



Sensitivity of Inflation to Demand Conditions in Turkey:
Determining CPI Items Responding to Output Gap and Credits

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- New focus of central banks: "price stability" and "financial stability"
 - In recent years, many central banks, including the Central Bank of Turkey (CBRT), expanded the set of policy tools accordingly
- Enhanced IT framework
 - The conventional inflation targeting regime, where demand and expectation management is the key channel and interest rate is the main instrument, has been enhanced with a special focus on credit developments
 - Mainly through required reserves
- New channels of monetary policy transmission
 - Unlike previously, effects of monetary policy on domestic demand and inflation are observed through two channels more systematically:
 - (1) Interest rate and liquidity management
 - (2) credits

- Determining the stance of monetary policy
 - Stance of the monetary policy regarding demand-management should be viewed as a reconciliation of two channels.
- Link between interim objectives and inflation
 - Monetary policy aims to achieve price stability through meeting interim policy targets (economic growth and credit growth in this sense)
 - The theoretic framework linking inflation to demand conditions (through real marginal cost) is established. However, no direct channel for credits is available.
- The "area of impact" of monetary policy on inflation
 - How impactful are the interim objectives on inflation?
 - Alternatively, how much of the inflation can really be controlled with two channels of demand management? (i.e. Output gap and credit growth)

- Consider a generic Phillips Curve (PC)
 - Inflation is related to its own lag and a measure of real marginal costs
 - If real marginal costs are pro-cyclical, then, output gap can be a good indicator of domestic demand pressures
 - Credits may also proxy demand pressures given the altered attention of central banks on credit movements
- Benefit from the availability of disaggregated price indices
 - Information obtained through analyzing headline inflation may be too general for policy makers
 - Focusing on disaggregated price data enables the detection of goods and services through which the effects of monetary policy are observed.
- Estimate distinct PC equations for each price sub-index
 - Alternate output gap and credits for measuring demand pressures
 - Determine the goods and services affected by output gap and credits
 - Generate aggregated price indices based on this selection
 - Similar approach has been followed by Froehling and Lommatzsch (2011) and Halka and Kotlowski (2014).

- Determine which price indices are responsive to output gap/credits
 - 152 sub-indices of CPI (COICOP 5-digit level); time period: 2004Q1-2014Q1
 - Estimate a generic PC:

$$\pi_t = c + \alpha\pi_{t-1} + \beta(GAP \text{ or } CREDIT)_{t-i} + \sum_{k=0}^K \gamma_k \cdot PMTL_{t-k} + \sum_{j=0}^J \delta_j \cdot MinWage_{t-j} + \varepsilon_t$$

$$i = 0, \dots, 6.$$

- PC includes lagged inflation, "demand measure" and two control variables: Import Prices in Turkish lira and Net Minimum Wage
- In all the equations, $K = 4$ and $J = 1$.
- "Output gap" and "Credit" measures enter the model with lags=0 to 6, one lag at a time.

- Determine which price indices are responsive to output gap / credits

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- Consider three different credit descriptions. Thus, per price index, 7 equations with output gap and 21 equations with credits are estimated (4256 equations in total).
- Strategy:** Identify the sensitive goods and services based on statistical significance of the β coefficient. *For instance, if β is statistically significant and positive in any of the 7 PC equations with output gap for price index A, then we identify that index A responds to (or affected by) output gap.*

- **Data definitions:**

Data	Description	Source
Inflation	Quarterly percent change of price indices	COICOP 5-digit CPI (2003=100) sub-indices, Turkstat
Credits	Quarterly change in credit stock as a percentage of the quarterly GDP	Consumer, business and total credits, CBRT
Output gap	Percent deviation of the GDP from its potential level	Alp, Öğünç and Sarıkaya (2012)
Import prices	Quarterly percent change of the Turkish lira denominated import price index	Import Unit Value Index (in TL) (2010=100), Turkstat
Wages	Quarterly percent change of the minimum wage	Net minimum wage, Ministry of Labor and Social Security

Notes: Consumer credits excludes housing. Business credits and total credits are adjusted for exchange rate effects.

