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The Macroeconomic Dynamics Behind SWFs

The decades around the turn of the century will be remembered in economic history for the process of ever closer economic and financial integration across the world which is synthetically referred to as 'globalization'. This process was propelled by the trade liberalization spurred by the inception of the World Trade Organization (WTO), the economies of scale that ensued in key industries, the technology transfers to emerging countries from relocation of factories, the advances in telecommunications and connectivity, and the revolution in logistics which, by pushing transport costs sharply down, paved the way to a revamp of global manufacturing. (A fascinating account on the effects of the globalization is *The World is Flat* by Friedman, 2006.)

Ironically, the early exegesis of globalization disseminated the illusion that stronger economic ties among remote geographical areas would set the stage for the extension of a US-centric dominance to those countries emerging from decades of stagnation or underdevelopment and eager to embrace free markets after shedding the self-sufficiency myth. Policies promoting economic liberalization, capital flows and Western-style democracy were considered the wings on which this process was destined to take off.

Few envisaged that the globalization would set in motion a momentous dislocation of economic activities, promote a myriad of cross-country relationships at microeconomic level, accelerate the transfer of know-how and attract capital to hitherto forbidding locations. The break-up and reassembly of supply chains favoured the newcomers and not the incumbents. Ultimately this reformatting of the world economic hardware led to a reshuffle of economic power between mature economies and emerging countries.

Even fewer foresaw that Anglo-Saxon finance, instead of gaining strength from globalization, would actually fall victim to this process, in part for its hubris and incompetence, in part because the decision makers in the financial institutions ignored the signals of impending change, as stressed by Mohamed El Erian in his book *When Markets Collide*. Paradoxically the countries (primarily the US and the UK) portraying themselves as the standard bearers and main beneficiaries of globalization have ended up in the relegation zone. By contrast (at least so far) the largest relative gains economically, financially and politically have been enjoyed by Brazil, India and, above all, China, which together with smaller emerging markets were expected to be the 'targets' of

the globalization process. In synthesis, contrary to the script of the movie, the extras have become protagonists.

The emergence of SWFs on the world stage must be analysed against the background of this secular process. The SWF phenomenon is fuelled by persistent large current account surpluses pushed by three intertwined phenomena:

1 a boom in commodity prices;
2 a strong, export-led growth model (some may say mercantilist, and we will examine this claim later);
3 a prudent (possibly overcautious) macro-policy framework pursued by the large Asian exporters and many other emerging economies.

The first phenomenon is rather easy to grasp: an unprecedented world growth over the 20 years before the Great Recession propelled the demand for all kinds of natural resources and food commodities stretching supply to the limit, especially after 2005. Among the main beneficiaries were the producers of energy commodities, but also some of the poorest African countries.

The second and third have their roots in the aftermath of the Mexican and Asian crises of the mid 1990s – which represented the first major hiccup of globalization – and the stabilization policies that were embraced (some would say imposed by the IMF), combined, especially in the case of Greater China, with a peg to the US dollar. In the painful aftermath of those crises, the authorities in most emerging countries – with their fingers still burning from the hot money whose flight suddenly sunk their currencies – adopted a cautious fiscal and monetary policy mix. The firmness of this policy stance was measured by the accumulation of foreign exchange reserves, seen as the bulwark against contagion, hot money flows and bouts of risk aversion. With the memory of the crisis fading and stability restored, it became clear that amassing reserves beyond a certain point was bearing substantial opportunity costs, as we will explain in detail in Chapter 2. So the authorities in emerging countries started to look for a better way of managing those funds and found inspiration from the experience of the Arab Gulf commodity exporters.

1.1 PERSISTENT CURRENT ACCOUNT SURPLUSES TRANSLATE INTO ACCUMULATION OF FOREIGN ASSETS

There is no alternative for a country with a current account surplus to invest abroad. The fundamental reason for this is well known to economists, but less so to politicians, editorialists and talk show guests. Countries with a current account deficit, i.e. net importers, need external credit to buy goods and services from abroad. Inevitably, part of the revenues earned by exporters finds its way to foreign bank deposits, foreign stock markets, foreign sovereign or

corporate bonds, foreign real estate, etc. For each dollar (or euro or yen or yuan) of current account surplus there is a dollar of foreign assets that the exporting country piles up, corresponding to a dollar of foreign liabilities for the importers.

This flow of funds also implies that there is a direct relationship between current account surplus and aggregate national savings: one is the flip side of the other (economists say there is an identity between current account balance and domestic savings). The reason should be clear. In order to provide credit to the importers, the exporters must save (otherwise they would not have money to lend). Therefore they must forgo some domestic investment in order to finance the purchase of their goods by their trade partners. This can be expressed through a simple relation

$$CAB = S - I \tag{1}$$

where CAB is the current account balance, S is the national savings (of the private and public sector combined) and I is the total investment (again private and public).

In short, a country with a structural current account surplus (such as an oil exporter) builds up a stock of foreign assets. The interest or profits paid on the external liabilities accrues to the current account surplus of the creditor country and to the deficit of the borrowing country.

In advanced, well-diversified economies, these assets are owned primarily by the private sector and, to a much lesser extent, by the public sector, in the form of central bank reserves. Central bank reserves are maintained in low-risk, very liquid assets to ensure that domestic firms and individuals have access to foreign currency needed for their business payments, portfolio transactions and travel requirements. Central banks do not engage much in active asset management.

