Working Paper 420

Impact of Age Structure Transition on Current Account Balance for India: An Empirical Analysis

Aneesha Chitgupi

ISBN 978-81-7791-276-0

Institute for Social and Economic Change (ISEC) is engaged in interdisciplinary research in analytical and applied areas of the social sciences, encompassing diverse aspects of development. ISEC works with central, state and local governments as well as international agencies by undertaking systematic studies of resource potential, identifying factors influencing growth and examining measures for reducing poverty. The thrust areas of research include state and local economic policies, issues relating to sociological and demographic transition, environmental issues and fiscal, administrative and political decentralization and governance. It pursues fruitful contacts with other institutions and scholars devoted to social science research through collaborative research programmes, seminars, etc.

The Working Paper Series provides an opportunity for ISEC faculty, visiting fellows and PhD scholars to discuss their ideas and research work before publication and to get feedback from their peer group. Papers selected for publication in the series present empirical analyses and generally deal with wider issues of public policy at a sectoral, regional or national level. These working papers undergo review but typically do not present final research results, and constitute works in progress.

Working Paper Series Editor: **Marchang Reimeingam**

IMPACT OF AGE STRUCTURE TRANSITION ON CURRENT ACCOUNT BALANCE FOR INDIA: AN EMPIRICAL ANALYSIS*

Aneesha Chitgupi†

Abstract

Impact of age structure variables on current account balance (CAB) is estimated by using the panel data of 57 countries from 1980 to 2014. Gudmundsson and Zoega (2014) methodology is used to calculate the age adjusted current account balance for 57 countries and India-specific results are analysed in comparison with other BRICS countries. Empirical results show that India's age adjusted CAB would have experienced surpluses had it not been for the high share of dependent population, especially the young. Further, age adjustment factor for India shows a gradual decline and larger share of working age population in future may help in reducing the current account deficit situation for India. These results highlight the importance of demographic variables in explaining and predicting changes in CAB and its implications for the attainment of India's macroeconomic objective of external stabilization.

Key words: Current account balance, age structure transition, age adjusted current account, India, BRICS.
JEL codes: E21, F32, J11

Introduction

Demographic factors have recently gained much global attention in macroeconomic studies, as changes in age structure and population ageing have a profound impact on the fiscal and other macroeconomic conditions. Falling fertility rates and increase in life expectancy have pushed developed economies towards an ageing society whereas the same has brought a favourable situation for most developing nations called demographic dividend[1]. Most countries in the Asian continent are experiencing a higher share of working age population than share of children and elderly which is expected to propel these economies to higher economic growth (Asian Development Bank 1997, Bloom and Williamson 1998). The Global Monitoring Report (2015) stresses on bringing in the right set of policies in the era of intense demographic change in order to ensure sustained development and improved well-being.

The current paper aims at economic analysis of the relationship between age structure transition variables and current account balance (CAB) for India, by answering the following research questions: Does age structure transition have a role in achieving external stabilization (gradual decline in ratio of current account deficit to national income; CAD/GDP)? If yes, what is the nature and extent of this impact?

The paper models and estimates age structure transition as one of the key determinants of CAB. The empirical model evaluated is a panel data model of 57 countries. Using Gudmundsson and

† PhD Scholar at Centre for Economic Studies and Policy (CESP), Institute for Social and Economic Change (ISEC), Bengaluru, India. Email: aneeshachitgupi@gmail.com

* This paper is based on the author's on-going doctoral dissertation, under ISCCR Research Fellowship Scheme, at the Institute for Social and Economic Change (Bengaluru, India). The author is grateful to her PhD supervisor, Prof M R Narayana, for his guidance throughout the preparation of this paper. Thanks are due to Prof G Zoega and G S Gudmundsson for their guidance on methodology; to members of the Doctoral Committee and Bi-Annual Panel members at ISEC for their suggestions on earlier versions of this paper; and to anonymous referees for comments and suggestions. However, the usual disclaimers apply.

Zoega (2014) methodology, age structure adjusted CAB is calculated. Results are separately analysed for countries by classifying them into different income groups and BRICS countries. Further, using panel data estimates and India data, India specific results are obtained and implications for the attainment of the macroeconomic objective of external stabilization are analysed. The entire approach, results and implications add to the existing empirical analysis of India's CAB as it is related to age structure transition.

Review of Related Literature

Under National Income Accounting Framework, Gross Domestic Product (GDP) from expenditure side includes private consumption (C), gross investments (I), Government consumption (G) and net exports (X-M).

$$GDP = C + I + G + (X - M) \quad (1)$$

Or it can be decomposed on the basis of how it is earned and disposed of in the form of consumption (C), savings (S) and taxes (T).

$$GDP = C + S + T \quad (2)$$

Equating (1) and (2) and subtracting C from both sides and rearranging:

$$S + (T - G) - I = X - M \quad (3)$$

Where (T – G) component shows public sectors[2] savings or dissavings, i.e. (T – G) > 0 budget surplus, < 0 budget deficit and = 0 balanced budget. Thus S + (T – G) can be defined as aggregate national savings (NS).

$$NS = S + (T - G) \quad (4)$$

Equation (3) and (4) are used to define current account balance (CAB):

$$NS - I = CAB \quad (5)$$

Equation (5) indicates national savings minus investments is equal to current account balance, which is accumulation of claims on rest of the world. This implies that national savings is either used for investments in domestic economy or for stock of foreign claims. Higher savings imply surplus in current account. Thus, savings play a vital role in determining the current account surplus or deficit for the economy and positive net savings is an important determinant of the level of current account surplus.

The savings-investment approach to current account balance is used to link the age structure transitions to current account (CA) movements. It attempts to capture the indirect impact of age structure on CA through savings rate. The study by Leff (1969) established a relationship between dependency rates and savings rates in a cross section of 74 countries. The most celebrated study of Modigliani (1975) on Life-cycle hypothesis states that savings patterns change over the life-cycle of an individual which implies that a country having a large share of population in a particular age cohort will follow a similar savings rate. Fry and Mason (1982) found that there exists a level and a timing effect of savings, which suggests that with age, savings increase but timing of savings is dependent on the

young population. Higher the young dependency ratio, lower are the savings rate as savings get pushed ahead in time in order to provide for consumption needs of the young population. Rajesh Shukla, NCAER study (2010) analyzed income, consumption and savings pattern in both rural and urban households for India. It indicated that savings of the households increased with increase in the age of the chief earning member of the household.

Studies so far have focused on the impact of changes in age structure on the fiscal policy (Lee and Edwards, 2002; Narayana, 2014), economic growth (Mason, 1988; Bloom and Williamson, 1998, Bloom *et al* 2007, Narayana, 2015a and 2015b), and other macroeconomic variables such as savings, investments and capital flows (Leff, 1969; Higgins, 1998; Lindh, 1999; Feroli, 2003; Domeij and Floden, 2006, Mason *et al* 2016). The following literature analyses the impact of age structure on CAB.

The study by Higgins (1998) established that higher young and elderly dependent ratios reduce savings and exacerbate current account deficits based on the analysis of 100 sample countries stretching from 1960-89 by estimating a fixed effects model. The study tests demographic effects on national savings, investments and current account. The major empirical results reveal that a higher share of the young population (0-24 years) entails lower savings and higher investments and therefore higher current account deficits for countries with a large young dependent population.