- Number of sub-indices affected by Output gap and/or Credits:
 - Out of 152 sub-components: 47 (60) are sensitive to output gap (credits)
 - However, shares in total CPI are higher for output gap-sensitive items

	Number of items			Share in CPI (%)		
	Gap	Credit	Gap or Credit	Gap	Credit	Gap or Credit
Core goods	15	34	42	6.7	16.2	20.1
Services	24	14	31	20.6	4.1	21.4
Food	7	12	15	5.4	5.2	9.2
Energy	1	0	1	1.3	--	1.3
Total	47	60	89	34.0	25.6	52.1

Source: Turkstat, Author's calculation. "Gap or Credit" refers to CPI items that are responsive to either output gap or credits or both.

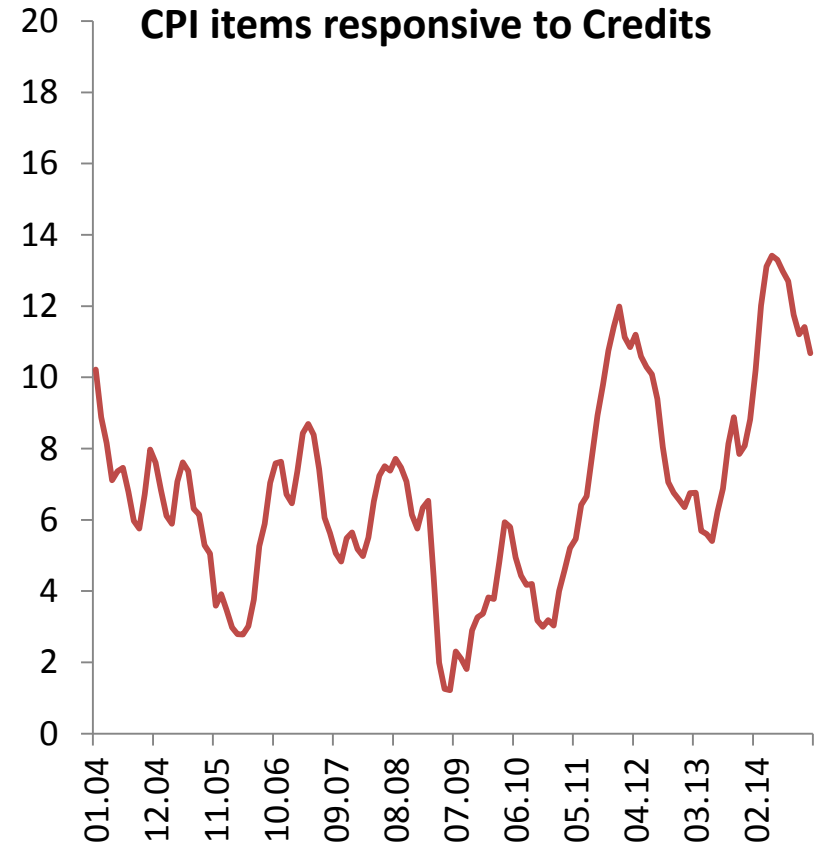
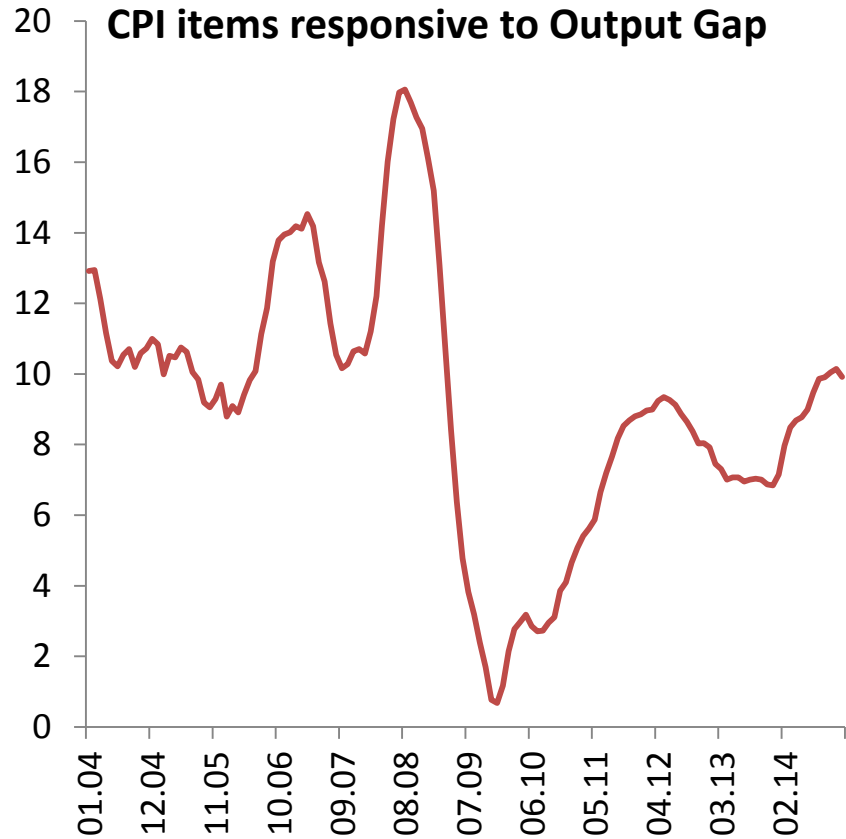
- Number of sub-indices affected by Output gap and/or Credits:
 - Sectoral heterogeneity in sensitivity:
 - Services are more sensitive to output gap, core goods are more sensitive to credits

