Demographic Dynamics, Savings, Investment and Current Account

Antonin Rusek
Dept. of Economics, Susquehanna University, Selinsgrove, PA 17870

Abstract: The upturn in the world economy brought with it the renewed attention to the issues of current account imbalances. Whereas large part of it is political, the issue still attracts some economic attention. In this paper the empirical side of the current account dynamics is addressed. We enquire of the relationships between the current account and savings dynamics, with the emphasis on the role of the “high savings” demographic cohorts (the population and/or labor force between 40 and 64). With the emphasis on the EUs “large” countries, we conclude that there is a significant role of this “high saving” population group in determining the current account dynamics for the consistent “high” surpluses countries of Germany and Netherlands.

The role of this population group is, however, rejected for France, Italy and Spain. In those countries the current account dynamics is dominated by (seemingly unexpected) liberalization of capital flows and the subsequent need for stabilization policies. Similarly, the dominant role of the demographic dynamic is rejected for the comparison, floating exchange rate countries of USA and Japan.

Keywords: Current account balances; demographic dynamics; high saving demographic cohorts

1. Introduction

World economy is on the upswing. Positive growth rates—both overall and on the per capita basis—can be observed not only in Europe and US, but even in Japan. Indeed, the large part of the observed improvement in the economic performance is cyclical and most economies remain below their estimated potential growth. Nevertheless, the observed growth experience sharply contrasts with memories of the first half of the current decade.

Importantly, the ongoing recovery implies that the globalization with its bright promises and often misunderstood challenges is here to stay, albeit in the dynamic and somewhat unpredictable form. Indeed, to face the globalization challenges, Europe has (as the rest of the world) to re-invent itself. EU 2.0 if you wish.

The restoration of economic dynamism is increasingly perceived as the answer for the “European” future—economically, politically and socially. There is a broad consensus that dynamic structural reforms and the restoration of competitiveness on the scale of the global economy are the key answers to current European challenges. However, even in the context of the renewed growth, the observed international “imbalances” (the seemingly persistent and relatively large current account deficits and/or surpluses) moved recently to the center of economic and political discussions.

Subject of inquiry in this analysis is the relationships (and perhaps the causality) between the demographic dynamics—basically the changing weights of individual age cohorts in the population structures, the savings-investments nexus and the changing current account positions.

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This is an open-access article distributed under the terms of the Creative Commons Attribution Unported License (http://creativecommons.org/licenses/by-nc/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
Basic analytical concepts will be elaborated in part II. Part III then provides the graphical illustration of the historical relationships between the saving-investment nexus, current account positions and the demographic dynamics. The formal econometric estimates form the part IV and the results are discussed in the part V. Part VI concludes.

2. Basics

The basic equilibrium condition (identity) in the macroeconomic models can be written as:

\[(G-TX) + NX = S-I\]  \hspace{1cm} 1\)

where \((G-TX)\) is the balance of public sector accounts (gross government’s budget surplus/deficit), \(NX\) are net export, \(I\) are private investments and \(S\) are private savings.

Some analysis interprets the balance of public sector accounts \((G-TX)\) as the public savings—which, indeed, can be negative—and as such is included in the savings-investment nexus. (This is the approach employed by Ameco, whose data are used in this analysis). The expression 1\) than can be written as:

\[GS – GI = CU\]  \hspace{1cm} 2\)

Where \(GS\) are gross savings in an economy, \(GI\) are gross investments (these variables include both private and public sectors), and \(CU\) denotes a current account balance.

Both 1\) and 2\) are identities. (For the derivation of these identities and some related discussion, see Oliveira\[1\].) It follows that the variables which determine the current account are those which determine the savings and investments, both public and private. The existing literature lists rather large spectrum of such variables. Most common are the dynamics of real exchange rates, productivity, government’s fiscal position, interest rates and the extend and nature of trade and capital movements regulation. (A more comprehensive discussion can be found in Gruber and Kamin\[2\] or IMF\[3\]).

The life cycle theory of consumption and savings provides an additional avenue for the discussion of the current account balances dynamics over time. Some authors (Bosworth et al.\[4\], Bosworth and Chodorow-Reich\[5\]) argue that that a demographic change which reduces the relative weight of the productive population (the age cohorts of 15–64) will reduce both savings and investments (the latter due to the fact that lower labor force requires less capital), so that the impact on the savings – investment nexus and hence capital account balance is indeterminate. Others look at the demographic determinants of savings – Schultz\[6\] for Asia and Belke, Dreger and Ochmann\[7\] for Germany. In the similar context, Farrell\[8\] argue that the coming “demographic deficit” will trigger the global “shortage” of savings, with resulting negative impact on the global investments and hence the economic growth.

