

Comments on Ashcraft, Garleanu, and Pedersen,  
“Two Monetary Tools: Interest Rates and Haircuts”\*

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It is common to consider monetary policy as a unidimensional problem, involving only the choice of an operating target for some short-term interest rate (the federal funds rate, in the case of the Federal Reserve). But other aspects of policy have been at center stage much of the time in the Fed’s response to the recent financial crisis. In particular, whereas the Fed has traditionally adhered (at least to a large extent) to a policy of “Treasuries only” (Goodfriend, 2009), under which the only asset on its balance sheet should be (mostly short-term) U.S. Treasury securities, the Fed has recently been involved in fairly large-scale extensions of credit to private institutions. These new programs have included “liquidity facilities” that extend (relatively short-term) credit to financial institutions of various types; facilities like the Term Asset-Backed Securities Loan Facility (or TALF), discussed in this paper, that provide longer-term financing for purchasers of privately-issued financial assets, and thus effectively make the Fed a financial intermediary itself, rather than a mere supplier of liquidity to such intermediaries; and direct purchases of securities other than Treasuries, as in the case of the Commercial Paper Funding Facility (or CPFF), which I discuss further below.<sup>1</sup>

It is therefore an important question for the theory of monetary policy to consider to what extent these additional dimensions of policy serve additional purposes, that could not already be adequately achieved through a proper use of traditional interest-rate policy. There are actually two questions that need to be considered: first, whether such policies should be *effective* at all, in changing financial conditions; and second, to the extent that they are effective, whether they are simply substitutes for more aggressive use of interest-rate policy. The present paper is one of the first to directly address these important questions; it provides cogent theoretical and empirical analyses of the first question, and an interesting theoretical argument with regard to the second question as well. Notably, the paper’s argument for the relevance of central-bank “haircut policy” even given the availability of traditional interest-rate policy does not turn on the observation that interest-rate policy is sometimes (as in the U.S. since December 2008) constrained by the zero lower bound on nominal interest rates; this raises the possibility that active intervention along this dimension might be desirable on a routine basis, and not only during especially severe crises (which are the only times that the zero lower bound is likely to be an issue).

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<sup>1</sup>See, for example, Madigan (2009) for an overview of the new programs, and Reis (2009) for an early discussion of the theoretical differences between programs of these different types.

# 1 Breaking the Modigliani-Miller Theorem for Central-Bank Financial Policy

The authors' theoretical analysis of why central-bank "haircut policy" — specifically, the willingness of the central bank to accept assets as collateral for loans under terms that are more generous than those prevailing in the market in the absence of central-bank lending — can affect equilibrium asset prices, and hence the allocation of resources, is an important contribution. The approach that they take draws upon earlier work by Garleanu and Pedersen (2009) on the role of margin constraints in explaining violations of the law of one price in financial markets. I shall not undertake a general assessment of that theory here, but I want to comment on the importance of certain features of that theory for the conclusions reached. In fact, not all theories regarding the sources of observed spreads between the rates of return on alternative financial instruments lead to the same conclusions regarding the scope for additional dimensions of central-bank policy; awareness of the differences may allow future work to focus more sharply on distinguishing the empirical relevance of these alternative theories, which will be important for further progress in the theory of monetary policy.

The most common explanation for why there should in principle be multiple dimensions of central-bank policy is based on portfolio-balance theory. According to this theory, changes in the portfolio held by the central bank change the aggregate portfolio that must be held in equilibrium by private investors; and to the extent that the assets between which the central bank substitutes are not perfect substitutes, it is expected that a change in the relative prices of the different assets will be necessary to induce this portfolio substitution by private investors. In this view, the key to whether a given change in the central bank's portfolio should affect equilibrium rates of return is the degree to which the assets involved are perfect substitutes or not; and (in accordance with the modern theory of finance) it is often supposed that what determines whether different assets are substitutes is the respective contingencies under which they pay out a greater or lesser amount.<sup>2</sup>

