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ICTs that offer various goods and services to be used specially during the leisure time create two types of favourable 'leisure externality' - on direct utility and income through the formation of knowledge and social capital required for productivity improvement. The paper builds a two-sector static model with consumption and leisure goods choice to capture such leisure externalities endogenously. Raising marginal benefits of leisure, one externality increases the demand for labour to meet additional production for ICT (leisure) and consumption goods. This apart, the other externality raises productivity through knowledge formation, which could limit the labour demand. In effect, both income and utility tend to rise in presence both externalities, but it does not necessarily reduce the gap between them (known as Eastelin paradox), which depends upon their relative strengths.

JEL Code: I31, J22, O41
Key Words: ICT, Leisure Externality, Two-sector model, Income-utility gap

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1. Introduction

Individual derives utility from leisure time along with consumption, which could further be magnified by the externality arising out the use of specific goods and services during this time. If an individual spends time with a set of specific goods and services, offered by ICT sector, to be used during the leisure time (defined as 'leisure goods' here), it creates two types of 'leisure externality'. One externality offers greater satisfaction from same leisure and another raises skills and motivation due to formation of knowledge and social capital required for productivity improvement. So, the total utility derived by the consumer should not only be originated from regular consumption and time spent for leisure but also thrive from the spending on such goods and services. They together influence both utility and income of an individual separately that has implication on the gap between them (known as Estelin paradox). Therefore, the pertinent question is to be asked whether a rise of the usage of leisure goods and services with the ICT boom could limit this income-utility gap.

Over the past decades, all sorts of human activities around the world as an individual or group has become increasingly influenced by the ongoing innovations of information and communication technologies (ICTs). One cannot imagine a life without having computer, cellular phone with fast internet connections and various applications therein that are used for entertainment, communication and knowledge improvement. Both individual and social lives have been undergoing fundamental transformations due to the exposure on such ICT usages and innovations (Bilbao-Osorio et al., 2012). Specifically, the leisure goods, offered by ICTs, has been changing individual consumption habits, leisure time use, learning style, formation of knowledge and social capital in such a way that the individual, by spending more on leisure goods and services, derives more satisfaction and improves skills and motivation required in the workplace. These forces together must impact the distribution of the labour-leisure choices, which becomes detrimental to explain the income-utility gap. This paper attempts to theoretically investigate this issue using a standard two-sector model with leisure externality.

Both leisure and its externality have become integral part of consumer preference in the standard growth literature. Initially, Lucas Jr. (1988) adopted leisure in two sector growth model, along with consumption, to demonstrate the balance growth path. Gomez (2008) extended it further by including leisure externality in the utility function with homothetic preference. Even if, the leisure is introduced non-homothetically and separated from consumption, the balanced growth path can still be achieved. Further, such growth is shown to be influenced by the leisure externality - keeping up with the Joneses effect and and running away from the Joneses effect (Benhabib and Perli, 1994; Ladrón-de-Guevara et al., 1999; Azariadis et al., 2013). However, these models, by and large, assumed leisure externality as exgeneous entity. If the expenditure share of leisure goods and services crates externality it can be endogenously solved through its demand and supply. Second, the inclusion of leisure goods and services in the utility function homothetically obviously changes the optimum choice of consumption-leisure mix. The resultant implication of such changes on income and utility simultaneously would enable us to investigate the effect of ICT innovation on the well-known Easterlin Paradox - the rising gap between income-utility with the growth. It is well-established in the literature that wellbeing has not been improved proportionately as income rises (Clark et al., 2008). But, ICT innovation could change the dynamics. This is different from other types of technology. The innovations of ICTs directly improves the work ability/motivation required for productivity improvement. At the same time, it offers leisure goods and services, which could enable an individual to raise quality of leisure along with

knowledge formation and communications.

