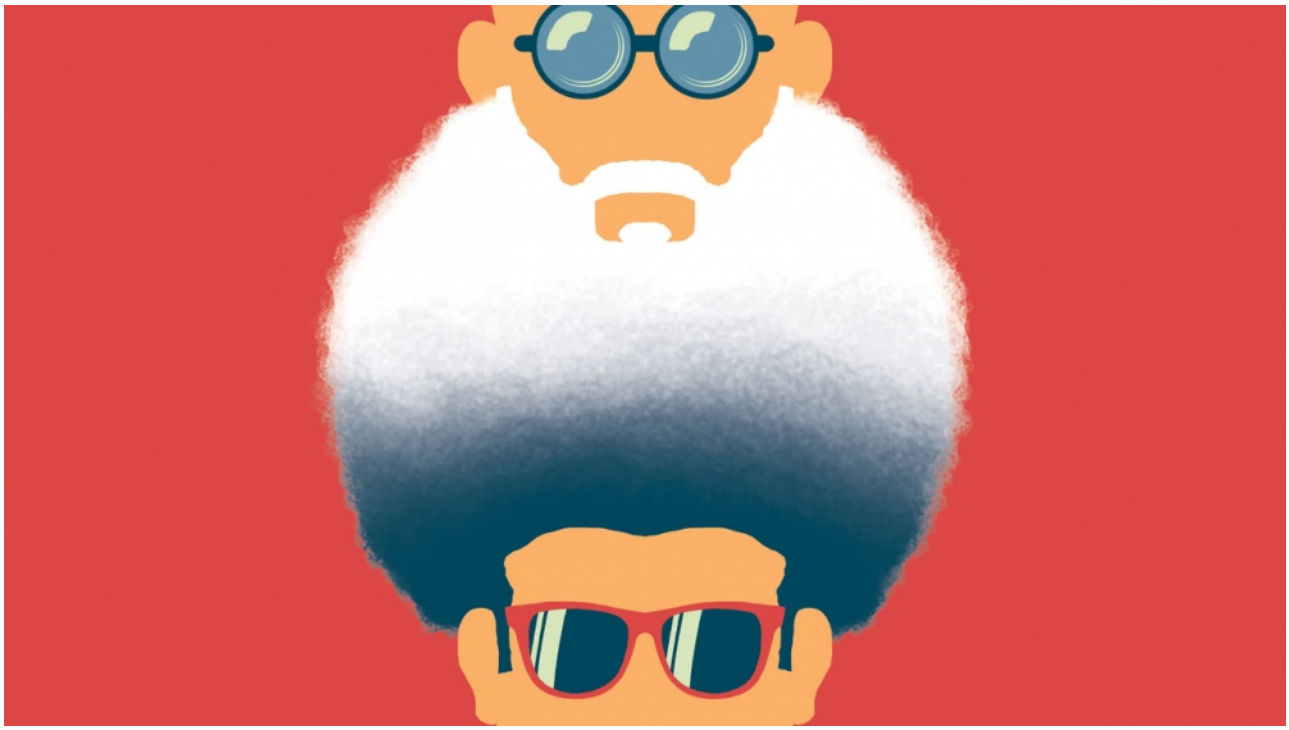
Overlapping generations

Kicking the can down an endless road

The final brief in our series on big economic ideas looks at the costs (and benefits) of passing on the bill to the next generation



Print edition | Economics brief Aug 31st 2017

IN THE spring of 1899 William Miller persuaded three members of his Brooklyn prayer group to invest their money with him, promising them unearthly returns. He would pay a dividend of 10% per week, plus a commission for each new investor they could recruit. Soon, William "520%" Miller was drawing throngs of depositors to his door. So "great was the crush", by one account, his staircase eventually gave way. Miller attributed his success to "inside information". But his real method was made famous 20 years later by the man who perfected it, Charles Ponzi.

Ponzi schemes like Miller's pay a return to early investors with money raised from later ones. When they run short of new contributions, they collapse. A scheme as generous as Miller's cannot last long. But what if the promises were less extravagant and the repayment intervals less tight? What if, for example, a scheme asked investors for money in their younger years in return for a payout in their dotage? Over that time scale, a Ponzi scheme need not limit its recruitment efforts to the people alive when it begins. It can repay today's contributors with money from future participants not yet born. And since the next generation is never likely to be the last, the chain could, in principle, continue indefinitely. Barring a catastrophe, new marks will be born every day.

