WHAT IF...
HILLARY CLINTON IS PRESIDENT
RUSSIA BREAKS UP
THE YUAN RIVALS THE DOLLAR
DRIVERLESS CARS RULE THE WORLD
AN ASTEROID HEADS FOR EARTH...
The World If is a companion to our annual compilation of predictions for the year ahead, The World In… The difference is that these are not forecasts but scenarios. We explore what could happen (or, in the case of China’s revolution, what might have happened) given certain assumptions. Just suppose…

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If Hillary Clinton is president  
The first 100 days

WASHINGTON, DC, APRIL 29TH 2017

She won the election by leaning right on national security and left on the economy. Now comes the fallout

A MErica’s first woman president won last November by taking two large risks, transforming an election campaign that had seemed to be slipping away from her. One of those gambles, her hard-edged response to the Cuban-refugee crisis and post-Castro turmoil on that island, may yet pay off for her. The second, her populist “Contract with the Middle Class”, has hit early turbulence, bogging down the rest of her domestic programme.

One hundred days into Hillary Clinton’s presidency, pundits have been quick to note the irony. A politician long called overly cautious has spent her first months in office dealing with the fallout from acts of campaign-trail boldness. The 45th president this week tried to laugh off reports that her husband, Bill Clinton, told a private gathering of Silicon Valley bosses that “all this stuff is costing Hillary her honeymoon as president.” The First Gentleman says that he was misquoted. Mrs Clinton began a White House lunch with women senators by joking: “This president came here to work, not have a honeymoon.” But Mr Clinton is right. Most presidents arrive in office able to set the agenda, at least for a while. This president is being buffeted by events.

Start with Cuba, epicentre of the crisis that so destabilised the presidential campaign of Mrs Clinton’s Republican rival, Marco Rubio. It has been months since TV screens were filled each night with scenes of American coastguard and naval ships pulling desperate balseros (rafters).
from the sea. A recent Gallup poll showed that 74% of Americans now support Mrs Clinton’s policy of suspending all applications for asylum by Cubans, at least while talks continue on freeing elections on the island. Since taking office Mrs Clinton has not wavered from the line that she adopted as a candidate last October, as the Castro era came to a chaotic and unexpectedly rapid end. As she said in a presidential debate with Mr Rubio: “There are ten Cubans. They deserve a free and prosperous homeland, not empty promises that they can all move to America.”

To this day Mr Rubio’s admirers accuse Mrs Clinton of using a “racist” strategy to drive a wedge between Cuban-Americans and other Hispanic voters. They are especially angry with Vice-President Tim Kaine, a former governor and senator from Virginia who learned Spanish as a missionary in Central America, for his declaration on the campaign trail that “Cubans deserve our sympathy, but they are not our only neighbours”—a line that Republicans called blantly pandering to Mexican-Americans.

Now, with the election a distant memory, Republicans in Congress remain divided over the other half of Mrs Clinton’s outreach to Latinos: her promise to send a comprehensive immigration bill to Congress during her first year in office.

**Something’s gotta give**

With the Senate divided 50-50, giving Democrats a tiny edge when Mr Kaine casts a deciding vote as vice-president, and the House still firmly controlled by Republicans, Mrs Clinton will need bipartisan support (indeed a miracle, some would say) to get any bill passed. Optimists argue that Republicans simply cannot ignore America’s growing diversity. Mrs Clinton not only held Mr Rubio—the first Latino presidential candidate—to 35% of the Hispanic vote, she narrowly defeated him in Florida, his home state. In his dignified concession speech Mr Rubio reminded his party that almost a million American teenagers of Hispanic origin reach voting age every year, giving Latinos and other immigrants a voice that “cannot be ignored”.

Optimists also point to Mrs Clinton’s pragmatic streak. She has wooed moderate Republicans by ditching her election promise to seek full citizenship for undocumented migrants now in the country. Legal status is already a huge advance for those living in the shadows, Mrs Clinton says.

Pessimists argue that Mrs Clinton’s relations with Congress are souring faster than expected and Congress to find reasons for mutual suspicion. Audible mockery greeted the arrival in the Senate of a new, appointed senator from Virginia, to fill the vacancy left by Mr Kaine’s election as vice-president. The interim appointment was in the hands of Virginia’s governor, Terry McAuliffe, who duly chose himself. Senator McAuliffe will need to seek direct election at the next general election in 2018 if he decides to remain in Congress. Until then even some Democratic senators have questioned their new colleague’s past as a chief fundraiser for Bill Clinton. “Don’t enough Americans think we are all bought and paid for?” asks a centrist Democrat.

Such ill-will will do little to help the Contract with the Middle Class. Mrs Clinton delighted Democrats by backing a rise in the federal minimum wage to $15 an hour and calling for working mothers to enjoy two months’ paid leave after giving birth or adopting a child. Amid Republican cries that she would lead America down a “European” path to bankruptcy, few voters examined the contract’s fine print.

The scrutiny has started now. Walmart, America’s largest private employer, said in March that it might have to automate many checkout lines in its stores if the federal minimum wage was raised to $15, well above the $10 that the store currently offers its lowest-paid staff. A report by the non-partisan Congressional Budget Office (CBO) gave warning that in the short term a higher federal minimum wage might cost as many as 1.2 million jobs. The White House pointed to the report’s predictions of more benign long-term effects, as higher salaries led to more consumer spending. But the CBO report could be ready-made for makers of TV attack ads.

The president’s plans for paid maternal leave are also in doubt. Asked to explain the origins of her pledge, a former campaign strategist for Mrs Clinton calls it “nuts” that America, unusually among rich countries, does not offer a nationwide right to maternity leave. “Also, we were losing the election,” adds the strategist, noting that almost as soon as the plan was unveiled, Mrs Clinton’s vote share grew sharply among married women voters.

**It’s complicated**

The Contract with the Middle Class calls for the costs of maternity leave to be met by a new quasi-insurance fund, with contributions from employees (capped for the low-paid) and employers (with special breaks for small businesses) as well as tax credits from the federal government. Even some Democrats privately deride the scheme as absurdly complicated.

The rest of Mrs Clinton’s domestic programme is pretty cautious, even dull. An early ambition is to reform the tax code, modestly, with new revenues going to early-childhood education. There is talk of an infrastructure bank to fund new roads, bridges and smarter electrical grids.

Even Washington’s over-cafeinated pundits are not about to write Mrs Clinton’s political obituary, just months into her presidency. But in an age of gridlock there is a price to be paid for making bold promises on the campaign trail. The first 100 days of an American presidency are not what they once were.
If Russia breaks up
The peril beyond Putin

MOSCOW
The world rightly worries about the prospect of a Greater Russia. But a Lesser Russia could be just as troubling

UNDER Vladimir Putin's presidency, Russia is seen in the outside world as an expansionist power trying to revise post-Soviet borders and rebuild an empire. But what if Russia itself—a country of nearly 200 nationalities that stretches across 11 time zones—is in danger of crumbling?

It would not be the first time that Russia tried aggression and expansion as a defence against modernisation and by doing so undermined its own territorial integrity. In 1904, when Russia was on the verge of a revolution, Nicholas II attempted to stave off change by looking for national traitors and starting a small war with Japan. The war ended a year later in Russia's defeat and disintegration of the country—is not as far-fetched as it might seem.

Yet there was no reason why the process had to stop there. Indeed, many of Russia's regions—including Siberia, Ural, Karelia and Tatarstan—declared their sovereignty at the time. To prevent further disintegration Russia's then president, Boris Yeltsin, came up with the idea of a federation, promising each region as much sovereignty as it could swallow. Yeltsin made this promise in Kazan, the ancient capital of Tatarstan, which acquired many attributes of a separate state: a president, a constitution, a flag and, most important, its own budget. In exchange, Tatarstan promised to stay part of Russia.

