International Journal for Novel Research in Economics , Finance and Management
www.ijnrefm.com
Volume 2, Issue 6, Nov-Dec 2024, PP: 113-118

Efficiency of Pareto Optimality for Consumption and Production

Pakhshan M R Palani
Department of Accounting
Technical College of Administration, Sulaimani Polytechnic University, Kurdistan Region, Iraq.

Ali jalal Hussen
Department of Economics
College of Administration and Economics, University of sulaimani, Kurdistan Region, Iraq.

Abstract **– Pareto efficiency, or Pareto optimality, is an economic condition where possessions cannot be rearranged to make one specific better off without creating at least one individual worse off. In this paper, the main objective is to focus on the empirical implications of Pareto optimal provision of public goods and of competitive equilibrium with public goods. The data set to test the empirical implications does not require full information on individual private goods consumption, and only involves market prices, aggregate endowments and production, government tax revenue and individual incomes. The research is based on reviewing and analyzing 15 different articles in a variety of international peer reviewed journal. The overall results show that the Pareto principle in mathematical economy can be used to derive necessary and sufficient conditions for observable data to be consistent with Pareto optimal provision of public goods and competitive equilibrium with public goods, respectively. Furthermore, the research has confirmed that Pareto efficiency is occurring when an organisation or entrepreneurs has its resources and goods apportioned to the supreme level of efficiency, and no alteration can be made without creating someone worsened. The study recommends the business world, factory managers to adopt Pareto development trials, in which they relocate labor capitals to attempt to increase the output of gathering workers without say, declining the productivity of the stuffing and delivery workers.**

Keywords **– Pareto optimality, equilibrium, business world, economic condition.**

I. INTRODUCTION

1. What does the term Pareto Efficiency mean?

Pareto efficiency, or Pareto optimality, can be defined as an economic state where resources cannot be reallocated to make one individual better off without making at least one individual worse off (Charnes, A., Cooper, W. W., Golany, B., Seiford, L., & Stutz, J. 1985). Pareto efficiency implies that resources are allocated in the most economically efficient method, but does not imply neutrality or fairness. An economy is said to be in a Pareto optimum state when no economic changes can make one individual better off without making at least one other individual worse off. Nirei, M., & Aoki, S. (2016) stated that an important property of Pareto distributions is that they have a fat tail, in the real world, this means that the wealthiest one percent of population possesses a substantially larger portion of the national income and wealth than would be predicted by extrapolating the distribution of middle income earners. Moreover, greater understanding of the overall concentration of income and wealth requires increased attention be paid to why the distributions of top earners universally follow the Pareto distribution. They also claimed that, it is important to analyze income distribution in a general equilibrium model, because many variables that influence the distribution, such as wage rates, capital returns, or the aggregate capital level, are endogenously determined.

The Pareto efficiency happen in different aspects, the most prominent are including Pareto efficiency is when an economy has its resources and goods allocated to the maximum level of efficiency, and no change can be made without making someone worse off. Additionally, Pure Pareto efficiency exists only in theory though the economy can move toward Pareto efficiency. And also alternative criteria for economic efficiency based on Pareto efficiency are often used to make economic policy, as it is very difficult to make any change that will not make any one individual worse off. Hypothetically, if there were perfect competition and resources were used to their maximum efficient capacity, then everyone would be at their highest standard of living, or Pareto efficiency. Economists Kenneth Arrow and Gerard Debreu demonstrated theoretically that under the assumption of perfect competition and where all goods and services are tradable in competitive markets with zero transaction costs, an economy will tend toward Pareto efficiency.

According to Duleba, S., & Moslem, S. 2019) Pareto optimality (or efficiency) is a fundamental concept in economic and management sciences, elaborated by Pareto in 1906. It can be defined as an allocation, activity, etc. that cannot be trivially improved; consequently no participant's situation can be improved without worsening other participant's situation.

The research conducted by Phelan, C., & Rustichini, A. (2018) presented that Pareto efficiency can be an enormously useful concept when considering government policy. They also emphasized that it allows the economist to make distinct those interventions necessary to avoid outcomes that are undesirable by any plausible measure versus those interventions that are desirable only if some individuals are deemed more deserving than others. In dynamic or intergenerational economies, however, Pareto efficiency is considered problematic precisely because it can be unclear which preferences orderings "count" when

making Pareto comparisons. The main objective of this paper is to understand from the fundamentals of Pareto efficiency and optimality in many different aspects of financial prospective and economic organisations.

