**Analyzing Income Inequality: Taxes and Transfers Impact**

# Abstract

*Improved quality natural fibre composites cannot be achieved without considering certain factors such as the degree of uniformity of the fibre, wettability of the fibre, fibre length, fibre volume fraction, type of matrix, interfacial bond strength, fibre orientation, compatibility of the fibre with the resin, processing parameters and manufacturing techniques among others. Their influences on the properties of the composites with typical examples from previous works were highlighted. The exact or approximate volume fractions of specific fibres in specific resins for optimal performance in composites are lacking. Epoxy, low density polyethylene, polystyrene and polyester resins were mostly used as matrix for natural fibre composites. Epoxy resins possess higher tensile and flexural strengths than polyester resins. Significant differences in the tensile strength and Young’s modulus of natural fibre polymer composites were observed with changes in the orientation and length of the fibres particularly when the differences in length are significant. Other relevant issues affecting natural fibre composites were buttressed with the aim of improving the properties of natural fibre polymer composites for advanced applications*.

**Keywords:** Composites, matrix, natural fibres, processing parameters, tensile properties

# 1.0 INTRODUCTION

# In most wealthy countries during the past few decades, there has been a worrying trend toward rising income disparity, which is especially noticeable in OECD countries (Burkhauser *et al*., 2016). The increase in inequality that has been caused mostly by a larger variation in primary income since the mid-1980s (OECD, 2008, 2011, 2015) has drawn a lot of attention from sociologists, economists, and political scientists (Jessen,2016). One crucial factor impacting disposable income distribution is the tax-transfer system, with redistributive impacts arising from both transfers and taxes.

# In light of this, this study carefully examines how taxation and income transfers to households affect redistributive consequences. Though earlier research suggested a "welfare state retrenchment," more recent studies cast doubt on this idea, particularly those that make use of the Luxembourg Income Study (LIS) dataset. Surprisingly, most welfare states showed more attempts at redistribution in the 1980s and 1990s, which was in line with their original intent.

# The goal in this study is to add to the current conversation by concentrating on the in-depth examination of the

# redistributive effects that income taxes and transfers have on households. The Study examines the implications on income distribution explicitly using harmonized LIS data across time and countries. It is expected that social transfers will mostly help lower-class populations, while income taxes will predominantly target the wealthy, thereby affecting the redistribution of income.

# This work examines the combined effects of income taxes and transfers on income distribution by comparing pre- and post-government income using the conventional budget incidence approach. Based on preliminary findings, there appears to be a noteworthy reduction in income disparity, primarily due to social benefits. This study contributes to the greater knowledge of the complex processes of income distribution by offering both a snapshot of current inequality levels and a longitudinal analysis from 1967 to 2014.

# The goal of this study is to clarify the nuances surrounding income inequality and provide insight into how redistribution has changed over time and between nations

# 2.0 LITERATURE REVIEW

# In the last two to three decades, most OECD nations have seen a noticeable change in the distribution of household income, with an increasing tendency towards inequality. (Burkhauser *et al*., 2016). This problem affects homes headed by individuals of working age as well as the general populace. In addition to being noticeable in the highest income levels of the distribution, the growing income gaps also show up as a worrisome increase in the prevalence of extremely low incomes, which has led to a rise in relative poverty measures in a significant number of nations. (OECD, 2008a). Although there is a chance that the recent

# economic crisis would lessen the top incomes, inequality's overall trajectory remains complex. Those who were already at a disadvantage prior to the crisis includes expected to see a decline in income going forward, exacerbating already existing inequalities (OECD, 2011c; Immervoll and Peichl, 2011). Compounding these challenges, austerity measures implemented by some countries to curtail spending levels pose a significant threat to the redistributive capacity of government budgets. This historical context sets the stage for an exploration into the role and impact of government redistribution policies on the evolving landscape of income inequality, particularly focusing on "non-elderly" households (Immervoll and Richardson, 2011)

# The study by Caminada, Goudswaard, and Wang (2012) looks at social transfers, taxation, and income inequality in 20 OECD nations between the middle of the 1980s and the middle of the 2000s. Using micro-data from the Luxembourg Income Study, the study applies a sequential accounting budget incidence decomposition technique to assess home market inequality and the redistributive impact of social programs. The results show that primary household inequality has increased, with two thirds of the increase being countered by tax-benefit systems. Redistribution is greatly aided by some

# social programs, such as survivorship plans and public

# old age pensions. The research gives vital insights into emerging patterns and the effectiveness of tax-benefit regimes during this era.