Mr Putin has reversed federalism, and turned Russia into a centralised state. He cancelled regional elections, imposed a “presidential” representative over the heads of governors and redistributed tax revenues in Moscow's favour. But he did not build common institutions. The Russian state is seen not as an upholder of law but as a source of injustice and corruption.

In the words of Mikhail Lampolski, a historian, Russia at present resembles a khanate in which local princes receive a licence to rule from a chief khan in the Kremlin. For the past decade the main job of the Moscow-appointed governors has been to provide votes for Mr Putin. In exchange they received a share of oil revenues and the right to rule as they see fit. Chechnya under Ramzan Kadyrov, a former warlord installed by Mr Putin, is a grotesque illustration of this. In the most recent presidential election, Chechnya provided 99.7% of its votes for Mr Putin with a turnout of 99.6%. In return, Mr Kadyrov receives subsidies and freedom to subject his people to his own “informal” taxes and Islamic rules. Moscow pays a dictatorial and corrupt Chechnya a vast due in return for Mr Kadyrov pretending to be part of Russia and pledging loyalty to Mr Putin.

If Mr Putin goes and the money runs out, Chechnya could be the first to break off. This would have a dramatic effect on the rest of the north Caucasus region. Neighbouring Dagestan, a far bigger and more complex republic than Chechnya, could fragment. A conflict in the Caucasus combined with the weakness of the central government in Russia could make other regions want to detach themselves from Moscow's problems.

Tatarstan, home to 2m Muslim ethnic Tatars and 1.5m ethnic Russians, could declare itself the separate khanate it was in the 15th century. It has a strong identity, a diverse economy, which includes its own oil firm, and a well-educated ruling class. It would form a special relationship with Crimea, which Crimian Tatars (at last able to claim their historic land) would declare an independent state.

The Ural region could form a republic—as it tried to do in 1993—around Yekaterinburg, Russia's fourth-largest city, or else it could form a union with Siberia. Siberia itself could revive its own identity, from a base in the cities of Krasnoyarsk and Irkutsk, and lay claim to its oil-and-gas riches, which it would sell to China. Unlike Russia, China might not have much interest in territorial expansion into the sparsely populated Far East and Siberia, but it could (and already does) colonise these regions economically via Vladivostok and Khabarovsk, two of the largest cities in the Far East, are more economically integrated with China and South Korea than they are with the European part of Russia.

Things fall apart—with nukes inside
Despite Russia's deep paranoia that America is trying to break it up, such a scenario is one of the West's worst nightmares. It opens the question of control over Russia's nuclear arms. Although the command centre would remain in Moscow, securing missiles spread across Russian territory could be harder than it was after the collapse of the Soviet Union. At the time, the Russian
Russia’s aggression in Ukraine has given NATO both a new sense of purpose and a new kind of threat: “hybrid” warfare. The alliance’s military analysts have been working on “detailed, granular” but secret plans for a range of crisis scenarios.

The overarching assumption is that Russia’s president, Vladimir Putin, flushed by the success of annexing Crimea and stirring separatism in eastern Ukraine, the Kremlin introduced a law which makes “incitement of hatred” a criminal offence. Yet the greatest threat to Russia’s territorial integrity is posed by the Kremlin itself and its policies in Ukraine.

By breaking the post-Soviet borders, Mr Putin opened a Pandora’s box. If Crimea “historically” belongs to Russia as he has claimed, what about Kaliningrad, the former Königsberg, an exclave which Germany lost to Russia after the second world war? Should not eastern Karelia, which Finland ceded to the Soviet Union after the winter war in 1940, be Finnish and the Kuril Islands return to Japan?

Even more perilously for Russia’s future, Mr Putin brought into motion forces that thrive on war and nationalism. These are not the forces of imperial expansion—Russia lacks the dynamism, resources and vision that empire-building requires. They are forces of chaos and disorganisation. Eastern Ukraine has turned into a nest of criminals and racketeers. They cannot spread Russian civilisation, but they can spread anarchy.

In short, Russia under Mr Putin is much more fragile than it looks. Vyacheslav Volodyin, his deputy chief of staff, recently equated Mr Putin with Russia: “No Putin, no Russia,” he said. It is hard to think of a worse indictment.

If a NATO member comes under attack
Article of faith

How the West would recognise, and respond to, a Russian offensive

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SUPPOSE THE NOSE KNOWS

EVERY NATION DESERVES TRUSTWORTHY LEADERS.

WHAT IF PEOPLES NOSES ACTUALLY GREW WHEN THEY LIED?

LEADERS' TRUSTWORTHINESS COULD BE EFFICIENTLY MEASURED.

THIS WOULD HAVE A PROFOUND IMPACT ON ELECTIONS:

AS I SAID, ANGELA, THERE ARE NO RUSSIAN TROOPS IN UKRAINE.

MAINTENANCE STAFF AT GOV'T BUILDINGS...

AND INTERNATIONAL AFFAIRS...

WOULD BE BUSY...

DESIGNING NEW BARRIQUES WOULD BE DIFFICULT...

THE MEDIA WOULD ALSO BE IMPACTED...

WE HAVE THE UTMOST RESPECT FOR ALL CITIZENS PRIVACY.

...LONGER LIMOS NEEDED FOR TABLOID NEWS EXEC'S...

HOLLYWOOD WOULD LAUNCH A NEW LINE OF COSMETIC SURGERY...

ALL OF SOCIETY WOULD BENEFIT:

HONEST BOSS'S USED CARS

IT'S A PIECE OF JUNK AND YOU WANT ME TO PAY THIS!

THE NEWS OF THE NOSE WOULD TURN NAZI!!

POLITICIANS...

MARRIAGES WOULD MELT:

DO YOU LOVE ME?

DO YOU HAVE PROTECTIVE GLASS?

THESE CARS WOULD BE MORE HATED THAN EVER!

DIPLOMACY...

WOULD DISSOLVE... DOOMING US TO APOCALYPSTIC DISASTER!!!

WHOSE CRAZY IDEA WAS THIS ANYWAY???

NOT YOURS.
If the yuan competes with the dollar

Clash of the currencies

SHANGHAI

The yuan’s rise will challenge America, but not before China changes

W

hen will the yuan rival the dollar? Many in China think it only a matter of time. Chen Yulu, a leading economist, says it will take 15 years. Wei Jiangguo, deputy head of a major think-tank, puts it at 20. Officials are more circumspect: currency internationalisation will be a long process, its pace determined by the market, says Zhou Xiaochuan, the central-bank governor. Outside China, opinions are more divided. Some think the yuan is already on the verge of displacing the dollar in Asia; others predict it will never get there.

What difference would it make if China’s currency did vie with the dollar for global pre-eminence? Scholars have looked for clues in the transition from the pound to the dollar, but that took place around the middle of last century in a very different context. The dollar and the pound were both convertible into gold at fixed rates, making the leap of faith for those switching from one to the other much less of a risk. Today, reserve currencies are not backed by gold. Their value is more slippery—a function of supply and demand.

What is more, the shift from the pound to the dollar reflected a passage of economic power, one that had started many decades earlier, between two allies with shared democratic values and economic ideas. China’s leaders talk of the yuan’s internationalisation in peaceful terms. A more diverse monetary system will breed financial stability for the world, they say. But China’s rise poses a bigger threat to America than America’s did to Britain. For all the paeans to mutually beneficial development, China is a possible adversary, governed by an autocratic regime with a statist approach to the economy.