II. Literature Review

On Pareto Efficiency in Asset Markets

Takino, K. (2019): The aim of this study is to consider Pareto efficiency in financial markets. In welfare economics, it is sufficient to consider competitive equilibrium to assure Pareto efficiency. This study, however, focuses on describing the utility possibility frontier, which explicitly shows Pareto efficiency for financial markets. The methods based on using the time-additive utility (functional) with the mean-variance utility. In deriving the utility possibility frontier, it obtains an asset pricing formula dependent on an agent's utility. The paper has provided a characteristic of this formula to ensure Pareto efficiency. Moreover, the results of the study generalize the payoff function of the asset. This enables us to analyze various financial transactions. As an application of our framework, the research has considered a simple insurance contract with default. It has indicated that the likelihood of default makes the market Pareto inefficient or deteriorates social welfare.

Keywords: Pareto Efficiency, Utility Possibility Frontier, Default Risk

$$U_j(x_0^j, x_T^j) = u(x_0^j) + e^{-\delta_j T} u(x_T^j),$$

where

$$u_j(x) = E[x] - \frac{\gamma_j}{2} Var[x]$$

for $j = b, s$, and γ_j is the risk-aversion and δ_j is the time preference of agent j. Note that $u_j(\cdot)$ is the mean-variance utility, which has been used to describe

Should the Pareto Principle Be Applied as a Cost Savings Method in Hip and Knee Arthroplasty?

Lovse, L., Poitras, S., Dobransky, J., Huang, A., & Beaulé, P. E. (2019): The objectives of this study are to determine whether cost distribution of THA and TKA follows the Pareto Principle (80/20 rule) and factors predictive of costs that could be modified. Methods: All inpatient, primary, elective, and unilateral THA and TKA patients from April 2008 to September 2017 were retrospectively reviewed. The Pareto Principle was tested by dividing patients into top 5% cost increments and calculating patient cost category ratio. Relationship between patient-related factors and acute care costs and relationship between cost categories and length of stay (LOS) were examined using multiple regressions. Results: The Pareto Principle does not apply for THA or TKA patients, with the top 20% of costly patients accounting for approximately 30% of total costs. LOS is the strongest independent driver of costs. Operating room services and supplies accounted for over 50% of total costs but with low variability (coefficient of variation < 0.25). Laboratory and allied health costs had high variability (coefficient of variation > 1.5), but their contribution to total costs was low (from 0.76% to 5.68%). Conclusion: THA and TKA costs do not follow Pareto Principle, concluding that targeting top costly patients is not as effective as focusing on overall patient population. Efforts to decrease overall costs should focus on decreasing the LOS and improving operating room process efficiencies including human resources for supplies and instruments.

$$A = [a_{ij}] \quad i, j = 1, \ldots, n.$$

Where a_{ij} denotes entries, in the same position (i,j), of pairwise comparison matrices. k-th decision maker

Examining Pareto optimality in Analytic Hierarchy Process on Real

Data: An Application in Public Transport Service Development

Duleba, S., & Moslem, S. (2019): The objective of this study is to to examine Pareto-optimality on real data pairwise comparison matrices gained from a public transport Analytic Hierarchy Process (AHP) survey. Moreover, detecting the impact of weight score modification on the whole AHP structure and thus the significance of Pareto test is also in the scope of this study. Further, a detailed description of the general process of Pareto optimal AHP is also included. The application has been conducted in Mersin, Turkey with the purpose of determining public preference on the importance of developing supply quality elements in local bus transportation service. Results Conducting Pareto optimality test on real pairwise comparison data has been successful in a sense that non-Pareto optimal weight vector could be detected in the AHP structure. The optimization process produced improved weight coordinates that are now Pareto optimal.

$$f_{ij}(w) := \left| a_{ij} - \frac{w_i}{w_j} \right| \quad \text{for all} \quad i \neq j, M = n^2 - n$$

and M is the total number of the objective functions.

Testing Pareto efficiency and competitive equilibrium in economies with public goods

Carvajal, A., & Song, X. (2018): The principal aim of the research was to examine the nonparametric testable implications of Pareto efficiency and competitive equilibrium in economies with public goods, with and without warm glow preferences, using mixed integer programming (MIP). Compared with tests based on the Tarski-Seindenberg algorithm, our tests are linear with respect to real and integer variables, and therefore operational, i.e., applicable to real data with multiple individuals and multiple observations. Monte Carlo simulation shows our tests can be implemented within reasonable time and have reasonable power when individual consumption can be (partially) observed.

