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Current Accounts and Demographics: The Road Ahead

- Demographics are a major determinant of long-term current account trends.
- Countries with a high proportion of 'prime savers' (those aged between 35 and 69) are more likely to run current account surpluses.
- We show how demographic shifts have influenced global current account trends in the past 30 years, and what they imply for the next 20 years and beyond.
- We have seen some rebalancing from the extremes in 2008 but the process is not yet complete.
- Demographic shifts point to a cleaner split between emerging markets (mostly in surplus) and developed markets (mostly in deficit) in the future than is evident in the current, more complicated picture.
- Emerging markets (EM) could continue to lend to developed markets (DM) on average.
- Demographic forces may help keep global real rates low.
- The development of EM capital markets may be important in offsetting demographic pressures for capital flows from the EM to the DM world.

Thanks to Jim O'Neill, Kevin Daly, Stacy Carlson, Tim Toohey, Ben Broadbent and Mike Buchanan for helpful comments

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August 12, 2010

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Current Accounts and Demographics: The Road Ahead

Over the past few years, global capital and current account imbalances have played a major role in a number of important macro debates. The perception of unsustainable imbalances between the US and the rest of the world; the unusual flow of capital from the emerging (EM) to the developed world (DM); and the so-called 'global savings glut' and its impact on real interest rates have all been key forces that may have played a role in the recent global recession.

We have focused on the longer-term drivers of shifts in the world economy, particularly in our work on the BRICs and the N-11. Demographic trends are a key component of that work. As we show here, demographic shifts also play an important role in determining long-term trends in global current account balances and the flow of global capital. An economy's current account is literally equal to its 'net' saving (total savings minus total investment). So a tendency to save more across an economy will translate into pressure for current account surpluses and a flow of capital to other countries. Because people's savings behaviour is generally different at different points in their life, the relative age structure of an economy plays a significant role in explaining their borrowing and lending to the rest of the world.

Demographic shifts play an important role in determining long-term trends in global current account balances and the flow of global capital

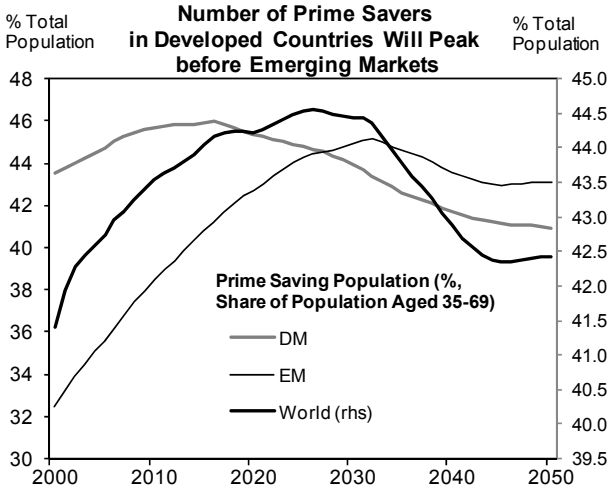
Using a model that links demographics, growth and current accounts, we illustrate here how demographic shifts have driven global current account trends in the last 30 years, and what they imply about current imbalances. We then look at how the influence of demographics over the next 20 years and beyond may affect current account positions. Importantly, it is the portion of a population of 'prime saving' age (on our estimates, roughly 35-69 years old) that matters most, and *not* the size of the working age population, as is commonly discussed in policy debates. That group is still growing globally, even in the developed world, and will likely rise in most of the EM world, including China, for at least two decades. Interestingly, the common intuition that China is demographically more like a developed market than a typical emerging market is only true with respect to working age population. In terms of 'prime saving' dynamics, China is more like an EM than a DM economy.

Demographics have generally reinforced a shift towards greater surpluses in some large EM countries and deficits in some DM

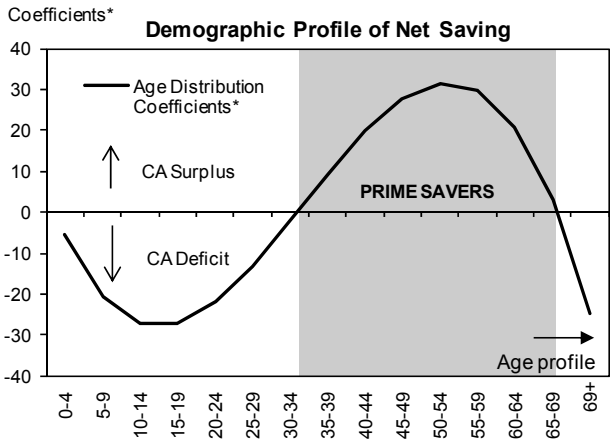
Our results confirm that the recent situation involved what look like 'excessive' current account surpluses in some of the oil producers, and in parts of Northern Europe and China, with 'excessive' deficits in some of the well-known offenders, such as the US, Greece and Spain. Those imbalances have narrowed substantially in the past two years but are still visible to a degree. However, demographic trends have also been influencing what is an 'appropriate' balance, and will likely continue to influence changes in the future. In particular, demographics have generally reinforced a shift towards greater surpluses in some large EM countries and deficits in some DM economies, even if today's reality is poorly captured by a simple EM/DM split (see box on page 5). And although that dynamic has overshot, demographic projections suggest that pressure for capital to flow from EM to DM—far from being an anomaly—may be more persistent than people realise and may become more uniform over time.

Pressure for capital to flow from EM to DM may become more uniform over time

The rise in 'prime age' savers globally may also have played an important role in the story of the 'savings glut', putting downward pressure on global real interest rates. Here too, the demographic underpinnings of that story could intensify in the next 10-15 years. Perennial worries about the impact on asset markets of dis-saving by US (and other OECD) retirees also need to be seen in this global context, both because current account shifts may provide a safety valve and because global pressures are likely to move in the other direction. As with our work in many of these areas, the global picture looks quite different to the (usually better-known) US or OECD story, given that the importance of non-OECD economies continues to increase.



Source: US Census Bureau, GS Global ECS Research Calculations.



*The age-distribution coefficients represent the change in current account associated with a unit change in the corresponding log population age shares. Source: GS Global ECS Research.

Demographics and Current Accounts: Key Results

We start by highlighting five key aspects of the topic before explaining in more detail the underlying model and the outlook that it generates:

A. The impact of demographics on current accounts and capital flows

- Demographics are a major determinant of long-term trends in current account balances. Despite the popular notion that current accounts are determined by relative growth prospects, demographics seem to play at least as large a role.

Economies with a large proportion of 'prime savers' (aged 35-69) are more likely to run current account surpluses

- The evidence suggests that those economies with a large proportion of 'prime savers'—a range we identify as aged between 35 and 69—are more likely to run current account surpluses.

- These shifts in the group of 'prime savers' are *not* identical to the more commonly followed story of shifts in the working age population. Most striking is that China—whose working age population is widely known to be ageing faster than those of most EM markets—is much less distinctive in terms of 'prime savers' and looks more like a typical EM than a DM.

B. A demographic perspective on current imbalances

- Prior to the global crisis in 2008, the world's current accounts appear to have drifted a long way from their long-term demographic anchors. Conventional wisdom—that the US, the Southern Europeans and several EM economies had deficits that were too large, while China, Japan, several Northern European economies and the oil producers were running excessive surpluses—looks fair relative to what slow-moving demographic and growth trends would say was 'appropriate'.

The world's current accounts appear to have drifted a long way from their long-term demographic anchors

- We have seen significant progress in reducing these 'imbalances' and are closer to the underlying 'equilibrium' predicted by our model. But these shifts take the world only partly back to the levels that underlying demographics suggest.

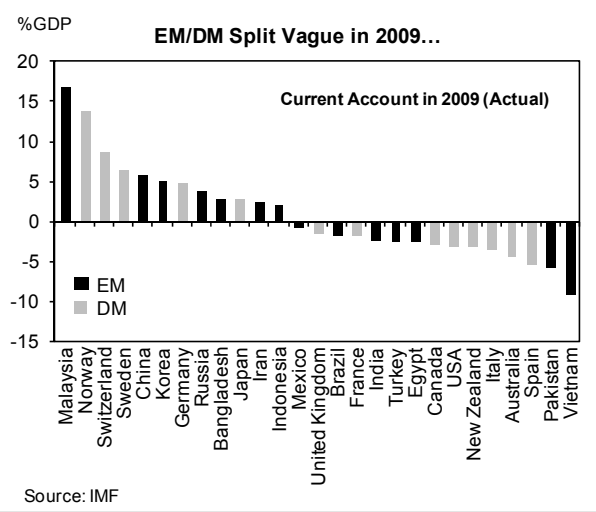
- Although there are excessive surpluses and deficits within both the EM and DM universes, EM surpluses on average have looked too large. That said, demographic pressures have driven larger surpluses in EM economies and validate the notion that they should be running surpluses now. What looks odd about the world is not that EM countries have lent to the developed world on average, but the *scale* of that lending.

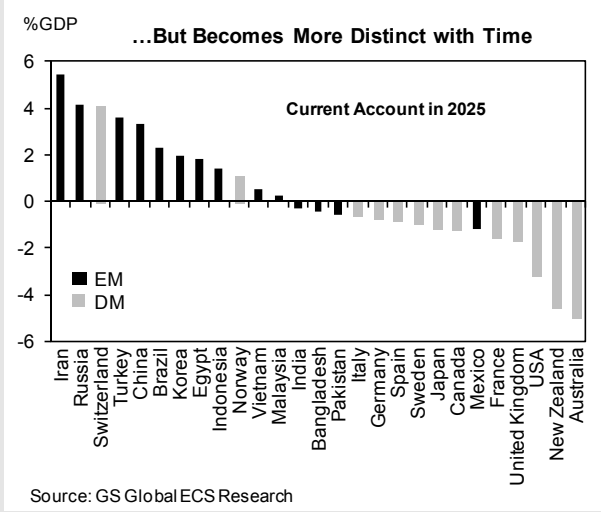
Why the World is More Complex Than an EM/DM Split

Throughout the presentation of our results, we refer to some of the key trends in the Emerging Market (EM) and Developing Market (DM) groups on aggregate. In part, this is out of convenience—it is too difficult to talk coherently about changes across a very large range of countries. Partly this is because, as we show, the underlying *changes* on the demographic front and their implications for categories are quite different across these two broad categories. We also take this approach because some of the important puzzles of global capital flows have historically been framed in this way in the broad debate. It is true, for instance, that there has been a pronounced shift from EM countries borrowing on average from DM countries to a situation in which they lend. And the improvement in current accounts across the EM universe since the late 1990s has been relatively broad-based, even for those that have remained in deficit. It is also true that this is more of a 'puzzle' to conventional economics than the imbalances within the DM or EM worlds.

Still, the risk of using broad groupings is that they obscure important differences that cut across them. That is certainly the case in the discussion of the current situation of global borrowing and lending. While EM countries are lending to DM countries on average, the pattern of global capital flows is not best described in this way. As our research on the topic often acknowledges and the chart below shows, it is better to think of a group of surplus countries that includes German, Japan, Switzerland and the Nordic economies in the developed world, alongside large parts of Asia including China and the oil producers. And these are balanced by the US, Spain, Greece and the UK, alongside India, parts of Eastern Europe and Latin America in the EM world. In many cases, surplus and deficit countries have persistently been in deficit or in surplus.

As a result, while we refer to the EM and DM groupings, it is important to focus too—and our model does—on the broad differences across them. Although we caution against classifying the current situation into these buckets too neatly, one key reason why we think it is still important to reference them is that the demographic story we tell here is more uniform within the DM and EM groups (see Appendix I). And this serves to push them away from the current, more complicated mix and towards a more uniform split over time. In fact, as we show later (see page 14), based on the results of our model, demographic profiles suggest that all of the BRICs and N-11 (bar the most developed, Korea), including those that have been systematically in deficit, could potentially be in surplus in 30 years' time, whereas all of the largest developed markets, including those in surplus today, could potentially be in deficit. As a result, the characterisation of 'EM' lending to 'DM' may become increasingly apt, even if it is not so today.

