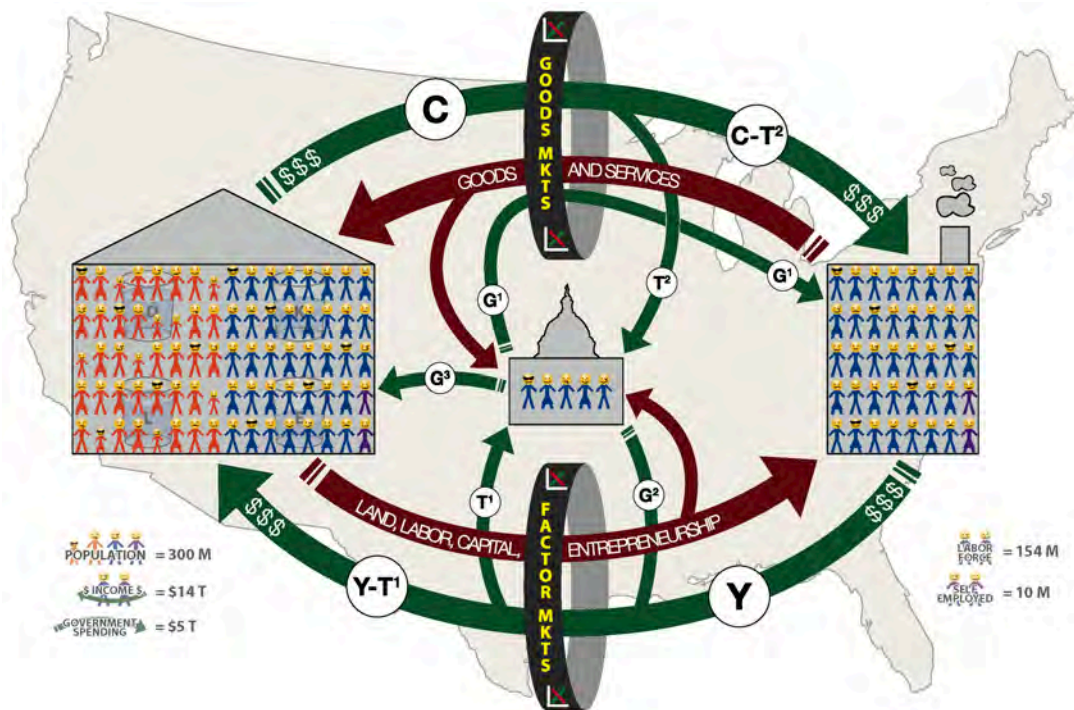


Buckets And Circular Flows

Macroeconomics Supplement

By Russ McCullough



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ALWAYS LEARNING

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Figure 1.1

Is this an economy?



Figure 1.1 Tom is stranded on an island and spends his day harvesting coconuts (C) and fishing (F). For example, on a given day Tom can produce 8C and 8F. Since Tom is productively efficient, to have more of one good he must give up some of the other. Tom only eats what he produces and therefore production equals consumption for our island dweller. Tom certainly faces economic decisions, but is this an economy?

Figure 1.2

Production Possibilities

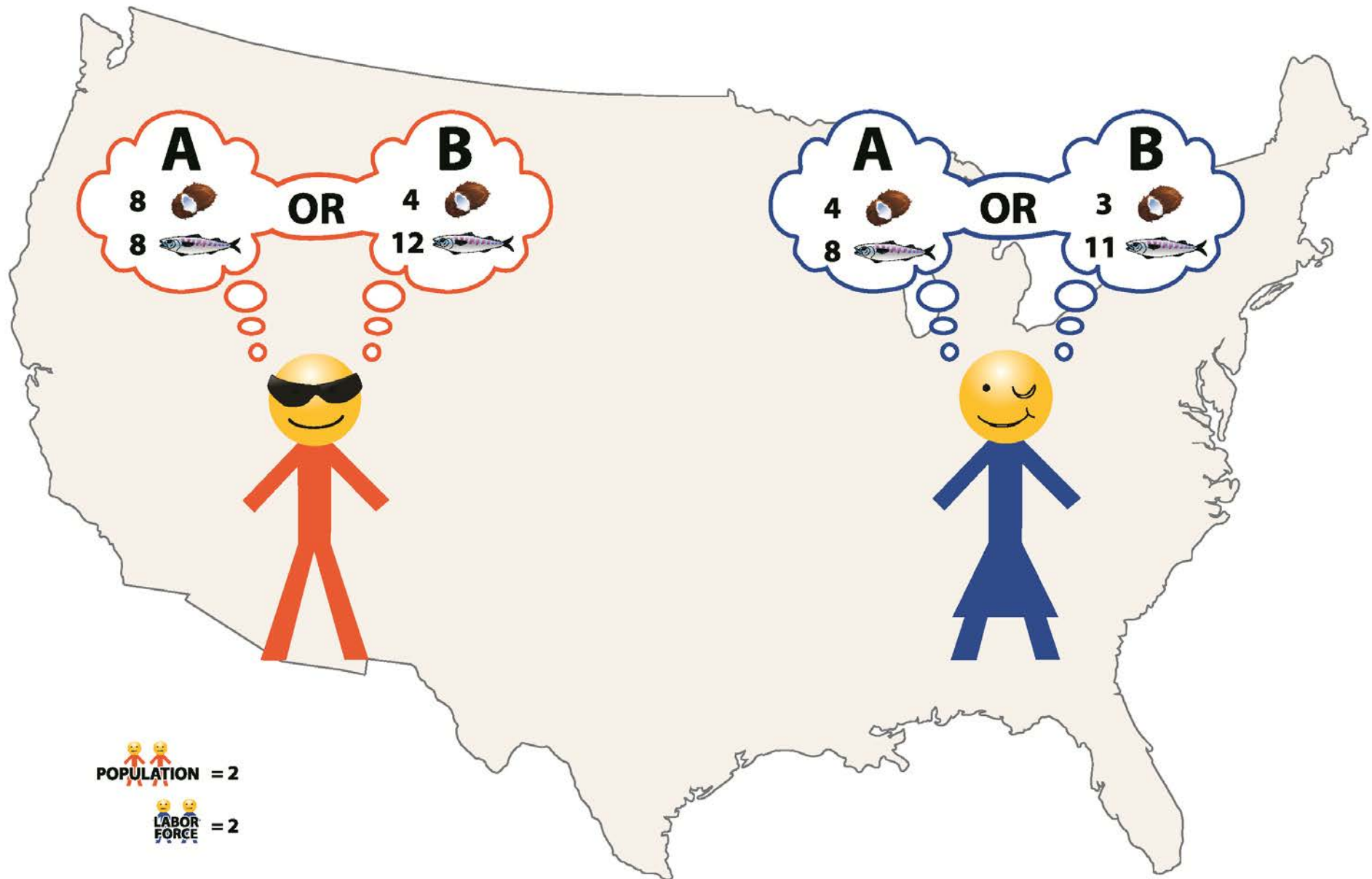


Figure 1.2 One day a woman joins Tom on the island. Jennifer faces the same choices Tom does for survival on the island but she is not as productive as Tom. Tom has an absolute advantage in production. In regard to production and consumption, is Tom better off just keeping to himself? Now that the island has two people, is it an economy?