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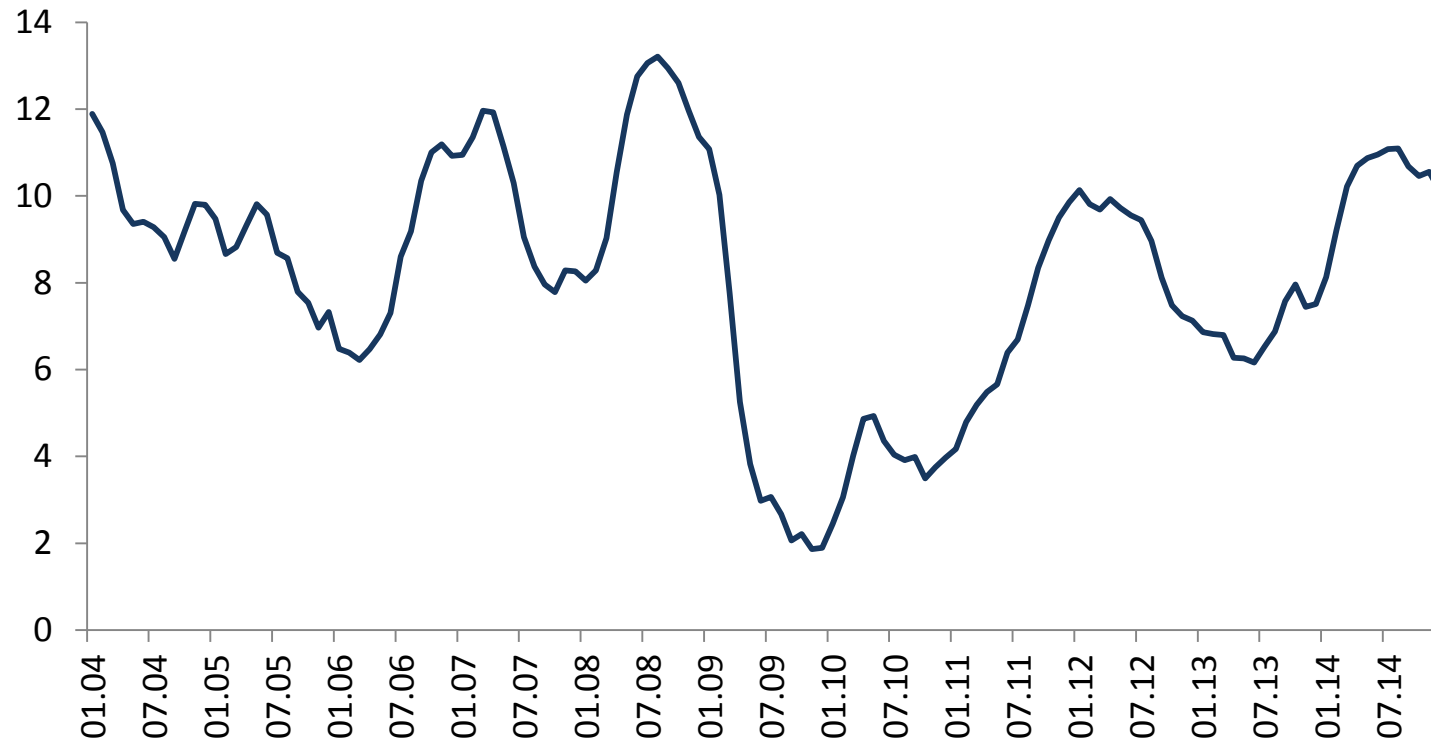
- Sectoral differences:
- Services prices:
 - Mostly non-tradable and labor-intensive
 - Thus, current income is more influential
 - Supports the ties between services prices and economic activity
- Core goods prices:
 - Mostly tradable
 - Demand can be shifted in time (i.e. durable goods)
 - Highly sensitive to financial conditions
 - borrowing rate, maturity length and number of instalments.
 - Thus, credits are important for core goods

