Efficacy of Monetary Policy and Limited Asset Market Participation: Neoclassical vs. Keynesian Effects*

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Abstract
This paper investigates the effects of limited asset market participation on the efficacy of monetary policy in a New Keynesian Dynamic Stochastic General Equilibrium (DSGE) model. Although an increase in consumers who cannot access to the financial markets reduces effects of interest rate policies via the consumption inter-temporal allocation (Neoclassical or permanent income effect), we find that an opposite result: Monetary policy becomes more effective as the degree of financial markets participation falls. The reason has a very Keynesian flavor.

Keywords: Consumers’ heterogeneity, efficacy of monetary policy.
JEL codes: E61, E63.

1. Introduction
New Keynesian DSGE models are founded on the permanent income idea (i.e. a forward-looking IS curve), which is built on the assumption that consumers have full access to financial markets. This assumption is however contradicted by the empirical evidence, which supports the view that a significant proportion of consumers do not smooth their consumption (Mankiw and Campbell, 1989).

Mankiw and Zeldes (1991) propose the idea that limited participation in asset markets

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matters for consumption and asset returns. This idea has been recently introduced in New Keynesian DSGE models by Gali et al. (2004), who consider that a fraction of households is constrained to consume out of current income. Gali et al. (2004) find that limited asset market participation affects the determinacy properties of the equilibrium since the effects of monetary policy no longer only depend on consumers’ inter-temporal allocation decisions but also on the behavior of the constrained consumers.

We further investigate the assumption of limited asset market participation by focusing on the efficacy of monetary policy. Differently from Gali et al. (2004), we do not consider capital accumulation, this allows us to obtain a closed-form solution and to analytically stress the effects of the heterogeneous consumers on the monetary transmission mechanism (since, as we will show, the transmission is demand driven).

We isolate two different channels for the efficacy monetary policy in our model. More specifically, even if an increase of consumers who cannot access to the financial markets reduces the efficacy of monetary policy via the consumption inter-temporal allocation (Neoclassical or permanent income effect) since the Neoclassical effect quantitatively depends on the share of consumers who smooth their consumption, it also supports a more effective monetary policy though the behavior of constrained consumers, who only react to changes in the current disposable income in a very Keynesian way. By comparing the two effects, we find that the latter always dominates the former at least if the IS curve is negatively sloped as in the canonical case. As result monetary policy is more effective if a larger fraction of consumers cannot access to the credit.

2. Asset-Market Constraints and Monetary Efficacy

2.1 The Basic Log-Linearized Model

We consider a standard New Keynesian DSGE model augmented by rule-of-thumb

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1 See, among others, Fuhrer (2000) and Ahmad (2005) for more recent studies.

2 We follow the Gali’s et al. (2004) approach, which can be justified along the lines of the hypothesis of limited asset market participation, but it can be also founded on different grounds as e.g. bounded rationality or myopic behavior. Thus, the reference to the limited participation can be generalized to other contexts (see Mankiw, 2000, and references therein). See also Amato and Laubach (2003), Bilbiie (2004) and Muscatelli et al. (2005).

3 Note that in New Keynesian DSGE models monetary policy always affects real output because the staggered prices. Thus, as will be soon clear, by investigating efficacy we intend the quantitative effects of a change in the interest rate (monetary policy) on real output.
consumers à la Gali et al. (2004). More specifically, a continuum of infinitely-lived heterogeneous agents normalized to one is assumed. A fraction $1 - \lambda$ of them consumes and accumulates wealth as in the standard setup (savers). The remaining fraction $\lambda$ is composed by agents who do not own any asset, cannot smooth consumption and, therefore, consume all their current disposable income (spenders). All consumers have logarithmic utilities defined over consumption and leisure. Formally, the log-linear model is formed by three equations.