Figure 1.3

Plotting Production Possibilities

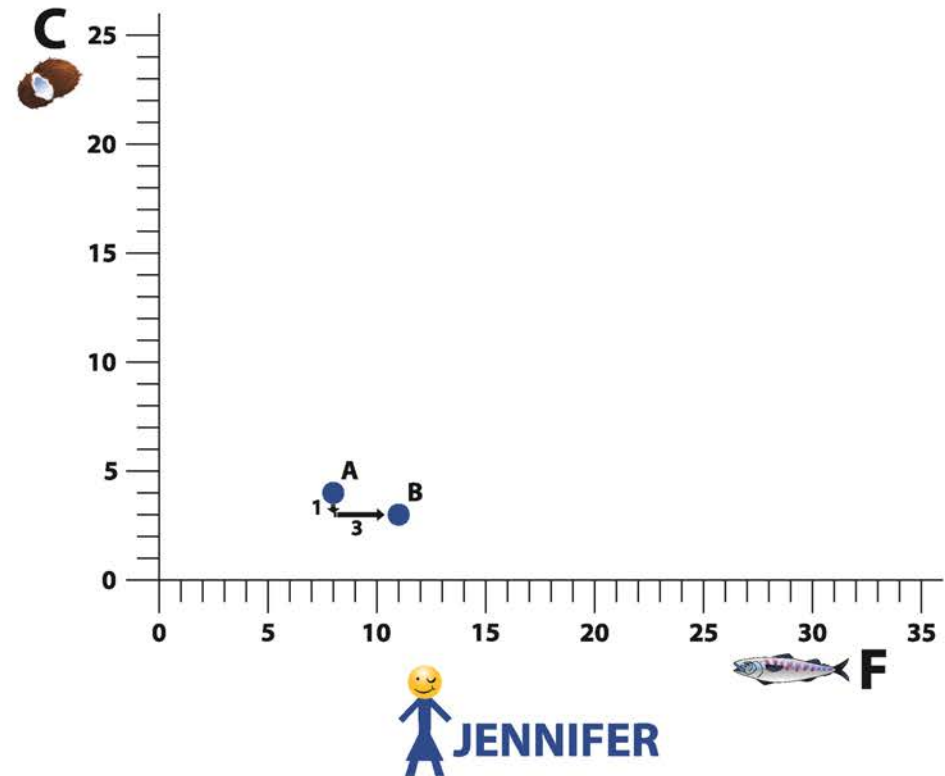
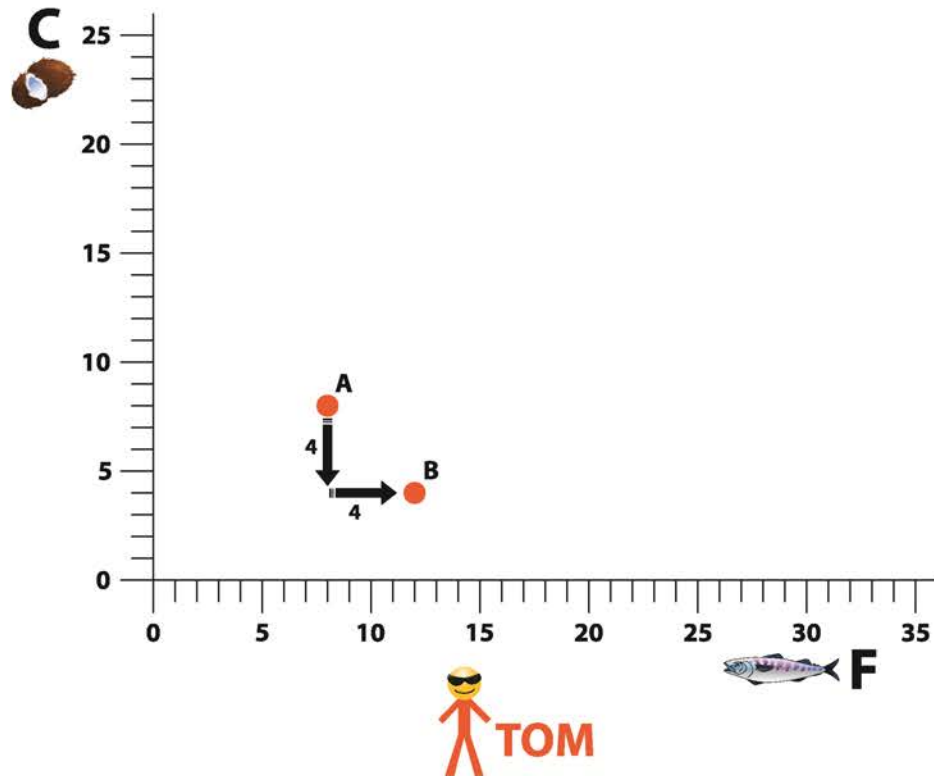


Figure 1.3 By plotting each person's production possibilities we see how Tom's points are farther from the origin (0,0). Each person prefers more to less and therefore strives to be farther out where they can enjoy more of both goods. We also see the trade-offs each faces with the choice of one point or the other. The opportunity cost of one fish is one coconut for Tom ($1F=1C$) but only $1/3$ coconut for Jennifer ($1F=1/3 C$). Since Jennifer's opportunity cost of fish is less than Tom's, she has a comparative advantage in fishing. Tom has an opportunity cost of one coconut equal to one fish while Jennifer has to give up three fish for one coconut, therefore Tom has a comparative advantage in coconuts.

Figure 1.4

Island vs Individual PPF

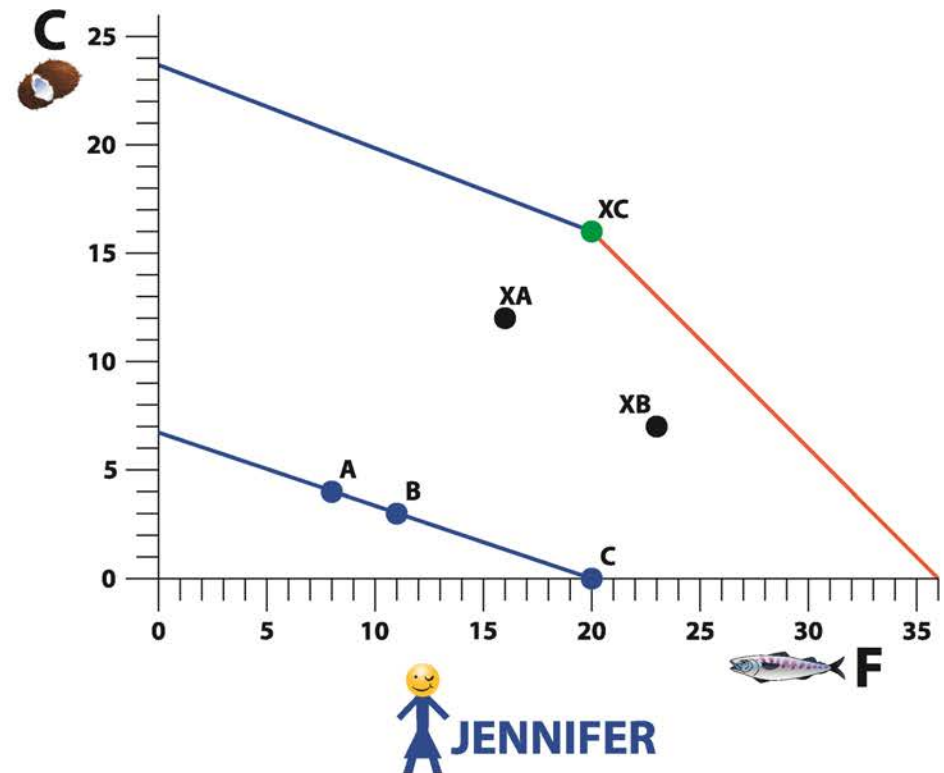
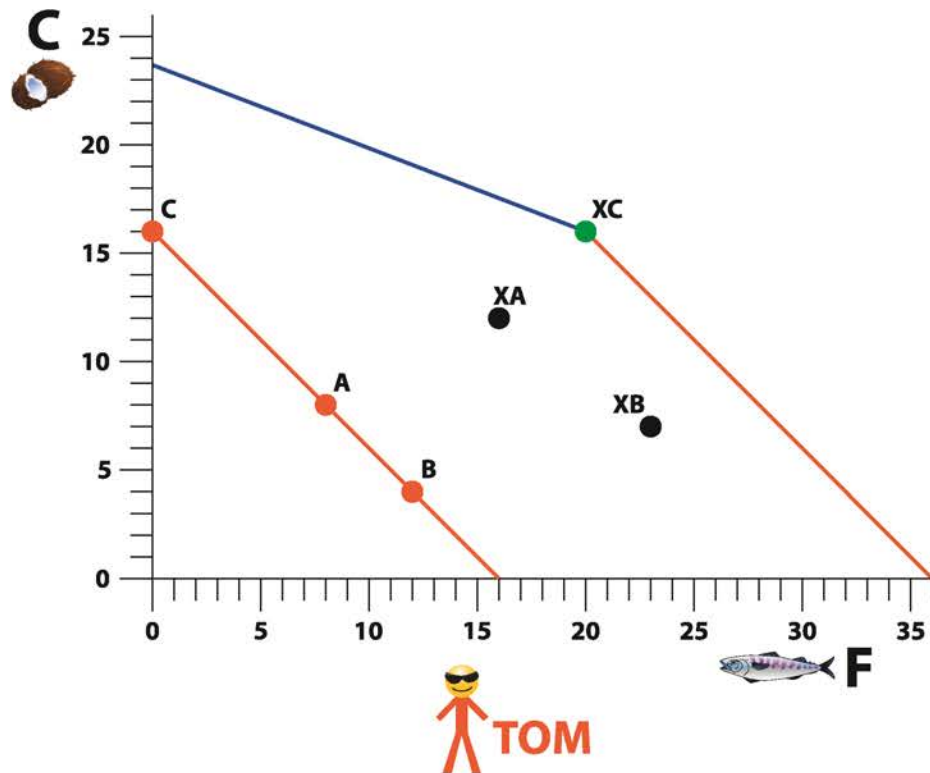


Figure 1.4 The inner line shows all production possibilities for each person and point C shows production at full specialization. If Tom and Jennifer coordinate production efficiently, island production can be anywhere along the outer production possibilities frontier (PPF). XA and XB show inefficient production points when each person acts individually. To be at a productively efficient point like XC, Tom should fully specialize in coconuts and Jennifer in fish by producing 16C and 20F respectively. We know that it is productively efficient because in order for the economy to produce more of one good, it must give up some of the other good. The PPF shows the maximum combination of two goods an economy can produce given its available resources and technology.