- Different patterns of y-o-y inflation

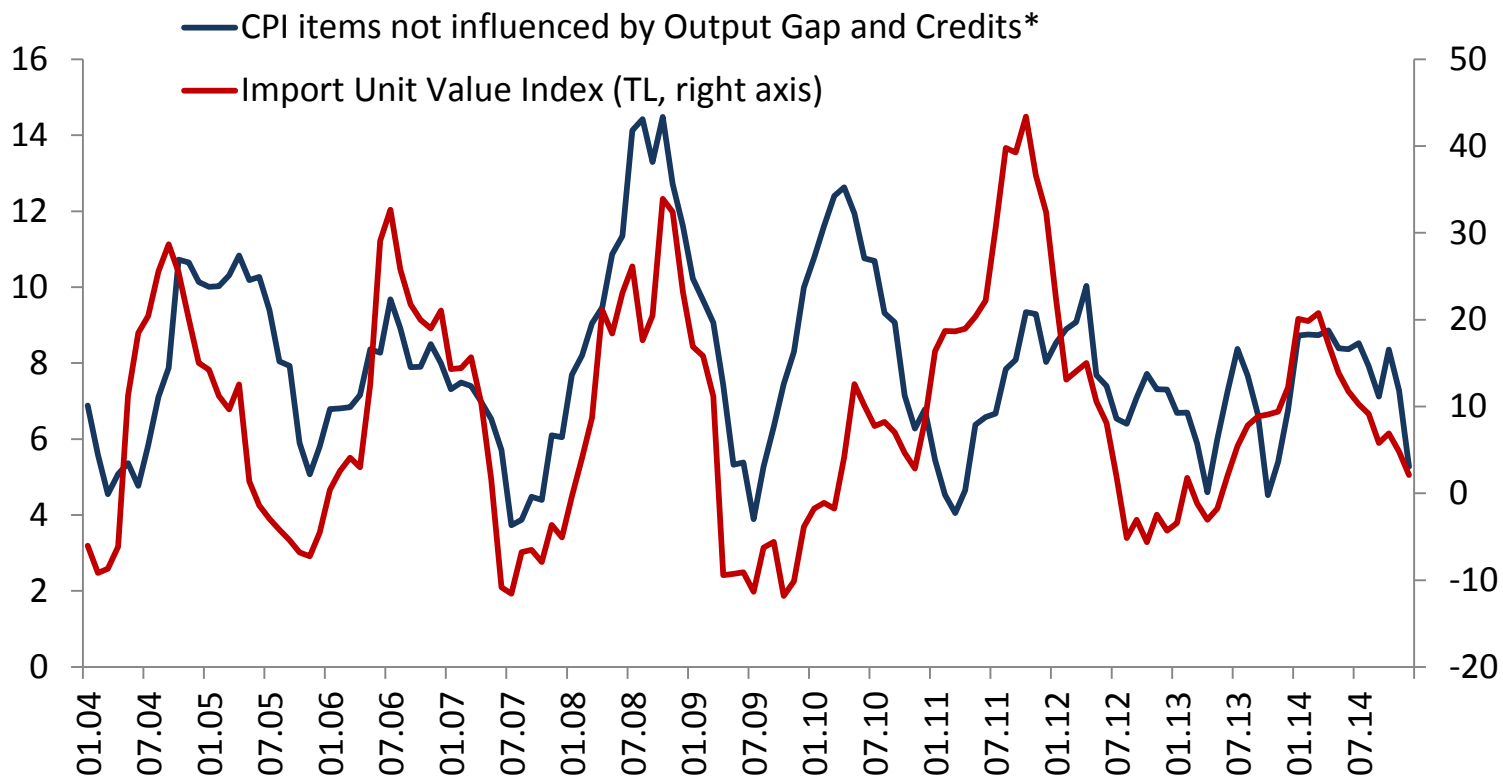


- "Impact area" of monetary policy
 - Index of CPI items sensitive to output gap and/or credits covers half of the CPI basket
 - Inflation in that index ranges from 2 to 13 % over the sample
 - But, items responsive to demand control policies also respond to exchange rate

