

Exploring the Relationship Between Exchange Rate Pass-Through and CPI Inflation in Mainland China and India

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Abstract:

By examining the link between exchange rate transmission and cpi inflation across countries, we investigate whether there is a considerable link between the two. In this paper, we examine data for two representative Asian countries, mainland China and India, to determine whether there is a relationship between the two. The study finds no significant link between exchange rate and cpi inflation for China by comparing 40 years of data for these two countries, but for India, there is a particularly clear link. The difference between the two is mainly due to the different exchange rate control systems implemented by the two governments. The paper will explore and test this further to find if there is a link between the two and which factor has the greatest impact on the exchange rate.

JEL Classification: E40,E44,E47

Key words: ERPT(exchange pass through rate), CPI, PPI,IMP,NEER

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1.Introduction:

The dynamics of exchange rates and inflation have been a very important point of debate in economics, especially in macroeconomics. There are many exchange rate regimes in place around the world, such as the fixed exchange rate in China, the flexible exchange rate regime in the United States and the euro-using region, and the managed floating exchange rate regime in India, which tend to influence these dynamics (Mallick and Marques, 2008). Whereas China has been in a state of massive inflation since the second half of 2007, India has seen inflation enter an inflationary era since 2010.

This study aims to enhance understanding exchange rate pass-through (ERPT) is a term used to describe the degree to which changes in exchange rates affect domestic inflation in an economy. It refers to the extent to which changes in the exchange rate of a country's currency are transmitted to the prices of goods and services produced within that country. The relationship between exchange rates and interest rates can also be influenced by the position of an economy, which can further impact ERPT. Various definitions of ERPT are available in the literature: “Exchange rate pass-through is the percentage change in the local currency importing countries.” – (Goldberg and Knetter 1997).

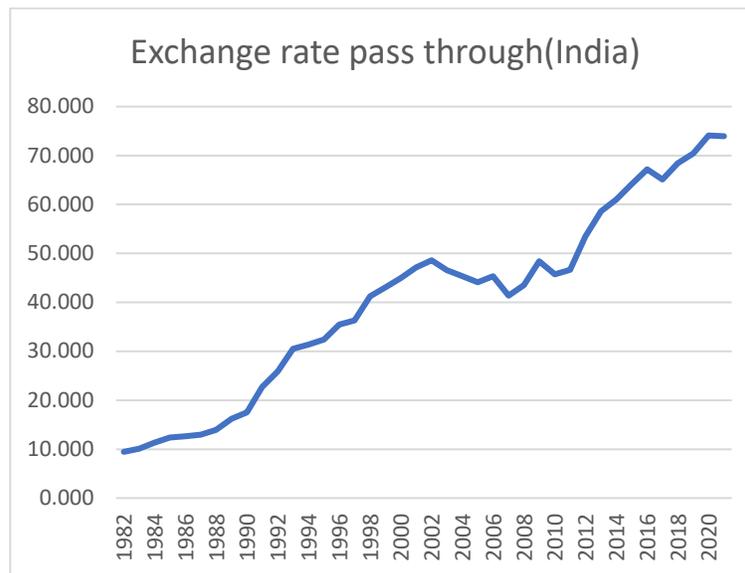
In recent years, as inflation has grown and spread around the world, a large number of governments have initiated attempts to control the exchange rate in the hope of controlling the rate of inflation, but none of the results have been significant. This paper will explore whether there is a specific link between exchange rate pass through and CPI inflation.

The rest of the paper is organized as follows: firstly, this paper will look for the inflation in mainland China and India in recent years. Secondly it will explore the exchange rate changes and trends in these two countries. Thirdly, this paper will measure whether there is a stable and persistent link between the two through the range causality. Section two of the paper provides a summary of the existing literature on the topic. Section three presents the theoretical framework, data sources, and regression analysis used in the study. The empirical methodology employed in the analysis is explained in section four. Section five offers a detailed discussion of the empirical findings, while section six provides policy implications and draws conclusions based on the study's results.