# During the "welfare state retrenchment" era, pivotal studies like Caminada, Goudswaard, and Wang (2012) and van Oorschot (2006) explored the changing landscape of 20 OECD nations from the mid-1980s to the mid-2000s. They highlighted a notable rise in primary household inequality, despite the mitigating effect of tax-benefit systems, aligning with discussions on the diminishing redistributive role of welfare states. Simultaneously, van Oorschot's study on European welfare states revealed differential rationing of benefits and shifting perceptions of deservingness among citizens. The consistent pattern emerged, ranking elderly individuals as most deserving, followed by sick and disabled people, with immigrants perceived as least deserving.

# The Luxembourg Income Study (LIS) revolutionized inequality analysis. Unprecedented cross-national and chronological comparisons were made possible by its painstakingly harmonized data from several nations and historical periods. LIS standardized income criteria, adjusted for purchasing power, and imputed top incomes, assuring data comparability. This exposed alarming worldwide trends: growing economic disparity among industrialized countries, undermining earlier convergence theories. Critical conversations regarding globalization, economic policies, and their distributional effects were sparked by LIS data. It was used by researchers to assess labor laws, social programs, and tax reforms, guiding their choices with solid facts.

# 3.0 DATASET

# The Leiden LIS Budget Incidence Fiscal Redistribution Dataset on Income Inequality 2017 is a valuable resource for conducting in-depth analyses of income inequality and the redistributive impact of social transfers and taxes across 47 countries spanning the period from 1967 to 2014. This dataset, which was compiled by Jinxian Wang and Koen Caminada, provides a thorough understanding of the dynamics of income distribution and enables scholars and decision-makers to examine patterns, deviations, and the efficacy of fiscal measures during the previous 50 years. The dataset enables a comprehensive understanding of the ways in which diverse factors contribute to income inequality and the ways in which fiscal policies affect overall economic well-being. It contains thorough data on a variety of income sources, including labour and capital income, social security transfers, and taxes.

# This dataset allows researchers to analyse welfare state redistribution's causes and effects, identify best practices, and address important questions about the sources of variance in the amount and nature of redistribution across nations and over time.

# 4.0 METHODOLOGY

# REFERENCES

1. Burkhauser, R. V., Herault, N., Jenkins, S. P. and Wilkins, R. (2016) “What Has Been Happening to UK Income Inequality Since the Mid-1990s? Answers from Reconciled and Combined Household Survey and Tax Return Data.” SSRN Electronic Journal. Elsevier BV.
2. Jessen, R. (2016) “Why has Income Inequality in Germany Increased from 2002 to 2011? A Behavioral Microsimulation Decomposition.” *SSRN Electronic Journal*. Elsevier BV.
3. OECD (2008a), Growing Unequal? Income Distribution and Poverty in OECD Countries, OECD, Paris.
4. Immervoll, H., A. Peichl and K. Tatsiramos, eds., (2011), Who Loses in the Downturn? Economic Crisis, Employment and Income Distribution (Research in Labor Economics, Volume 32), Emerald Group Publishing Limited.
5. Immervoll, H. and Richardson, L. (2011) Redistribution Policy and Inequality Reduction in OECD Countries: What Has Changed in Two Decades? Redistribution Policy and Inequality Reduction in OECD Countries: What Has Changed in Two Decades? by Herwig Immervoll, Linda Richardson:: SSRN. [Online]
6. van Oorschot, W. (2006) “Making the difference in social Europe: deservingness perceptions among citizens of European welfare states.” Journal of European Social Policy. SAGE Publications, 16(1) pp. 23–42.
7. Peças, P., Carvalho, H,. Salman, H and Leite, M. "Natural Fibre Composites and Their Applications: A Review". *J Compos Sci.* 2(4), 2018, pp 66.
8. Dhaliwal, J. "Natural Fibers: Applications". *Intech* . 2019.
9. Summerscales, J and Grove, S. "Manufacturing methods for natural fibre composites" . *Natural Fibre Composites: Materials, Processes and Applications. Woodhead Publishing Limited*; 2013, pp. 176–215.
10. Dos Santos, J.C., Siqueira, R.L, Vieira, L.M.G., Freire, R.T.S., Mano, and Panzera, T.H. "Effects of sodium carbonate on the performance of epoxy and polyester coir-reinforced composites". *Polym Test*. 67, 2018, pp. 533–44.
11. Elbadry, E.A., Aly-Hassan, M.S and Hamada, H. "Mechanical properties of natural jute fabric/jute mat fiber reinforced polymer matrix hybrid composites". *Adv Mech Eng*., 2012.
12. Akash, S., Rao, K .V., Venkatesha Gupta, N.S., Arun, K. "Mechanical Properties of Sisal/Coir Fiber Reinforced Hybrid Composites Fabricated by Cold Pressing Method". *IOP Conf Ser Mater Sci Eng*. 149(1), 2016
13. Gu, H. "Tensile behaviours of the coir fibre and related composites after NaOH treatment". *Mater Des*. 30(9), 2009, pp. 3931–4.
14. Sonparote, P.W and Lakkad, S.C. "Mechanical properties of carbon/glass fibre reinforced hybrids".