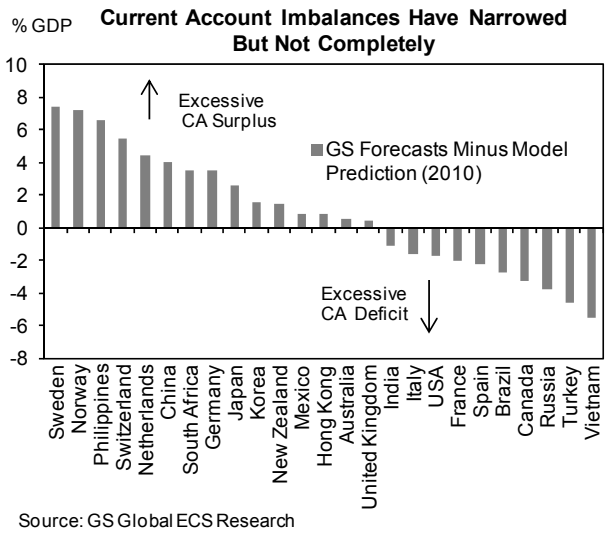


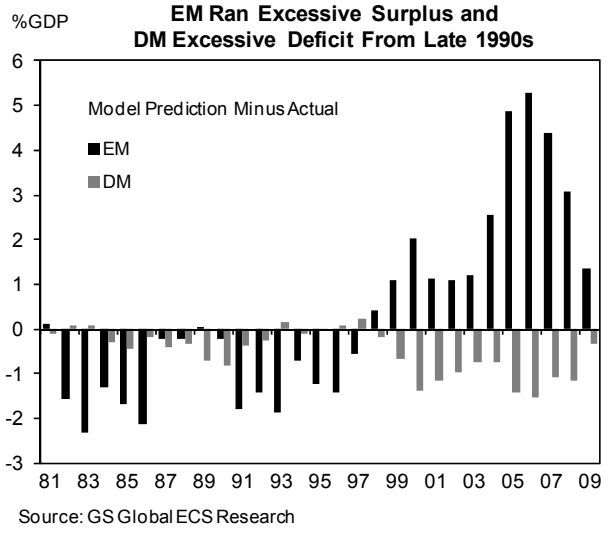


C. Demographic pressures on current accounts

- Demographics hint at fresh current account shifts in the next 20 years. Demographic trends push towards *larger* surpluses across a broad group of EM countries (including China) and larger DM deficits (including the US), because the proportion of EM 'prime savers' rises more and peaks later than for DM.

- Because the world is starting from a point where several large EM economies are running 'excessive' surpluses and several large DM





countries' deficits are 'excessive', those shifts need to be balanced against a tendency for the world to move further back to the underlying equilibrium. If both developments occur, this could blunt the demographic pressures between DM and EM groups.

Most EM economies could potentially see improving current account positions...

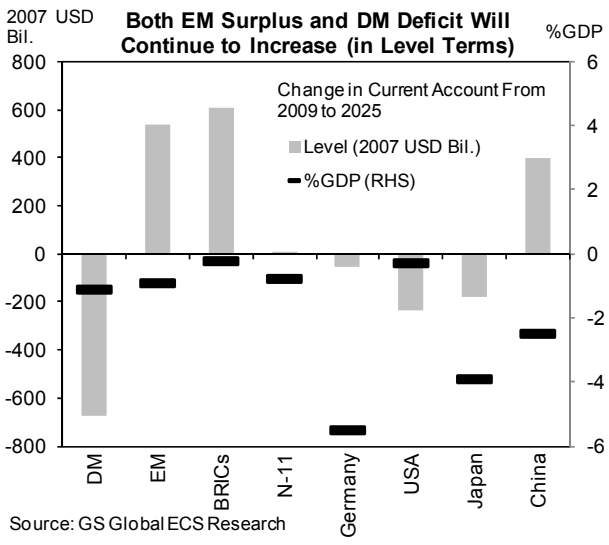
- These forces potentially show the biggest shifts *within* DM and EM groups, with big declines in the major surplus groups (the oil producers, China, Japan, Germany) matched by narrower deficits in India, Brazil, Turkey, Greece and Spain. With the exception of China and the oil producers, most EM economies could potentially see improving current account positions.

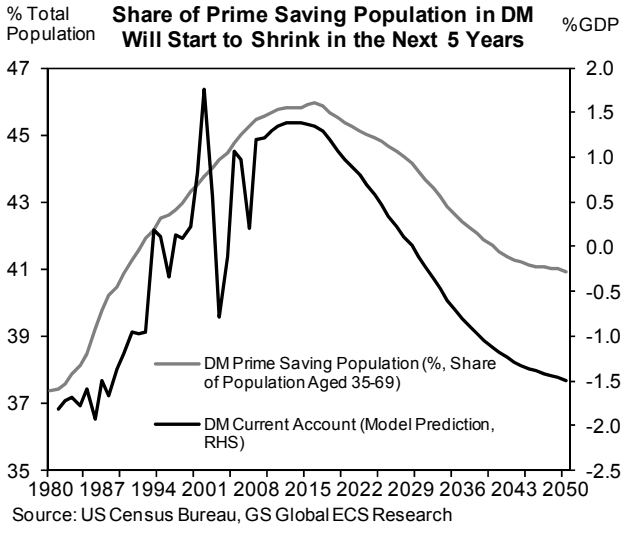
- These shifts could push towards a cleaner split between EM (mostly in surplus) and DM (mostly in deficit) than is the case in the current, more complex picture. In particular, demographic pressures could see the largest DM surplus countries (Japan and Germany) move into deficit and the largest EM deficit countries (Brazil, India and Turkey) move into surplus.

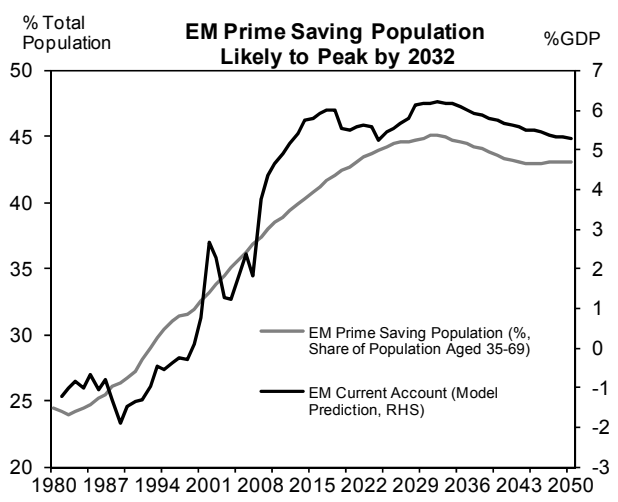
...with a cleaner split between EM and DM than is currently the case

D. Demographics and the 'savings glut'

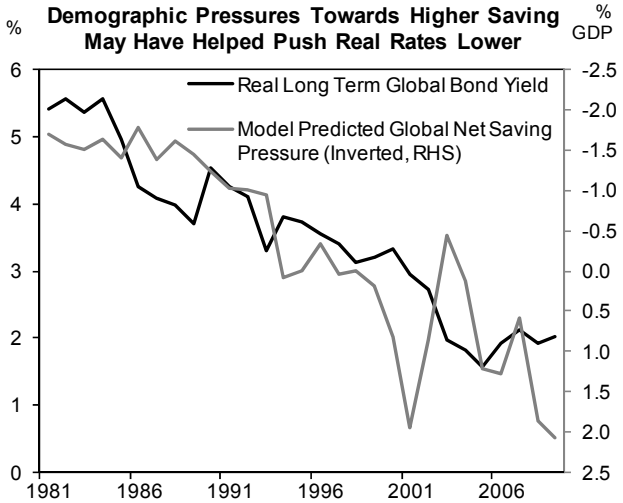
- Demographic forces may have played an important role in the 'savings glut' and may have contributed to falling global real interest rates over the last 20 years, as the proportion of 'prime savers' globally has risen over that period.







Source: US Census Bureau, GS Global ECS Research



Source: GS Global ECS Research

- The global pool of 'prime savers' is expected to keep rising, and peak in 20 years. As a result, the *ex ante* tendency will be for more, rather than less, *net saving* globally, and the 'savings glut' (and lower real rates) may become a more persistent feature of the world than many think.

E. Implications of the shifts ahead

Real rates may stay lower for longer globally than generally expected, and may fall further

- Even after recent progress, currencies and demand profiles may need to move further to support further rebalancing across the major economies.
- The likely ongoing flow of capital from EM and the demographic component of the 'savings glut' story suggest that real rates may stay lower for longer globally than generally expected, and may even fall further.
- While local markets in DM could see more pressure (and DM real interest rates rise relative to EM rates), increased EM savings could remain an important part of funding DM dis-saving as the population ages, mitigating long-standing worries about the impact on asset markets of ageing populations in developed markets.
- Demographic pressures for capital flows make it even more critical to improve financial/regulatory infrastructure to handle large cross-border flows.
- The development of EM capital markets—a consistent theme in our research—may be important in offsetting the underlying demographic pressures for continued capital flows from the EM to the DM world.

The development of EM capital markets may be important in offsetting the underlying demographic pressures for continued capital flows from EM to DM

Why Demographics Affect Savings and Current Accounts

Current account imbalances and capital flows are at the heart of many of the big macro issues of today. Was there a 'savings glut' globally, as a result of a high-saving group of economies driving down global real rates or contributing to the credit bubble? Has the US been borrowing too much or China too little? Is the current pattern according to which EM economies lend to developed economies either sustainable or appropriate? Will the ageing population and dis-saving by 'baby boomers' push asset markets lower, as some have feared?

To answer these questions, we need a view on the long-term drivers of current accounts and capital flows. Demographics and long-term growth can, to a significant degree, provide such a view. Our own work on the BRICs, the N-11 and the Expanding Middle Class has been driven to a large extent by demographic trends. But we have focused largely on growth and income developments and not, until now, on likely shifts in global capital flows.

Life-Cycle Savings and Links between Demographics and Capital Flows

The life-cycle hypothesis of savings (LCH), originally proposed by Fisher (1930), Harrod (1948) and Modigliani & Brumberg (1954), is based on the saving decisions of consumers over their lifespan. LCH posits that individuals tend to save while they work to finance consumption after retirement. Consequently, the saving pattern of individuals over their lifetime is hump-shaped, with individuals saving more during their working years and dis-saving after retirement.

One of the products of the empirical work on the life-cycle hypothesis was the observation that with savings and investment schedules both likely to depend on age structure, the current account balance (which is the difference between an economy's savings and investment) may also shift along with demographics in particular ways. Investment demand is closely related to the share of young people in an economy, through its connection with labour force growth, whereas savings supply should be related to the share of mature adults, through its connection with retirement needs (Blanchard and Fischer (1988) and Higgins and Williamson (1996)). This implies that, for a financially open economy, a shift in the population age distribution towards younger cohorts should produce current account deficits as the increase in investment demand outweighs the fall in savings. Similarly, as the age distribution shifts towards the older working population, there would be a current account shift to a surplus as the rise in savings becomes more pronounced.

A range of studies (we would note Higgins (1998), in particular, and Lane and Milesi-Ferreti (2001)) have explored that notion, and have produced projections on that basis, as we do here.

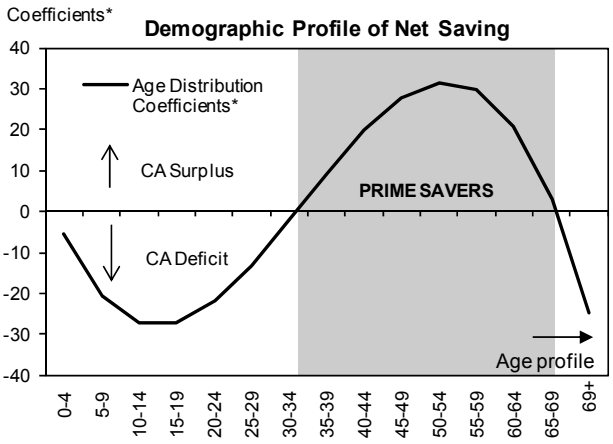
Economists have long understood that demographic trends influence savings and investment behaviour. The most famous insight into that linkage comes from the so-called 'Life-Cycle Hypothesis' of consumer spending, which posits that savings pattern are different at different points in a person's life. Early on in life, when incomes are low, people are more likely to borrow and invest (in themselves or their children). They then move through a period of 'prime savings' towards middle age to accumulate assets, and then to gradual dis-saving as those assets are spent in retirement.[1]

Evidence suggests that demographic profiles can have important effects in determining savings and investment outcomes across countries, and hence the current accounts and capital flows between them

The life-cycle theory provides some clues as to how the demographic structure of an economy (i.e., how many young people, how many of 'prime saving' age, how many elderly) may influence the general desire to save or invest across an entire economy. By definition, the current account—and the flipside of it, the capital flows that finance it—is the difference between an economy's savings and investment. When economies are closed to trade and capital flows, savings and investment must be equal and interest rates move to bring them into balance. And that is true for the world as a whole, which is a closed unit. But in practice, the vast majority of the world's economies are relatively open and current account imbalances and capital flows are sizeable. So it makes sense that those economies that have younger populations or have fewer 'prime savers' could on average borrow from those who have more. And, as a result, it is also plausible that relative demographic profiles can have important effects in determining savings and investment outcomes across countries, and hence the current accounts and capital flows between them.