2.0 Trend:

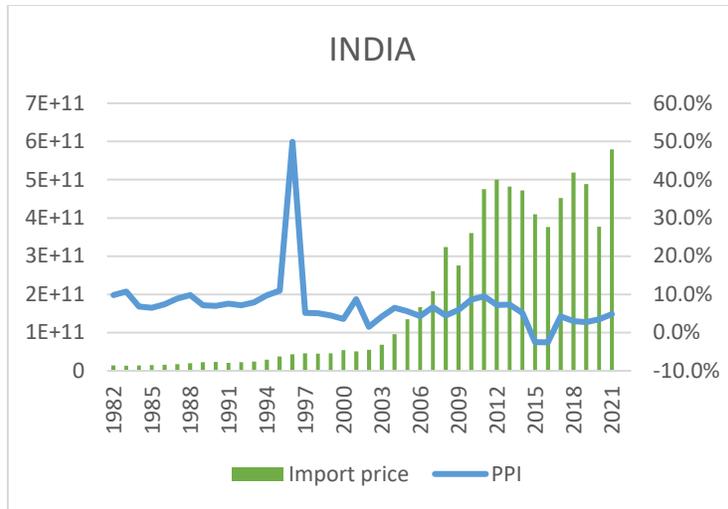
Figure 1 and 2 shows the development of inflation in India with the development of the economy. It can be found that the overall trend of inflation rate in India is getting faster and faster, and a big problem is that the magnitude of change is very large, every year, sometimes positive, sometimes negative, which indirectly reflects the situation of the domestic economic situation is very free. Comparing the exchange pass through rate of India, we can see that the currency has been devalued by up to double from one dollar to 43 Indian currency in 2005 to one dollar to 82 Indian currency now. And that's with the exchange rate converting in the face of general global inflation. That means that with the dollar already depreciating, the Indian currency is still depreciating at up to double the rate. This would be a particular exaggeration. This is something that will be explored later in this article, whether the exchange pass through rate is changing back and forth because of the change in cpi inflation.

Figure 1: The exchange rate pass through in India



Source: world bank database

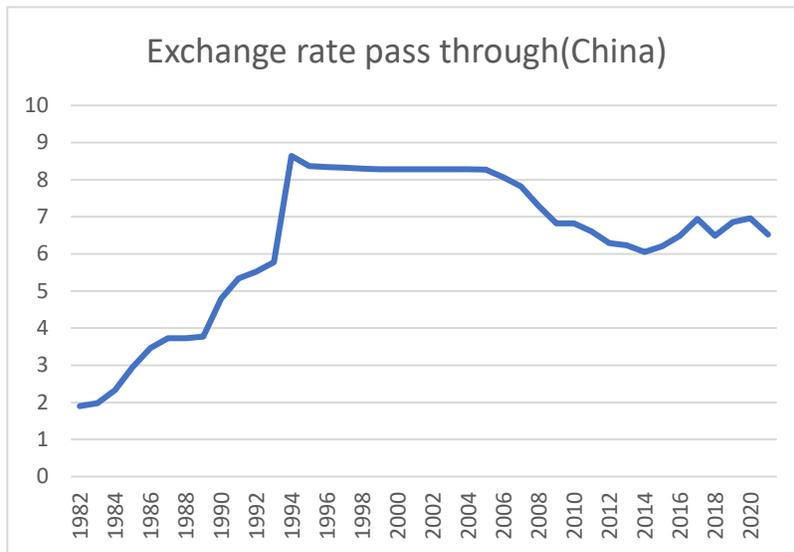
Figure 2: The import price and producer price index in India



Source: world bank database

Figure 3 turning back to China, another one of the two largest Asian economies, as the economy continues to grow after the reform and opening up, with the total quickly jumping to the top of the world, the first thing we will observe is the change in the inflation rate in China. China's inflation rate also varies considerably, but in terms of total magnitude, it is slightly lower than India's and has smaller positive and negative maximum and minimum values than India's maximum and minimum values. China's inflation outbursts were mainly concentrated before 2010, and inflation rates have been relatively low and stable in recent years.

