

# Opinion

SATURDAY, MARCH 30, 2019

## Battling fake news online won't be easy for ECI

As the New Zealand attack shows, an absolute curb on spread of misinformation and bigotry online is difficult to achieve

**T**HE UPCOMING GENERAL election could well be dubbed India's first WhatsApp election—87,000 groups, as per media reports, are targeting over 20 crore voters in the country with forwards of genuine political news, fabricated and twisted news, propaganda, hate speech, videos of violence that are misattributed to a region or community, etc. The Election Commission of India (ECI) working with social media and insta-messaging platforms to put curbs on use of these to influence voting decisions, thus, is a welcome move. The poll regulator has made it mandatory for candidates to furnish details of their social media accounts, and their activity on such platforms is to be monitored. Model code of conduct rules will apply to social media as well, and political advertisements on social media will need pre-certification. The ECI is also believed to have set a deadline for social media companies for removing content after violation is flagged—both the companies and the ECI (based on the Sinha Committee recommendations) have accepted three-hours-post-flagging as the deadline. Internet-enabled campaigning via social media/insta-messaging also must end 48 hours before election. However, digital media is a different beast altogether, and, even on paper, the ECI's proactive monitoring—despite being right-spirited—hardly seems adequate.

Controlling the flow of misinformation and bigotry online seems a Sisyphean task. Take, for instance, the New Zealand terrorist attack, in which the white supremacist attacker live-streamed his attack on a mosque that left over 50 dead, via Facebook. At least 200 users were watching, and none reported it immediately—it was only half-an-hour into the attack that viewers used Facebook's reporting tools. In the first 24 hours of the attack, users had uploaded the video 1.5 million times and Facebook's automatic detection blocked 1.2 million. A day after the attack, therefore, 300,000 copies were circulating unchecked, reaching millions worldwide, some of whom would have made new copies; indeed, Turkish president Recep Erdogan used the video in a political speech to play on communal passions. This problem afflicts all internet-enabled media, and whatever companies do *post facto* may not ever be enough to dam in misinformation and bigotry, often spread to achieve narrow political ends. YouTube and other such platforms continue to battle re-uploads. On Reddit, links to the video were shared, and then deleted by the company, only for users to post links to alternative "mirror" sites. Users devise myriad ways—almost on a daily basis—to beat detection by algorithms. So, the three-hour removal deadline is like trying to stopper a tsunami.

Even if the ECI were to ban parties and candidates from sharing polarising content, given how disaggregated these chains of sharing and forwarding are—the 87,000 WhatsApp groups could be just the tip of the iceberg—there is almost no way to control dissemination in an absolute manner. Also, some of ECI's provisions spell out how these can be sidestepped. For instance, given the Lok Sabha election will be conducted in seven phases, the bar on social media/insta-messaging campaigning is rendered void simply by ensuring campaign messages originate in a different geography from where the bar applies, and from a source that can't be tied to a contesting party or candidate. What can the ECI do, then? The poll regulator could recommend exemplary action for violations by parties/candidates. It can also perhaps consider mandatory disclosure by parties of the particulars of their social media spending and key figures in the implementation of the social media/IT strategy—though the latter could run afoul of privacy rights. Social media firms need to commit to more serious efforts; a Facebook, which admits that "it's not feasible given our (Facebook's) scale" to become "arbiters of truth", must thus remedy the disconnect between partnering "third-party fact-checking organizations" to control spread of fake news and enlisting three Indian "fact-checkers" that have themselves shared misinformation ([goo.gl/TbvLst](http://goo.gl/TbvLst)).

## Curbing academic freedom

Limiting the pool of research topics is a bad idea

**P**ROMPTED BY A Union HRD ministry diktat to central universities, to ensure PhD candidates choose research topics that are "in accordance with the national priorities", "research in irrelevant areas" is discouraged and "alotting privilege (sic) topics" is disensed with, the Central University of Kerala recently issued a circular directing deans and HoDs to come up with a list of topics "considering national priorities". This led to a senior external member of the Board of Studies of English and Comparative Literature resigning in protest. The episode is a symptom of the rot that is spreading in higher education regulation. Apart from the fact that a nebulous "national priorities" touchstone for research topics will foster confusion—does India's military history trump labour as a research topic or vice versa?—this interferes with the academic freedom researchers and higher education institutions should enjoy, something that multiple reports on higher education reform have highlighted. Yet, instead of meaningful regulatory reforms, the HRD ministry would rather micromanage the choice of research topics.