Herbertsson and Zoega (1999) incorporated working age population to determine private savings and government saving and established that the existence of current account imbalances partly reflects demographic differences across countries. They use Modigliani's life-cycle hypothesis to model the behaviour of current account by using data for 84 countries for the period 1960-1990. Combining the life-cycle hypothesis with national income account identity, the study tests the hypothesis that a nation with a higher share of working age population would have a current account surplus while another nation with a proportionately larger share of young and retired would run current account deficits. They further their analysis to bring out the direct effect of age structure on current account through private savings and differentiating it from government budget surplus. The empirical results state that the working age population and budget surplus account for 31 per cent of variations in current account and ¼ of the effect of demographic variable works through public budget whereas ¾ works through private savings.

Gudmundsson and Zoega (2014) panel data study subtracted the age effects from the current account to obtain age adjusted current account for 57 nations for the period 2005-2009. They found that demographics and age structure have a significant impact on the current account balances (CAB). The age adjusted CAB showed that countries with high dependent population had diminished CA surpluses such as Japan and Germany, whereas surpluses of China, Malaysia and Singapore increased due to a larger proportion of working age population. Using the fixed effects regression model with current account as a percentage of GDP as dependent variable and share of population under 0-24 years (young) and 65+ years (elderly) as independent variables, the study offered evidence that both these demographic variables had a negative impact on current account surpluses.

Studies by Debelle and Faruqee (1996), Chinn and Prasad (2003) and Gruber and Kamin (2007) included demographic variables (expressed as dependency ratios) along with other macroeconomic determinants of CAB such as exchange rates, fiscal balance, trade openness, GDP

growth and business cycle to analyse the impact of these variables on CAB. Their studies also provide evidence that dependent population i.e. the young and the elderly have negative impact on CAB.

External stabilization i.e. reducing the CAD to GDP ratio has been a key policy agenda for the Indian economy, especially the post-1990s BOP crisis. In general, external sector policies use the traditional and conventional approaches to explain and predict the current account deficits for India including exchange rates and inflation (Rangarajan and Mishra, 2013), budget deficits (Bose and Jha, 2011), and openness to trade and trade barriers (Panagariya, 2004). In the approaches to analyzing CAB for India, demographic variables do not find an explicit role and this paper tries to address this lacuna.

Trends in India's Current Account Balance and Age Structure Transition

Trends in Current Account Balance

The current account under the Balance of Payments records the economic transactions of an economy with the rest of the world for a specified duration (monthly, quarterly or annually). According to the Balance of Payments Manual, Sixth Edition (BPM6) published by IMF, the major components of current account are *goods and services, primary income and secondary income accounts.* India follows a similar classification to record economic transactions in its current account.

Table 1: India's Balance of Payments by Current and Capital Account: 1980-81 to 2014-15

Time Period	Current Account (US$ Million)	Capital Account (US$ Million)	Balance of Payments (US$ Million)
1980-81 to 1984-85	-3,004.6	2,042.2	-962.6
1985-86 to 1989-90	-5,823.4	5,821.2	-1.8
1990-91 to 1994-95	-3,782.4	6,550.2	2,767.8
1995-96 to 1999-2000	-4,953.2	9,094.4	4,141.2
2000-01 to 2004-05	3,738.4	14,699.6	18,438
2005-06 to 2009-10	-20,260	47,696.8	27,436.6
2010-11 to 2014-15	-54,941	71,133.2	16,191.8

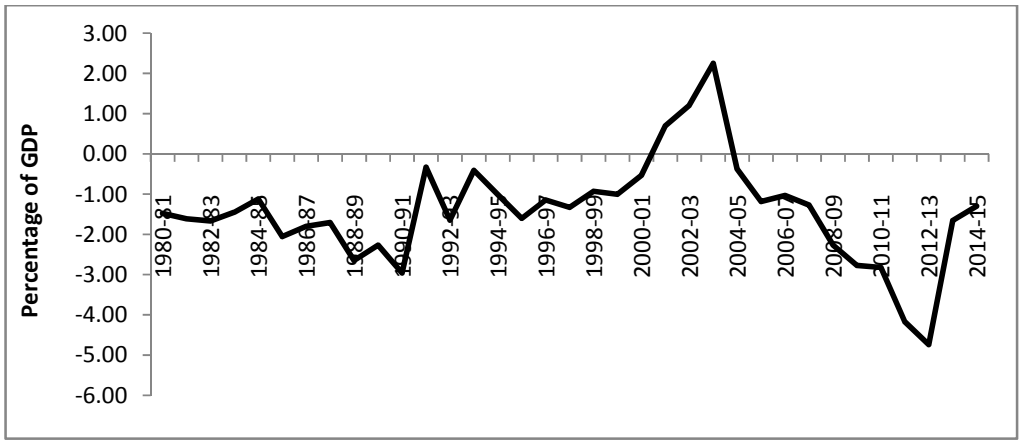
Source: Reserve Bank of India (2015)

Data pertains to the fiscal year (1st April to 31st March).

The overall balance or total on balance of payments (BOP) account is the summation of current account and capital account balances. A positive overall balance for India is due to high inflow of foreign funds in capital account (inflow of funds is treated as positive or credit item in BOP) which has offset the negative balance in current account. Table 1 gives five-yearly averages of current and capital accounts for India. The BOP deficit of US$ 962.6 million for the first period 1980-81 to 1984-85 was high due to deficits in current account and insufficient capital inflow. In the subsequent periods, it is observed that there is higher inflow of capital over and above the current account deficit especially from the period 2000-01 to 2004-05. The period 2005-06 to 2009-10 saw the highest surplus in BOP (US$ 27,436.6 million) even though the current account for that period escalated to an average deficit

of US$ 20,260 million due to surge in capital inflows. The period 2010-11 to 2014-15 experienced high current account deficits on account of increased gold and oil imports. India's overall BOP position has remained positive post 1990-91 due to the inflow of foreign capital greater than the amount required to pay for imports in excess of exports.

Figure 1: Ratio of CAB to GDP India, 1980-81 to 2014-15



Source: Reserve Bank of India (2015).

Data pertains to the fiscal year (1st April to 31st March).

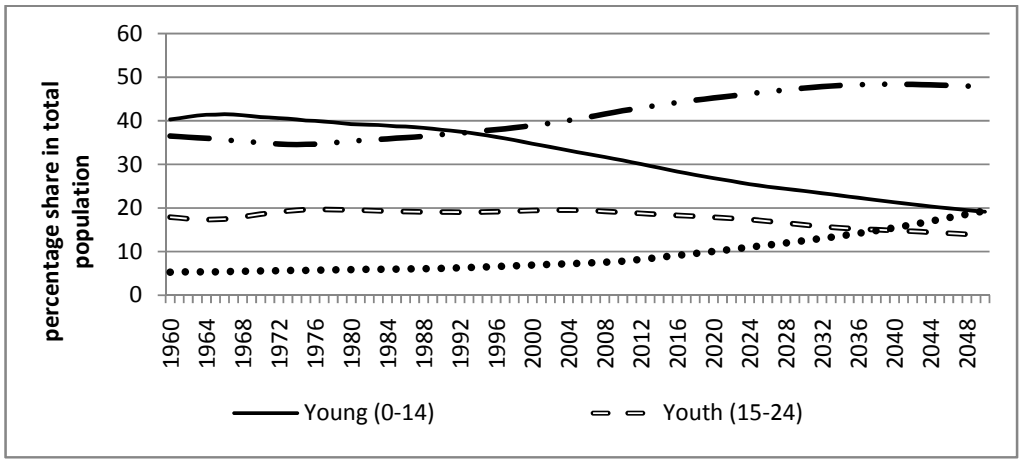
Both CAB and GDP are measured at Current Prices.