But the mere fact that different assets have different state-contingent returns

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<sup>2</sup>Thus Gagnon *et al.* (2010) discuss the theoretical basis for the Fed's Large Scale Asset Purchase program by noting that "the LSAPs have removed a considerable amount of assets with high duration from the markets.... In addition, the purchases of MBS reduce the amount of prepayment risk that investors have to hold in the aggregate."

does not suffice to imply that the fact that the central bank purchases one of them rather than the other must have any effect on equilibrium asset prices, and hence on the allocation of resources. For example, in a representative-household asset-pricing theory, the equilibrium price of each asset should equal the present value of the income stream to which it is a claim, where the stochastic discount factor used to compute present values is based on the state-contingent consumption of the representative household. If a change in the portfolio of the central bank changes neither the state-contingent income stream associated with a single unit of a given asset nor the state-contingent aggregate supply of goods available for consumption, it should have no effect on the equilibrium price of the asset.<sup>3</sup>

Representative-agent asset-pricing theories have well-known difficulties accounting for the empirical behavior of asset prices; in particular, the size and variability of the spreads between the returns on different assets are difficult to account for without the hypothesis of time-varying risk premia, of a kind that are not easily explained by the relatively smooth variations observed in aggregate consumption. But the neutrality result just mentioned does not depend on the assumption of a representative household. The key to the result is the fact that, if the central bank shifts its portfolio among assets with different state-contingent payoffs, the state-contingent portfolio earnings of the central bank will be different as a result of the policy change, and these state-contingent portfolio earnings must be distributed to someone in the private sector (to the representative household, in a representative-household model).<sup>4</sup> This changes the degree to which the private investors demand particular assets in order to hedge against risks associated with its other sources of income.<sup>5</sup>

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<sup>3</sup>This is the basis for the irrelevance result for unconventional monetary policies obtained in Eggertsson and Woodford (2003).

<sup>4</sup>The direct consequence of a change in the state-contingent earnings of the central bank is a corresponding change in the state-contingent distribution that the central bank makes to the Treasury; but the change in the Treasury's state-contingent income from this source must ultimately change the net state-contingent tax obligations of parties in the private sector.

<sup>5</sup>Hedging demands of this kind are frequently ignored in portfolio-balance models. When the securities demand functions in such models are explicitly derived from an analysis of investors' attitudes toward risk, as in Tobin (1997), a problem is typically considered in which investors have initial wealth to allocate and no future non-financial income or tax obligations at the time when the securities pay off. Macroeconomic models often simply postulate asset demands that are functions of the expected returns on the various available assets, without using any explicit choice problem to motivate them.

In the representative-agent model, the change in the hedging demand of the representative household precisely offsets the change in the central bank’s portfolio, so that asset markets continue to clear at the same prices as before. But the argument is essentially a Modigliani-Miller theorem for changes in the net asset issuance of the government, as first pointed out by Wallace (1981), and doesn’t depend at all on the existence of a representative agent. In fact, the only postulates needed to obtain the irrelevance result are (i) that all investors can buy or sell the same set of assets at the same market prices, and (ii) that each investor’s objective, and the only relevant constraints on her portfolio choice, can be stated purely in terms of the state-contingent future value of her wealth.<sup>6</sup>

These postulates may well be satisfied, even a model that incorporates time-varying risk premia due to variation in the resources of the “natural buyers” of risky assets, and that allows for the amplification of disturbances by “leverage spirals.” The model proposed by Adrian and Shin (2010) provides a simple example. In this two-period model, investors are of two types, one of which funds the leveraged investment of the other (just as in the model proposed here). Letting the random variable  $W_2^h$  denote the second-period value of the investor  $h$ ’s wealth, “passive investors” are assumed to choose a portfolio to maximize

$$E[W_2^p] - \alpha \text{Var}[W_2^p],$$

where  $\alpha > 0$  parameterizes their degree of risk aversion; “active investors” instead choose a portfolio to maximize  $E[W_2^a]$  subject to a “value-at-risk constraint”, which requires that

$$W_2^a \geq 0$$

with probability 1. Both types choose arbitrary positions in two assets, a risky asset and a riskless asset, and are price-takers in the markets for these assets.

