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Nexus between Consumption, Income, and Price Changes: Asymmetric Evidence from NARDL Model

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Abstract

Previous research has primarily examined the link between price, income, and consumer spending using linear regression models. On the other hand, the latest evidence shows an asymmetric link among economic and financial variables. We contribute to the literature by employing a novel technique known as the asymmetric ARDL model. This approach is used to investigate the impact of favorable and unfavorable changes in income and prices on household consumption. The results show that higher income has a substantial and beneficial effect on household expenditures in the short term and long term. On the other hand, a fall in income has no impact on consumer spending. Moreover, for most developing countries, price adjustments have a negligible effect on consumer expenditures. Our findings suggest that implementing the same policy initiatives across periods of rising and falling income and prices may result in potential losses.

Keywords:
E7 countries; consumption, NARDL model, asymmetry

How to Cite:

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INTRODUCTION

A large number of theoretical works support the drivers of consumer spending. Moreover, empirical work also supports the drivers of consumer spending. To begin with, Keynes (1936) offered the psychological rule of consumption as a preliminary hypothesis. The absolute income hypothesis (AIH) is another name for this notion. According to this concept, an increase in income enhances consumption; nevertheless, a change in consumption is often smaller than a change in income. Duesenberry (1949) presented the relative income hypothesis (RIH) parallel to an absolute income hypothesis. According to this idea, the consumption habits of one individual rely on the consumption patterns of their relatives. In other words, most purchasing behaviors are culturally linked. To counter the relative income hypothesis, Ando and Modigliani (1963) developed the permanent income hypothesis (PIH), whereas Friedman (1957) offered the life-income hypothesis (LIH). The propositions by these authors suggest that a family's future and current income affect their consumption spending. Macklem (1994) further said it's not just the current income that influences family consumption but also future earnings. Arapova (2018) mentioned that family income is the most critical factor-affecting consumer spending.

The past research also claims that household spending is influenced by income and a variety of other variables that seem to have a considerable effect on consumer buying patterns. Research studies, such as Obinna (2020), D'Acunto et al. (2015), and Bakri et al. (2017), exclusively considered annual income as a driver of spending. Nevertheless, the major flaw in earlier research has been that researchers failed to include the emerging seven (E7) nations, which is the focus of this research.

Furthermore, the past research paid attention to older methodologies that did not consistently provide reliable findings. Ahmed et al. (2015) used an Autoregressive distributed lag approach to estimate the absolute income hypothesis (AIH) and permanent income hypothesis (PIH) in Korea, Singapore, Australia, and New Zealand. They concluded that unemployment and interest rates have significant short-run impacts on household consumption, but wealth and income possess considerable long-run effects. Khan et al. (2015) also came to the same conclusion. Similarly, Bakri et al. (2017) used the least square method and found that income has a rising impact on consumer spending in Malaysia, whereas prices hurt consumer spending. Diacon & Maha (2015) likewise utilized conventional methods to conduct research in 79 countries. Researchers grouped the 79 nations into high-income, middle-income, and low-income countries and found different results for each income group. Their findings show that the impact is much more substantial in the context of low-income and high-income nations; however, the effect is minimal in middle-income countries. Vihriala (2017) examined the effects of Mexico's income and assets using the instrumental variable approach. They concluded that rises in pension shares enhance consumption-to-income ratios. Researchers also found that income had a higher significant impact on consumer spending than the other factors. Similarly, Bonsu & Muzindutsi (2017) conducted research in Ghana using variance decomposition, Granger causality, and the impulse response function analysis. They concluded the identical findings to Vihriala (2017).

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The latest evidence has looked at the factors that influence household consumer spending. Arapova (2018) performed research in Asian nations employing panel data methodologies & discovered that income is a vital expenditure factor. Similarly, Muzindutsi & Mjeso (2018) and Damane (2018) examined the link in South Africa using the Autoregressive distributed lag model. Researchers stated that income has a favorable long- and short-run impact on consumer spending, while interest rate and prices negatively affect expenditures. Gahtani et al. (2020) used an ECM approach to perform research in Saudi Arabia. Researchers' goal was to look at how prices, income and interest rates affect spending. Their study discovered that money had a more significant influence on spending than other factors. Iheonu & Nwachukwu (2020), Sugiarto & Wibowo (2020), and Keho (2019) further looked at the factors that influence consumer spending. Researchers discovered that household spending is affected by prices, income, and interest rates.

