
How to measure inflation in India?

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Working Paper 2011-83

February 2011

NIPFP-DEA Research Program on Capital Flows and their Consequences
National Institute of Public Finance and Policy
New Delhi

<http://www.nipfp.org.in/nipfp-dea-program/index.html>

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February 7, 2011

Abstract

What is the best inflation measure in India? What inflation measure is most relevant for monetary policy making in India? Questions of timeliness, weights in the price index, accuracy of food price measurement, and inclusion of services prices are relevant to the choice of measure. We show that under present conditions of measurement, the Consumer Price Index for Industrial Workers (CPI-IW) is preferable to either the Wholesale Price Index or the GDP deflator.

JEL classification: E52; E58.

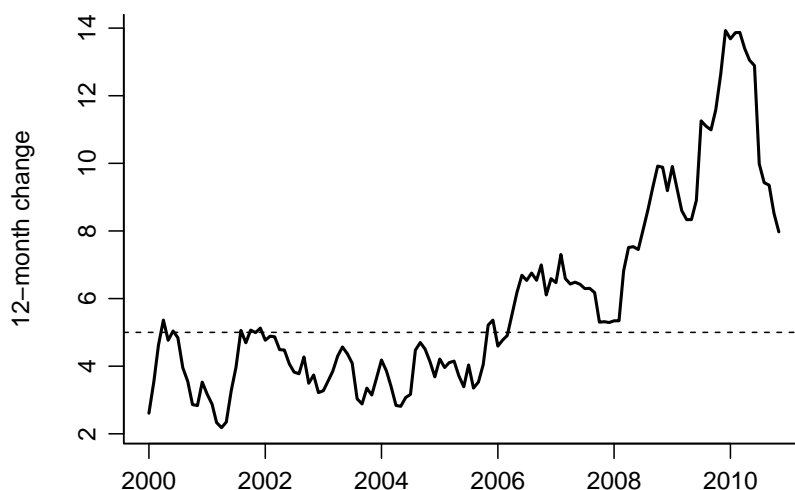
Keywords: Monetary policy; inflation measure; statistical system.

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Figure 1 Consumer price inflation in India



1 Introduction

In recent years, consumer price inflation in India has slowly crept up and reached double digits. Figure 1 shows that the year-on-year change of the CPI-IW has exceeded 5 per cent in every month from early 2006 onwards. This contrasts with other emerging economics who have, in general, witnessed low or single digit inflation, especially after the global financial crisis of 2008 (Figure 2).

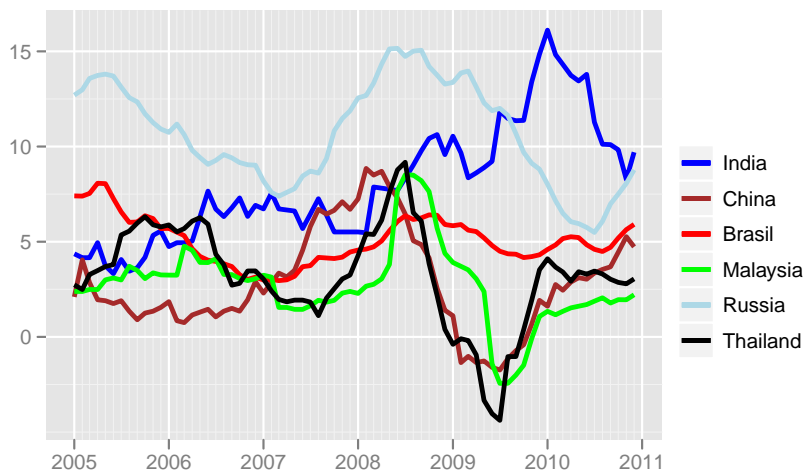
Though monetary policy in India is not explicitly charged with delivering low and stable inflation, it still needs to choose a measure of inflation as a reference. In this context, a major problem identified by the Reserve Bank of India (RBI) is the measurement of inflation in India:

“Which inflation index do we target? Our headline inflation index is the WPI and that does not, by definition, reflect the consumer price situation.”

– Subbarao (2010a)

The recent literature on inflation targeting suggests that targeting headline CPI is welfare improving relative to core CPI (Chang and Catao, 2010). In the case of emerging economies where the share of food consumption is high

Figure 2 Consumer price inflation in emerging economies



and not all consumers are able to borrow in credit markets to smooth their consumption, [Anand and Prasad \(2010\)](#) show that an inflation targeting central bank should target the headline inflation rate rather than the less volatile core inflation.

Monetary policy in India is not organised around an inflation targeting central bank. Notwithstanding the arguments in favor of, or against, the usefulness of adopting an inflation targeting approach, or the choice of core versus headline inflation as the appropriate target, we attempt to answer the question of which measure of inflation should have primacy in thinking about macroeconomic policy.

We look at detailed price data, expenditure patterns of households and the composition of different price indices available in India. Further, we discuss policies on inflation measurement in other countries. We argue that at this juncture, despite some serious deficiencies, the Consumer Price Index for Industrial Workers (CPI-IW) should be given a priority in discussions about overall inflation outcomes.

While this index needs to be improved upon, and updated in line with changing consumption baskets since 2001, it has the most recent weights among the CPIs and resembles today's consumer basket better than any other measure. To date, no other measure of inflation provides any information on services prices developments. The CPI-IW does so, with a weight of almost 12% on services and of 15% on rents of dwellings.

We argue that the Wholesale Price Index (WPI), while continuing to be a valuable source of price data, should be demphasised in the discussion of inflation outcomes. Increasing trade integration coupled with the domestic liberalization of administered prices has turned a growing fraction of the WPI basket into *tradable goods*, whose prices are determined in international markets.

By this reasoning, the acceleration in year-on-year inflation beyond 5 per cent from early 2006 onwards should be seen as a serious problem. The problem of high and volatile inflation should not be downplayed on the grounds that it is based on low quality information.

The Central Statistical Office's plans of releasing a new CPI series for India in February 2010 lends fresh salience to this question. This new CPI is likely to become the best candidate for a headline inflation indicator, through significant improvement upon existing price indices in terms of representation, quality of price collection and weighting. The release of this new CPI is a natural opportunity for RBI to de-emphasise other inflation measures and focus on the new CPI.

2 Multiple inflation measures

The multiplicity of inflation indices available in India has often been described as problematic and has been used as an argument for not adopting a full fledged inflation targeting framework:

“In India, we have one wholesale price index and four consumer price indices. There are ongoing efforts at a technical level to reduce the number of consumer price indices, and I believe the technical issues are not insurmountable. But that still will not give us a single representative inflation rate for an emerging market economy with market imperfections, diverse geography and 1.2 billion people.”