Now suppose that, in the model of Adrian and Shin, we were to introduce a central bank, that purchases a quantity  $x^{cb}$  of the risky asset at the market price in the first period, and finances these open-market purchases by selling an equal quantity of the riskless asset. (Here I measure both quantities by the first-period market values of the assets purchased or sold.) This results in state-contingent second-period portfolio earnings for the central bank equal to  $(R - r)x^{cb}$ , where  $R$  is the (random) return

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<sup>6</sup>See Cúrdia and Woodford (2010) for further discussion.

on the risky asset and  $r$  is the (certain) return on the riskless asset. Suppose further that the additional income transferred to the Treasury as a result of these earnings by the central bank is distributed in fraction  $\theta^p$  to the passive investors and in fraction  $\theta^a = 1 - \theta^p$  to the active investors. The second-period wealth of investors of type  $h$  will then equal

$$W_2^h = (1 + r)W_1^h + (R - r)x^h + \theta^h(R - r)x^{cb},$$

where  $W_1^h$  is the first-period wealth of type  $h$ , and  $x^h$  is the quantity of the risky asset held by type  $h$  investors. Since both the objective and the constraints of type  $h$  investors depend only on  $\tilde{x}^h \equiv x^h + \theta^h x^{cb}$ , the optimal choice of  $\tilde{x}^h$  will be independent of the central bank's choice of  $x^{cb}$ . Moreover, the condition for market clearing (that  $\tilde{x}^p + \tilde{x}^a$  equal the total supply of the risky asset) can be expressed solely in terms of the two quantities  $\tilde{x}^h$ . Hence the price for the risky asset that clears the market will be independent of the choice of  $x^{cb}$ .

This result implies that in a model satisfying the two postulates, like the one just sketched, direct (open-market) purchases of assets by the central bank should have no effect on the equilibrium structure of asset returns. But such a model implies that lending by the central bank to leveraged borrowers should accomplish little, either. Unless the central bank is willing to *completely replace* private sources of funding for the leveraged investors, they will still have to satisfy the VaR constraint. (It would not be enough that the central bank serve as the sole source of funding for their acquisitions of a particular category of risky assets, say mortgage-backed securities — because the VaR constraint relates to the global situation of a leveraged investor, it becomes irrelevant only if the central bank can supply *all* of the active investors' funding.) Hence the decision problem of both types of investors would remain the same, and the market-clearing price vector for the various types of risky assets would remain the same.<sup>7</sup>

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<sup>7</sup>This argument assumes that the central bank lends at the competitive market interest rate. If the bank lends at a below-market rate, and ties the quantity lent at the subsidized rate to the quantity that an investor holds of a particular asset, by requiring that asset to be pledged as collateral for the subsidized loan, this is equivalent to paying investors a specified subsidy  $s$  per unit held of the asset. This should obviously be expected to change the equilibrium price of the asset in question, and is potentially an alternative explanation for the findings of these authors about the effects of on the prices of particular MBS of eligibility for funding under the TALF.

It is thus important to the conclusions of Ashcraft *et al.* that they do *not* assume a *global* leverage constraint, such as the VaR constraint proposed by Adrian and Shin, but rather an *asset-specific* margin constraint. Under this type of constraint, a central-bank policy of lending to finance purchases of a particular kind of risky asset, with a lower margin requirement than the one imposed by the market, can substantially change the demand for that asset, even if the quantity of lending involved is only a small fraction of overall lending in the economy, or even of overall lending to leveraged intermediaries.

In fact, although it is not the main focus of their paper, the model proposed by Ashcraft *et al.* is also one in which targeted asset purchases by the central bank are not, in general, predicted to be irrelevant for asset price determination. If the central bank acquires a risky asset with a positive margin requirement, and redistributes the resulting increase in its state-contingent portfolio earnings at least partially to leveraged investors, then the optimal response of leveraged investors will not simply be to reduce their holdings of that asset by the amount  $\theta^a x^{cb}$ , in the case of no change in the prices of any assets. For while such a change in the portfolio choice of the leveraged investors would restore the same state-contingent value of  $W_2^a$  as would have existed in the absence of the central bank's asset purchases, these investors' *leverage constraint* will be relaxed by the change. In the case that the leverage constraint was previously binding (as in the equilibria discussed by Ashcraft *et al.*), relaxation of the constraint will allow the active investors to borrow more and purchase greater quantities of risky assets subject to margin requirements. The market for these assets will then no longer clear at the same vector of prices as before. The Modigliani-Miller theorem is broken by the assumption of asset-specific margin requirements, so that the leverage constraint of active investors cannot be expressed as a function solely of the random variable  $W_2^a$ .