There is now a host of evidence that strongly suggests that they do. This basic insight has been shown to be important in a wide number of studies (the box above discusses a few interesting ones in more detail), which have looked at the way in which demographic shifts help to explain changes in growth, savings rates and global current account patterns.

1. A long history of macro research has also looked into how the passage of generations affects investment, savings and growth (including the so-called overlapping generation models).



*The age-distribution coefficients represent the change in current account associated with a unit change in the corresponding log population age shares. Source: GS Global ECS Research.

A Demographic Model of Current Accounts

Our goal here—as with our earlier work on the BRICs and beyond—is to set out a framework for thinking about long-term trends in global current account balances. Like all of our long-term projections, this exercise is fraught with uncertainty and the results should not be interpreted as *forecasts*. That said, they do provide a consistent means to examine the key issues and some insight into how they may evolve.

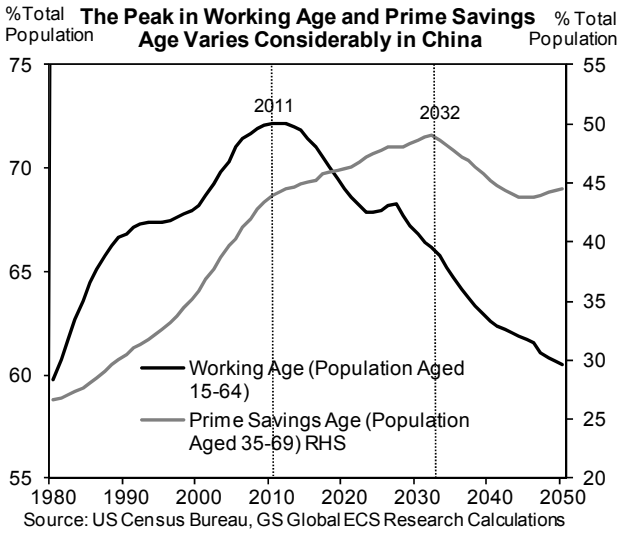
Our starting point is to come up with a straightforward economic model of current accounts across the major economies over the last 30 years. Appendix II describes the model in more detail but, in the wake of earlier studies (in particular Higgins (1998)), we attempt to explain current accounts (as a percentage of GDP) as a function of:

- **Demographics—**to capture the forces we have already discussed.
- **GDP growth per capita—**to capture the common notion that high-growth countries are more likely to attract more capital (and run current account deficits) than lower-growth countries.
- **The relative price of investment goods,** which has been shown to influence real investment levels and potentially, through that channel, current accounts.
- **A variable to capture oil price exposure** for the major oil exporters, where oil prices are the major determinant of current account swings and therefore need to be adjusted for.

Having more 'prime savers' tends to improve an economy's current account position

The model generally does a good job of explaining the broad shifts in current accounts across the 44 countries we look at over the last 30 years. It also validates the importance of each of these variables. As expected, higher GDP growth per capita tends to push countries towards running current account deficits. But the influence of demographics is particularly striking.

The formulation that we have used allows us to map the impact of having people at particular age groups on the current account position. As the chart above shows, it strongly supports the basic insight from the life-cycle theory. Up to the age of 35, the population appears to be a drag on the current account position—in other words, people invest more than they save, on average. Between ages 35 and 69, people on average appear to save more than they invest. These are the so-called 'prime savers', and having more of them in the population would tend to improve the current account position. Above 69, the



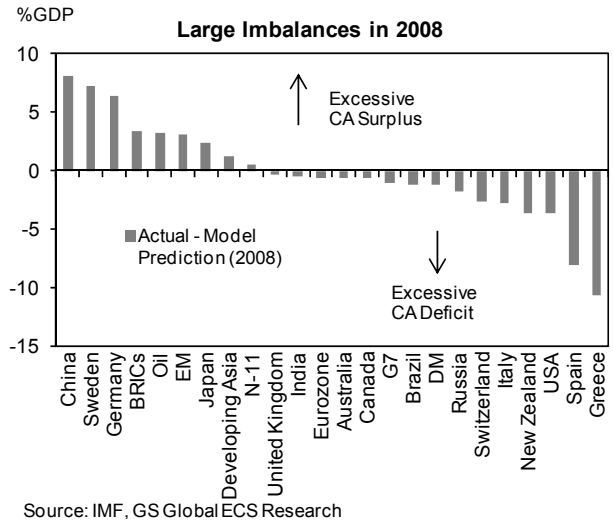
population again tends to become a drag on the current account, spending more than they earn. The relative proportions of these groups (and as a summary measure, the proportion of 'prime savers') across different countries are essentially what then drives predictions for net savings—and capital flows—in different economies.

The relevance of the 'prime saving' group is important because much of the common discussion of demographic issues focuses instead on the 'working age population' (usually defined as ages 15-64) or the related notion of the 'dependency ratio' (this group relative to the rest). As Appendix I shows in more detail, the two concepts are different and that difference matters in some places. Most of all, the common intuition that China is demographically more like a developed market than a typical EM market is *only true* with respect to working age population (where its working age share peaks in 2011, around the same time as developed economies such as the US, UK and New Zealand, and earlier than key EM markets such as India, Indonesia, Brazil, Mexico, South Africa and Turkey). It is much less clear in terms of its 'prime saving' population (which peaks in 2032 compared with an EM peak in the same year and a DM peak in 2016).

In terms of 'prime saving' dynamics, China is more like an EM than a DM economy

A Perspective on Current Imbalances

The model we have described essentially maps out a slow-moving 'underlying' current account, which shifts in these longer-term factors (growth trends and demographics) would normally predict. It does not, of course, take into account



the large cyclical swings that we commonly observe, nor is it strictly an 'equilibrium' current account given that there is no real assessment of sustainability embedded here. But it provides a good benchmark against which to assess the potential pressures from the shifting growth and demographic profiles across countries.

Current account imbalances have corrected somewhat over the past two years...

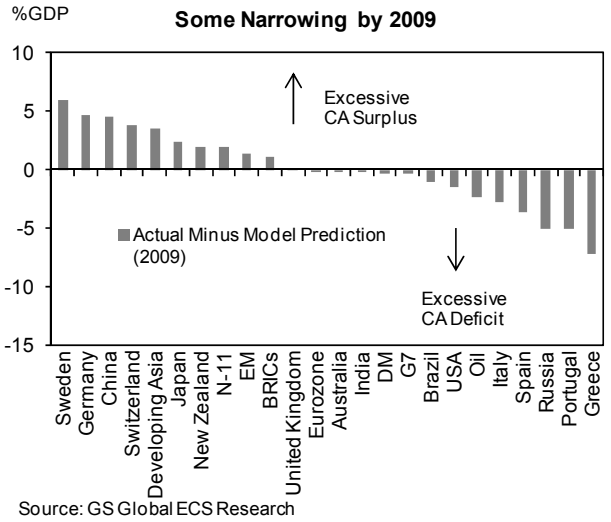
Since the model's predictions are clues as to where the current account 'should' be, they provide a useful benchmark to assess recent imbalances. How do actual current accounts compare to the model's prediction of the 'underlying' equilibrium? The charts show those differences for 2008 (before the crisis began in earnest) and for 2009 (the last actual year of current accounts), as well as our forecasts for this year, since there have been significant shifts in current account positions and there are likely to be further shifts ahead. These confirm that coming into the crisis in 2008, a number of economies were a long way from their estimated underlying position. In particular, the surpluses in many oil producers, China, Malaysia, Norway, Sweden and Germany were 'larger' than the model predictions, balanced by 'larger' deficits in Greece, Spain, Portugal and several important EM economies (Turkey and South Africa), as well as in the US, of course. Those results match the general view that the world has been too unbalanced and the broad groupings (China/Asian/European surplus economies versus US, European deficit countries and some emerging markets) are also largely in line with our overall views of where the problem areas have been.[2]

...but these adjustments serve only partially to correct the gap

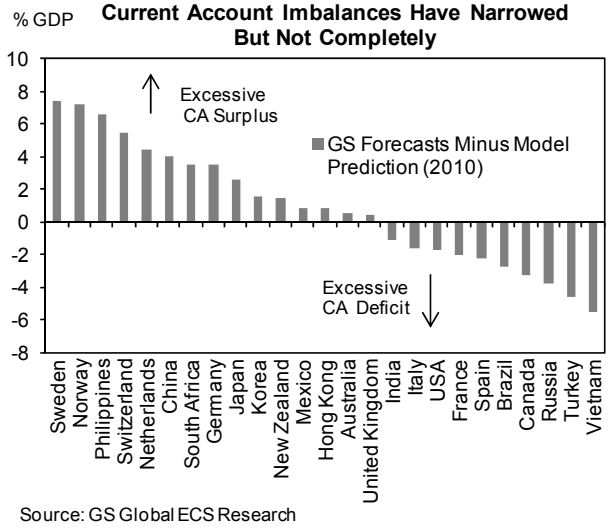
These imbalances have corrected somewhat over the last two years and the model shows this too. In particular, the declines in surpluses in the oil producers and China, alongside narrower deficits in the US, Spain and Turkey, are all notable features of the landscape. But in many cases, these adjustments serve only partially to correct the gap. In the US, for instance, underlying demographic and growth trends point to a current account balance in 2009 at -1.4% of GDP (actual, -2.9% in 2009); in China, a surplus of 1.3% of GDP (actual, 5.8% in 2009); in Japan, a surplus of 0.5% (actual, 2.8% in 2009); in Germany, a surplus of 0.1% (actual, 4.8% in 2009); and in Spain, a balance of -1.5% of GDP (actual, -5.1% in 2009). So, while we have made progress towards equilibrium, there may still be work to do.

One of the big shifts of the last decade has been the move towards an average EM surplus and a DM deficit

Although the recent mix of deficit and surplus countries is much more complicated than an EM surplus versus a DM deficit, one of the big shifts of the last decade has been the move towards an average EM surplus and a DM deficit, after a long period when the DM world on net lent to EM economies.

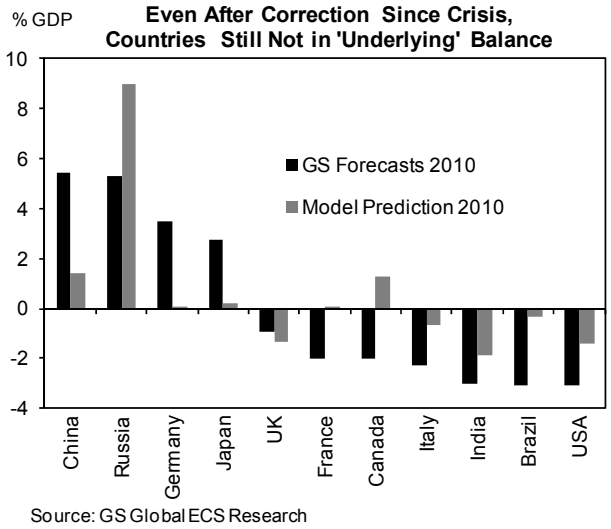


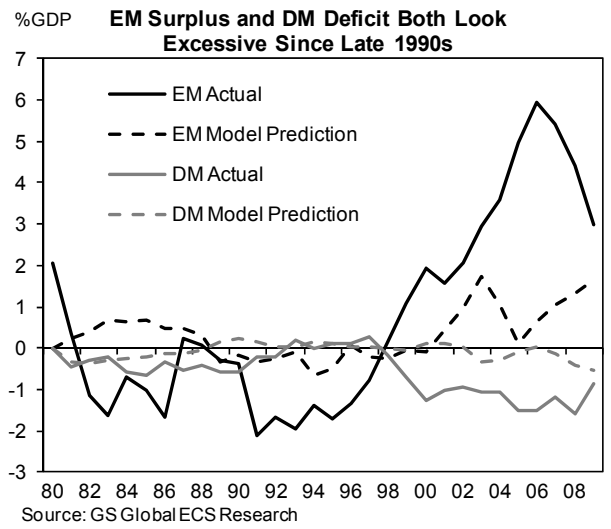
Source: GS Global ECS Research



Source: GS Global ECS Research

2. In looking at these, we would downplay the results for the oil producers, where our predictions are less refined. A detailed model of their balances would pay much more attention to the individual energy situations in each and their precise exposures. We aim here simply to strip out the main impact of oil prices in a way that allows us to include them in the broader estimation.



