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INTRODUCTION

In a recent paper in this Journal (1987) Croushore sets forth conditions for the neutrality of government fiscal policy in an overlapping generations model. Neutrality is defined as constant rates of inflation and interest; the exact rates to be specified later. He concludes that policy neutrality is difficult to achieve. The purpose of this comment is to demonstrate that policy neutrality is relatively easy to implement in his model. With a single exception Croushore's notation will be used throughout this paper.

MONEY AND BOND MARKET EQUILIBRIUM

Croushore demonstrates that a period t real interest rate is equal to the (constant) population growth rate in equilibrium, i.e. $i(t) = n$. He also shows that the inflation rate, $\pi(t)$, is a function only of $n$, $\pi(t) = -n/(1 + \delta)$, thus is also constant in equilibrium. The nominal interest rate at time t is $R(t)$ and is related to the inflation and real interest rates by the familiar formula in equation (1).

$$1 + R(t) = \frac{1 + R(t)}{1 + \pi(t)}$$

The equilibrium values for $R(t)$ and $\pi(t)$ imply that $R(t) = 0$ for all t. Thus the rates of return on money and bonds are identical.2

Prior to the government's implementation of any taxing or transfer scheme Croushore outlines the conditions for money and bond market equilibrium in period t, equations (2) and (3) respectively,

$$M(t) - N_t \cdot p(t) \left( \frac{\delta t}{1 + \delta} \right)$$

$$B(t) - N_t \cdot p(t) \left( \frac{\delta t}{1 + \delta} \right)$$

where

$M(t)$—money supply in period t,

$B(t)$—supply of bonds in period t,

$p(t)$—period t price level,

$N_t$—number of young poor in period t,

$N_t$—number of young rich in period t,

$\delta$—rate of time discount from the utility function,

$\alpha$—initial endowment of the young poor,

$\beta$—initial endowment of the young rich,

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The terms in brackets involving $\alpha$ represent a poor agent’s optimal real demand for money in (2) and a rich agent’s optimal real demand for bonds in (3). Note that the rate of time discount is constant for all agents and endowments are constant among poor (rich) agents. Using the equilibrium result that $R = 0$, the ratio of the equilibrium quantity of money to the equilibrium quantity of bonds in period 1 is given by equation (4).

$$\frac{B(1)}{M(1)} = \frac{N(1)\alpha}{N(1)\alpha} = K$$

where $K$ is a constant because the two populations grow at the same rate and the initial endowments are constant in each period. In the absence of government taxing or transfers the money and bond markets are in equilibrium for any time paths of bond and money supplies which maintain $K$ subject to the condition that the nominal money (bond) supply expands at a rate no faster than $n$. A faster rate of increase than $n$ in the supply of money each period would entail a positive rate of inflation, and under such conditions (constant) good storage is preferred to money or bond holdings.

**NEUTRALITY AND GOVERNMENT POLICY**

Croushore’s objective function for the government is to select lump sum taxes and transfers, bond issuance, and the money supply for equations (5) and (6) to hold. He refers to the objective described by equations (5) and (6) as neutrality.

$$\xi(0) = \frac{\eta - n}{1 + \eta}$$  

(6)

Since these values of the inflation rate and real interest rate imply $R = 0$, equation (4) shows that the government can achieve its neutrality objective by maintaining constant supplies of money and bonds (assuming both are costlessly issued) and zero lump-sum transfers and taxes. Neutrality is easily attained, despite Croushore’s claim for his analysis that “... what the result shows is how difficult it is to achieve neutrality.”

**CROUSHORE’S NUMERICAL EXAMPLE**

Croushore’s numerical example illustrates that a tax and transfer strategy which maintains neutrality can be devised to present utility reductions arising from changes in money and bond supplies. However, there is no purpose for the increases in the money and bond supplies in his example. The government neither supplies nor consumes goods nor does it provide services except for the welfare-improving initial introduction of money and bonds to the system. Future increases or decreases in the supplies of money or bond cannot improve every agent’s welfare. Furthermore, the counter example provided below shows that, under certain conditions, neutrality cannot be attained without the imposition of a permanent transfer/tax scheme.