It is therefore a matter of considerable importance for the theory of unconventional monetary policies, not simply whether there are binding constraints on the degree of leverage that is acceptable to those funding leveraged investors, but whether these leverage constraints involve only the total state-contingent wealth of leveraged investors (as in the case of a value-at-risk constraint), or whether they involve asset-specific margin constraints (as proposed here). While some implications of the two types of theories are broadly similar — for example, both imply that developments that redistribute wealth away from leveraged investors should raise equilibrium risk

premia, by tightening the leverage constraints on these investors, and that the resulting price movements should tend to further redistribute in the same direction, thus amplifying the direct effects of any such disturbance — they have quite different implications for the effects of central-bank asset purchases and lending facilities.

## 2 Does This Theory Account for the Effects of the Fed’s Programs?

To what extent does the proposed model succeed in accounting for the effects of the Fed’s unusual lending programs? Ashcraft *et al.* present interesting evidence regarding the effects of Fed lending under the TALF. Their evidence indicates that TALF lending *did* affect the prices of assets that were eligible for use as collateral for borrowing under this program. It should be noted that the question addressed in their main empirical result (the regression results of section 3.3) is a fairly narrow one; in particular, they look only at the *differential* effect on commercial mortgage-backed securities that were eligible for the TALF program relative to the effect on similar securities that were not eligible. This means that their method “differences out” any effects of the TALF on asset prices that occur through relaxation of investors’ capital constraints, as effects through this channel would affect the shadow value of relaxation of the margin constraints on *all* asset purchases, and hence would have similar effects on all assets subject to similar margin requirements, whether TALF-eligible or not.

But while the method is not suited to provide a quantitative estimate of the overall effects of the TALF on asset prices, their results do suffice to establish that the effects of the introduction of the TALF were not zero. This conclusion does allow one to exclude some potential theories; for example, unless one supposes that loans under the TALF were made at a subsidized rate of interest, it allows one to reject the hypothesis that the only constraint on leverage is a global constraint like the value-at-risk constraint discussed above. And the model proposed in this paper is at least one that can account for a non-zero differential effect of the kind that is measured.

Nonetheless, I am not convinced that this model alone can account for all of the relevant facts. Note that while the model of Ashcraft *et al.* can account for differential effects of central-bank acceptance of particular assets as collateral, as under the TALF, the model predicts that there should be *no* differential effects of