Figure 1.5

Specialization and Trade

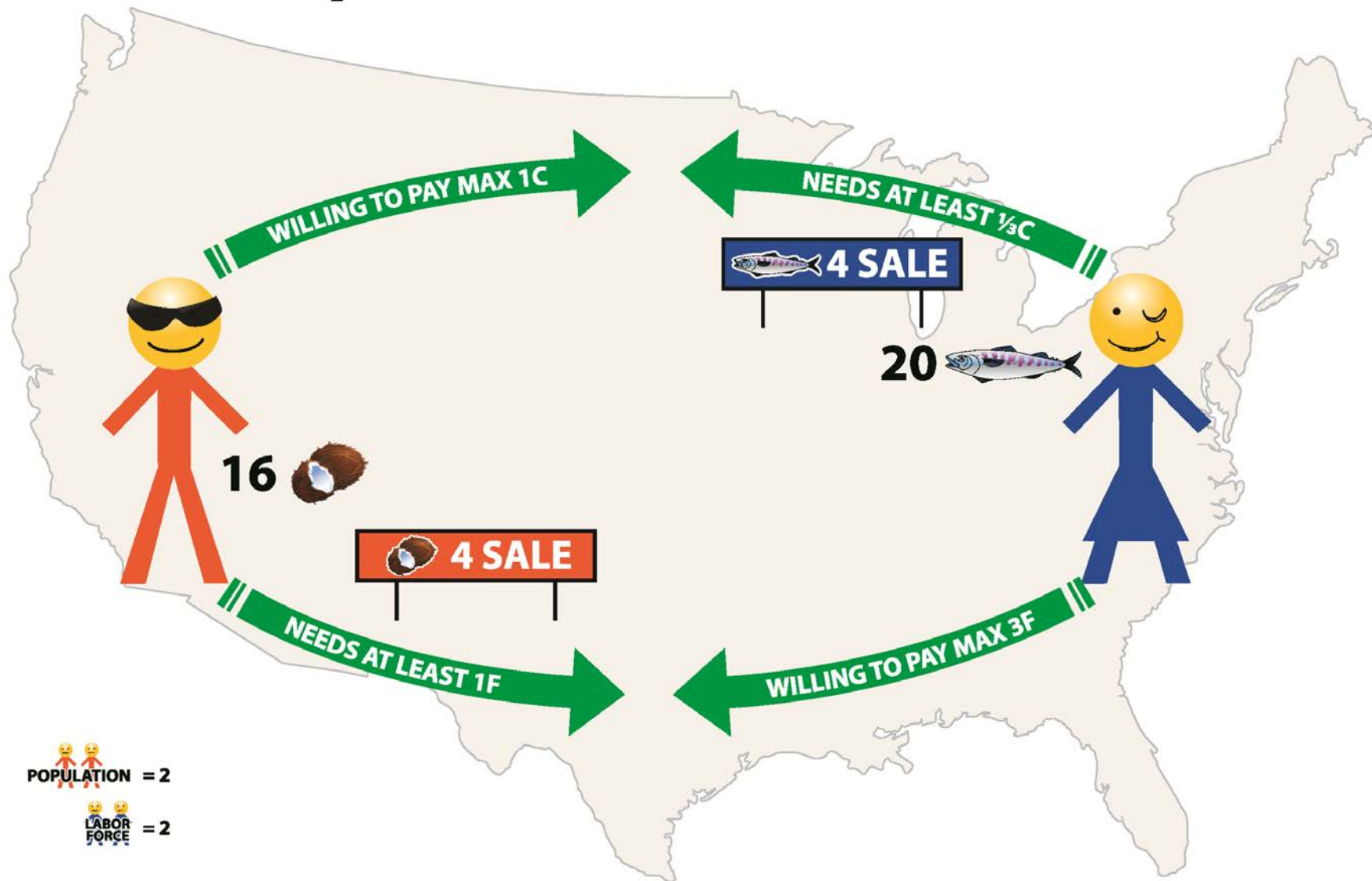


Figure 1.5 A market is born when there is a buyer willing and able to pay a price that will at least cover the opportunity cost of a seller. Tom gives up one fish for each coconut he harvests and therefore needs at least one fish when he goes to sell coconuts. Jennifer gives up three fish for every coconut and would love to pay anything less than $3F$ if she could find a seller. When these two negotiate, the price of a coconut will fall between $1F$ and $3F$. Our fisherman Jennifer gives up $1/3$ of a coconut for each fish she catches and therefore needs at least $1/3 C$ when she goes to sell her fish otherwise she would just do it herself. Each coconut Tom harvests himself costs him one fish so if he can pay less than $1C$ for each fish, he is better off. Given the incentives of each person, we can predict that the market price of fish (P_F) will be between $1/3C$ and $1C$ ($1/3C < P_F < 1C$).

Figure 1.6

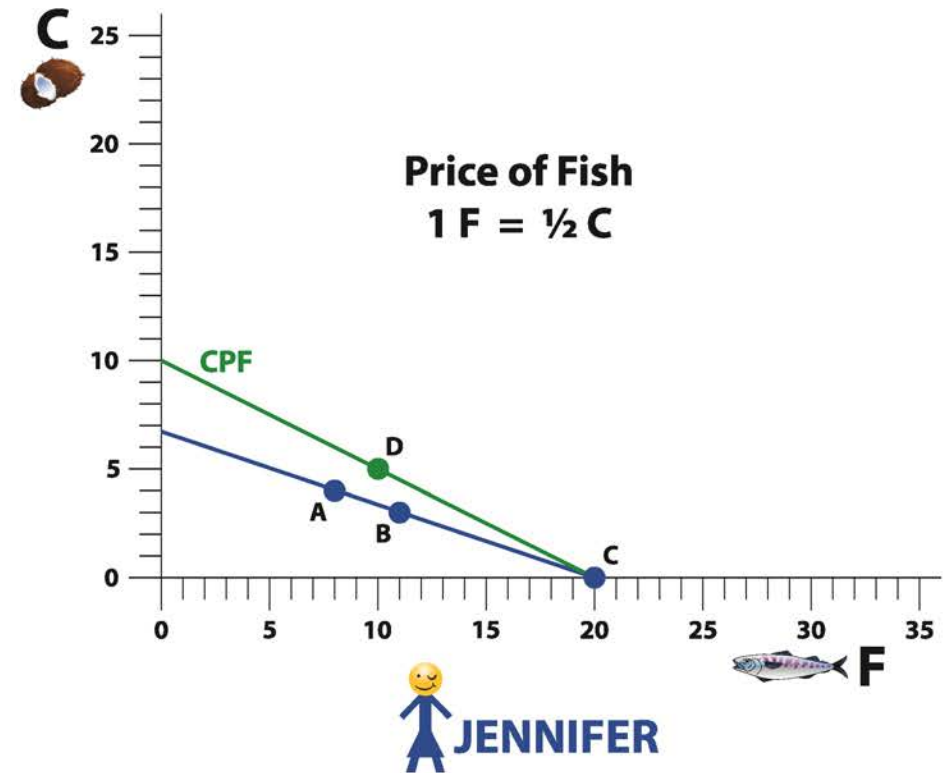
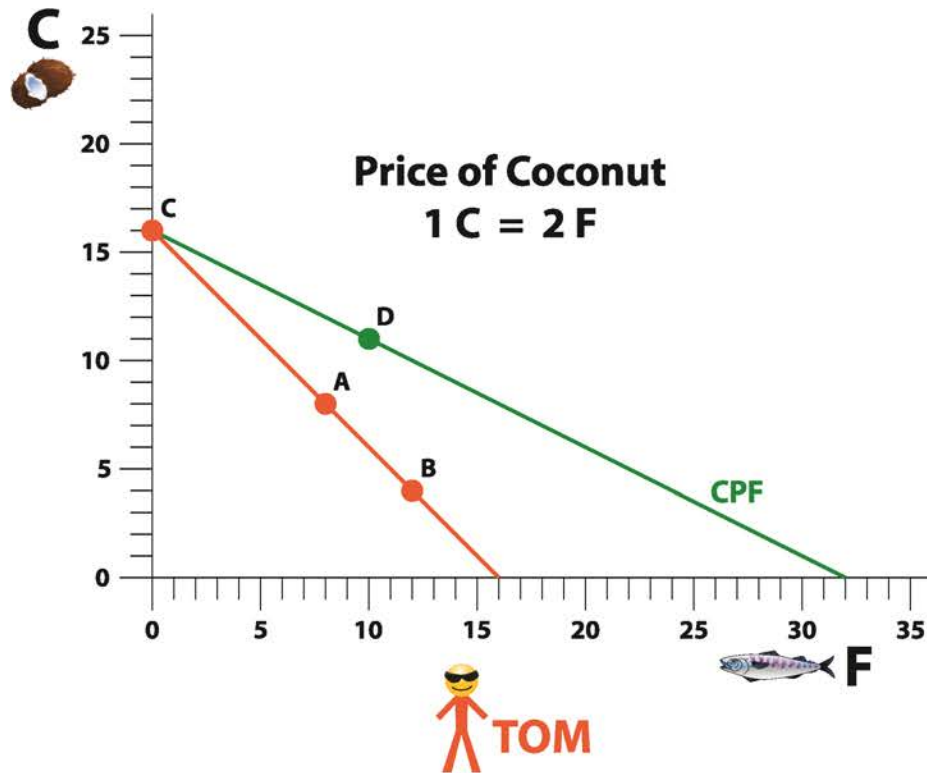


Figure 1.6 Assume that after some serious negotiations, the two agree to a market price of coconuts equal to two fish ($1C = 2F$). This of course effectively sets the price of one fish being $\frac{1}{2} C$ ($1F = \frac{1}{2} C$). In theory, each person can be anywhere along the new consumption possibilities frontier (CPF) which is entirely outside his and her individual PPF! Specialization and trade allows consumption to be greater than production for both Tom and Jennifer. Point D highlights one possible post-trade point in which each person has more of both goods. The principles of trade and comparative advantage that work to make Tom and Jennifer better off are the same that make two countries better off with free trade.