As in Croushore’s model, suppose the government permanently raises the supplies of money and bonds. If these conditions are satisfied then neutrality can easily be achieved. First, the initial ratio of bonds to money is preserved. Second, agents believe that the government’s actions will not be repeated. Third, the changes are known to all but not foreseen by any agents. To introduce the new money (bonds) the government gives transfers of equal size to each period 4 poor (rich), young agent. Since the changes are unexpected these money and bond transfers have no effect price to period 4. The same parameters as used by Croushore are employed in this example, with one exception: the money supply is increased by 15 rather than 10 units. The effect of this change is to maintain the original money to bond ratio of 1.5. Thus, the money and bond supplies are increased to 60.47 and 403.16, respectively, in period 4. In his example neutrality [equations (5) and (6)] is given by $\xi(0) = -5$ and $\iota(4) = 1$.

**Money Market Consequences**

The change in the money supply affects the period 4 price level, inflation rate, and consumption of the old. Using equation (2) the price level of period 4 is given by $P(4)$.

$$P(4) = \frac{M(4)|1 + \iota|}{N(4)|1 + \iota|} = \frac{(60.47)(1.9)}{(120)(5.4)} = .1662$$

The period 4 price level is used to calculate the period 4 inflation rate, equation (8). The period 3 price level is .25.

$$\iota(4) = \frac{P(4) - P(3)}{P(3)} = \frac{.1662 - .1669}{.1669} = .3351$$

Real consumption of the period 4 old is below its anticipated level due to the slower than expected rate of deflation and is given by equation (9).

$$\phi(4) = \frac{\iota(4)}{(1 + \theta)(1 + \iota(4))} = \frac{.3351}{(1.9)(.6649)} = .4275$$

The period 5 price level is given by equation (7) which simply involves subtracting the higher number of period 4 young into (7). Comparing the period 5 and 4 price levels shows that $\iota(5) = 5$, part of the neutrality objective has been achieved.

$$P(5) = \frac{M(5)|1 + \iota|}{N(5)|1 + \iota|} = \frac{(60.47)(1.9)}{(256)(5.4)} = .083$$

**Bond Market Consequences**

Using the calculated period 4 price level, equation (3) is used to solve for the nominal interest rate yielding equation (10).

$$\iota(4) = \frac{R(4) - R(4)}{P(4)N(4)|1 + \iota|} = \frac{(403.16)(1.9)}{(1662)(256)(18)} = 1$$

Thus, $R(4) = 0$.

Equation (11) is derived by substituting the computed values of $P(4)$ and $R(4)$ into equation 1 to determine the real interest rate.

$$\iota(4) = \frac{1 + \iota(4) - 1}{1 + \iota(4)} = .6649$$

From $\iota(4) = .649$. Because the $\iota(4) = .5$ and $R(4) = 0$, the ‘neutral’ real rate of interest, $\iota(4) = 1$ is restored within one period. In other words the two neutrality conditions can be achieved within one period without further government actions.

Finally, consumption of the period 4 old rich is reduced to 14.25, calculated in a fashion similar to that used for the period 4 poor. Because neutrality is restored in period 5 consumption of all generations, rich and poor, after the fourth returns to the optimal values given in Croushore’s paper.

**CONCLUSIONS**

Croushore’s claim for the difficulty of achieving the government’s objective of neutrality is inconsistent with the overlapping generations model he develops. Rather, the government can easily achieve neutrality by holding the supplies of bonds and money constant and by imposing zero taxes and
Reply: What Neutrality Means in Macroeconomics

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The basic idea of my original paper (1987) is the following: Consider a growth model of money and bonds, and examine the optimal growth rates of the money supply and government debt. Suppose the government changes the levels of the money supply and government debt from their optimal levels at some date. What impact do these changes have on the economy? Does the government possess tools which can return the economy to its optimal point? That is, can the government affect the change in monetary and fiscal policies by changing some other variable, such as the level of the money supply? If so, do these changes affect the economy in the same way as changes in money supply and government debt? The answer is yes, but the necessary tool is a precise lump-sum tax-transfer scheme. The government can arrange taxes and transfers to modify agents' demands for money and bonds to just offset the increase in supply of money and bonds while leaving the interest rate and inflation rate unchanged. From this result, I conclude that the conditions for neutrality are stringent, because the ability to choose a precise lump-sum tax-transfer scheme is beyond the scope of most governments.

