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Abstract

Controlling for monetary policy, government transfers are potentially inflationary. This, however, may not be true when the economy is demand-constrained. Using a panel data of 17 Indian states over 30 years, we show that government transfers via welfare programs do not lead to inflation. For identification, we use a narrative shock series of transfer spending that is based on the introduction of new welfare programs. We then look at a specific program, NREGA, which has been shown to increase rural wages, and show that its implementation did not increase inflation.

JEL: E31; E62; H53; I38

Keywords: Fiscal Transfers; Welfare programs; Government spending; Inflation

1 Introduction

A wide variety of welfare measures primarily consist of fiscal transfers. Owing to the long lags associated with the design, approval, and implementation of large government purchase programs, redistributive fiscal transfers are often an attractive policy response to economic downturns in developing economies. However, concerns regarding fiscal transfers fueling price inflation can often impede such policy interventions. In an economy that is near the efficiency frontier, large scale transfers can boost demand, thus accelerating inflation (Bilbiie et al., 2013).[1]

However, product markets in developing countries are often demand constrained which can cause fiscal transfers to be expansionary without increasing price inflation. There is some recent evidence to suggest this. Taking evidence from a large food-assistance program in Mexico, Cunha et al. (2018) show that while in-kind transfers reduced prices, cash transfers had no effect on prices. Similarly, Egger et al. (2019) show that in Kenya, a large fiscal transfer ($\approx$ 15% of local GDP) had an output multiplier of 2.6, while causing an economically insignificant price inflation of 0.1%. While, these studies use specific programs as evidence, in this paper we study welfare spending in India over a period of 30 years and show that it had no effect on inflation.

Estimating the effect of transfer spending on inflation is often confounded by contemporaneous changes in monetary policy. We circumvent this issue by using sub-national variation in transfer spending in India, which allows us to control for monetary policy at the national level. India is particularly well suited for such analysis because of (i) the federal structure of the government with substantial within and across states variation in transfer spending and (ii) the large geographic size of the country with substantial differences in prices across states. An analysis of variance for the annual rate of inflation at state-level (controlling for year fixed effects) shows that while changes in the country-wide average inflation explain about 60% of the variation, the remaining 40% is attributable to variation between states. There is hence enough variation in both the regressor and the regressand.

A second key challenge is that changes in transfer spending may be endogenous to other macroeconomic changes, such as economic downturns and recessions, which can also directly affect inflation. Ignoring this issue can spuriously over/under-report the effect of government transfers on prices. For identification, we use a series of exogenous shocks to transfer spending

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[1] Giambattista and Pennings (2017) argue that government transfers are more inflationary than government purchases as both increase demand but purchases also increase aggregate supply.

under rural welfare programs as constructed by Bahal (2019) using narrative analysis (see Romer and Romer, 2010 for a detailed description of the narrative analysis approach). Bahal (2019) uses administrative records of rural welfare programs to identify changes in transfer spending that are associated with the implementation of new programs where the principal motivation to introduce such schemes is independent of local economic conditions. This yields a panel data of exogenous shocks in transfer spending for 17 large states over a period of thirty years between 1980 and 2010. We further use the Consumer Price Index for Agricultural Labourers to derive the inflation in each state-year. We find no effect of contemporaneous and lagged transfer spending on inflation. Importantly, using the same shock series, Bahal (2019) finds an impact multiplier of 1.4 and a cumulative multiplier of 2.1 for agricultural output at the state-level.

Finally, we take evidence from the largest public workfare program in the world: India's National Rural Employment Guarantee Act (NREGA). The program guarantees 100 days of employment per year at minimum wages to every rural household in India. Starting from 2006, NREGA was implemented in a phase-wise manner over three years across all districts of the country.[2] During 2009-10, NREGA generated around 2.6 billion work-days and employed around 55 million households. The total expenditure under NREGA amounted to around 0.6 percent of the GDP.