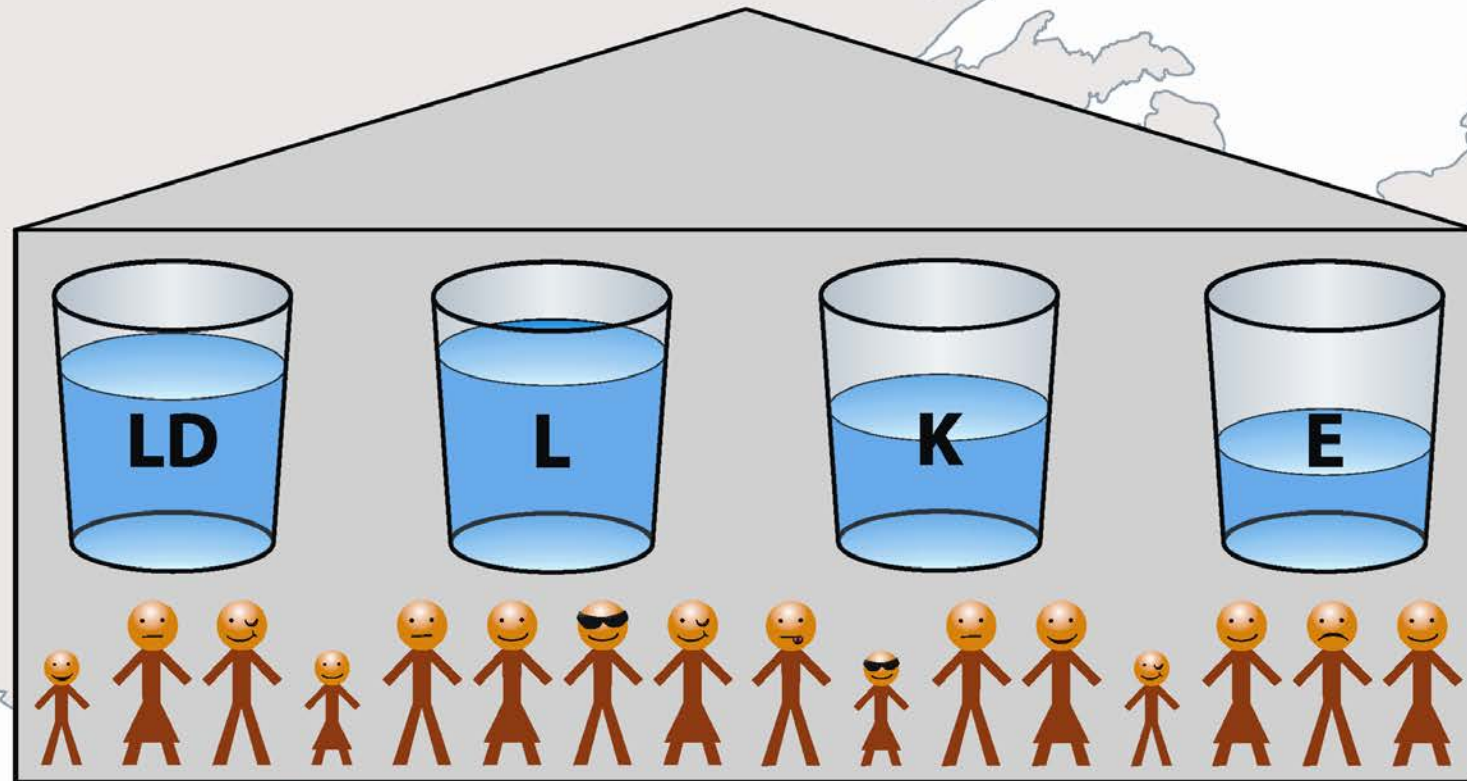


Figure 2.1 Households unlimited wants and limited resources: An economy is nothing more than a group of households engaging in trade for the pursuit of happiness. These households own all of the resources in the economy. We can categorize all resources into four basic groups: land (LD), labor (L), capital(K) and entrepreneurship(E). If we could freeze time, you could take an inventory of the quantities of each group. Think of the quantity of each resource being held in a bucket. At any point in time, there is a certain level in the bucket.

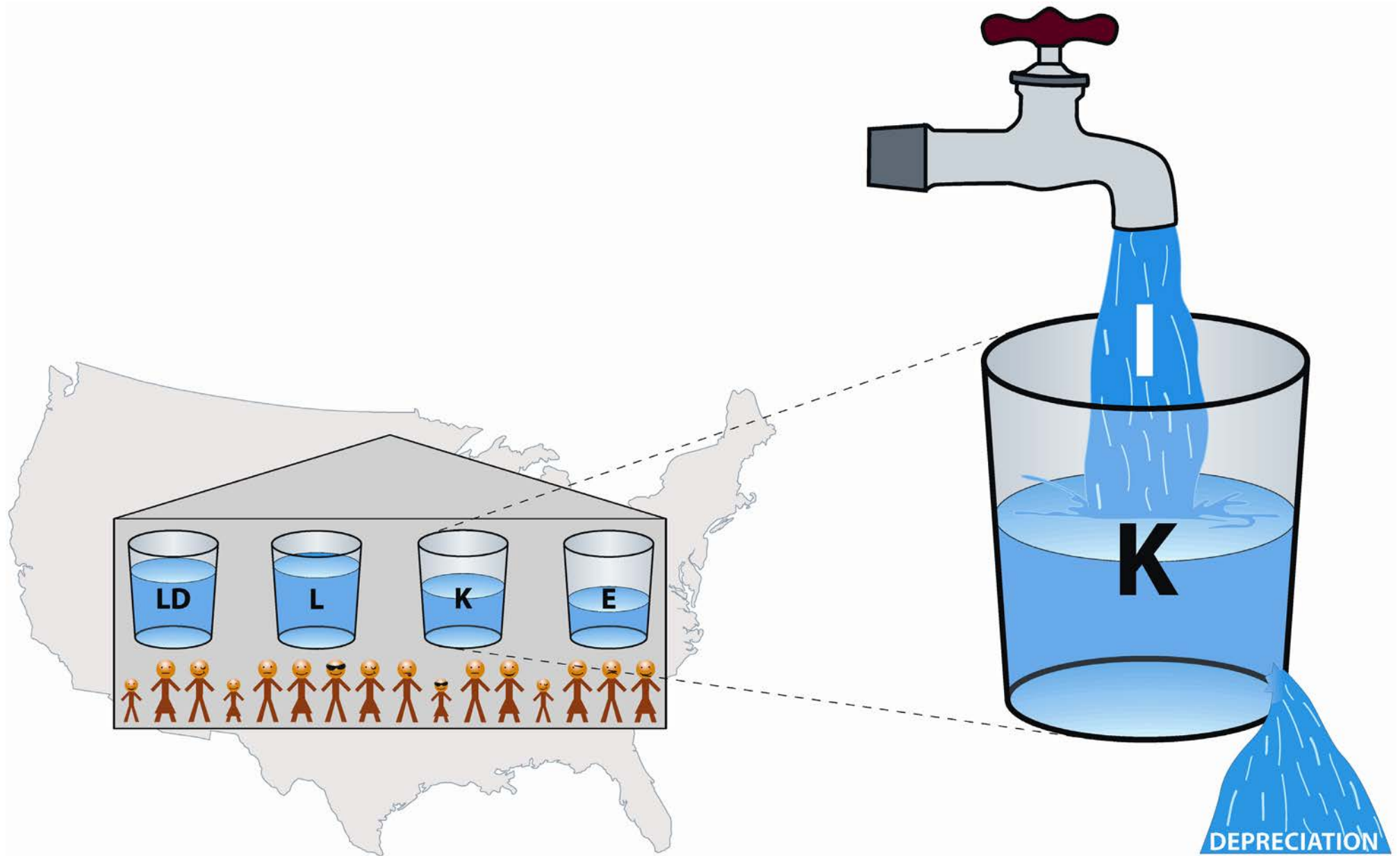


Figure 2.2 Stocks and Flows: The stock of resources changes from one point in time to another by increases and decreases to the bucket. The flows to and from the buckets occur for different reasons, sometimes by choice (spigot valve), sometimes by chance or use (hole in the bucket). For the capital bucket, investment (I) is the purchase of new capital over the course of some time period (like one year) and depreciation is the loss of value of capital during that same time period. The bucket level at the end of the time period adjusts accordingly.