Wallace's comment on this is to ask the question: Why doesn't the government simply leave the money and bond supplies at their optimal levels? This question completely misses the point of the exercise, which is to change policy and see if it has some impact on the economy. Wallace says that "there is no purpose for the increase in money and bond supplies," and concludes that "the government can easily achieve neutrality by holding the supplies of bonds and money constant and by imposing zero taxes and transfers. Why the government chooses to alter the stocks of money and bonds in the first place is a question which Croushore leaves unanswered." Wallace seems not to understand the difference between normative and positive analysis. My neutrality argument is a positive analysis of the effects of a change in policy.

There are important reasons for engaging in positive analysis. As I suggested in my paper (p. 132), the weak neutrality theorem establishes that there is "useful as a basis for comparison with models which have more realistic assumptions about the government's goals or the tools available to it." In the presence of some distortion, the lack of complete information, or alternative goals by the government, the government may optimally choose some particular policy mix, and we would like to know the implications of that choice. By looking at the conditions under which neutrality holds in a simple model, and at non-neutral changes in policy, we obtain guidance for analyzing more complicated models and for thinking about the real world.

Not only does Wallace employ a faulty concept of neutrality, but his numerical counter-example is incorrect. First, it violates the government budget constraint (Croushore, 1987, top of p. 130). Second, it changes the information setup of the problem from one of perfect foresight (a useful simplifying assumption) to one of uncertainty about future government action. The counter-example suggests that the changes are known to all, but not foreseen by any agents. This change in the information set of agents is equivalent to injecting all the preceding analysis, and leads to quite different demands for money, bonds, and consumption goods that I derived in my paper. Consequently, this is not a valid counter-example.

The ECONOMIC MEANING OF NEUTRALITY

The economics literature contains a number of neutrality theorems. These theorems are most widely known in financial economics, especially the Modigliani-Miller theorem (1958). The same type of theorem, though, has been applied to macroeconomics in regard to the government's choice of financing spending by current taxation or by current borrowing, the principal and interest of which are to be financed from future taxes. This neutrality theorem is the Ricardian equivalence proposition, which has been a major research topic since Barro (1974) refined it.

To prove these theorems, one must show that the activity in question (the choice of debt versus equity financing of corporations in the Modigliani-Miller theorem, and the choice between tax and debt financing in the Ricardian equivalence proposition) does not affect any real economic variable, such as a firm's stock price, or the interest rate in the economy. In this form, which we call "strong neutrality," the firm's debt-equity ratio or the government's debt level are completely irrelevant in determining endogenous variables of interest. In the Modigliani-Miller theorem, investors acting to maximize their own returns simply offset whatever debt-equity ratio is chosen by the firm. In the Ricardian equivalence proposition, people increase their saving to match the government deficit dollar-for-dollar, so that interest rates are unaffected. In both these cases, the firm's and government's budget constraints are subsumed by the economic agents' budget constraints, and the economic agents take actions which offset the actions of the firm or government.

"Strong neutrality" is subject to a large number of assumptions, the failure of any of which prevents the neutrality theorem from holding. In the Modigliani-Miller case, the presence of bankruptcy or dissuasion taxation may eliminate strong neutrality. In the Ricardian equivalence proposition, finite lifetimes (in the absence of bequests), discretionary-income taxation, or imperfect capital markets may prevent strong neutrality from holding. Nonetheless, the neutrality theorems are useful as benchmark cases from which deviations from neutrality may be examined, both theoretically and empirically.

In other models, more stringent conditions are required for neutrality to hold. For example, Nelson Wallace (1981) shows that open-market operations may have no effect on the economy, if the government adjusts taxes in a particular way as it changes the money supply. In this case, which we might call "weak neutrality," the actions of private agents can not neutralize government action. Instead, the government must use a different tool to offset the effects of the first tool. A similar example of weak neutrality is given

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by Sargent and Smith (1987), who extend the Wallace result to the case where money is dominated in rate of return. Essentially, if monetary policy is accompanied by a particular type of fiscal policy, then there is no real effect on the economy. Further examples of both strong and weak neutrality arguments may be found in Sargent (1987).