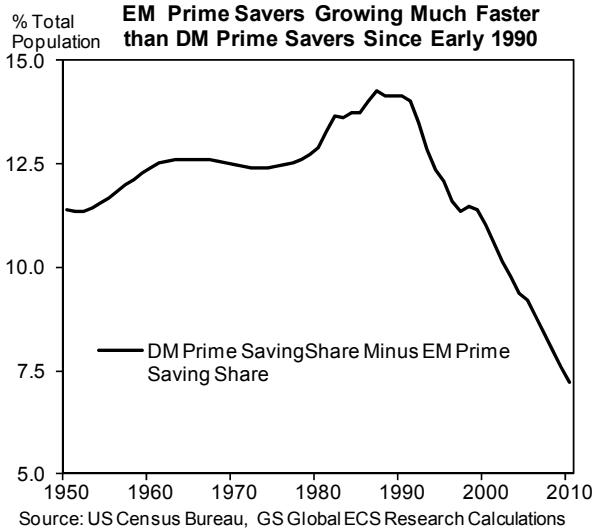


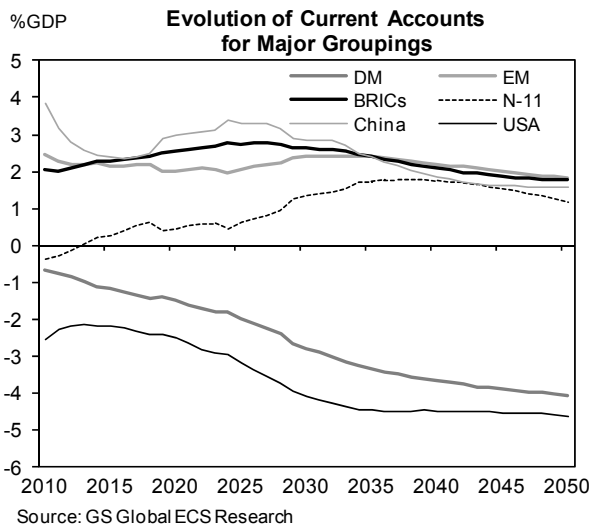
Despite big differences within each group, our model *does* suggest that on average both the EM current account surplus and the corresponding DM deficit have both been 'too large', after a period in the early 1990s when EM deficits looked 'excessive'. On average between 1998 and 2008, our model suggests that the EM surplus was around 2.5% of GDP 'too big', while the DM deficit was around 1.0% too large over the same period. Like the country rebalancing that we have seen, those 'excesses' have fallen but not yet disappeared.

Our model predicts that EM economies on average should be running surpluses, albeit smaller ones...

But while the sharp shift towards EM surpluses has led to puzzlement over why capital is flowing 'uphill' from poorer to richer economies (the common intuition is that returns are higher in 'capital-poor' EM and so capital should flow towards them), the model predicts that EM economies on average *should* be running surpluses, albeit smaller ones, and has predicted this for several years. So, even accounting for differential growth performance as we do here, allowing for demographics (and oil prices), it may not be inappropriate for DM economies to borrow from emerging markets. What is more, the model shows that those forces have tended to push EM towards surplus and DM towards deficit since 1990. The EM 'underlying' surplus has risen by nearly 2% of GDP over that period, with the BRICs and other oil producers as part of that story, while the underlying balance in the G7 and other developed markets is predicted to have deteriorated by close to 1% of GDP. This model suggests that it is not the *direction* of change that is inappropriate but the *magnitude*. As we shall see shortly, this challenge to the conventional wisdom about EM/DM balances may intensify in the future.

...so it may not be inappropriate for DM economies to borrow from emerging markets





The pressure mirrors the demographic shifts in the two areas. As the chart shows, the share of DM 'prime savers' rose faster than the share of EM 'prime savers' between 1950 and 1990, the period of DM surpluses. But over the last 20 years it has begun to reverse and the process has accelerated. Relative to the stability of the 1950-1990 period, the sharp shifts in the relative proportion of those of 'prime saving' age in EM is dramatic. Something has clearly changed.

Looking Ahead: Towards a More Uniform EM/DM Split

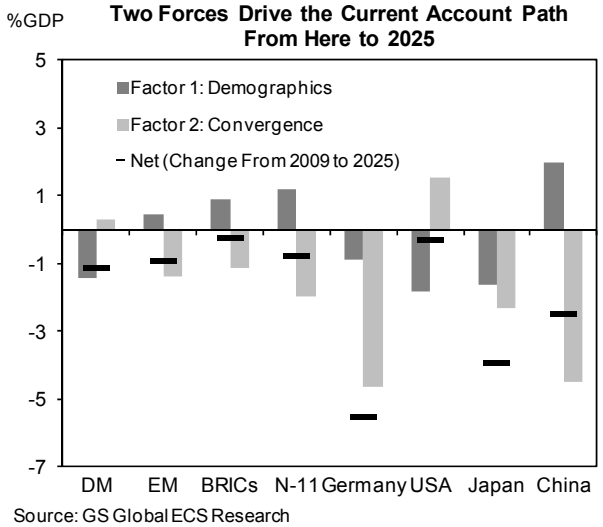
How is this story likely to change with time? To assess this, we use the model to look at the underlying shifts in current accounts globally out to 2050, matching our forecasts for GDP growth and income that we have published in our BRICs-related research. We use our existing long-term paths for GDP growth and the demographic projections from the US Census Bureau that underpin them (see Appendix I for more details).[3] Again we stress that these are not *forecasts* but a framework for describing key long-term trends under reasonable assumptions that can act as a baseline for what may actually happen. There are a host of country-specific and other developments that cannot be captured by this kind of exercise, as we describe below.

Changing demographic and growth profiles likely to improve EM current accounts further (for another 25 years or so), in particular in the BRICs and N-11...

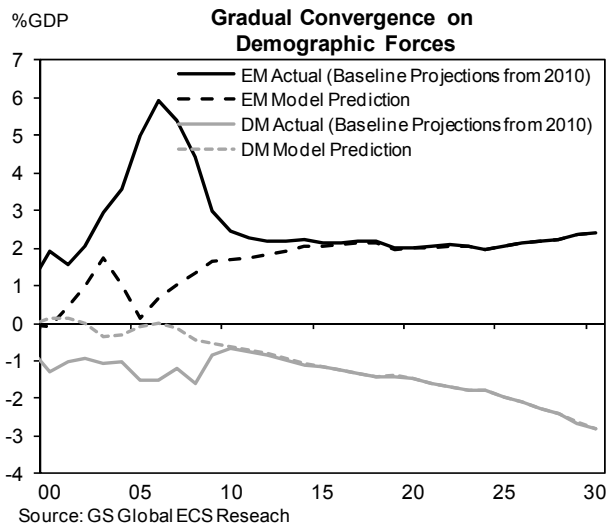
As the Appendix describes in detail, this exercise is the balance of two (often opposing) forces. **The first is the influence of the changing demographic and growth profiles on the 'underlying equilibrium' that the model estimates.** As the charts show, the *pure* impact of those demographic and growth shifts is to improve EM current accounts further (for another 25 years or so), in particular in the BRICs and N-11, and to worsen them in oil-producing countries and developed countries, particularly the US, France and Japan. Those shifts are closely related to the projected shifts in our 'prime saving' groups for each economy or region. The share of 'prime savers' peaks much earlier in DM (around 2016) than in EM (around 2032), and while China peaks earlier than some in EM, it still looks much more like the other EM economies on this particular measure than like a developed market.

...and worsen them in oil-producing countries and DM, particularly the US, France and Japan

However, current accounts in many places are starting a long way from the 'underlying equilibrium'—the model's prediction for where current accounts should be given a country's demographic and growth trends—as we described in the previous section. So, **the second force is the gradual convergence back to that underlying equilibrium over time**. Consistent with the results of the previous section, this convergence pressure tends to lower the current account surplus for countries that currently have excessive surpluses (notably oil



Source: GS Global ECS Research



Source: GS Global ECS Reseach

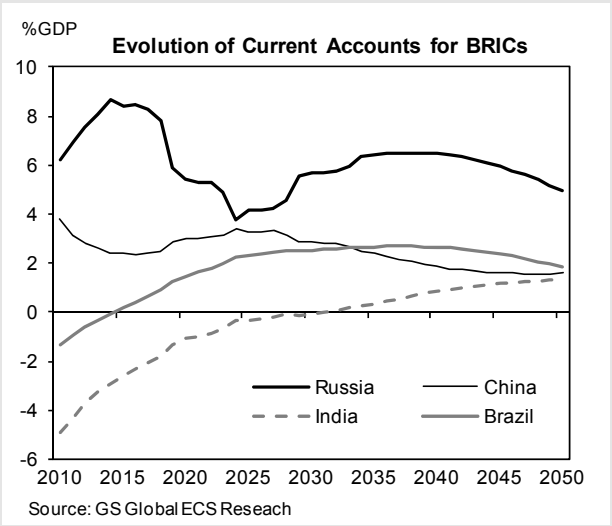
3. For oil prices, we use a simple projection pattern over the long term from our Commodity Research team (we have no official forecasts for this kind of time horizon, for obvious reasons).

Current Account Pressures in the Major Markets

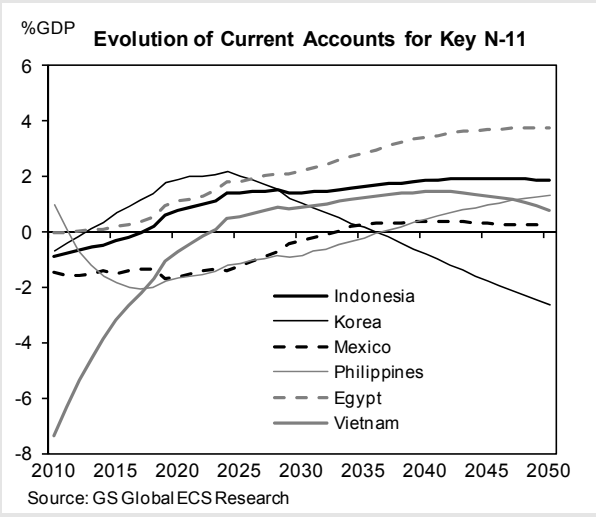
Our baseline outlook suggests that the current account deficit in the DM group will continue to decline till 2050 and at a faster pace after 2025. The surplus in EM is likely to decline but remain firmly positive till 2025. But the shifts *within* the larger EM and DM groups are more striking than the shifts between them. The main impact is to make the split between major EM and DM economies more uniform over time than it is now, with large EM economies almost all in surplus and the large DM economies in deficit. We summarise below some of the main shifts in major markets:

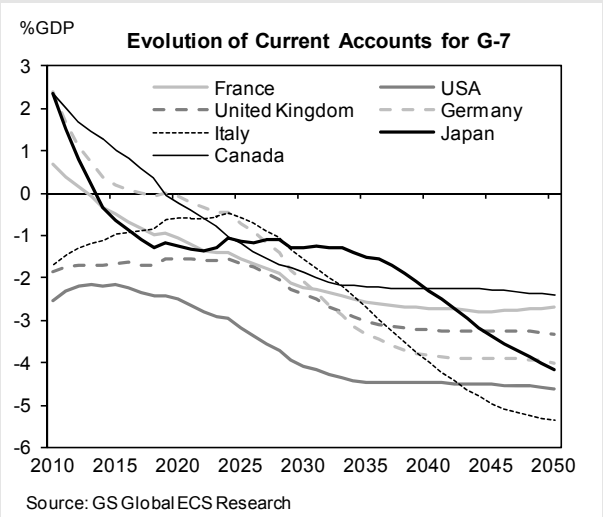
BRICs: China and Russia's falling surpluses are offset by rises in India and Brazil, with both markets moving into surplus over time (and all four of the BRICs in surplus by around 2020). The current account surplus is likely to peak earliest in China but remain positive, while India's should continue to grow until 2050. The shift in India is particularly dramatic, as its demographic dividend boosts net saving over time.

N-11: The oil-producer surplus declines will be balanced by other non-oil producing EM, especially the N-11. Within the N-11, Korea is projected to peak earliest and (uniquely) fall into negative territory by the late 2030s. Egypt's current account is projected to rise; Indonesia's (and Vietnam's to some extent) are projected to have a flattish profile. As an aggregate, N-11's current account surplus is projected to rise until 2037, and then gradually decline but remain in positive territory.