Though the ICT innovations have also brought new challenges and risks to the individual life in terms of work-life balances, privacy, security, cybercrime, digital divide (running away from Joneses effect), its favourble effects cannot be undermined. We only consider positive effects (keeping up with the Joneses effect) to see whether such favourable effect has any implication on the explanation of paradox. After the industrial revolution started in the fifteen centuries, the human history experienced favourable boosts from various technological innovations in the episodes of human progress, the probable impacts of the ICT have been the widest, largest and have been different from all those were seen the past in terms of their depth and spread. Of course, ICT increases productivity and efficiency of production units and workers through saving time, information spillover, network effects and artificial intelligence etc. Crafts (2003) argued that the impact of ICT on labour productivity has been greater than that of steam engine came in the 19th century. The maximal impact of steam engine on labour productivity was 0.41% per year during 1850-70, whereas the estimated effect of ICT on US labour productivity growth over 1974-90 was 0.68% per year. Secondly, ICT offers goods and services to be used during the leisure time (that helps to raise knowledge and social capital formations through easy communications, getting online training, recreation, entertainment, updating epistemology and knowledge etc.). Through these ICT goods and services, an individual not only raises quality of leisure but also improves skills and motivation. Therefore, the question is what happens to the overall wellbeing of a country and the paradox in the presence of these factors. Literature is extremely limited. No work till date tries to address these issues. An alternative version of a two-sector model has been presented to capture ‘leisure externality’ endogenously that has implication on the dynamics of income and utility.

2. The Static Model

This section builds a two-sector static model with homogenous individual to demonstrate the implication of liesure externality on income and utility with a representative consumer. There is no capital motion and depreciation to keep it static model.

2.1 Household

The representative agent is endowed with one unit of time; L units of it are allocated to work and earn wage, w. The remaining 1-L units of time is spent for leisure, which gives utility directly to the consumer. With the income earned from the labour, the consumer allocates to purchase two types of goods - consumption goods and leisure (or ICT) goods. The consumption goods represent those that are consumed to sustain daily life, i.e., food items, cloths, durable assets (household assets) etc. On the other hand, the goods and services consumed (for example, listening music and news, communicating people in far distance, online training, gathering information and recreation) only during the leisure time are termed as leisure goods and services. We assume that ICT is the key source to get these services through its application. Of course, there could be other types of goods and services, which may not be related to ICT applications. For simplicity, we ignore them here. In addition to the leisure, these two goods enter into the utility function separately. When these two are combined, the externality is created. Moreover, the entire income will be spent between consumption and leisure goods in such a way, the utility will be maximised. If C and D capture the actual expenditure on consumption and leisure goods and services respectively, an agent's utility function is represented as follows:

$$U = C^{\theta}\left(D\, e^{(1-L)}\right)^{(1-\theta)};\ 0 \le \theta \le 1 \qquad (1)$$

θ represents expenditure share on consumption goods and the remaining 1-θ is spent for leisure goods and services. If the satisfaction from leisure comes jointly with the utility from leisure time, then it creates an externality. In other words, the marginal utility from leisure time keeps rising with the spending on D.

If θ=1, then the utility coming for leisure time would also be 1, which is minimum. If θ=0, then the utility coming for leisure time would also be $e^{(1-L)}$. It can maximum be 2.72 when the entire time is spent on leisure. Taking logarithmic transformation, we get

$$InU=\theta \log C+(1-\theta) \log D+(1-\theta)(1-L) \qquad (2)$$

This clearly demonstrates that lower the value of θ, the higher would be utility from leisure.

If the agent earns wage, w, from her labour, L, the total income would be W = wL. This income is entirely spent on between C and D. Then, the agent will choose, C, D and L in such a way it gives maximum utility.

2.2 Production

Two types of goods are produced respectively in two sectors to cater the needs of consumer. A core sector produces consumption goods and ICT sector produces both leisure goods for consumer and capital goods (i.e., technology) to be used in the core production sector. Consumption goods is produced with the use of labour only. The core production function is represented as follows:

$$Y = (AL)^{1-\alpha};\ 0 \le \alpha \le 1,\ A>0 \qquad (3)$$

A represents the level of technology of the production function. Labour is the only factor of production as we do not consider capital in this case.