The implementation of NREGA was followed by a period of relatively high inflation in India (see Figure 1) and the programme is often cited as being responsible for increasing inflation during this period. While multiple studies have shown that NREGA did lead to an increase in real wages in rural India (see Sukhtankar, 2016 for a detailed literature review on the program), there has been no direct evidence of the effect of this large public workfare on inflation.

We use the phase-wise roll out of the program as a quasi-experiment to check whether the implementation of NREGA led to higher inflation. We find that after controlling for year fixed effects there is no significant association between the implementation of NREGA and inflation.

2 Data and methodology

To construct the exogenous shock series we use government records like the Annual Reports of the Ministry of Rural Development, Government of India

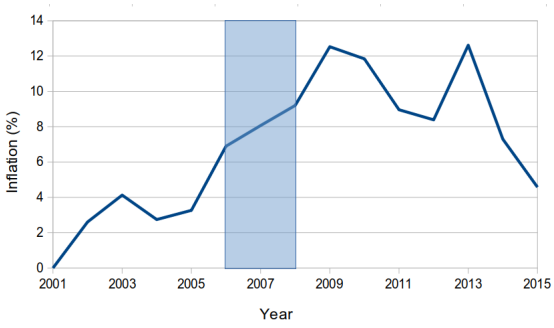

Figure 1 Inflation trend in India
Inflation based on CPI (Agricultural Labourers). The shaded region is the time when NREGA was implemented.

that identify all major rural welfare programs that were in operation between 1980 and 2010. These documents contain detailed information for all programs viz. the principal motivation to introduce a new program; the key program objectives; the date of program implementation; and state-wise financial statements that provide information on annual program expenditure.

Using official government documents as narrative evidence Bahal (2019) identifies the size, timing, and duration of all major program introductions between 1980 and 2010 to construct a state-level narrative shock series. The key identifying assumption is that the central government's decision to introduce a new nationwide scheme – like a subsidy or a public works program – is not related to the local economic conditions, including inflation, of specific states.

The narrative shock series acknowledges that once new programs are well established, spending on these programs can be endogenous to local output shocks (and hence to local price fluctuations) as the government pursues a counter-cyclical fiscal policy. However, when a program is first launched, its objective is not related to local output. We, therefore, set the timing of a shock as the year in which a new program is introduced. The duration of a shock is limited only to the year in which a new program is introduced.[3] The shock series is thus constructed using the per capita year-on-year increase in program expenditure in a state in a given year. This is normalised with per capita state agricultural output to account for the size of the rural economy in the state.

To check for endogeneity, Bahal (2019) tests and finds that the shock series is not correlated with past fluctuations in agricultural output or state fixed effects. Similarly, there is no correlation between the shock series and the level of rural poverty in a state

[2]NREGA covered 200, 330, and all the districts of the country by 2006, 2007, and 2008 respectively.

[3]The "introductory period" is two years only for two programs that were launched in phases.

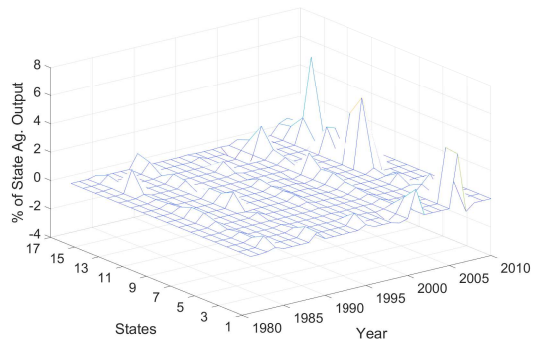

Figure 2 Distribution of expenditure shocks over states and years

Source:Bahal (2019)

or with the occurrence of elections. See Bahal (2019) for a detailed discussion on the construction of the shock series and tests for exogeneity.