The initial research's fundamental flaw is that it ignored differentiating the impact of favorable and unfavorable price and income change shocks on consumer spending. The previous research assumed that favorable and unfavorable surprises in such variables are considered to provide the same effect on consumer spending. On the other hand, business cycles have resulted in systemic economic fractures. As a result, economic indicators exhibit asymmetric behavior (Hok, 2020). Only very few earlier types of research have considered the asymmetric connection among economic and financial variables. Okwu et al. (2020), for instance, used an asymmetric ARDL model to investigate Nigeria's setting. Their goal was to look at the asymmetrical short term and long-term impacts of the factors that predict consumer spending. Researchers concluded that positive oil supply shocks significantly influenced consumer spending. Similarly, Hok (2020) used the Markov Switching Autoregressive (MSAR) approach to perform Cambodia research. Their goal was to look at how government spending, prices, and inflation asymmetrically affect consumer spending. They concluded that income had a strong influence on consumer spending, and this effect is asymmetric on consumption. Moreover, they found that prices do not influence household consumption expenditures. Likewise, Bahmani-Oskooee & Nayeri (2020) employed the asymmetric Autoregressive distributed lag model to examine if economic policy uncertainty (EPU) does have a symmetric or asymmetric influence on the level of consumption expenditures. They found that EPU has a nonlinear effect on consumer spending.

Even though the previous research explored the asymmetric link among various economic factors, these researches neglected to analyze the asymmetric relationship when concentrating on the emerging seven (E7) nations. Furthermore, previous research ignored the asymmetric effect of the variables used in our case. As a result, our study adds to the current literature by investigating the long- and short-term impacts of price changes and income on consumer spending in the emerging seven nations. We employ the nonlinear ARDL model developed by Shin et al. (2014), an expanded version of the ARDL model. We evaluate the influence of both positive and negative shocks on the dependent variable using the asymmetric ARDL by decomposing the income and price

variable into positive and negative surprises. This model may be used to see whether a rise in family income and price changes has the same impact on consumption as a decrease in income and price changes.

The essential addition of this research to the available literature is that it focuses on the E7 nations since the previous work has neglected to explore the link between income, prices, and consumer expenditures in these specific countries of concern. Brazil, Russia, India, China, Mexico, Turkey, and Indonesia are the emerging nations considered in our research. According to the World Bank (2019), emerging seven countries account for almost 40% of global GDP (Diacon & Maha, 2015). As a consequence, the findings from the E7 nations might have important implications in terms of low income and middle-income countries. Furthermore, it is said that consumer spending in China accounts for 70% of China's GDP. Similarly, consumer spending accounts is 67% of Turkey's GDP. Likewise, consumer spending accounts for 46.15%, 45.14%, 45.21%, 51.14%, and 61.14% of GDP in Mexico, Brazil, India, Russia, and Indonesia, respectively (https://unstats.un.org/unsd/snaama/downloads).

Furthermore, the economic growth of E7 nations has a significant impact on global GDP. Spending has considerable short-run and long run implications on world economic growth and inequalities in developing nations (Mody & Ohnsorge, 2010). As a result, this research might help design strategies for both advanced and emerging countries.

In two ways, our research contributes to the existing body of knowledge. First, Bahmani-Oskooee & Nayeri (2020) examined the nonlinear influence of economic policy uncertainty on household consumption in the G7 nations. Rather than the G7 nations, the emerging seven (E7) countries emphasize this research. Our study breaks down explanatory variables among positive and negative changes, as done by Bahmani-Oskooee & Nayeri (2020). Next, contrary to Bahmani-Oskooee & Nayeri (2020), this study analyses the asymmetric influence of changes in income and household spending using price changes and income as explanatory variables.

According to our findings, a rise in family income has a significant and favorable short- and long-term effect on household spending in all sample nations except Indonesia and China. Similarly, a fall in income has a substantial and beneficial influence on household spending. Furthermore, a rise in price adjustments has a long-term unfavorable, and significant impact on consumer expenditures in Mexico, China, Brazil, Russia, India and Turkey; however, a price decrease has a long-term adverse effect on consumer spending.

METHODS

Description of Data

Under this research, the nonlinear influence of Price (PR) and income (NI) changes on consumer spending (CP) in Emerging 7 (E7) is investigated. Household consumption expenditures (CP), National income (NI), domestic prices (CP), and interest rate (IR) are

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all based on quarterly data where the quarterly data ranges from 1991Q1 to 2020Q4. For household consumption, seasonally adjusted nominal data is used represented in local currency. Similarly, disposable personal income data, also expressed in local currency, is used to measure national income. Furthermore, the prices are described using data from the consumer price index. Lastly, the interest rate is shown using 90-day T-bill data. The International Financial Statistics (IFS) database was used to acquire all factors. The interest rate is being used as a control variable as prior research shows that this significantly affects household consumption (Mumtaz & Ali, 2020; Bahmani-Oskooee & Nayeri, 2020).