The key difference between strong and weak neutrality theorems lies in the actions of optimizing agents. In the case of strong neutrality, the budget constraint of the agent which causes policy to change (the firm in the Modigliani-Miller case and the government in the Ricardian Equivalence case) is incorporated within the budget constraint of the optimizing agents (investors or savers). But in the weak-neutrality case, the budget constraints are not imbedded sufficiently to cause distortion or friction in the economy. In overlapping generations models, as in my paper, the friction arises because finite-lived agents cannot agree to contracts with those who are not yet alive. A change in fiscal or monetary policy cannot be neutralized by private agents, since their budget constraints do not subsume the government budget constraint. Neutrality of government policy requires the government to offset its own policy change by some other tool, such as a change in the stream of lump-sum taxes and transfers. In the absence of such a powerful tool, government policy changes are not neutral.

SUMMARY

Wallace's conclusions are wrong because his concept of neutrality is incorrect. My statement (Croughs, 1987, p. 123) that "neutrality theorems demonstrate the stringency of the conditions needed for debt or money to be neutral" remains valid. Research which explores the effects of government policy changes under some distortion which prevents neutrality (such as the absence of lump-sum taxes and transfers) is needed by policy-makers.

REFERENCES


Book Reviews


Anindya Datta's short book can be conveniently divided into two parts. The first part critiques the Lewis type dualistic models (LDM) in general and in particular their applicability to India's development experience. This is done in the first 36 pages covering three brief chapters. The second and major part of the book, which also includes five appendices, is devoted to an empirical study designed to find out whether growth and equity are compatible goals for India.

The paper by A. Lewis (1954), and subsequent elaborations and refinements by Fei and Ranis (1961, 1964), ushered in a new way of thinking about development. At the macro level the economy was conceived to consist of two sectors: a large "traditional" agricultural sector with surplus labor and a small "modern" or "capitalistic" sector being an enclave of industry. Labor in the latter sector is employed up to the point where its marginal product is equal to a constant real wage which is strictly higher than the average wage paid in agriculture. This difference provides an incentive for labor to migrate from the agricultural sector to the industrial sector without any fall in agricultural output thus resulting in higher aggregate output for the economy. Growth in the economy proceeds as the capitalist, with a higher savings propensity, continuously realises a major part of his profits through capital accumulation. At each round a part of the surplus labor is absorbed in the industrial sector until no surplus labor remains in the agricultural sector. The economy then takes off on a self-sustained balanced growth path.

Around that time, S. Kuznets (1955) found that as countries move from very low levels of development toward higher levels, income distribution tended to worsen for prolonged periods until a 'middle' development level was reached. After reaching that stage, further growth was associated with an increasingly equal distribution of income. The phenomenon of first worsening and then improving distribution of income came to be known as Kuznets' inverted U hypothesis. By the Lewis-Kuznets tradition the author is referring to the 50 years of stylized facts sketched out above.

Datta contends that the predictions of the Lewis dual-sector model are refuted by India's rate of 'structural transformation' which set in from the mid-sixties to the late seventies. During this period, the industrial sector exhibited slow and distorted growth with basic and capital goods industries experiencing lower growth rates than the "trade-oriented" consumer goods industries. Furthermore employment and investment barely increased in this sector. On the other hand, in spite of enjoying favorable terms of trade the agricultural sector failed to show productivity increases over levels achieved before 1965/1966 (years of the Green Revolution) and was characterised by worsening income disparities. Economy-wide there was scope and continuing inflation.

Datta's explanation for the stagnant condition in India is a synthesis of several ideas, at times, competing explanations put forth by various writers. He agrees with the majority opinion that the source of industrial stagnation is inadequate effective demand and that painstakingly proceeds to provide a comprehensive picture of the processes involved in both sectors. Briefly put, since the agricultural sector consumed the major source of demand for industry output and as it had extreme inequalities of income, the aggregate level of effective demand remained severely restricted by the slow growth of agricultural.

However, that leaves unresolved a host of issues that arise about the deficiency-in-demand type explanations, if viewed in the Lewis type framework. Firstly, with the terms of trade in the有利 favor, the agricultural sector's real income should have increased which would have induced more output through the increased hiring of labor and the technology of the seed-processor-water based Green Revolution. Labor stagnation in the urban sector would have been slowed due to the resulting rise in the real wage in the agricultural sector. Secondly a higher income level in the agricultural sector would have generated the necessary demand for industrial output as well as savings for increased capital formation irrespective of the kind of income distribution that prevailed. So the picture of general stagnation in the economy could not have persisted over fifteen years.