The narrative shock series is a panel of 17 large states from 1981 to 2010.[4] The state-level inflation variable is constructed using state-specific Consumer Price Index (Agricultural Labour) that are released by the Labour Bureau of India.[5,6] We estimate the following empirical model.

$$\pi_{i,t} = \beta_1 S_{i,t} + \beta_2 S_{i,t-1} + \delta_i + \gamma_t + \xi t + \epsilon_{i,t} \quad (1)$$

Here, $\pi_{i,t}$ is the rate of inflation in state i in year t, $S_{i,t}$ is the exogenous expenditure shock as a proportion of state agricultural GDP, measured in real terms in 2004 prices, δ_i and γ_t are respectively the state and year fixed effects, ξt are state-specific time trends and $\epsilon_{i,t}$ is the error term. We also run a specification with year-on-year changes in total rural transfer spending as a proportion of agricultural output ($B_{i,t}$) in place of $S_{i,t}$.[7] See table 1 in the Appendix for descriptive statistics for variables used in equation 1. Figure 2 shows the distribution of $S_{i,t}$ over the states and years. As the figure shows, the shock series mostly takes the value zero except for the expenditure spikes that correspond to the introduction of a new program.

To test the effect of NREGA on inflation, we use the year in which the program was implemented in a district.[8] We then construct a state-level variable $\mathbf{I}_{i,t}$ denoting the percent of districts in a state where NREGA was implemented. Hence, before 2006 $\mathbf{I}_{i,t}$ takes the value zero for all states. From 2006 onwards, $\mathbf{I}_{i,t}$ increases as the fraction of districts in a state that are covered under NREGA increase. Finally, $\mathbf{I}_{i,t}$ takes the value 100 for all states from 2008 onwards. We construct our specification at the state level as inflation numbers are not available at the district level, and it is also likely that prices within a state would be much more correlated than between states. We estimate the following specification with variables having the same interpretation as equation 1.

$$\pi_{i,t} = \beta_3 \mathbf{I}_{i,t} + \beta_4 \mathbf{I}_{i,t-1} + \mathbf{X}_{i,t} + \delta_i + \gamma_t + \xi t + \epsilon_{i,t} \quad (2)$$

$\mathbf{X}_{i,t}$ in equation 2 represent a set of controls that could affect both NREGA implementation and inflation. This includes an indicator for state election year, and the log of average annual rainfall (in mm) a state receives.[9] See table 2 in the Appendix for descriptive statistics for variables used in equation 2. We estimate equation 2 over a period from 2001 to 2010. We take a ten year period around the implementation of NREGA to allow efficient estimation of state-specific heterogenous trends.

3 Results

The results from estimating equation 1 are given in Table 1. The first column shows the effect of contemporaneous and lagged shocks on inflation, while controlling for state and year fixed effects. In the second column state-specific trends are also controlled for. As the coefficients show, there is no effect of expenditure shocks on inflation. The coefficients are both statistically and economically insignificantly different from zero. In the third column the key explanatory variables are contemporaneous and lagged values of all changes in transfer spending in a state ($B_{i,t}$). The coefficients continue to be insignificant in this specification.

The null result of the narrative shock series on inflation is in contrast with Bahal (2019) where a similar specification shows spending shocks to increase state agricultural output quite substantially.[10] The results

[4]Results are qualitatively the same if we include smaller states as well.

[5]The CPI numbers were obtained from Indiastat.com.

[6]We also ran regressions using inflation calculated from the GDP deflator and the results were qualitatively the same.

[7]$B_{i,t}$ may include changes in transfer spending that are potentially endogenous to local output and prices.

[8]Using information available at https://nrega.nic.in

[9]Data for elections was obtained from the Election Commission of India website, and the rainfall data was obtained from Tropical Rainfall Measuring Mission (TRMM) satellite. We thank Thiemo Fetzer for sharing the rainfall data.

[10]Bahal (2019) reports an impact multiplier of 1.4 (2.1 over a period of five years).