To be sure, some manner of quality-check seems reasonable. Indeed, in 2015, following allegations of rampant plagiarism, including resubmission of the same thesis year after year, the Bihar government tightened the screws in state universities. But, quality check shouldn't come to mean curbs on research topics. So, even if there is a mind-boggling number of doctoral theses/dissertations on tea plantation workers—the workers would certainly seem the most thoroughly researched cohort in India—if there is a genuine research question that needs to be examined, students must be free to pursue this. There are a dime a dozen research topics that may seem irrelevant or merit the "privilege topics" tag. A doctoral student from a state university in Gujarat was recently in the news for researching Narendra Modi's leadership style as Gujarat chief minister. Given the chequer foots the bill for research at government-funded universities, many would likely view such research as unproductive use of scarce resources. Even so, academic independence has to be held as sacrosanct if universities, especially the top-rung ones, are truly to become the intellectual powerhouses a nation needs. The Union HRD ministry seems to have taken a cue from the ill-conceived move of the Gujarat government to reserve a substantial number of PhD seats for research on government programmes. But, given the Union ministry's recent myopia and unbridled interference in the running of universities in the country, this doesn't seem a surprise. Far from giving universities a free hand and creating the Higher Education Commission of India to replace the mouldy UGC regime, the government has concerned itself with whether university professors are free to air their views or not, asking students to pledge support to the armed forces, battling for the old faculty reservation structure in universities, etc. No wonder then that, despite Indian R&D gaining ground, catching up with a China or other R&D giants seems a distant hope.

## Missing SUIT

Nasa cancelling the first-ever all-women space walk has at its root an institutionalised disregard for women at the work place

**E**ARLIER THIS WEEK, two women astronauts from the US should have suited up and headed outside the International Space Station for a spacewalk—it was touted as a big win for gender justice—but that didn't happen. NASA had announced earlier that the two women currently on board the ISS, Anne McClain and Christina Koch, would embark on the first all-female spacewalk in history. But, thanks to some last-minute logistics issues and, crucially, the non-availability of the right-sized spacesuits on the ISS—Koch and McClain both needed medium-sized spacesuits, but NASA only had one—a male astronaut, Nick Hague, is taking McClain's place. News that NASA cancelled the spacewalk—and the fact that it has only one spacesuit available for a size more likely to be worn by women astronauts—did not go down well with observers. Many saw it as proof that women are still not thought of as equal partners in space exploration.

The *Atlantic* quoted NASA spokesperson Brandi Dean as saying that the ISS houses six spacesuits, two each in medium, large, and extra large. One medium and one extra large are spares, and require hours of work in order to be used. In addition, today, astronauts wear 40-year-old space suits. While the failure to upgrade old equipment can be blamed on funding cuts NASA has had to suffer since the 1990s, NASA's present embarrassment has a lot to do with the fact that it simply didn't provide for its women astronauts, even when they were part of such a thoroughly advertised excursion. The first size to go was extra small, followed by small—two sizes that are likely to fit, on average, to a larger number of women better than men. Although space-suit engineers had assumed that women could fit into the same suit sizes as small men, as per Elizabeth Benson, a NASA design engineer also quoted by *The Atlantic*, this didn't account for differences in the body shape of men and women, even when they are at the same height and weight. Peggy Whitson, a NASA astronaut who helped build the ISS and who holds the American record for time spent in space, said that the average female body would find it difficult to conduct spacewalks in the suits as they are sized larger. That NASA chose to junk space-suits that would have fit women better in the face of shrinking budget is emblematic of the institutionalised disregard for women across professions. On Earth and off it, this needs to be battled.

**T**HERE HAS ALWAYS been a fixation on Chinese economic growth. And with good reason. For a large economy, sustaining annual growth rates of 10% over several decades is unprecedented. And yet, that is exactly what China did from 1980 to 2011. But now the miracle is over. Since 2012, annual growth has slowed to 7.2%, and premier Li Keqiang's recent annual 'work report' set a growth target of just 6-6.5% for 2019. For the vast legions of China doubters, this is a "gotcha" moment. After all, the lower bound of the premier's target implies a 40% deceleration from the "miracle" trend.