Some in China thus take a darker view of how competition between the yuan and the dollar will play out. Song Hongbing, author of “Currency Wars”, a conspiracy-laced series of books, foresees America fighting the yuan every step of the way. That has been shown to be wrong, so far. Over the past five years China has built a network for yuan-trading around the world, and America has not tried to thwart it. But a glimpse of the potential for conflict came last year when America tried, unsuccessfully, to persuade its allies to stay out of the Asian Infrastructure Investment Bank, launched by China. America is pushing for a Pacific trade deal that excludes China. And it is striking that among the many yuan-trading hubs established by China, from London to Singapore, the one glaring hole in the network is New York.

America has good reason to worry about the yuan. Its emergence as a credible alternative to the dollar would undermine a cornerstone of American power. Sanctions against Iran and North Korea have had bite because of the dollar’s centrality to global finance. Some 45% of all cross-border transactions are denominated in dollars. So any bank with international business needs access to the American banking system, to clear payments or manage cash. And for that it needs an American licence, which means it had better heed the sanctions. China knows how potent this is. In 2013, after America hit North Korea’s main foreign-exchange bank with sanctions, Bank of China stopped serving its North Korean client. In 2012, at the height of American pressure on Iran, China grudgingly cut imports of Iranian oil.

The dollar’s political leverage will dissipate as the yuan goes global. China is already close to launching a system for processing cross-border yuan payments. Although described blandly as a platform for facilitating transactions, its consequences could over time be far-reaching. It will allow banks and companies to move money around the world on a financial superhighway delinked from the dollar.

America will find it far harder to track who is using the China International Payment System (CIPS) and for what. The threat of exclusion from the American financial system will start to lose its force. And China would have a new tool to propagate its way of thinking. When heads of state meet the Dalai Lama, the Tibetan spiritual leader regarded by China as a separatist, they may find their banks placed on the CIPS blacklist. This tactic would damage the yuan’s standing if used too liberally, but the mere threat of punishment might be enough for China to get its way.

A global yuan would also win China more respect. China has shown that it wants to be seen as a good citizen of the world.

A tale of three currencies

The road to dollar-yuan rivalry: the story so far...

1820-1913

America’s economic surge

The road to dollar-yuan rivalry: the story so far...

1820-1913

America’s economic surge

1913

Founding of the Federal Reserve

1950-60

The dollar takes control

1978-79

China begins economic reforms

1995-2014

China trades its way to power

United States

Britain

China

Sources: Angus Maddison; EOB (IMF: University of California, Berkeley); WTI
world at times of trouble. In 1997–98, during the Asian financial crisis, and in 2008–09, during the global one, it locked the yuan in place against the dollar. This reassured other countries that it would not use deprecia-
cation as a crutch for its economy. As interna-
tional use of the yuan increases, China will
be in a position to do more, by serving as
backstop to the global financial system.

Yuan-upmanship
When Lehman Brothers collapsed in 2008, the Federal Reserve provided emergency swap lines to banks around the world. If a crisis hits in two decades’ time, China could play a similar role. It is assembling the framework to lend such support by estab-
lishing currency swaps with many nations, from
Argentina to Russia.

The economic conse-
quenes of the yuan’s rise would be moment-
ous. The “exorbitant
privilege” that goes with being the issuer of the dominant currency would ebb for America. Because there is so much de-
mand for dollar assets—more than 60% of all global central-bank reserves are held in
dollars—America and companies based there can sell bonds for higher prices than
they could otherwise. Since bond yields move inversely to prices, this means it
costs less for Americans to borrow—so it is
easier for the government to fund its defi-
cits and for firms to raise money.

How much is this exorbitant privilege worth? Researchers found that yields on
American ten-year treasury bonds were as
much as a percentage point lower in the early 2000s thanks to the dollar’s status.
America is also able to issue all its debt in
dollars. The currency mismatch that often triggers debt crises in smaller economies is
thus off the cards; the Federal Reserve can simply print more dollars to pay off the
government’s liabilities. The benefits add
up to $100 billion a year for America, esti-
mates the McKinsey Global Institute.

But there are also downsides. Demand for the dollar as a reserve asset means the
currency is stronger than it would otherwise be, making it harder for American ex-
porters to compete. McKinsey found this
lops as much as $60 billion off GDP. Net, America still gains 0.3–0.5% of GDP a year
thanks to the dollar’s status.

When the yuan rivals the dollar, China
will eat into this pie. Investors from other
countries might sell off dollar assets since
the yuan would have alternatives in the yuan; this would drive up American interest
rates and weaken the economy. Research-
ers have shown that the Fed can mitigate
but not fully counteract this effect by buy-
ing the bonds sold by foreigners. The up-
shot is that America would have to work
harder to retain the confidence of global in-
vestors, perhaps leading it to rein in gov-
ernment debt.

But the changes required of China
would be even more dramatic. In his ac-
count of how the dollar remained the
world’s pre-eminent currency despite be-
ing at the centre of the global financial cri-
sis, Eswar Prasad, an economist at Cornell
University, explains that its strength re-
sides in America’s institutions. Deep finan-
cial markets, a robust legal system and a
generally transparent political process un-
derpin the dollar. Faith in these make
America and its currency a haven.

China would have to build a similar complement of institutions to persuade in-
vestors that the yuan is as reliable. It would
need to make its currency truly converti-
ble, stop intervening in its exchange rate
and build a big, liquid, transparent bond
market. Heavy-handed intervention to prop up stocks when they recently crashed shows how far China is from developing a
mature financial system. China would also,
like America, need proper rule of law. This
would require allowing courts to go
against the wishes of the Communist
Party, something unthinkable for now.
And through all this, China needs to keep its economy marching forward. Stagnation
would undermine the yuan’s appeal.

If China somehow accomplishes all that, a global monetary system with multi-
ple poles could in theory engender greater economic stability. America and China
might compete to make their respective
currencies more attractive by demonstrat-
ing sound fiscal and monetary policies. The exorbitant privilege would become an
extraordinary responsibility. But there
would also be new risks—“more room for friction and accidents”, says Alan Wheat-
ley, editor of a recent book about reserve
currencies. With the dollar’s status in
doubt, there might be damaging uncertain-
ity about where to turn for a safe harbour
when the next financial tsunami strikes.

How likely is any of this to happen? The dollar has a huge incumbent’s advantage.
Political gridlock in Washington risks chipp-
ing away at that, as might excessive use of
the sanctions that reserve-currency status
allows America. Much will depend on
Chinese policy. The key is to make China’s
financial system as deep, open and trusted
as America’s. That is a long-term project, but China can speed things up a little with
specific policy changes—for instance, low-
ering barriers to foreign investment in its
bond market.

China’s record over the past five years,
when it began to promote yuan interna-
tionalisation, is impressive. The share of
Chinese cross-border trade settled in yuan
rose from nothing in 2009 to 22% last year.
It is now the fifth-most-used currency for
international payments. The IMF is debat-
ing whether to adjust its special drawing
right, a basket of reserve currencies, to in-
clude the yuan. Still, this is a far cry from its
rivalling the dollar. Some 50 central banks
have invested reserves in yuan, but only in
small amounts. Foreigners hold $200 bil-
lion in Chinese stocks and bonds; they have 80 times more—$6 trillion—in Ameri-
can securities. For now, the yuan is a bit
player on the global stage. But at the start
of the 20th century, so was the dollar.

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The Economist August 1st 2015

WHAT IF

France and America swapped working hours?

Average annual hours worked in 2013

1,790

1,490

AMERICA

FRANCE

Equivalent to over 37 days’ difference
(based on 8-hour days)

Source: OECD

GDP per person, current prices, 2014, $’000

US

55

50

5

45

40

35

Fr

Fr

At purchasing-power parity
Assuming an instant productivity

...the next chapter?