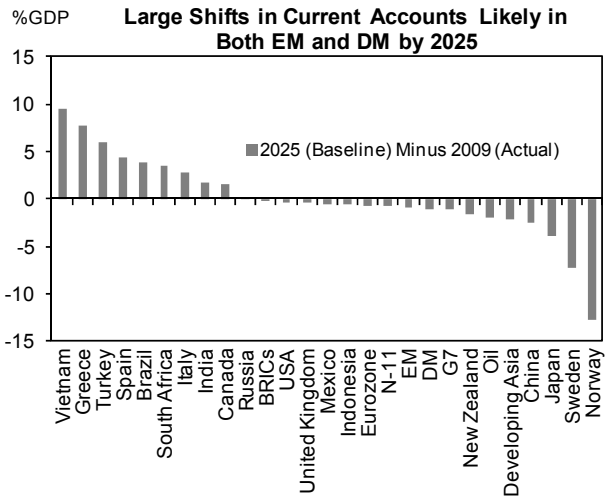
G-7: The underlying current account positions of all G-7 countries are projected to deteriorate over time, but at a varying pace and with a varying profile. Germany, Japan and Canada are projected to move from surplus to deficit. Current accounts in Canada, France, the UK and the US are shown stabilising in negative territory by late 2030, while Japan and Italy will likely face pressure for further declines given more challenging demographics.



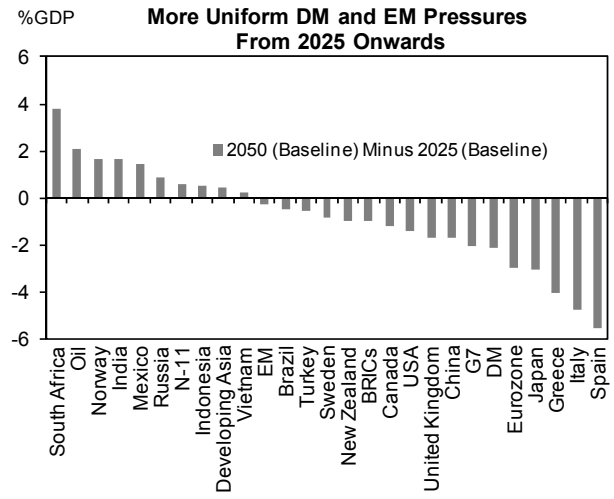


producers, China, Malaysia and Norway). On the flipside, the current account balance of those with 'excessive' deficits (Greece, Spain, Portugal and the US) should see pressure to improve.[4] Because the EM surplus is on average 'too large' currently, these same forces work to offset the demographic pressure towards even larger EM surpluses. This means that the outlook we describe here—particularly in the initial stages—is driven by a combination of two forces, which in places counteract one another.

4. The pace of convergence in our projections is derived from the actual convergence speed in the past that the model predicts.



Source: IMF, GS Global ECS Research



Source: GS Global ECS Research

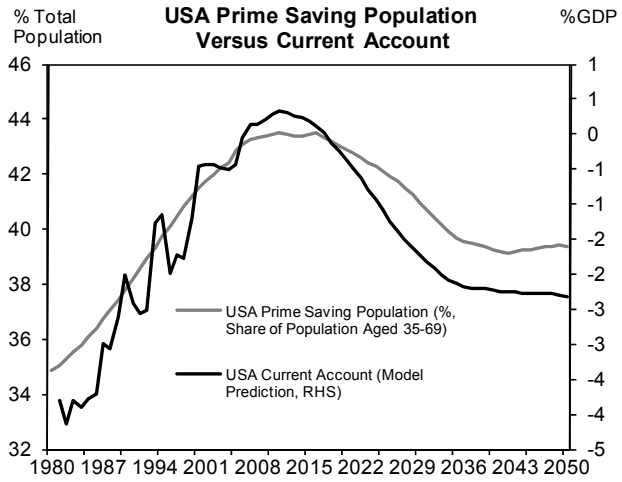
That outlook involves potentially large shifts in global current account positions. In thinking about these shifts, we focus on the 2009-2025 period, which is more immediately interesting. But we also look at the developments from 2025-2050, by which time any impact from current imbalances will have receded, and so the outlook here is almost completely driven by the demographic and growth shifts that underpin our model. The box on the previous page describes some of the key developments in the major markets, but the most obvious are:

The outlook is for potentially large shifts in global current account positions

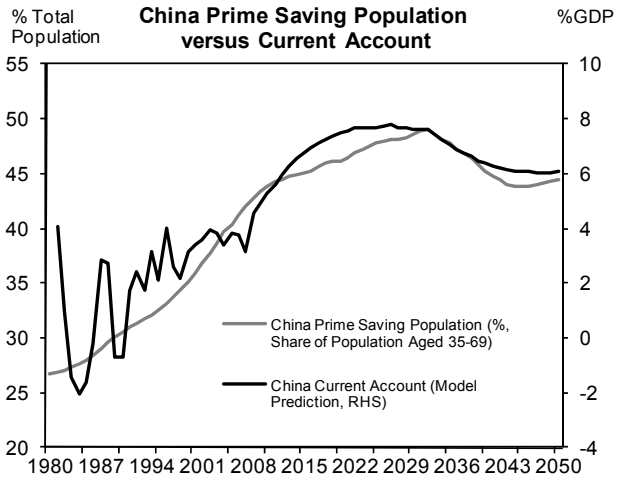
- Potentially significant declines in surpluses between 2009 and 2025 from many of the major surplus groups (the major oil producers, China, Japan, Germany, Sweden), matched by significant improvements in the current account positions of many of the higher-deficit developed market economies, such as Greece, Spain, Portugal and, more modestly, the US. However, the basic pattern of surplus and deficit countries may not reverse completely over this period, although the surpluses and deficits may shrink.

- The model (with all the obvious caveats) shows the US deficit at -3.2% of GDP by 2025; China's surplus declining to 3.3%, roughly where it was before the structural break higher in 2005; and Germany and Japan entering deficit territory. South and South-East Asia, whose demographics are favourable, also see significant pressure for stronger current accounts.

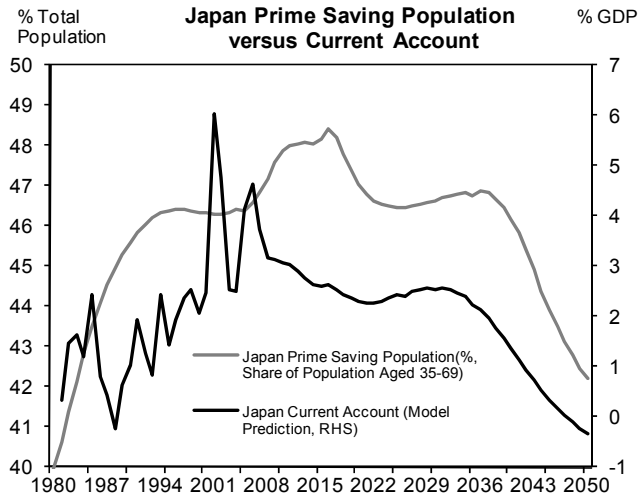
- Changes in the EM and DM aggregate positions are modest (-1.1ppt for DM



Source: US Census Bureau, GS Global ECS Research Calculations



Source: US Census Bureau, GS Global ECS Research Calculations



Source: US Census Bureau, GS Global ECS Research Calculations

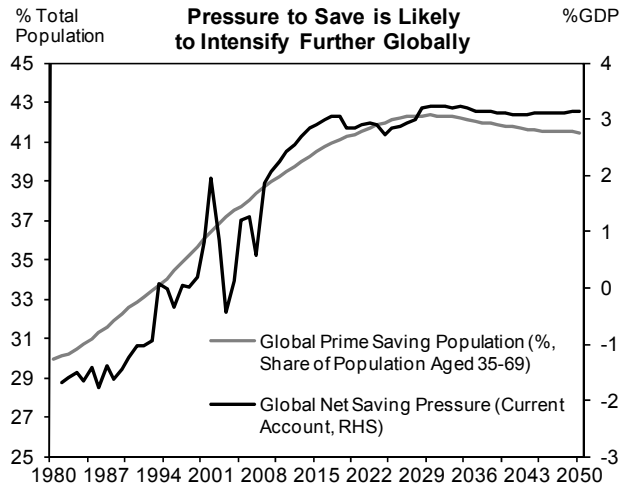
and -0.9ppt for EM), and the same is true for the BRICs as a bloc. This means that the model does *not* predict any significant shift in the picture of EM economies sending capital to the developed world, and by 2025 it still shows EM as a group potentially running a surplus and DM a deficit. (It may seem counterintuitive that the current accounts of both DM and EM can deteriorate as a percentage of GDP but EM GDP is rising much more rapidly.)

- What does change is that the picture within the EM and DM blocs becomes more *uniform*. In particular, the fact that Germany, Japan and Canada may move into deficit, but that Brazil and India could join Russia and China in surplus as their 'prime savings' groups expand, means that the exercise envisages a world where all of the large EM countries move into surplus and all of the large DM economies into deficit over time, unlike today.

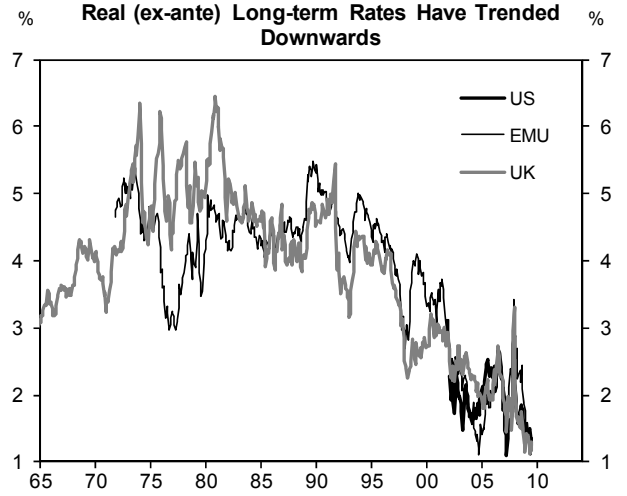
The picture within the EM and DM blocs is likely to become more uniform

A Demographic View of the 'Savings Glut'

The flow of capital from EM to DM economies—which we have shown here may continue—is closely identified with the notion of the 'savings glut', a widely debated issue ever since then-Fed Governor Ben Bernanke coined the phrase in a speech on global imbalances in 2005. As we mentioned earlier, the global current account balance has to be zero. If there is a *tendency* for the world's economies on average to want to save more than they invest (i.e., run a global current account surplus), in principle this should be resolved by a fall in global real interest rates. The rise in desired global savings about which Fed



Source: US Census Bureau, GS Global ECS Research



Source: Goldman Sachs estimates

Global Versus Local Drivers of Real Interest Rates and Asset Prices

We mentioned above that our models cast some light on how demographics may influence global real interest over time. At a simple level, as we describe in the main text, the 'global' real interest rate can be thought of as the rate that makes desired global savings and desired global investment equal. All else equal, if demographic or other forces push for an increase in desired savings relative to desired investment, global real interest rates should fall and vice versa.

It is important to think about what the 'global' real interest rate means, however. If all goods can be traded and capital accounts are open, then (long-term) real interest rates should be equal everywhere. But, in practice, even with relatively open capital accounts, many goods cannot be traded across countries. And it is easy to show that this means that real interest rates in each country need not be equal. In those circumstances, a simple framework would define a country's real interest rate as a weighted average of the global real interest rate (for the 'traded goods' sector) and a locally determined one (for the 'non-traded goods sector'). Our *Bond Sudoku* models of G10 bond yields have some of this flavour, using both local and global influences as determinants of yields.

In the context of the demographic approach here, the *global* component of real interest rates (real rates in terms of 'tradable goods') would be determined by the global demographic profile. But those economies where net saving is predicted to fall (and current account deficits to rise) would tend to see higher real rates and stronger real exchange rates than otherwise, with the reverse true in those where net saving is predicted to rise. On our outlook, the demographics point to upward pressure on DM real rates relative to EM, in the context of downward pressure on overall global real rates.

In addition to the implications for interest rates, a number of studies in recent years have worried about the notion that dis-saving by retiring workers in DM will push real rates higher and asset prices lower. This 'demographic' fear has been expressed periodically with respect to equities and housing markets in the US most particularly. Mankiw and Weil (1989) made a well-known prediction that the decline in the 'baby boomer' generation and their dis-saving would put downward pressure on US housing markets. And similar predictions have been made about downward pressure on equities as the 'baby boomers' hit retirement age.