In economies without significant natural resources, the financial sector is considered by the public, by governments and by most economists as a place where private investors trade securities or foreign currencies, make deals, negotiate terms of contracts such as loans, swaps and derivatives. In fact exporters, banks and asset managers are predominantly private, with some notable exceptions – e.g. civil servant pension funds, such as California Public Employees Retirement System (CalPERS) – and publicly owned banks, which in Europe until 20 years ago were rather common (and still are in Germany). But overall the public hand lost much of its grip on the financial sector in the West by the mid-1990s.

Accordingly, governments' participation in financial markets is now limited to the issuance and management of public debt and occasionally the sale of publicly owned companies. Simply put, in mature economies, governments and their agencies are as a rule on the sell side, not on the buy side. Central banks routinely inject or withdraw liquidity through open market operations and,

more rarely, intervene in the foreign exchange market. However these operations are carried out for policy purposes and are not intended to yield a profit.

In small countries with considerable natural resources (which belong to the nation), a large share of export revenues is controlled by the public sector, directly or through state owned entities, which therefore end up managing large funds.

It is awkward for Western public opinion to realize that public entities are engaged in financial transactions as if they were private companies. Is this an aberration or should it be considered a legitimate course of action, and under what conditions?

Before we answer such a question in next section, we need to point to a fallacy that policy makers and media commentators maintain in the back of their minds: **current account imbalances are temporary**. This notion dates back to the venerable Mundell–Fleming model.

In essence, the model posits that real exchange rate corrections and/or productivity adjustments absorb quickly any competitive advantage of net exporters, and therefore an external equilibrium is restored. Also, the magnitude of these surpluses or deficits is supposed to be small relative to the stock of outstanding financial assets, which is largely true in developed countries. In reality, apart from a short period between the end of the Second World War and the demise of the Bretton Woods system, free trade and especially free movement of capital typically generated large and persistent surpluses or deficits. Periodically these imbalances become the focus of international policy diatribes and calls for 'adjustment' but the widespread perception that a large stock of foreign assets or foreign liabilities is an anomaly is hard to dispel.

The size of persistent current account surpluses (and mirroring deficits) has grown steadily in the past decade in some large economies: apart from Japan which has a long track record, Germany, China and OPEC countries have been notable net exporters and are destined to remain in such a position for a long time, contrary to the tenets of the Mundell–Fleming model.

A new generation of models pioneered by Obstfeld and Rogoff (1996) embodying an intertemporal framework explains current account imbalances in terms of consumption smoothing and international portfolio allocation.[1] Nevertheless even this more sophisticated theoretical approach neglects the influence on global asset prices from international capital inflows generated by persistent current account deficits. Hence, the links between current account deficits and the financial sector remain poorly understood.[2]

In Chapter 7 we will focus on a particular aspect of this broader issue, namely how energy commodity prices affect what Ben Bernanke, Chairman of the US Federal Reserve, dubbed the savings glut, i.e. an apparent excess of financial flows seeking to be employed across the capital markets.

[1] Knight and Scacciavillani (1998) contains a critical review of the mainstream approach to current account balance with an application to the experience of developed and emerging countries.

[2] Hopefully the financial crisis will prompt a flurry of research and data analysis.

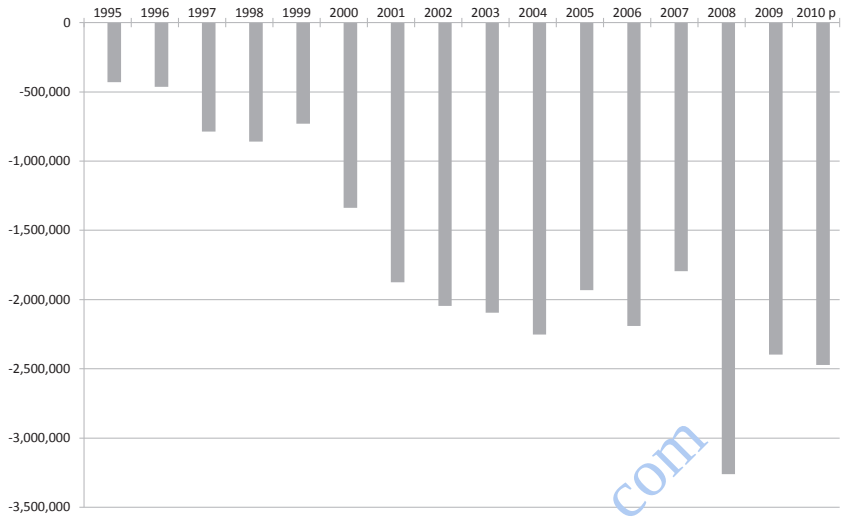

Figure 1.1 US net international position (in US$ millions), p = predicted.

Source: US Department of Commerce.

From the mid-1990s, as the US continued to run a widening current account deficit (Figure 1.1) and countries such as China and Japan (together with other Asian countries and, to a lesser extent, Germany) maintained large permanent current account surpluses, mainstream economists looked increasingly baffled by the lack of any theoretical underpinning.

According to estimates by the Institute of International Finance in the period between 2002 and 2006, the Gulf Cooperation Council (GCC) countries accumulated US$1.5 trillion, twice as much as in the previous five years. As a matter of comparison, this figure is equivalent to about 10% of the domestic market capitalization of the New York Stock Exchange (NYSE) at the end of 2007, more than one-third of the Tokyo Stock Exchange, the Euronext exchanges and the NASDAQ, and it would have almost been sufficient to buy all the companies listed in the Deutsche Börse at the end of 2006. To this flow of money from oil exporters one must add the build-up of foreign assets by China, Korea, Japan and commodity exporters such as Canada and Australia. The financial crisis has only marginally dented these flows, so foreign assets continue to accumulate.