The first two equations describe the demand side of the economy and are found by solving the optimization problem of savers and spenders and then aggregating:

\begin{align}
(1) & \quad c_t = E_t c_{t+1} - (1 - \lambda \zeta_N) (i_t - E_t \pi_{t+1}) - \lambda \zeta_N E_t \Delta \omega_{t+1} \\
(2) & \quad \omega_t = c_t + v n_t
\end{align}

Equation (1) represents a modified version of the standard Euler equation, where $c_t$ is the aggregate consumption, $i_t$ is the nominal interest rate, $\pi_t$ is the inflation rate, and $\zeta_N = (1 + v)\kappa(1 + \kappa)^{-1}$ is the steady state share of spenders, with $\kappa$ which indicates how leisure is valued relative to consumption. Consumption today depends on tomorrow expected consumption and on the real interest rate, but differently from the standard Euler equation, the presence of spenders establishes a link between the demand for goods and the real wage $\omega_t$ (see Gali et al. 2004; or Muscatelli et al. 2005; for further details).

Equation (2) is the aggregate labor supply, in particular, $\omega_t$ is the aggregate real wage, $n_t$ is the aggregate amount of labor, finally and $v$ is the inverse of the Frisch aggregate labor supply elasticity.

The supply side of the economy is represented by a standard forward-looking Phillips curve:

\begin{itemize}
\item[4] The model is only described in its essential features since it is rather standard, we focus on the logic implications. A technical appendix with all derivations and additional proof is available on-line or upon request (see http://wp.comunite.it/works/ijet_appendix.pdf).
\item[5] Other usual specifications for utility do not affect the logic of our results. We use the logarithmic function for the sake of exposition. See Di Bartolomeo et al. (2005).
\item[6] For the sake of brevity, we directly focus on the log-linearized model. The model is rather standard and obtained in the usual way, an appendix with full derivation is however available upon request.
\item[7] It should be noticed that neither the share of Non-Ricardian consumption nor the Frisch elasticity depends on the fraction of the spenders.
\end{itemize}
(3) \[ \pi_t = \beta E_t \pi_{t+1} + k \left( y_t - a_t \right) + u_t \]

where \( \beta \in (0,1) \) is the discount factor, \( y_t \) is aggregate output, \( a_t \) and \( u_t \) are AR(1) processes (representing an exogenous technology and a cost push shock, respectively). It is worth noticing that \( x_t = y_t - a_t \) is the output gap with respect to the flexible-price output.

Finally, the log-linear representation of the production function is \( y_t = a_t + n_t \). It follows that \( x_t = n_t \). The aggregate resource constraint is \( y_t = c_t \).

2.2 Transmission Mechanism and Efficacy of Monetary Policy

Equations (1)-(3) describes our benchmark aggregate model. Now, in order to highlight the monetary policy transmission mechanism, we derive expressions for aggregate consumption and output gap comparable to those of the canonical New Keynesian DSGE model. By considering the log-linear production function, the labor supply (2), and \( E_t c_{t+1} = E_t y_{t+1} \) (i.e. the expected aggregate resource constraint), equation (1) becomes:

\[ (4) \quad c_t = -\alpha_R \left( i_t - E_t \pi_{t+1} \right) + \alpha_C y_t + \alpha_S E_t y_{t+1} + \left( \alpha_R - \alpha_S \right) E_t \Delta a_{t+1} \]

where \( \alpha_R = 1 - \lambda \zeta_N \) and \( \alpha_C = \lambda \zeta_N \left( 1 + \nu \right) \) are the aggregate elasticity of consumption smoothing due to the inter-temporal consumption substitution done by savers and the Keynesian marginal propensity to consume deriving from the spenders behavior. The interpretation of \( \alpha_S = 1 - \alpha_C \) is trivial. We only consider the case of a propensity to consume between zero and one, thus we restrict the savers’ fraction as \( \lambda \in \left[ 0, \frac{1}{\zeta_N (1 + \nu)} \right] \).

Current aggregate consumption depends on real interest rate and expected output (Neoclassical effect) and on current output (Keynesian effect). If all consumers can save, the marginal propensity to consume current output is equal to zero and the standard equation holds.