*Fibre Sci Technol.* 16(4), 1982, 309–12.

1. Hill, C.A.S and Khalil, H.P.S.A. "Effect of fiber treatments on mechanical properties of coir or oil palm fiber reinforced polyester composites". *Appl Polym Sci*. 78, 2000.
2. Yang, Y., Boom, R., Irion, B., van Heerden, D.J., Kuiper, P and de Wit, H. "Recycling of composite materials". *Chem Eng Process Process Intensif.* 51, 2012, pp. 53–68.
3. Kumar, S and Mallesh, D.S.G. "Evaluation of Mechanical Properties of Sisal / Glass Fiber Reinforced Epoxy Composites". *Int J Eng Res Technol*. 9(07), 2020, pp. 1122–7.
4. Kim, H. "Hybrid composites with natural fibres. dessertation", 2014.
5. Tran, L.Q.N., Fuentes, C.A., Dupont-Gillain, C., Van Vuure, A.W and Verpoest, I. "Understanding the interfacial compatibility and adhesion of natural coir fibre thermoplastic composites". *Compos Sci Technol.* 80, 2013, pp. 23–30.
6. Tran, L.Q.N., Fuentes, C.A., Dupont-Gillain, C., Van Vuure, A.W and Verpoest, I. "Wetting analysis and surface characterisation of coir fibres used as reinforcement for composites". *Colloids Surfaces A Physicochem Eng Asp*, 377(1–3), 2011, pp. 251–60.
7. Fiore, V., Scalici, T., Nicoletti, F., Vitale, G., Prestipino, M and Valenza, A. "A new eco-friendly chemical treatment of natural fibres: Effect of sodium bicarbonate on properties of sisal fibre and its epoxy composites". *Compos Part B Eng.* 85, 2016, pp. 150–60.
8. Bakri, Putra, A.E.E., Renreng, I., Arsyad, H and Mochtar, A.A. "Sodium bicarbonate treatment of coir fiber on wettability and shear strength of coir fiber-epoxy composite". *J Phys Conf Ser*. 1242(1), 2019.
9. Yan, L., Chouw, N., Huang, L and Kasal, B. "Effect of alkali treatment on microstructure and mechanical properties of coir fibres , coir fibre reinforced- polymer composites and reinforced-cementitious composites". *Constr Build Mater.* 112, 2016, pp. 168–82.
10. Nam, T.H., Ogihara, S., Tung, N.H and Kobayashi,

S. "Effect of alkali treatment on interfacial and mechanical properties of coir fiber reinforced poly(butylene succinate) biodegradable composites". *Compos Part B Eng*. 42(6), 2011, pp. 1648–56.

1. Shehu, U., Isa, M.T., Aderemi, B.O and Bello, T. K. "Effects of NaoH modification on the mechanical properties of baobab pod fiber reinforced ldpe composites". *Niger J Technol.* 36(1), 2017, 87–95.
2. Van Dam, J.E.G., Van Den Oever, M.J.A.,

Teunissen, W., Keijsers, E.R.P and Peralta, A.G. "Process for production of high density/high performance binderless boards from whole coconut husk. Part 1: Lignin as intrinsic thermosetting binder resin". *Ind Crops Prod*. 19(3), 2004, 207–16.

