Title

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"Housing, Credit Constraints, and Macro Stability:

The Secondary Mortgage Market

and Reduced Cyclicality of Residential Investment"

Joe Peek and James A. Wilcox*

Like U.S. real GDP, real residential investment has seen a marked moderation in volatility over the last two decades. Figure 1 plots real residential investment as a percent of potential real GDP (RESINV) along with GAP, the percentage by which actual fell short of potential real GDP over the 1968-2004 period. Notably, this moderation in RESINV occurred despite widespread problems in the banking system and a recession during 1990-91, the extended economic boom of the 1990s, and the 2001 recession and subsequent recovery.

Moreover, Figure 1 suggests that RESINV has moderated *more* than GAP. Indeed, James H. Stock and Mark W. Watson (2003) report that the standard deviation of the growth rate of residential investment compared to those of the other components of GDP both was larger and had the largest percentage decline after the mid-1980s. Compared with the 1968-1987 period, during 1988-2004 the standard deviations of GAP and RMTG were 41 and 51 percent lower, while that of RESINV declined by 64 percent. In contrast to the Stock and Watson finding of unchanged correlation between the growth rates of residential investment and GDP, we find that the simple correlations of RESINV with GAP and RMTG also declined substantially, from 0.77 to 0.43 and from -0.74 to -0.24, respectively. Thus, not only did the volatility of (the level of) RESINV fall relative to that of the macroeconomy, but RESINV became less correlated with GAP and RMTG as well.

Not surprisingly, mortgages show similarly waning procyclicality. Figure 2 plots total one-to-four family residential mortgage balances (MORTBAL), those mortgages held by mortgage pools (POOLS), and the difference between them (NONPOOLS), each as a percent of potential nominal GDP. MORTBAL showed a notable tendency through the 1980s to rise and fall during macroeconomic expansions and recessions, mirroring fluctuations in NONPOOLS. Since the 1980s, however, the faster growth of its less-procyclical component, POOLS, has reduced the volatility of MORTBAL around its own trend.

Here, we analyze why and estimate how much the development and growth of the secondary mortgage market (SMM) may have dampened the responses of residential investment to income and interest rates and thereby may have contributed importantly to the reduction in the volatility of the aggregate U.S. economy.

I. The Secondary Mortgage Market and the Level and Volatility of Residential Investment

Fluctuations in RESINV result from shifts in demand for and supply of housing. Because both residential construction and purchases typically require considerable borrowing, shifts in the supply of construction loans and purchase mortgages can also have important effects on RESINV. The magnitudes of the fluctuations in RESINV reflect, among other factors, the magnitudes of, and responses to, fluctuations in income and interest rates. The development and dramatic growth of the SMM have, by broadening and deepening the mortgage market, both increased RESINV and mitigated the responses of RESINV to fluctuations in income and interest rates.

The spectacular growth of the SMM was spurred both by federal policies intended to increase the supply of mortgage funds and by private sector developments. For example, the missions of housing-related government-sponsored enterprises (GSEs), such as Fannie Mae and Freddie Mac, included promoting the flow of capital to residential mortgage markets and stabilizing residential mortgage markets by facilitating "a continuous supply of mortgage credit for U.S. homebuyers in all economic environments" (Federal Home Loan Mortgage Corporation 2000). Financial innovations in risk management and pricing and in the structure of mortgages and mortgage-backed securities (MBS) and technological advances in information processing raised the allocative and cost efficiency of both primary and secondary mortgage markets.

MBS are backed by mortgages that conform to various standards and that are owed by borrowers of differing occupations, ages, and local real estate markets. As such, MBS provide investors with both increased liquidity and diversification, which reduces credit risk. The economies of scale and risk reductions that arise from aggregating mortgages into pools also allows mortgage originators to more cheaply and easily sell mortgages to others. Allowing investors to purchase MBS that differ by prepayment risk and by duration further expands the supply of mortgage funds from the SMM. Thus, the large and active SMM reduces the liquidity and credit costs and risks associated with holding both whole mortgages and MBS and thereby increases the total supply of mortgage funds from private sector investors such as banks, insurance companies, trusts and pension funds, as well as from GSEs, which guarantee mortgages as well as hold mortgages and MBS.