This seems to vindicate warnings of the dreaded "middle-income trap"—the tendency of fast-growing developing economies to revert to a much weaker growth trajectory just when they get their first whiff of prosperity. The early work on this phenomenon was precise in terms of what to expect: as per capita income moved into the \$16,000-\$17,000 range (in 2005 dollars at purchasing power parity), a sustained growth deceleration of around 2.5 percentage points can be expected. With China having hit that income threshold in 2017, according to International Monetary Fund estimates, its post-2011 slowdown looks all the more ominous.

But one of the first things taught to economics graduate students, even back in my day, is to be wary of the perils of data mining. And the middle-income trap is a classic example of the pitfalls of endless number crunching. Give me a database and a powerful computer, and I can "validate" almost any economic relationship masquerading as an analytical conjecture. There are five key reasons to dismiss the now-widespread diagnosis that China is ensnared in the middle-income trap.

Firstly, a middle-income trap may not even exist. That is the conclusion of Lant Pritchett and Lawrence Summers's rigor-

## QUALITY OVER QUANTITY

PRODUCTIVITY GROWTH IS FAR MORE IMPORTANT THAN GDP GROWTH IN DETERMINING A COUNTRY'S DEVELOPMENT PROSPECTS

# No middle-income trap for China

**STEPHEN S ROACH**

Faculty member at Yale University and former chairman of Morgan Stanley Asia



ous empirical study covering a broad cross section of 125 economies from 1950 to 2010. The best they could come up with is a strong tendency for growth discontinuities and mean reversion. At the recent China Development Forum in Beijing, Summers went further in assessing likely outcomes in rapidly growing developing

must be time to worry!

Thirdly, not all growth slowdowns are alike. A country's GDP is a broad aggregation of a multiplicity of activities across sectors, businesses, and products. Structural shifts from one sector to another can give the appearance of a growth discontinuity that may be nothing more than the outcome of a deliberate rebalancing strategy. This is very much the case with China today, given its shift from higher-growth manufacturing and other "secondary" industries to slower-growing services, or "tertiary" industries. To the extent that this shift is the intended result of China's strategic rebalancing, a growth slowdown is far less alarming.

Fourthly, the daunting challenges that China faces at this point in its economic development are far more important than whether its slowdown is a gap or a trap. What comes after the catch-up to advanced economies operating on the technological frontier? This is where China's stated goal of shifting from imported to indigenous innovation comes in. Middle- versus high-income status is a relative comparison for developing economies seeking to operate on that frontier. Notwithstanding the temporary effects of periodic exogenous disturbances—such as deleveraging, global slowdowns, or even trade wars—catching up to the frontier

**Structural shifts from one sector to another may be nothing more than the outcome of a deliberate rebalancing strategy**

## Revitalising the agricultural sector

Small landholdings have constrained mechanisation, technology adoption, and economies of scale do not accrue at such levels of landholding

**AJIT PAI & RANVEER NAGAICH**

Pai is officer on special duty, NITI Aayog and Nagaich is young professional to vice-chairman, NITI Aayog. Views are personal

**INDIA HAS MADE** significant strides in agriculture and food security since independence. It has transformed from a food deficit nation to ensuring its food security despite an almost four-fold increase in population. However, the time has come to relook at agriculture in India. India needs to shift from subsistence agriculture to robust agricultural systems that not just provide food security for all its citizens, but also ensure income security for its farmers, more diversified and better nutrition for its citizens, and globally competitive farm productivity levels.

Productivity in agriculture can be looked at from two lenses: on a per hectare basis and on a per farm worker basis. Over the past few decades, India has increased its productivity on a per hectare basis but still lags behind many emerging market peers and most developed nations on this metric. However, it is on a per farm worker basis that India lags severely behind. About 45% of India's workforce is involved in agriculture relative to national best practices of less than 1%, making India one of the least productive in agriculture on a per farm worker basis amongst major economies.

The disproportionately large labour force in agriculture is related to the size of India's landholdings. From an average of 2.7 hectares in 1970, India's farms have become progressively more fragmented, with the latest Agriculture Census 2015-16 showing that India's average farm size is now 1 hectare. Compare this to say, Canada (~300 hectares), Argentina (~500 hectares) and Ukraine (~1,000 hectares). Small landholdings have constrained mechanisation, technology adoption, and economies of scale do not accrue at such levels of landholding.