– Subbarao (2010b)

Table 1 shows that a multiplicity of inflation measures are also found in other countries. Indeed, India does not collate some of the indicators that are available in other countries. Some careful country descriptions are useful:

The United States In the US, consumer price indexes are available for two

Table 1 Most countries have many indicators

Distribution stage	India	USA	UK	Italy
Importer	na	Import price index	PPI-imp	PPI-imp
Exporter	na	Export price index	PPI-exp	PPI-exp
Producer	na	PPI	PPI	CPI-NIC
Wholesaler	WPI CPI-IW	na CPI-W	na RPI	na CPI-FOI
Retailer	CPI-AL CPI-RW	CPI-U C-CPI-U	CPI	HICP
Deflator	PCEPI	PCEPI	PCEPI	PCEPI

population groups: a CPI for All Urban Consumers (CPI-U) which covers approximately 87 percent of the total population, and a CPI for Urban Wage Earners and Clerical Workers (CPI-W) which covers 32 percent of the population. The CPI-U includes expenditures by urban wage earners and clerical workers, professional, managerial, and technical workers, the self-employed, short-term workers, the unemployed, retirees and others not in the labor force. The CPI-W includes prices of only those items that are present in the consumption basket of workers with hourly wage earning or clerical jobs.¹ In addition, there are measures of inflation within regions. While all these measures exist, the US Federal Reserve Board focuses primarily on the CPI-U and the Personal Consumption Expenditure deflator.

Italy In Italy, a number of inflation measures are published monthly, with prices surveyed at different stages of the production and distribution chain. Price indices referring to different segments of the population are also collated. There are three indices for consumer prices: (i) the consumer price index for the whole nation (NIC), based on population wide household consumption expenditure; (ii) consumer price index for blue and white-collar worker households (FOI), based on consumption of households whose reference person is an employee; it is used for indexing rental contracts and in wage negotiations (iii) harmonised index of consumer prices (HICP), calculated according to the EU regulations in force, which is used for the comparison of inflation between EU member states and as a key indicator for the monetary policy of the European Central Bank. These three indices differ in terms of the composition and weighting of the expenditure basket, while, for the most part, the underlying price collection survey is the same. Finally, pro-

¹For more details see the US Bureau of Labor [website](#).

ducer prices (PPI) are surveyed monthly, distinguishing developments on the domestic and the export market.

The United Kingdom A similar situation exists in the UK, where the Consumer Price Index (CPI) is the Government's preferred measure of inflation for macroeconomic policy. The institutional arrangement in the UK involves a central bank that targets inflation, while the Treasury specifies which index should be used and what rate should be targeted. The UK Treasury has instructed the Bank of England to deliver 2% inflation as measured by the CPI.

In contrast, the UK Retail Prices Index (RPI) is a general purpose indicator of inflation and its uses include indexation of pensions, benefits and index-linked gilts. A variant of the RPI is the RPI-X which excludes mortgage payments, but includes other components of housing costs (housing depreciation, council tax, dwellings insurance, ground rent, estate agents fees, surveyors costs and conveyancing fees). The Producer Price Index (PPI) is a monthly survey that measures the price changes of goods *bought and sold* by UK manufacturers. The survey collects information to develop the *output price index*, sometimes referred to as *factory gate prices*, which measures prices of goods sold by UK manufacturers. Furthermore, it also collects information for the *Input index* which measures the prices of materials and fuel purchased by manufacturers. In addition, there are a *number of export and import price indices* available. Finally, the *Services Producer Price Index* (SPPI) is a quarterly survey of prices charged for services provided by UK businesses to other UK businesses and government.²

These examples illustrate the point that in all countries, multiple price measures exist and have a useful role. At the same time, the presence of multiple measures does not undermine the conduct of macroeconomic policy.

On the issue of a large and diverse population also, India is not unique. As an example, the US has substantial domestic heterogeneity, with greater income inequality than is found in India. This has not undermined the notion of an overall average measure of inflation. A more striking counter-example is that of the European Central Bank (ECB), which has the mandate of delivering price stability for a group of 14 countries with a population adding up to 320 million featuring substantial regional diversity.

While these differences may be present, there is still much value in viewing

²Industry-specific series covering about half the total corporate services sector are currently published as experimental statistics.

an overall average measure of inflation as one of the key summary statistics of *macroeconomic* conditions. Since macroeconomic policy is about aggregative policy instruments which influence every household, it is appropriate that it respond to aggregative information measures which average across all households.

In a nutshell, we conclude that other countries too have many price indices, but this does not deter them from choosing one or the other measure of inflation for macroeconomic policy making. This motivates a careful examination of the price indices available in India with the aim of choosing one.

3 Issues in choice of inflation measure

In most countries, the Consumer Price Index is the most widely understood and recognised measure of inflation. It is available relatively frequently, and it is typically not subject to revisions. The overall CPI is meant to represent the cost of a representative basket of goods and services consumed by an *average* urban/rural household.

In most countries, a ‘Producer Price Index’ (PPI) is also reported. While PPIs record the price change from the perspective of the seller, CPIs measure price change from the purchaser’s perspective. Sellers’ and purchasers’ prices differ due to government subsidies, sales and excise taxes, and distribution costs. This distinction, used internationally, between the PPI and the CPI is considerably unlike the Indian distinction between the WPI and the CPI.

In India, the RBI has historically focused on developments in the Wholesale Price Index. This is visible in the much greater depth of analysis dedicated to the WPI in the Central Bank communication. Consumer prices are referred to when significant departures from the dynamics of the WPI emerge, as happened since early 2009 (RBI, 2009-10).

In order to choose a measure of inflation that monetary policy will focus on, three issues need to be addressed:

1. The choice of a reference population is the first challenge. In any country, no one price index will measure the impact of price changes on the entire population (be it consumers or producers). Thus a target population needs to be chosen. Ideally the price index for this population should not move very differently from those of others.

2. The weights in the index need to be chosen. This distribution should be as close to the present consumption basket of the target population as possible.
3. Prices that go into the indicator should be measured properly, effectively reflect the consumption basket and the data should be timely and reliable.

With these criteria in mind, we now analyse the various prices indices available in India, with a view to choosing the one that best fits the above criteria.

4 Wholesale price index

India is one of the few countries where the WPI is considered as the *headline inflation* measure by the Central Bank. This preference over the CPI is often explained in terms of three criteria: national coverage, timeliness of release (now only limited to food products) and its availability in very disaggregate format (Mohanty, 2010). Of these criteria only the last one is uncontroversial: CPI numbers are not released to the public in the detail available for the WPI. This however does not appear to be an insurmountable problem to address, as the detailed data is collected, but it is just not made public with sufficient timeliness.

The Working Group for Revision of Wholesale Price Index Numbers OEA-DIPP (2008) discussed the construction of a new weighting scheme. The Report pointed to the inherent difficulty of defining the concept of the *universe* of the WPI. While, in principle, the WPI should comprise all transactions at first point of bulk sale in the domestic market, in practice, how to account for these transactions, and what sources to use are issues that remain open to interpretation. Furthermore, the weighting could be based on the notion of value added, final demand or gross output. The approach underlying WPI relies on two concepts: *gross* value of output for manufactured products and *value of marketed surplus* for agricultural products.