There are many reasons why those fears are overstated (the Jackson Hole Symposium by the Kansas Fed in 2004 saw this issue widely discussed). But the logic described above with respect to global interest rates also applies here. While the demographic profile of the US and some other developed markets may push towards lower net savings—and so conceivably to asset liquidation—the global perspective shows that this concern needs to be offset partially against the prospect of increased global (principally EM) net saving, which could potentially provide capital inflows to balance that dynamic. Those markets that are more 'local' (non-traded) would in theory be more vulnerable to that dynamic than those that are globally traded, but the overall picture would certainly be more benign than a purely local view would suggest, and more of the adjustment would occur through capital flows than through asset prices.

Chairman Bernanke speculated is not directly observable, so the *prima facie* evidence given was the surge in EM current accounts alongside lower real interest rates, which might point to increased savings supply from that source. Explanations for *why* exactly the desire to accumulate savings may have surged vary (Bernanke pointed to the scars of financial crises and rising commodity scares). And there has been an extensive debate about whether the theory is correct and if it will prove fleeting or persistent.

The framework for global capital flows and current accounts set out here provides an interesting perspective on this issue. Our main exercise imposes the constraint that the global current account must add up to zero, as any sensible prediction must. But if we relax that constraint and aggregate the individual country predictions, we can get a sense of how the shifts in demographics and growth may be influencing the *ex ante* balance between global savings and investment. Looking at the predicted global excess savings (or global 'current account surplus') from this unconstrained model shows that since the mid-1980s, demographic and growth shifts globally have steadily and significantly pushed in the direction of higher excess savings over that period. The predicted *ex ante* global current account balance has risen from -1.7% of GDP in 1980 to +2.1% in 2009, accelerating between 1988 and 2009. The demographic counterpart to that shift is easily identified. The proportion of 'prime savers'—and we are talking about *net* savings here—globally (again weighted by GDP)

has risen over that period. This coincides with the significant decline in global real interest rates that we have seen since the mid-1980s and suggests that demographics may have played a role. While there is no easy way to *prove* that this linkage exists, economic logic supports it.[5]

These pressures appear to be intensifying rather than reversing, if we run the model forward on this basis. This exercise predicts a further 1.1% of GDP (from 2009 to 2050) increase in the *ex ante* global current account surplus, smaller than that seen over the last 25 years but still large, before a modest reversal. This means that a purely demographic model of global real interest rates would predict further downward pressure as desired savings globally rise further relative to investment.[6] Both in the past and in the future, these shifts appear to result largely from an increase in desired savings in the EM world.

As a recent *Global Economics Paper 185* by Ben Broadbent and Kevin Daly showed, the simple story of a 'savings glut' does not explain all of the major features of the recent global landscape. They argue that the increase in global savings alongside increased returns on capital is probably also due to the integration of large high-savings emerging market economies into the global economy. That story is highly plausible and is a reminder that the persistent demographic pressures that we identify are likely to be only part of the story. But their paper also highlights that the composition of the rise in global savings (skewed towards central banks in EM with conservative portfolio preferences) may also have acted to raise the global equity risk premium. Our projections suggest that this too could be persistent.

The rise in 'prime savers' globally suggests that demographics may continue to put downward pressure on global real interest rates

While the rise in 'prime savers' globally suggests that demographics may continue to put downward pressure on global real interest rates, differences across the various country groups could lead to persistent differences in relative interest rate trends. As the box on the previous page describes, theory would predict that those whose current account positions are forecast to deteriorate (largely in the DM world) could see upward pressure on real interest rates *relative* to those who see an improvement (mostly in EM). So, while demographic forces may work to keep real interest rates low across the world, our projections imply that, on average, this downward pressure may be larger in EM. But these same dynamics also imply that the periodic worries that the wave of retiring (and dis-saving) 'baby boomers' in the developed world will hurt asset prices (bonds and equities) need to be offset against the prospect of a continued (and perhaps increasingly) strong desire for saving (and capital flow) from the EM world and globally.

But differences across the various country groups could lead to persistent differences in relative interest rate trends

Offsets to These Pressures: Sustainability, Capital Markets

As we have said in our BRICs-related work, there are many reasons why the outlook we describe here might not be borne out. In the case of current accounts evolution, two issues are particularly important, both of which may mitigate the underlying demographic pressures.

The first is that the pressure we describe may lead to foreign financing needs that prove excessive, particularly in some DM economies. Nothing in our projections addresses the aggregate 'rationality' or sustainability of the paths that we project. They are simply the outcome of what the demographic and growth projections would 'normally' lead to. So they are best seen as guides to the underlying pressures than as a true forecast of what may occur. In that sense, they are reminiscent of the global energy demand forecasts that we made

5. Interestingly, Matthew Higgins's 1998 paper analysed current account and demographic links in a similar framework to the one we use here. He conducted some simple projections that showed exactly this effect. The paper argued, correctly it turns out, that global real interest rates could come under downward pressure.

6. Because we predict 'net saving' here, i.e., savings less investment, the demographic pressures do not necessarily imply that actual savings rates (or the clearing levels of savings) will have to be higher too, as some other explanations require. Demographics influence both investment and savings profiles, and it is possible demographic shifts reduce both desired investment and desired savings but reduce the latter by more.

Likely Net Foreign Asset Profile (%GDP)

	Australia	Spain	New Zealand	Greece	Portugal
2008	-47	-77	-72	-71	-92
2015	-61	-84	-79	-95	-110
2020	-71	-77	-86	-98	-114
2025	-80	-69	-90	-99	-117

Net Foreign Asset Position (%GDP) using identity NFA(t) = (1-g)*NFA(t-1) + CA
where g = assumed nominal GDP growth. Source: IFS, National Sources, GS Global ECS Research Calculations

in our earlier BRICs research, which were designed to show where pressure points would emerge but not necessarily whether those pressures could actually be satisfied.

One simple way to see this is to look at what our exercise for the evolution of current accounts would imply for the net foreign asset (liability) positions of the relevant countries. Given that the demographic pressures in many cases push for further current account deterioration in the developed markets, foreign liabilities in those that are already significant debtors would be set to deteriorate further under these forecasts. The most obvious examples are Australia, New Zealand, Spain, Greece and Portugal.

The pace of deterioration is not dramatic relative to their current situation. And if these economies can earn returns that are sufficiently higher than the cost they pay to borrow, then in principle this borrowing may prove more sustainable and appropriate than it looks. Much of the hand-wringing about US foreign liabilities over the last 15 years, for instance, has not yet been borne out, and similar exercises for many of these economies conducted in the past would have overstated their problems now. And it may simply be that the surplus countries come to own larger portions of the capital stock of the deficit countries over time. But even with those caveats, the profiles here suggest that some developed countries that already have large foreign liabilities may ultimately need to run smaller deficits than currently predicted (presumably through some combination of exchange rate depreciation and demand restraint).

Some developed countries that already have large foreign liabilities may ultimately need to run smaller deficits than currently predicted

The second issue is the prospect of financial market deepening in the big EM economies. There is now a wide body of work suggesting that underdeveloped local financial markets in the EM are part of the reason why savings are larger than they 'should' be, and why current account surpluses (capital outflows) are also surprisingly large. Caballero et al (2008), for instance, rationalised the sustained rise in US current account deficits, the decline in real rates and the rise in the US assets in global portfolios as a rational response to differing capacities to generate financial assets from real investments. Under this theory, the EM crises at the end of the 1990s and their subsequent rapid growth prompted them to search for sound and liquid financial instruments, which the US markets were positioned to provide but their own markets were not. And of course the US 'exorbitant privilege' from its position as a reserve currency may also help in this regard. Others have found supporting evidence for that dynamic.[7]

Our own research has focused over an extended period on the challenges of building capital markets in the BRICs economies and the deepening in capital markets in the developed world. In 2005, we showed how the development of the BRICs might lead to a sharp rise in the equity capitalisation of the BRICs and broader EM world, a process that is already underway and that may act to mitigate some of the inherent weaknesses in local market development (see *Global Economics Paper 118*). Since then, Francesco Garzarelli, Sandra Lawson and others have focused on what is arguably a larger challenge, the development of local debt markets, particularly in China and India—but with

7. See Gourinchas and Rey (2005), Cooper (2007).

applicability beyond (see *Global Economics Paper 149 and 161).* Their work highlights the potential for significant expansion in debt markets if continued progress on supporting reforms can be made (in 2008, we predicted that India's non-public debt market could grow sixfold by 2016). More recently, but in a similar vein, Christopher Eoyang and team have highlighted the enormous potential for growth in Shanghai as a financial centre, and the prospect of much deeper and more liquid markets there (*see Global Economics Paper 198)*. Broader financial liberalisation, which might change access to credit in EM markets, could also be an important development in changing aggregate savings.

If further progress is made on these issues of local capital market development, it might plausibly act to reduce savings in some of the large EM markets, and reduce the pressure for capital outflows and current account surpluses that stem from higher savings rates. It is also a reminder that non-demographic forces are hugely important to the overall path of savings, as Helen Qiao described in detail in *Global Economics Paper 191*. It is important to remember that in any given country, a host of changes not captured by our models may be in operation. And in China—with the transitions in social security provision and the SOE system since 1990s—these forces may be larger than in many other major economies.

The development of domestic bond and broader capital markets could be a useful safety valve in limiting the challenges of managing even larger global capital flows

Because our models allow for convergence towards 'underlying' balances in some of the large EM countries and because they account for any 'persistent' effects for any given country[8], some of these issues are probably partially captured. And none of this alters the fact that relative *demographic* profiles across EM push towards larger not smaller surpluses. But there is much that the models leave out. Significant progress in capital deepening in the BRICs and beyond might act to offset that tendency and reduce the size of global current account balances. The development of domestic bond and broader capital markets is an important goal in its own right in terms of the efficiency of local capital allocation. But it could also be a useful safety valve in limiting the challenges of managing even larger global capital flows.

Implications for Markets and Policy

Returning to the issues that we raised at the outset, we would highlight three major implications of this demographic perspective on capital flows and current accounts.

- First, there is strong confirmation that recent imbalances were overshoots of the slow-moving underlying determinants of global capital flows. While we are making progress to reducing them (in particular in the US), it is still only partial progress towards what the underlying equilibrium should be. This means that further adjustments in global demand and currency patterns may still be needed, as with the encouraging shifts in China recently.

- Second, while those near-term adjustments on average argue for lower EM surpluses and lower DM deficits, underlying demographic and growth dynamics push towards a situation where the EM world continues to export savings to the richer economies. We find this even after explicitly allowing for the differences in growth rates across the groups. While those pressures may ultimately push some developed countries towards unsustainable paths, they also caution against assuming that what is going on currently is an anomaly waiting to be corrected.

- Third, at a global level, demographic pressures seem to push towards continued increases in desired savings relative to desired investment. That force may already have been more important in pushing real interest rates down globally over the last 10-15 years than is often acknowledged. But it

8. Through the country dummies in the panel.

may still have further to run and real rates may stay low for longer than many expect. Those who worry *either* that current developed market current account deficits will need to be brought to an end or entirely reversed *or* that the ageing of developed markets may put upward pressure on their interest rates and downward pressure on their asset markets may prove to be underestimating the safety valve from global demographic forces.

Taking these forces together, it seems likely that significant *net* flows of capital across borders—including from the EM to the DM world—are likely to remain a feature of the landscape and may be set to grow further. This means that developing the infrastructure, policy tools and regulatory settings to be able to cope with them is likely to remain an urgent task. As with our work on the BRICs and the Expanding Middle Class, we are struck again by how a global perspective is needed to understand what have often been examined as local issues. In particular, looking at the story of savings, investment and capital flows from the perspective of the large developed markets may end up being misleading in a world where the global picture is increasingly different.

Ongoing large cross-border capital flows mean work to improve global financial regulation may become even more important

In terms of policy choices, the lessons are a little muddier. The fact that cross-border capital flows are likely to remain significant and that demographic shifts may push for them to increase rather than decrease in places means that work to improve global financial regulation and the monitoring of cross-border capital is likely to become even more important. The lessons of the recent crisis suggest particular urgency in ensuring that developed market financial sectors can cope with substantial capital inflows without misallocating resources. But they also imply that a deepening of capital markets in the EM world may reduce some of the excessive pressure to 'export' savings.