2015-2030

Rise of the yuan

China passes America as the biggest economy and overhauls its market structure. The yuan starts to rival the dollar.
If the world introduces a “Piketty tax”
Squeezing the rich

Thomas Piketty, a superstar economist, favours the introduction of a global wealth tax. Its impact might be surprisingly small

In a speech in 2013 Barack Obama labelled inequality “the defining challenge of our time”. A few months later a book on the subject by Thomas Piketty, an economist at the Paris School of Economics, became an unlikely bestseller. It walked readers through centuries of data and a theory of inequality before leaving them with a bold policy recommendation: to prevent a dangerous rise in the concentration of wealth, the world’s governments ought to co-operate to enact a global wealth tax.

Egalitarian themes remain popular on campaign trails, but the wealth-tax idea has so far failed to gain ground. Yet in the right circumstances, might a “Piketty tax” emerge from the messy world of democratic politics? Two preconditions are in place. First, inequality within countries is soaring, as it was when progressive taxation first became widespread, in the early 20th century. Around the world top earners are gobbling up a larger share of income than they have for decades (see chart 1, left-hand side). Wealth has also rebounded. New research suggests that the share of wealth held by the top 0.1% of American households has leapt from about 7% in 1979 to as much as 22% in 2012.

Second, governments have piles of debt to pay down. Tax rates rose sharply as governments struggled to finance the second world war, then gradually fell in post-war decades (chart 1, right-hand side). In recent years, most of the continental economies that had in place an annual wealth tax repealed it. But government borrowing zoomed up again thanks to the financial crisis. Across the rich world debt as a share of GDP is 50% higher than it was before the financial crisis, on average (chart 2). When push comes to shove, those with the most will be asked to pay more.

How much more? Though Mr Piketty reckons taxes on the incomes of the rich should be 75% or more, his proposals for a wealth tax are generally modest. In his book he suggests that those with fortunes worth less than €1m ($1.1m) might pay nothing, while a tax of 1% would apply to fortunes between €1m and €5m, and 2% to those greater than €5m. Some speculate that a wealth tax of this sort could emerge as part of a deal to simplify America’s tax rules and reduce income-tax rates. In a column in the Wall Street Journal in 2012, Ronald McKinnon, a late, eminent economist, argued that American conservatives should support a wealth tax in exchange for cuts in other tax rates. He reckoned that high income taxes create poor incentives for productive workers, but could be slashed only if Democrats were offered a highly progressive wealth tax in return.

Following America’s lead
Impossible? Suppose America’s Congress were controlled by business-friendly Republicans keen to streamline the tax system and cut rates. And the White House was occupied by a Democrat open to tax reform but prepared to veto any bill without a strong progressive component. Congressional haggling could produce a wealth tax as the linchpin of a deal.

It would bring no great windfall. Data on personal wealth are patchier than income statistics—one of the reasons, Mr Piketty complains, why governments find it hard to tax wealth. But figures from America suggest that between 6m and 7m households, or about 5%, have a net worth (meaning the value of assets less debt) of more than €1m, and about half as many have a net worth of €2m or more. At present, in other words, a wealth tax like the one described by Mr Piketty might bring in a few hundred billion dollars a year, or a bit less than the federal government receives each year in corporate income-tax receipts. The numbers could be lower if households responded to the tax by reallocating their wealth from easily valued assets like equities to woollier ones, like rare antiquities, or if they found ways to exaggerate the apparent value of household debts, which reduces the value of taxable net wealth.

However, an American tax would put the power of its authorities, with their extraterritorial reach, on the case. The Internal Revenue Service would demand that foreign governments keep better data on American wealth held abroad, and might threaten legal action against banks that refused to co-operate. As information accumulated about where and how much wealth was held across the globe, the temptation among foreign governments to tax those hoards would grow.

In economic theory, taxes on wealth are bad for growth, since they discourage saving and investment. But evidence from wealth taxes in Europe suggests the effect on growth and entrepreneurship is tiny. Asa Hansson of Lund University in Sweden calculates that a 1-percentage-point increase in wealth tax reduces growth by between 0.02 and 0.04 percentage points. If a wealth tax were a part of a bargain that trimmed personal and corporate tax rates, it is possible that neither growth nor wealth would be harmed much.

But nor would it qualify, strictly speaking, as a Piketty tax. To curtail growth in inequality, Mr Piketty reckons, a wealth tax must be paired with higher taxes on personal and corporate income, not adopted in exchange for lower rates. So for the full complement of egalitarian policies to be enacted, a third precondition must be met: a shift in political power. The wealth-compressing policies of the early 20th century were rooted in dramatic changes in the political landscape: the expansion of the franchise to those without property, and the explosive growth of the state in response to war and depression. They also included more than just tax; regulations shored up labour rights, while public investment and nationalisations nurtured public wealth at the expense of private fortunes.

That is the irony of Mr Piketty’s call to arms. A wealth tax that emerges in the absence of tectonic political change will not alter economic growth or the overall tax burden on the wealthy by very much.
If the Panama Canal gets a rival
Trench warfare in Nicaragua

Near the mouth of the Brito river there are no paved roads, no earthmovers and no signs of construction yet. There is a beach, a mangrove swamp teeming with crabs, and a shirtless drifter called Peyró, whose hobby is riding bulls. There are no ships. The only crafts along this remote stretch of the Pacific are surfboards. Could this really be the place where within a decade the world’s largest vessels will enter Nicaragua and pass through forest, lake, mountain and jungle between the Pacific and the Atlantic oceans? Peyró looks mystified. “Only God knows,” he says.

And China, perhaps. Two years ago Nicaragua put its sovereignty in hock by giving a concession of up to 100 years for a canal that could cost $40 billion-50 billion to Wang Jing, a Chinese telecoms magnate. His company, HKND, says it will soon be ready to start digging an entrance channel near this spot. The next step will be a port a few miles inland big enough to process 500-metre-long ships with five times the container-carrying capacity of those that currently traverse the Panama Canal.

Respectable firms such as McKinsey, a business consultant, and ERM, an environmental one, have put their reputations on the line assessing the feasibility of the 260km (162-mile) canal. It is surely one of the world’s most improbable infrastructure projects. However, Bill Wild, the chief project adviser, appears raring to go. “It’s massive. I can’t stress enough how big it is. But it’s technically relatively straightforward,” he says.

The construction alone would be a spectacle. Some 50,000 labourers (perhaps a quarter of them Chinese) might work on site, and 2,000 diggers, dredgers and other giant machines would excavate about 5 billion cubic metres (177 billion cubic feet) of dirt, using 5 billion litres of fuel in the process. They will lay what they dig up 1.5km either side of the canal, which HKND promises to turn into new arable land about three times the size of Manhattan, partly for the 30,000 people uprooted from their homes.

Construction will no doubt damage the environment. A 107km-long, 280-metre-wide trench will be dredged through pristine Lake Nicaragua, rainforests will be uprooted, big-cat migration routes traversed and indigenous families ousted from sacred lands. Mr Wild pledges that, when finished, the reforested land along about three times the size of Manhattan, partly for the 30,000 people uprooted from their homes.

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Chinese navies could use the passage. The Canal would be an essential place to deploy ships.
ECONOMIES naturally grow. People innovate as they go through life. They also look around at what others are doing and adopt better practices or tools. They invest, accumulating financial, human and physical capital.

Something is deeply wrong if an economy is not growing, because it means these natural processes are impeded. That is why around the world, since the Dark Ages, lack of growth has been a signal of political oppression or instability. Absent such sickness, growth occurs.