Keywords: public goods; warm-glow; Pareto efficiency; Nash-Walras equilibrium

1. for each individual, her consumption plan is rational in the sense of Lindahl equilibrium:

$$(x^i, K+Y) \in \operatorname{argmax}_{\{x,y\}} \{u^i(x,y) : p \cdot x + q^i \cdot y \leq m^i\}; \quad (1)$$

2. for the firm, its production plan is rational:

$$(X,Y) \in \operatorname{argmax}_{\{x,y\}} \{p \cdot x + q \cdot y : (x,y) \in T\};$$

3. private markets clear: $\sum_i x^i = E - X$; and

4. the public good is fully funded by the Lindahl pricing mechanism: $\sum_i q^i = q$.

Pareto Efficiency and Identity

Phelan, C., & Rustichini, A. (2018): This paper examines the set of Pareto efficient allocations in a finite period Mirrlees economy; each period represents a lifetime for an agent who cares about the utility of his descendants. In making Pareto comparisons, we use an interim concept of efficiency and consider an individual as indexed not only by his date of birth but also by the history of events up to his birth, including his own type.

That is, we assume the child of a high skilled parent is a different person than the child of a low skilled parent, even if both children have the same skill level. Our contributions are characterization of these efficient allocations and their implementation. We completely characterize the set of efficient allocations under full information. We show that for efficient allocations, implicit inheritance taxes from the perspective of the parent's type can be either progressive or regressive. Further, imposing no taxes of any kind, coupled with each agent owning his own production, results in a Pareto efficient allocation.

Under private information, we completely characterize the set of Pareto efficient allocations for the two-period economy where skill types take on two values, and again show that implicit inheritance taxes can be either progressive or regressive, again relative to the parent's type. For more general multi-period economies with private information, we show that the reciprocal Euler condition of Rogerson and Golosov, Kocherlakota, and Tsyvinski holds as a necessary condition, but as an inequality, and that the expected value of implicit inheritance tax rates conditional on a parent's history are weakly negative. Finally, we derive conditions such that given private information, no taxes of any kind, coupled with each agent owning his own production, results in a Pareto efficient allocation.

$$\sum_{t=0}^{T} \sum_{\theta^t} \frac{1}{R^t} f(\theta_0) \pi(\theta_1|\theta_0) \cdots \pi(\theta_t|\theta_{t-1}) [c_t(\theta^t) - y_t(\theta^t)] \leq 0, \quad (1)$$

where $R > 1$. From here on, we consider only symmetric allocations.

Agents have identical preferences over the consumption–labor pairs of themselves and their descendants. We assume an agent born at date t with family history θ^t ranks allocations according to

$$U_t(\theta^t) = u(c_t(\theta^t)) - h\left(\frac{y_t(\theta^t)}{\theta_t}\right) + \sum_{\tau=t+1}^{T} \beta^{\tau-t} \sum_{\theta^\tau | \theta^t} \pi(\theta_{t+1}|\theta_t) \cdots \pi(\theta_\tau|\theta_{\tau-1}) \times \left[u(c_\tau(\theta^\tau, \theta^{t+1,\tau})) - h\left(\frac{y_\tau(\theta^\tau, \theta^{t+1,\tau})}{\theta_\tau}\right)\right], \quad (2)$$

where u is assumed to be differentiable, strictly increasing, strictly concave, and with $\lim_{c \to 0} u'(c) = \infty$. We also assume that

Keywords. Pareto efficiency, taxation, bequests, laissez-faire.