The Working Group proposed set of weights in the base 2004/05=100 (Table 2) has been adopted in the new WPI. It is interesting to note that the combined weight of food (primary food articles and manufactured food items) in the WPI has come down to 24% from 26.9% in the old base 1993/94=100. This appears inconsistent with both the reduction in the share of agricultural value added in GDP (by approximately 15 percentage points in this period) or that recorded by food products in the National Sample Survey consumption expenditure basket, in rural and urban areas (Tables 3 and 4).

Table 2 The revised WPI index, with weights 2004/05=100Sourced from the **Report** by the Working group on revision of the WPI.

	Weight	
	(2004-05)	(1993-94)
ALL COMMODITIES	100	100
I. PRIMARY ARTICLES	20.1	22.0
(A) Food Articles	14.3	15.4
(B) Non-Food Articles	4.3	6.1
(C) Minerals	1.5	0.5
II. FUEL & POWER	14.9	14.2
(A) Coal	2.1	1.8
(B) Mineral Oils	9.4	7.0
(C) Electricity	3.5	5.5
III. MANUFACTURED PRODUCTS	65.0	63.7
(A) Food Products	10.0	11.5
(B) Beverages, Tobacco & Tobacco Products	1.8	1.3
(C) Textiles	7.3	9.8
(D) Wood & Wood Products	0.6	0.2
(E) Paper & Paper Products	2.0	2.0
(F) Leather & Leather Products	0.8	1.0
(G) Rubber & Plastic Products	3.0	2.4
(H) Chemicals & Chemical Products	12.0	11.9
(I) Non-Metallic Mineral Products	2.6	2.5
(J) Basic Metals, Alloys & Metal products	10.7	8.3
(K) Machinery & Machine Tools	8.9	8.4
(L) Transport, Equipment & Parts	5.2	4.3

Table 3 Rural consumer basket

NSSO round	43rd	50th	55th	61st	62nd	63rd
Rural population	1981/82	1986/87	1991/92	1996/97	2001/02	2006/07
Cereals	26.1	23.8	22.2	17.4	17	16.5
Gram	0.2	0.2	0.1	0.1	0.2	0.2
Cereal substitutes	0.1	0.1	0.1	0.1	0.1	0.1
Pulses & their products	4	3.7	3.8	3	3.2	3.3
Milk & milk products	8.6	9.3	8.8	8.2	8.2	8.1
Edible oil	5	4.4	3.7	4.4	4.1	3.9
Egg, fish & meat	3.2	3.3	3.3	3.2	3.9	3.5
Vegetables	5.2	5.9	6.2	5.9	6.1	6.2
Fruits & nuts	1.6	1.7	1.7	1.8	1.9	1.8
Sugar	2.9	3	2.4	2.3	2.4	2
Salt & spices	2.9	2.6	3	2.4	2.1	2.3
Beverages etc.	3.9	4.1	4.2	4.4	4.2	4.4
Food total	63.8	62.1	59.4	53.1	53.3	52.3
Pan,tobacco & intoxicants	3.2	3.1	2.9	2.6	2.5	2.5
Fuel & light	7.4	7.2	7.5	9.8	9.7	9.5
Clothing	6.7	7.4	6.8	6.7	6.3	6.1
Footwear	1	1	1.1	1	1	0.9
Misc. goods & services	14.4	16.8	19.6	23	23.7	24.9
Durable goods	3.6	2.3	2.6	3.8	3.5	3.8
Non-food total	36.2	37.9	40.6	46.9	46.7	47.7

Table 4 Urban consumer basket

NSSO round	43rd	50th	55th	61st	62nd	63rd
Rural population	1981/82	1986/87	1991/92	1996/97	2001/02	2006/07
Cereals	14.8	13.8	12.3	9.6	9.4	9.1
Gram	0.2	0.2	0.1	0.1	0.1	0.1
Cereal substitutes	0.1	0.1	0	0	0	0
Pulses & their products	3.4	3	2.8	2	2.2	2.3
Milk & milk products	9.5	9.7	8.7	7.5	7.3	7.4
Edible oil	5.3	4.3	3.1	3.3	3	2.9
Egg, fish & meat	3.5	3.3	3.1	2.6	2.8	2.6
Vegetables	5.2	5.4	5.1	4.2	4.2	4.3
Fruits & nuts	2.5	2.6	2.4	2.1	2.2	2.1
Sugar	2.3	2.3	1.6	1.4	1.5	1.3
Salt & spices	2.3	2	2.2	1.6	1.5	1.6
Beverages etc.	6.7	7.1	6.3	5.9	5.8	5.7
Food total	55.9	53.9	48.1	40.5	40	39.4
Pan,tobacco & intoxicants	2.6	2.3	1.9	1.5	1.5	1.4
Fuel & light	6.7	6.5	7.8	9.5	9.4	8.9
Clothing	6	7	6.1	5.6	5.4	5.4
Footwea	1.1	1.2	1.2	1	1	1
Misc. goods & services	23.5	26.4	31.5	37.6	38.7	39.4
Durable goods	4.2	2.6	3.6	4.3	4	4.5
Non-food total	44.1	46.1	51.9	59.5	60	60.6

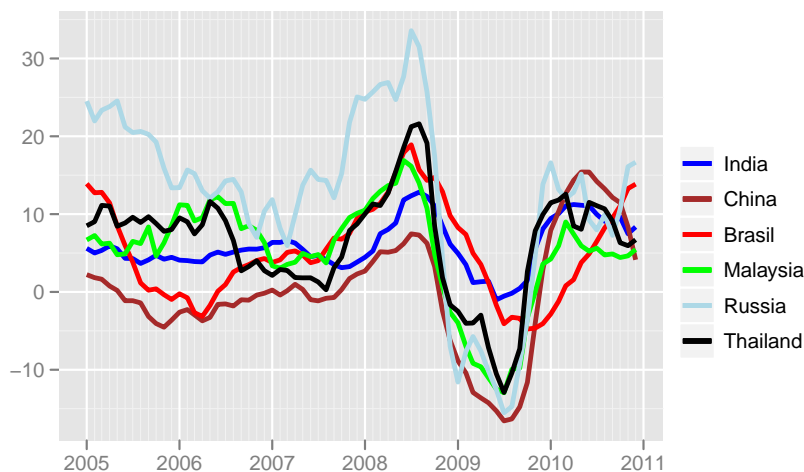
While producer prices reflect *factory-gate prices*, valued from the producer perspective, wholesale prices may record prices paid at various stages of the distribution chain: starting from prices of raw materials for intermediate and final consumption, or prices of intermediate goods, to prices of finished goods up to the retail stage. Furthermore, prices for WPI reflect discounts and rebates, taxes and subsidies on products, as well as trade and transport margins.