The current account as a percentage of GDP was -1.5 during 1980-81, and deteriorated to 3 per cent in 1990-91 during the balance of payments crisis (see Figure 1). After the implementation of New Economic Policies of 1991-92, there was a slight improvement in the ratio, averaging around -1.14 percent during 1992-2000. Apart from the four years in the early 2000s (2000-03) India has not experienced a current account surplus in the last 35 years. The surplus peaked at 2.2 per cent in 2003-04 due to strong exports and boom in IT sector trade and recorded a low of -4.7 per cent in 2012-13 due to increase in oil prices and high gold imports. The current account deficit for 2014-15 was -1.4 per cent of GDP and India's average CAB/GDP since 1980 to 2015 is -1.47 per cent.

Age Structure Transition

India's population is experiencing a change in its age structure with a larger proportion of the population being under the working age group and a smaller proportion of population being under the young and elderly categories. The main reason for the decline in the young population is the fall in the fertility rates (Bloom, Canning and Fink, 2011). The total fertility rate (TFR) declined from 5.87 children per woman at the beginning of 1960s to 2.4 children per woman in 2014 (World Bank, 2016) and is predicted to decline further in the coming decades. The Sample Registration Survey (2013) shows that for eight states, the fertility rate has fallen below 2.1 children (average replacement level).

Figure 2: Age Structure Transition, India, 1960 to 2050



Source: World Bank (2014).

Figure 2 shows the changing age structure of India over the past 3 decades and projections upto 2050. Age structure is classified into four groups: Young (0-14), youth (15-24), working (25-59) and elderly (60+). The share of the young population in total population has reduced from 40.3 per cent in 1960 to 29.2 per cent in 2014 and is projected to further decline to 19.1 per cent in 2050. The youth population has stayed stagnant at approximately 20 per cent of the total population till 2010 post which it shows a decline and will shrink to 13.7 per cent of the total population by 2050. The share of the elderly in total population is expected to expand for India. People above the age of 60 years were only 5.2 per cent of the total population in 1960, but in 2014, they were 8.6 per cent and for 2050, they will be close to 20 per cent of the total population. The share of the working population increased from 36.5 per cent in 1960 to 43.5 per cent in 2014 and by 2050 it will be 47.8 per cent. It is interesting to note that during 1991-92, there was a crossover between young and working age population shares, and a scissor shape is observed between the two curves, highlighting that post 1991, there has been a marked decline in the share of the young population and rise in the share of the working age population.

Methodology

The Gudmundsson and Zoega (2014) model is extended by the study period and by drawing country specific implications for India. The empirical model and estimation technique is given below.

Model

$$CAB_{it} = a + \beta_1 Py_{it} + \beta_2 Po_{it} + \delta_1 growth_{it} + \delta_2 Py_{it} * growth_{it} + U_{it} \quad (6)$$

CAB is the current account balance as a percentage of GDP, *Py* and *Po* are demographic variables, percentage of population under the young (24 years and below) and elderly (65 years and above) respectively, the middle age (25-65 years) is not included to avoid perfect multicollinearity. Following Fry and Mason (1982) *growth* variable which is the growth rate of income per capita and

*Py*growth* is the interactive term between growth and young variables is used to capture the level and timing effect on savings respectively because the young population enjoys a higher income and consumption with increase in economic growth. The variable rate of growth effect model studies the nexus between youth dependency and the national savings rate. Positive labour productivity growth implies that the younger generation has a higher permanent income and consumption as compared to their elders. The savings rate depends on the interaction of youth dependency ratio and growth rate of national income, the logic being that a declining youth population will shift the consumption from child-rearing stages to non-child rearing stages (Higgins, 1998). For example, in a country with a high young population, the working age cohort will save less as they would have to provide for the young and thereby creating a lesser current account surplus compared to a country which has a less youth dependent population as its working age population which would have a lesser burden of providing for youth and can save more.

Prediction

The predicted signs on the coefficients are as follows:

$\alpha > 0, \quad \beta 1, \beta 2 < 0, \quad \delta 1, \delta 2 < 0$

The expected signs of the standardized coefficient for the constant term (α) must be positive as it captures the impact of the working age population which contributes positively towards the current account, the coefficients of demographic variables (β1) and (ß2) must be negative as both the young and the elderly population adversely impact the CAB, the coefficient of growth variable (δ1) and the interaction term (δ2) must have negative signs too as higher levels of income lead to higher consumption in the presence of a high dependent population.

Calculation of Age Adjusted CAB

Using panel data, pooled OLS and fixed effect model are estimated by including or excluding the growth and interaction term and F test is conducted to choose between fixed effects model (FEM) and pooled regression model (PRM) on empirical grounds. The coefficients estimated through the fixed effect model without the growth and interactive term are used to calculate the age adjusted CAB for 57 countries. Following Gudmundsson and Zoega (2014) *age adjusted CAB* is calculated by the average of the two population variables (young and elderly) and current account balance (CAB) from 2009-2014 as $\bar{P}_{y,}$ $\bar{P}_{o}$ and $\overline{CAB}$ respectively and estimated coefficient $\hat{\beta}_1$ and $\hat{\beta}_2$ are multiplied with $\bar{P}_{y}$ and $\bar{P}_{o}$ which are the average of *Py* and *Po* for the years 2009-2014 to obtain *Z**.

$$Z^* = \bar{P}_y * \hat{\beta}_1 + \bar{P}_o * \hat{\beta}_2 \quad (7)$$

$$\textit{Age Adjusted CAB} = (\overline{CAB} - Z^*) - \alpha \quad (8)$$

$$\textit{Adjustment factor} = \textit{Age Adjusted CAB} - \overline{CAB} \quad (9)$$

A

The *Age Adjusted CAB* is calculated from $\overline{CAB}$ by subtracting *Z** and constant term (α). The *Adjustment factor* is the difference between *Age adjusted CAB* and $\overline{CAB}$ which shows the nature and impact of age structure on CAB.

Country Specific Implication

Country specific implications for India are calculated from cross-country estimation in (6) without growth and interactive term. The India specific age adjusted CAB was obtained as:

$$Z_t^I = P_{y,t}^I.\hat{\beta}_1 + P_{o,t}^I.\hat{\beta}_2 \qquad (t = 1980, 1981, 1982.....2014) \qquad (10)$$

$$\text{Age Adjusted } CAB_t^I = (CAB_t^I - Z_t^I) - \alpha \qquad (11)$$

$$\text{Adjustment Factor} = \text{Age Adjusted } CAB_t^I - CAB_t^I \qquad (12)$$

B

In equations (7), (8) and (9) , the *Age adjusted CAB* is calculated for all 57 nations using the average of CAB, *Py* and *Po* for the years 2009-2014, whereas, in the case of equations (10), (11) and (12), the *Age Adjusted CAB* is calculated for the entire period from 1980-2014 for country specific analysis. This captures the year-wise changes in the impact of age structure transition on the CAB for India and *Adjustment Factor* is calculated for each year to highlight its movement over the period.