So the question of whether rich countries have been aiming for excessive growth is profoundly misguided. The real question is whether they are getting barriers out of people’s way enough to allow growth to take place. Sometimes it requires regulation or public investment or even redistribution, rather than laissez-faire, to remove those barriers.

Fundamentals of demography, education, capital and technology determine growth potential. A government that aims at “maximal” growth above this potential will quickly be frustrated—inflation will rise, bottlenecks will occur, financial markets will “correct”. A country that pursues growth persistently below potential suffers more acutely. The prospects of younger people dim, as they have in southern Europe during the forced contraction of the euro crisis. Savings are eroded, leaving many older people unable to maintain their health care and basic income.

Climate change and water scarcity, among other resource-driven threats, are real concerns. But mispricing of their true costs and misallocation of those resources are their cause, not economic growth. If anything, greater rich-country growth is the hope for dealing with these mounting disasters, in two ways.

First, it is economies growing on average at potential (Japan in the 1980s, Germany in the 2000s and now China) which have led in reducing their carbon emission per unit of GDP. Even America has improved in this regard, despite its childish political denials of global warming, because of the natural tendency for healthy growth to promote efficiency.

Second, to the degree that closure of unclean industries or inefficient processes is required to reduce environmental harm, more growth makes that adjustment easier. Laid-off workers can more easily find new employment and special interests blocking progress can more easily be bought off. Given that rich-country environmental problems are primarily political, caused by politicians’ lack of courage to price carbon and water properly, growth is necessary (though not sufficient) to change those politics.

For the other great global moral challenge, the reduction of poverty in the poor world, the argument is the same, but with even clearer evidence. More people have exited poverty globally in the past 30 years than in all of prior human history, precisely because the rich world steadily grew at potential rates for most of the time. That rich-country growth led to the diffusion of innovations to poorer countries and the expansion of markets for their exports. This would not have happened if the rich world had strived for minimal growth.

“ANYONE who believes that exponential growth can go on forever in a finite world is either a madman or an economist,” remarked (the economist) Kenneth Boulding. John Stuart Mill devoted an entire chapter of his “Principles of Political Economy” to the concept of the “stationary state”—a state that he believed would be “on the whole, a very considerable improvement on our present condition”.

Yet the pursuit of economic growth has been the single most prevalent policy goal across the world for the past 70 years. Global output is now more than eight times higher than it was in 1950. If it continues to grow at the same average rate, then the world economy will be 13½ times bigger in 2100 than it is today; a staggering 146-fold increase in economic scale in the space of just a few generations.

This unprecedented ramping up of economic activity is increasingly at odds with the ecological constraints of a finite planet. By the turn of this century, it had been accompanied by the degradation of an estimated 60% of the world’s ecosystems. Earlier this year the Stockholm Resilience Centre, at Stockholm University, identified four key areas in which human activity already lies beyond the “safe operating space” of the planet: climate change, land-use change, loss of biosphere integrity and overload in bio-geochemical cycles.

The default response to this dilemma is to suppose that we can “decouple” growth from its material impacts and continue to do so as the economy expands indefinitely. But the arithmetic of decoupling is a profoundly challenging one. A widening scientific consensus now accepts, for instance, that tackling climate change entails achieving zero net carbon emissions by 2100 and an economy that is taking carbon out of the atmosphere, rather than adding to it, in the second half of this century.

Technological options to achieve decoupling clearly exist. But the most financially attractive of them (an aggressive pursuit of energy efficiency) may simultaneously make the task harder, as another economist, William Stanley Jevons, once pointed out, by increasing demand still further. Green investment opportunities are certainly there. But financial priorities and institutional incentives are often pointing in entirely the opposite direction.

Most often, what stands in the way of progress is an undying allegiance to growth at all costs. Growth must go on, we insist: not just for the poorest countries, where a better quality of life is desperately needed; but even in the affluent West, where the satisfaction of human needs was long since transformed into a rampant and potentially damaging consumerism.

Questioning growth is now deemed to be the act of lunatics, idealists and revolutionaries. Yet question it we must. The mantra of growth has failed us. It has failed the 2 billion people who still live on less than $2 a day. It is damaging the fragile ecology on which we depend for survival. It has fuelled our addiction to spiralling debt. Prosperity for the few, founded on financial instability, ecological destruction and persistent social injustice, is no basis for a civilised society.

"A DISASTER"
Adam Posen is president of the Peterson Institute for International Economics, a think-tank on economics and globalisation

“Anyone who believes that exponential growth can go on forever in a finite world is either a madman or an economist.”
—Kenneth Boulding

"A BLESSING"
Tim Jackson is professor of sustainable development at the University of Surrey and Director of the Centre for the Understanding of Sustainable Prosperity

If the rich world aimed for minimal growth, would it be a disaster or a blessing?
If autonomous vehicles rule the world
From horseless to driverless

SHANGHAI

Overturning industries and redefining urban life, self-driving cars promise to be as disruptive and transformative a technology as the mobile phone

Shortly after Thomas Müller eases his Audi A7 into the flow of highway traffic heading towards Shanghai, a message on the dashboard indicates that “piloted driving” is now available. Mr Müller, an Audi engineer, presses a button on the steering wheel and raises his hands. The car begins to drive itself, the steering wheel eerily moving on its own as the traffic creeps over a bridge towards the city centre.

This is, admittedly, a limited form of autonomy: the car stays on the same road, using cameras and a “lidar” scanner to follow the lane markings and maintain a constant distance from the vehicle in front. But this is how the world’s carmakers see the future of self-driving technology: as driver-assistance features that gradually trickle down from luxury vehicles to mass-market cars, just as electric windows and power steering did before them. Autonomous driving will, in this view, make motoring less stressful—drivers “arrive more relaxed”, says Mr Müller—but people will still buy and own cars just as they do today.

For a different vision of the driverless future, visit Heathrow airport outside London, and head to a “pod parking” area. Transfers between the car park and terminal are provided by driverless electric pods moving on dedicated elevated roadways. Using a touchscreen kiosk, you summon a pod and specify your destination. A pod, which can seat four people, pulls up, parks itself and opens its doors. Jump in, sit down and press the start button—the only control—and it drives you to your destination, avoiding other pods and neatly parking itself when you arrive, before heading off to pick up its next passengers.

Like riding in the autonomous Audi, travelling by pod is thrilling for the first 30 seconds—but quickly becomes mundane. The difference is that self-driving vehicles that can be summoned and dismissed at will could do more than make driving easier: they promise to overturn many industries and redefine urban life. The spread of driver-assistance technology will be gradual over the next few years, but then the emergence of fully autonomous vehicles could suddenly make existing cars look as outdated as steam engines and landline telephones. What will the world look like if they become commonplace?

The switch from horse-drawn carriages to motor cars provides an instructive analogy. Cars were originally known as “horseless carriages”—defined, like driverless cars today, by the removal of a characteristic. But having done away with horses, cars proved to be entirely different beasts, facilitating suburbanisation and becoming symbols of self-definition. Driverless vehicles, too, will have unexpected impacts. They will look different. Early cars resembled the carriages from which they were derived, and car design took some years to escape its horse-drawn past. By the same token, autonomous vehicles need look nothing like existing cars. Already, Google’s futuristic pods are on the public roads of California, and some concept designs, liberated from the need to have steering wheels and pedals, have seats facing each other around a table.

Autonomous vehicles will also challenge the very notion of car ownership. Cars are among the most expensive things most people own, yet they sit idle, on average, 96% of the time. That is justified by the convenience of having access to a car whenever you need it. These days, however, you can summon a car at will using a smartphone app for a taxi service, car-sharing scheme or rental provider. Google reckons that shared, self-driving taxis could have utilisation rates of more than 75%. If so, a much smaller number of cars would be needed to move the same number of people around. “There will be fewer cars on the road—perhaps just 30% of the cars we have today,” predicts Sebastian Thrun, a computer scientist at Stanford University and a former leader of Google’s self-driving-car project.