There is another production sector in the economy, defined ICT sector. Although in reality private firms participate in ICT sector, we assume, for simplicity, that government finances ICT sector. It is evident that each nation owns a core ICT sector or a large share of this is subsidized and financed by the government. If B represents initial ICT capital, the production function of ICT can be expressed as follows:

$$Z=B(G)^{\phi};\ B \ge 0,1;\ \phi>0 \qquad (4)$$

A part (say, q) of Z goes to the core production, Y, and is thereby raising the productivity. The rest goes to the consumer to be used as leisure goods. This simplified assumption is made to capture that the ICT sector produces goods and services to be used for both in production and directly consumed as leisure goods.

$$A=qZ \text{ and } D=(1-q)Z, \text{ where } 0 \le q \le 1$$

2.3 Government

This apart, we assume that only consumption goods are taxed. Because, many governments does not impose much tax in the recent years to promote ‘disitalization’. Government taxes a fraction, t (0<t<1), of income and the consumption is the net disposable income, C=(1-t)Y and T=tY. Government spends the entire tax revenue to produce ICT good and services. After substituting tax revenue, the sector produces.

$$Z=B(tY)^{\phi} = Bt^{\phi}(AL)^{\phi(1-\alpha)} \qquad (5)$$

Further, substituting A into the core production function, we get

$$Y=(qBt^{\phi})^{\frac{1-\alpha}{1-\phi(1-\alpha)}}(L)^{\frac{1-\alpha}{1-\phi(1-\alpha)}} \quad (6)$$

Further substituting, this Y on Z, we get

$$Z=B(tY)^{\phi} = \left(Bt^{\phi} q^{\phi(1-\alpha)}\right)^{\frac{1}{1-\phi(1-\alpha)}} (L)^{\frac{\phi(1-\alpha)}{1-\phi(1-\alpha)}} \quad (7)$$

Note that B represents initial level of technology (B_0) in the ICT sector. Now, B can be endogenously influenced by the skill and motivation acquired during the leisure time (defined by productive externality of leisure goods and services). The later case offers an alternative framework of endogenous growth model without considering any R&D and competition that are used in the standard model. We shall deal with these two cases separately and compare them with the case of no externality.

Case 0: No Leisure externality

If individual spends on two types of goods and services (consumption and ICT goods) without any externality, the utility function could be expressed as: $U = C^{\theta} D^{(1-\theta)} e^{(1-L)}$; $0 \le \theta \le 1$. ICT goods and services are treated as alternative sources of utility without taxes. Lagrangian function for utility maximisation can be represented as follows:

$F=\theta \log C+(1-\theta) \log D+(1-L) +\lambda[(1-t)Y-C]+\mu[(1-q)Z-D]$

Taking derivatives with respect to C, D and L and solving them, we get

$$L_0^*=\frac{(1-\alpha)(\theta+\phi(1-\theta))}{(1-\theta(1-\alpha))} \quad (8)$$

Note that $\frac{\partial L_0^*}{\partial \theta}=1-\alpha\phi>0$. If the expenditure share on consumption goods marginally rises, the individual needs to work more in order to pay taxes and this further encourage production of ICT goods. They together push up labour hour. In case, the share declines, the individual saves tax and this may encourage leisure.

Substituting L_0^* into C, D and U functions, we get

$$C_0=(1-t)(qBt^{\phi})^{\frac{1-\alpha}{1-\phi(1-\alpha)}}(L_0^*)^{\frac{1-\alpha}{1-\phi(1-\alpha)}} \quad (9a)$$

$$D_0=(1-q)\left(Bt^{\phi} q^{\phi(1-\alpha)}\right)^{\frac{1}{1-\phi(1-\alpha)}} (L_0^*)^{\frac{\phi(1-\alpha)}{1-\phi(1-\alpha)}} \quad (9b)$$

$$U_0= C_0^{*\theta} D_0^{*(1-\theta)} e^{(1-L_0^*)} \quad (9c)$$

The above expressions show that C_0, D_0 and U_o are monotonically related to L_0^*.