Extending working lives might offset some of the pressure towards larger DM deficits

In terms of policies to address the pressures of 'ageing', the debate in terms of social security and healthcare often focuses on raising retirement ages to reduce dependency rates and alleviate fiscal pressures. The impact of those kinds of shifts on net savings is a little less transparent, since the shift to private savings patterns at different points in the life cycle in response to a higher retirement age are less obvious than the impact on incomes, retirement payments and tax receipts. However, the fact that demographic pressures seem to be pushing most DM economies towards larger current account deficits over time—and perhaps unsustainably large ones—is arguably indicative that these countries may not be saving enough. Extending working lives relative to the time spent in retirement (where savings are necessarily negative) is likely to help to address that issue too and may also serve to offset the tendency towards larger DM current account deficits than we outline here. We are likely to see further steps in that direction, in particular, in those parts of Europe which are beginning to address the issue as a part of their fiscal sustainability. If that happens, it would arguably raise the upper bound on the 'prime saving' age and so the consequence could again be to reduce the dependence on EM savings flows.

Appendix I: Demographic Trends and the 'Prime Saving' Population

Since early 2000, economists have highlighted and widely discussed the major shifts in demographic trends and their implications (the IMF's 2004 World Economic outlook and the Fed's Jackson Hole Conference in 2004 are good examples).

Our own research has also focused on demographic trends (see *Global Economics Paper 132; Global Economics Weekly 09/24)* and has shown how demographic shifts play an important role in determining the long-term drivers of the world economy (demographics play an important role in all of the BRICs and related research as key ingredients of our projections).

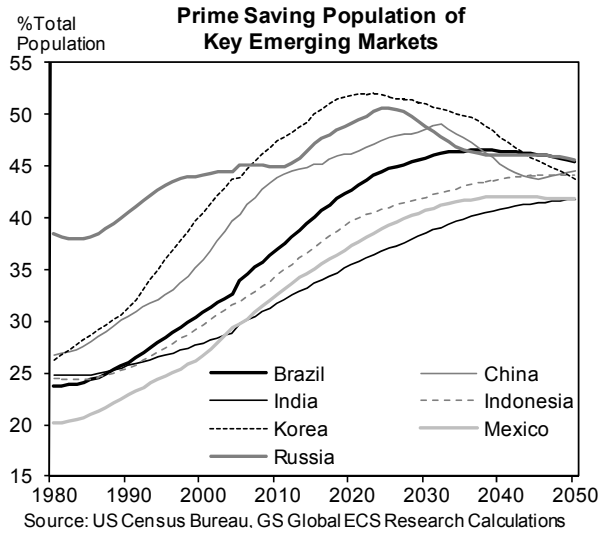
The combined effects of increased life expectancy and lower fertility will result in slower population growth and will significantly change the population age structure as the number of young people as a share of total population falls and the proportion of the elderly rises. The focus on shifting dependency ratios—and on the resulting fiscal burdens—has generated a heated debate in the developed markets.

As our model shows here, what matters more in the context of global capital flows is the (related) notion of those in the 'prime saving' age group. While definitions vary as to when that age occurs, our models suggest that positive net saving is mostly explained by the portion of the population between the ages of 35 and 69 (the IMF defines it as a somewhat narrower band, from 40 to 65). The variation in this group—at a simple level—plays a major role in our results, so it is helpful to lay out the main dynamics of how that group evolves.

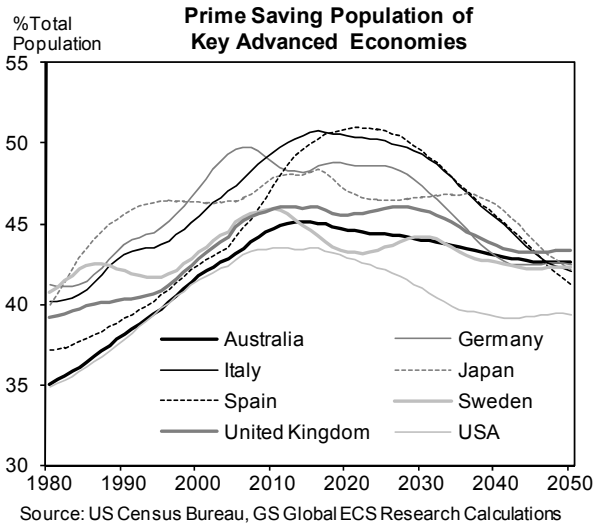
The share of the global population falling within that bracket is increasing rapidly and is set to reach a 50-year high by around 2026, then stay at relatively high levels for some time after. However, variation underpins this global theme. Broadly speaking, the share of 'prime savers' is likely to peak earlier in developed countries than in emerging markets (around 2016 for DM as a whole compared with 2032 for EM).

Even within the broad groups of DM and EM economies, there will be important differences, as highlighted at the Jackson Hole proceedings in 2004. Among developed countries, Japan, Korea and some European economies will experience more rapid population ageing than the US. And, among developing countries, China will experience population ageing sooner than India and many other Asian countries. Although the focus on China's advanced 'ageing' profile relative to other EMs has received a great deal of attention, on our definitions its 'prime saving' population still looks much more like a typical EM than a typical DM economy. In our sample, the earliest peak in 'prime savers' comes in Germany (already peaked in 2006) and Austria (2009), while the latest comes in a bunch of emerging economies, namely India, Indonesia, South Africa, Nigeria, Malaysia, Philippines, Bangladesh, Egypt, Saudi, UAE and Oman, where the proportion of the population at 'prime age' continues to grow until 2050.

Running behind these shifts—and our description of the outlook—is not just the varying shifts in the 'prime-saving' population in EM and DM, but also the trends in economic size identified in our BRICs research and elaborated on globally in our work on the 'Expanding Middle Class', which also suggest that the weight of the two blocs in the global economy changes sharply over time. This is why it is possible both for the EM surplus as a share of GDP and the DM deficit as a share of GDP to deteriorate at the same time (since EM's share of GDP is rising, the same proportional surplus would be able to fund a larger



Source: US Census Bureau, GS Global ECS Research Calculations



Source: US Census Bureau, GS Global ECS Research Calculations

DM proportional deficit). As background, our BRICs projections imply a shift in EM GDP from 33% of global GDP in 2010 to 71% in 2050.

It is also important to bear in mind that the shifts in the 'prime age' population *are* different from the shifts in the share of the working age population (15-64 is the common definition) in terms of timing and impact, although the two are clearly related. Those pictures are much better known and important in defining fiscal burdens and other significant policy issues. But as the table below shows, the profile in terms of the peaks in those areas is quite different to the peaks in the 'prime-saving' groups that drive our results here. Since it is common to estimate current account balances on working age population shares (as in the IMF's 2004 World Economic Outlook study), these distinctions are potentially important and a finer gradation of demographic impacts—as we use here—an advantage.

Peak in Prime Age Versus Working Age (% Total Population)

	Year of Peak in Prime Age (35-69)	Year of Peak in Working Age (15-64)		Year of Peak in Prime Age (35-69)	Year of Peak in Working Age (15-64)
Argentina	2045	2032	Mexico	2041	2021
Australia	2014	2009	Netherlands	2012	1989
Austria	2009	2004	New Zealand	2037	2011
Bangladesh	2050	2033	Nigeria	2050	2050
Belgium	2015	1987	Norway	2012	2009
Brazil	2037	2018	Oman	2050	2050
Canada	2015	2008	Pakistan	2050	2041
China	2032	2011	Philippines	2050	2037
Denmark	2011	1992	Portugal	2024	2000
Egypt	2050	2030	Qatar	2020	2004
France	2016	1987	Russia	2025	2011
Germany	2006	1986	Saudi	2050	2043
Greece	2022	1998	South Africa	2050	2044
Hong Kong	2019	2011	Spain	2022	2004
India	2050	2027	Sweden	2010	2007
Indonesia	2050	2023	Switzerland	2013	1989
Iran	2032	2011	Thailand	2031	2013
Italy	2016	1991	Turkey	2035	2018
Japan	2016	1992	UAE	2050	2010
Korea	2023	2015	United Kingdom	2012	2009
Kuwait	2004	2004	USA	2016	2007
Malaysia	2050	2018	Vietnam	2032	2020

Source: US Census Bureau

Appendix II: Modelling Current Account Imbalances

A. The basic model

Our approach to modelling current account balances as a function of demographics is closely related to that followed by Higgins (1998) but also has a lot in common with a frequently-cited study by Lane and Milesi-Ferreti. The underlying assumption is that for all of the countries in the sample, capital accounts are open enough for macro fundamentals to drive current accounts, which seems reasonable for the countries we consider here.

We model current accounts using a fixed-effect panel framework comprising of 44 countries and data from 1980, with both time and country effects. The fixed panel framework helps us to strip out country-specific factors such as cultural norms, rates of time preference, institutional issues. Also, we use 5-year averages during estimation to minimise the risk of capturing cyclical shifts that may potentially bias the coefficients.

The current account is a function of a set of demographic variables (DEM1, DEM2 and DEM3), income per capita growth (INC), relative price of investment goods (RPI) and an oil variable (Oil).

$$CA_{it} = B_{i,0} + B_1 DEM_{1i,t} + B_2 DEM_{2i,t} + B_3 DEM_{3i,t} + B_4 INC_{i,t} + B_5 RPI_{i,t} + B_6 Oil_{i,t}$$

The motivation and detail of the main variables is as follows:

1) Demographic variables: Demographic variables are constructed using a low-order polynomial to represent 15 population age shares: 0-4, 5-9, ….., 65+. This approach was first discussed by Fair and Dominguez (1991). The three demographic variables are complicated geometric averages of the population age shares. This helps to eliminate the problem of multicollinearity that makes it difficult to isolate the contribution of any particular segment in traditional equations and allows for a richer structure of age effects similar to those predicted by the life-cycle model (we provide details below).

2) INC and RPI: We control for income per capita growth so that we do not spuriously attribute current account positions to demographics that are in fact driven by growth effects. The relative price of investment goods is included to control for its possible effects on savings supply or investment goods, something that has been found to be important in some cross-country work on investment and savings. These variables are sourced from the Penn World Tables.

3) Oil: Of course, oil revenue matters for the oil-producing countries. We capture this impact by taking a cross between a dummy variable that identifies the oil-producing countries and their export share of GDP. In other words, we take account of export revenues for oil-producing countries. Oil price shifts also have an impact on oil importers. The common exposure will be picked up by the time dummies in our regression, but exposures vary across countries too. However, that variation is much smaller than for producers (and less persistent) and we omit it here.

B. Capturing the demographic profile

As mentioned above, our demographic variable looks at the impact of 15 different population segments on current account positions. In other words, the regression specification can be thought of along the lines of:

$$S_t = \beta X_t + \alpha_1 p_{1t} + \alpha_2 p_{2t} + ... + \alpha_n p_{nt} + u_t \quad (1)$$

with x_t the vector of explanatory variables and the $p_1 \cdots p_n$ shares of the population of *n* groups (15 in this case).

Following Higgins (1998), we constrain the coefficients of the population shares to lie on a third degree polynomial. We do this because the high degree of correlation between the population shares would induce the problem of multicollinearity. In this case, the variance of the OLS estimates will be large, making it difficult to identify the effect of any particular group (as the correlation between the independent variables converges to 1, variance of the OLS estimates will converge to ∞).

