

How Much Income Inequality is Fair?

Surprising insights from Statistical Thermodynamics and Game Theory

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Abstract:

Extreme economic inequality is widely seen as a serious threat to the future of stable and vibrant capitalist democracies. In 2015, the World Economic Forum in Davos identified deepening income inequality as the number one challenge of our time. Yet some inequality is inevitable. As different people have different talents and skills, and different capacities for work, they make different contributions in a society, some more, others less. Therefore, it is only fair that those who contribute more earn more.

But how much more? In other words, at the risk of sounding oxymoronic, *what is the fairest inequality of income?* This critical question is at the heart of the inequality debate. The debate is not so much about inequality per se as it is about fairness. But this question has remained unanswered in economics for over two centuries. Mainstream economics has offered little guidance on fairness and the ideal distribution of income in a free-market society. Political philosophy, meanwhile, has much to say about fairness yet relies on *qualitative* theories that cannot be verified by empirical data. As we take steps to address extreme inequality, we need to know what the desired target inequality is -- and for this we need a *quantitative*, testable theory of fairness for free-market capitalism. I recently proposed such a normative theory, an unorthodox, transdisciplinary theory that integrates foundational principles from disparate disciplines into a unified conceptual and mathematical framework that includes the key perspectives on this question -- the perspectives of political philosophy, economics, game theory, statistical mechanics, information theory, and systems engineering.

My theory, which I call *statistical teleodynamics*, rests on two *surprising conceptual insights*. One is that the concept of entropy from statistical mechanics and information theory is the same as potential from game theory, and that these represent the concept of *fairness* in economics and philosophy. The other is that when one maximizes fairness, *all workers* enjoy the *same effective utility* at equilibrium in an ideal free-market society, thereby providing the *moral justification* for the very existence of the free-market economy. We prove that the *fairest inequality* of pay is a *lognormal* distribution under ideal conditions. This result is the *economic equivalent* of the Gibbs-Boltzmann exponential distribution in statistical thermodynamics. Statistical teleodynamics is the generalization of statistical thermodynamics for rational agents, with the surprising connection that economic utility is similar to *chemical potential*.

I will compare my theory's predictions with empirical data on global income inequality trends provided by Piketty and others. Our analysis suggests that the Scandinavian countries, and to a lesser extent Switzerland, Netherlands and Australia, have managed to get close to the ideal income inequality for the bottom ~99% of the population, while the U.S. and U.K. remain considerably less fair at the other extreme. Other European countries such as France and Germany, and Japan and Canada, are in the middle. I will conclude by summarizing the theory's policy implications and future directions.



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CPSE Seminar room, RODH C615, Chemical Engineering department, Imperial College London
This event is free and open to the public. No registration is required.
Refreshments before the seminar in the CPSE Common room