Allocation of Emission Permits for China's Power Plants: A Systemic

Pareto optimal method

Ji, X., Li, G., & Wang, Z. (2017): The main objective of this paper is to This research has investigated the issue of allocating emission permits, which is significant in environmental and operational management. We divide the considered AEP process into one observation pre-stage and one two-stage regulatory scheme as motivated by recent real-world examples, such as the ''Inner Mongolia main pollutant emission allowance verification plan." .These Results of our empirical study show that the heterogeneous-limited AEP model exhibits higher performance over the non-limited and uniform limited AEP models. Thus, we suggest that the Chinese coal-fired power industry should employ the heterogeneous-limited AEP model in the practical allocation of SO2 emission permits.

systemic variables that accompany $\tilde{\Delta}$ as $X_i(k,\tilde{\Delta})$, $Y_r(k,\tilde{\Delta})$, and $Z(k,\tilde{\Delta})$. We then employ Model (1) and Proposition 3.1 to check whether $\tilde{\Delta}$ is a *systemic Pareto optimal* allocation scheme in the decision domain Λ.

$$\begin{aligned} &\eta(\tilde{\Delta}) = \min \frac{\sum_{i=1}^{m} v_i X_i(k,\tilde{\Delta}) + wZ(k,\tilde{\Delta})}{\sum_{r=1}^{s} u_r Y_r(k,\tilde{\Delta})} \\ &s.t.\ for\ all\ \Delta = (\Delta_1, \cdots, \Delta_n) \in \Lambda \\ &\frac{\sum_{i=1}^{m} v_i X_i(k,\Delta) + wZ(k,\Delta)}{\sum_{r=1}^{s} u_r Y_r(k,\Delta)} \geqslant 1 \\ &v_i, u_r, w \geqslant 0 \end{aligned} \quad (1)$$

Pareto Optimization of Adaptive Modulation and Coding Set in Nonlinear Fiber-Optic Systems

Koike-Akino, T., Kojima, K., Millar, D. S., Parsons, K., Yoshida, T., & Sugihara, T. (2017): The main aim of this paper is to analyze GMI of various modulation formats including HDM in nonlinear fiber transmissions. To consider realistic variable-rate LDPC codes, we take the rate loss into account for GMI analysis. We identified Pareto-efficient pairs of modulation and coding to maximize the SE and nonlinearity tolerance at the same time. It was found that low-rate DP-8PSK can be Pareto efficient, whereas some HDMs such as.

$$I = 1 - \mathbb{E}\left[\log_2\left(1 + \exp\left((-1)^{b+1} L\right)\right)\right],$$

where $\mathbb{E}[\cdot]$, b and L denote an expectation (i.e., ensemble average over all LLRs), the transmitted bit, and corresponding LLR value, respectively.

Pareto-Efficient Tax Breaks

Koehne, S., & Sachs, D. (2017): This paper aims at investigating Pareto-efficient tax breaks for personal

taxation in a private information environment. In addition to a labor-leisure choice, the agents decide how to spend their money between consumption and work-related goods. We derive an efficiency condition that relates the rate of tax deductibility for work-related goods to the marginal tax rate at each income level. This condition holds irrespective of the skill distribution and the taste for redistribution. If the efficiency condition is violated (which it is almost generically), we characterize utility-neutral and incentive-compatible allocation perturbations that minimize resource costs. We apply our theory to study possible tax breaks for domestic services in the US economy. We find that this reform introduces marginal deduction rates for domestic services ranging from 60% to 90% combined with a small increase of the marginal tax rates on labor income. The implied annual resource gains are up to 50 Dollars per household.

Keywords: optimal taxation, tax deduction, Pareto-improving tax reform.

$$u\left(c,d,y;n\right)=w\left(c,d\right)+v\left(d,y;n\right),$$

Where: w and v are concave and continuously differentiable and w (c; d) is strictly increasing in both arguments, whereas v (d; y; n) is strictly increasing in d and strictly decreasing in y.

Pareto Efficiency, the Coase Theorem, and Externalities: A Critical View

Ventura, A., Cafiero, C., & Montibeller, M. (2016): The key target behind this study is to synthesize a critical review of the Paretian definition of efficiency by noting its correspondence with the description of the logic underpinning market relationships. With reference to Ludwig Wittgenstein's analysis of the value content of tautologies, we discuss the tautological nature of the propositions regarding the efficiency of exchange and market equilibrium when there are externalities. We critically review the debate on the Coase theorem, its treatment of externalities, and the contrast with the Pigouvian approach, taking into account the distinction between propositions that are true based on their formal logical structure and propositions that are true with respect to their correspondence to actual states of affairs. We also reveal and discuss the logical inconsistencies — in particular, the one between the Coase theorem and perfect competition — and the practical consequences of the application of Pareto efficiency to the analysis of externalities.