WPI prices refer to different stages in the production and distribution process:

*“The concept of a wholesale price adopted in practice represents the quoted price of bulk transaction **generally at primary stage**. The price pertaining to bulk transaction of agricultural commodities may be farm harvest prices, or prices at the village mandi /market of the Agricultural Marketing Produce Committee/ procurement prices, support prices. For manufactured goods the wholesale prices are administered prices, ex- factory gate/ ex-mill, ex-mine level. Ex-factory prices exclude rebate if any, other taxes and levies are excluded though excise duty is currently included.”*

– OEA (2008)

Figure 3 PPI/WPI growth in emerging markets



The difficulty this creates is clear in the case of agricultural commodities, where the WPI reflects not only market prices recorded in the mandis, but also administered prices. For example, the WPI for wheat is a mixture of the mandi price and the government procurement price or the MSP (in the old WPI it used to be the Public Distribution System price), thereby significantly attenuating the actual price fluctuations.

This complicates not only the reading and analysis of the inflation rate recorded by the WPI, but also the communication to the public of the rate of inflation which is being used as a headline indicator. To gauge more effectively inflationary pressures mounting in the earlier stages of the production stage, a useful approach could entail re-aggregating the elementary WPI items by stage-of-processing, i.e into raw materials, intermediate goods, capital goods and consumer goods, as is done for PPIs in advanced countries. However, it is not obvious to what extent this could be achieved without full details about price data collection.

Another important perspective upon the WPI gives insights into its role in domestic policy thinking. Figure 3 shows that the WPI tends to move with PPI of other countries, as a consequence of the substantial share of tradeables in the WPI. This co-movement has become more dramatic across countries during the recent crisis.

The domestic WPI is thus strongly influenced by the fluctuations of global prices of tradeables and the fluctuations of the rupee. Domestic monetary policy has no impact on global tradeable prices. In addition, now that India

has moved towards a flexible exchange rate policy, domestic monetary policy does not involve an administrative control of the exchange rate.³ There is a telling contrast between Figure 3, where a range of countries have similar tradeables inflation, and Figure 2, which shows the divergence of consumer price inflation across the same countries.

This suggests that the central bank should focus on Figure 2 – the unique features of each domestic economy – rather than on Figure 3 – the common factor of global tradeables inflation.

5 GDP deflator

The GDP deflator is another indicator of inflation, which is often considered to be broader than the CPI and the WPI. The GDP deflator in most countries is obtained by using a variety of primary price indices. These are used to deflate individual components of GDP valued at current prices (either from the production or the demand side estimates) to obtain volume estimates. The GDP deflator is then defined implicitly as the ratio of the estimate at current prices to the one at constant prices. When this process is followed, the GDP deflator is legitimately recognised as a high quality measure of inflation. Nonetheless, given the delay in publication of national accounts it is seldom used as a headline indicator of inflation in a realtime setting.

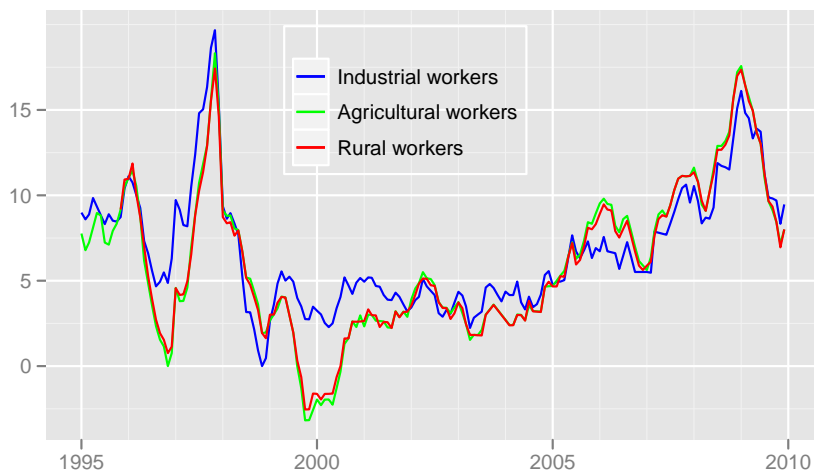
In India, some observers have argued in favor of using the GDP deflator as the reference measure of inflation. While appealing in theory, this suggestions do not take into account the actual procedures used to estimate this deflator in India. For quarterly accounts, the production approach GDP estimates are first obtained using proxy indicators of quantity (e.g. industrial production) and then inflated to current price estimates. This operation, especially for the most recent quarters, is performed using the **overall** WPI series.⁴ It should not, therefore, come as a surprise that the dynamics in the deflator closely resembles the ones of WPI, especially so in the last available quarters, as mentioned in [Nadhanael and Pattnaik \(2010\)](#)⁵. Thus, by construction, the most recent figures on the quarterly GDP deflator contain little information

³Domestic monetary policy does have an indirect impact upon the exchange rate. Other things being equal, when the Indian policy rate goes up, more capital comes into India, and the rupee appreciates. However, these changes are a small part of the overall volatility of the INR/USD exchange rate which now works out to roughly 10 per cent per year.

⁴In our knowledge, the CPI-IW is used only for 2 sectors.

⁵See [CSO \(2008\)](#).

Figure 4 Consumer prices



beyond that already visible in the WPI and the CPI.

6 Consumer price index

The overall CPI is meant to represent the cost of a representative basket of goods and services consumed by an *average* household. However, in India, the existing CPIs refer to specific segments of the population (Rural, Industrial Workers, etc.).

Figure 4 shows that all measures of consumer prices inflation broadly moved together, especially since 2008. The most recent weighting scheme, as we saw earlier in Figure 4, is of the CPI Industrial Workers, based on an NSSO survey. The index is collected from 78 centers. In this nomenclature, the category ‘Industrial Worker’ is actually a misnomer and should perhaps be called manual workers as it includes workers in factories, mines, plantations, railways, public motor transport undertakings, electricity generation and distribution establishments as well as ports and docks. It includes imputed rents, as is done by some CPI measures internationally, e.g. in the US. Roughly 10% of the index is services, in addition to the rent component (LB, 2009). Furthermore, from the point of view of monetary policy, one important property of the CPI-IW is that it is used as a reference index for the wage indexation for civil servants.

