

## Problems with Funny Money

Problem 12 in Chapter 2 of *Workouts in Intermediate Microeconomics* poses the following. On the Planet Mungo, they have two kinds of money, blue money and red money. Every commodity has two prices, a red price and a blue price. Every consumer has two incomes, a red money income and a blue money income. In order to buy a unit of any good, a consumer must pay *both* the blue money price and the red money price. There are just two goods on Mungo, Good 1 and Good 2.

This problem was written to torment undergraduate economics majors, but PhD students should be able to take it much further.

**Part 1).** Let there be  $n$  goods and suppose that Mungovian creatures have continuous strictly convex preferences and always prefer more to less of any good. Let  $b$  be the vector of blue prices, and  $r$  the vector of red prices. Let  $m_b$  be blue income and  $m_r$  be red income.

Draw a diagram (or two) for the case of two goods, to show budget sets, indifference curves and choice sets.

Consider the “Marshallian demand correspondence”  $x(b, r, m_b, m_r)$  that specifies the bundles chosen by a consumer facing price vectors  $b$  and  $r$  with incomes  $m_b$  and  $m_r$ . What properties can you find for this correspondence? Is it single-valued? continuous? Is it homogeneous of some degree in something (explain)? Define an indirect utility function  $v(b, r, m_b, m_r) = u(x(b, r, m_b, m_r))$ . What properties can you find for this function?

How would you generalize the idea of expenditure functions to this situation. What properties can you find for expenditure functions?

**Part 2).** Suppose that there are just two commodities and everybody on Mungo has a utility function  $u(x_1, x_2) = \min\{x_1, ax_2\}$  where  $a > 0$ . Find Marshallian demand functions, indirect utility functions, and a generalization of expenditure functions for this case.

**Part 3).** A Mungovian creature named Donald is running for president on a platform of “monetary reform.” Under Donald’s reform, people will no longer have to pay for goods with two currencies. Instead, every Mungovian, after examining his income and the red and blue prices, can decide whether he wants to be a “blue” or a “red”. Blues must send their red income to Donald, but can use their blue income to buy goods at blue prices. Reds must send their blue income to Donald, but can use their red income to buy goods at red prices.

Draw a diagram (or two) to show budget curves, indifference curves and choice sets. Answer the questions posed in Part 1) under this currency regime.

**Part 4).** Answer the questions posed in Part 2) in the case where Donald is elected and enacts his monetary reforms. (You may be wondering whether there will be a market equilibrium in the new regime and what would happen to equilibrium prices. Don’t worry about that for now. Let’s just see how demand responds to prices and incomes in this regime.)