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Money and capital as competing media of exchange

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Abstract

We construct a model where capital competes with fiat money as a medium of exchange, and establish conditions on fundamentals under which fiat money can be both valued and socially beneficial. When the socially efficient stock of capital is too low to provide the liquidity agents need, they overaccumulate productive assets to use as media of exchange. When this is the case, there exists a monetary equilibrium that dominates the nonmonetary one in terms of welfare. Under the Friedman Rule, fiat money provides just enough liquidity so that agents choose to accumulate the same capital stock a social planner would.
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1. Introduction

We study an economy where real assets (capital goods) compete with fiat money as a medium of exchange, and address the following questions: can fiat money be valued—and useful to society—when real assets can be used as means of payment? Does the production of real assets provide enough liquidity to the economy? How do economies respond to liquidity shortages in the absence of fiat money?

We adopt the search-theoretic approach of Kiyotaki and Wright [7,8] since it is well-suited to study which objects endogenously emerge as media of exchange. In order to allow for competition between nominal and real assets, we follow Lagos and Wright [9] and give agents periodic access to competitive markets where they can trade all assets. In addition, we let agents choose which

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assets to use as a means of payment in decentralized trades and impose no restrictions on their portfolios.

We establish a condition on fundamentals under which fiat money can be valued and socially beneficial. This condition states that money has a welfare-enhancing role when the capital stock that a social planner would accumulate is smaller than the stock of assets that agents need to conduct transactions. In the nonmonetary equilibrium, this liquidity shortage confers the assets that can be used as a medium of exchange an additional return, and this induces agents to overaccumulate capital. Capital plays two roles in this economy: it has a productive role and it provides liquidity services. Its rate of return can be decomposed into a *liquidity return*, related to its role in the exchange process, and an *intrinsic return* associated with its productive role.

The introduction of fiat money helps to disentangle the productive use of the real asset from its liquidity use and induces agents to reduce the inefficiently high stock of capital goods. In the monetary equilibrium, money has the same rate of return as liquid capital since agents can exploit arbitrage opportunities in the centralized market. The Friedman Rule (deflating at the rate of time preference) is the optimal monetary policy and it induces the efficient accumulation of capital in the monetary equilibrium. Finally, there are also parametrizations under which the socially efficient capital stock provides enough liquidity to the economy, and in these circumstances fiat money is neither useful nor valued.

The notion of capital goods being used as media of exchange is not a pure theoretical abstraction. Einzig [5, pp. 116–117] provides several accounts of primitive societies using capital goods—mainly cattle—as currency, and presents anecdotal evidence on the inefficiencies associated with such arrangements:

> 'Goats and cattle were until comparatively recently the principal currency of a large part of Kenya. (...) In some districts livestock still constitutes the principal medium of exchange, in addition to serving social functions arising from the surviving tribal system. (...) Owing to the fact that cattle is, or was until recently, the sole currency of the Masai, they are grossly overstocked, far beyond requirements. (...) Before British control over the territories inhabited by them in Kenya and Tanzania became effective, the difficulties of over-stocking were overcome through raids on agricultural communities whose population was destroyed or enslaved, and whose cultivated land was turned into pasturage. When this could no longer be done, over-stocking tended to cause soil erosion. Once the cattle has eaten every blade of grass off the land, the soil turns into dust under the scorching, tropical sun, and the wind blows it away, leaving nothing but bare rocks. This problem of first-rate gravity preoccupied the Colonial Administrations in Kenya and other countries of East and South Africa. Deficiency of water supplies is also aggravated by overstocking. The remedy lies in inducing the Africans to abandon the monetary use of cattle and other livestock. (...) In the report of the Kenya Agricultural Commission Sir Daniel Hall suggested the issue of coins bearing the image of cows or goats, or to provide special tokens shaped like livestock and convertible into modern money, to bridge the psychological gap between the use of animal and mineral tokens of exchange.'

Our model rationalizes Einzig's diagnosis—the use of a productive asset as a medium of exchange can result in an inefficiently large stock of the asset—and at the same time lends theoretical support to the Agricultural Commission's policy recommendation of introducing fiat money to mitigate this inefficiency.

There are also several interesting connections between our analysis and previous studies in monetary theory. The idea that commodity standards are undesirable because they distort the

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