Case 1: Leisure externality on utility

When the individual spends a share for ICT goods and services to be used during the leisure time, there is a rise of utility at the same level of leisure. In other words, the marginal benefits from leisure will be higher in the presence of leisure goods and services. But, this raises to work more to buy both consumption and leisure goods. In equilibrium, the labour would be different from the earlier one. This determines further the resultant consumption and income. Lagrangian function for utility maximisation can be represented as follows:

$$F=\theta \log C+(1-\theta) \log D+(1-\theta)(1-L) +\lambda[(1-t)Y-C]+\mu[(1-q)Z-D]$$

Taking derivatives with respect to C, D and L and solving them, we get

$$L_1^*=\frac{(1-\alpha)(\theta+\phi(1-\theta))}{(1-\theta)(1-\theta(1-\alpha))} \quad (10)$$

Lemma 1: If $\frac{1}{(1-\alpha)} > \theta^2 - \phi(1-\theta)^2$, *then* $\frac{\partial L_1^*}{\partial \theta} > 0$

Proof: Taking derivative of $L_1^*$with respect to θ, we get

$$\frac{\partial L_1^*}{\partial \theta} = \frac{(1-\alpha)(1-(1-\alpha)\phi^2+(1-\alpha)(1-\theta)^2\phi)}{(1-\theta)^2(1-(1-\alpha)\theta)^2}$$

Since $\frac{1}{(1-\alpha)} > \Theta^2 - \phi\ (1-\Theta)^2$, we get $\frac{\partial L_1^*}{\partial \Theta} > 0$. Left-hand side will be always greater than one for α<1. And. the right-hand side is always less than one for ϕ<1 and θ<1. This suggests that higher is the spending share on consumption goods, lower would be the leisure. QED.

Substituting L_1^*, we get

$$C_1=(1\text{-}t)(qBt^{\phi})^{\frac{1-\alpha}{1-\phi(1-\alpha)}}(L_1^*)^{\frac{1-\alpha}{1-\phi(1-\alpha)}} \quad (11a)$$

$$D_1=(1\text{-}q)\left(Bt^{\phi}q^{\phi(1-\alpha)}\right)^{\frac{1}{1-\phi(1-\alpha)}}(L_1^*)^{\frac{\phi(1-\alpha)}{1-\phi(1-\alpha)}} \quad (11b)$$

$$U_1=(C_1)^{\theta}\left(D_1 e^{(1-L_1)}\right)^{(1-\theta)} \quad (11c)$$

Lemma 2: C_1, D_1 and $U_1$are monotonically related to $L_1^*$and depend on t.

Proof: see above expression in (11).

Case II: Leisure Externality on both utility and production

More the use of leisure goods and services, higher would be the formation knowledge and social capital. Unlike the previous case, we are no longer assuming B as exogenously given. In addition to this, we assume that B=$B_0e^{(1-\theta)(1-L)}$. If $B_0 = 1$ and 0<θ<1, then 1<B<2.72 for 1>L>0.

Substituting B into Y and Z, we get

$$Y=(qBt^{\phi}L)^{\frac{1-\alpha}{1-\phi(1-\alpha)}}=(qBt^{\phi})^{\frac{1-\alpha}{1-\phi(1-\alpha)}}(L)^{\frac{1-\alpha}{1-\phi(1-\alpha)}}$$

$$Z=B(tY)^{\phi} = \left(Bt^{\phi}q^{\phi(1-\alpha)}\right)^{\frac{1}{1-\phi(1-\alpha)}}(L)^{\frac{\phi(1-\alpha)}{1-\phi(1-\alpha)}}$$