The short-run and long-run asymmetrical impacts of price and income fluctuations on household spending are investigated using the asymmetric ARDL approach. Shin et al. (2014) presented an asymmetric ARDL approach that enhances the classic Autoregressive distributed lag model (Pesaran & Shin, 1999) while considering the nonlinear nature of the relationships between the specified variables in the study. The traditional ARDL approach, on the other hand, ignores the asymmetric character of the connection between the variables of the study (Chang, 2020, Syed et al., 2019). In our example, the conventional ARDL model is represented by the equation (1).

$$\Delta lnCP_{kt} = \beta_0 + \beta_1 lnCP_{kt-1} + \beta_2 lnNI_{kt-1} + \beta_3 lnPR_{kt-1} + \beta_4 lnIR_{kt-1} + \sum_{i=1}^{n} \theta_1 \Delta lnCP_{kt-i} + \sum_{i=0}^{n} \theta_2 \Delta lnNI_{kt-i} + \sum_{i=0}^{n} \theta_3 \Delta lnPR_{kt-i} + \sum_{i=0}^{n} \theta_4 \Delta lnIR_{kt-i} + \varepsilon_t \quad (1)$$

The long-run parameters are β_1, β_2, β_3 and β_4, whereas the short-run parameters are θ_1, θ_2, θ_3, and θ_4. Income, consumption, interest rate, and prices for nation k at time t are represented by IR_{kt}, PR_{kt}, NI_{kt}, IR_{kt} and CP_{kt}, respectively. Using ln for each variable shows that a natural logarithm has been used for all parameters. Furthermore, Δ signifies the difference operator that is utilized to establish the short-run connection.

In addition, the nonlinear influence of price changes and income on household consumption is investigated using an asymmetric ARDL approach. The long-run description of the asymmetric ARDL approach is shown in equation (2).

$$lnCP_{kt} = \beta_0 + \beta_1 lnNI_{kt}^{+} + \beta_2 lnNI_{kt}^{-} + \beta_3 lnPR_{kt}^{+} + \beta_4 lnPR_{kt}^{-} + \beta_5 lnIR_{kt} + \varepsilon_t \quad (2)$$

Where $lnNI_t^{+}$ signifies the partial sum of positive changes in the national income and $lnNI_t^{-}$ shows the partial sum of adverse changes in national income. Similarly, $lnPR_t^{+}$ represents the partial sum of upward price hikes, whereas $lnPR_t^{-}$ represents the partial sum of adverse price fluctuations.

The partial sum of favorable and unfavorable changes in income level was generated using equations (3a) and (3b). In contrast, the data for the partial sum of favorable and negative changes in the prices were generated using equations (4a) and (4b), respectively.

$$lnNI_{kt}^{+} = \sum_{i=1}^{t} \Delta lnNI_{kt}^{+} = \sum_{i=1}^{t} \max(\Delta lnNI_i, 0) \quad (3a)$$

and

$$lnNI_{kt}^{-} = \sum_{i=1}^{t} \Delta lnNI_{kt}^{-} = \sum_{i=1}^{t} \min(\Delta lnNI_i, 0) \quad (3b)$$

$$lnPR_{kt}^{+} = \sum_{i=1}^{t} \Delta lnPR_{kt}^{+} = \sum_{i=1}^{t} \max(\Delta LnPR_i, 0) \quad (4a)$$

and

$$lnPR_{kt}^{-} = \sum_{i=1}^{t} \Delta lnPR_{kt}^{-} = \sum_{i=1}^{t} \min(\Delta LnPR_i, 0) \quad (4b)$$

where $lnNI_{kt} = lnNI_0 + lnNI_{kt}^{+} + lnNI_{kt}^{-}$ and $lnPR_{kt} = lnPR_0 + lnPR_{kt}^{+} + lnPR_{kt}^{-}$

The nonlinear ARDL approach is constructed by combining the equations 3a-3b and 4a-4b to get the following expression (Shin et al., 2014).

$$\Delta lnCP_{kt} = \beta_0 + \beta_1 lnCP_{kt-1} + \beta_2 lnNI_{kt-1}^{+} + \beta_3 lnNI_{kt-1}^{-} + \beta_4 lnPR_{kt-1}^{+} + \beta_5 lnPR_{kt-1}^{-} + \beta_6 lnIR_{kt-1} + \sum_{i=0}^{n} \theta_1 \Delta lnCP_{kt-i} + \sum_{i=0}^{n} (\theta_2^{+} \Delta lnNI_{kt-i}^{+} + \theta_3^{-} \Delta lnNI_{kt-i}^{-}) + \sum_{i=0}^{n} (\theta_4^{+} \Delta lnPR_{kt-i}^{+} + \theta_5^{-} \Delta lnPR_{kt-i}^{-}) + \sum_{i=0}^{n} \theta_6 \Delta lnIR_{kt-i} + \varepsilon_t \quad (5)$$

Many of the parameters in equation (5) are specified in the same way as before. The asymmetric autoregressive distributed lag model is represented through this formula, which divides national income (NI) and prices (PR) into a partial sum of positive and negative shocks (Chang & Rajput, 2018; Chang et al., 2018).