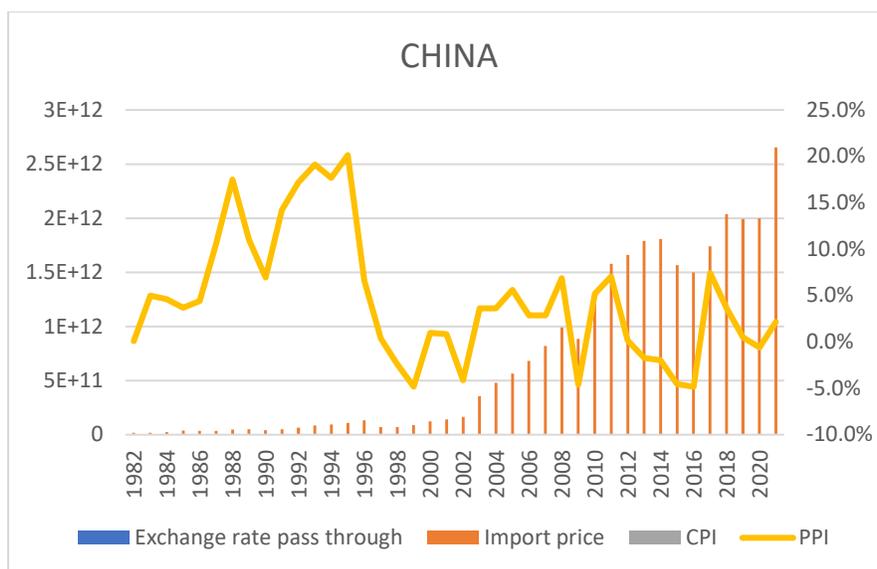
Figure 3: The exchange rate pass through in Chin



Source: world bank database

Figure 4 observing the change in the exchange pass through rate back in China, there is not a particularly significant change from 8.2 RMB per dollar in 2005 to 6.8 RMB per dollar now, which is not a particularly significant change and relatively speaking the RMB has appreciated. This is a particularly stark contrast to the doubling of India's situation, which is an indirect indication that economic development does not have to depend on exchange rate devaluation to proceed faster. Of course, this paper will also look at the reasons why this is happening, whether it is a result of the relative stability of the nation's own money circulation and the rise of the country's economic power in the world, or whether it is simply a result of the government's constant control to force the currency from depreciating too quickly, which is also a result of the difference in the two countries' political systems.

Figure 4: The import price and producer price index in China



Source: world bank database

3.0 Literature review:

Exchange rate pass-through (ERPT) is an important issue in international economics as it determines how changes in exchange rates affect domestic prices and ultimately, inflation. Various studies have been conducted to examine the extent and determinants of ERPT across different countries and regions.

Mihaljek and Klau (2001) estimated the extent of ERPT for thirteen emerging market economies using the single equation method. However, they ignored possible regime changes in

exchange rate policies. In contrast, McCarthy (2000), Hahn (2003), and Faruquee (2006) used the VAR approach to examine ERPT in developed countries, particularly in the Euro Area. Ito and Sato (2006) applied the VAR analysis to ERPT in East Asian countries, while Belaish (2003) and Leigh and Rossi (2002) used the VAR technique for Brazil and Turkey, respectively.

In addition to the methodological differences in examining ERPT, researchers have also explored the factors that affect ERPT. Dornbusch (1987) proposed the overshooting hypothesis, which suggests that ERPT is higher in the short run as prices adjust slowly to changes in exchange rates. Engel and Storgaard (2004) argued that ERPT is influenced by the degree of competition in domestic markets and the pricing strategies of firms. Marazzi and Rothenberg (2006) found that ERPT is higher when exchange rate volatility is higher. Bhattacharya et al. (2008) suggested that ERPT is affected by the degree of openness of the economy, the structure of trade, and the monetary policy regime.