1.2 ABSORPTION CONSTRAINTS: THE RATIONALE FOR ESTABLISHING SWFs AND FWFs

Why would a government reinvest export revenues abroad while neglecting domestic projects or social programmes? After all it would be politically more

palatable to raise the living standards of the local population by investing domestically rather than providing funding to foreigners.

The answer depends to a large extent on the absorption capacity of the country and has some noteworthy implications. If we examine two almost opposite examples, Russia and Qatar, we notice that Russia is not a fully functioning market economy. The rule of law and even the basic protection of investors are, at best, patchy. Despite the desperate need for capital for infrastructure, manufacturing, raw materials extraction, etc., bureaucratic hurdles, governance shortcomings, political rivalries and internecine power struggles render the business environment a minefield for those outside the cobweb of powerful relationships. The private corporate sector – i.e. companies outside the influence of national or local authorities – plays a negligible economic role outside small services, such as retail or accounting. As a consequence, even the Russian SWFs prefer to invest abroad those resources that could be deployed to improve domestic living standards.

Qatar, in contrast, is a tiny, mostly barren country with less than 250,000 citizens. Its government has launched a massive programme of infrastructure building and structural transformation of the economy in areas such as finance, tourism, transport services and petrochemicals. As a result, the size of the economy increased almost tenfold in nominal US dollar terms between 2001 and 2011 and the per capita income doubled according to data from the IMF World Economic Outlook.[3] Obviously part of this performance is simply the result of oil price increases, but the non-oil sector has flourished as well. Investments in some years amounted to more than one-third of Qatari GDP, and new investments planned over the next few years are estimated at about three times current GDP. Expatriates already make up over three-quarters of the resident population. A further acceleration of this expansion would run into bottlenecks, which are already evident in terms of housing scarcity, labour and raw materials shortages, and infrastructure insufficiencies. Similar observations can be made of the United Arab Emirates (UAE) and, to a lesser extent, other GCC countries.

In essence, economic development cannot be instantaneous. Absorption capacity needs to be built gradually; hence small oil-exporting countries are compelled to invest a consistent fraction of their export revenues abroad. Stated differently, countries such as Qatar, the UAE, Kuwait, but also the likes of Norway and Singapore – which have already attained a high per capita income – have made a choice to transfer wealth accumulated through exports to future generations. An additional motivation for investing abroad is hedging: if a shock hits the domestic economy or the commodity prices, income levels can be preserved.

[3] Per capita income in Qatar increased from US$52,300 to US$103,900 between 2001 and 2011, while nominal GDP rose from US$17.5 billion to US$173.2 billion over the same period; see WEO database in http://www.imf.org.

At the opposite end of the spectrum, large dysfunctional countries such as Russia or Nigeria would be better off if they channelled more of their export proceeds into their domestic economies after liberalizing their business environment and promoting infrastructure development.

A variant of the dysfunctional governance case takes place when the creation of SWFs is motivated by the need to preserve the windfall revenues from the appetite of various pressure groups (and political constituencies) competing for budgetary resources. Ring-fencing the revenues in an entity separated from the central government is a line of defence against pilfering by politicians, waste of resources on pet projects or patronage.

This is a course of action advocated in certain cases by the IMF, although the record is mixed. For example, the 2010 IMF Staff Report on Papua New Guinea argued that 'As country experiences suggest, special fiscal institutions (such as SWFs) themselves are not a panacea, but need to be integrated into a sound fiscal policy framework. […] In fact, in some countries with special fiscal institutions [i.e. SWFs], government spending followed commodity revenues without averting pro-cyclicality of fiscal policy, and no meaningful difference has been found in the behaviour of spending relative to similar countries without special fiscal institutions (Davis and others, 2001).' In other countries with special fiscal institutions, government spending did not follow commodity revenues, but this was the case before and after the establishment of special fiscal institutions (Ossowski *et al.*, 2008).

Needless to say, the institutional set up, the governance, the check and balances, the accountability, the mandate, the internal audit, etc. need to be well designed for a SWF to manage the funds it has been assigned in conformity with the mandate received.

Nigeria offers a paradigmatic example in this sense. Nigeria had various types of extra budgetary funds financed by oil revenues and used for off-budget expenditure before 1995. Spending was allocated to various investments in the oil sector and development projects for which project evaluation, selection criteria and governance were lax. Moreover, capacity to manage the scale and complexity of the ventures was inadequate. As a result, a number of these projects ended up requiring huge additional financing and displayed low *ex post* rates of return. Not surprisingly in several cases the expenditures were out of line with the budget and their destinations unaccounted for. However, mindful of that experience, the Nigerian Parliament, under pressure from the new President Goodluck Jonathan – who has gained some reputation in fighting corruption at a high level in a country where past administrations were not widely deemed a model of integrity – passed a law instituting a SWF to manage the oil export revenues after a long and acrimonious debate.

To summarize this section, small economies with huge natural resources face the problem of absorptive capacity of export revenues determined by size, whereas large countries face the problem of absorptive capacity determined by their institutional and legal framework.