Empirical studies of relationship between demographic patterns, savings, investments and current account were undertaken (among others) by Graff et al.\[9\] for a large number of countries (using the panel estimation approach) and Kim and Lee\[10\] for East Asia. Both studies acknowledge some influence of demographics (basically a population ageing) on current account—but only on a limited scale. The question of a role of demographic dynamics in the economic analysis was addressed by Goodhart and Erfurth\[11\].

The aim of this analysis is to look whether a demographic dynamic combined with a life-cycle hypothesis approach can contribute to a predictability of current account dynamics inside the Eurozone. Information for the major developed world economies (USA and Japan) is sometimes added for comparison.

The approach is based on the two assumptions. First is that, barring the unforeseen major catastrophe or a major breakthrough in medical science/farmacology, the demographic dynamic in the developed countries today is predictable for at least next 15–20 years. That holds not only for the ratios of productive to retired population, but for the dynamic of a smaller (5 years) cohorts within the productive (i.e. saving) populations as well. The second assumption concerns the time profiles of income and savings. It is assumed not only that an average individual income increases with the age (this is confirmed by both Eurostat and BLS data), but that the savings rate increases as well, up to the point of retirement. After that it declines steeply toward zero. This savings profile assumption may be considered somewhat speculative, because (at least to the author’s knowledge) no relevant data are publicly available. However, it
is indicated by the anecdotal evidence and a life-cycle logic.

When individual enters the earnings cycle (at a comparatively young age), his/her earnings are relatively low, albeit gradually increasing. The need to establish itself (housing, career etc.) and to raise a family (by a majority) indicate relatively low (in some cases even negative) net savings.

However, in their mid-forties individuals (by and large) are well established in their lives (incomes) and careers, their children get lives of their own, and, importantly, the perspective of retirement appears clearly on the horizon. Consequently, the savings rate increases.

These two assumptions imply that the (net) savings rate profile could be correlated with a (changing) share of a “high saving” age cohorts in the population (the group of people between 40 and 64). The gross savings rate is a more complicated proposition, as far as it includes government’s fiscal stance.

That can be associated--in a form of lower public saving--with the rising share of non-saving parts of population, both children and retirees. But such a phenomenon would only amplify the relative weight of the high saving age cohorts – and hence their association with a gross savings rate profile as well. (Indeed, one has to keep in mind that that dynamics of the public fiscal stance--i.e. public saving and/or dissaving – will be influenced by factors at best only vaguely related to demography, like national security or business cycle. But even then, the demography will play an important role over all.)

On the investment side of the current account identity (expression 2) above the standard neoclassical growth model would indicate a stable optimal capital-labor ratio–implying that the demand for investments will be proportional to the dynamic of the total labor force. In reality the investments will respond to changes in technology and total factor productivity, dynamic of wages and interest rates and expected phases of business cycles. There is no reason to assume (either theoretically or empirically) that the investment time path and the “high saving” age cohorts are correlated.

The discussion above indicates a testable hypothesis: the current account dynamics is correlated with the dynamics of the “high savings” cohorts within the national populations.

3. Current Account Balances and “High Savings” Age Cohorts: Graphical Illustrations

The analysis includes five EU and the Eurozone countries, which may be considered to be representative of respective geographic and sociopolitical areas. Germany and Netherlands for the EU core (sometimes called “North”), Spain and Italy for the Mediterranean and France, which is effectively in the middle, even if often included in the “North”. (The inclusion of other countries, especially Austria, Finland, Belgium, Portugal and Ireland was considered. The limitation on the scope of the analysis induced the author not to look those and other countries (the Visegrad group)). They will be the subject of the subsequent research.) For the purposes of a comparison, the information for the USA and Japan is provided in the appendix.

Figure 1 shows the data for gross (left column) and net (right column) savings for all 5 countries mentioned above. (Figure 1A in the appendix shows the same data for the USA and Japan.) All data were obtained from the AMECO statistical database. Period covered is the Euro period 1999-2017 and frequency is annual. The data are reported as the percentage of GDP.