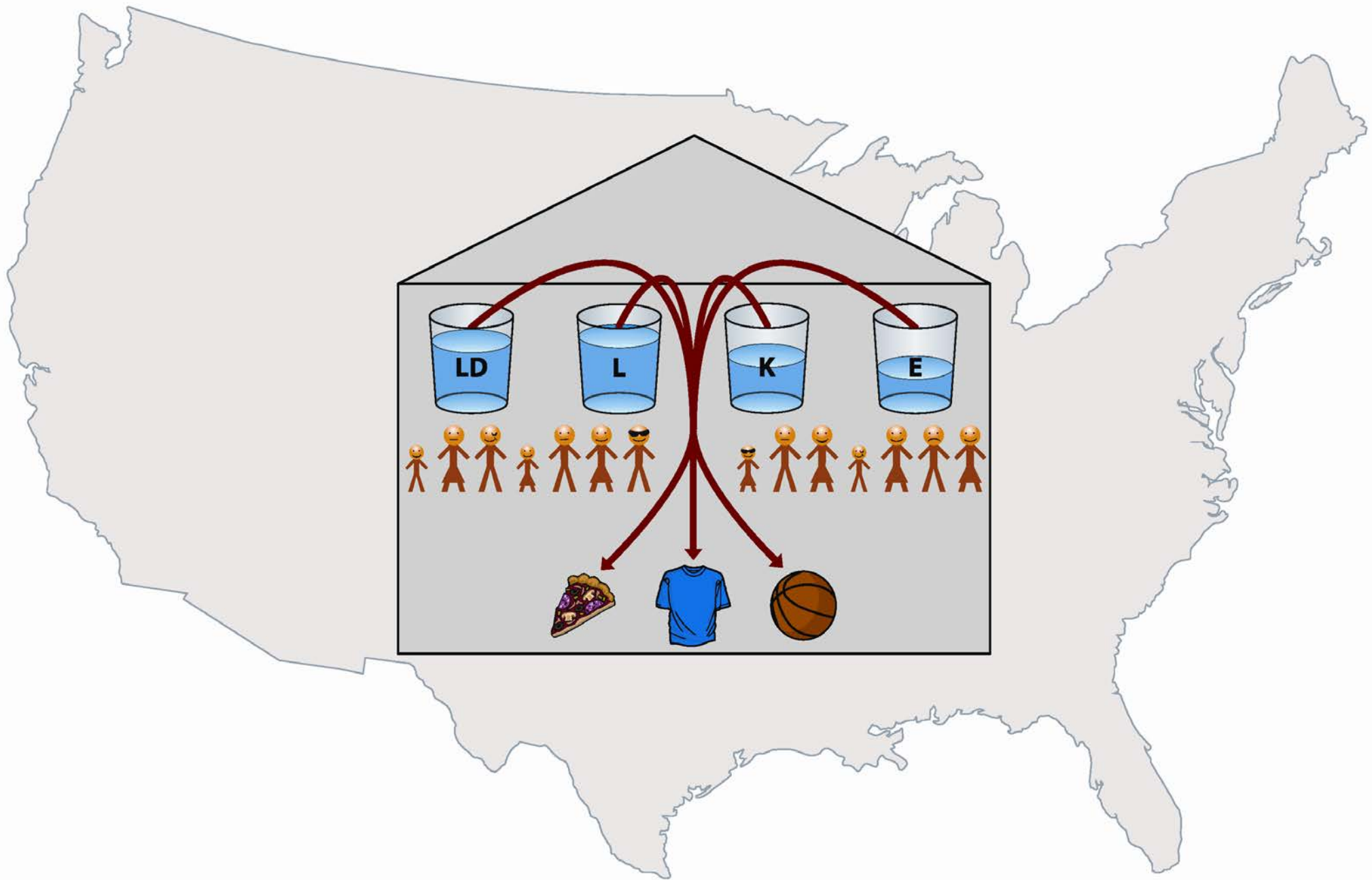


Figure 2.3 What? How? For Whom? The challenge households have is to figure out the best way to convert the buckets of limited resources they own into final goods and services. Households' unlimited wants and needs compel them find the most efficient way to answer three basic questions of: What to produce? How to produce what they want? For whom are the goods produced? The real economy is about physical trades. There is no true happiness derived from money! Money helps facilitate trade, the real final goods and services consumed is what makes us happy.

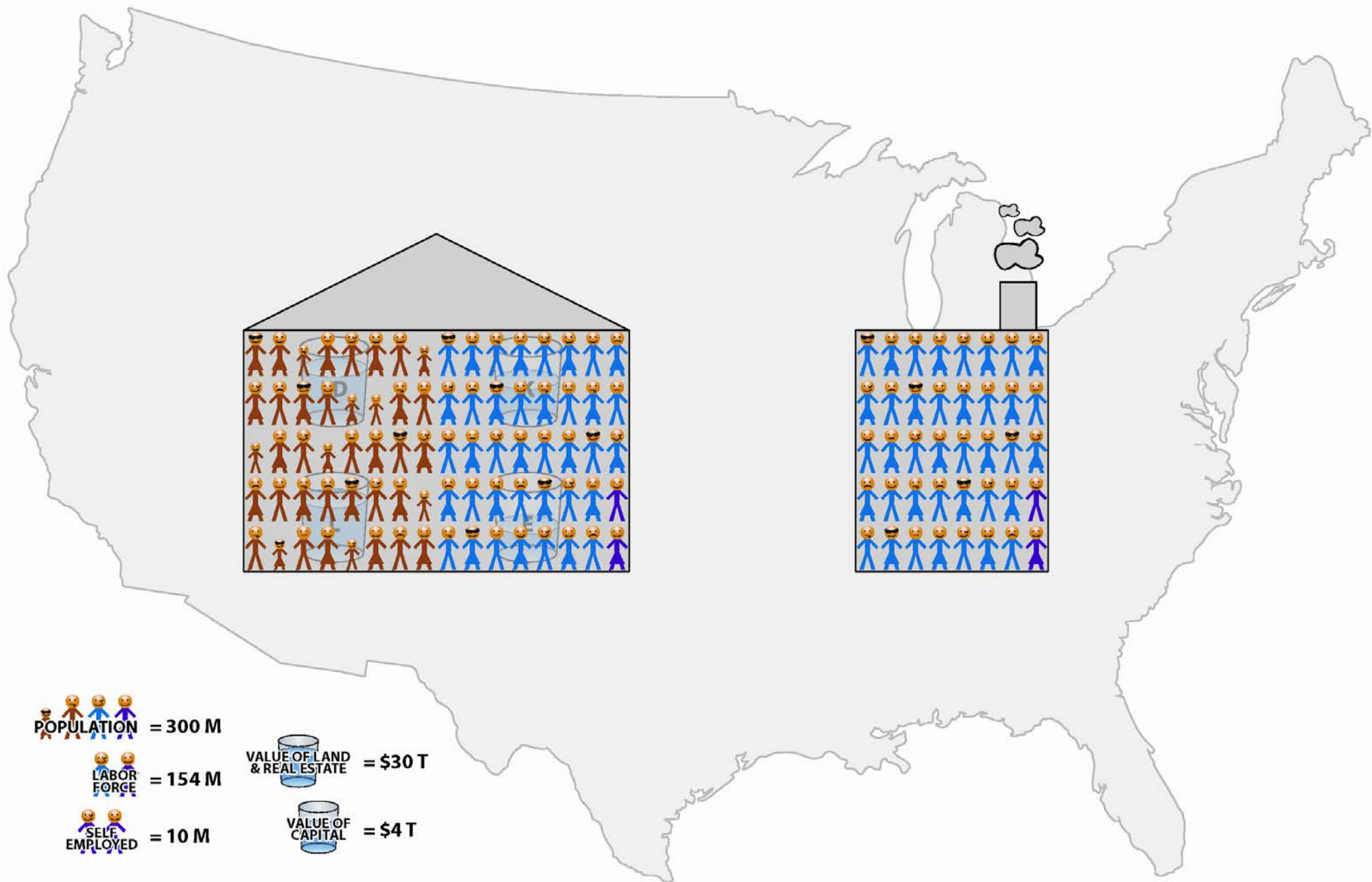


Figure 2.4 Specialization: A result of households pursuing happiness is that they take on multiple roles. About half of the members of households organize themselves as firms in the United States. Firms are composed of employees and entrepreneurs. Organizing labor efforts in a firm (business) allows individuals to specialize in the production of goods for which they have a comparative advantage. This allows them to trade for consumption possibilities that would otherwise not be possible on their own. Using round numbers, the population of our island is about 300m, the labor force is 154m of which about 10m call themselves entrepreneurs. Our island's capital bucket is valued at about \$4T and our land bucket has real estate valued at roughly \$30T. We make decisions daily on what to buy which then determines the wealth of our nation.