What needs to be done? NITI Aayog has recommended that farms need to get bigger. Land being a state subject requires that states must take the lead by using NITI Aayog's Model Land Leasing Act, 2016, after suitable modification as per their needs. Accelerating the digitisation of land records is critical for smooth

implementation of this game-changing reform. Telangana has made significant progress in this regard and other states must follow their example. Similarly, a stronger push is needed to collectivise farmers through various farmer producer companies (FPCs), farmer producer organisations (FPOs) and cooperatives, for bringing collective benefits from scale.

The benefits of rising productivity will not accrue to farmers unless the supply and value chain is strengthened, especially in the case of horticulture products. NITI Aayog's *Strategy Document* points out that the annual cost of post-harvest losses can be as much as ₹92,561 crore. The study by the Central Institute of Post-Harvest Engineering & Technology (CIPHET) indicated that the largest amount of losses accrue at the harvesting stage, then at the sorting/grading stage, followed by the transport one.

We need to target the creation of pack-houses much closer to the farm gate. The Gramin Rural Agricultural Markets (GRAMs) scheme is targeting the transformation of 22,000 rural periodic markets close to the farm gate. An important component of this scheme is that these GRAMs be kept out of the purview of the State APMC Acts. Promoting FPC and FPO ownership of these GRAMs should be considered. Similarly, private sector enterprises willing to establish backward linkages should partner with state governments in organising their sourcing through GRAMs. Larger farms with a strengthened supply chain are incremental solutions to agrarian distress, as are marketing reforms and contract farming, which will collectively serve to, perhaps, double the final output of the overall food supply chain in the country. However, even with these reforms, the problem of dismally low productivity per farm worker is not yet suitably addressed.

As NITI's *Strategy for New India @ 75* document states, pulling cultivators into non-farm or off-farm activities is the strategy we need to follow. This requires more remunerative jobs being created outside agriculture. The 'Make in India'

initiative could be a driver of absorbing some of the labour from rising farm productivity, but for speedier progress, the construction sector, with its relatively high labour intensity has the capacity to absorb labour rapidly without depending on the uncertain global economy.

Chand, Singh, and Srivastava (2017) note that creating blue collar jobs in and around agriculture is an attractive option. The food processing industry has the potential to generate substantial employment. Farming as a Service (FaaS) offers employment generation capacity as well. Whether it is delivering farm mechanisation solutions, transport solutions or extension services, FaaS has the potential to reduce costs for farmers besides generating rural employment. Madhya Pradesh has had success in promoting the custom hiring centre model. Partnering with the private sector in delivering extension services is another avenue towards generating rural employment. NITI's *Strategy for New India @ 75* pitches for public-private partnership in extension delivery through Krishi Vigyan Kendras (KVK).

The current farm distress is one of excess at the farm gate rather than drought and borne of the government's success in improving irrigation combined with a couple of years of a reasonable monsoon. It is currently easy to forget that India's productivity at a global level is well below average. The current distress should remind us that as productivity increases, we have to focus more on efficient evacuation with aggregation points closer to the farm gate to avoid distressed sales and depressed prices, especially in the case of horticulture products. Improving productivity should be accompanied by developing an efficient value chain, with adequate grading/sorting and assaying facilities, marketing reforms, encouraging contract farming, and boosting investment in the food processing industry. It should also be accompanied by boosting construction and manufacturing in rural areas to absorb the labour generated by higher farm productivity.

## GIVING ALL A VOICE

Congress president Rahul Gandhi

We want India's voice and aspirations to prosper. We don't believe in one man's voice. We believe in everyone's voice and choices. It requires tremendous discipline and hard work to do, but it works



and joining others pushing to move beyond it is the ultimate reward of economic development. That goal is enshrined in president Xi Jinping's aspiration for China to achieve high-income status by 2050.