Belaish (2003) explores the issue of ERPT in Brazil, using a VAR model. The study finds evidence of significant pass-through from exchange rates to domestic prices, although the extent of pass-through varies depending on the type of shock and the time horizon considered. The study also highlights the role of inflation expectations and the degree of market competition in influencing the magnitude of pass-through. Burstein et al. (2002) and (2005) investigate the puzzle of why inflation rates remain low after large devaluations in several emerging market economies. Using a dynamic general equilibrium model, the authors find that the presence of nominal rigidities in pricing and wage-setting behavior can explain the observed phenomenon. The study highlights the importance of considering the underlying economic structure when assessing the effects of exchange rate changes on domestic prices. Campa and Goldberg (2005) examine ERPT into import prices in a cross-section of countries. Using panel data techniques, the authors find evidence of incomplete pass-through, with the extent of pass-through varying across countries and over time. The study also highlights the role of pricing-to-market behavior and competition in influencing the magnitude of pass-through. Campa et al. (2005) focus specifically on the euro area, using a similar approach to investigate ERPT into import prices. The study finds evidence of incomplete pass-through, with the degree of pass-through varying across product categories and across countries within the euro area. The study also highlights the role of exchange rate volatility in influencing the magnitude of pass-through.

Overall, the literature suggests that ERPT varies across countries and regions, and is influenced by various factors such as exchange rate volatility, market competition, trade openness, and monetary policy regimes. Further research is needed to better understand the determinants of ERPT and its implications for macroeconomic stability.

4.0 Data, Variables and Empirical Methodology

4.1. Data and Variables

This data uses a total of 40 years of data from 1982 to 2021, and investigates the exchange rate pass through, imp, cpi, ppi for China and India respectively, and treats them as independent variables for exchange rate pass through and treats the others as dependent variables. The reason I use China and India is mainly due to the continuous development of Asian economies, both China and India have a very rapid development, while both are gradually becoming the two countries with the largest volume among Asian countries due to their large populations. The paper wants to explore whether there is a strong relationship between the exchange rate transmission process and these things by exploring the changes in the various data of the two countries.

Table 1 Exchange rate pass through, CPI inflation, PPI, IMP between 1982-2021 in China and India

CHINA	ERPT	REER(Assume 2010=100)	IMP	CPI	PPI
1982	1.9	230.9	16876000000	20.47	0.1%
1983	1.98	227	18717000000	22.84	5.0%
1984	2.33	202.3	23891000000	23.02	4.6%
1985	2.95	171.7	38231000000	24.08	3.7%
1986	3.46	124.1	34896000000	26.05	4.4%
1987	3.73	107.2	36395000000	27.93	10.5%
1988	3.73	117.2	46369000000	33.19	17.5%
1989	3.77	136.3	48840000000	39.24	11.0%
1990	4.79	100.5	42354000000	40.44	6.9%
1991	5.34	88.3	50176000000	41.88	14.2%
1992	5.52	84.5	64385000000	44.54	17.2%

1993	5.78	90	86313000000	51.05	19.1%
1994	8.64	70.5	95271000000	63.43	17.7%
1995	8.37	78.6	1.1006E+11	74.08	20.1%
1996	8.34	86.4	1.31542E+11	80.24	6.6%
1997	8.32	93	69431000000	82.47	0.3%
1998	8.3	98	70323000000	81.84	-2.4%
1999	8.28	92.7	87136000000	80.69	-4.8%
2000	8.28	92.8	1.24897E+11	80.97	1.0%
2001	8.28	96.8	1.41031E+11	81.55	0.8%
2002	8.28	94.6	1.63481E+11	80.96	-4.1%
2003	8.28	88.4	3.54608E+11	81.87	3.6%
2004	8.28	85.8	4.8072E+11	85.00	3.6%
2005	8.277	84.9	5.64742E+11	86.51	5.6%
2006	8.070	86.3	6.81974E+11	87.94	2.9%
2007	7.816	89.3	8.19891E+11	92.17	2.9%
2008	7.294	97	9.90088E+11	97.63	6.9%
2009	6.823	101.1	8.83614E+11	96.92	-4.6%
2010	6.827	100	1.23999E+12	100.00	5.2%
2011	6.607	102.7	1.5791E+12	105.55	7.1%
2012	6.294	108.7	1.66195E+12	108.32	0.1%
2013	6.230	114.7	1.78961E+12	111.16	-1.7%
2014	6.051	118.4	1.80872E+12	113.29	-2.0%
2015	6.206	130	1.56656E+12	114.92	-4.6%
2016	6.494	123.9	1.50064E+12	117.22	-4.8%
2017	6.945	120.3	1.74027E+12	119.09	7.4%
2018	6.493	122	2.03737E+12	121.56	3.7%
2019	6.862	121.2	1.99365E+12	125.08	0.5%
2020	6.964	123.6	1.99891E+12	128.11	-0.6%
2021	6.527	127.3	2.65313E+12	129.37	2.1%