By using the log-linear production function and the aggregate resource constraint, the aggregate Euler equation can be written as the following IS curve:

\[ (5) \quad x_t = E_t x_{t+1} - \Omega \left( i_t - E_t \pi_{t+1} \right) + \Omega \Delta a_{t+1}, \]

where \( \Omega = \frac{1 - \lambda \zeta_N}{1 - (1 + \nu) \lambda \zeta_N} = \frac{\alpha_C}{\alpha_S} \) is the income monetary multiplier.\(^8\)

\(^8\) It can be easily verified that determinacy of the model given by (3) and (5) requires standard conditions,
Equation (5) implies that the efficacy of monetary policy is increasing in the fraction of constrained consumers. In fact, an increase in the spenders’ share, on the one hand, reduces the elasticity of aggregate consumption smoothing $\alpha_R$ (and thus the efficacy of monetary policy), but, on the other hand, it reduces the aggregate marginal propensity to save, $\alpha_S$, making monetary policy more effective. The *Keynesian* effect always dominates the *Neoclassical* one (at least if the slope of the IS curve is negative) since:

$$\frac{\partial \Omega}{\partial \lambda} = \frac{\nu \zeta_N}{\left[1-(1+\nu)\lambda \zeta_N\right]^2} \tag{6}$$

Summarizing the rationale of our result can be found in equation (4) that highlights the monetary policy transmission mechanism and the two opposite forces at work: the *Neoclassical* transmission (by real interest rate and consumption expectations, via savers) and the *Keynesian* transmission (by current disposable income, via spenders).\(^9\)

Interest rate changes modify the inter-temporal consumption and labor supply of savers who have access to complete asset markets and can smooth consumption. As usual higher interest rates reduce savers’ current consumption (*Neoclassical* effect); staggered prices implies that this initial reduction in consumption affects mark-ups (i.e. inverse of marginal costs) and real wages, and, as in Gali et al. (2004), the demand thereby of agents who have no asset holdings, are oversensitive to real wage changes, and insensitive directly to interest rate changes. Formally, the fall in output demand (see equation (1)) reduces output and employment, which reduce marginal costs and real wage (see equation (2)) and thus the aggregate demand further falls (*Keynesian* effect) because constrained consumers reduce their consumption.

An increase in the spenders’ share reduces the *Neoclassical* effect of monetary policy on real output but it supports the *Keynesian* one as the marginal propensity to consume is increasing in it. We find that the latter always dominate. Hence monetary policy efficacy is improved.

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\(^9\) By considering monetary policy transmission, it is worth noticing that the *Neoclassical* effect is *direct* and the *Keynesian* is *indirect* since as usual in New Keynesian DSGE models, we have assumed an interest rate policy. By introducing fiscal policy or money-based monetary policy this order can change but without affecting our main intuition and the quality of our results.
3. Conclusions
By considering a New Keynesian DSGE model, this paper has shown that the inclusion of limited asset market participation implies an increase of monetary policy efficacy as the number of consumers who cannot access to the credit market increases. The rationale of the result is very Keynesian.

As usual, a change in the interest rate affect the trade-off between consumption today and consumption tomorrow (Neoclassical or direct effect), but, in limited asset market participation economies, the change in demand also stimulates the revision of the consumption plan of the agents who cannot access to the credit (Keynesian or indirect effect) because of the changes in disposable income.

After a change in the interest rate, both spenders and savers revise their consumption plans in the same direction since reductions in the interest rate supports further rises in current output by affecting the spenders’ consumption by higher real wages. Staggered prices in fact imply a decline in the mark-up after an initial increase in economic activity; this allows real wages to increase, generates inflation and a boom in consumption among rule-of-thumb consumers and thus improves effectiveness of monetary policy. Even if a lower fraction of savers reduces the impact of interest rate policies because fewer agents smooth their consumption (and thus reacts to interest rate changes), i.e. $\alpha_r$ decreases, it can sustain the efficacy of the monetary policy by the spenders’ reaction, i.e. $\alpha_s$ increases, because of the changes in their current income.

By taking account of both the above effects, we find that a lower fraction of savers reduces the direct or Neoclassical efficacy of monetary policy, but this reduction is always more than compensated by the increases in the indirect of Keynesian efficacy as the aggregate marginal propensity to consume increases in the fraction of spenders.

References


