	-0.017** [-2.046]	-0.024*** [-4.436]	-0.0243* [-1.333]
INF	0.0682*** [.685]	0.087*** [14.721]	0.0232 [0.092]	0.0039 0.0282]	0.0015 [0.323]	0.0032 [0.532]	0.0092 [0.502]	0.0063* [-1.93]	-0.0038** [-4.192]
POPG	0.0133** [2.641]	2.132** [2.132]	2.093** [2.161]	2.902** [2.247]	1.652 [1.338]	1.338 [0.7598]	1.931 [0.494]	2.5323 [0.856]	2.8205** [1.715]
PCG	0.071 [0803]	0.062*** [6.771]	0.0432*** [4.809]	0.0393*** [4.402]	0.0337*** [4.332]	0.025*** [2.742]	0.0203** [2.25]	0.0102 [1.333]	0.0161 [0.412]
TAX	0.0843* [1.527]	0.0468* [1.852]	0.0303** [2.189]	0.0433*** [3.355]	0.041*** [3.651]	0.054*** [3.523]	0.0191* [3.543]	0.077*** [5.842]	0.069*** [7.323]
W	0.052** [1.7279]	0.037 ** [4.766]	0.026*** [4.282]	0.0242*** [4.431]	0.0261*** [4.894]	0.025*** [4.843]	0.02*** [4.354]	0.017** [1.812]	0.013 [0.722]

The results of Quantile regression show that labor supply has a positive association with population growth in low-income countries but not the same in high-income. As we see the per capita growth has a positive and significant impact on labor supply as suggested by the neoclassical theory.

Conclusion

According to the neoclassical theory, labor supply is dependent on the wage rate, income, and demography of the population. The neoclassical model of labor supply provides a framework for analyzing how individuals make decisions about work and leisure based on wages, preferences, and constraints. It highlights the balance between the utility derived from consumption and leisure, influenced by changes in wages and other economic variables. This work augmented this work with the role of fiscal variables. The fiscal policy plays a vital role in determining the labor supply theoretically (individual analysis). The utility functions are used to investigate the relationship between different types of taxes and the wage income of labor. The wage rate, income, and substitution effect are usually based on the degree of elasticity of labor supply; the imposition of the tax hurts labor work efforts. Public spending has a positive and significant impact on labor income through the provision of public goods and services. The increase in labor income enhances the demand for goods and services which further increases the investment through acceleration effect.

In summary, the neoclassical model of labor supply provides a framework for analyzing how individuals make decisions about work and leisure based on wages, preferences, and constraints. It highlights the balance between the utility derived from consumption and leisure, influenced by changes in wages and other economic variables. The empirical results of our study show that government expenditures directly contribute to the labor supply worldwide; during a recession, government expenditures or tax cuts can boost economic activity, leading to job creation and potentially increasing labor supply as more job opportunities become available. When we segregate the sample, population growth hurts the labor supply in high-income countries because of population control policies, aging problems, and high-income wage levels. But in the low-income most of the variables have a positive impact on labor supply because of poverty and the necessity for basic needs, a large informal sector of agricultural dominance, and labor market rigidities. For the policy recommendations, the government should understand and address the

interplay between population growth and labor supply, which is crucial for the future economic and social stability of high-income nations. Policies that promote a balanced demographic structure, support a dynamic labor market, and foster social integration are crucial to navigating these challenges. In low-income countries, the government should reinvestigate the dynamics that present opportunities and challenges for labor supply. By implementing targeted policies that focus on education, health, family planning, economic diversification, and social protection, these countries can better manage their labor supply and harness the potential of their growing populations for sustainable economic development.