INDIA		Assume 2015=100			
1982	9.455	151.64	14046301495	11.88	9.8%
1983	10.099	158.06	13867570753	13.29	10.7%
1984	11.363	173.21	14216303267	14.40	6.8%
1985	12.369	163.45	15081203788	15.20	6.5%
1986	12.611	149.82	15686464961	16.53	7.4%
1987	12.962	130.28	17660894318	17.98	8.9%
1988	13.917	123.86	20091207198	19.67	9.8%
1989	16.226	115.84	22254274861	21.06	7.2%
1990	17.504	104.04	23437059205	22.95	7.0%
1991	22.742	97.46	21086827022	26.13	7.6%
1992	25.918	75.54	22930537818	29.21	7.2%
1993	30.493	72.90	24108390143	31.06	7.9%
1994	31.374	72.60	29672617824	34.24	9.7%
1995	32.427	71.31	37957312941	37.75	11.0%
1996	35.433	65.37	43788952391	41.13	49.9%
1997	36.313	73.58	45730082604	44.08	5.2%
1998	41.259	83.70	44827962413	49.91	5.1%
1999	43.055	80.18	45556209177	52.24	4.5%
2000	44.942	81.01	53887205924	54.34	3.5%
2001	47.186	81.74	51212270439	56.39	8.7%
2002	48.610	84.79	54702279750	58.82	1.5%
2003	46.583	82.58	68081180951	61.05	4.2%
2004	45.316	83.17	95539056500	63.35	6.5%
2005	44.100	86.85	1.34692E+11	66.04	5.5%
2006	45.307	88.09	1.66572E+11	69.87	4.4%
2007	41.349	88.88	2.08611E+11	74.32	6.6%
2008	43.505	95.08	3.23917E+11	80.53	4.5%
2009	48.405	87.65	2.75227E+11	89.29	5.9%
2010	45.726	97.20	3.60146E+11	100.00	8.7%

2011	46.670	101.18	4.75304E+11	108.91	9.5%
2012	53.437	92.69	4.99989E+11	119.24	7.2%
2013	58.598	93.18	4.81686E+11	131.18	7.3%
2014	61.030	88.99	4.72434E+11	139.92	5.2%
2015	64.152	98.71	4.09237E+11	146.79	-2.5%
2016	67.195	101.99	3.7609E+11	154.05	-2.5%
2017	65.122	102.07	4.52241E+11	159.18	4.3%
2018	68.389	105.83	5.18779E+11	165.45	3.0%
2019	70.420	100.59	4.8895E+11	171.62	2.8%
2020	74.100	105.45	3.76995E+11	182.99	3.5%
2021	73.918	102.15	5.79145E+11	192.38	4.8%

4.2 Regression

The regression tested the sensitivity of exchange rate pass through to CPI inflation, PPI, Import price. The fixed effects regression specification was estimated in the form of:

$$ERPT=B_0+B_1 REER+B_2 IMP+ B_3 PPI+B_4 CPI+E$$

Independent variable ERPT is represent exchange rate pass through. Dependent variable REER represents real effective exchange rate, IMP represents import price, PPI represents producer price index, CPI represents consumer price index.

4.3 Empirical Results

Table 2: the regression between ERPT and CPI, PPI,REER,IMP in China

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	0.109510	0.002692	40.67632	0.0000
PPI	6.111586	1.151096	5.309363	0.0000
REER_REAL_EFFECTIVE_EXCHANGE...	-0.001898	0.001293	-1.468514	0.1506
IMPORT_PRICE	-3.29E-12	1.62E-13	-20.33303	0.0000
R-squared	0.942243	Mean dependent var	6.342740	
Adjusted R-squared	0.937430	S.D. dependent var	1.990756	
S.E. of regression	0.497967	Akaike info criterion	1.538074	
Sum squared resid	8.926962	Schwarz criterion	1.706962	
Log likelihood	-26.76147	Hannan-Quinn criter.	1.599138	
Durbin-Watson stat	1.361910			

This is the Chinese part of the Regression, the results show that not many results show a relationship with independent variable, combined with the Chinese information shows that this is because China uses a fixed exchange rate, the state has a strict control of the exchange rate, so even if the number of imports increase, inflation continues, cannot be obvious under the exchange rate development is reflected.