In between these extremes there is a whole spectrum of situations. The main one is in China, which has engaged in a breakneck expansion programme over the past three decades, but has not provided modern social services and a universal public pension system that would grant beneficiaries a decent living standard. In practice, the Chinese SWFs constitute a sort of a shadow pension fund, where funds that in other countries would be devoted to social services, as we will see later, consist of a large portfolio of US sovereign debt, and increasingly real assets such as mines, agricultural land, commodities and infrastructure of all kinds in various countries. In other words this sort of gigantic pension fund (we are oversimplifying, because the Chinese government is not formally committed to use SWFs assets to fund any retirement benefits) is being used to foster some broader economic objectives encompassing food security, raw materials and – last but not least for an export-led economy – an extension of credit to the importers of Chinese goods. One can debate whether this crypto-mercantilist policy is still serving the interests of a country such as China and whether it would be more appropriate to redirect its efforts towards improving domestic living standards. In fact this change of objectives is one of the main points of contention in the framework of international policy coordination which takes centre stage during G20 meetings. In other words it involves the global imbalances that in many quarters are considered the main cause of the Great Recession and as such it has much broader implications than the legitimacy of government-sponsored investment vehicles, as we will argue in the next section.

1.3 THE MANAGEMENT OF NATURAL RESOURCES WINDFALL

Why would a country rich in natural resources want to accumulate foreign assets? After all, would it not be better to extract only what is needed to sustain its economy and its government budget each year, maybe a little more, just to be on the safe side?

In abstract this seems a more reasonable long-term resource management strategy. In reality it might not be feasible, for example because the extraction technology has increasing returns to scale, hence installed capacity needs to be fully used to recover the investment. In other instances a contract assigns the extraction rights to a private foreign company, so the government collects royalties but has little say over the pace of exploitation.

Generally speaking, a SWF or a Future Wealth Fund (FWF) aims to transform underground wealth into overground wealth. It could very well be the case that the highest long-term return on the natural resource endowment would come from keeping the oil or the minerals untouched for decades and borrow from the financial market in the meantime. For Norway, an already prosperous country, arguably it might be preferable to stop pumping North Sea oil for

20 years rather than accumulate wealth in a wobbly financial market. But no strategy is riskless, especially when it involves decisions over a long time span for which the degree of uncertainty cannot be internalized. For example, if over the next 20 years a new form of energy supplants hydrocarbons, oil and gas reserves might become worthless, and Norwegians would be dismayed.

The optimal management of a natural resource windfall is hardly a novel topic for economists. The literature is extensive and its roots are often traced to the venerable Hotelling's Rule (Hotelling, 1931), which states that under certain conditions the price charged for an exhaustible resource must grow at a rate equal to the rate of interest. From this principle it follows that an optimal extraction policy maximizes intertemporal benefits (see Box 1.1).

Four main assumptions underpin Hotelling's Rule:

1 production can effortlessly be increased in the present or shifted to the future at will;
2 the total reserves of the exhaustible resource are accurately calculated and no technological advances permit an expansion;
3 future demand (in each year) is estimated with accuracy;
4 future interest rates are known.

None of them are realistic, especially in the case of energy commodities. For condition 1, non-renewable commodities require considerable capital expenditures, extraction facilities take a long time to be built and the equipment remains in operation for a long time. Firms take a risk on the price volatility of the natural resource; hence they use cautious price forecasts before undertaking the investment. Once the investment is made, facilities will remain in operation until the price covers operating costs, which are very much lower than the average cost inclusive of fixed capital amortization. Condition 2 is also improbable. Firms engage in exploration of new deposits in response to price signals, largely dependent on demand changes and often deposits grow over or along horizon more or less in conjunction with production. Condition 3 holds only temporarily: as price increases, substitutes for the resource start to emerge or conservation technologies are developed. In essence no one has much of an idea about the backstop price, or the future demand for the use of the resource. Moreover the interest rate itself varies continuously.

Oil prices, to cite a well-known example, have not been increasing at a pace remotely equal to the interest rate, but have fluctuated in response to demand and supply since 1931, when the oil price was low due to the Great Depression and to huge oil discoveries in the Middle East and the USA (mostly Texas and California). Supply overcapacity disappeared during the Second World War, but new discoveries in the Middle East of oil fields that were cheaply exploitable pushed prices down again in the 1950s to 1960s. The success of the OPEC cartel and its embargo in 1973 (triggered by the

Box 1.1 Hotelling's Rule

The optimal extraction rate of an exhaustible resource as posited by Hotelling can be seen as the solution to a profit maximization problem:

$$\frac{\partial X}{\partial t} = Y(t) \tag{2}$$

where X is the stock of the resource and $Y(t)$ is the extraction in each unit of time. The profit is given by

$$\Pi(t) = pY(t) \tag{3}$$

where p is the price of the resource. Future profits must then be discounted. The discount rate in equilibrium is equivalent to the interest rate. Hence the maximization problem, first posed and solved by Hotelling, can be written as:

$$\max \int_0^{\infty} pY e^{-rt} dt \tag{4}$$

where r is the interest rate assumed to be constant over time. The solution that maximizes the present value of total profit is:

$$p_t = p_0 e^{rt}, \tag{5}$$

i.e. the price of the resource grows over time at the exponential rate r. Extraction continues until a price is reached where an alternative technology or a substitute for the resource becomes economically viable. This is known as a backstop price. It is interesting to note that the natural resource endowment is equivalent to holding a bond which yields r until the backstop price is reached.

The rationale of Hotelling's Rule is simple. If we consider a natural resource as a capital endowment, its present value is determined by the discount rate (which in equilibrium, in a riskless world, is equal to the prevailing market interest rate). Hotelling's Rule is therefore a particular case of the general notion that in competitive (and perfectly functioning) markets, returns on all assets, be they financial or real, will be equal.