References

- Aguiar, M., & Hurst, E. (2007). Measuring trends in leisure: The allocation of time over five decades. *The quarterly journal of economics*, *122*(3), 969-1006.
- Ahmad, K., & Chaudhary, A. R. (2016). The Effect of Trade Liberalization on Tax Structure of Pakistan. *South Asian Journal of Management*, *10*(2), 39-55.
- Ahmad, K., Ali, S., Haider, A., Shahid, M., & Naushahi, M. M. (2021). Fiscal Implications for Rural-Urban Income Inequality: The Case of Pakistan. *International Journal of Economics & Business Administration* (IJEBA), *9*(2), 246-259.
- Ali, S., Ahmad, K., Shahid, M., & Naushahi, M. M. (2021). Fiscal Implications for Rural-Urban Poverty of Pakistan. *The journal of contemporary issues in business and government*, *27*(6), 389-402.
- Ali, A. & Naeem, M.Z. (2017). Trade Liberalization and Fiscal Management of Pakistan: A Brief Overview. *Policy Brief-Department of Economics, PU, Lahore*. 2017 (1), 1-6.
- Altonji, J. G., & Paxson, C. H. (1988). Labor supply preferences, Hours constraints, and hours-wage trade-offs. *Journal of labor economics*, *6*(2), 254-276.
- Audi, M., & Ali, A. (2023). Public Policy and Economic Misery Nexus: A Comparative Analysis of Developed and Developing World. *International Journal of Economics and Financial Issues*, *13*(3), 56.
- Benjamin, D., Cooper, K., Heffetz, O., and Kimball, M. (2020), Self-reported wellbeing indicators are a valuable complement to traditional economic indicators but aren't yet ready to compete with them, *Behavioural Public Policy 4* (Special Issue 2), 198–209.
- Bick, A., Brüggemann, B., & Fuchs-Schündeln, N. (2019). Hours worked in Europe and the United States: new data, new answers. *The Scandinavian Journal of Economics*, *121*(4), 1381-1416.
- Bick, A., Fuchs-Schündeln, N., & Lagakos, D. (2018). How do hours worked vary with income? Cross-country evidence and implications. *American Economic Review*, *108*(1), 170-199.
- Bingley, P. and I. Walker (2001). Housing Subsidies and Work Incentives in Great Britain, *Economic Journal*, *111*(471), C86-103.
- Blanchard, O., (2004). The Economic Future of Europe. *Journal of Economic Perspectives, 18,* 3-26.
- Blundell, R. (2001), Welfare reform for low income workers, *Oxford Economic Papers, 53,* 190-214.
- Blundell, R., A. Bozio, and G. Laroque (2011). *Extensive and intensive margins of labour supply: Working hours in the US, UK and France.* Working Paper 01/11, Institute forFiscal Studies.
- Burnside, A. C., & Dollar, D. (2004). Aid, policies, and growth: revisiting the evidence. *Policies, and Growth: Revisiting the Evidence (March 18, 2004)*.
- Callan, T. and A. van Soest (1996). *Family labour supply and taxes in Ireland.* ESRI Working Paper No. 78.
- Cavallo, A., Dallari, P., Ribba, A., Cavallo, A., Dallari, P., & Ribba, A. (2018). The Labor Market Outcomes of Austerity. Evidence for Europe. *Fiscal Policies in High Debt Euro-Area Countries*, 153-176.
- Cizakca, M. (2024). Understanding the Determinants of Foreign Trade Volume in Turkiye: An Empirical Analysis. *Journal of Business and Economic Options*, *7*(1), 19-28.