The SMM also may mitigate business cycle-related fluctuations in mortgage supply, and thereby in RESINV, in at least two ways. First, a conjectured federal guarantee keeps GSEs' costs from rising as much as other mortgage suppliers' costs when the credit risks of mortgages rise. Increases in the relative risks and associated yield premiums on whole mortgages, which are more likely when incomes have fallen, encourage GSEs to supply mortgage guarantees and funds countercyclically. Second, GSEs' mission to stabilize mortgage markets may motivate them to purchase mortgages and MBS countercyclically. In offsetting others' procyclical mortgage supplies, GSEs may serve as macroeconomic shock absorbers that reduce the effects of income fluctuations on RESINV and ultimately on real GDP.

This integration of local U.S. residential mortgage markets into national and even international capital markets (Paul R. Goebel and Christopher K. Ma 1993, Patricia M. Rudolph and John Griffith 1997) also implies that the total supply of mortgages falls less as interest rates rise. If tighter monetary policy reduces the supply of mortgage credit from banks, the higher interest rates may induce the SMM to increase its supply of mortgages and thereby cushion the effects of higher interest rates on RESINV. As such, a more integrated and larger SMM tempers the bank lending channel of monetary policy emphasized by Anil Kashyap and Jeremy C. Stein (1994). The SMM may also temper the bank capital channel emphasized by Joe Peek and Eric Rosengren (1995) and Diana Hancock and James A. Wilcox (1993) by allowing banks to more easily boost their capital ratios via selling mortgages outright or by swapping them for GSEs' MBS, which carry lower Basel capital requirements than do whole mortgages.

II. Specification and Data for a Model of Residential Investment

To derive an estimating equation for RESINV, we start with specifications for the supply and demand for (the stock of) housing. In equation (1), we posit an effect of house prices (PH) on the long-run supply of housing (HS*).

(1) $HS^* = a_0 + a_1 * PH$

The long-run demand for housing (HD*), equation (2), depends on house prices, (the cyclical component of) income (GAP), the mortgage interest rate (RMTG), inflation (INFLAT), and a measure of the population of home buying age (POPGRO) (Joe Peek and James A. Wilcox 1991).

(2) $HD^* = b_0 + b_1 * PH + b_2 * GAP + b_3 * RMTG + b_4 * INFLAT + b_5 * POPGRO + b_6 * SMM$

To allow the data to indicate whether interest rates adjusted for general inflation affect housing, we separately include the inflation rate, as measured by the annualized percentage change in the GDP deflator. POPGRO, the percentage change over the past four quarters of the population aged 25-44, measures the net flow of people into the traditional ages for home buying. We use values for POPGRO that were smoothed by a fourth-order polynomial in time.

The income, interest rate, and inflation rate coefficients in equation (2) to reflect the combined effects of household demand plus any effects of the supply of mortgage funds provided by the primary market that are systematically related to income and the mortgage and inflation rates. The last term allows the SMM supply of mortgages to affect housing demand. The long-run equilibrium housing stock then equates (1) to (2).

(3) $H^* = HS^* = HD^*$

The extra costs of faster construction imply that the supply of housing adjusts gradually, for example by a constant fraction (α), to discrepancies between the long-run equilibrium (H^*) and the actual, prior-period's housing stock (H_{-1}). Gross residential investment, RESINV, is the sum of net investment plus the depreciation of the housing stock, which we assume to be a constant fraction (d) of the prior period's housing stock.

(4) $RESINV = \alpha^*(H^* - H_{-1}) + d^*(H_{-1}) = \alpha^*(H^*) + (d^* - \alpha)^*(H_{-1})$

To construct H, we assume that the ratio of the actual real value of the (reproducible) housing stock to potential real GDP in 1952 was 0.75 and that the annual depreciation rate of the housing stock was 1.2 percent and apply the perpetual inventory method to real residential investment. Like RESINV, H is scaled by potential real GDP.

In equation (5), we posit that the SMM supply of mortgage funds rises with mortgage interest rates.