The rationale can be explained as follows. If the price of the natural resource rises so that the return goes above the rate of interest, producers will increase their supply or new producers will enter the market, and prices will fall back to their long-term equilibrium. If the price rises more slowly than the rate of interest would warrant, then the supply will decrease and the price will rise back to equilibrium. The profit created by resource scarcity in competitive markets is called Hotelling rent (also known as resource rent or, in a Ricardian flavour, scarcity rent).

Israel–Arab war) inflicted a double blow because the monopoly power was compounded by the higher cost to develop and exploit new oil fields outside the Middle East. After the waning of the second oil shock, triggered by the Iranian Revolution in 1979, until 2003 (with the invasion of Iraq), oil prices remained depressed (except for a brief rebound during the first Gulf War), with continued oil discoveries and the slow growth of oil demand. Over the last decade, the growing demand by emerging economies and geopolitical instability led to a surge of oil prices from a range of US$25–30 to well over US$100 per barrel.

Although Hotelling's Rule is not a coherent theory to guide forecasts relevant for the real world, it does provide an abstract benchmark against which to gauge reality. In particular it contains an important reminder for policy makers: consumption of a resource unit today has an opportunity cost equal to the present value of the marginal profit from selling the resource in the future. A decision maker will always face the choice between the increasing value of the resource, if left unexploited, and its current value if extracted and sold.

Even though the marginal profit cannot be precisely calculated – and in practice it varies continuously – this intertemporal trade-off has been the cornerstone of the Permanent Income Hypothesis (PIH), which represents in a sense the evolution of Hotelling's Rule (Box 1.2). The PIH states that individuals base their consumption (and savings) decisions not on their current income, but on the total expected stream of future incomes from employment, investments, inheritance, etc. during their lifespan.[4] Wealth in this context is defined as the sum of the discounted stream of expected future incomes.

Of course there are other options based on different discounting criteria or that take into account real life constraints or that abide by other definitions of fairness. A country that has discovered deposits of natural resources within its territory but lacks funds to invest in extraction facilities can only resort to external borrowing, providing as collateral the future stream of export proceeds, saving part of the revenues until the natural resource is exhausted, and building up a SWF large enough for interest on the accumulated financial wealth to maintain consumption increments in perpetuity. A widely adopted variant of this strategy consists of auctioning the exploration and extraction rights to foreign companies in exchange for a stream of royalties over a predefined period of time.

In reality even countries that would not face any problem in raising funds for the exploitation of their natural resources or that have enough financial means prefer to auction off the rights, because a key problem is the lack of technology and project management skills. A recent case would be Iraq, where

[4] An implication of the PIH is that the choices made by individuals on their consumption patterns are determined not by current income but by their expectations on future incomes. Therefore in a bad year consumption falls less than one would expect because individuals tend to smooth out consumption levels.

Box 1.2 Permanent Income Hypothesis (PIH)

The key intertemporal relation underpinning the PIH states that for an individual (or a community) **optimal consumption in each period is equal to the real rate of return on their wealth.** Translating this principle to a country with an endowment of natural resources, optimal consumption *Ct* in each period *t* can be expressed by the formula:

$$Ct = r\,[Ft + \Sigma\,(Tt + 1 + i\,/(1+r)i))]\ ,\ i \text{ ranging from } 0 \text{ to } \infty \qquad (6)$$

where *Ft* is the value of accumulated (i.e. not spent) net revenues from oil, including interest income, at the beginning of each period *t*; *Tt* is the oil revenue the government expects (net of production costs) in each period *t*; *r* is the real rate of return on oil wealth (assumed to be constant across time).

When applied to a country, the PIH states that the population in each period should consume an amount equal to the rate of return on accumulated oil wealth multiplied by the net present value of expected future wealth. This intertemporal equilibrium rule insures that the current generation shares the proceeds of the natural resources endowment in a way that preserves the endowment for the next generation. We can interpret the PIH as a sort of fairness benchmark in intergenerational transfer.

a large SWF manages the accumulated oil revenues (including those under the Food for Oil Programme managed by the United Nations).[5]

A very prudent approach is the 'bird-in-hand' hypothesis (Bjerkholt, 2002; Barnett and Ossowski, 2003), which posits that all revenues be saved through a SWF and incremental consumption be restricted to the interest earned on the fund. This rule can be interpreted as being equivalent to the PIH, but with the windfall left untouched until it has been fully earned. In other words, the expected imputed interest on the value of the resource still in the ground will be not be spent, but reinvested through the SWF.

A complete account of all the possible optimal rules could probably fill a treatise and it is beyond the scope of this book.[6] Here it suffices to say that the decision on the consumption-saving trade-off over the proceeds from exports of natural resources depends on a wide set of circumstances and collective

[5] During the years of the embargo, Iraq was allowed to sell a minimal part of its oil output and the revenues were channelled into a UN account from which only the funds for basic needs were transferred to the Iraqi government.

[6] An overview covering several interesting cases illustrated through two-period models is contained in Venables (2009).

preferences. SWFs are one, often the main one, of the institutions that implement the strategy adopted.

In the real world there is a continuum of practical solutions and theory rarely guides practice precisely, so it is unlikely that any investment policy will follow strictly one of the abstract models. They ought to be considered as purely illustrative, a sort of benchmark shedding light on the broad implications of various alternatives.