The Wald test evaluates long-run cointegration in the asymmetric ARDL approach. The null hypothesis in the Wald test means that there is no cointegration, but the refutation of the null hypothesis implies that there is cointegration. The null hypothesis for the bounds test is $\beta_0 = \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$, with the null hypothesis being checked with the use of the Wald test. We conclude that a long-run correlation exists if a null hypothesis is false. The long-run asymmetry is then examined, with the null hypotheses for income and prices marked by $\beta_2 = \beta_3$ and $\beta_4 = \beta_5$, respectively. Furthermore, we look at the short-run asymmetries, in which the null hypotheses for income and prices, respectively, are $\theta_2 = \theta_3$ and $\theta_4 = \theta_5$. The Wald test can also be used to examine short-term and long asymmetry, with the null hypothesis being rejected, implying an asymmetric connection.

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RESULT AND DISCUSSIONS

The descriptive analysis of consumption, prices, income, and interest rates, for the selected nations in our research, are shown in Table 1. In addition, the time series plots of the variables employed in our study are shown in Figure 1. The summary characteristics of almost all of the studied variables within our study are shown in table 1, where PR, IR CP, and NI stand for domestic prices, interest rate, consumer expenditures, national income, respectively. Without log data are used to represent descriptive statistics. The Jarque-Bera test is used to ensure that the data is normal. Under this test, the null hypothesis states that the data are normally distributed. *, **, and *** signify that the alternative hypothesis is accepted at 10%, 5%, and 1% significance level, respectively.

Table 1. Descriptive Statistics

Variable	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
		Brazil			
CP	64712.200	35141.612	0.541	1.415	14.471***
NI	124512.000	45124.000	0.251	1.641	17.411***
PR	47.214	54.582	-0.745	1.415	17.742***
IR	8.541	9.471	0.471	5.251	15.451***
		Russia			
CP	44745.512	74751.544	-0.241	1.471	14.451***
NI	541521.714	514214.012	-0.451	1.412	18.541***
PR	74.471	47.451	-0.142	2.251	17.471**
IR	5.471	7.471	0.641	4.412	16.541***
		India			
CP	45142.568	74512.984	0.541	3.471	2.845
NI	74512.251	54124.253	0.471	4.847	8.474**
PR	74.541	41.47	-0.251	3.745	7.842*
IR	6.541	7.844	0.541	5.451	17.745***
		Indonesia			
CP	4512.471	4512.584	-0.874	1.412	17.470***
NI	54114.654	5412.541	-0.475	1.641	14.519***
PR	87.745	54.451	-0.512	1.745	12.748**
IR	6.745	6.745	1.541	2.471	24.543***
		Mexico			
CP	21421.544	54124.242	1.451	2.412	54.352***
NI	54125.251	84515.547	1.471	4.541	47.541***
PR	74.471	8.745	-1.782	7.652	34.235***
IR	6.541	6.541	1.845	6.541	35.541***
		Turkey			
CP	412541.451	7841.784	0.845	2.845	17.874***
NI	54154.514	18451.652	0.745	2.471	14.745***
PR	84.471	54.784	-0.855	2.874	12.541**
IR	10.541	7.745	0.784	2.541	14.451***
		China			
CP	47142.541	1425415.354	0.451	1.745	18.541***
NI	514514.451	451254.545	0.874	1.652	16.784***
PR	74.745	51.584	-0.541	1.471	18.874***
IR	54.451	4.745	0.641	4.541	24.865***

According to the summary data, China has the most significant average value, followed by Brazil and India. On the other hand, the minimum average value is obtained inside the setting of Mexico. The highest value for income also was observed within the context of India. In Mexico, the greatest price value is discovered. Meanwhile, the least price value is found in China. For all Emerging 7 countries, the value skewness is positive for income and consumption but a minus for prices. Except for the interest rate in Indonesia, China, Brazil, and India and prices in India, the kurtosis values show that each variable is platykurtic.

Furthermore, the Jarque-Bera statistics suggest that the variables are not normally distributed, indicating that the data may be subject to temporal volatility. The nonlinear nature of the link amongst presented factors is conceivable due to the temporal fluctuation in the dataset. Therefore, examining asymmetric relationships is the primary emphasis of this research. The residual plots of the series are shown in Figure 1.

The nonlinear ARDL model, like the classical ARDL model, could only be utilized if no variables are stationary just after taking the second difference. It indicates that the variable could be stationary at both the level and first difference. As a result, stationary tests are used to assess the order of integration of each variable. The enhanced Lee Strazicich, Perron, and dicky fuller (ADF) stationary tests are utilized in this investigation. The method's findings consisted of all three-sample statistics presented at the level, and the first difference is shown in Table 2. The results suggest that all our variables seem to be stationary at level I(0) or after the first difference I(1) of such indicators is determined. On the other hand, neither variable is discovered stationary at the second difference. Therefore, our research motivates us to apply the asymmetric autoregressive distributed lag approach.