To gauge the extent of the information delays in the CPI-IW basket, we

Table 5 Weights in CPI-IW and CMIE household survey

CMIE- Sep 2009, all India		CPI-IW	
Food	shares in food	shares in food	Label
Cereals & Pulses	29.4	29.2	Cereals & Pulses
Edible Oils	7.3	7.0	Oils and Fats
Spices etc.	3.7	5.5	Condiments and spices
Potatoes & onions	5.8	1.56	Potato and onions
Vegetables & Fruits	14.4	13.1	Vegetables and fruit
Milk	13.2	13.9	Milk various kinds
Milk Products	2.5	1.9	other milk products
Biscuit	1.3	1.02	Biscuit
Salty Snacks	1.1	1.65	Snack-Saltish
Noodles/flakes	0.4	0	NA
Confectionery	0.4	0.95	Snack-Sweet
Juices/jams	0.6	0.13	1/2 Cold drink/Aerated Water
Health supplements	0.8	0	NA
Meat/Eggs/Fish	8.1	8.6	Meat, Fish and Eggs
Ready to Eat Food	1.8	0	NA
Tea	2.3	6.2	Hot drink tea and tea leaf
Coffee	0.2	0.3	Coffee Powder and Hot-drink tea
Sweeteners (Sugar, Gur etc.)	4.5	3.3	Sugar and Gur
Beverages (Soft drinks)	0.6	0.1	Green Coconut
Bottled Water	0.1	0.13	1/2 Cold drink/Aerated Water
Others (Food)	1.4	1.73	Other food
weight of food in CMIE	44.92	46.2	weight of food in CPI-IW

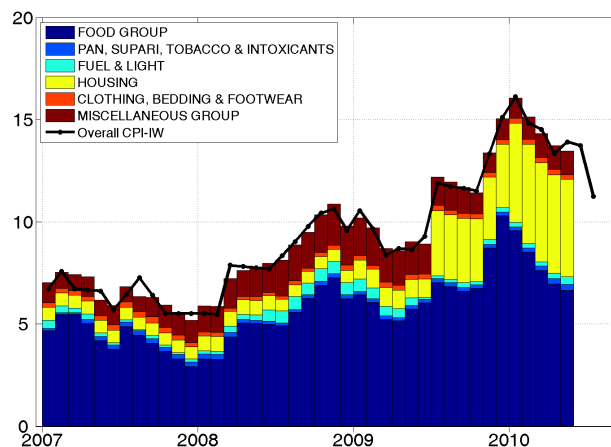
compare it with what probably is the most up to date information on Indian households expenditure patterns. This is taken from the CMIE Consumer Pyramids, a dataset drawn from a panel dataset where over 100,000 households are surveyed each quarter, for which we have a detailed level breakdown. The weight of food in the Consumer Pyramids dataset is 45%, compared to 46% in the CPI-IW. The difference between the two baskets is, however, much larger (almost 10 percentage points) when accounting for the fact that imputed rents are included in the expenditure weights by the CPI-IW, but not in CMIE's measurement of the consumption basket. However, *within* the food categories, we find that the distribution of expenditure is not too dissimilar across the two sets of weights.⁶ This improves our confidence in the weighting scheme of the CPI-IW.

The CSO plans to release a new all India Consumer Price index by early 2011.⁷ The weights will be based on the 2004/05 NSSO expenditure survey. These are expected to be closer to the weights visible in the CMIE household survey. The new index will also account for imputed rents, as in the current CPI-IW.

⁶Of course, some substitutions may have occurred at a finer level of disaggregation.

⁷See [this web page](#).

Figure 5 Contribution to consumer prices



6.1 Food prices

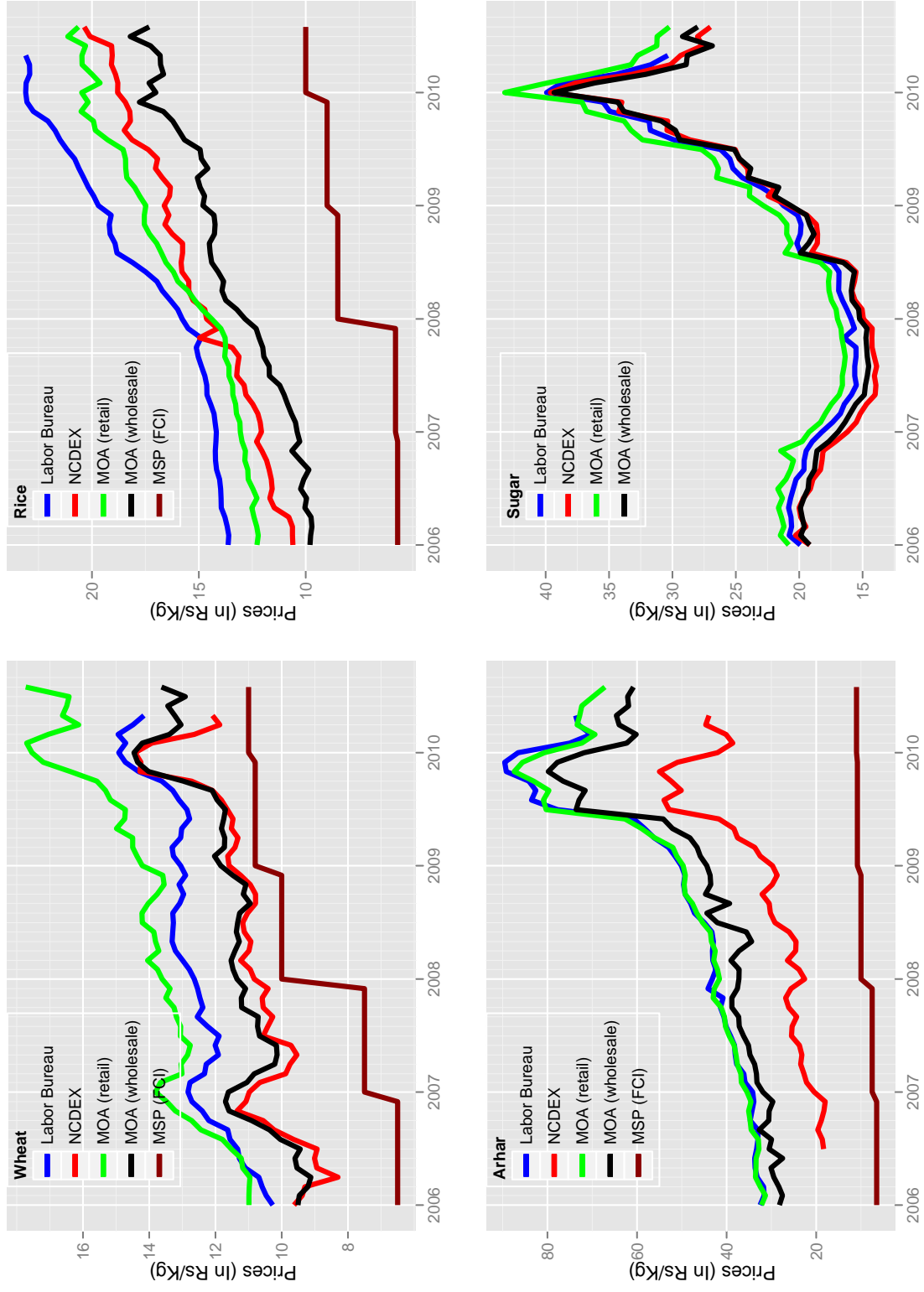
The biggest contribution to the high CPI inflation of recent years has come from food prices (Figure 5). This has been a major topic of discussion among policy makers and the media. In order to explore the accuracy of food price data, we juxtapose data for food prices from four sources:

1. Ministry of Agriculture(MoA): retail and wholesale prices.
2. CMIE: commodity spot price data produced at a daily frequency for the National Commodity Derivatives Exchange (NCDEX).
3. Labour Bureau: price level data underlying the CPI-IW.
4. FCI: Minimum Support Prices (MSP).