Lastly, productivity growth is far more important than GDP growth in determining a country's development prospects. As such, I would be far more worried about China falling into a productivity trap than a GDP growth trap. A new study on total factor productivity by a team of Chinese researchers offers some comfort here. Like the work of Pritchett and Summers, this latest assessment of Chinese TFP growth reveals several discontinuities over the past 40 years. But the underlying trend for the past five years is encouraging: annual TFP growth of around 3%, with especially strong growth in the tertiary sector. So, notwithstanding the recent slowdown in aggregate GDP growth, services-led Chinese rebalancing is imparting meaningful productivity leverage to the economy as a whole.

The question now is whether China can sustain its recent TFP trajectory—a distinct possibility in light of an increasingly powerful shift to indigenous innovation and the sustained services-led productivity of a growing cohort of well-educated knowledge workers—and also reap the benefits of continued upgrading of its capital stock. If it can, the new Chinese study concludes that China's potential GDP growth rate could hold at nearly 6% over the next five years. Such an outcome would conform quite closely with China's longer-term ambitions.

So, yes, the days of 10% Chinese growth are over. That was inevitable. But there is good reason to believe that the real story is the shift in Chinese output from quantity to quality. That suggests that China will defy yet again widespread fears of a looming middle-income trap.

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## LETTERS TO THE EDITOR

### Brexit? May-be later

Political stability in the EU continues to be impeded by the repeatedly unsuccessful attempts to attain consensus on a viable deal, and now an even bigger failure to meet the promised Brexit timeline—something that was known ever since the outcome of the first referendum. It is prudent to close the chapter for good and concentrate on larger issues, at the earliest, in order to improve the business environment and regain public cheer. Lacking collaboration prevailing political turmoil, speculations over a change-of-guard and uncertainty over availability and pricing of goods and basic necessities have dampened business sentiment and forced untimely exits for quite a few ventures. Institutional investors and market participants are reluctant to explore new avenues as currency valuations are on the decline and the real estate market is confronted with a price correction. After three years of administrative efforts, the absence of crystal clear exit terms and prevailing ambiguity over the fulfillment of the first referendum are deeply impacting the sovereign's goodwill. Capital markets are fairly range-bound, as the potential turbulence in the near-term poses a risk to the growth of emerging economies too — Girish Lalwani, Delhi

### Emulating Mamata

Chief minister HD Kumaraswamy has emulated his West Bengal counterpart Mamata Banerjee by picking up cudgels against the Income Tax (I-T) department for the raids on contractors and associates of JD(S) politicians in Bengaluru on Thursday. The raids have caught the JD(S) netas unawares and it is no surprise that the CM has alleged political vendetta by the BJP. With the I-T officials claiming that cash in bulk is being illegally transported on a daily basis, it is imperative that the authorities ensure a free and fair election — Ravi Chander, Bengaluru

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# The dilemma of modern retail in India

Modern retail is generally targeted towards the urban youth (age group 15-45 years). This segment also typically includes the most affluent section of the society. But successfully entering the rural markets and attracting older customers (aged 55 years and above) is a challenge

## Unaddressed segments

A careful inspection of different consumer segments in India will reveal that modern retail is mostly targeted towards the urban youth (age group 15-45 years). This segment also typically includes the most affluent section of the society—people who are likely to adopt new technologies faster. In fact, their needs are spearheading the growth of online retail market. Tech-savvy, always on the go, the members of this group spend considerable time online and thus present an enormous opportunity for retailers to tap in through mobile advertising, location tracking, Google analytics, online-offline synergetic outlets, social media marketing and AI-run applications like Amazon Alexa and Google assistant, etc.

In cities, large shopping malls have branded showrooms, attracting a crowd that largely represents the young, middle class and higher income group people; on the other hand, the lower middle class and the poor in the city rarely visit these stores and are more dependent on small roadside shops or local family stores for their purchases. Even megastores like Big Bazaar, which run regular discounts and adopt EDLP (everyday low price), do not greatly attract the lower economic rung of the population.

To explain this phenomenon, one has to understand the psychology of consumers from different levels of economic affluence. A person from lower middle class or below may be seen looking for more affordable products, often in smaller quantities, from small stores and outlets. They often indulge in bargaining and buy less numbers of products. Most of their transactions happen essentially with known shopkeepers who may not mind selling them on credit due to the relationship built over years. On the con-

trary, megastores hardly sell in small quantities when it comes to packaged products, they offer discounts for large quantities or expensive items, and there is no scope for bargaining. The feel of the store is upmarket and the general shoppers buy in large quantities—at times enough to make a person buying in smaller quantities feel inferior.