The idea that autonomous vehicles will be owned and used much as cars are today is a “tenuous assumption”, says Luis Martinez of the International Transport Forum, a division of the OECD, a think-tank. Fleets of self-driving vehicles could, he says, replace all car, taxi and bus trips in a city, providing as much mobility with far fewer vehicles. An OECD study modelling the use of self-driving cars in Lisbon found that shared “taxibots” could reduce the number of cars needed by 80-90%. Similarly, research by Dan Fagnant of the University of Utah, drawing on traffic data for Austin, Texas, found that an autonomous taxi with dynamic ride-sharing could replace ten private vehicles. This is consistent with the finding that one extra car in a car-sharing service typically takes 9-13 cars off the road. Self-driving vehicles could, in short, reduce urban vehicle numbers by as much as 90%.

Driven to tears
All this would be transformational for carmakers. They would end up selling autonomous vehicles to fleet operators, rather than to individual drivers. The value in carmaking would shift from hardware to software and from products to services, says Mr Martinez. That would shake existing carmakers, just as smartphones upended Nokia and Kodak. Already, high-tech newcomers such as Google, Uber and Tesla are muscling in.

Yet car-industry executives gamely insist that many people will still want to own their own vehicles and that the popularity of leasing means the industry has already moved to a service model. It sounds a lot like wishful thinking, if not denial.

Carmaking is not the only industry that faces upheaval. So does car insurance—worth $88 billion a year in America—
alone—as cover switches from millions of consumers to a handful of fleet operators. In Australia three big American insurers, Cincinnati Financial, Mercury General and Travelers, noted in their SEC filings that driverless cars threaten to disrupt their business. Similarly, LKQ, a car-parts firm, pointed out in its filing that fewer cars on the road, and fewer accidents, could reduce its sales.

Accidents would, more obviously, be bad news for taxi drivers. A study by Columbia University found that a fleet of 9,000 autonomous vehicles could replace all 13,000 taxis in New York. Passengers would spend less time waiting, and would pay less per mile, because paying drivers is the biggest cost for taxi operators. No wonder Uber is keen on driverless vehicles. “When there is no other dude in the car, the cost of taking an Uber anywhere becomes cheaper than owning a vehicle,” observed its boss, Travis Kalanick, last year. Uber’s first test vehicle was recently spotted on the streets of Pittsburgh.

Other workers stand to lose as well. Rio Tinto, a mining giant, is already using 53 self-driving lorries across three of its sites in Australia. The first self-driving truck licensed for testing on public highways, built by Daimler, hit the road in May. America’s 3.5m truck drivers sustain workers in other businesses, too, such as motels and restaurants. The current arguments over Uber, Lyft and other ride-hailing services (which at least still require drivers) may seem like a picnic compared with the opposition to driverless vehicles.

Safety first
But self-driving cars would also have enormous benefits. Today 94% of car accidents are due to human error, according to America’s National Highway Traffic Safety Administration, and the three leading causes are alcohol, speeding or distraction. Accidents kill around 1.2m people a year, reports the World Health Organisation, equivalent to a 9/11 attack every day.

Driverless cars cannot drink alcohol, break the speed limit or get distracted by a text message, so accidents should occur much less often. Google’s driverless vehicles have driven 1.8m miles (2.9m kilometres) in the past six years, and have been involved in 12 minor accidents, none of which caused injury and none of which was the car’s fault. A study by the Eno Centre for Transportation, a non-profit group, estimates that if 90% of cars on American roads were autonomous, the number of accidents would fall from 5.5m a year to 1.3m, and road deaths from 32,400 to 11,300.

Once self-driving vehicles become available, some places will probably ban ordinary cars on safety grounds, starting with city centres, resorts, business parks and campuses. A report on self-driving cars from Morgan Stanley predicts that attitudes will quickly shift from “I don’t want to share the road with robots” to “I don’t want to share the road with other human drivers”. People in Google’s home town of Mountain View, California, are now used to seeing its prototype vehicles on the streets. Some even complain that they drive too timidly, waiting for pedestrians to finish crossing, for example, to the annoyance of drivers revving behind them. Strikingly, nobody seems to be scared of them.

As well as being safer, self-driving vehicles would make traffic flow more smoothly, because they would not brake erratically, could be routed to avoid congestion and could travel close together to increase road capacity. A study by Texas A&M University estimates that 90% penetration of self-driving cars in America would be equivalent to a doubling of road capacity and would cut delays by 60% on motorways and 35% on suburban roads. And riders in self-driving vehicles would be able to do other things.

Morgan Stanley calculates that the resulting productivity gains would be worth $1.3 trillion a year in America and $5.6 trillion worldwide. Children, the elderly and the disabled could gain more independence (one of Google’s videos shows a blind man doing errands in an autonomous car).

With cars in constant use, much less parking space would be needed. Parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking accounts for as much as 24% of the area of American cities, and some urban areas have as many as 3.5 parking spaces per car; even so, people looking for parking could count for 30% of miles driven in urban business districts. By liberating space wasted on parking, autonomous vehicles could allow more people to live in city centres; but they would also make it easier for workers to live farther out. If you can sleep on the journey a longer commute becomes feasible, notes Mr Martinez, who foresees a “simultaneous densification of cities, and expansion of the exurbs”.

The bumpy road ahead
Even though they will have fewer crashes, self-driving cars are sure to be held to a higher standard than human drivers when they are involved in accidents. They will present “new types of crash scenarios”, says Mr Martinez. When faced with an unavoidable impact, should self-driving vehicles try to minimise injuries to their own passengers, or minimise harm overall? Autonomous vehicles bring to life questions from the domain of experimental philosophy, or “trolleyology”: its theoretical ethical dilemmas involving runaway vehicles seem suddenly all too relevant.

At the very least, says Mr Martinez, regulators will demand that the algorithms that make such judgments should be audited, and their decision processes rendered transparent. Some self-driving vehicles are already fitted with “black boxes” to facilitate investigation of accidents. Regulators will face difficult questions about the legal liability of carmakers and fleet operators. Car-lovers would doubtless mourn the passing of machines that, in the 20th century, became icons of personal freedom. But this freedom is illusory. The empty roads seen in car advertisements are not most people’s experience of driving. In a driverless future, people will come to wonder why they tolerated such a high rate of road deaths, and why they spent so much money on machines that mostly sat unused. A world of self-driving vehicles may sound odd, but coming generations will consider the era of car ownership to have been much stranger.
ON APRIL 13TH 2015 the Minor Planet Centre (MPC), an office with a staff of six which looks after such matters for the International Astronomical Union, recorded hundreds of newly discovered asteroids—a typical daily haul. The one to which it assigned the name 2015 PDC, though, stood out.

When asteroids are discovered in orbits that come close to the Earth’s, as this one did, the MPC makes various calculations to see if they pose a threat. Because observations of small, distant rocks cannot be made with perfect accuracy, those calculations define a “corridor” where the asteroid might be. The calculations for 2015 PDC showed that on September 3rd 2022 the Earth would cross the corridor where the asteroid might be. The two might collide.

That was not, in itself, too worrying. Newly discovered asteroids have had measurable possibilities of hitting the Earth before; further observations, and thus a more precise understanding of the rocks’ orbits, have always ruled those impacts out. The one exception to that rule so far, 2008 TC3, was an asteroid only 4 metres (13 feet) across; when it exploded in the upper atmosphere in 2008, just days after its discovery, it mattered to no one except the meteorite hunters who rushed to Sudan to find the remains that fell to Earth.