The CMIE/NCDEX data is available daily. It provides more timely information on primary food commodities markets, compared with that recorded by the WPI data. The use of these prices in the clearing and settlement processes of the commodity futures market (at NCDEX) gives confidence in data quality.

We find serious problems of non-response and outliers in the MoA data. This data feeds into the WPI for agricultural products. Similar problems are also found in the Labour Bureau data (underlying the CPI-IW). We also find substantial geographical heterogeneity in price levels and trends. Some

Figure 6 Looking at food price levels from many sources



discrepancies in price levels are also visible across sources, but may relate to issues of product variety. Both the MoA wholesale data, and the Labour Bureau retail data comoves with the NCDEX data after we delete outliers and non-responding locations. This suggests that the quality of the food price data which is one of the largest components of the CPI is acceptable.

As an aside, it is interesting to note the limited extent to which other price data comoves with Minimum Support Prices.

6.2 Base year

Among the consumer price indices in India, the most recent weights are from CPI-IW, based on an ad-hoc NSSO survey on expenditure patterns in 2001. The other indices, as seen in Table 6, are fairly outdated. Unti August 2010, the WPI which was often used to discuss inflation, had 1993-94 as its base period. Only in August 2010, a new WPI was released with 2004/05 as its base period.

6.3 Price of services

While services account for half of Indian GDP, and a large share of household consumption expenditure, there is no price index for output prices in this sector, neither at the consumer nor at the producer level. The only price series available for some services prices are those that have always been routinely collected in the CPI surveys (in particular for the CPI-IW). This series is not published or easily accessible and the data for various services prices has not been collated into a single index.⁸

Since CPI contains an element of services, we examine services price data to assess whether data under this category is meaningful. In this section, we focus on services prices in the CPI-IW. Do the trends in services prices in the CPI-IW look reasonable?

Using the publicly available breakdown of the CPI-IW basket into 310 elementary items, we isolate those items which could be regarded as relating entirely to services prices. We exclude from this group the housing category, which refers to the rents of leased⁹ apartments and owner occupier hous-

⁸Following a formal request to the Bureau of Labour, we obtained the price series of these items. We thank Director S.S. Negi in Shimla for his kind help.

⁹For more details, see the OEA (2008)

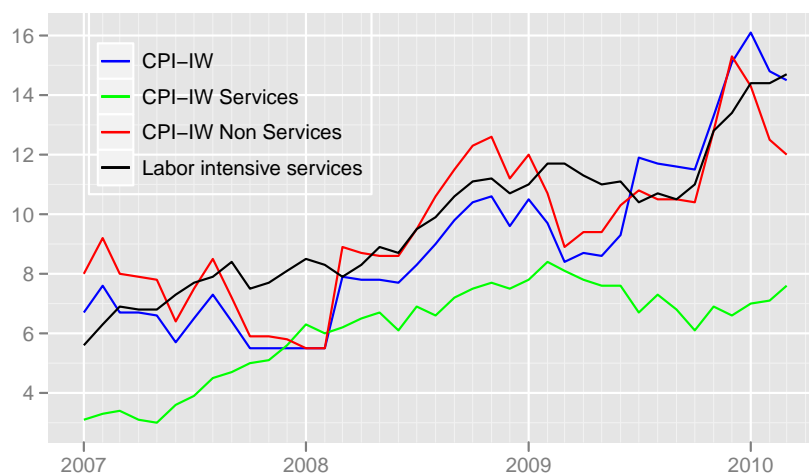
Table 6 The price indices in India

Index	CPI-IW	CPI-AW	CPI-RW	CPI-UNME*	WPI**
Source	Ministry of Labor	Ministry of Labor	Ministry of Labor	Central Statistical Office	Ministry of Commerce and Industry
Base	2001=100	1986-87=100	1986-87=100	1984/85=100	1993/94=100
Frequency of data collection	monthly and weekly	monthly and weekly	monthly and weekly	monthly and weekly	monthly and weekly (food)
Frequency of published data	monthly	monthly	monthly	monthly	monthly and weekly (food)
Publication delay (weeks since end of reference month)	4	3	3	2	2
No. of elementary items	320	260	260	146-345	435/1918
Weight % food products	48.47	69.15	66.77	45.67	26.9
Weight % energy	7.43	8.35	7.9	5.48	14.2
Weight % services	8.72	7.04	7.09		0
Target population	70% non agric. workers	agricultural workers	rural workers	urban manual employees	Weighting on gross value of production
Underlying survey	Working Class Family Income and Expenditure Survey 1999/2000	National Sample Survey Organisation 1983	National Sample Survey Organisation 1983	Middle class family living survey 1982/83	Nat.Acc. and agriculture production survey
Geographical coverage and data collection	78 urban centers	600 rural villages	600 rural villages	59 urban centers	Centralized collection

* The CPI-UNME has been discontinued from April, 2010. See the [press release page](#).
 ** A new WPI with base 2004/05 was released on Sept.2010.

Table 7 Services in CPI (weights)

Description	Weight
Communication Services	1.04
Labor intensive Services	4.17
Health Services	0.87
Education	3.01
Leisure Services	0.71
Transport Services	2.52
ESI contribution	0.52
Overall Services	12.84

Figure 7 Year-on-year CPI-IW inflation

ing services. We further classify these elementary items into 7 economically meaningful subgroups reported in (Table 7): labor intensive, communication, health and ESI, education, leisure related and transport services. Their overall weight comes to approximately 13% of the overall CPI-IW.

Figure 7 shows that the year-on-year growth in the CPI-IW, according to the services-non services breakdown. Two interesting facts emerge: first, overall inflation in services, from below 5% in 2007, gradually increased to reach around 7.5% in early 2010 (data is only available up to May 2010). This has come not only from food, but also from the housing component and **some services**; second, labor intensive services grew at a rate comparable to overall CPI-IW, above 10% year-on-year from mid 2008 and hovering around 15% in the most recent months. Among non-food items, housing has a weight of 15.6% in the overall CPI-IW basket.