This intergenerational logic lies behind the "pay-as-you-go" (PAYG) pensions common in many countries. People contribute to the scheme during their working lives, and receive a payout in retirement. Many people fondly imagine that their contributions are saved or invested on their behalf, until they reach pensionable age. But that is not the case. The contributions of today's workers pay the pensions of today's retirees. The money is transferred between generations, not across time.

America's Social Security, for example, is largely pay-as-you-go. For this reason, its critics often compare it to a Ponzi scheme in order to discredit it. But the comparison can also work the other way. If Social Security—a venerable entitlement that has spared millions from penury—bears some resemblance to a Ponzi scheme, then perhaps Ponzi principles are not always as diabolical as the name suggests.

In some cases, those principles might indeed redound to everyone's benefit. One such scenario was sketched by Paul Samuelson of the Massachusetts Institute of Technology in 1958. His thought experiment is easiest to understand when recast as an island parable (along lines suggested by Laurence Kotlikoff of Boston University). The island in this parable is home to unusually tall cacao trees, hungry people, and little else. Only the young can climb the trees and pick the fruit, which

must be eaten quickly before it spoils in the hot sun. And only two generations (young and old) are alive at the same time.

On such an island, the elderly have no way to provide for themselves. They are physically incapable of picking fruit. They cannot buy fruit from the young, because they have nothing to offer in exchange. Nor can they live off any cacao pods saved from their youth, because their stockpile will have rotted by the time they are old. There are no durable, imperishable assets that might serve as a vehicle for their thrift.

The solution, of course, is an intergenerational Ponzi scheme. The young give fruit to the old on the understanding that the next generation will do the same for them when they grow frail. In effect, the young lend to their parents and collect repayment from their children. In so doing, they serve as a link between two generations that never otherwise coexist.

Great minds overlap

The scheme works, Samuelson pointed out, only because "new generations are always coming along". If reproduction were ever to cease, the last generation would get nothing out of the scheme. Knowing this, they would not put anything in. But their failure to contribute would also deprive the penultimate generation of a payout, leaving them no reason to take part either. Any anticipated future break in the chain causes the whole thing to uncouple. If the scheme must ever end, it cannot even start.

Samuelson's paper was seminal but not wholly original. A similar model was described in 1947 by Maurice Allais, then working in a bureau of mining statistics in Paris, but his contribution had the "misfortune to be written in French", as one scholar has noted. The neverendingness of these models plays havoc with a lot of economic common sense. Economists know in their bones that budget constraints eventually bind and that accounts must be settled at the end of the day. But what if the end never quite arrives?

Such parables may seem too contrived to be illuminating. Surely the islanders benefit from a Ponzi scheme only because the story arbitrarily denies them any way to save for their future. If the young could instead acquire a durable asset, they

could take care of themselves in their old age by selling it for the things they need. Instead of eating a cacao fruit, islanders could plant it to grow a new tree, which they could later rent or sell to young climbers when they retire.

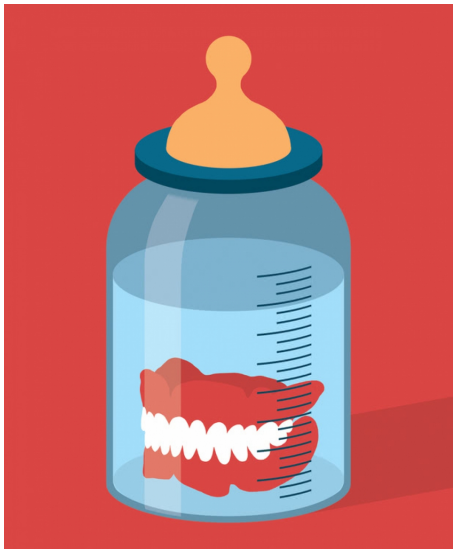
In most cases, this kind of saving and investing does indeed serve people far better. Capital accumulation enlarges the economy's productive capacity, thereby creating wealth, unlike Ponzi schemes, which merely spread it around. Saving and investing both store value and add to it, turning one cacao fruit into a whole tree. Retirees can therefore expect to get more out of their investment than they put in.

In some unusual cases, however, other factors may weigh in the Ponzi scheme's favour. First, saving and investing may run into sharply diminishing returns. If a society is eager to transfer resources into the future, it will accumulate a large stock of capital, which may depress the return on further investment. Think of an orchard too densely packed with trees, each getting in the others' light and denuding their soil.