Furthermore, the autoregressive distributed lag and nonlinear ARDL models also need optimal lags to be chosen using particular criteria. We employ the Akaike Information Criterion (AIC) and Hannan-Quinn Information Criterion (HIC) to identify optimal lags. In our instance, the information criteria advise picking a total of 4 lags.

According to the Wald test, all of the explanatory variables are cointegrated with household spending (Table 3-Panel C). Because the Wald test results denote long-run cointegration, this study investigates each variable's short- and long-run impacts on the predictor variables. The long-run influence of income and price fluctuations on family household consumption is discussed in Panel C of Table 3. Our findings corroborate the absolute income theory in terms of the emerging seven nations since income increases considerably influence household consumption. When family income rises about 1%, consumer spending rises by 0.12%, 0.23%, 0.25%, 0.23%, 0.24%, 0.13%, 0.37% in India, Indonesia, Turkey, China, Brazil, Russia, Mexico, respectively. As a result, our findings support the absolute income hypothesis since a rise in family income leads toward a large rise in consumer spending. Still, a rise in household consumption is less proportional to a rise in income.

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Figure 1. Residual Plots of the Emerging Seven Nations' Income, Consumption and Price Series

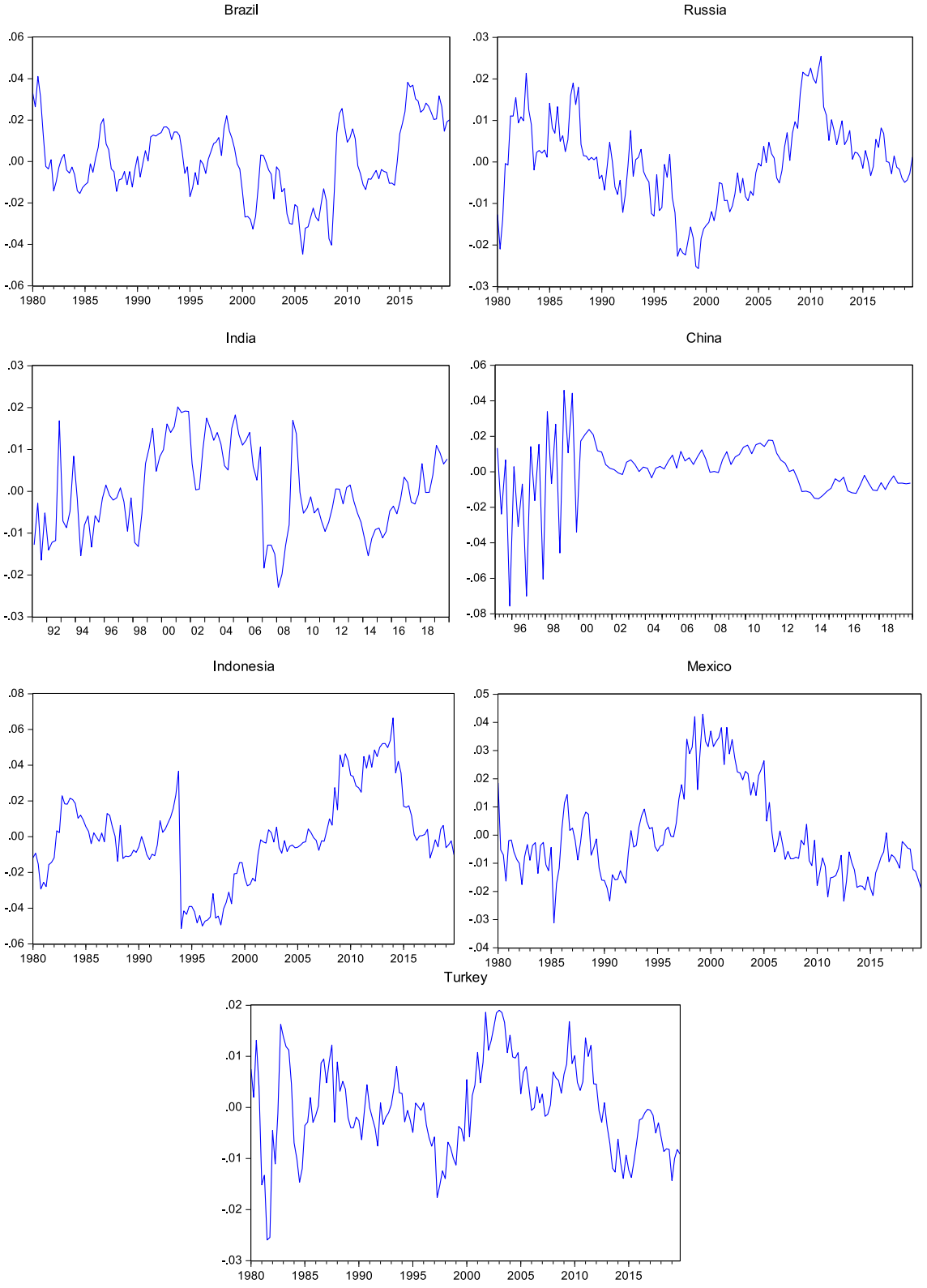

Table 2. Results of the Stationarity of The Variables

Variables	ADF (Level)	ADF I(1)	L-Z (Level)	Break year	L-Z I(1)	Break year	Peron (Level)	Break year	Peron I(1)	Break year
					Brazil					
CP	-9.744[a]	-7.451[a]	-0.741	1899Q3	-8.471[a]	1996Q2	-4.471	2012Q1	-14.45[a]	2014Q3
NI	-5.452[b]	-7.471[a]	-1.471	2002Q4	-8.844[a]	1999Q3	-3.477	2014Q4	-13.11[a]	2016Q2
PR	-1.451	-8.471[a]	-0.745	2001Q2	-5.74[b]	2012Q4	-4.655	1999Q3	-14.7[b]	2001Q2
IR	-2.451	-8.541[a]	-7.841[a]	2001Q1	-9.745[a]	2014Q2	-5.450[b]	2001Q2	-11.47[a]	2014Q3
					Russia					
CP	-6.562[a]	-4.541[b]	-0.451	1998Q4	-4.874[a]	1997Q2	-6.541[a]	2018Q2	-5.745[b]	1999Q3