Table 1 Inflation and Transfer Spending 1980-2010

	(1)	(2)	(3)
$S_{i,t}$	-0.155	-0.040	
	[0.250]	[0.255]	
$S_{i,t-1}$	-0.194	-0.038	
	[0.196]	[0.198]	
$B_{i,t}$			-0.054
			[0.164]
$B_{i,t-1}$			0.068
			[0.153]
Year F.E.	Yes	Yes	Yes
State F.E.	Yes	Yes	Yes
Trends	No	Yes	Yes
Obs.	451	451	451

The dependent variable in all regressions is $\pi_{i,t}$: the year-on-year rate of inflation for a state i in year t. The standard errors reported in square brackets are clustered at the region-year level and are robust to heteroskedasticity.

put together show that while these changes in transfer spending were expansionary, they were not necessarily inflationary. This is indicative of an economy well below potential output where redistributive fiscal transfers increase aggregate demand and output without building inflationary pressures.

Table 2 shows the results of estimating equation 2. All columns show the coefficients of the contemporaneous and lagged NREGA implementation variable. While the first column estimates equation 2 without any additional controls, the second column controls for state fixed effects. The contemporaneous coefficients are statistically and economically significant in both these columns showing a strong correlation between the implementation of NREGA and inflation. However, adding year fixed effects in the third column render the coefficients statistically insignificant. Finally, adding state-specific time trends together with other controls in column 4 do not change the results obtained in column 3. Disregarding the standard errors, if we only consider the point estimates, the contemporaneous and lagged estimates of $\mathbf{I}$ in column 4 add to 0.005, which implies that the full implementation of NREGA in a state increased inflation by an economically insignificant amount of 0.5 percentage points over two years.[11,12] Hence, the strong correlation between inflation and program implementation in the first two columns can be attributed to aggregate country-level factors such as a rise in international crude oil prices (see Mohanty and John, 2015).

Table 2 NREGA and Inflation

	(1)	(2)	(3)	(4)
$\mathbf{I}_{i,t}$	0.070***	0.070***	0.024	0.026
	[0.007]	[0.007]	[0.013]	[0.014]
$\mathbf{I}_{i,t-1}$	0.002	0.003	-0.018	-0.021
	[0.008]	[0.008]	[0.019]	[0.018]
State F.E.	No	Yes	Yes	Yes
Year F.E.	No	No	Yes	Yes
Trends[a]	No	No	No	Yes
Obs.	153	153	153	153

The dependent variable in all the regressions is $\pi_{i,t}$: the year-on-year rate of inflation for a state i in year t. The standard errors reported in square brackets are clustered at the region-year level and are robust to heteroskedasticity. $^{*}p < 5\%$, $^{**}p < 1\%$, $^{***}p < 0.1\%$
[a] : also includes other controls like an indicator for state election year and (log) rainfall at the state-level.

4 Conclusion

Using a narrative shock series constructed from data on government transfers via welfare programs in India over a period of 30 years, we show that fiscal transfers have not been inflationary. Importantly, the same fiscal transfers have been shown to increase output. Finally, we focus on a recent large public workfare in India that has been shown to increase real wages and is suspected of causing inflation. Exploiting the phase-wise implementation design of the program, we show that the implementation of this program is not associated with higher inflation. Hence, we conclude that welfare programs which consist primarily of fiscal transfers, have not caused inflation in India.

[11] Relative to the eight percentage point increase in inflation between 2005 and 2010 (see figure 1).

[12] The p-value for testing if the sum of the two coefficients in column 4 is zero is 0.62 with an F-statistic of 0.25.

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Appendix

Table 1 Summary statistics for variables in equation 1

Variable	Mean	S.D.	Obs.
$S_{i,t}$	0.13	0.54	510
$B_{i,t}$	0.21	1.00	510
$\pi_{i,t}$	7.38	5.69	465

Note: The number of observations for inflation are lower as the CPI figures for some states are available only from 1995.

Table 2 Summary statistics for variables in equation 2

Variable	Mean	S.D.	Obs.
$\mathbf{I}_{i,t}$	38.34	44.82	170
$\pi_{i,t}$	6.51	4.41	170