Keywords: Coase theorem, economic methodology, efficiency equity, market failures, social values

Pareto distribution of income in neoclassical growth models

Nirei, M., & Aoki, S. (2016): This study examines to construct a neoclassical growth model with heterogeneous households that accounts for the Pareto distributions of income and wealth in the upper tail. In an otherwise standard Bewley model, we feature households' business productivity risks and borrowing constraints, which we find generate the Pareto distributions. Households with low productivity rely on wages and returns from safe assets, while high productivity households choose not to diversify their business risks. The model can quantitatively account for the observed income distribution in the U.S. under reasonable calibrations. Furthermore, we conduct several comparative statics to examine how changes in parameters affect the Pareto distributions. In particular, we find that the change in the top tax rates in the 1980s potentially accounts for much of the observed increase in top income dispersion in the last decades. Our analytical result provides a coherent interpretation for the numerical comparative statics.

$$y_{i,t}=k_{i,t}^{\alpha}(a_{i,t}l_{i,t})^{1-\alpha},$$

where $l_{i,t}$ is the labor employed by i and $k_{i,t}$ is the detrended capital owned by i. production function $\tilde{a}_{i,t}$ has a common trend $\gamma>1$:

$$\tilde{a}_{i,t}=\gamma^{t}a_{i,t},$$

Pareto Optimality of the Golden Rule Equilibrium In An Overlapping Generations Model With Production and Transfers

Mertens, J. F., & Rubinchik, A. (2015): The main result is that the golden rule equilibrium (GRE) is Pareto optimal (in the classical sense) in an overlapping generations (OG) model with constant-returns-to-scale production, transfers, arbitrary life-time productivity and homogeneous instantaneous felicity. In addition, we extend Cass and Yaari's equivalence between efficiency (aggregate consumption dominance) and present value dominance (with evaluation made using a candidate equilibrium price path).

Keywords: Infinite Economies, Overlapping Generations, Exogenous Growth, Golden Rule Equilibrium

Consider the basic OG model from Mertens and Rubinchik (2013) with general instantaneous felicity.

Lifespan of any individual born at $x \in \mathbf{R}$ is $[0, 1]$:

$$U_x=\int_0^1 e^{-\beta t}u(\tilde{c}_{x,t})dt$$

Pareto efficiency of reliability-based traffic equilibrium and risk-taking behavior of travelers

Tan, Z., Yang, H., & Guo, R. (2014): This paper investigates the Pareto efficiency of the various reliability-based traffic equilibria proposed in the literature and the risk-taking behavior of travelers. Reliability indexes such as the percentile travel time (PTT), travel time budget (TTB), mean excess travel time (METT) and the quadratic disutility function (QDF) are examined in terms of the mean and standard deviation (SD) of travel times. The downward sloping mean-SD indifference curve is introduced to geometrically analyze the risk-taking behavior of travelers. Both the diversifying and plunging

behaviors of risk-averse travelers are investigated by examining the curvature of the mean-SD indifference curves at traffic equilibria based on the PTT, TTB, METT and QDF. Several specific probability distributions are adopted to elucidate the theoretical results obtained.

Consider a stochastic transportation network $G(N,A)$, where N is the set of nodes and A is the set of links. Let W and R denote the set of origin-destination (OD) pairs and the set of routes, respectively. Denote w and r as the elements of those sets, $r \in R = \cup_{w \in W} R_w$, where R_w is the set of routes for OD pair $w \in W$. Each OD pair is associated with a fixed travel demand q_w. Denote f_r^w and v_a as the flow of route r and link a, respectively. The set of all feasible route flow patterns is given by

$$\Omega = \{f = (f_r^w) : \sum_{r \in R_w} f_r^w = q_w, f_r^w \geq 0, r \in R_w, w \in W\}. \quad (1)$$

Algorithm 1: Preference Refinement Algorithm

Algorithm 1 Preference Refinement Algorithm (PRA).