A second consideration is demography. A growing population creates a natural pyramid scheme. Each cohort of participants will receive the money contributed by a later, larger generation. Therefore they too can get more out of it than they put in. Future generations may also be better off than their predecessors. They may benefit from sources of economic advance (such as improved technology) over and above simple capital accumulation. This march of progress should allow a Ponzi scheme to pay a positive return to investors even if the scheme only takes a constant percentage from each generation's income. Thanks to economic growth, 10% collected from the incomes of today's young will be worth more than the 10% collected in the past from their parents' poorer generation.

To make things concrete, suppose a country's population grows by 1% a year and incomes per person grow by 4%. In this case, a Ponzi scheme can offer an annual return of about 5% indefinitely, simply by taking a steady share of each generation's income. If the economy already has a large stock of capital, the return on saving and investing might be less than that, especially given the risk involved. Such an economy would suffer from what economists call "dynamic inefficiency". In these circumstances, an intergenerational Ponzi scheme can be sustainable and desirable.

A PAYG pension is only the most obvious example of such a scheme. Government debt can play a similar role (a possibility entertained by Peter Diamond of MIT in a 1965 paper building on Samuelson's insights). If the government does not want to extract social-security contributions from the young, it can sell them long-term bonds instead. When these bonds mature, the government can repay them by selling a fresh round of bonds to the next, richer generation.



A third, more anarchic way to transfer resources from young to old is a speculative bubble. In a bubble, people pay over the odds for an asset, such as a house, in the belief that subsequent investors will pay a higher price still. The overpayment amounts to a contribution to a Ponzi scheme, redeemed not by the earnings of the underlying asset, but by overpayments from later investors. If each generation is collectively richer than the last, then the asset's price can keep rising even if each buyer sinks only the same percentage of their (rising) income into it.

The younger-fool theory

All these mechanisms have side-effects. Government debt can crowd out productive investment. Bubbles can do the same. But in an economy suffering from dynamic inefficiency, this crowding out is a good thing. Such an economy has accumulated too much capital. It requires heavy investment to keep this large stock of machinery, equipment, buildings and infrastructure growing in line with the economy. The young are tempted to add yet more capital in an effort to transfer resources to their future, older selves. Yet because the returns are so low, it is more efficient for them to transfer resources directly to today's elderly (by contributing to social security, buying government bonds or overpaying for the old people's assets), on the understanding that tomorrow's young will do the same for them.

Under certain conditions, then, Ponzi principles are efficient not maleficent. But are those conditions ever found in the real world? One way to look for them is to compare interest rates (which represent the return on capital) and GDP growth rates (which reflect both population growth and increases in income per person).

An alternative, stiffer test (which works well under certain assumptions) is to compare investment and profits. If national investment is greater than profits, a country is ploughing more into its stock of capital than it earns from it. It is as if the islanders are replanting all of the fruit they collect from the additional trees they have cultivated (minus whatever fruit they need to compensate themselves for their labour) plus a few more. The economy's efforts to save and invest for the future are overloading the available vehicles for thrift.

Economists used to be confident that most economies were on the right side of this test, earning far more in profit than they invested. Recent research is less definitive. François Geerolf of the University of California, Los Angeles believes that Japan suffers from dynamic inefficiency. And he cannot rule out the possibility that all the G7 countries (and nine others) suffer similarly. If so, the implications are provocative. They imply that G7 public debt is soaking up money that would otherwise be spent on further augmenting an overbuilt capital stock. Insofar as the proceeds of this government borrowing are spent on health care and pensions, the elderly benefit disproportionately. Perhaps, then, G7 public debt is diverting unfruitful efforts to provide for the future into providing for the elderly instead.

Several scholars, including Qian Liangxin of Anhui University, also point out that China often ploughs more into its capital stock than it earns from it. At China's stage of development, this may not be a bad thing, because the economy's capital-intensity is still in flux. But the combination of fast growth and repressed returns on saving may help explain why China is so prone to speculative bubbles, especially in property. Working-age Chinese overpay for houses, many of which stand empty, on the assumption that they will sell them at higher prices—not to a greater fool necessarily, but to a younger, richer one.

William Miller's proto-Ponzi scheme lasted less than a year. His banks (including the Hide and Leather National Bank Of New York) closed his accounts and newspapers hounded him. He fled to Canada (eluding one pursuer by ducking into a Chinese laundry, according to Mark Gribben of the *Malefactor's Register,* a blog) before the police eventually caught up with him. But he never actually ran out of investors. Even as he was escaping the country, envelopes addressed to his

syndicate piled up at the post office, filled with contributions from the next generation of believers.