As 2015 PDC’s orbit became better known the corridor in which it might be on that fateful day in 2022 shortened. But it still contained the Earth. By June the probability of an impact had risen to 1%, making it the most threatening asteroid astronomers had ever seen. By September governments in America, Europe, Russia and China had started work on space missions aimed at changing the asteroid’s orbit by ramming into it. Even at a speed of more than 10km (6 miles) a second, hitting a billion-tonne asteroid with a few tonnes of spacecraft will make only a minute difference to the asteroid’s orbit.

But a minute difference, made early enough, can provide the margin between a near miss and a hit that is palpable on a planetary scale. And 2015 PDC looked like providing such a hit. Early estimates put its diameter between 440 and 400 metres. Even if it were at the small end of that range, though, when it hit the Earth at 11km a second it would release as much energy as hundreds of large nuclear warheads set off simultaneously. At the large end the hundreds would become thousands.

Towards the end of 2015 the sun came between the Earth and the rock, making further observations impossible for a while. After observations resumed the following year, though, an impact became certain. The remaining uncertainty was about where, exactly, it would hit. The risk corridor was wrapped around the Earth in a great-circle arc that began in the tropical Pacific and ran north-west over the Philippines and across the South China Sea before passing over a swathe of Asia beginning in Vietnam and ending in Iran. The track passed over a surprisingly large fraction of the world’s population and three megacities—Dhaka, New Delhi and Tehran. You would have been hard put to have imagined a more threatening rock.

Designed to disturb That was because Paul Chodas, an asteroid expert at JPL, the laboratory that manages most of NASA’s planetary science, had put a lot of his own imagination into making 2015 PDC intriguingly disturbing. He and a few colleagues invented the asteroid, and its orbit, as a scenario to be discussed at the Planetary Defence Conference held in Frascati this April. The scenario unfolded over five days, in breaks between technical papers, with participants drafted in to imagine the reactions of world leaders, the media and the public. Their deliberations revealed a lot about the nature of the threat asteroids pose and the response that a real threat might provoke—a response which could make the danger greater than it would otherwise be.

As with all missions to other parts of the solar system, interceptors aimed at 2015 PDC could be launched only at a specific time defined by the asteroid’s orbit. They would have to take off in late August 2019 in order to reach the rock in early March 2020, 900 days before the impact. The largest of the interceptors originally proposed fell by the wayside because the rocket could not be readied in time. Still, the six remaining spacecraft—three American attempts and one each from China, Russia and Europe—were to offer more than enough kinetic energy to change the asteroid’s orbit by the two centimetres a second required to make it miss the Earth in 2022.

What was not much discussed—other than by Bhavya Lal of the Science and Technology Policy Institute in Washington DC, who was representing India in the role-playing—was whether the deflection of the spacecraft—three American attempts and one each from China, Russia and Europe—were to offer more than enough kinetic energy to change the asteroid’s orbit by the two centimetres a second required to make it miss the Earth in 2022. The damage could be enormous—but unlike the hazards posed by most natural disasters its timing would be known, to within an hour, years in advance, and its effects could be modelled. Breakwaters could be built in front of the larger cities, evacuation plans perfected.
nuclear plants at risk from the waves shut down, populations resettled either for a few crucial weeks or for good, were deemed unnecessary.

A fair bit of this work would be necessary to deal with the sea-level rises expected due to global warming anyway; the asteroid would just mean getting it done faster. The hundreds of billions of dollars invested would increase GDP, as spending after a disaster does. But this possibility—referred to at the meeting as “taking the hit”—got short shrift.

Oops

Which was a pity, because in Dr Chodas’s scenario the deflection went wrong. Instead of being nudged safely onto a new trajectory, the asteroid was cleft in two. The larger part had been given a big enough impulse to no longer be an imminent threat, but the smaller part was still on a collision course. And now its orbit was newly uncertain. The corridor that had been shortening was lengthened, with the once-threatened, then-safe places between Vietnam and Tehran newly at risk again thanks to the actions of space programmes that were mostly based in places (Europe, America, Russia) that were at no direct risk at all.

India began work on a mission that would use a nuclear warhead to try to blast the new fragment to smithereens on its final approach—but which might have simply changed its impact point again.

China warned that it wanted a veto over any such mission; if it did not approve of the way it was being done it would feel justified in using anti-satellite weapons to shoot down the Indian rocket pretty much as soon as it took off. Iran, previously safe, fulminated against the Great Satan, and it was hard not to think it had a point. Hannes Mayer, an Austrian lawyer who has given the application of space law to such situations a lot of thought, raised the possibility that by altering the asteroid’s orbit the intercepting nations changed its legal status from that of a “celestial body” for which no one was responsible to that of a “space object”—and thus become liable for any damage that it did.

By the end of the scenario, when the asteroid was a few days from exploding in the sky over Dhaka with more power than 1,000 Hiroshima bombs and more than 20m people being evacuated, that was looking like a great deal of liability. The question of India’s last-ditch nuclear interception, and China’s worries, were brushed aside as beyond the scenario’s scope. In the real world, though, a botched interception which created a crisis for people who would otherwise have avoided one would be a grave issue—perhaps, in some circumstances, casus belli.

Bigger rocks have hit the Earth, doing great damage in the process. There is a 90km crater under Chesapeake Bay which bears witness to an impact 35m years ago, and a 380km crater on the Yucatan which marks the impact site of the rock that ended the age of the dinosaurs. But, in practice, astronomers are confident that their diligent observations have discovered almost every one of the asteroids more than a kilometre wide that cross the Earth’s orbit, and none of them poses a threat in the coming centuries. In the coming decades it is likely that ever-more-thorough surveys will mean that there is similar assurance for rocks down to 100 metres or so.

What is more, a rock 250 metres across (the size of 2015 PDC before it was cleft in two) hits the Earth, on average, only once every 500 centuries. So the scenario played out at Frascati is a highly unlikely one. Getting only seven years’ warning of such an impact is unlikelier still. With ample time it would be possible to use gentler methods to try to adjust the orbit.

At some point, though, a rock large enough to do real damage—something like the 50-metre beast that exploded over Siberia in 1908 with the force of the largest nuclear weapon ever tested, the sort of visitor statistics suggest should be expected every century or so—will be discovered on the way in. Then the nations of the world will have to decide what to do. The technical fix of moving it will appeal to some; and if there is time enough and the impact site is valuable enough, then they might be wise to try it. But the lessons of 2015 PDC, in which a disaster that might well have been weathered, if at huge expense, was traded for one in which a megacycle was destroyed, should give them pause.

If India’s monsoon fails

A billion-person question

NOTHING in India is as terrifying as the thought that the monsoon might not come. Robert Kaplan, in his book “Monsoon”, claims global warming is causing a more erratic monsoon, which “could spell disaster”. Around half of India’s population, some 600m people, still depend on farming, and nearly two-thirds of fields have no irrigation, so must rely on rain. Without water at the right time, hundreds of millions of people would see their incomes crash. Food costs would rise. And as India is an emerging global giant in food production, exporting more rice than anyone, droughts could push up global prices.

Waiting for the monsoon is an annual ritual. In the early summer, weeks pass without rain. Temperatures and frustration rise. For villagers there is irritable inactivity, hours slumped on a charpoy under a tree, nights on a flat roof in hope of a breeze. Even birds and insects fall quiet, exhausted. Farmers yearn to start planting.

Cities are crowded and feel worse. The highest temperature ever measured in India, 50.6°C (123°F), was recorded in May 1956 in Alwar, Rajasthan. Delhi is delightfully leafy, but in these months a drab crust envelope its trees, bushes and cars.