Variables and Data Description

Table 2 lists the variables and their sources that are employed in the estimation of the panel regression models described in the previous sections.

Table 2: Variable Description and Data Sources

Variable		Measurement	Data Source
Current Account Balance	*CAB*	Percentage of GDP at Current Prices	RBI (2015) IMF (2015)
Young Population	P_y	Population aged 0-24 years as a percentage of total population	World Bank (2014)
Elderly Population	P_o	Population aged 65+ years as a percentage of total population	
Per Capita Growth Rate	*growth*	Growth rate of per capita GDP in current prices	IMF (2015)
Interaction term	P_y**growth*		

Source: Author's compilation.

Empirical Results

This section discusses the estimation results separately for the cross country analysis and India specific analysis.

Cross Country Evidence

The estimation results of panel regression (includes 57 countries over 34 years) in (6) are presented in Table 3.

Table 3: Age structure transition effects on the current account, 1980-2014

Variables	Models		
Dependent variable : CAB	**PRM**	**FEM (1)**	**FEM (2)**
Young (0-24)	-0.497*** (-15.46)	-0.425*** (-8.48)	-0.441*** (-8.50)
Elderly (65+)	-0.955*** (-13.83)	-0.668*** (-5.70)	-0.69*** (-5.80)
Growth per capita	-35.606 (-2.88)		-26.141 (-1.77)
Growth * young	0.66 (2.28)		0.529 (1.54)
Constant	29.96*** (14.89)	23.731*** (7.5)	24.696*** (7.56)
R^2	0.117	0.462	0.464
F statistic	60***	35.71***	34.37***
Number of observations	1804	1804	1804
F-test for fixed effects		F(56, 1745) = 20.28***	F(56, 1743) = 20.15***

*** Denotes significance at 1% level.

Source: Author's estimation based on equation (6).

Values in parenthesis for variables are t-statistic.

The F test for poolability[3] shows that countries are not poolable and fixed effects model is empirically appropriate and statistically significant.

Table 3 shows that the standardized coefficients have the expected signs. In all three estimated models {PRM, FEM (1) and FEM (2)}, the young and the elderly exhibit a negative impact on the current account balance[4]. Using life-cycle hypothesis and savings–investment approach, it can be stated that the young and the elderly reduce the current account surplus because they consume/dissave more than they earn. The choice between FEM (1) and FEM (2) models is based on the qualitative differences. Firstly, the growth and interaction variables are not statistically significant in FEM (2). Secondly, standardised coefficients of the population variables (young and elderly) in FEM (1) are not significantly different after the incorporation of growth and interaction variable in FEM (2). Thirdly, incorporation of growth and interaction term did not improve the R^2 for FEM (2) . The standardized coefficients of the FEM (1) are used to calculate age adjusted CAB.

Table 4 gives the results on the nature and extent of age adjusted CAB for 57 for the period 2009-2014. The countries are classified into surplus and deficit countries on the basis of their actual CAB. Countries with surplus in their current account under BOP are listed under surplus countries and vice versa. The World Bank classification (July, 2013)[5] of countries based on income is adopted which

groups the countries into High Income, Upper Middle Income, Lower Middle Income and Low Income countries on the basis of per capita income.

A negative adjustment implies that there is a high share of working age population in the economy, whereas positive adjustment depicts a large share of dependent (young and/or old) population. Among the High Income and Surplus countries, Singapore, Hong Kong SAR, Korea Republic and Russia have high negative adjustment due to the high share of working age population in these countries. Once the adjustment is netted out of the actual CAB as a per cent of GDP, the current account surpluses reduced drastically, for Hong Kong SAR by -4.44 per cent, Singapore by -4.34 per cent, Korea Republic by –3.52 per cent and Russia -2.64 per cent. In contrast, Japan, Sweden, Israel, Denmark and Germany have a positive adjustment as these countries have a high share of old population. For Japan and Sweden, the adjusted CAB as a percentage of GDP increased by 2.08 per cent and 1.48 per cent respectively.

For the High Income and Deficit countries, France, Finland, United Kingdom, Lithuania and Italy have positive adjustment on account of a greying society and countries like Slovak Republic, Poland, Czech Republic, Canada, Chile and Spain have negative adjustment, depicting a high share of working age population.

Table 4: Actual and Age Adjusted CAB, 2009-2014

High Income	Actual CAB	Adjusted CAB	Adjustment	Upper Middle Income	Actual CAB	Adjusted CAB	Adjustment	Lower middle income	Actual CAB	Adjusted CAB	Adjustment
Surplus Countries											
Singapore	19.44	15.1	-4.34	Malaysia	8.16	7.49	-0.67	Philippines	3.76	5.29	1.53
Saudi Arabia	15.37	13.45	-1.92	**China**	**2.8**	**-0.87**	**-3.67**				
Norway	10.96	10.95	-0.01	Thailand	2.52	-1.09	-3.61				
Switzerland	9.88	9.06	-0.82	Hungary	1.67	0.67	-1				
Netherlands	9.05	8.62	-0.43								
Sweden	6.39	7.87	1.48								
Germany	6.34	6.83	0.49								
Luxembourg	5.98	4.1	-1.88								
Denmark	5.65	6.36	0.71								
Honk Kong SAR	4.57	0.13	-4.44								
Korea Republic	4.1	0.58	-3.52								
Russia	**3.67**	**1.03**	**-2.64**								
Israel	3.04	4.47	1.43								
Slovenia	2.45	0.74	-1.71								
Japan	1.91	3.99	2.08								
Austria	1.72	1.39	-0.33								
Ireland	0.58	-1.13	-1.71								
Estonia	0.37	0.45	0.08								
Belgium	0.05	0.23	0.18								

High Income	Actual CAB	Adjusted CAB	Adjustment	Upper Middle Income	Actual CAB	Adjusted CAB	Adjustment	Lower middle income	Actual CAB	Adjusted CAB	Adjustment
Deficit Countries											
Latvia	-0.2	0.08	0.28	Argentina	-0.21	0.97	1.18	Indonesia	-1.01	-1.98	-0.97
Lithuania	-0.26	0.19	0.45	Mexico	-1.38	-0.74	0.64	Pakistan	-2	1.28	3.28
Finland	-0.71	-0.16	0.55	Bulgaria	-1.47	-2.03	-0.56	**India**	**-2.95**	**-2.31**	**0.64**
France	-0.94	0.08	1.02	Peru	-2.61	-1.83	0.78	Ukraine	-5.33	-7.08	-1.75
Croatia	-0.95	-1.27	-0.32	Columbia	-3.23	-4.23	-1	Morocco	-6.75	-6.58	0.17
Chile	-0.98	-2.09	-1.11	Romania	-3.25	-4.41	-1.16				
Italy	-1.01	-0.61	0.4	**Brazil**	**-3.25**	**-4.6**	**-1.35**				
Spain	-1.57	-3.08	-1.51	**South Africa**	**-3.76**	**-2.63**	**1.13**				
Czech Republic	-1.61	-3.41	-1.8	Turkey	-6.28	-6.66	-0.38				
Slovak Republic	-1.78	-4.76	-2.98								
United States	-2.65	-3.13	-0.48								
Iceland	-2.77	-3.06	-0.29								
Canada	-2.91	-4.18	-1.27								
New Zealand	-2.97	-2.88	0.09								
Poland	-3.41	-5.74	-2.33								
United Kingdom	-3.53	-3.03	0.5								
Australia	-3.66	-4.15	-0.49								
Portugal	-4.44	-4.41	0.03								
Greece	-5.31	-5.12	0.19								

Source: Author's calculations based on equations (7), (8) and (9) and estimated results from Table 3, FEM (1).