CPI items influenced by Output Gap or Credits

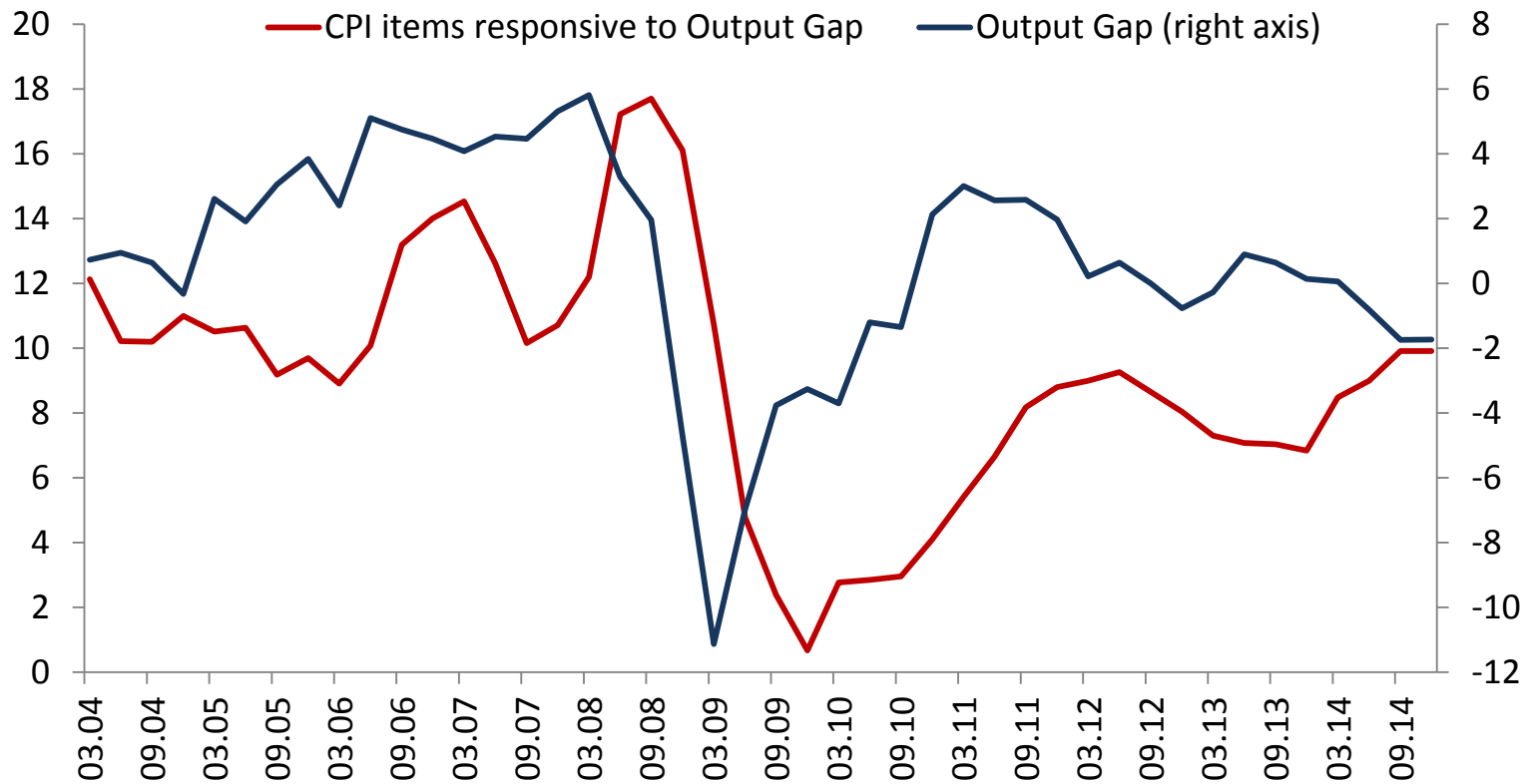


- However, the effectiveness of monetary policy is not limited to that..
 - Remaining items of CPI are highly sensitive to foreign prices and exchange rate
 - Stabilizing exchange rate may help control this portion of the basket