(5) $SMM = (c_1 + c_2{*}GAP + c_3{*}RMTG + c_4{*}INFLAT){*}S$

By reducing the perceived credit risks of whole mortgages and non-guaranteed MBS, higher incomes may increase the supply from the nonfederal portion of the SMM. By contrast, the rate spread and mission-related motivations that were noted above may lower the supply of mortgage funds from GSEs as incomes rise. Thus, a priori, we cannot sign the effect of cyclical income in equation (5).

The determinants of SMM mortgage supply to affect volume in proportion to the integration and size of the SMM. S. Our measure of the integration and size of the SMM, S, is calculated as the ratio to potential nominal GDP of one-to-four-family mortgage balances in all mortgage pools. We indexed S to equal one at the end of the sample period (2004Q4). Plotted as POOLS in Figure 2, S rises from near zero in 1968 to one at the end of 2004.

Substituting (5) into (2), combining equations (1)-(3) to eliminate PH, and then substituting the resulting equation into (4) produce an estimating equation for RESINV.

(6) $$RESINV = e_0 + e_{1,s}*S + e_2*GAP + e_{2,s}*S*GAP + e_3*RMTG + e_{3,s}*S*RMTG + e_4*INFLAT + e_{4,s}*S*INFLAT + e_5*POPGRO + e_6*H_{-1}$$

The estimated (net) responses of RESINV to income, interest rates, and inflation rates now each depend on the size of the SMM, as well as on their separate (e_i) and interacted ($e_{i,s}$) coefficients. The responses approximately equal the e_i's when S was very small, early in sample period. By the end of 2004, S was one, which implies that the response of RESINV to each variable equals the simple sum of its e_i and $e_{i,s}$ coefficients. A negative value for $e_{2,s}$ and a positive value for $e_{3,s}$ imply that a larger SMM tempers the positive and negative responses of RESINV to income fluctuations and to interest rates.

We estimate (6) using instrumental variables. We use several instruments for GAP, S*GAP, RMTG, S*RMTG, INFLAT, S*INFLAT, and S: a constant term, a linear trend and its square, POPGRO, H_{-1}, once and twice-lagged values of each of the variables on the right-hand side of equation (6), plus current and once-lagged values of the real, cyclically-adjusted federal surplus and of real exports (both scaled by potential real GDP), of the price of oil relative to the GDP deflator, and of the real, trade-weighted exchange rate. Dickey-Fuller and weighted symmetric tests rejected the hypothesis that

RESINV had a unit root. The estimation procedure allowed for first-order autocorrelation of the error term (RHO).

III. Regression Results

The results in columns 1 and 2 of Table 1 are based on 1968-2004 data. The results in column 1, which omitted the S interaction terms, conform to our priors: A larger SMM, higher income, lower RMTG, and faster population growth each raise RESINV significantly. Throughout, we the coefficients on INFLAT are small and insignificant, suggesting that nominal, rather than real, interest rates affect RESINV. The coefficient on H_{-1} suggests that RESINV makes up about half of any discrepancy between the equilibrium and actual housing stocks in a little over a year. The large, positive, significant coefficient for S suggests that from 1968 through 2004 the continually growing SMM raised RESINV.

In column 2, which adds the $e_{i,s}$'s, the separate income and interest rate effects (e_i's) remain significant, as do the population and lagged housing stock variables. Row 2s shows the reduction in the positive response of RESINV to GAP was statistically insignificant (t = -1.16). The positive coefficient in row 3s, however, suggests that, as S grew, the negative effects of interest rates on RESINV shrank, a reduction that is statistically significant at the 10 percent level. In fact, by the end of 2004, the point estimate for S*RMTG indicates the offsetting effect due to the SMM is larger than the separate effect of RMTG. The resulting net positive effect of interest rates on RESINV, however, is insignificantly different from zero. In sum, column 2 makes a suggestive, but not overly compelling, case that the larger SMM cushions the effects of higher income and interest rates on RESINV over the entire 1968-2004 period.