One approach cannot be deemed better than another and it might well be that a country decides initially to adopt a certain rule and shift to a different one at a later stage. For example it might make sense for a poor country once commodity deposits have been discovered to borrow against future revenues in order to jump-start the exploitation. Later, when the investment has been amortized (fully or partially), the country could shift more or less gradually to a PIH policy or something akin to the 'bird-in-hand' approach. We will devote the last section of this chapter to a hypothetical shift of Norway to a Saudi Arabian approach. Furthermore, in the real world one faces sudden changes such as the interest rate profile, the fluctuations in commodity prices, security risks, technological advances that impact the demand for the commodity and so on, and therefore the response needs to adapt to circumstances rather than stick once and for all to a predetermined course.

1.4 COMMODITIES DEMAND AND THE SUPER-CYCLE THEORY

Hotelling's Rule and the PIH are relevant for the supply side. The demand side is even cloudier. We have already pointed out how since 2006 there has been an intensification of the upward trend in all commodity prices. This phenomenon was taken as evidence of a secular relentless increase in the use of natural resources which could not be stopped. Peak oil became a favourite theme on the media and internet. Then in the summer of 2008 oil prices dropped sharply, casting doubt on this sort of argument (Table 1.1). The rebound in 2009 and then another drop (not remotely as sharp as in 2008) in late 2011 is evidence that simplistic views are mostly material for talk shows.

To determine whether the SWFs funded by commodity revenues will remain a powerful force in international finance it is paramount to have an idea of the underlying factors affecting commodity demand. In the Appendix to Chapter 2 we will work out a scenario on the growth of AUM managed by SWFs based on the energy prices projected by the IMF. Here we will focus on a more general outlook for commodity demand.

The more popular explanations for the recent oscillations and upward trend in commodity prices follow two lines of argument: the super-cycle and

Table 1.1 OPEC basket oil price (in US$/barrel)

November 2007	88.84
December 2007	87.05
January 2008	88.35
February 2008	90.64
March 2008	99.03
April 2008	105.16
May 2008	119.39
June 2008	128.33
July 2008	131.22
August 2008	112.41
September 2008	96.85
October 2008	69.16
November 2008	49.76
December 2008	39.53
Average 2008	94.15

Source: OPEC.

speculation. The first emphasizes a long-term phenomenon, the second focuses on short run spells out of line with fundamentals.[7]

Typically during the upward phase of an economic cycle, commodity prices increase and once they start to affect everyday life, e.g. when food prices skyrocket, 'speculation' becomes the preferred culprit. Speculation has no face, no country, no names, so it is the perfect target for a rite reminiscent of the Orwellian two minutes of hatred.

Lately fingers were pointed at commodity index funds which could supposedly earn 'substantial risk premiums', and take advantage of considerable leverage. Combined with the availability of deep and liquid exchange-traded futures contracts, investors shifted from equities and fuelled a dramatic surge in index fund investment. Some described this phenomenon as 'the financialization of commodity futures markets' (Tang and Xiong, 2010). Given the size and scope of commodity index funds, for many it followed that they were the prime suspects in the supposed speculative moves that pushed up energy and other commodities' prices. Time and again though, since the onion futures market suppression in the 1950s, following the trails of speculators have always proven difficult. Never mind that for anyone who speculates (i.e. bets) on a price increase there must be someone who speculates on a price decrease, otherwise there would be no trade. Despite the large average position size, the total size of index funds within a given market is not overwhelming. Academic studies and official commissions, routinely appointed to find the smoking gun, have rarely produced conclusive evidence. One of the most extensive recent papers (Irwin and Sanders, 2010), using new data and empirical analysis, found that index funds are not responsible for a bubble in commodity futures

[7] Another name often evoked on media and in academic literature is 'bubble'.

prices: 'There is no statistically significant relationship indicating that changes in index and swap fund positions have increased market volatility. The evidence presented here is strongest for the agricultural futures markets because the data on index trader positions are measured with reasonable accuracy'.

If speculation is not a major factor in commodity prices, it follows that fundamental forces are at work. There has been a large body of literature both in academia and among market analysts that points to a 'super-cycle' in commodities driven by emerging markets, which is likely to continue in the foreseeable future (Standard Chartered, 2010). Apart from the obvious effect on commodities demand from the growth of emerging markets, a more specific impulse is attributed to urbanization, which is one of the main ramifications of the secular shift in economic centre of gravity. Urbanization constitutes a commodity-intensive process and, historically, commodity consumption has significantly increased as annual per capita income approaches a level deemed 'middle class'. City dwellers have higher per capita incomes, consume more goods, use more energy and have a diverse protein-rich diet, leading to a higher demand for soft commodities such as grains as well as metals.

According to data from the United Nations,[8] the percentage of the world's population living in urban locations in 2008 exceeded that in rural areas for the first time in human history. This shift is projected to accelerate. By 2030 the world will have almost five billion city dwellers, with urban growth concentrated in Africa and Asia. China alone has about 170 urban areas exceeding one million people – and this number will grow through massive migration from the countryside over the next few years. To give a comparative figure in Europe, only 35 cities reach one million inhabitants. The same process is underway in India – albeit at a slower rate. India, according to UN projections, might be 15 years behind China, in terms of demographics dynamics.