Countries are classified into income groups according to 2012 gross national income (GNI) per capita, calculated using the World Bank Atlas method. The groups are: low income, $1,035 or less; lower middle income, $1,036–4,085; upper middle income, $4,086–12,615; and high income, $12,616 or more. World Bank (July 2013).

Among the Upper Middle Income countries, China has the highest negative adjustment of -3.67 per cent followed by Thailand (-3.61 per cent). Once the adjustment is taken into account, China's current account surplus of 2.8 per cent of GDP shifted into deficit of -0.87 per cent and Thailand's surplus shifted from 2.52 to a deficit of -1.09 per cent.

Pakistan, Philippines and India have positive adjustment factors, as they have a higher share of the young population in their countries. These Lower Middle Income countries experienced an increase in their CAB when the age structure transition was netted out. In the case of Pakistan, the current account deficit of 2 per cent of GDP shifted to a surplus of 1.28 per cent after accounting for the age structure.

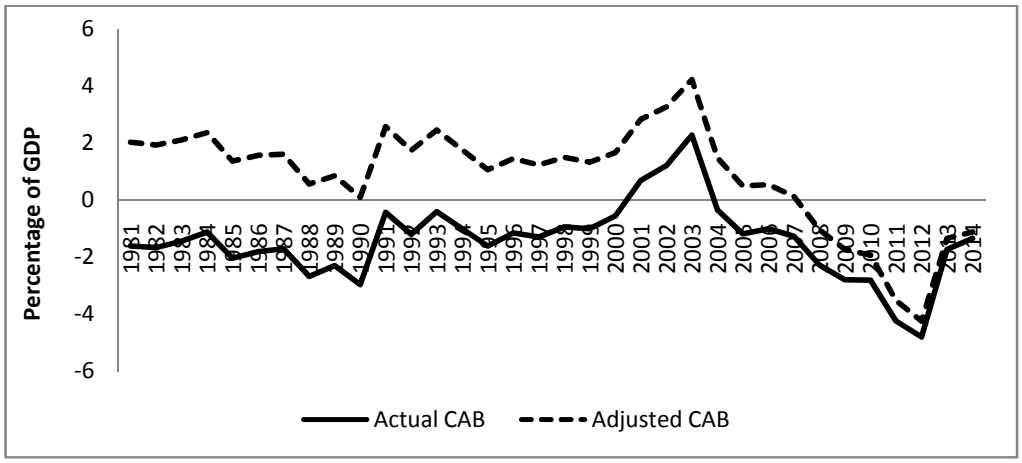
For India, the adjustment is positive but not of remarkable magnitude. The positive adjustment indicates that its large dependent population, more so under the young category, is responsible for reducing the current account surplus by 0.64 per cent of the GDP. The results obtained differ significantly from the ones obtained by Gudmundsson and Zoega (2014). In their paper, India had a negative adjustment factor of -0.32, whereas in this analysis, India has a positive adjustment factor. The positive adjustment factor is more close to theory as India has a large dependent population which must necessarily increase the deficits. Countries like Canada, Peru and Argentina have moved into the deficit countries due to current account deficits in the past 5 years and Estonia and Ireland have become surplus nations. Austria, Norway, Bulgaria and New Zealand have had reverse adjustment factors when compared with the results of Gudmundsson and Zoega (2014). One of the reasons for the reversal of the adjustment factor could be the extension of the time period.

Of the BRICS nations, China, South Africa and Brazil come under the Upper Middle Income countries, Russia under High Income country and India under Lower Middle Income. Not only are the incomes different, but also the stage of age structure transition. China and Russia have a high share of working age population which is depicted in their adjustment factor followed by Brazil and South Africa and India. In order to understand how the age structure transition has impacted the CAB over the decades, one needs to make a country-specific analysis undertaken in the following section.

India Specific Analysis

The impact of age structure on CAB was calculated and presented in Table 4, but it only provides the average impact of age structure transition on CAB for 2009-2014. In order to bring out the impact of age structure variables for India from 1981 to 2014 (year-wise) the actual and the *Age Adjusted CAB* are calculated using equations (10), (11) and (12) along with the coefficients obtained from FEM (1) in Table 3 and it is presented in Figure 3.

Figure 3: Actual and Age Adjusted CAB, India, 1981-2014



Source: Author's calculations based on equations (10), (11) and (12) and estimated results from Table 3, FEM (1)

Figure 3 shows that if the age effect is netted out from the current account, then India would have experienced a current account surplus rather than deficit for most of the study period. The actual CAB includes the effects of all the macro economic variables as well as the age effect. When age effect is subtracted for India, the shift observed in the CAB is drastic. Thus, age structure explains to a large part why the CAB has been under deficit. For the entire study period (1981-2014) the age adjustment factor for India has been positive, implying that the high share of dependent young population has a negative impact on the CAB.