The rich retreat under air-conditioners.
or inside cooled cars. Middle classes can at least resort to fans. It is those who labour in tents—taxes well above 40°C—who most risk heart attacks and heat-stroke.

Newspapers produce maps tracking the fronts of black clouds as if they were an approaching, welcome, army. It is natural to think of the cavalry galloping to the rescue from each coast—water evaporated up from the Indian Ocean and the Bay of Bengal—as the monsoon progresses inwards and northwards. Far inland, you read of countrymen drenched in cooling water, and anticipate your own respite.

That moment, usually late June for Delhi, is joyful. Cities erupt in delight as fat, dust-filled raindrops flop down. Novelsists and poets revel in the instant: it is more deeply felt, for many, than any religious festival. It is also the sexiest time of year: a standard scene for Indian film-makers is a Bollywood starlet drenched in monsoon rain, set to celebratory music.

So imagine the anguish, the misery, with monsoons that do not arrive. A seriously late monsoon, or a patchy one which releases water only in some places, an unpredictable or scanty one, all can be devastating. An uneven monsoon, which unloads its waters in a few, overwhelming torrents, can destroy the fortunes of farmers and others in days. Mumbai in 2005 was but a similar strike last year, with deaths stronger than anyone could remember. The heaviest rains since those 2005 floods). Uncounted in the hundreds.

Followed by long patches of dryness, can its waters in a few, overwhelming torrents, immense cloudbursts in Uttarakhand killed over 6,000 people in 2013. Kashmir suffered severe drought, and an- other 30% moderate drought. It was one of the worst years ever recorded. Without irrigation, crops died. Human costs were immense. Tens of millions went hungry, were impoverished as food prices soared, displaced to relief camps or forced off their land. Several million people died. Political consequences followed. During famines colonial rulers continued to export grain from starving India. Anger about that became a spur to those who sought independence. In 1885 Allan Hume, a civil servant dismayed by the behaviour of his own government, formed the Indian National Congress, which eventually negotiated the British exit.

What if monsoons failed today? Indian farmers rarely have insurance and their savings are typically low. A single bad monsoon would be nasty, but two or three in a row could spread enormous disquiet and spur migration into cities. And if such upheaval were to happen in India, it would probably also affect Pakistan and Bangladesh (together with another 350m people or so) that depend on the same monsoon. Potentially a fifth of the world’s population would be directly affected.

But unlike the India of 1877, the country today has structures to mitigate the effects of erratic or failed monsoons, at least for a while. State-run granaries are wasteful and often a source of corruption, but the point of holding large stocks is to release rations when supplies grow tight. Democratic rulers are quick to stop exporting crops in times of hunger, though that can worsen problems in other countries. As the economist Amartya Sen points out, democracies do not see famines.

Better technology, improved weather forecasting and more capacity for assessing climate data mean warnings of bad weather are improving. In the long run farmers can adapt. India could invest more in reservoirs, small-scale water harvesting, drip irrigation and crops (including genetically modified ones) better able to withstand droughts or grow in brackish water. And India must one day get to grips with the problems in other countries. As the economic consensus on the Indian monsoon is growing less stable the IPCC. A Japanese study, which tries to predict long-term rainfall for southern India, suggests a rapid decline is possible. More particle-filled air could also mean monsoons dropping water in ever more intense, destructive bursts.

Other unknowns include doubts about the formation of deep depressions out at sea (crucial for the start of the monsoon), and questions of how declining snow cover in the Himalayas might affect the northern reach of the summer rains. It is safe to predict more unpredictability. Stealing India’s thunder

Talk of a failed monsoon does not imply the sudden end of an age-old phenomenon. But there are profound risks if it starts to go haywire. Heidi Cullen of Climate Central, an American research group, says a failing monsoon would have “huge” consequences: “The country lacks large reservoirs that can moderate a drought’s impact on food supplies.”

History offers some clues. The years 1876 and 1877 saw deadly hunger in southern India. In August 1877 The Economist said the area become “fatally exposed” to famines, as “the soil is poorer, barren tracts are more frequent, the land-tenure is economically unsound and practically oppressive”. Showing early environmentalism, we also noted “the reckless destruction of the forests during past generations has made the rainfall more precarious.” Later that year the monsoon in southern India in effect failed: nearly 30% of areas suffered severe drought, and another 30% moderate drought. It was one of the worst years ever recorded. Without irrigation, crops died. Human costs were immense. Tens of millions went hungry, were impoverished as food prices soared, displaced to relief camps or forced off their land. Several million people died.

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What if Mao Zedong’s Communist Party had lost the Chinese civil war to Chiang Kai-shek’s Nationalist Party?

When the second world war ended, the 3.7m-strong army of China’s leader, Generalissimo Chiang Kai-shek, was badly weakened by its fight with the Japanese and a Communist insurgency. But it still had the upper hand against the Communists: superior by far in numbers and equipment. As Soviet forces withdrew from Manchuria in the north-east, which they had taken from the Japanese, Chiang’s forces surged forward to regain the territory. Chinese Communists in the area, who had hitherto been backed by the Russians, were shattered by the onslaught. But in 1946 the Americans, anxious to prevent an all-out civil war between Chiang and the Communists’ leader, Mao Zedong, persuaded Chiang to stop fighting. It was a moment that may have changed history: the few weeks’ hiatus enabled Mao to replenish his forces with Soviet aid. When the truce broke down, Chiang lost Manchuria and eventually the civil war. Americans—particularly right-wingers—kicked themselves about it for many years afterwards. What if Mao’s victory had been avoided?

China’s spectacular rise in the past three decades has helped dispel the idea that an absolute nationalist leader could not lead a modern, market-friendly economy. But Chiang was an ardent nationalist. His relationship with Japan would have been fraught. Millions of Chinese had been killed during Japan’s occupation of China, with the KMT rather than Mao’s forces suffering by far the worst casualties. Animosities between China and Japan, which Mao did not appear eager to play up, might have bedevilled east Asian security long before they did emerge in the 1990s as a source of regional tension. Chiang’s domination of Taiwan as well as the mainland would have given him control over the shipping lanes on which the economy of Japan depends. America’s restraining hand in the region may still have been needed.

The cold war might have turned hotter too. Chiang did not accept the Soviet Union’s control of Mongolia. Under Mao, brief battles broke out on the Chinese-Soviet border in the 1960s. They might have turned bigger and bloodier under Chiang. The Chinese public, indoctrinated by the KMT into a belief that Mongolia was China’s, might have clamoured for their government to assert the claim more forcefully once the Soviet threat was gone.

But China by then may have become a more politically liberal country. Moves towards democracy would have been slowed by fears of secession, especially in Tibet and other ethnic-minority regions (many Taiwanese would have been chafing at the KMT’s rule; they had begun to even before Chiang fled to the island). But a middle class would have grown far sooner than it has under the Communists.

Despite the autocratic rule of Chiang’s KMT, China would have remained an ally of America. Asia would therefore not be riven as it is today by a struggle for supremacy between America and China. Perhaps even Japan would be learning to live with its powerful, rich neighbour.

Much of the tension that now plagues Asia relates to the nature of China’s Communist Party. Neighbouring countries worry about the way the party behaves: secretively, high-handedly and sometimes (at home at any rate) brutally. But all of them fear what might happen were the party now to follow the KMT’s path and liberalise. The KMT was voted out of power in Taiwan in 2000, before returning in 2008. It is likely to be voted out again next year. Few in Asia believe that the Communist Party could ever accept the vagaries of democratic politics. Its eventual demise might well involve bloody tumult; a return, even, to the chaos of the 1940s. The rest of Asia would prefer the devil it knows.