Indian suburbs and villages pose another set of challenges for modern retail. Large format shopping malls are being seen in tier-3 cities, but they are yet to enter rural India. These places are small and have less population density compared to cities. Here the issues are the lack of logistics infrastructure and demand volume to support the supply value chain. Lesser degree of positive awareness among people is also a problem in these areas, and together they are hindering the entry of modern retail deep into Indian rural market.

Another market spectrum that modern retail is missing is the older population (aged 55 years and above). Unlike products for the youth, possibly the only

phone proficiency among them is also rising. Although they are seen to be sceptical about spending money online, this will soon change as people now in their early-50s and mid-40s enter this bracket. These people represent a potential market and, if targeted properly, can be of great value to marketers.

Scouting ways We need to understand the needs of each group of people and what they are willing to spend to meet their needs. The urban youth is tech-savvy, and depending on the products, generally do not mind paying a premium. They are often overexposed to advertising. Therefore, an advertising effort that stands apart from the general advertising trends holds a good chance of success among them. Technology-driven applications like omnichannel approach, mobile advertising, self-serving kiosks and AI assistants have higher success potential with this group.

Capturing the market in rural areas and suburbs can be tricky and will

depend on addressing the unique customer needs. Rural income is often seasonal and, therefore, villagers' buying capacity varies through the year. Moreover, rural needs are often met by local shopkeepers who operate from own houses and have very low overhead costs. They also enjoy high trust among the local people. To prosper in this scenario, modern retail must match in points of parity while offering points of differentiation to attract attention. One of the concepts that can be used here is 'micro selling', which facilitates selling in small quantities and on credit in exchange of personal details.

Creating logistics efficiencies can be another issue in rural markets. To counter this, modern retail shops in rural markets can form a close-knit network and e-commerce giants may choose to collaborate in logistics to increase the overall operational efficiencies in terms of both economies of scope and scale. This will help modern retail, including e-commerce companies, to minimise the costs and create higher revenue, while offering greater value to the population and improving brand presence, stepping up its chance of survival in rural markets and later, prosper.

To capture the senior citizen market, it's important to perceive elderly people's needs—added to be respected and feel special. Which to this, studies have shown that older people do not want to feel old and are likely to reject a product that carries a perception tag of 'for senior citizen'. To address this, modern retail must make use of integrated marketing communication that can depict a product as useful for the senior citizen as for the youth. Also, modern retail and e-commerce giants can stimulate spending by senior citizens by offering special senior citizen's coupons and deals while incorporating their details in the CRM database. Large shopping malls can also create areas where the elderly are encouraged to come, sit and enjoy—eventually increasing their familiarity with the place and the offerings.

Lastly, no growth comes without hindrances. One cannot deny that the average low income, lack of infrastructure and logistics in smaller towns and rural India is a challenge. Modern retail thus should follow the path of gradual expansion and focus more on building a close-knit value chain for rural markets, while understanding rural capacity and needs, and accordingly tweak its logistics for maximum efficiency. At the same time, modern retail should focus on the growing elderly segment. So, while it might seem an uphill task to cater to the rural market and the elderly, given the large potential size of these markets, the rewards can be worth the effort.