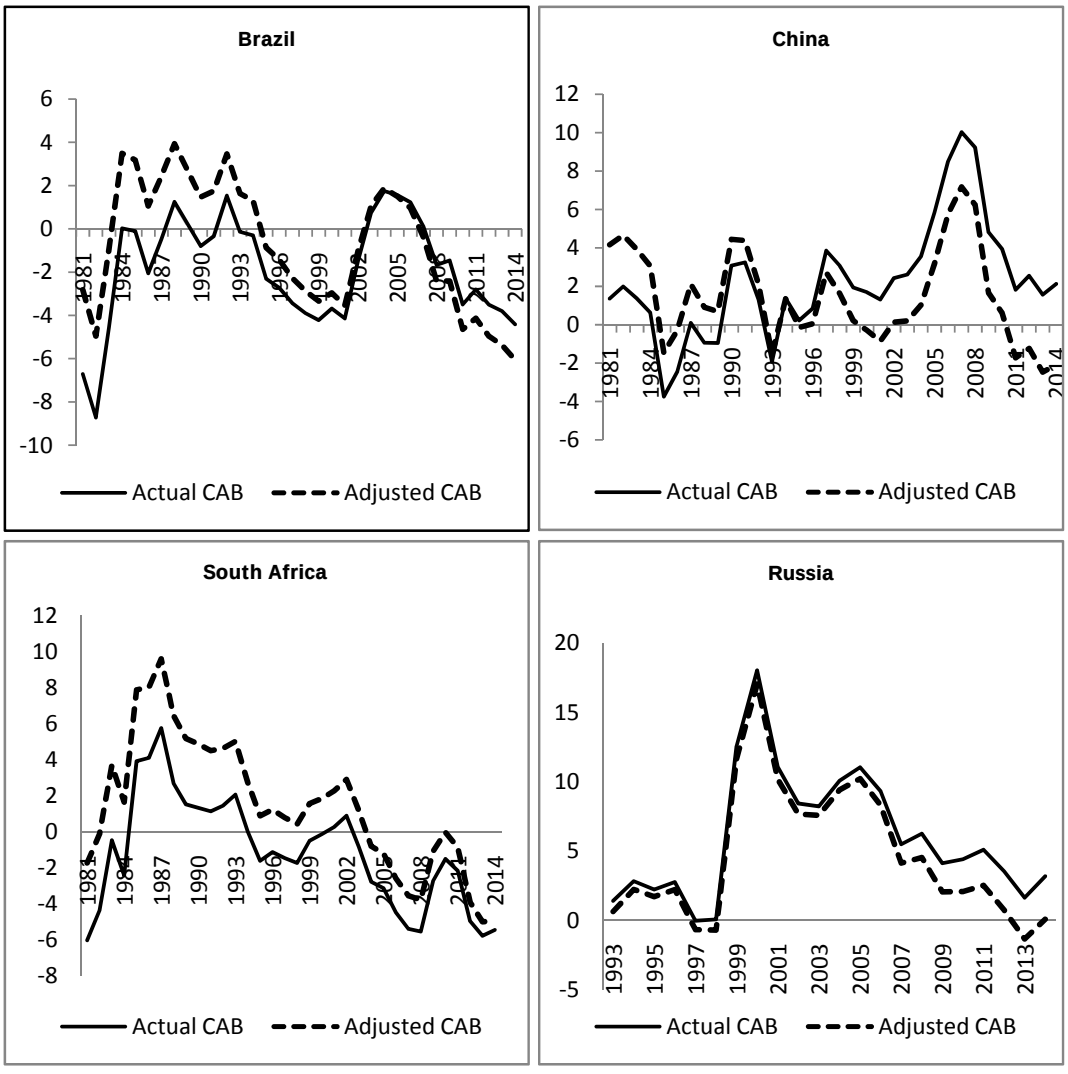
At the beginning of 1980s, the age effect was 4 per cent, netting out the age effect from the actual CAB yields a surplus of 2 per cent of GDP for India in the initial years of 1980s. Due to age structure transition and a gradual decline in the share of the young population and simultaneous increase in the share of working age population, the age effect reduced to 3 per cent during 1991 to 1995. It further reduced to 2 per cent from 1998 to 2003 and from 2005 onwards it has tapered further to 1 per cent in 2012. The decline in young population by 6.4 per cent from 2000 to 2014 and increase in working age population by 5.3 per cent for the said period (Appendix Table A.2.) has led to the convergence between the actual CAB and adjusted CAB. For the years 2012 to 2014, the actual and the adjusted CAB have almost overlapped, depicting a negligible age effect which suggests that the negative impact on CAB from the dependent population is being nullified by the positive contributions of the working age population.

Studying the impact of age structure transition on India in isolation may not help in predicting the future course of the adjusted CAB. A comparison with other economies can shed better light in this regard. The BRICS nations (Brazil, Russia, China and South Africa) are selected for this purpose as these nations are homogeneous on the basis of economic activity and international presence and heterogeneous in age structure and income levels. Placing India alongside other emerging economies would help us understand the movement of the age effect on CAB in the future.

Comparison with BRICS

As observed in Table 4, China, Russia and Brazil have a negative age adjustment, depicting the positive contribution of the working age population, whereas India and South Africa have a positive adjustment, depicting the adverse impact on CAB due to a high share of dependent population. Replicating the technique used to extract India's age adjusted CAB, i.e. using the equations (10), (11) and (12) and coefficients obtained from FEM (1) in Table 3, age adjusted CAB for the rest of the BRICS nations is presented in Figure 4.

Figure 4: Actual and Age Adjusted CAB, Brazil, China, South Africa and Russia, 1981-2014



Source: Author's calculations based on equations (10), (11) and (12) and estimated results from Table 3, FEM (1).

For Russia the data on CAB is available from 1992 onwards.

Observing Figure 3 and 4 brings out the fact that all the BRICS nation except Russia had actual CAB below the adjusted CAB, depicting a high share of the dependent population during the 1980s and 1990s.

In the case of Brazil, China and Russia, it is observed that these countries have passed the convergence phase[6] where the actual CAB is equal to the adjusted CAB. For Brazil it was during the early 2000s, for China in the mid-1990s and for Russia during the latter half of the 1990s and early 2000s. Brazil and China have experienced a crossover of the adjusted CAB and actual CAB which shows that the positive contributions by the working age population is greater than the adverse impact by the dependent population on the current account.

Prior to the convergence phase, both China and Brazil had a higher adjusted CAB as compared to actual CAB, which shows that if the age effect was netted out, then both these economies would have experienced higher CAB. The high dependent population in these two countries was reducing their CAB by approximately 2 per cent of GDP for China and 3 per cent for Brazil. The fall in the dependent young population and the rise in the working population brought out convergence between the adjusted and actual CAB; in the case of China, its working population increased by 8.6 per cent and young population fell by 9.9 per cent during 1990-2000, whereas for Brazil, its working population increased by 7 per cent during 2000-2014 and its young population shrank by 9.6 per cent during the same period. Hence, China achieved the convergence earlier than Brazil. As of today, both these countries are experiencing high contributions towards their CAB from their large share of the working population, for China it is nearly 4 per cent and for Brazil it is 1 per cent. If the positive contributions from the age effects were to be subtracted from China's actual CAB, China would end up having a current account deficit rather than surplus.

Russia is an outlier, in the sense that for the entire study period (1992-2014) it has experienced positive contributions towards in actual CAB from its working age population. It is possible that the convergence of actual and adjusted CAB has happened for Russia prior to 1992, for which data is unavailable. But after 2000, nearly 3 per cent of the GDP is being added to the actual CAB on account of the decline in the share of young population and increase in working age population. Russia's young population reduced by 6.2 per cent during 2000-2014, whereas the share of working age population increased by 5.5 per cent for the same period.

The movement of adjusted CAB for South Africa is similar to that experienced by India. It is also in its convergence phase. South Africa's young population has declined sharply. Over the past three and a half decades, its young population has reduced by 15 per cent and its working age population stagnated during 1980-90, but from 1990-2014 it has increased by 8.2 per cent. Until the early 1990s, nearly 4 per cent of the actual CAB was being reduced on account of the high share of young dependent population, but with the subsequent decline in their share and increase in working age population, the difference between adjusted CAB and actual CAB is reduced to 1 per cent as of 2014.

The above analysis helps in comparing the movements of the CAB of countries which are in different stages of age structure transition and shed light on the future course of India's adjusted CAB. China, Brazil and Russia have made through the convergence, whereas South Africa and India are going through the process. In the case of India, more people joining the workforce and a steady decline in the

fertility rate would mean that the adjusted CAB would be below the actual CAB, depicting the positive contribution from the working age population. In the coming years, India could observe a fillip to its CAB on account of a larger share of the working age population.

