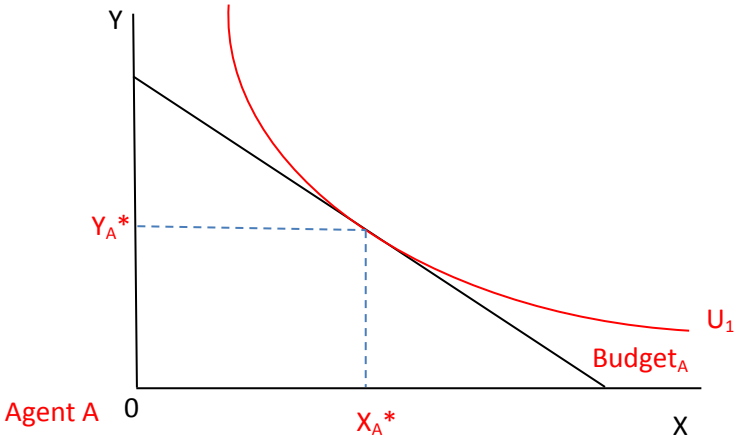
Pareto Principles and the Edgeworth Box[1]
Instructional Primer[2]

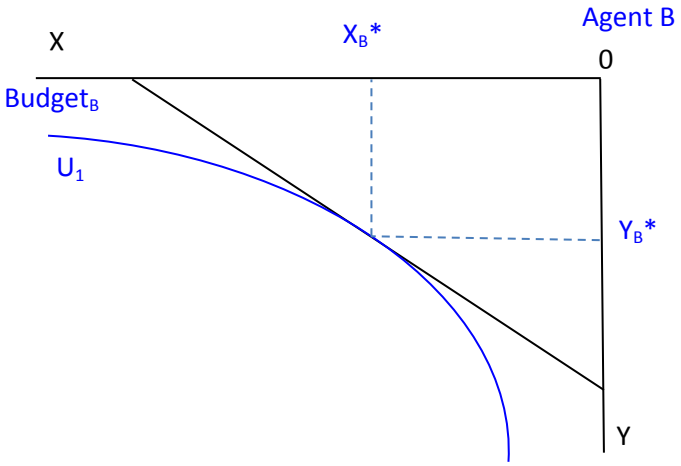
Consumers transact, purchase, goods to receive an expected level of utility. If someone buys an apple for $.50 the consumer expects to get at least as much utility from the apple as they did the $.50, otherwise the trade wouldn't occur. This exchange where each party gets something they want without giving up something of greater value to get it is considered ***Pareto Efficient***. In an exchange where one party gets more utility than they give up, or an exchange where both parties get more than they give up, is considered ***Pareto Improving*** and is also ***Pareto Efficient***. And an exchange where one party receives more than they give up but the other party gives up more than receive is not a Pareto transaction. Finally, a transaction in which the neither of the parties in an exchange can get more without the other getting less in said to be ***Pareto Optimal***.

We'll use the Utility Maximization model to begin our abstraction:



Now think about the Utility Maximization model shown above, but this time let's simply look at it from a different perspective: looking at it from the perspective of a second agent, Agent B.

This is the exact same indifference curve and budget formation as we have above but looking at it from a different angle. Now let's think about this from the perspective of two agents in the economy and consider the Pareto concepts as we observe their transactions.

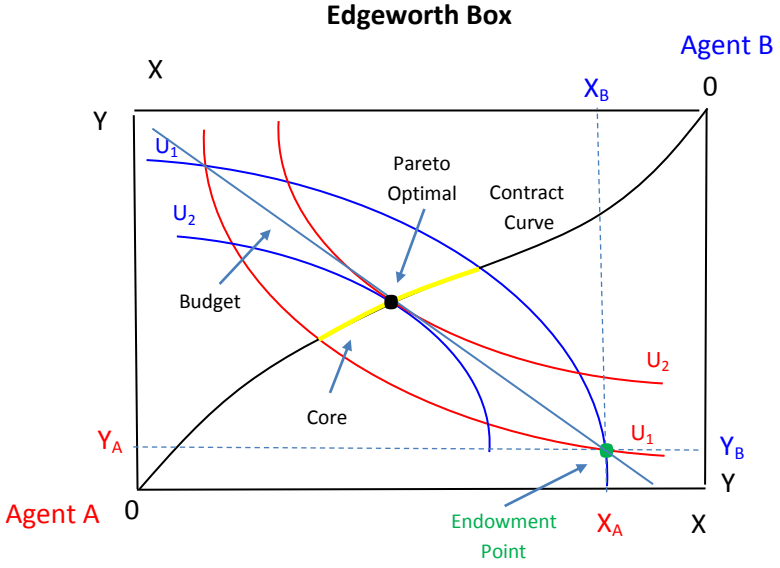


[1] This primer is intended to present an abbreviated discussion of the included economic concepts and is not intended to be a full or complete representation of them or the underlying economic foundations from which they are built.

[2] This primer was developed by Rick Haskell (rick.haskell@utah.edu), Ph.D. Student, Department of Economics, College of Social and Behavioral Sciences, The University of Utah, Salt Lake City, Utah (2013).

I like to use the ***Edgeworth Box*** to discuss this concept. If we put the two Utility Maximization models together, removing the budget curves and the optimal levels of X and Y (X*, Y*), the ***Edgeworth Box*** forms and reveals something about the constraints of these agents in this economy.

- As each agent increases their level of utility as they move from U_1 towards U_2 they each gain without the other losing – these movements (transactions) are Pareto Improving. But as they each come to utility level U_2, neither can obtain more without the other giving up some amount of utility – this is the ***Pareto Optimal*** point: the point at which the agent has maximized their own individual utility without requiring some sacrifice from the other.
- The line connecting agents A and B is representative of that curve upon which the agents are capable of and willing to exchange, which exchanges are ***Pareto Efficient*** – it is called the Contract Curve.
- If we consider that these two agents held some amount of X and Y to begin with, as their initial endowments, that the sum of X and Y held by each is the sum of economy's entire stock of X and Y, and that this endowment forms their initial budgets and constrains their potential exchanges. We can see that this point is at the transection of X_AX_B and Y_AY_B, and fully utilizes all of the X and Y in the economy such that $Y_A + Y_B = Y$, and $X_A + X_B = X$
- That part of contract curve highlighted in yellow is called the Core of the economy and represents possible exchanges in which these agents might engage.



We can further think about this placement of the initial endowments, called the endowment point as being a point on each of the agents' budget curves, which extends through the intersection of each of their respective U_I's and transects the Contract Curve at the ***Pareto Optimal*** point at which each of the respective U_2's are tangent. This forms a triple tangency and confirms the ***Pareto Optimal*** point.