NI	-5.421[a]	-5.562[b]	-0.562	1996Q3	-6.541[a]	1994Q2	-6.451[a]	2007Q1	-8.564[a]	2014Q2
PR	-1.541	-6.412[b]	-0.471	1998Q4	-7.562[a]	1995Q3	-8.541[a]	2002Q4	-9.562[a]	1998Q2
IR	-3.541	-10.25[a]	-2.521[c]	1995Q3	-5.541[a]	1995Q4	-9.451a	1999Q4	-8.541[a]	1995Q4
					India					
CP	-2.541	-13.25[a]	-1.521	1996Q4	-5.353[c]	1995Q4	-1.452	1994Q4	-4.541[b]	1999Q1
NI	-1.251	-8.457[a]	-3.124	2001Q3	-7.252[a]	1996Q3	-2.241	2001Q3	-15.21[a]	1992Q3
PR	-1.541	-4.845[a]	-1.254	2002Q2	-9.450[a]	1994Q2	-3.125	2002Q2	-6.541[b]	1994Q1
IR	-1.562	-7.541[a]	-4.142[c]	2001Q3	-7.653[a]	1993Q3	-3.241	1996Q3	-7.384[a]	1999Q1
					Indonesia					
CP	-7.365[a]	-7.542[a]	-0.541	1999Q3	-8.562[a]	1996Q2	-2.542	1996Q4	-9.345[a]	1994Q1
NI	-3.954[c]	-5.254[b]	-1.874	1994Q1	-4.471[b]	1997Q4	-1.235	1997Q1	-8.298[a]	1998Q4
PR	-2.258	-5.451[b]	-0.259	1992Q4	-5.541[b]	1996Q3	-3.584	1992Q3	-5.548[b]	1997Q2
IR	-8.541[a]	-7.541[a]	-5.584[b]	1994Q1	-4.485[b]	1996Q2	-3.258	1995Q2	-8.658[a]	1999Q2
					Mexico					
CP	-1.374	-12.84[a]	-2.451	1999Q2	-8.259[a]	1994Q1	-15.65[a]	1996Q2	-15.42[a]	1999Q1
NI	-2.447	-15.95[a]	-3.845	1994Q3	-12.87[a]	1995Q3	-11.42[a]	1994Q2	-15.16[a]	1994Q3
PR	-3.284	-8.784[a]	-1.471	2013Q2	-4.541[c]	2012Q2	-2.541	1995Q3	-4.452[a]	2001Q2
IR	-2.545	-7.451[a]	-5.258[a]	1995Q1	-5.541[b]	1992Q1	-2.452[b]	1994Q2	-8.587[a]	1901Q3
					Turkey					
CP	-8.584[a]	-4.541[c]	-0.784	1994Q4	-8.474[a]	2001Q3	-5.895b	1994Q1	-8.854[a]	2001Q1
NI	-9.485[a]	-9.258[a]	-0.584	1994Q1	-9.447[a]	1999Q2	-6.845a	2001Q2	-7.485[a]	1999Q2
PR	-1.254	-8.451[a]	-0.485	1992Q2	-8.684[a]	1999Q1	-7.451a	1998Q3	-6.584[b]	1995Q2
IR	-1.541	-8.584[a]	-4.254[b]	1991Q1	-7.345[a]	1991Q2	-4.451b	1994Q3	-25.47[a]	2018Q3
					China					
CP	-9.482[a]	-6.745[a]	-0.854	2012Q1	-7.484[a]	2012Q2	-8.540[a]	2010Q3	-18.59[a]	2018Q2
NI	-8.954[a]	-7.845[a]	-1.874	2010Q1	-7.447[a]	1994Q2	-5.485[c]	2018Q2	-9.874[a]	2015Q2
PR	-4.485[b]	-9.845[a]	0.258	2011Q2	-5.584[b]	2010Q2	-5.884c	2017Q1	-8.684[a]	2013Q3
IR	-4.452[b]	-8.562[a]	-4.847[b]	1994Q3	-5.745[b]	1999Q3	-5.447c	1991Q2	-8.747[a]	2016Q1