Conclusions and Implications

The study attempts to provide an alternative explanation to the movement of CAB for India. The presence of a high share of the young population during 1980-90 dampened the CAB. If India had not experienced a high share of the young population, it would have enjoyed a current account surplus for the majority of the period (from 1980 to 2008) which is depicted by the age adjusted CAB (Figure 3). The negative impact of a young population on India's CAB has been gradually reducing due to a favourable age structure transition i.e. the increase in the share of working age population because of which the gap between the actual CAB and age adjusted CAB has been reduced in the recent years. It is possible that in the coming decade, the adjustment factor (which captures the age structure transition effect) for India may reverse like in the case of China and Brazil, highlighting the positive contribution of the working age population towards their current account.

A comparison with other BRICS nations emphasized that Brazil, China and Russia had passed their peak demographic dividend phase and as of now, the large share of working age population is contributing positively towards their CAB, whereas India and South Africa are still in the convergence phase where the actual CAB and the age adjusted CAB are moving towards each other. And in the coming decades, with the maturing of the population, India and South Africa could reap the benefits in the form of a positive boost in their current account.

Though there are numerous macroeconomic variables that impact the CAB, this paper exclusively looks at the impact of age structure variables on the current account and analyses the nature and impact of these variables on India's external stabilization. Future extension of this analysis could focus on including the productivity of the population. Having a large proportion of unproductive working age population in the developing countries may be detrimental to output and thereby savings as they may remain unemployed or underemployed. At the same time, the advent of new technologies which have the potential for providing a massive boost to labour productivity can increase output and employment for developed and ageing economies which when coupled with increased life expectancy may lead to increased savings and current account surpluses.

Appendix

Table A.1: Correlation Matrix

	CAB	Young (below 24)	Working (25-64)	Old (above 65)	Growth per capita income
CAB	1				
Young (below 24)	-0.146	1			
Working (25-64)	0.228	-0.956	1		
Old (above 65)	0.021	-0.925	0.774	1	
Growth per capita income	0.001	0.019	0.039	-0.093	1

Source: Author's calculations.

Table A.2: Changes in the population shares of BRICS nations

Countries	1980-1990			1990-2000			2000-2014		
	young	working age	old	young	working age	old	young	working age	old
India	-2.9	1.6	0.2	-2.9	2.3	0.6	-6.4	5.3	1.1
China	-9.9	4.4	0.8	-9.9	8.6	1.3	-9.2	6.7	2.5
Brazil	-5.3	4.2	0.3	-5.3	4.2	1.0	-9.6	7.0	2.5
Russia	-2.2	0.0	3.1	-2.2	0.1	2.1	-6.2	5.5	0.8
South Africa	-4.9	0.1	1.9	-4.9	4.1	0.8	-5.1	4.1	1.0

Source: World Bank (2014).

Changes in the population shares are calculated by subtracting the first year values from last year values.

Notes

[1] Demographic dividend, as defined by the United Nations Population Fund (UNFPA) means, "the economic growth potential that can result from shifts in a population's age structure, mainly when the share of the working-age population (15 to 64) is larger than the non-working-age share of the population (14 and younger, and 65 and older)." In other words, it is "a boost in economic productivity that occurs when there are growing numbers of people in the workforce relative to the number of dependents."

[2] The public sector in India includes General Services (Economic Services such as agriculture, forestry, fishing; mining, manufacturing, construction etc. and Non-Economic Services as defence, education, health etc.) and Departmental and Non-Departmental (financial and non-financial) enterprises.

[3] F-test for poolability checks the null hypothesis (Ho) that none of the country dummies are significantly different than zero as against the alternative (H_1) that atleast one dummy is significantly different than zero. In this case the country dummies are used to capture the country specific intercepts and are jointly tested. Ho = $\square_1 = \square_2 = \square_3 = \ldots = \square_{56} = 0$, where $\square i$ the intercept of the individual country regressions. For the dataset the poolability test rejected the null hypothesis stating the countries are not poolable.

[4] Random effects model was also estimated and Hausman test conducted which favoured the fixed effects model over random effects model for this dataset.

[5] The World Bank classification (July, 2013) was selected because it stays into effect till July, 2014 and the analysis spans over 2009-2014 time period.

[6] The convergence phase shows the increase in the share of the working age population which positively contributes to the CAB and thus, the actual CAB moves closer to the adjusted CAB.

References

Asian Development Bank (1997). *Emerging Asia: Challenges and Prospects.* Manilla.

Bloom, D E and J G Williamson (1998). Demographic Transitions and Economic Miracles in Emerging Asia . *World Bank Economic Review,* 12 (3): 419-56.

Bloom, D E, D Canning, G Fink and J E Findley (2007). Does Age structure forecast economic growth? *International Journal of Forecasting,* 23 (4): 569-585.

Bose, S and S Jha (2011). India's Twin Deficits: Some Fresh Empirical Evidence. *ICRA Bulletin, Money and Finance*, 83-104.

Chinn, M D and E S Prasad (2003). Medium-term Determinants of Current Accounts in Industrial and Developing Countries: An Empirical Exploration. *Journal of International Economics,* 59 (1): 47-76.

Debelle, G and H Faruquee (1996). What Determines the Current Account? A Cross-Sectional Panel Approach. *IMF Working Paper No. 96/58*.

Domeij, D and M Floden (2006). Population Ageing and International Capital Flows. *International Economic Review,* 47 (3): 1013-32.

Fair, R C and K M Dominguez (1991). Effects of Changing US Age Distribution on Macroeconomic Equations. *American Economic Review,* 81 (8): 1276-94.

Feroli, M (2003). Capital Flows among G7 Nations: A Demographic Perspective. *FEDS Working Paper No. 2003-54*.

Fry, M J and A Mason (1982). The Variable Rate-of-Growth Effect in the Life-Cycle Saving Model. *Economic Enquiry,* 20 (3): 426-42.

Gruber, J W and B K Steven (2007). Explaining the Global Pattern of Current Account Imbalances. *Journal of International Money and Finance,* 26 (4): 500-522.

Gudmundsson, G S and G Zoega (2014). Age Structure and the Current Account. *Economic Letters,* 123 (2): 183-86.

Herbertsson, T T and G Zoega (1999). Trade Surpluses and Life-cycle Saving Behavior. *Economic Letters*, 227-37.

Higgins, M (1998). Demography, National Savings and International Capital Flows. *International Economic Review,* 39 (2): 343-69.

IMF, World Economic Outlook. (2015, October). *World Economic Outlook Databse.* Retrieved October 2015, from https://www.imf.org/external/pubs/ft/weo/2015/02/weodata/index.aspx

Lee, R and R Edwards (2002). The Fiscal Effects of Population Aging in the US: Assessing the Uncertainties. *Tax Policy and the Economy,* 16: 141-80.

Lee, R D and A Mason (eds) (2011). *Population Aging and the Generational Economy: A Global Perspective.* Cheltenham: Edward Elgar Publishing.

Leff, N H (1969). Dependency Rates and Savings Rates . *The American Economic Review,* 59 (5): 886-96.

Lindh, T (1999). Age Structure and Economic Policy: The Case of Savings and Growth. *Population Research and Policy Review,* 18: 261-77.

Mason, A (1988). Saving, Economic Growth, and Demographic Change. *Population and Deveopment Review,* 14 (1): 113-44.