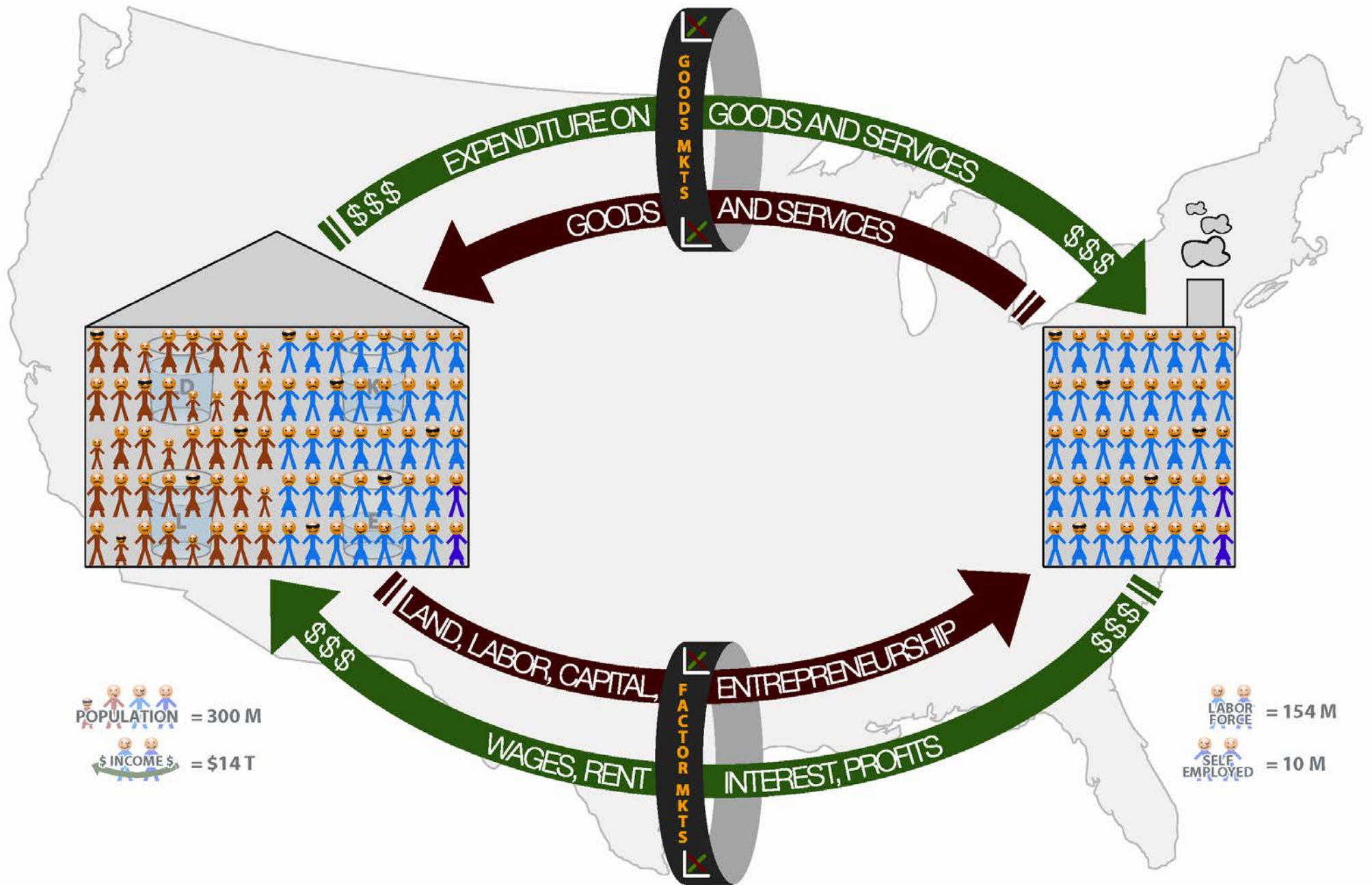


Figure 2.5 The Free Market: The red flows show the real economy which is made up of trades of *quantities* resources for *quantities* of goods and services. Green flows show the money that helps facilitate trade. The market ring shows the exchange of real quantities for payments between households and firms. The monetary value of the use of resources is equal to monetary value of all final goods and services. Or, stated differently, income earned from the use of resources is equal to total spending on final goods and services.

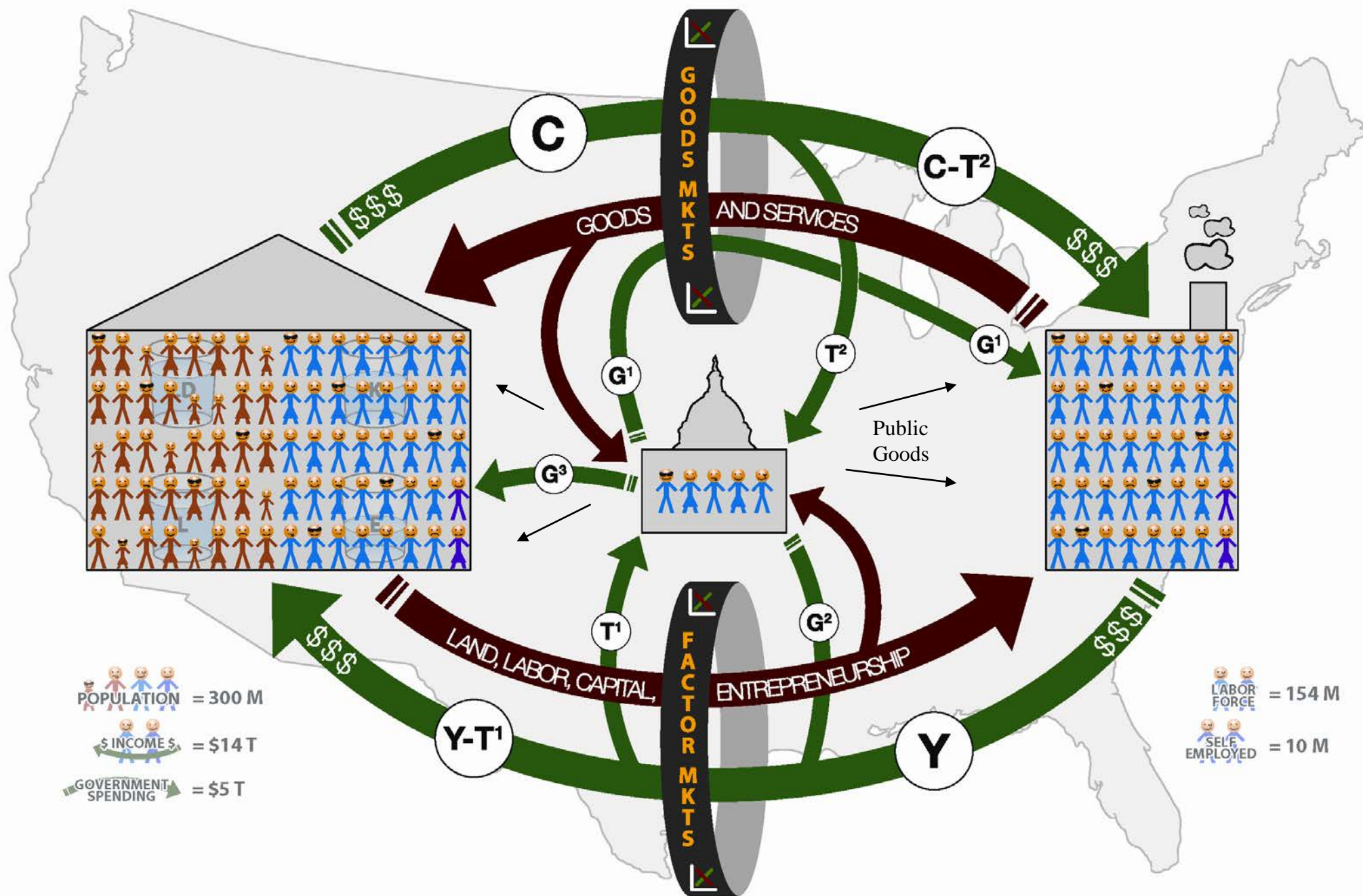


Figure 2.6 Enter Government: Households form a government to define and protect their buckets (property rights). The government is composed of politicians (elected) and bureaucrats (employees). The government collects taxes on income (T_1) and consumption (T_2). The government spends money on new goods and services like weapons of mass destruction (G_1), resources like labor (G_2) and transfer payments like from rich to poor (G_3). Government spending is about 20% of all spending in the economy.

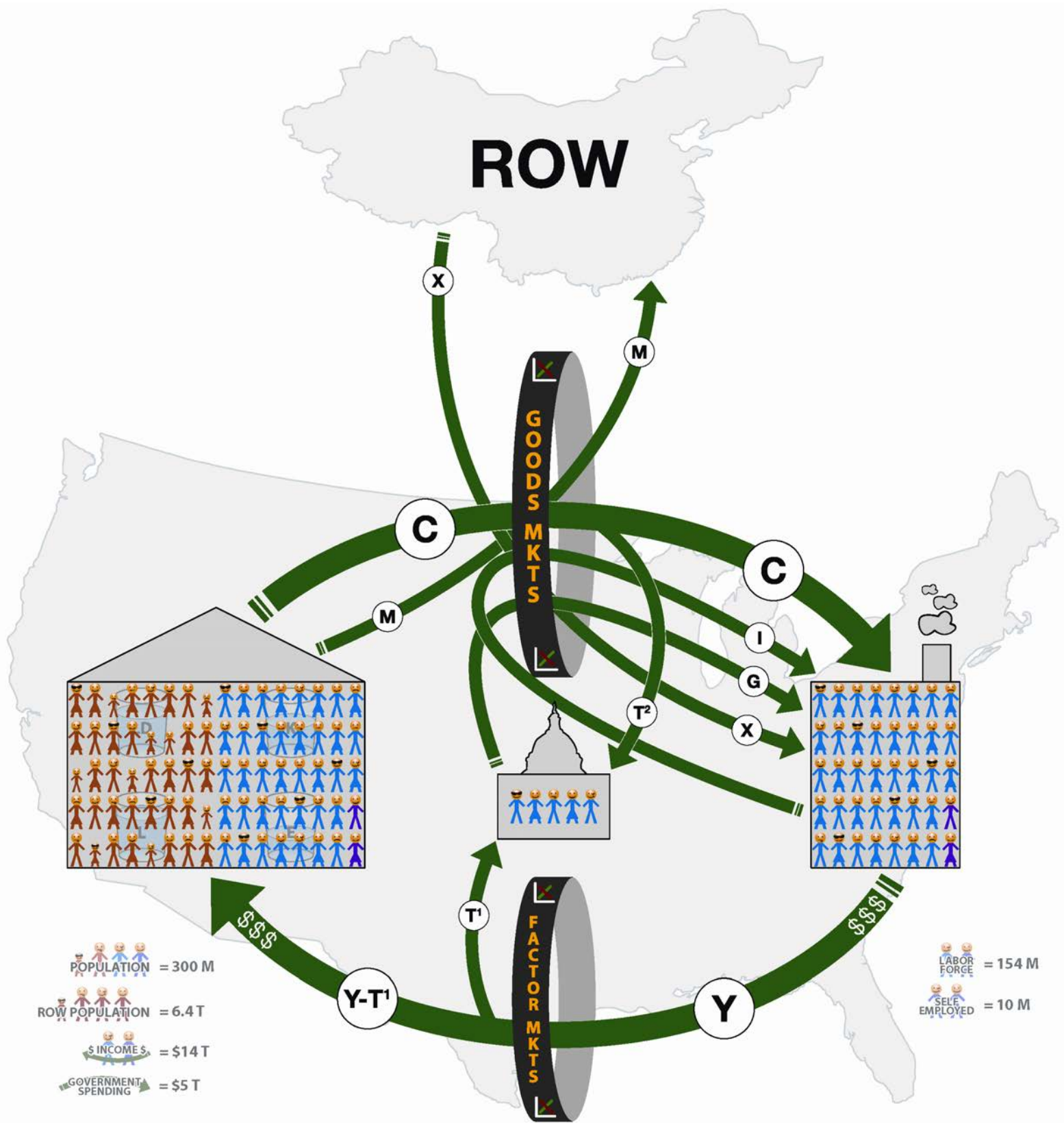


Figure 2.7 Enter ROW: International trade creates exports (X) and imports (M) for the United States. Exports are sales of goods or services to the rest of the world (ROW) which create money inflows into the US. Imports are purchases of goods and services from ROW which create outflows of money. All international trade flows through the goods and factor markets. The circular flow diagram shows how total income for the nation (Y) is equal to the sum of spending in four categories of consumption (C) + Investment (I) + Government Spending (G) + Net Exports (X-M)