The findings of the Lee Z, ADF and Perron tests for domestic prices (PR), interest rate (IR), consumption (CP), income (IN) are shown in this Table. The subscript c shows the rejection of the null hypothesis at a 10% significance level, b suggests that the rejection of the null hypothesis is at a 5% level of significance, and a denotes that the null hypothesis is rejected at a 1% level of significance.

Like the previous literature (Hashmi et al., 2021a, 2021b, 2022) our estimates indicate that negative income changes reduce consumer spending; nevertheless, this fall in spending is significant in China and Indonesia. According to our estimates, a 1% decrease in income causes a 0.35% to 0.42% decrease in household spending. Our findings also suggest that income has little influence on consumer spending during economic

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downturns, a conclusion that is supported by the life cycle and permanent income theory and are consistent with the prior literature such as Chang et al. (2020a, 2020b).

In the E7 nations, price movements have a considerable impact on domestic spending. While prices rise 1%, consumer spending in Mexico, China, Brazil, and Russia drop by 0.24%, 0.29%, 0.12%, and 0.13%, respectively. Furthermore, if prices fall by 1%, consumer spending in India and Mexico fall by 0.33% and 0.52%, respectively. As the findings show, a rise in prices has not had the same effect as a fall in prices; as a result, price movements in developing nations get an asymmetrical impact on domestic spending.

Table 3: Estimates of NARDL model

Countries	Brazil	Russia	India	Indonesia	Mexico	Turkey	China
Panel A: Long-run estimates							
NI+	0.124***	0.235***	0.251***	0.232***	0.241**	0.127**	0.365***
NI-	0.124	0.187	-0.174	0.352***	0`.142	0.241	0.421**
PR+	-0.243***	-0.287*	0.124	-0.140	-0.123**	0.142	-0.125**
PR-	0.251	0.254	-0.155**	-0.235	-0.625**	0.325	-0.254
IR	-0.125***	-0.142	0.142*	-0.174	0.141	0.145	-0.125**
Panel B: Short-run estimates							
ΔNI+	0.451***	0.241***	0.412***	0.142	0.641***	0.741***	0.512***
ΔNI+ (-1)	0.352	0.421	-0.521**	0.251	0.114	0.235***	0.412**
ΔNI+ (-2)	0.541	0.251**	0.412	0.412	-0.244*	0.741***	0.235
ΔNI-	0.845***	0.874***	0.251	0.352***	0.125***	0.412*	0.412*
ΔNI-(-1)	0.254	0.352	0.412	-0.414***	0.511***	0.412***	0.214
ΔNI-(-2)	0.147	-0.541	0.251	-0.412	0.315	0.235	-0.411
ΔPR+	-0.514	0.251**	-0.541*	0.471***	-0.411**	0.241	0.541*
ΔPR+ (-1)	0.125	0.251	-0.352	-0.544*	0.247	-0.512	0.235
ΔPR+ (-2)	0.541	0.521	0.251	-0.412	0.352	-0.453**	0.425
ΔPR-	0.251	0.251	0.412	0.251	-0.641*	0.241	0.641
ΔPR- (-1)	0.654***	0.235	0.352	0.512	-0.742	0.142	0.341
ΔPR- (-2)	0.352	0.541	0.352	0.241	0.235	-0.411	0.751*
ΔIR	0.541	-0.521	0.241	0.127***	0.241	0.235	-0.252
ΔIR(-1)	0.412	0.352	-0.544	0.235	0.641	-0.412	-0.412***
ΔIR(-2)	0.352	0.541	0.214***	-0.412	0.247	0.241	-0.247
Panel C: Bounds test and diagnostics test statistics							
Bounds test	9.411***	8.841***	7.541***	7.451***	5.741***	5.745***	5.471***
LM	0.124	0.251	3.541*	1.541	0.745	0.874	0.541
Hect	0.541	0.745	5.451*	0.251	1.654	0.541	0.471
R-Reset	0.235	0.541	4.411**	1.471	17.251***	0.352	0.456
ECT	-0.412***	-0.652***	-0.251***	-0.254***	-0.451***	-0.352***	-0.425***
CUSUM	S	U	S	U	S	S	U
CUSUMSQ	U	U	U	U	U	U	S
WLR (NI)	5.142**	7.541***	4.541***	7.745***	3.745*	2.451*	10.745***
WSR (NI)	17.241***	13.412***	9.745***	6.251***	8.475***	16.541***	15.412***
WLR (PR)	6.745**	1.541	5.452**	0.521	6.471**	0.235	3.412*
WSR (PR)	0.415	3.514*	1.258	4.512**	5.755**	3.451**	3.142*