Table 3: the regression between ERPT and CPI, PPI, REER, IMP in India

Variable	Coefficient	Std. Error	t-Statistic	Prob.
REER_REAL_EFFECTIVE_EXCHANGE...	0.043299	0.021863	1.980467	0.0553
CPI	0.629261	0.057555	10.93328	0.0000
PPI	33.46124	15.54402	2.152676	0.0381
IMPORT_PRICE	-7.40E-11	1.72E-11	-4.307368	0.0001
R-squared	0.857005	Mean dependent var		40.48952
Adjusted R-squared	0.845089	S.D. dependent var		19.47625
S.E. of regression	7.665604	Akaike info criterion		7.006003
Sum squared resid	2115.413	Schwarz criterion		7.174891
Log likelihood	-136.1201	Hannan-Quinn criter.		7.067068
Durbin-Watson stat	0.395209			

On the contrary, the results in India are quite different. As in the Chinese part, the r square reaches 94% and 84% respectively showing an extremely strong credibility, and since India adopts a floating exchange rate model, it can be seen through this regression that the transmission of exchange rate changes and cpi, ppi, and imp are significantly linked, with the most influential being imp, followed by ppi, and the relatively least cpi inflation.

First, the exchange rate does matter for domestic inflation. Second, the three prices respond differently to ERPS shocks. The response is that IMP is the largest, followed by PPI and CPI is the smallest. Import price content

The IMP is the highest and the CPI is the lowest, which is a reasonable result. This finding is also consistent with previous studies such as McCarthy (2000), Hahn (2003) and Faruquee (2006) which examine exchange rate pass-through countries in Europe. 3. The price response to the ERPS shock is significantly positive. Even in the crisis period, the degree of response varies from country to country. As discussed by Burstein, Eichenbaum, and Rebelo (2002, 2005), the degree of CPI inflation following a sharp depreciation depends on (i) the extent to which imported inputs are used for domestic production and (ii) the presence of distribution costs. The impact of exchange rate shocks on domestic prices in our current analysis is closely related to the

use of imported inputs. The degree of pass-through of the exchange rate is highest in IMP and lowest in CPI, since imports are imported using the largest IMP and the smallest CPI.

5.0 Conclusion

Based on the results of the regression analysis, it can be concluded that the relationship between exchange rate transmission and inflation varies according to the exchange rate regime and import composition and varies from country to country. In China, which has a fixed exchange rate regime, changes in import prices, producer prices and consumer prices do not have a significant impact on inflation. In contrast, in India, which has a floating exchange rate, there is a strong association between exchange rate changes and inflation, with import prices having the largest effect, followed by producer prices and consumer prices having the smallest effect. These findings are consistent with previous studies and underscore the importance of understanding the specific economic conditions and policies of each country when analyzing the relationship between exchange rates and inflation. In addition, the results show that exchange rate transmission is highest Import prices, reflecting the fact that imports are heavily dependent on foreign currency and therefore more sensitive to exchange rate fluctuations. On the other hand, the degree of pass-through is lowest for consumer prices, indicating that domestic prices are less affected by exchange rate changes. This finding is consistent with the theory that the degree of pass-through depends on the extent to which imported inputs are used in domestic production and the presence of distribution costs.

Overall, these findings have important implications for policy makers, especially in countries with floating exchange rate regimes. They argue that exchange rate movements can have a significant impact on domestic inflation and that policies aimed at stabilizing the exchange rate may also help to control inflation. Moreover, the results underscore the importance of understanding each country's specific economic conditions and policies when analyzing the relationship between exchange rates and inflation.

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