Stronger evidence that the SMM affected RESINV appears in column 3, which is based on data for 1988-2004, when the SMM was much larger and more fully developed and integrated. An advantage of the 1988-2004 sample is that it omits the period when regulations had large but eventually vanishing effects on deposit and mortgage markets and thus on residential investment (Karen E. Dynan et al. (2006)). Thus, results based on the 1988-2004 sample are less likely to be confounded with the effects of financial deregulation.

Column 3 indicates that, as the SMM grew, the impact of income and interest rates on RESINV shrank. Rows 2 and 3 contain significant positive and negative responses to income and interest rates, respectively. Rows, 2s and 3s, in turn, show that those responses declined significantly in both economic and statistical terms as the SMM grew. The less consequential effects reported in column 2 might be due to the confounding of the effects of the SMM with the effects of Regulation Q, whose effects likely varied considerably with income and interest rates during the period before 1988. The estimated tempering of income and interest rate effects due to the SMM in column 3 might well be implausibly large. Column 3 implies that the estimated effects of income and interest rates on RESINV by the end of 2004 are not significantly different from zero. While the SMM may have tempered the effects, it still seems unlikely that income and interest rates no longer affect housing.

IV. Summary and Implications

Our results provide some evidence that the larger and more fully developed and integrated secondary mortgage market tempers the responses of residential investment to income and to interest rates and therefore the volatility of residential investment.

Considerable attention has been paid recently to the reduced volatility of U.S. real GDP growth after the 1970s. Among the reasons that have been put forth for this great moderation are reduced volatility of external shocks and the improved performance of monetary policy. Over the same period, the SMM grew enormously and the volatility of residential investment shrank relative to that of income and of interest rates. To the extent that it tempers the volatility of residential investment, the secondary mortgage market may have contributed importantly to the reduced volatility of the U.S. economy.

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Footnote

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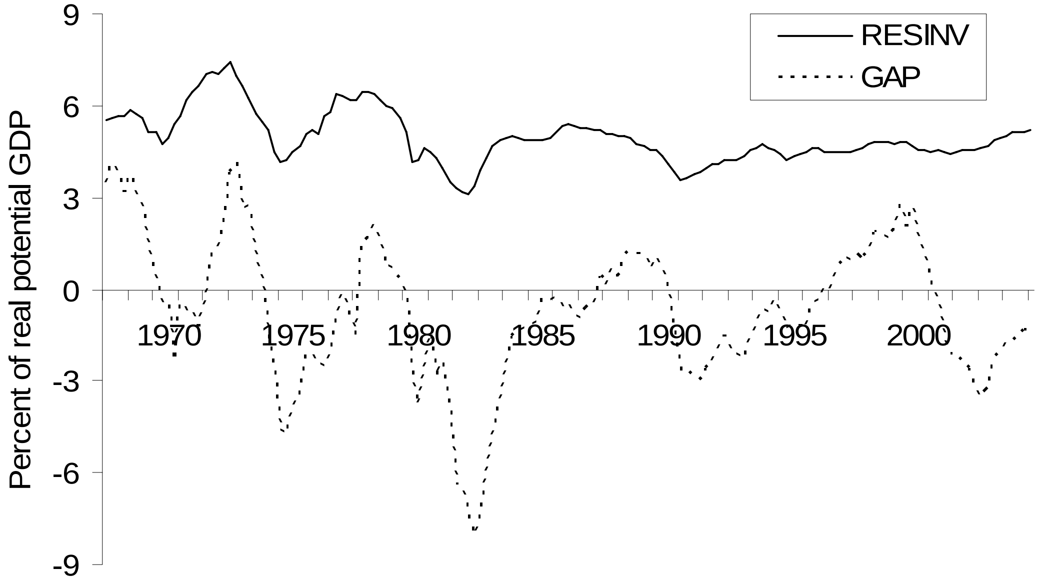
Figure 1

Real Residential Investment and the Output Gap

(Seasonally adjusted, 1968Q1-2004Q4)