Constraining $\alpha_1 \ldots \alpha_n$ to lie on a third degree polynomial implies:

$$\alpha_1 + \alpha_2 + \ldots + \alpha_n = 0 \quad (2)$$

,

because the population shares sum to unity and are thus collinear with the intercept term, and

$$\alpha_1 = \beta_0 + \beta_1 1 + \beta_2 1^2 + \beta_3 1^3$$
$$\alpha_2 = \beta_0 + \beta_1 2 + \beta_2 2^2 + \beta_3 2^3$$
.
.
$$\alpha_n = \beta_0 + \beta_1 n + \beta_2 n^2 + \beta_3 n^3$$

which implies that

$$\alpha_1 + \alpha_2 + \ldots + \alpha_n = n\beta_0 + \beta_1(1 + 2 + \ldots + n) + \beta_2(1^2 + 2^2 + \ldots + n^2) + \beta_3(1^3 + 2^3 + \ldots + n^3)$$

Once we estimate β_1, β_2 *and* β_3 and we impose the condition (2)

$$\beta_0 = \frac{-[\beta_1(1 + 2 + \ldots + n) + \beta_2(1^2 + 2^2 + \ldots + n^2) + \beta_3(1^3 + 2^3 + \ldots + n^3)]}{n}$$
$$= -\frac{(\beta_1 \sum_{j=1}^{n} j + \beta_2 \sum_{j=1}^{n} j^2 + \beta_3 \sum_{j=1}^{n} j^3)}{n} \quad (3)$$

Substituting $\alpha_1 \ldots \alpha_n$ in equation (1), we have

$$S_t = \beta X_t + p_1(\beta_0 + \beta_1 1 + \beta_2 1^2 + \beta_3 1^3) + p_2(\beta_0 + \beta_1 2 + \beta_2 2^2 + \beta_3 2^3) + \ldots +$$
$$p_n(\beta_0 + \beta_1 n + \beta_2 n^2 + \beta_3 n^3)$$
$$= \beta X_t + \beta_0 \sum_{j=1}^{n} p_j + \beta_1 \sum_{j=1}^{n} j p_j + \beta_2 \sum_{j=1}^{n} j^2 p_j + \beta_3 \sum_{j=1}^{n} j^3 p_j$$

With β_0 from (3)

$$S_t = \beta X_t + \beta_1(\sum_{j=1}^{n} jp_j - \frac{1}{n}\sum_{j=1}^{n} j) + \beta_1(\sum_{j=1}^{n} j^2 p_j - \frac{1}{n}\sum_{j=1}^{n} j^2) + \beta_3(\sum_{j=1}^{n} j^3 p_j - \frac{1}{n}\sum_{j=1}^{n} j^3)$$

From here, we derive the form of the three demographic variables, which allows us basically to capture the same information contained in $\alpha_1 ... \alpha_n$, but in a parsimonious form.

$$D_1 = (\sum_{j=1}^{n} jp_j - \frac{1}{n}\sum_{j=1}^{n} j)$$

$$D_2 = (\sum_{j=1}^{n} j^2 p_j - \frac{1}{n}\sum_{j=1}^{n} j^2)$$

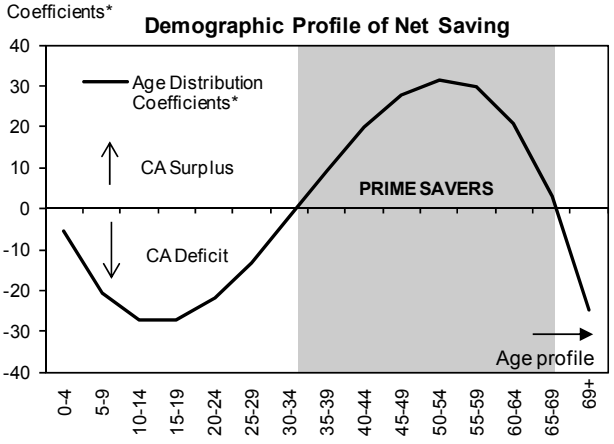
$$D_3 = (\sum_{j=1}^{n} j^3 p_j - \frac{1}{n}\sum_{j=1}^{n} j^3)$$

For each country, we construct the variables accordingly. The regression effectively then is run to find simply the three parameters, β_1, β_2 *and* β_3

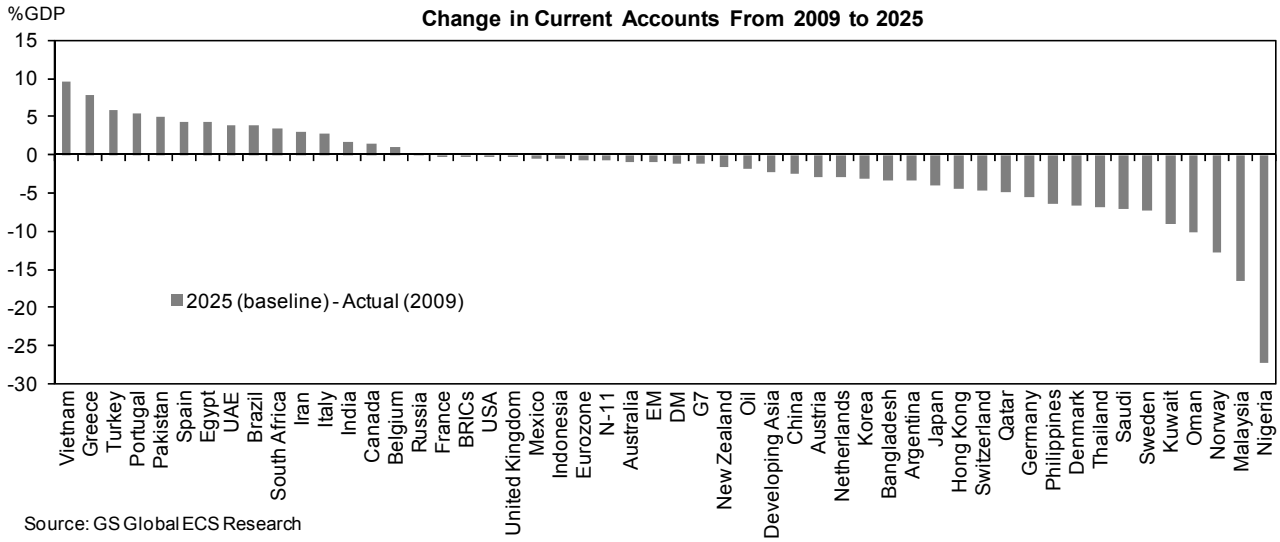
In simple terms, this reconfiguration imposes the restriction that the impact of age on current accounts across the different age groups follows a cubic 'shape'. Our estimations show a current account-age distribution profile that is fairly intuitive and in line with the common literature.

C. Projecting current accounts

To run the model forward, we take the parameters estimated in the model and use them alongside predictions of the key variables. We use the US Census Bureau demographic projections. We use our GDP growth per capita outlook from our own prior research on the evolution of the global economy (last updated in *Global Economics Paper 170*, "The Expanding Middle") and keep flat RPI to project the current account balance up to 2050. We rely on a forward view of oil prices from our Commodity Research team. These are indicative only, since in practice projecting oil prices over such long periods is an even more uncertain exercise than much of the rest of what we assume.



*The age-distribution coefficients represent the change in current account associated with a unit change in the corresponding log population age shares. Source: GS Global ECS Research.



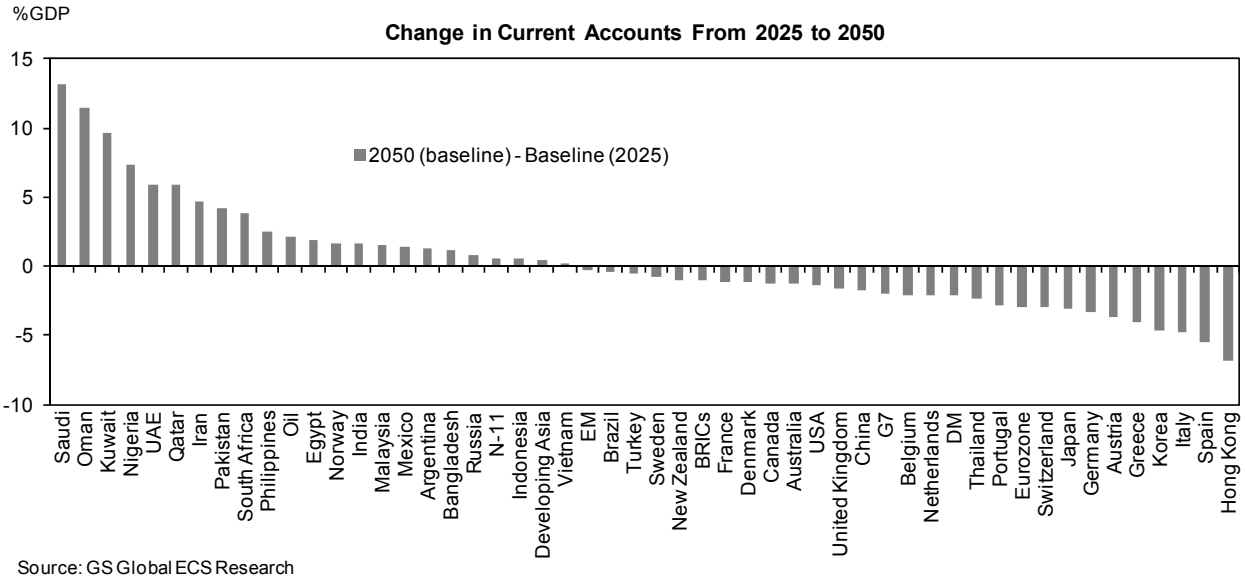
Source: GS Global ECS Research

In running the model into the future, two further issues need to be addressed. The first is how to treat the fact that, as of the current period, many current accounts are a long way from the model's 'underlying balances'. We assume that those deviations will decay over time, estimating the speed of that convergence from past history (the model we use shows that errors do tend to decay). That convergence is largely complete in the first two decades of the outlook. But it does mean that our baseline view of how current accounts may evolve—particularly in the initial stages—is driven by a mix of two forces:

- **The convergence to the 'underlying' position:** Those economies whose current account positions are higher (further into surplus) than the model's estimate as of 2009 will see a tendency from this force to see current accounts deteriorate, while those whose current accounts are lower will see the opposite tendency.

- **The way in which the demographic and growth shifts are changing the model estimate of the 'underlying' balance itself.** Those shifts in underlying balance are driven primarily by shifts in demographics and growth profiles.

The two drivers of our models work in the opposite direction. Demographic pressures push in the direction of even *larger* EM surpluses, but this is offset



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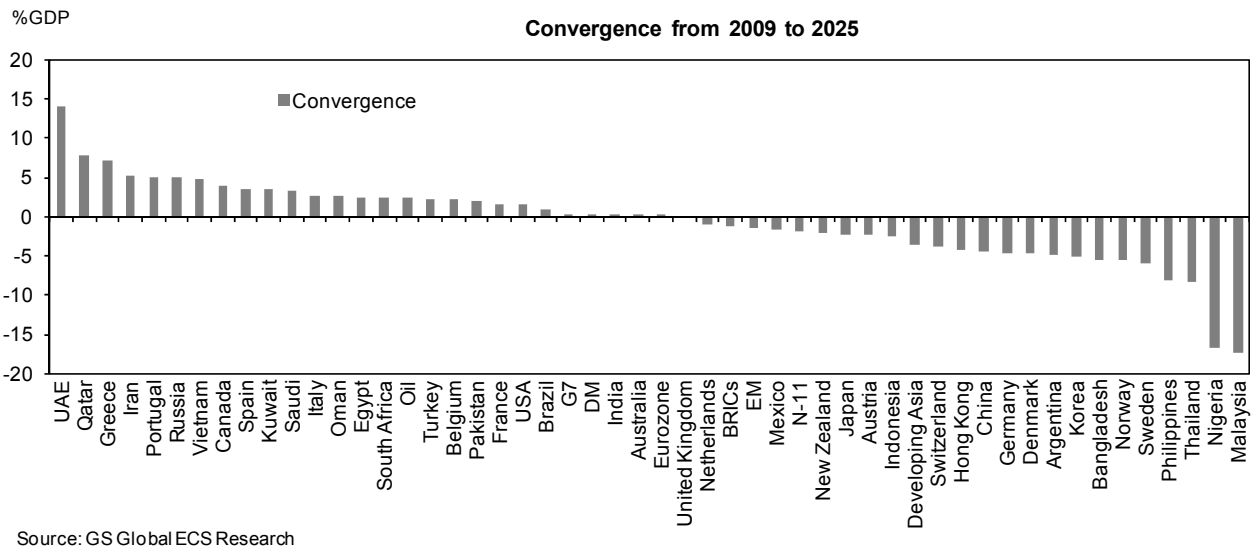

Source: GS Global ECS Research

by the fact that the EM surplus already looks 'too high'. To the extent that those current overshoots do not correct, there would actually be underlying pressure for EM surpluses to grow. Those underlying forces also point in general to higher surpluses in the BRICs (including China) and the N-11, and to somewhat larger deficits in the US. So again it is the moderation of already excessive imbalances that overwhelms that natural pressure. The convergence factor, however, slowly erodes with time so that, looking out to the later period (2025-2050), there are some changes in those patterns. At this point, only demographic and growth shifts are driving the model's projections.

Since the two forces pull in somewhat different directions, the assumption of convergence to the underlying balance is important. The model's history supports that convergence, but if it did not occur, then only the shift in model estimates would be relevant. Those would push more forcefully for increases in EM surpluses and DM deficits, as the main text describes.

The second issue is that the projected global current account shifts have to be internally consistent. In sample, the time effects in the panel effectively make that adjustment in each period. Out of sample, we have to impose the constraint that the global current account balance adds up to zero (roughly true in the actual historical data!). In practice, we do that by rebalancing our initial forecasts with proportional adjustments to savings and investment estimates in each economy, having made the initial predictions. This is equivalent to assuming that the sensitivity to the shifts in real interest rates globally that would be needed to bring about global balance is roughly even across countries. That is a strong assumption, but probably the easiest to defend. As the main text describes, we also look at the unconstrained model predictions as an indication of where *ex ante* net savings pressures globally are heading.

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