Mason, A, R Lee and J X Jiang (2016). Demographic Dividends, Human Capital and Saving. *The Journal of the Economics of Ageing,* 7: 106-22.

Modigliani, F (1975). The Life-cycle Hypothesis of Saving Twenty Years Later. In M Parkin and A R Nobay (eds), *Contemporary Issues in Economics*. Manchester: Manchester University Press. Pp 2-35.

Modigliani, F and R H Brumberg (1954). Utility Analysis and the Consumption Function: An Interpretation of Cross-section Data. In K K Kurihara (ed), *Post Keynesian Economics*. New Brunswick: Rutgers University Press. Pp. 388-436.

Narayana, M R (2014). Impact of Population Ageing on Sustainability of India's Current Fiscal Policies: A Generational Accounting Approach. *The Journal of the Economics of Ageing,* 3: 71-83.

———— (2015a). Age Structure Transition, Population Ageing and Economic Growth: New Evidence and Implications for India. In K V Ramaswamy (ed), *Labour, Employment and Economic Growth: The Indian Experience*. Delhi: Cambridge University Press. Pp 127-52.

———— (2015b). India's Age Structure Transition, Sectoral Labor Productivities, and Economic Growth: Evidence and Implications Based on National Transfer Accounts. *Population Research and Policy Review,* 34 (3): 318-415.

Panagariya, A (2004). India in the 1980s and 1990s: A Triumph of Reforms. *IMF Working Paper, No. 04/43*.

Rangarajan, C and P Mishra (2013). India's External Sector: Do We Need to Worry? *Economic and Political Weekly,* XLVIII (7): 52-59.

Reserve Bank of India. (2015, December). *https://rbi.org.in/home.aspx*. Retrieved December 2015, from http://dbie.rbi.org.in/DBIE/dbie.rbi?site=publications

Shukla, R (2010). *How India Earns, Spends and Saves: Unmasking the Real India.* New Delhi: Sage Publications.

Taylor, A M (1995). Debt, Dependence and the Demographic Transition: Latin America into the Next Century . *World Development,* 23: 869-879.

World Bank (2014). Retrieved October 2015, from Health, Nutrition and Population Statistics: *http://databank.worldbank.org/data/reports.aspx?source=Health%20Nutrition%20and%20Population%20Statistics:%20Population%20estimates%20and%20projections*

———— (2014). Retrieved 2014, from Country Classification: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519

———— (2015). Development Goals in an Era of Demographic Change. In *Global Monitoring Report*. Pp 165-87.

———— (2016, February). *Fertility rate, total (births per woman)*. Retrieved 2016, from http://data.worldbank.org/indicator/SP.DYN.TFRT.IN

Recent Working Papers

357 Geographical Access and Quality of Primary Schools - A Case Study of South 24 Parganas District of West Bengal
Jhuma Halder

358 The Changing Rates of Return to Education in India: Evidence from NSS Data
Smrutirekha Singhari and S Madheswaran

359 Climate Change and Sea-Level Rise: A Review of Studies on Low-Lying and Island Countries
Nidhi Rawat, M S Umesh Babu and Sunil Nautiyal

360 Educational Outcome: Identifying Social Factors in South 24 Parganas District of West Bengal
Jhuma Halder

361 Social Exclusion and Caste Discrimination in Public and Private Sectors in India: A Decomposition Analysis
Smrutirekha Singhari and S Madheswaran

362 Value of Statistical Life: A Meta-Analysis with Mixed Effects Regression Model
Agamoni Majumder and S Madheswaran

363 Informal Employment in India: An Analysis of Forms and Determinants
Rosa Abraham

364 Ecological History of An Ecosystem Under Pressure: A Case of Bhitarkanika in Odisha
Subhashree Banerjee

365 Work-Life Balance among Working Women – A Cross-cultural Review
Gayatri Pradhan

366 Sensitivity of India's Agri-Food Exports to the European Union: An Institutional Perspective
C Nalin Kumar

367 Relationship Between Fiscal Deficit Composition and Economic Growth in India: A Time Series Econometric Analysis
Anantha Ramu M R and K Gayithri

368 Conceptualising Work-life Balance
Gayatri Pradhan

369 Land Use under Homestead in Kerala: The Status of Homestead Cultivation from a Village Study
Sr. Sheeba Andrews and Elumalai Kannan

370 A Sociological Review of Marital Quality among Working Couples in Bangalore City
Shiju Joseph and Anand Inbanathan

371 Migration from North-Eastern Region to Bangalore: Level and Trend Analysis
Marchang Reimeingam

372 Analysis of Revealed Comparative Advantage in Export of India's Agricultural Products
Subhash Jagdambe

373 Marital Disharmony among Working Couples in Urban India – A Sociological Inquity
Shiju Joseph and Anand Inbanathan

374 MGNREGA Job Sustainability and Poverty in Sikkim
Marchang Reimeingam

375 Quantifying the Effect of Non-Tariff Measures and Food Safety Standards on India's Fish and Fishery Products' Exports
Veena Renjini K K

376 PPP Infrastructure Finance: An Empirical Evidence from India
Nagesha G and K Gayithri

377 Contributory Pension Schemes for the Poor: Issues and Ways Forward
D Rajasekhar, Santosh Kesavan and R Manjula

378 Federalism and the Formation of States in India
Susant Kumar Naik and V Anil Kumar

379 Ill-Health Experience of Women: A Gender Perspective
Annapuranam Karuppannan

380 The Political Historiography of Modern Gujarat
Tannen Neil Lincoln

381 Growth Effects of Economic Globalization: A Cross-Country Analysis
Sovna Mohanty

382 Trade Potential of the Fishery Sector: Evidence from India
Veena Renjini K K

383 Toilet Access among the Urban Poor – Challenges and Concerns in Bengaluru City Slums
S Manasi and N Latha

384 Usage of Land and Labour under Shifting Cultivation in Manipur
Marchang Reimeingam

385 State Intervention: A Gift or Threat to India's Sugarcane Sector?
Abnave Vikas B and M Devendra Babu

386 Structural Change and Labour Productivity Growth in India: Role of Informal Workers
Rosa Abraham

387 Electricity Consumption and Economic Growth in Karnataka
Laxmi Rajkumari and K Gayithri

388 Augmenting Small Farmers' Income through Rural Non-farm Sector: Role of Information and Institutions
Meenakshi Rajeev and Manojit Bhattacharjee

389 Livelihoods, Conservation and Forest Rights Act in a National Park: An Oxymoron?
Subhashree Banerjee and Syed Ajmal Pasha

390 Womanhood Beyond Motherhood: Exploring Experiences of Voluntary Childless Women
Chandni Bhambhani and Anand Inbanathan

391 Economic Globalization and Income Inequality: Cross-country Empirical Evidence
Sovna Mohanty

392 Cultural Dimension of Women's Health across Social Groups in Chennai
Annapuranam K and Anand Inbanathan

Price: ₹ 30.00 ISBN 978-81-7791-276-0

INSTITUTE FOR SOCIAL AND ECONOMIC CHANGE
Dr V K R V Rao Road, Nagarabhavi P.O., Bangalore - 560 072, India
Phone: 0091-80-23215468, 23215519, 23215592; Fax: 0091-80-23217008
E-mail: reimeingam@isec.ac.in; Web: www.isec.ac.in