It shows a sustained excess of both gross and net savings over investment (over the analyzed period) for both Germany and Netherlands. For France, gross savings exceeded gross investments till about mid-2004, afterward gross investment exceeded gross savings, seemingly in a slightly expanding rate. The net savings and investments display similar dynamics, with the period of excess net (i.e. the private) investment commencing in 2007. For Italy, the gross investments (dominated by the public sector) exceed gross savings until the mid-2012, afterward the relationship is reversed. The dynamics of the net (private) savings and investments is similar. It should be noted that between 2009 and mid-2014 Italian net savings were negative, and so were net investments after mid-2013. In Spain, both gross and net investments exceeded corresponding savings rates till 2012. After that the relationship was reversed, with slight
excess of savings

**FIGURE 1**

Gross and Net Savings and Investments

We obviously observe a large variety of savings and investment behavior among the large Eurozone countries, with the core (northern) countries displaying a tendency for savings exceeding investments, whereas Mediterranean (southern) countries tend to the opposite. (The slight excess of savings over investments post 2012 can clearly be attributed to the EU orchestrated stabilization policies.) The French case is somewhat unique, displaying excess savings pre-2004 (pre-2007 for net) and excess investments afterwards.

**Figure 2** shows the current account balances as a percentage of GDP in the left column (the difference between gross savings and investments in the left column of Figure 1, corresponding to the expression 2) above). In the right column are then the percentages of “high saving” population cohorts (40–64 years old) either in aggregate workforce (Germany, Italy) or in total population (Netherlands, France Spain).

**FIGURE 2**

Current Account Balances and Shares of 40-64 years old

As can be expected, the persistent excess od (both gross and net) savings over investment results in current account surpluses for both Germany and Netherlands over almost the whole period under consideration. Deficits in Italy and Spain turned into weak surpluses subsequent to stabilization measures in 2012–2013. France (as is to be expected from the savings investments dynamics) is again rather unique in this group, with initial surpluses turning into deficits after 2004.
The share of the “high saving” population cohorts increased significantly (between 5 and 10 percentage points) after 1999 in all countries, even if in Germany, Netherlands and France there are some declines recently.

To provide for a better visual comparison between the dynamics of the current account and the “high saving” population cohorts, the population cohorts variable was adjusted by substracting the constant (there are different constants for different countries). Such adjustment shifts the graphs vertically downward, without changing the variability (i.e. the shape) of the relevant graphical expression. (Technically, it changes the mean, but preserves the variance.) The resulting graphical expressions and comparisons are in the Figure 3.

Visual inspection suggests co-movement between the current account balance and the “high savings” population cohorts for Germany and Netherlands. This possibility appears to be open for Italy and Spain, whereas for France it is clearly rejected. To resolve questions arising from a graphical descriptions, the basic econometric analysis is presented in the next part.

**FIGURE 3**

*Current Account Balances and Shares of 40-64 years old (adjusted)*

| Country  | Cross-correlation coefficient |
|----------|-----------------------------|
| Germany  | 0.911                       |
| Netherlands | 0.811                      |
| France   | -0.706                      |
| Spain    | 0.226                       |
| Italy    | -0.105                      |
| USA      | -0.297                      |
| Japan    | -0.397                      |

*Table 1. Cross-correlations 1999–2017*

Subsequently, the co-integration analysis was applied on data for each country. Not surprisingly (in the view of the reported graphical and cross correlation results) the hypothesis of cointegration of current account balances and the
relative weights of the “high savings” demographic cohorts is rejected for France, Spain and Italy. But the same hypothesis is accepted for the Germany and Netherlands, with results as follows. (Estimates and calculations were performed by using the

CATS 2 programs of the RATS software package.)

Cointegration relationships (i.e. the long-run equilibrium), normalized to the current account balances:

Germany: \( \text{DECU} = 0.255 \times \text{DE4064} \); \( \alpha_{\text{DE4064}} = -0.041 \); \( \alpha_{\text{DECU}} = -0.047 \) (10.55) (8.005) (2.024)

Netherlands: \( \text{NLCU} = 0.264 \times \text{NL4064} \); \( \alpha_{\text{NL4064}} = -0.103 \); \( \alpha_{\text{NLCU}} = -0.203 \) (24.60) (6.623) (2.236)

Where DECU is German current account balance (percentage of GDP), DE4064 is the share of population cohorts 40 to 64 year old in German labor force, NLCU is the Dutch current account balance (percentage of GDP and NL4064 is the share of population cohorts 40 to 64 year old in the Dutch population. \( \alpha \) coefficients indicate the speed of adjustment of the variable indicated by subscript toward the equilibrium after a shock. Variables are in the annual frequency. Numbers in parenthesis are the relevant \( t \)-statistics.

5. Evaluation of Results

The results above indicate that the hypothesis in this paper, namely that the dynamics in current account is closely correlated with the dynamics (the share) of the “high savings” population cohorts cannot be rejected only in cases of Germany and Netherlands (coincidentally the two countries with a consistently high current account surpluses). In all other countries the hypothesis is rejected – both in the Eurozone (where the France, Italy and Spain were investigated) and in the “comparison” countries of USA and Japan. (Figures 1A, 2A and 3A in the appendix.)