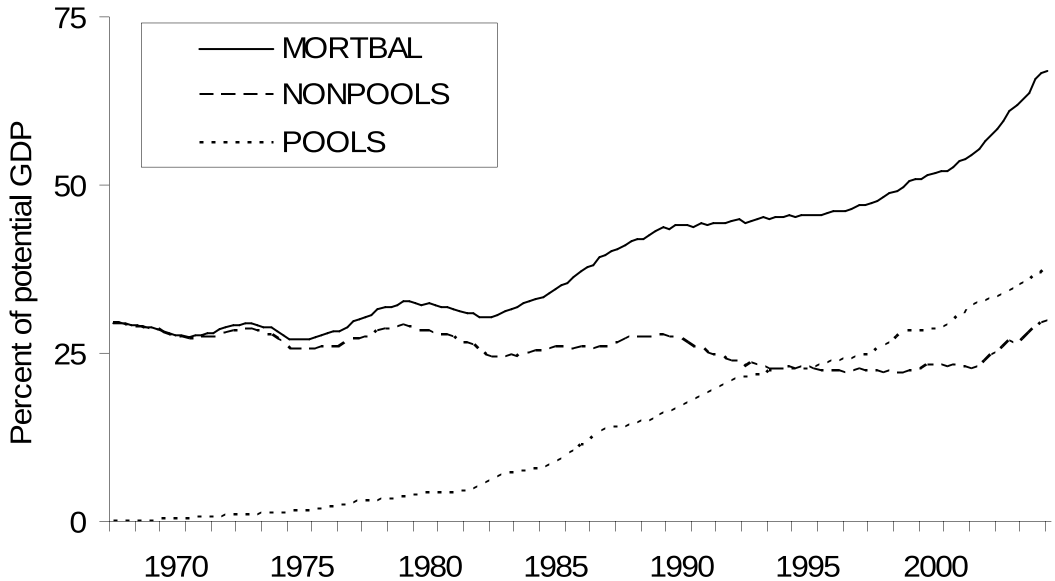


Source: Federal Reserve Bank of St. Louis FRED database.

Figure 2

Single Family Residential Mortgages: Total Balance, Total not Held by Mortgage Pools, and Total Held by Mortgage Pools

(End-of-quarter balances, Not seasonally adjusted, 1968Q1-2004Q4)



Sources: Board of Governors of the Federal Reserve System, Federal Reserve Bank of St. Louis FRED database.

Table 1

Impacts of the Secondary Mortgage Market on Residential Investment

		Sample Period		
		1968Q2-2004Q4	1968Q2-2004Q4	1988Q2-2004Q4
Row	Independent Variables	(1)	(2)	(3)
1	C	27.9***	32.1***	-11.6
		(4.48)	(4.63)	(1.21)
1s	*S*	2.39**	0.636	-0.539
		(2.35)	(0.40)	(0.38)
2	*GAP*	0.204***	0.223***	0.578***
		(8.92)	(7.51)	(6.15)
2s	*S*GAP*	-	-0.132	-0.691***
			(1.16)	(5.08)
3	*RMTG*	-0.153***	-0.191***	-0.376***
		(3.74)	(3.75)	(2.71)
3s	*S*RMTG*	-	0.297*	0.573***
			(1.70)	(2.79)
4	*INFLAT*	0.005	0.004	0.029
		(0.33)	(0.22)	(0.77)
4s	*S*INFLAT*	-	0.021	-0.005
			(0.41)	(0.10)
5	*POPGRO*	1.08***	1.17***	0.301
		(4.23)	(3.85)	(1.59)
6	H_{-1}	-0.218***	-0.257***	0.147*
		(3.55)	(3.84)	(1.76)
7	RHO	0.890***	0.916***	0.857***
		(21.60)	(25.22)	(18.03)
	Summary Statistics:			
	Number of Observations	147	147	67
	Mean of Dependent Variable	4.96	4.96	4.53
	Adjusted R-squared	0.960	0.961	0.960
	Standard Error of Estimate	0.170	0.167	0.070
	Durbin-Watson	2.14	2.18	1.32

Notes: Absolute values of t-statistics in parentheses.
*** significant at the 1 percent level
** significant at the 5 percent level
* significant at the 10 percent level