1. Ezekiel, N., Ndazi, B., Nyahumwa, C and Karlsson,

S. "Effect of temperature and durations of heating on coir fibers". *Ind Crop Prod.* 33(3), 2011, pp. 638– 43.

1. Dicker, M.P.M., Duckworth, P.F,, Baker, A.B., Francois, G., Hazzard, M.K and Weaver, P.M. "Green composites: A review of material attributes and complementary applications". *Compos Part A Appl Sci Manuf.* 56, pp. 280–9, 2014.
2. Luz, F.S., Paciornik, S., Monteiro, S.N., Silva, L.C and Tommasini, V.I.O.J. "Porosity Assessment for different diameters of coir lignocellulosic fibers". *Miner Met Mater Soc Porosity*. 69(10), 2017, 2045– 51.
3. Tran, L.Q.N., Minh, T.N., Fuentes, C.A., Chi, T.T., Van Vuure, A.W and Verpoest, I. "Investigation of microstructure and tensile properties of porous natural coir fibre for use in composite materials". *Ind Crops Prod.* 65, 2015, 437–45.
4. Nieves Bogonez, F.D. "Fibre spreading and impregnation monitoring". PQDT - UK & Ireland. 2014.
5. Rao, K.M.M., Rao, K.M and Prasad, A.V.R. "Fabrication and testing of natural fibre composites : Vakka , sisal , bamboo and banana". *Mater Des*.31(1), 2010, 508–13.
6. Joseph, P .V., Rabello, M.S., Mattoso, L.H.C., Joseph, K and Thomas, S. "Environmental effects on the degradation behaviour of sisal fibre reinforced polypropylene composites". 62, 2002, pp. 1357–72.
7. Bodros, E., Pillin, I., Montrelay, N and Baley, C. "Could biopolymers reinforced by randomly scattered flax fibre be used in structural applications ?" 67, 2007, pp. 462–70.
8. Garkhail, S. "Composites based on natural fibres and thermoplastic matrices". *PhD Thesis Univ London*. (October), 2001.
9. Ouagne, P., Bizet, L.B and Baley, C.B. "Analysis of the Film-stacking Processing Parameters for PLLA / Flax Fiber Biocomposites". *J com*. 44(10), 2010.
10. Rait, G.K. "Effect of Surface Treatments on the Mechanical Properties of Coir Fibres and Coir Fibre Reinforced Composites". 2014.
11. Harish, S., Michael, D.P., Bensely, A., Lal, D.M and Rajadurai, A. "Mechanical property evaluation of natural fiber coir composite". *Mater Charact*. 60(1), 2009, pp.44–9.
12. Joseph, K and Thomast, S. "Effect of chemical treatment on the tensile properties of short sisal fibre-reinforced polyethylene composites". 37(23), 1996, pp. 5139–49.
13. Nair, K.C.M., Diwan, S.M and Thomas, S. "Tensile properties of short sisal fiber reinforced polystyrene composites". *J Appl Polym Sci*. 60(9), 1996, pp. 1483–97..
14. Ben, G., Kihara, Y., Nakamori, K and Aoki, Y. "Examination of heat resistant tensile properties and molding conditions of green composites composed of kenaf fibers and PLA resin". *Adv Compos Mater Off J Japan Soc Compos Mater*. 16(4), 2007, pp. 361–76.
15. Ezema, I.C., Edelugo, S.O., Omah, A.D and Agbo,

I.U. "Ply tensile properties of banana stem and banana bunch fibres reinforced natural rubber composite". *Niger J Technol*. 31(1), 2012, pp. 25–30

1. Mukherjee, P.S and Satyanarayana, K.G. "Structure and properties of some vegetable fibres - Part 1 Sisal fibre". *J Mater Sci*.19(12), 1984, pp. 3925–34.
2. Tomczak, F., Sydenstricker, T.H.D and Satyanarayana, K.G. "Studies on lignocellulosic fibers of Brazil. Part II: Morphology and properties of Brazilian coconut fibers". *Compos Part A Appl Sci Manuf*. 38(7), 2007, pp. 1710–21.
3. Monteiro, S.N., Lopes, F.P.D., Barbosa, A.P., Bevitori, A.B., Amaral, Da Silva, I.L and Da Costa,

L.L. "Natural lignocellulosic fibers as engineering materials-An overview". *Metall Mater Trans A Phys Metall Mater Sci.* 42(10), 2011, pp. 2963–7.

1. Mathura, N and Cree, D. "Characterization and mechanical property of Trinidad coir fibers". *J Appl Polym Sci*.133(29), 2016, pp. 1–9.
2. Alves Fidelis, M.E., Pereira, T.V.C., Gomes, O.D.F.M., De Andrade Silva, F and Toledo Filho,

R.D. "The effect of fiber morphology on the tensile strength of natural fibers". *J Mater Res Technol*. 2(2), 2013, pp. 149–57.

1. Baiardo, M., Zini, E and Scandola, M. "Flax fibre – polyester composites". 35, 2004, pp. 703–10.
2. Arib, R.M.N, Sapuan, S.M and Ahmad, M.M.H.M. "Materials & Design Mechanical properties of pineapple leaf fibre reinforced polypropylene composites". 27, 2006, pp. 391–6.
3. Geethamma, V.G, Thomas Mathew, K., Lakshminarayanan, R., Thomas, S. "Composite of short coir fibres and natural rubber: effect of chemical modification, loading and orientation of fibre. Polymer (Guildf)". 39(6–7), 1998, pp. 1483– 91.