In this context it must be stressed that the measure of the “high savings” demographic cohorts used (the share of population (or labor force) between 40 and 64) is to a degree speculative, as far as no information about savings by population cohorts is available to the author. This uncertainty probably plays the highest role in the French case. As the relevant graph in Figure 1 indicates, France experienced a rapid decline of private savings (net savings) commensurate with the onset of financial crisis in 2008–2009. Even if the adjustment measures adopted in France were mild relative to the Mediterranean countries, it appears that their impact on especially private savings were significant. Perhaps a rather generous French system of public welfare played a role here–even if it is doubtful whether the French public welfare system is more generous in comparison with Germany or Netherlands.

Relevant graphs in Figure 1 display the dominant role played by newly liberated capital flows during the first decade of Euro period in the expansion of both public and private investments in both Italy and Spain and the negative effects of post 2011 stabilization measures on both public and private investment and savings in both countries. These phenomena clearly dominated the dynamics of current accounts, leaving a little room for an impact of changing demographic structure.

In the “comparison economies” (characterized not only by their size, but by the floating exchange rates as well), the share of the “high savings” population cohorts in Japan remains relatively stable, with a mildly declining trend (from 34.6% in 1999 to 33.3% in 2017). The current account dynamics will then be dominated by other factors, especially the radically undervalued currency and overall ageing which impacts negatively domestic consumption, increasing exports and reducing imports.

The US result reflects the interplay between the centrality of the US financial sector in the globalized world financial system and the unique characteristics of the US retirement arrangements. The US serve as the safest and comparatively the most attractive of the world financial centers, which results in a large and steady capital inflows, enhancing the values of the US financial assets. That increases the market value of the US private pension funds, which facilitates lower contributions (i.e. lower savings and hence higher current consumption) for the same expected retirement income. This mechanism dominates any demographic cohort dynamics. (But note (graph in the Figure 2A)
that the share of the “high savings” cohorts—40–64 years old—declines after 2011

6. Conclusion

The basic idea behind this paper, namely that the current account position is correlated with the share of the “high savings” cohorts in population (or in the overall labor force) was confirmed for two of the five large EU and Eurozone countries. It is probably not coincidental that those two countries (Germany and Netherlands) are those who experienced the least of stabilization measures and policy adjustments in response to recent “Financial” crisis. Indeed, those are the countries with the largest current account surpluses. The findings in this paper indicate that those surpluses are to a large degree “natural” consequences of demographic development – hence no economic reason for policy action. (Indeed, one may surmise that with the coming decline of relative weight of “high savings” cohorts, the often (unfairly) criticized current account surpluses (especially for Germany) will gradually subside.)

As far as Italy and Spain are concerned, the graphs in Figure 2 indicate that the possible major role for demographic factors was dominated by the liberalization of capital flows inherent in the introduction of the Euro first and subsequently by the stabilization fiscal measures which, via their restrictive impact on aggregate demand significantly affected the current account.

Results for France appear to be an outlier which probably needs a more detailed study. The two possible (speculative) explanation come to mind. The first is that the French preferences for early retirements combined with pervasive social welfare system makes the 40 to 64 population cohorts very poor proxy for a peak savings group. Second is the impact of French “post recession” policies, which attempted simultaneously to comply with the fiscal restriction and to reduce unemployment via public investments. Indeed, more research is desirable here.

As far as “comparison countries” (included because of their importance in the global economy and floating exchange rate regime) are concerned, the share of Japanese “high saving” demographic cohorts in total population is rather steady (declining slightly from 34.5% in 1999 to 33.3% in 2017). The current account position then fluctuates around the 2.5% of GDP average surplus, most likely reflecting the extreme undervaluation of Japanese currency.

The USA situation is unique. As mentioned above, it serves as both the global world financial center and the asset holders safe heaven, attracting more than its share of capital inflows. The slight dollar overvaluation and the persistent current account deficits are the consequences, dominating any possible demographic factors.

It is impossible to disagree with Fratzscher[12] that there is no economic reason for policy steps to “control” current account surpluses. Those are the results of demographic dynamics and as the relative weight of “high savings” cohorts declines, so will current account surpluses. (Indeed, the current account deficits often raise financiability issues and hence require policy reactions—but that is entirely different issue.) If policy steps are required—and that is big if—the countries should concentrate on productivity and efficiency growth. Financial positions (i.e. the current accounts over time) will then take care of itself.

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