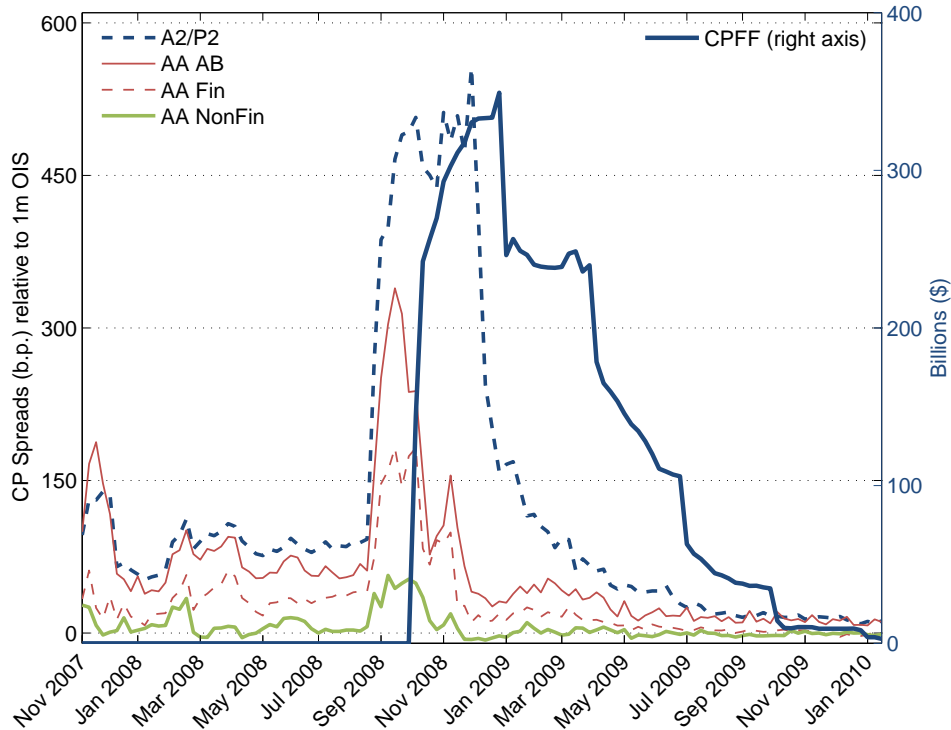


Figure 1: Spreads between yields on four different classes of commercial paper and the 1-month OIS rate, together with the value of paper acquired by the Fed under its Commercial Paper Funding Facility. (Source: Federal Reserve Board.)

*targeted asset purchases* by the central bank. As explained in the previous section, this model, unlike the model of Adrian and Shin (2010), *does* predict that open-market purchases of assets by the central bank will generally change equilibrium asset prices. But the effect on asset prices occurs purely as a consequence of the relaxation of the capital constraint of the leveraged investors; hence the effect should be the same on all assets with similar margin requirements. This means that there should be no *differential* effect on the price of assets purchased by the central bank, relative to the prices of similar assets that happen not to be purchased by the central bank.

While the effects of these programs are only beginning to be studied, the available evidence is not obviously consistent with this prediction. For example, Figure 1 shows the effects of Federal Reserve purchases of commercial paper under the Commercial

Paper Funding Facility (CPFF), introduced in October 2008.<sup>8</sup> The heavy solid line plots the total value of the commercial paper purchased by the Fed under this program; the several lighter and/or dashed lines plot the spreads between the yields on various categories of commercial paper and the one-month overnight interest-rate swap rate (essentially a market forecast of the average level of the federal funds rate over the coming month). The explosion of the commercial paper spreads in September 2008 indicates the distress in these markets, following the default of Lehman Brothers on its paper and the consequent runs on U.S. money-market mutual funds. The figure shows that in the case of the three types of AA-rated commercial paper (all of which were eligible for purchase by the Fed under the CPFF), spreads fell sharply as soon as purchases under the CPFF began. The figure also shows that in the case of A2/P2 commercial paper (lower-rated, but still prime-grade paper issued by non-financial corporations, and *not* eligible for purchase under the CPFF), spreads remained very high for several more weeks.

While the evidence presented in this figure is much more casual than that offered by Ashcraft *et al.* in their study of the effects of the TALF, here too it seems that (i) the Fed's asset purchases affected asset prices, contrary to the Modigliani-Miller argument; and (ii) there was a particular effect on the prices of the specific securities purchased by the Fed, relative to those of other securities that were more similarly affected by market conditions in general. While observation (i) is consistent with the model proposed by Ashcraft *et al.*, observation (ii) is not.<sup>9</sup> And there is an alternative way of breaking the Modigliani-Miller theorem, which is to deny the postulate that all investors can purchase the same spectrum of assets at the same market prices (and negligible transactions costs).

The implications of this alternative hypothesis of *market segmentation* for the effects of targeted asset purchases by the central bank are developed (in the context of a complete DSGE model of the monetary transmission mechanism) by Cúrdia and Woodford (2010). Under this view, certain assets are only purchased (or only

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<sup>8</sup>For further discussion of this program and its effects, see Adrian *et al.* (2010) and Kacperczyk and Schnabl (2010).