Taking derivate of Lagrangian function with respect to C, D and L and solving them, we get

$$L_2^* = \frac{(1-\alpha)(\theta+(1-\theta)\phi)}{(1-\theta)((1-\phi(1-\alpha))+\theta(1-\alpha)+(1-\theta))} \quad (12)$$

and $\frac{\partial L_2^*}{\partial \Theta} = \frac{(1-\alpha)\left(2-\alpha\Theta^2-\phi+\alpha(2+(-2+\Theta)\Theta)\phi\right)}{(-1+\Theta)^2(-2+\alpha(\Theta-\phi)+\phi)^2}$

Lemma 3: $\frac{\partial L_2^*}{\partial \Theta} > 0$ if $\frac{2-\phi}{\alpha} > \theta^2(1-\phi)-2\phi(1-\theta)$.

Proof: Left-hand side will be always greater than one for α<1, i.e., $\frac{2-\Theta}{\alpha} > 1$. And, the right-hand side is always less than one for ϕ<1 and θ<1. Therefore, we get $\frac{\partial L_1^*}{\partial \Theta} > 0$. This suggests that higher is the spending share on consumption goods, lower would be the leisure. QED.

Once, we found L_2^*, it is easy to derive other variables by simply substituting it:

$$D_2=(1\text{-}q)\left(t^{\phi}q^{\phi(1-\alpha)}e^{(1-\theta)(1-L_2^*)}\right)^{\frac{1}{1-\phi(1-\alpha)}}(L_2^*)^{\frac{\phi(1-\alpha)}{1-\phi(1-\alpha)}} \quad (13a)$$

$$C_2 = (1-t)(qt^{\phi}e^{(1-\theta)(1-L_2^*)})^{\frac{1-\alpha}{1-\phi(1-\alpha)}}(L_2^*)^{\frac{1-\alpha}{1-\phi(1-\alpha)}} \quad (13b)$$

$$U_2 = (C_2)^{\Theta}\left(D_2 e^{(1-L_2)}\right)^{1-\Theta} \quad (13c)$$

Comparing (8) and (10), and further (10) and (12), we can draw the following proposition.

Proposition 1: (i) If $\phi(1-\alpha) < 1$, then $L_0^* < L_1^*$, $L_1^* > L_2^*$; (ii) If $1+\alpha\Theta^2 < (1-\alpha)\phi+\Theta(1-\phi+\alpha(2+\phi))$, then $L_0^* > L_2^*$

This suggests that labour works more in the presence of the externality only on utility in comparison to the cases of no externality and both externalities on utility and production. In the presence of externality only on utility, the marginal benefit from leisure goes up with the use of more leisure goods. The produc-

tion of higher leisure goods requires more tax, which comes from higher amount of consumption good production. This production requires more labour hour to supply consumption goods. However, the labour hour in the presence of the second externality of leisure goods use saves some labour by raising the skills and productivity.

When, we compare them between the absence and the presence of both externalities, there is an ambiguity of labour hour. If the productivity of ICT is sufficiently high to compensate the labour demand to meet the increased ICT and consumption goods production, then labour demand in the former case could still be higher. QED.

Comparing (9), (11) and (13, we can derive the following results.

Proposition 2:(i) $C_0 < C_1$ and $C_1 > C_2$ when $\left(\frac{L_1^*}{L_2^*}\right) > e^{(1-\theta)(1-L_2^*)}$ (ii) $D_0 < D_1$ and $D_1 > D_2$ when $\left(\frac{L_1^*}{L_2^*}\right) > e^{\frac{(1-\theta)(1-L_2^*)}{\phi(1-\alpha)}}$.

Since $L_0^* < L_1^*$, we can argue that $C_0 < C_1$ and $D_0 < D_1$. This suggests that the individual purchases more of both consumption and ICT goods in case of one externality on utility in comparison to the case of no externality.