- Creedy, J., G. Kalb and R. Scutella (2006). Income distribution in discrete hours behavioural microsimulation models: An illustration, *Journal of Economic Inequality*, *4*, 57-76.
- Decancq, K., Fleurbaey, M., and Schokkaert, E. (2015). Happiness, equivalent incomes, and respect for individual preferences, *Economica, 82,* 1082–1106.
- Dickens, W. and S. Lundberg (1993). Hours restrictions and labor supply, *International Economic Review*, *34*, 169-192.
- Dolan, P. and Kahneman, D. (2008). Interpretations of utility and their implications for the valuation of health, *Economic Journal, 118,* 215–234.
- Ek, A. (2021). Cross-country differences in preferences for leisure. *Labour Economics*, *72*, 102054.
- Euwals, R. and A. van Soest (1999). Desired and actual labour supply of unmarried men and women in the Netherlands, *Labour Economics*, *6,* 95-118.
- Fatás, A., & Mihov, I. (2001). Government size and automatic stabilizers: international and intranational evidence. *Journal of International Economics*, 55(1), 3-28.
- Fetene, M., & Kedir, A. (2024). Irrigation Interventions and Food Security in The Case of Ethiopia's East Hararghe Lowlands. *Journal of Business and Economic Options*, *7*(1), 39-47.
- Galí, J., (1994). Government Size and Macroeconomic Stability. *European Economic Review, 38*(1), 117–132.
- Glaeser, E. L., Gottlieb, J. D., and Ziv, O. (2016). Unhappy cities, *Journal of Labor Economics*, *34* (S2), S129–S182.
- Haan, P. (2006). Much ado about nothing: Conditional logit vs. random coefficient models for estimating labour supply elasticities, *Applied Economics Letters*, *13*(4), 251-256.
- Ilmakunnas, S. and S. Pudney (1990). A model of female labour supply in the presence of hours restrictions, *Journal of Public Economics*, *41*, 183-210.
- Kahn, S., & Lang, K. (1996). Hours constraints and the wage/hours locus. *The Canadian Journal of Economics/Revue canadienne d'Economique*, *29*, S71-S75.
- Karim, A., & Said, F. (2024). Discussion on Malaysia's Globalization Journey From Resource-Based Economy to Global Player. *Journal of Business and Economic Options*, *7*(1), 29-38.
- Keane, M. and R. Moffitt (1998). A structural model of multiple welfare program participation and labor supply. *International Economic Review, 39*, 553-589.
- Keane, M. P. (2011). Labor supply and taxes: A survey. *Journal of Economic Literature*, *49*(4), 961-1075.
- Keane, M., & Moffitt, R. (1998). A structural model of multiple welfare program participation and labor supply. *International economic review*, 553-589.
- Killingsworth, M. and J. Heckman (1986). Female labor supply: A survey. In Handbookof Labor Economics, Vol. 1 (O. Ashenfelter and R. Layard, eds.), 103–204, North-Holland,Amsterdam.
- Machado, J. A., & Silva, J. S. (2019). Quantiles via moments. *Journal of Econometrics*, *213*(1), 145-173.
- Manski, C. F. (2014). Identification of income–leisure preferences and evaluation of income tax policy. *Quantitative Economics*, *5*(1), 145-174.
- Mapira, D., Gerald, G., & Enerst, M. C. (2017). Factors Affecting Labour and Leisure Time Decision: Evidence from Small and Medium Enterprises in Masvingo Urban. *Journal of Business and Financial Affairs*, *6*(253), 2167-0234.
- McDaniel, C. (2011). Forces shaping hours worked in the OECD, 1960–2004. *American Economic Journal: Macroeconomics*, 3(4), 27-52.
- Meghir, C. and D. Phillips (2010*). Labour supply and taxes. In Dimensions of TaxDesign: The Mirrlees Review* (T. Besley, R. Blundell, M. Gammie, and J. Poterba, eds.),202–274, Oxford University Press, Oxford.
- Moffitt, R. (1984). Estimation of a joint wage-hours labor supply model, *Journal of Labor Economics*, 2, 550-556.