Figure 8 The year-on-year story behind the CPI numbers

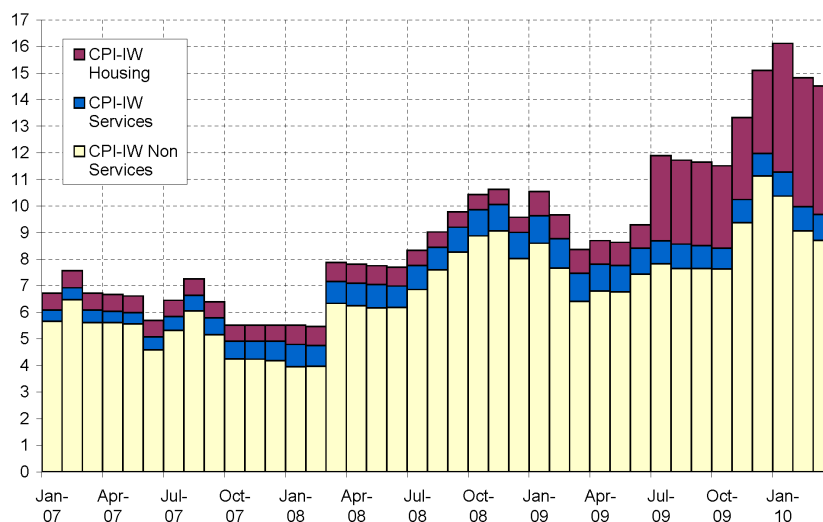
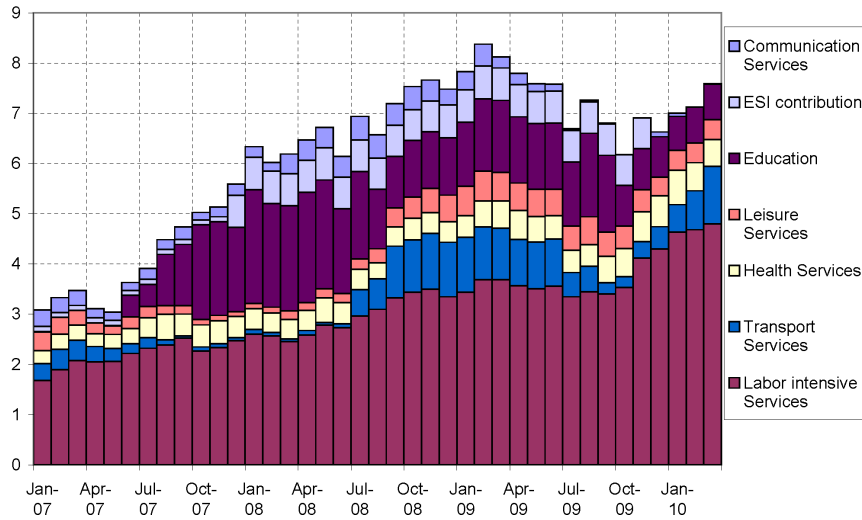


Figure 8 reports the contribution to the year-on-year growth to the CPI-IW due to services, housing and the remaining components. While food indeed contributed the most to overall inflation during 2008 and 2009, housing related expenditure (rents) determined a further increase from the end of 2009. In contrast, services prices contributed the least given their relatively low weight in the index. Nonetheless, it is still interesting to examine the dynamics of this component to understand the drivers of services inflation.

This is reported in Figure 9, using the breakdown described in Table 7. In the period 2007-2010, the labor intensive component, with an overall weight of 4% contributed increasingly to overall services inflation. In March 2010, approximately 67% of the services inflation was due to these prices.

The role of rent in CPI inflation may reflect difficulties in price measurement. The Sixth Pay Commission raised the house rent allowance to civil servants by 30%. This contributed to a sharp jump in the house rent index that is used in the CPI, starting from the second half of 2009. To the extent that computation of the CPI uses *price information* for rent from the house rent allowance for civil servants, this represents a low quality source of information.

Figure 9 Focus on services in CPI-IW



6.4 Issues of core inflation and further research

Underlying inflation measures feature prominently in the economic debate and in central banks' external communication and internal policy discussions. Various measures of core (or underlying) inflation have been proposed in the literature, differing in the way transient noise is defined and removed, but not in the basic underlying principle (first described by [Blinder \(1982\)](#)). Indeed, all methods share one key feature: they are constructed by applying (cross-section or time-series) filters to available information. In many cases, the construction of core inflation indicators is relatively simple, which makes them an ideal tool for communication with the public.

The then Governor of the US Federal Reserve Board said in a speech:

*“In **discussing and thinking** about the conduct of monetary policy, **many central bankers focus on core inflation** —that is, a measure of inflation that excludes the rate of increase of prices for certain volatile components in price indexes. The Federal Reserve, for example, pays particular attention to the rate of growth of the core personal consumption expenditure (PCE) deflator, which **excludes food and energy prices.**”*

– Mishkin (2007)

Central banks differ in their use of total CPI or some measure of core CPI as their official target. By downplaying temporary fluctuations in food prices and energy prices, as well as other one-off changes (from administered prices or VAT), the central bank can convey better the developments in underlying inflation. In the last year, unlike in previous episodes of high inflation, the Reserve Bank of India has increasingly referred to the dynamics of the WPI excluding energy and food to signal price pressures becoming more broadly based.

Whether existing core inflation indicators *should* play a role in the monetary policy decision-making process —whether they would prove valuable in that context— has not been subjected to systematic theoretical scrutiny. An exception is Aoki (2001), who first provided a normative argument in support of the construction and use of core inflation indicators, using a New Keynesian model.¹⁰ Aoki (2001) shows that, in an economy where the degree of price stickiness differs from sector to sector, the central bank should aim at stabilizing inflation in *sectors where prices are stickier*. Indeed, available microeconomic evidence on sectoral price rigidity for both the euro area and the US Dhyne *et al.* (2006); Nakamura and Steinsson (2008) shows that consumer prices tend to be more flexible precisely in the energy and food sectors, thereby providing empirical support for targeting a measure of core inflation which excludes the latter prices. The items to be included are then typically *services prices* or wages Mankiw and Reis (2007).

Building on these findings, S. Eusepi and Tambalotti (2009) use a calibrated DSGE model of the US economy to construct a personal consumption expenditure based price index, with weights chosen to minimize the welfare costs of nominal distortions arising from heterogeneity in price rigidity across

¹⁰Benigno and Woodford (2005) extends Aoki (2001) results to a multiple country setting.

sectors.

However, the focus of these theoretical results on core inflation has generally been on developed economies. One major concern over extending these results to emerging economies lies in the relevant weight of food in the households consumption basket. Addressing this concern, [Anand and Prasad \(2010\)](#) reverse the key result of [Aoki \(2001\)](#) by showing that in an economy populated by credit constrained households and with a low price and income elasticities of food, the Central Bank should not ignore fluctuations in food prices. The latter are to be accounted for when setting interest rates, since agents may factor in food price inflation when formulating their strategy on the labour market, thereby determining second-round effects through the expectations channel.

Based on empirical results, recent research on China by [Zhang and Law \(2010\)](#) suggests that surging food prices may call for policy reactions even if non-food-price inflation is tame. The authors present evidence suggesting that while food-price inflation may have pushed up inflation expectations, it failed to generate significant second-round effects on non-food-price inflation, because of the lack of workers bargaining power.

7 Conclusion

In recent years, India has experienced a remarkable surge in CPI-IW inflation. In this paper, we have argued that CPI-IW should take center stage among the existing measures of inflation in India as the headline inflation rate. The arguments of this paper are likely to be amplified with the improvements unveiled in the new CPI of February 2011.