Furthermore, in Table 3, Panel B illustrates the short-run results for household spending and their determinants in E7 nations. Except for negative (NI-) surprises in India and positive surprises in income (NI+) in Indonesia, our results show that a rise and reduction in family income significantly impacts consumer spending across all E7 nations. Significant differences in the short-run influence of price increases on household spending have also been discovered in developing countries. In China and Russia, favorable price changes have a significant and favorable impact on domestic spending. On the other hand, positive price changes impacted spending in Turkey and Mexico. In Russia, a rise in price fluctuations at lag zero (PR+) has a substantial beneficial effect, whereas an increase in the price level at lag two (PR+(-2) has a significant adverse impact. In both China and Brazil, price changes have a considerable beneficial influence on family consumer spending. While in the case of Mexico, however, unfavorable price changes reduce spending that is also supported by the previous literature (Uche et al. 2022; Chang et al., 2019a, 2019b; Hashmi & Chang, 2021).

The diagnostic tests are shown in Panel C of Table 3. The Wald test is used to verify for short-run and long run asymmetry formally. According to the Wald test, the E7 nations show an asymmetrical income impact in the long and short term. Furthermore, for E7 countries except for Brazil, India, and Mexico, the Wald test reveals an asymmetric influence of prices in the long term. Again, according to the Wald test, all E7 nations, except Brazil, and India, show a nonlinear effect of prices in the short term. The asymmetrical long and the short impacts of income and price fluctuations on household consumption confirmed the hypothesis that favorable and unfavorable changes in all variables have distinct consequences on consumer spending which also supported by the previous literature (Chang et al., 2020b 2020c).

Furthermore, this study employs diagnostic testing to ensure that the findings are reliable. The model stability is checked using the CUSUM and CUSUMQ methods. The model specification is checked using the Ramsey Rest (R-Reset) testing. The serial correlation is studied using the LM Test. The estimates show that particular nations have model specifications and other diagnostic difficulties, pushing us to utilize the asymmetric ARDL model.

Results based on the asymmetric ARDL approach are shown in this Table. Independent variables include national income (NI) and prices (PR). The outcome variable is consumption (CP), while the interest rate is employed as a control variable. Panel A displays the long-run estimations, Panel B Illustrates the short-run results, and Panel C exhibits the bounds test and diagnostic tests findings. * shows that the null hypothesis is rejected at a 10% statistical significance, ** at a 5% statistical significance, and *** at a 1% statistical significance. The Wald test is used for checking the long-term (WLR) and short-term (WSR) asymmetries. The R-Reset test ensures the model specification, the Hect test verifies heteroscedasticity, and the LM test demonstrates a serial correlation. CUSUM and CUSUMQ examine the model's stability; with 'S' indicating that the model is stable and 'U' suggesting it is not. The error correction term is abbreviated as ECT.

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CONCLUSION

The link among household consumption, price changes, income changes is supported by existing research. However, none of this research looks at the impact of favorable and unfavorable price and income fluctuations on consumption spending. The influence of favorable and unfavorable variations in prices and income on consumer spending is examined in this research, which adds to the current knowledge. We utilize quarterly time series data spanning 1991Q1 through 2020Q4 to construct these models.

According to results based on the asymmetric ARDL model, income level seems to have a favorable and significant impact on consumer spending in the Emerging 7 nations. On the other hand, a drop in income does indeed have a detrimental and considerable influence on consumer spending in every country except China and Indonesia. The Wald test is further used to examine the short-run and long-run asymmetry formally. In almost all sample nations, the Wald test for the asymmetric ARDL approach shows that income does have a nonlinear influence on consumer spending in the short and long run. Furthermore, the Wald test for the asymmetric ARDL approach suggests that price increases in Mexico and China have an asymmetric influence on consumer spending in the long term. However, prices have an asymmetric effect on consumer spending in Indonesia, Russia, and Turkey in the short term.

Consequently, the findings of this study are critical for policy recommendations in both industrialized and developing nations. The results show that the impact of price income changes on consumer spending varies between favorable and unfavorable income and price increases. As a result, we must examine the asymmetric effect when formulating policies, as failing to do so could result in potential losses.

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