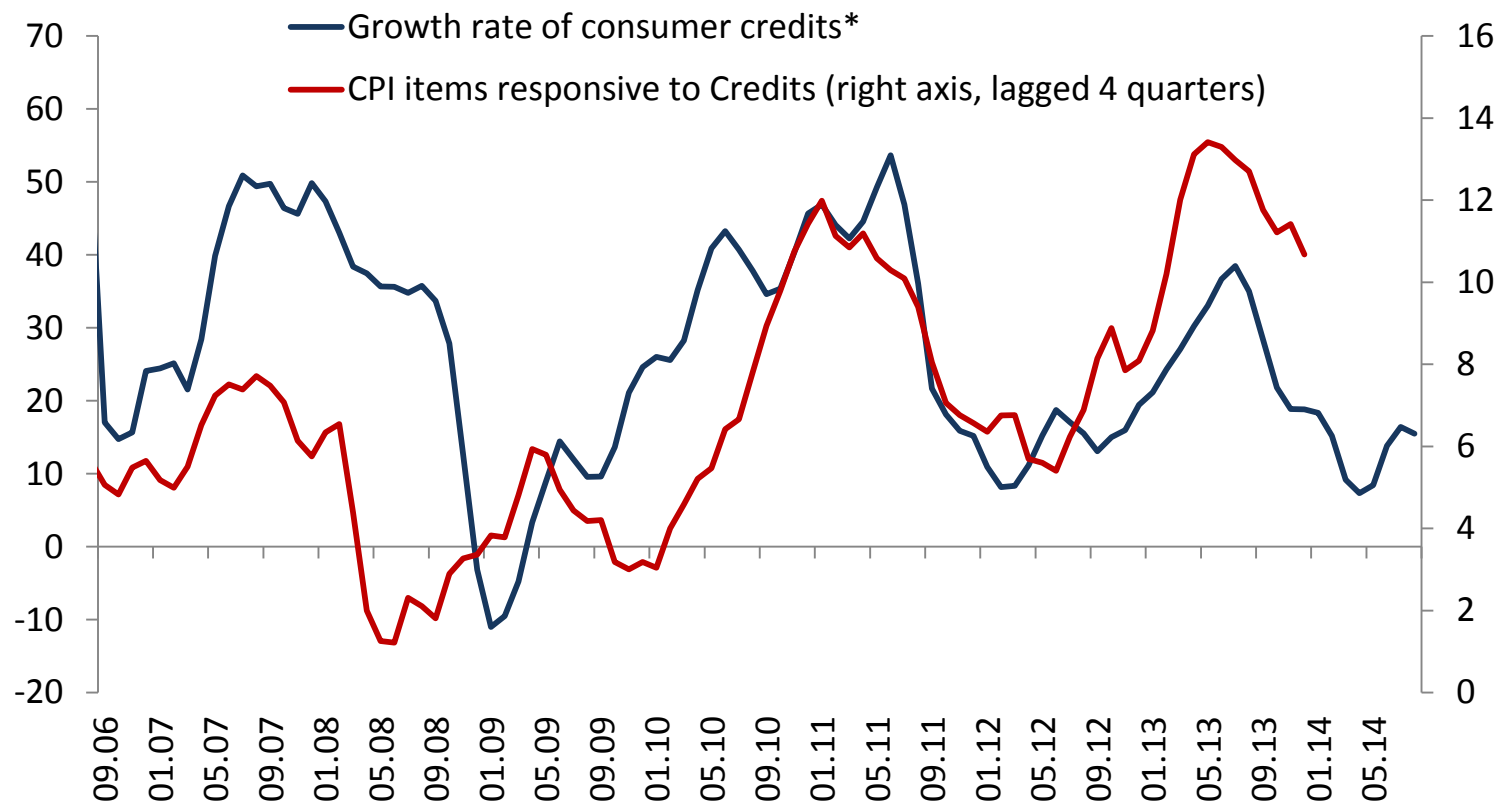


*Excludes fresh fruits and vegetables and tobacco products.

- Time horizon of the transmission differs..
 - Output gap affects inflation within 2-3 quarters



- Time horizon of the transmission differs..
 - Credits affect inflation within 4-6 quarters, a much longer transmission period



*Credit growth rate is calculated as the annualized 13-week moving average rate.

The disaggregated analysis reveals several interesting points that may not be induced from an aggregated analysis. We find that:

- About one half of the CPI may be influenced directly through two channels of monetary policy
 - About 1/3rd of the CPI is sensitive to output gap
 - About 1/4th of the CPI is sensitive to credits
- This does not limit the impact of monetary policy, however.
 - Since the remaining items are highly sensitive to foreign prices and exchange rate, stabilizing exchange rate also helps control inflation indirectly.
- Transmission lengths of two channels are different
 - The effects of credits are observed with a greater lag.
- Sectoral heterogeneity exists
 - Output gap sensitive items are mostly under services; credit-sensitive items are mostly under core goods.

The results also offer several policy implications:

- Countercyclical policies are effective to some extent
 - In order to reduce inflation, countercyclical policies may not be sufficient
- Need to tackle structural issues
 - Given that the inflation in CPI items not affected by output gap and credits fluctuates around a relatively high number suggest that exchange rate stabilization policies may not be enough per se.
 - Structural reforms are needed to diminish the import dependence of the domestic production structure
- A new set of more informative core inflation measures can be designed
 - Using the direct outcomes of this study, new core inflation measures which incorporate the items that are influenced by monetary policy can be designed.
 - More efficient than permanent exclusion based measures.

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