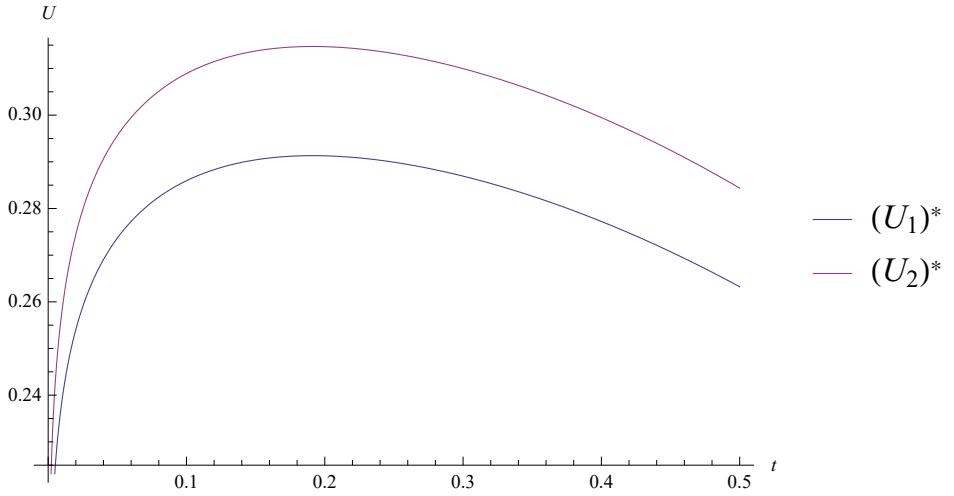
On the other hand, the consumption of both goods could be conditionally higher in case of only externality on utility in comparison of the presence of both externalities. In the presence of direct externality on utility, the demand for labour rises due to the increased marginal benefits from leisure goods. Then, workers need to work more in order to produce them. This additional demand for labours could be limited in the presence of other externality on production, if the productivity is sufficiently high to compensate the additional labour demand needed to increase the production of both goods. So, if the productivity rise is not sufficient enough to compensate the demand for additional labour, both consumption goods and ICT goods usage will be lower in spite of the existence of both externality.

This allows us to compare income and utility using numerical examples.

3. Optimum taxation and equilibrium

Note that both the expenditures on consumption and leisure goods are influenced by the tax rate directly and indirectly (see 9 and 11). Therefore, the government must optimize the tax rate in order to provide the best utility envelope to the consumer. Using specific values of the parameter (see the footnote of figure 1), utility plots of both cases show that they show the concavity to the rate rates.

Figure 1: Tax and utility



Note: α=0.3; ϕ=0.1; θ=0.4; B=1; q=0.80;

Since C and D depends on t, a rational government would like to impose the tax which maximises the utility of the representative consumer. Taking derivatives of U_0, $U_1$and U_2 with respect to t, we get

$$t_0^* = t_1^* = t_2^* = t^* = \frac{\phi\ (1 - \alpha\,\theta)}{\theta + \phi\ (1 - \theta)} \qquad (14)$$

Lemma 4: Optimum tax is inversely related to θ and independent of leisure externalities.

Proof: The expression (14) derived from maximisation of U_0, $U_1$and U_2 with respect to t shows that $t^* = \frac{\phi\,(1-\alpha\,\theta)}{\theta+\phi\,(1-\theta)}$. QED

Substituting (14) into (9), (11) and (13), we get the equilibrium values of C, D and U respectively in the three cases. Income (or GDP) of the individual can be found simply by adding C and D. This allows us to derive the gap between GDP and U in absolute term. Note that both GDP and U rise due to the higher C and D in case 1, compare to case 0 and 2. But, U declines with the higher value of L. It is difficult to conclusively remark on the gaps between them, specifically when the utility expressions are different.

On the other hand, if C, D and GDP are lower in the case of both externalities (case 2) in comparison to case 1 under some conditions, utility could be still higher due to higher leisure (1-L), even though the income is lower. The lower GDP with higher utility in the presence of both externalities seems to reduce the gap between them in the presence of both externality in comparison to that of case 1 (with the externality only on utility).