- Munir, Q., Akram, B., & Abbas, S. A. (2024). Understanding Stock Price Dynamics with Dividend-Related Metrics and Financial Indicators in Pakistan's Non-Financial Sectors. *Journal of Business and Economic Options*, *7*(1), 1-9.
- Oswald, A. and Wu, S. (2010). Objective confirmation of subjective measures of human well-being: evidence from the USA, *Science* 327, 576–579.
- Pencavel, J. (1986). Labor supply of men: A survey. In Handbook of Labor Economics, Vol. 1 (O. Ashenfelter and R. Layard, eds.), 3–102, North-Holland, Amsterdam.
- Prescott, E. C. (2004). Why do Americans work so much more than Europeans?
- Rayo, L., & Becker, G. S. (2007). Evolutionary efficiency and happiness. *Journal of Political Economy* 115, 302–337.
- Rogerson, R. (2006). Understanding differences in hours worked. *Review of Economic dynamics*, *9*(3), 365-409.
- Rogerson, R. (2008). Structural transformation and the deterioration of European labor market outcomes. *Journal of political Economy*, *116*(2), 235-259.
- Rottenberg, S. (1995). Regulation of the hours of work and its Externalities defenses. *Journal of Labor Research*, *16*(1), 97-104.
- Saez, E., Slemrod, J., & Giertz, S. H. (2012). The elasticity of taxable income with respect to marginal tax rates: A critical review. *Journal of economic literature*, *50*(1), 3-50.
- Sarkodie, S. A., & Strezov, V. (2019). Effect of foreign direct investments, economic development and energy consumption on greenhouse gas emissions in developing countries. *Science of the total environment*, *646*, 862-871.
- Spurgeon, A., Harrington, J. M., & Cooper, C. L. (1997). Health and safety problems associated with long working hours: a review of the current position. *Occupational and environmental medicine*, *54*(6), 367-375.
- Tummers, M. and I. Woittiez (1991). A simultaneous wage and labor supply model with hours restrictions. *Journal of Human Resources*, *26*(3), 393-423.
- ur Rehman, J., Ahmad, K., & Saeed, J. (2023). Income Inequality and Public Health Status: The Role of Government Expenditures of Pakistan. *Journal of Asian Development Studies*, *12*(3), 624-640.
- Van Soest, A. (1995). Discrete choice models of family labor supply. *Journal of Human Resources*, *30*, 63-88.
- Van Soest, A., I. Woittiez and A. Kapteyn (1990). Labour supply, income taxes and hours restrictions in the Netherlands. *Journal of Human Resources*, *25*, 517-558.
- Xiong, L. (2024). Driving Growth for SMEs in Laos' Commercial Sector Challenges and Opportunities. *Journal of Business and Economic Options*, *7*(1), 10-18.

Appendix: List of Countries

No	Name of Country	No	Name of Country	No	Name of Country
1	Afghanistan	42	France	83	Nepal
2	Albania	43	Georgia	84	Netherlands
3	Angola	44	Germany	85	New Zealand
4	Argentina	45	Ghana	86	Nicaragua
5	Armenia	46	Greece	87	North Macedonia
6	Australia	47	Guatemala	88	Norway
7	Austria	48	Honduras	89	Pakistan
8	Azerbaijan	49	Hungary	90	Panama
9	Bahamas	50	Iceland	91	Papua New Guinea
10	Bahrain	51	India	92	Paraguay
11	Bangladesh	52	Indonesia	93	Peru
12	Barbados	53	Iran, Islamic Rep.	94	Philippines
13	Belarus	54	Ireland	95	Poland
14	Belgium	55	Israel	96	Portugal
15	Belize	56	Italy	97	Romania
16	Bhutan	57	Jamaica	98	Russian Federation
17	Bosnia and Herzegovina	58	Japan	99	Rwanda
18	Botswana	59	Jordan	100	Samoa
19	Brazil	60	Kazakhstan	101	Serbia
20	Bulgaria	61	Kenya	102	Singapore
21	Burkina Faso	62	Korea, Rep.	103	Slovak Republic
22	Cabo Verde	63	Kyrgyz Republic	104	Slovenia
23	Cambodia	64	Latvia	105	Solomon Islands
24	Canada	65	Lebanon	106	South Africa
25	Central African Republic	66	Lesotho	107	Sri Lanka
26	Chile	67	Lithuania	108	St. Lucia
27	China	68	Luxembourg	109	St. Vincent
28	Colombia	69	Macao SAR, China	110	Sweden
29	Congo, Dem. Rep.	70	Madagascar	111	Switzerland
30	Costa Rica	71	Malawi	112	Tobago
31	Croatia	72	Malaysia	113	Tunisia
32	Cyprus	73	Maldives	114	Turkiye
33	Czechia	74	Mali	115	Uganda
34	Denmark	75	Malta	116	Ukraine
35	Dominican Republic	76	Mauritius	117	United Kingdom
36	Egypt, Arab Rep.	77	Mexico	118	United States
37	El Salvador	78	Moldova	119	Uruguay
38	Equatorial Guinea	79	Mongolia	120	Uzbekistan
39	Estonia	80	Morocco	121	West Bank and Gaza
40	Ethiopia	81	Myanmar	122	Zambia
41	Finland	82	Namibia	123	Zimbabwe