<sup>9</sup>Note that these observations are also inconsistent with the hypothesis that the effects of the TALF were due simply to the Fed's having made a certain kind of collateral a condition for obtaining a loan at a subsidized rate. Under that interpretation of the effects of lending under the TALF, one would not expect to see similar effects of direct asset purchases by the Fed, of the kind shown in Figure 1.

purchased at low cost) by “specialists”, who have an advantage over other investors in this particular activity. The Modigliani-Miller theorem no longer holds if the central bank purchases assets of this kind, if not all of the addition to the central bank’s state-contingent portfolio earnings is distributed to the “specialists”; for other investors will not reduce their holdings of the assets in question, even if the change in their state-contingent tax liabilities gives them a hedging motive for doing so, owing to their non-participation in that market. Moreover, under this mechanism, the central bank’s purchases have a disproportionate effect on demand for the particular assets that it purchases (rather than increasing demand for all assets that are subject to margin requirements, by relaxing the capital constraints of leveraged investors), and the hypothesis of market segmentation makes it particularly likely that a substantial change in the price of those particular assets will be required for market clearing. The hypothesis of market segmentation also provides an alternative potential explanation for programs like the TALF. *Targeted lending* to the “specialists” who are able to purchase a particular kind of asset — and who have been forced to curtail their purchases owing to capital constraints, or some other disruption of the availability of funding for their activity — can similarly affect asset prices, and should similarly have a differential effect on the prices of the particular assets the purchases of which can be funded under the targeted lending program.

### 3 Is Credit Policy Equivalent to Interest-Rate Policy?

Even granting the conclusion that programs like the TALF or the CPFF can influence financial market conditions, there remains the important question whether such programs are nonetheless *equivalent* (or nearly equivalent) in their effects to some adjustment of the level of the federal funds rate, so that there is no need for a central bank to act on these other dimensions as well — or at least, no need for it to use them as long as further adjustments of the policy rate remain possible.

Ashcraft *et al.* show in the context of their model that central-bank lending to finance purchases of risky assets that are subject to high margin requirements (or for that matter, direct central-bank purchases of such assets) are *not* equivalent to a reduction of the riskless rate of interest in their effects on investment spending. This is

because in their model, an interest-rate cut will increase the shadow value of relaxation of the capital constraint of leveraged investors, thus increasing the relative cost of investment in assets subject to high margin requirements. Central-bank lending to finance purchases of such assets with less collateral, or direct purchases of such assets, will instead *relax* that constraint, *lowering* the relative cost of investment in assets subject to high margin requirements; hence the effects of the two policies on the *composition* of aggregate expenditure are quite different.

It would be interesting to see evidence of this effect of monetary policy on relative asset demands. But the general conclusion is quite robust. Once one's model has multiple interest rates in it, and the possibility of variable spreads between them, there arises the possibility that different dimensions of financial conditions will be differentially affected by alternative central-bank policies. Under the conditions discussed above that imply a Modigliani-Miller theorem, one can actually show that there is only one relevant dimension of central-bank policy, namely, traditional interest-rate policy;<sup>10</sup> but under almost any assumptions that break the Modigliani-Miller theorem, alternative central-bank policies will be able to influence more than one dimension of financial conditions. Moreover, changes in the structure of relative yields on different kinds of financial claims will generally have consequences for the allocation of resources, so that there is no reason in general to suppose that interest-rate policy alone will suffice to achieve desirable adjustments of financial conditions in response to the disturbances to which the economy may be subject. The possible welfare gains from active use of central-bank credit policy alongside interest-rate policy are illustrated in Cúrdia and Woodford (2010) in the context of one particular (fairly simple) model with endogenous credit spreads.

Yet despite this general observation, it is worth noting that the effectiveness of central-bank credit policy does depend on *binding financial constraints* of one kind or another, that break the Modigliani-Miller theorem. One can also reasonably expect that the effects of such policies are only substantial when the financial constraints are significant. This is surely true at some times; the kind of severe financial crisis that we have recently experienced provides a prime example. But it is less obvious whether the benefits of active credit policy should be large under more routine circumstances. Given the prudential arguments for preferring not to involve central banks in the allocation of credit (summarized, for example, by Goodfriend, 2009), it may be wise

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<sup>10</sup>Again, see Cúrdia and Woodford (2010) for further development of this point.

to reserve the use of these additional dimensions of policy for the unusual conditions associated with a financial crisis.

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