Proposition 2: The gap between utility and income would be lower in case of two externality (both utility and production) of leisure in comparison to the presence of one externality (only on utility) and would be ambiguous in comparison to no externality.

Table 1 presents calibrated values of the utility-income gap (in absolute logarithmic terms) under various parametric conditions, by changing output elasticity of labour (1-α), expenditure share on consumption goods (θ) and leisure good production share of ICT goods (q). It is evident that C, D and L are all lower in case 0 in comparison to case 1. Hence, both GDP and U as well as gap between them are found

to be lower. On the other hand, when we compare cases 1 and 2, the C, D, L and GDP are found to be lower in case 2 (both externalities). With higher leisure (1-L) and lower C and D in case 2, the utility (U) appears to be higher than that of case 1 in all parametric conditions. The higher utility with lower GDP leads to a lower gap in the presence of both externalities. But, when we see the gap with respect to case 0 (no externality), this is still higher in all conditions. This leaves us to conclude that the leisure externality created by ICT innovations does not necessarily weaken the Easterlin Paradox even we consider the favourable effect of ICTs (keep up with Jones effect) through leisure externality.

Table 1 : Comparative Statistics of characteristics parameters

Variables	$\alpha = 0.7$ $\varphi = 0.1$ $\theta = 0.6$ $B = 1$ $q = 0.8$			$\alpha = 0.3$ $\varphi = 0.1$ $\theta = 0.4$ $B = 1$ $q = 0.8$			$\alpha = 0.7$ $\varphi = 0.1$ $\theta = 0.4$ $B = 1$ $q = 0.8$			$\alpha = 0.7$ $\varphi = 0.1$ $\theta = 0.6$ $B = 1$ $q = 0.6$		
	Case 0	Case 1	Case 2	Case 0	Case 1	Case 2	Case 0	Case 1	Case 2	Case 0	Case 1	Case 2
t	0.091	0.091	0.091	0.191	0.191	0.191	0.157	0.157	0.157	0.191	0.091	0.091
L	0.234	0.585	0.310	0.447	0.745	0.297	0.157	0.261	0.136	0.234	0.586	0.310
Y	0.553	0.734	0.671	0.407	0.598	0.411	0.497	0.582	0.542	0.506	0.672	0.614
C	0.503	0.668	0.597	0.329	0.484	0.332	0.419	0.491	0.457	0.460	0.611	0.558
Z	0.741	0.763	0.748	0.775	0.805	0.751	0.775	0.787	0.771	0.735	0.756	0.741
D	0.148	0.153	0.150	0.155	0.161	0.150	0.155	0.157	0.154	0.294	0.302	0.297
GDP	0.651	0.820	0.747	0.480	0.645	0.482	0.514	0.648	0.611	0.754	0.913	0.854
U	0.467	0.437	0.452	0.270	0.291	0.315	0.483	0.386	0.400	0.582	0.544	0.571
$\lvert \log GDP - \log U \rvert$	0.332	0.630	0.501	0.583	0.795	0.427	0.173	0.517	0.424	0.259	0.518	0.403

Conclusion:

The paper offers a static two-sector model (with consumption goods and ICT goods) to capture the effect of leisure externality created by the ICT sector, which offers leisure goods and services, on the utility and the gap between utility and income (i.e., Easterlin Paradox). It assumes that ICT sector is run by the government through tax levied on consumption good sector. This offers an endogenous frame-work of leisure externality assuming that the production of ICT goods and services to be used during the leisure time creates two types of leisure externalities - improving marginal benefits from leisure and raising skill and motivation required to improve the productivity of workers. The increased marginal benefit from leisure requires more labour for the production of ICT goods (thereby, consumption goods as well). On the other hand, the externality on productivity saves the labour. In effect, GDP and utility go up with the usage of more leisure goods and services. This does not ensure the reduction of the gap between them unless the productivity effect is sufficiently higher to compensate the addition demand for labour needed for extra production.

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