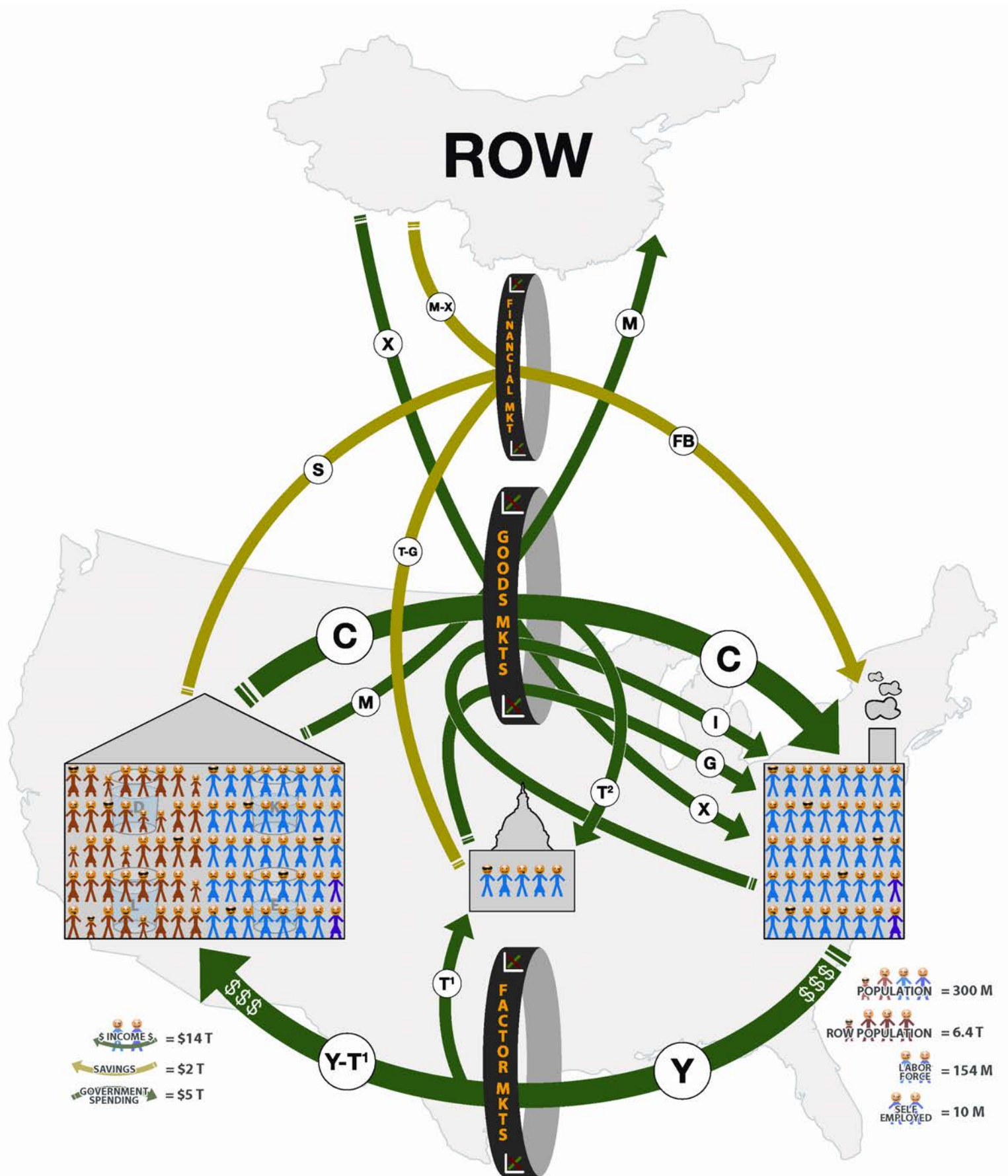


Figure 2.8 Saving and Borrowing: Financial markets allow households, firms and the government to borrow and save. Households allocate their disposable income (Y_d) to consumption (C) and saving (S). The government affects the financial markets when taxes (T) do not equal spending (G). The rest of the world (ROW) affects the financial markets when exports (X) do not equal imports (M). These three sectors of the economy provide funds for firms' borrowing (FB) which is the primary source for new domestic investment (I) purchases during the year. Domestic investment is funded by domestic savers, government saving and foreign saving, $I = S + (T-G) + (M-X)$. Note that a government deficit crowds out domestic private investment while a trade deficit helps fund domestic investment. Assume that our island has I of $\$2T$ and ROW saving of $\$.7T$.

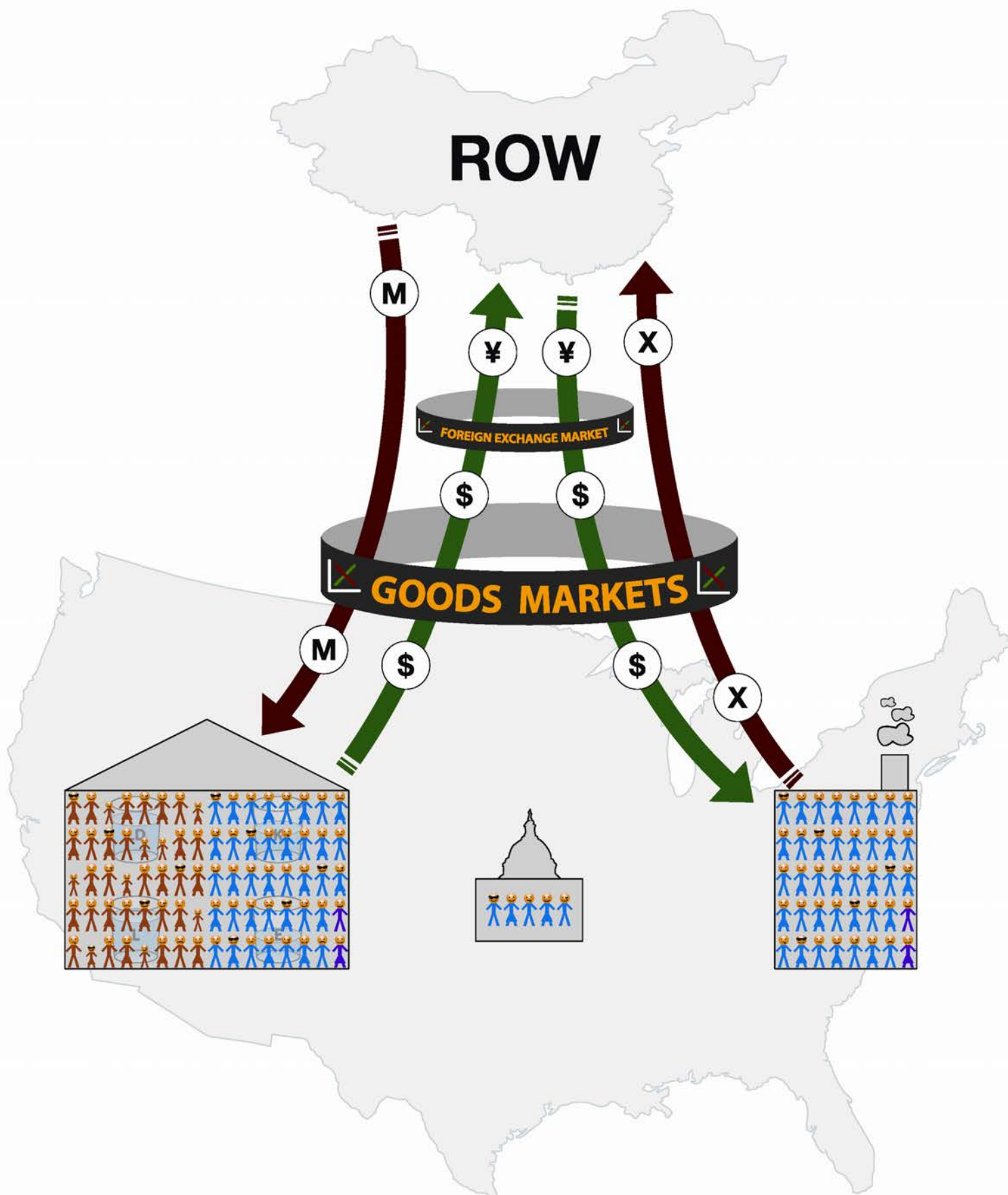


Figure 2.9 Currency Exchange: Since China does not use US dollars within their country and vice versa, a part of the financial market evolved to trade currency and it is called the foreign exchange market (FEM). The demand and supply of currency in FEM is derived from real factors that affect the trade of goods and services among countries. When the US buys more from China than what China buys from us (US trade deficit, $X-M$), China has a claim to dollars for which it does not desire anymore US goods. Therefore, China buys US denominated financial assets and provides foreign saving that helps fund US investment (I).