Input: Hedonic game (N, R)
Output: Pareto optimal and individually rational partition

$Q_i^\top \leftarrow R_i$, for each $i \in N$
$Q_i^\perp \leftarrow R_i \cup \{(X, Y)\colon X\, R_i\, \{i\}$ and $Y\, R_i\, \{i\}\}$, for each $i \in N$
while $Q_i^\perp \neq Q_i^\top$ for some $i \in N$ **do**
  $i \leftarrow$ Choose$(\{j \in N\colon Q_j^\perp \neq Q_j^\top\})$
  $Q_i' \leftarrow$ Refine$(Q_i^\perp, Q_i^\top)$
  if PerfectPartition$(N, (Q_1^\perp, \ldots, Q_{i-1}^\perp, Q_i', Q_{i+1}^\perp, \ldots, Q_n^\perp)) = \emptyset$ **then**
    $Q_i^\top \leftarrow Q_i''$ where Cover$(Q_i'') = Q_i'$
  else
    $Q_i^\perp \leftarrow Q_i'$
  end if
end while
return PerfectPartition$(N, Q^\perp)$

Pareto Analysis of Critical Success Factors of Total Quality Management a Literature Review and Analysis

Karuppusami, G., & Gandhinathan, R. (2006): Purpose – The purpose of this literature review is to identify and propose a list of few vital critical success factors (CSFs) of total quality management (TQM) for the benefit of researchers and industries.

Design/methodology/approach – Even though there has been a large number of articles published related to TQM in the last few decades, only a very few articles focused on documenting the CSFs of TQM using statistical methods. The main objective of this literature review is to investigate and list the CSFs of TQM according to the descending order of frequencies of occurrences. The domain of review is the scale development studies and the TQM effect versus performance measurement studies.

The review period is between 1989 and 2003. Rigorous statistical reliability tests and validity tests were conducted during these studies to factorize the CSFs and hence these studies were chosen for the literature review. Finally, the quality tool "Pareto analysis" was used to sort and arrange the CSFs according to the order of criticality.

Findings – An examination of 37 such TQM empirical studies resulted in compilation of 56 CSFs. Implementation difficulties exist to operationalize such a large number of CSFs in organizations. This study analyzed and sorted the CSFs in descending order according to the frequency of occurrences using Pareto analysis. A few vital CSFs were identified and reported.

The results of this study will help in a smoother penetration of TQM programs in organizations

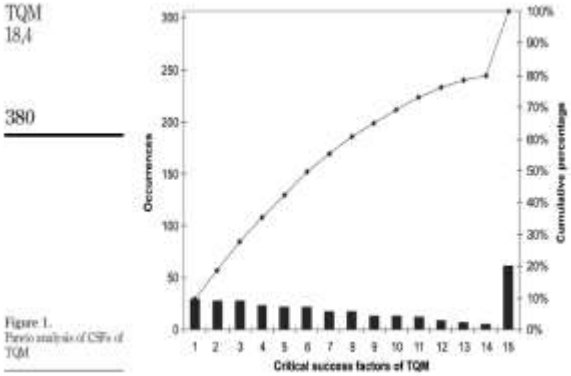

Figure 1: Pareto Analysis of CSFs of TQM

Foundations of Data Envelopment Analysis for Pareto-Koopmans Efficient Empirical Production Functions

Charnes, A., Cooper, W. W., Golany, B., Seiford, L., & Stutz, J. (1985): The aim of this paper is to introduce as basic the idea of Pareto-optimality with respect to an empirically defined production possibility set. The applied methods included the characterizing of the mathematical structures permitted under our minimal assumptions and contrast these with work by others. Properties such as isotonicity, non-concavity, economies of scale, piece-wise linearity, Cobb-Douglas forms, discretionary and non-discretionary inputs are treated through a new Data Envelopment. The main results have shown how direct application of the Charnels-Cooper test for Pareto-optimality leads to a simpler and more robust method, efficiency pH, encompassing all previous ones for ascertaining 'efficiency'.

$$\mathcal{P}_A \triangleq \left\{(x, y)\colon x = \sum_{j=1} X_j \mu_j, y = \sum_{j=1} Y_j \mu_j, \forall \mu_j \geq 0, \sum_j \mu_m = 1\right\}. \quad (3.1)$$

We extend it to our 'empirical production possibility set' 9, by adding to 9,: all points with inputs in 9, and outputs not greater than some output in B,,

Pareto optimality in coalition formation

Aziza, H. Brandt, F. and Harrensteinc, P. (2013): A minimal requirement on allocative efficiency in the social sciences is Pareto optimality. In this paper, we identify a close structural connection between Pareto optimality and perfection that has various algorithmic consequences for coalition formation. Based on this insight, we formulate the Preference Refinement Algorithm (PRA) which computes an individually rational and Pareto optimal outcome in hedonic coalition formation games. Our approach also leads to various results for specific classes of hedonic games. In particular, we show that computing and verifying Pareto optimal partitions in general hedonic games, anonymous games, three-cyclic games, room-roommate games and B-hedonic games is intractable while

both problems are tractable for roommate games, W-hedonic games, and house allocation with existing tenants.