The notion of a long-term cycle was highlighted at the dawn of modern economics by Kondratiev (1925) who extensively studied the price series across the nineteenth century of variables such as wages, interest rates, raw material prices, foreign trade and bank deposits. The Kondratiev waves (also called great surges, long waves, K-waves, long cycles and the now fashionable super-cycle) were described as regular sinusoidal-like cycles with a period of roughly 30 years. Kondratiev's and similar theories on regular secular cycles have not enjoyed widespread acceptance as an elucidation of how economic forces work. The wave of commodity prices surge in the second half of last decade has brought back the interest.

At the heart of the super-cycle lies the idea that all commodities and most other price movements are synchronized. Nevertheless commodities prices behave rather differently even during a long wave for a number of reasons: for some it is easier to increase production, others require specialized transportation facilities, others might be affected by security problems or conflicts,

[8] United Nations Population Division. http://www.un.org/esa/population.

etc. Today's technology and logistics are quite different from the nineteenth century which Kondratiev examined.

Oil offers an interesting historical perspective. When it became a major energy commodity around the 1860s, oil production was marred by over-exploitation which led to depletions of reservoirs, and therefore its price was subject to notable volatility. Price controls and two world wars reduced these effects and until 1973 the price remained fairly stable. Wheat prices also varied during periods when other commodities surged. For example the drop in transport costs caused by the spread of the steamships, combined with the gush of American production in the late nineteenth century, tended to depress prices. In the period after the Second World War, the 'green revolution', i.e. the use of improved seeds and fertilizers across the world, boosted production and dampened prices.

A venerable tool describing the effect of demand on prices for commodities with a fixed short-term supply is called the cobweb model (or cobweb theorem) by Kaldor (1938). As usual, reality might be much more complicated, but essentially the cobweb theorem underscores that the super-cycle hypothesis relies on a slow adjustment of supply to demand (see Box 1.3). This might be true more for some metals, oil or rare earths, but agricultural production should correct any major imbalance after a few years. In fact food commodities prices in 2011 retrenched markedly.

For oil and gas, whose exports provide the bulk of fund into several SWFs, making a prediction is not much simpler. Hydrocarbons will maintain their dominant role in the energy supply mix despite the doomsters' refrain that oil will be exhausted in 30 years. This prediction actually remains unaltered since 1970 when the Club of Rome first brought the alarm over the depletion of natural resources to the attention of the wider public. In mid-2008, the media were full of articles on the peak oil theory, and predictions of oil prices at US$200 per barrel made headlines. The frenzy later abated, but the expectation that hydrocarbon reserves are dwindling is still widespread. In reality new discoveries continue to be made, but the extraction costs are increasing because new deposits lie deeper or in a testing environment, often underwater.

Box 1.3 The cobweb theorem

In the basic model of supply and demand, the price adjusts so that the quantity supplied and the quantity demanded are equalized. The precise mechanism that achieves this equilibrium is not always explicit, because essentially it is postulated that supply and demand adjust instantly. In reality if a shock disrupts an equilibrium and as a consequence the total quantity demanded and sold in the market is Q_1 at price P_1 (see Figure 1.2), how will equilibrium be restored? In the short term, supply is fixed so no adjustment can take place. The following year producers will base their production on

P_1 and therefore produce Q_2. But at Q_2 the price buyers are willing to pay is P_2, i.e. much lower than P_1. As a result in the third year producers will adjust production at Q_3 which leads to a price P_3 and so on, until after a few years the equilibrium is restored. The right panel of Figure1.2(a) depicts the time series of the commodity price as it converges to equilibrium. A crucial condition for this convergence is that the slopes of the demand and supply curve are different (if they were the same the process would never reach P_{EQ} but would oscillate endlessly). Specifically, if the supply line is steeper than demand line the process converges. Otherwise the commodity price would spiral out as shown in Figure 1.2(b).

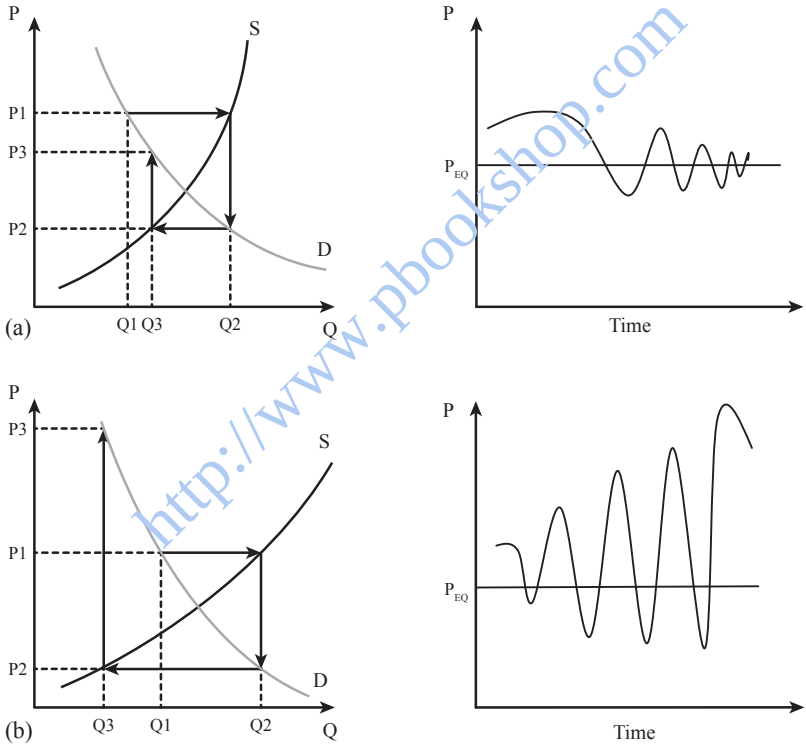

Figure 1.2 The cobweb theorem. (a) Convergent case when the supply curve is steeper than the demand curve. The fluctuations decrease in magnitude with each cycle, so a plot of the prices and quantities over time would look like an inward spiral. (b) Divergent case when the demand curve is steeper than the supply curve. The fluctuations increase in magnitude with each cycle, so that prices and quantities spiral outwards.