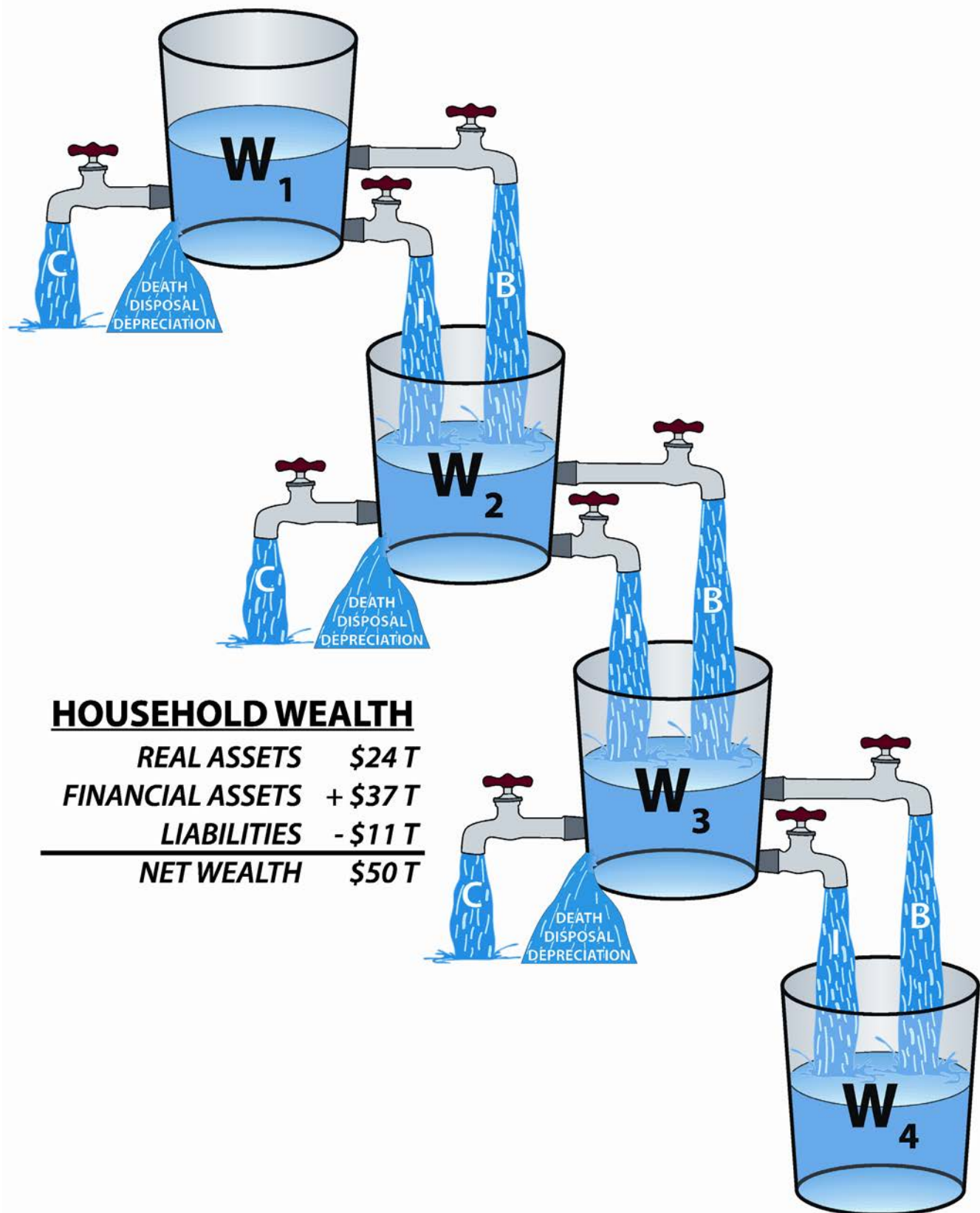


Figure 2.10 Changes to the Wealth of Nations: Wealth of a nation changes year to year ($W_1 - W_2 - W_3$). US Wealth can be thought of as the total value of all the nation's assets less any claims against those assets from ROW. Assets include inventory of unused final goods, durable consumer goods of any age, and all buckets of resources. Economic growth is a positive increase in RGDP (Income) from one year to the next and it has consumption (C) and investment (I) making up about 85% of its value. When the nation chooses to spend its income on **I**nvestment it flows into next period's wealth bucket whereas **C**onsumption does not. The wealth bucket also grows through discovery and birth (B) of natural resources.

We are often concerned about the welfare of the average person. It is helpful to calculate RGDP per person to better understand how population growth relates to economic growth. It highlights that we need the economic growth rate ($\% \Delta \text{RGDP}$) to be at least as much as the population growth rate in order for average income per person to grow. Per Capita RGDP grows faster when there are **I**ntestments in physical capital, human capital and technology.

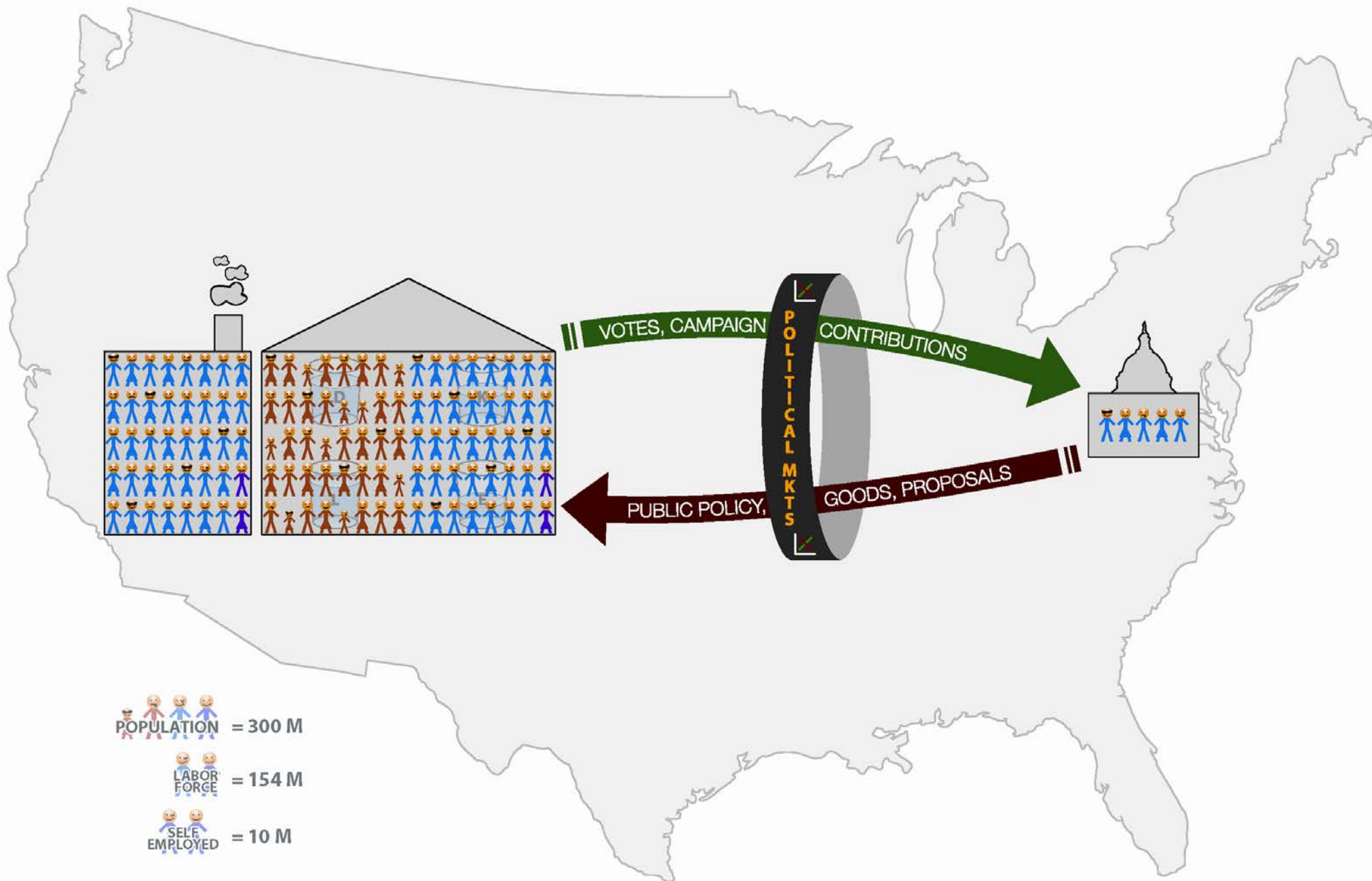


Figure 2.11 Political Markets: With any market it is important to identify the agents and objectives of each agent. The characteristics of public goods can make democratic decisions complex and this calls into question the efficiency of the political marketplace. The consumers of government goods are voters and firms who “pay” with votes, campaign contributions and lobbying efforts. The supply of government goods is produced by politicians and bureaucrats. Politicians are the “entrepreneurs” and their objective is to get elected and stay in office. Bureaucrats are the staff and employees of the government and their objective is to maximize the budget of their department which gives them job security.