The CPI reflects the consumption bundle of households, and is thus more relevant than any other measure of inflation. Second, the CPI-IW also reflects prices of food as accurately as other measures. Third, CPI-IW includes the price of services that are not included in any other measure of inflation. Further, the WPI or the PPI largely reflect global prices of tradeables expressed in rupees. Monetary policy of the RBI has a minimal role in influencing these, other than through the exchange rate. On the contrary, the consumer price index has a large share of non-tradables. Monetary policy of the RBI has a much bigger role to play in influencing domestic non-tradable prices.

Indian macroeconomic analysis and policy thinking thus needs to move away from a focus on the WPI to the CPI-IW.

References

- Anand R, Prasad ES (2010). “Optimal Price Indices for Targeting Inflation under Incomplete Markets.” (16290). URL <http://www.nber.org/papers/w16290>.
- Aoki K (2001). “Optimal Monetary Policy Responses to Relative Price Changes.” *Journal of Monetary Economics*, **48**(3), 55–80.
- Benigno P, Woodford M (2005). “Inflation Stabilization and Welfare: The Case of a Distorted Steady State.” *Journal of the European Economic Association*, **3**(6), 1185–1236.
- Blinder AS (1982). “Inventories and Sticky Prices: More on the Micro-foundations of Macroeconomics.” *The American Economic Review*, **72**(3), 334–348.
- Chang R, Catao L (2010). “World Food Prices and Monetary Policy.” (16563).
- CSO (2008). *Manual on Index of Industrial Production (IIP)*. URL www.mospi.gov.in/manual_iip_23oct08.pdf.
- Dhyne E, Alvarez LJ, Bihan HL, Veronese G, Dias D, Hoffmann J, Jonker N, Lunnemann P, Rumler F, Vilmunen J (2006). “Price Changes in the Euro Area and the United States: Some Facts from Individual Consumer Price Data.” *Journal of Economic Perspectives*, **20**(2), 171–192.
- LB (2009). “Report of the Index Review Committee.” *Technical report*, Labor Bureau, New Delhi. URL http://labourbureau.nic.in/Index_RevComRep_082009.pdf.
- Mankiw NG, Reis R (2007). “Sticky Information in General Equilibrium.” *Journal of the European Economic Association*, **5**(2-3), 603–613. URL <http://ideas.repec.org/a/tpr/jeurec/v5y2007i2-3p603-613.html>.
- Mishkin FS (2007). “Headline versus Core Inflation in the Conduct of Monetary Policy, At the Business Cycles, International Transmission and Macroeconomic Policies Conference, HEC Montreal, Montreal, Canada.” URL <http://www.federalreserve.gov/newsevents/speech/mishkin20071020a.htm>.
- Mohanty D (2010). “Measures of inflation - issues and perspectives.” URL <http://www.bis.org/review/r100125f.pdf?noframes=1>.
- Nadhanael GV, Pattnaik S (2010). “Measurement of Inflation in India: Issues

- and associated challenges for the conduct of monetary policy.” In “RBI Staff Papers,” Reserve Bank of India.
- Nakamura E, Steinsson J (2008). “Five Facts About Prices: A Reevaluation of Menu Cost Models.” *Quarterly Journal of Economics*, **123**(4), 1415–1464.
- OEA MoC (2008). *Manual on compilation of index numbers of Wholesale prices in India*. URL http://eaindustry.nic.in/manual_out.htm.
- OEA-DIPP (2008). “Technical Report of the working group, revision of Index numbers of wholesale prices in India from the base -94 to 2004-05.” *Technical report*, Office of the Economic Adviser, Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, New Delhi.
- RBI (2009-10). “Annual Report.” *Technical report*, Reserve Bank of India, Mumbai.
- S Eusepi BH, Tambalotti A (2009). “CONDI: A Cost-of-Nominal-Distortions Index.” In “Staff Papers,” 367. Federal Reserve Bank of New York.
- Subbarao D (2010a). “Financial Crisis - Some Old Questions and Maybe Some New Answers, Tenth C.D. Deshmukh Memorial Lecture delivered at Council for Social Development, Southern Regional Centre, Hyderabad.” URL http://www.rbi.org.in/scripts/BS_SpeechesView.aspx?Id=515.
- Subbarao D (2010b). “India and the global financial crisis transcending from recovery to growth, at the Peterson Institute for International Economics, Washington DC.” URL http://www.rbi.org.in/scripts/BS_SpeechesView.aspx?Id=502.
- Zhang W, Law D (2010). “What drives China’s food-price inflation and how does it affect the aggregate inflation?” *HKMA working paper*, Hong Kong Monetary Authority.

Table 8 Food prices: sources and sample period

Data Source	Sample Period	Number of centres			
		Arhar	Rice	Sugar	Wheat
MoA (retail)	Jan 2006- Aug 2010	54	63	66	56
MoA (wholesale)	Jan 2006- Aug 2010	17	20	18	77
NCDEX	Jan 2006- May 2010	3	1	6	7
Labor Bureau	Jan 2006- May 2010	78	78	78	78

A Appendix

A.1 Notes on the food-prices dataset

We describe the dataset used in this paper for tracking food-prices. It becomes all the more important in light of the fact that it covers different markets across country and the different source agencies employed in collection of the data. In table 8, we list the sample period and number of markets tracked for prices data collection from different sources.

Retail and Wholesale Prices (Ministry of Agriculture) The Ministry of Agriculture collects prices data for both retail and wholesale prices from different markets across India. The number of markets tracked varies across commodities and prices (retail and wholesale, see table 8). In the absence of any weights attached to different centres, we calculate the all India prices as the *simple mean*¹¹ of centre prices. The data suffers from the problem of outliers¹² and non-reporting by many centres. The wholesale data also has quality factor (especially in case of rice) of products to account for. Efforts to maintain similar and comparable quality further reduces the number of markets. Having said that, due to its wide coverage, it remains as a important indicator of prices prevailing in the economy. The data is not available publicly and we sourced it by a special request to the MoA. We would like to thank the Ministry of Agriculture for support provided to this project.

Retail Prices (Labor Bureau) The Labor Bureau collects data on retail prices from 78 centres across India for 24 commodities for calculating the CPI

¹¹For margin analysis, we have used median prices for all India figures.

¹²Price series of centres with outliers were dropped from analysis because they could have given a wrong picture of all India prices.

(IW). All India prices are calculated as the *weighted average* of the centre prices, weights being centre weights used to calculate the CPI (IW) prices. The level of non-reporting and outliers in the data is lesser than MoA data, but is persistent in places from North-East and Kashmir. Another feature to note for is the price-stickiness observed at centers at West Bengal and adjoining states. This data is available in public domain (See [page](#)).

NCDEX prices (CMIE) CMIE collects data on commodity spot prices produced at a weekly frequency by conducting spot market surveys of the National Commodity Derivatives Exchange (NCDEX) mandis. We classify this data in the wholesale category because it is sourced from mandis whose prices go into the derivatives pricing of agricultural products. It covers a limited set of markets across India and the all India prices are the *simple average* of the mandi prices. The issue of non-reporting is negligible in this data. This is a classified information and is not available publicly. We thank CMIE for providing us access to the data.