Source: http://en.wikipedia.org/wiki/Cobweb_model

Natural gas offers a dramatic and fresh example of how faulty predictions might turn out to be. Until 2008 gas prices were tracking oil prices. Then in 2009 vast discoveries of shale gas in the US and other parts of the world led to a dramatic price drop. In the US, infrastructure for the import of gas had to be transformed into infrastructure for the export of gas. As a result the price dropped and it still remains depressed in the US compared to the 2008 peak.

In conclusion, the evidence that we are experiencing a 'super-cycle' in all commodities is not overwhelming. It is more likely that over the past decade demand pressures combined with a slow supply response has pushed the price of key commodities to a new plateau. Depending on the speed of supply adjustment or the difficulty of extracting in more extreme locations, commodity prices will follow different long-term dynamics. A scenario of ever-increasing commodity prices worldwide seems at odds with economic theory and history lessons.

1.5 SWFs AS ALTERNATIVE TO AN INCOME TAX SYSTEM: WHAT IF NORWAY BECOMES LIKE SAUDI ARABIA?

In section 1.3 we argued that the exploitation of natural resources could follow various patterns. One course of action cannot, in abstract, be judged superior to others. Ultimately it is a matter of political decisions or collective choices.

Norway and Saudi Arabia (or other countries in the Arabian Gulf) provide two opposite real-life paradigmatic illustrations. The oil deposits under the North Sea were discovered when Norway was already one of the most advanced and prosperous economies in the world, had a modern tax system with a renowned welfare system and stable institutions that had been in place for centuries.

When the windfall started to accumulate, it was decided to save most of it without fundamentally altering the lifestyle of the population and the structure of the economy (apart from the development of the energy extraction sector). In practice it was decided to transfer most of the wealth to future generations. The Norwegian government instituted the ultimate FWF, which has recently been transformed into a pension fund that does not require periodic contributions from the beneficiaries.

By contrast, the discovery of oil under the Arabian sands came at a time when the country, under the influence of the British Empire, had a small (predominantly nomadic) population barely above subsistence. Herding camels or goats, fishing, date cultivation and pearl trading were the most common activities.

The oil windfall in Saudi Arabia and the rest of the Arabian Gulf was used to lift the population's standards of living and, especially after the bonanza

following the first oil shock in 1973, it was increasingly destined to improve infrastructure, housing and expand the ranks of public employees.

Saudi Arabia and the other Gulf States do not currently have an income tax system and therefore the oil revenues finance all government functions and several welfare programmes for the citizens. In recent years, benefitting from a considerable increase in the prices of hydrocarbons, all Gulf countries to different degrees have embarked on a sustained programme of economic diversification to prepare for when the oil reserves will be exhausted. The Emirate of Dubai was the first and most aggressive in the pursuit of this strategy.

Would it make sense for Norway to become like Saudi Arabia or Qatar? Certainly one could argue that investing considerable oil revenues in financial assets is not exactly a wise choice, considering the parlous state of the world economy and the risks of catastrophic events such as a break-up of the euro. Furthermore, sovereign debts are skyrocketing to a point at which it would be too tempting for government to inflate away the problem. How smart could it be accumulating fixed income securities for long-term wealth preservation? Likewise the financial crisis of 2008–09 shows that the faith in ever-increasing equity valuations is misplaced and long periods of falling or stagnating stock prices in real terms or widespread bankruptcies are not uncommon.

Actually, if we take the data on the eight decades since 1929, we observe that, in three out of eight, stock returns have been nil or negative in the US. This is not really encouraging if one considers that this record was achieved by the country whose economy dominated the twentieth century.

So one could argue that to provide a pension for future generations, a more attractive alternative to financial assets is investing in human capital and research. It would make more sense for the Norwegian government to fund research, make life more pleasant in the vast, sparsely populated North, expand the high- value added sector through venture capital initiatives, attract talent and labour from abroad on a scale comparable to that occurring in the Gulf, doubling the population over, say, a decade. Boosting demographics and human capital could prove a more successful long-term strategy than counting on expectations of hefty financial returns.

Sceptics might look back at Japan in the 1980s and the huge surplus it accumulated in financial and real estate assets: it is not so far-fetched to assert that it would have been wiser to expand the economy by allowing more immigration rather than buying large swathes of California and the Rockfeller Center at inflated prices.

In Switzerland, a debate along these lines was triggered by the proposal to launch a SWF, given that the country is experiencing a flood of foreign capital in no little part due to fears of a Eurozone dissolution. Those opposing such a proposal have rightly (in our view) argued that for a country like Switzerland it would be preferable to lower taxes or boost research expenditures rather than invest money abroad. It would be paradoxical that while foreign investors take

their savings to Switzerland exactly because they feel it is a safe haven, the Swiss authorities would take this money and invest it abroad.

In conclusion, developed countries that are blessed with a sizeable endowment of raw materials could be better off boosting their own economic potential, giving incentives to invest domestically or attracting human capital from outside rather than exacerbate the current account imbalances.