III. Conclusion

This paper has illustrated the main principle of Pareto optimality in financial and economics. Firstly, it has defined the concept of Pareto as an economy is in a Pareto Optimal state when no further changes in the economy can make one person better off without at the same time making another worse off. It has been recognised that this is the socially optimal outcome achieved by a perfectly competitive market referred to the Pareto state. To achieve the objectives, the paper has based on reviewing 15 different articles from international peer reviewed journal. The main results from all papers can be presented that an economy will be Pareto Optimal when the economy is impeccably inexpensive and in a state of static common balance. The instinctive circumstance for this is founded on the point that prices reflect economic values in an economical market. When this price system is in equilibrium, the marginal revenue product, the opportunity cost, and the price of a resource or asset will all be equal. Each unit of every good and service is in its most productive use or best consumption use. No transfer of resources could result in greater output or satisfaction. Although, this study had many limitations such as, lack of data from local companies and internal banks, it will recommend that it can be examined more formally in terms of three criteria that have to be met for market equilibrium to result in Pareto Optimality they include: exchange efficiency, production efficiency and output efficiency.

References

1. Aziza, H. Brandt, F. and ,Harrensteinc, P. (2013). Pareto optimality in coalition formation. Games and Economic Behavior. 82, (2013), 562–581.
2. Carvajal, A., & Song, X. (2018). Testing Pareto efficiency and competitive equilibrium in economies with public goods. Journal of Mathematical Economics, 75, 19-30.
3. Charnes, A., Cooper, W. W., Golany, B., Seiford, L., & Stutz, J. (1985). Foundations of data envelopment analysis for Pareto-Koopmans efficient empirical production functions. Journal of econometrics, 30(1-2), 91-107.
4. Duleba, S., & Moslem, S. (2019). Examining Pareto optimality in analytic hierarchy process on real Data: An application in public transport service development. Expert Systems with Applications, 116, 21-30.
5. Ji, X., Li, G., & Wang, Z. (2017). Allocation of emission permits for China's power plants: A systemic Pareto optimal method. Applied Energy, 204, 607-619.
6. Karuppusami, G., & Gandhinathan, R. (2006). Pareto analysis of critical success factors of total quality management: A literature review and analysis. The TQM magazine, 18(4), 372-385.
7. Koehne, S., & Sachs, D. (2017). The international platform of Ludwig Maximilian University's for Economic Studies and the IFO Institute. Pareto-efficient tax breaks. CESIFO, 2017.
8. Koike-Akino, T., Kojima, K., Millar, D. S., Parsons, K., Yoshida, T., & Sugihara, T. (2017). Pareto optimization of adaptive modulation and coding set in nonlinear fiber-optic systems. Journal of Lightwave Technology, 35(4), 1041-1049.
9. Lovse, L., Poitras, S., Dobransky, J., Huang, A., & Beaulé, P. E. (2019). Should the Pareto Principle Be Applied as a Cost Savings Method in Hip and Knee Arthroplasty?. The Journal of arthroplasty. 2019,1-5
10. Mertens, J. F., & Rubinchik, A. (2015). Pareto optimality of the golden rule equilibrium in an overlapping generations model with production and transfers. Macroeconomic Dynamics, 19(8), 1780-1799.
11. Nirei, M., & Aoki, S. (2016). Pareto distribution of income in neoclassical growth models. Review of Economic Dynamics, 20, 25-42.
12. Phelan, C., & Rustichini, A. (2018). Pareto efficiency and identity. Theoretical Economics, 13(3), 979-1007.
13. Takino, K. (2019). On Pareto Efficiency in Asset Markets. Theoretical Economics Letters, 9(07), 2508.
14. Tan, Z., Yang, H., & Guo, R. (2014). Pareto efficiency of reliability-based traffic equilibria and risk-taking behavior of travelers. Transportation research part B: Methodological, 66, 16-31.
15. Ventura, A., Cafiero, C., & Montibeller, M. (2016). Pareto efficiency, the Coase theorem, and externalities: A critical view. Journal of Economic Issues, 50(3), 872-895.