ILLUSTRATION: ROHINIT PHORE

## DATA DRIVE

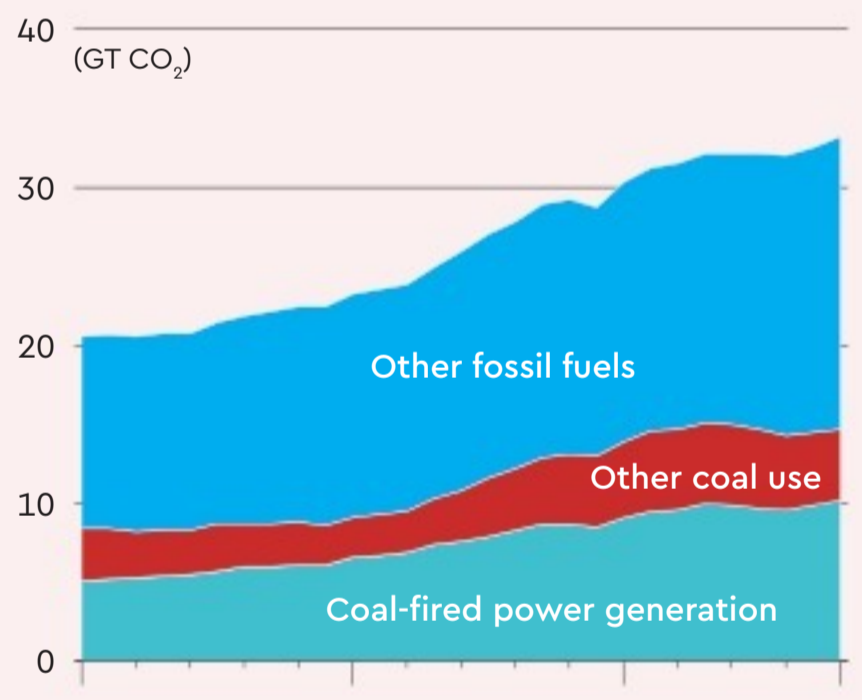
# Fuelling growth and emissions

**RISING ECONOMIC GROWTH,** and higher heating and cooling needs in some parts of the world, pushed up global energy consumption. It rose 2.3% in 2018, nearly twice the average rate of growth since 2010. As a result, carbon emissions too rose to a record high of 1.7% last, according to a report by International Energy Agency. China, the United States, and India together accounted for nearly 70% of the rise in energy demand. The biggest gains came from natural gas, which emerged as the fuel of choice last year, accounting for nearly 45% of the increase in total energy demand. Demand for all fuels rose, with fossil fuels meeting nearly 70% of the growth for the second year running. China saw the most substantial increase in energy demand, which grew 3.5% to 3,155 Mtoe, the highest since 2012. This accounted for a third of global growth. The report says India saw primary energy demand increase 4% or over 35 million tonnes of oil equivalent (Mtoe), accounting for 11% of global growth, the third-largest share. Growth in India was led by coal (for power generation) and oil (for transport), the first and second

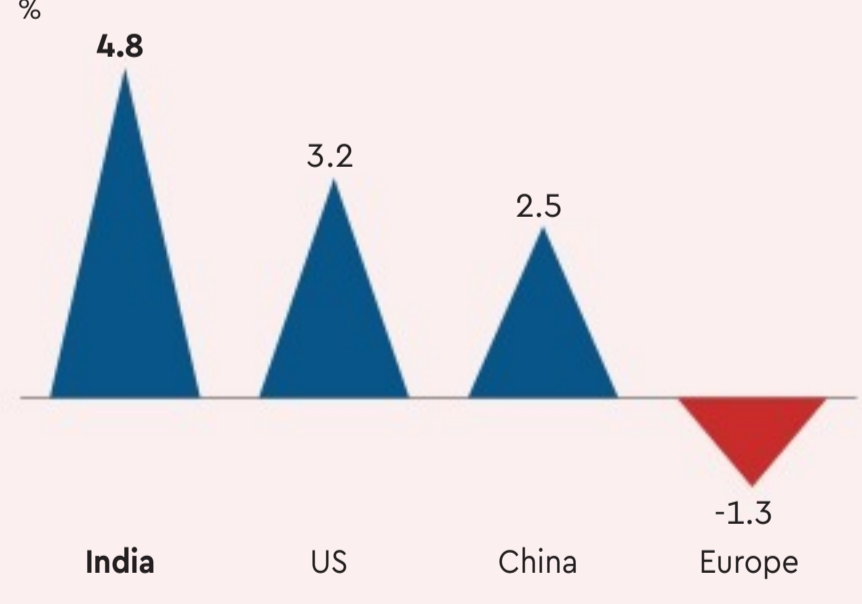
biggest contributors to energy demand growth, respectively. While emissions from all fossil fuels increased, the power sector accounted for nearly two-thirds of emissions growth. Coal use in power alone surpassed 10 Gt CO<sub>2</sub>, and in total in Asia. China, India, and the United States accounted for 85% of the net increase in emissions, while emissions declined for Germany, Japan, Mexico, France and the United Kingdom.



## Global energy-related CO<sub>2</sub> emissions rise



## India saw most growth in CO<sub>2</sub> emissions



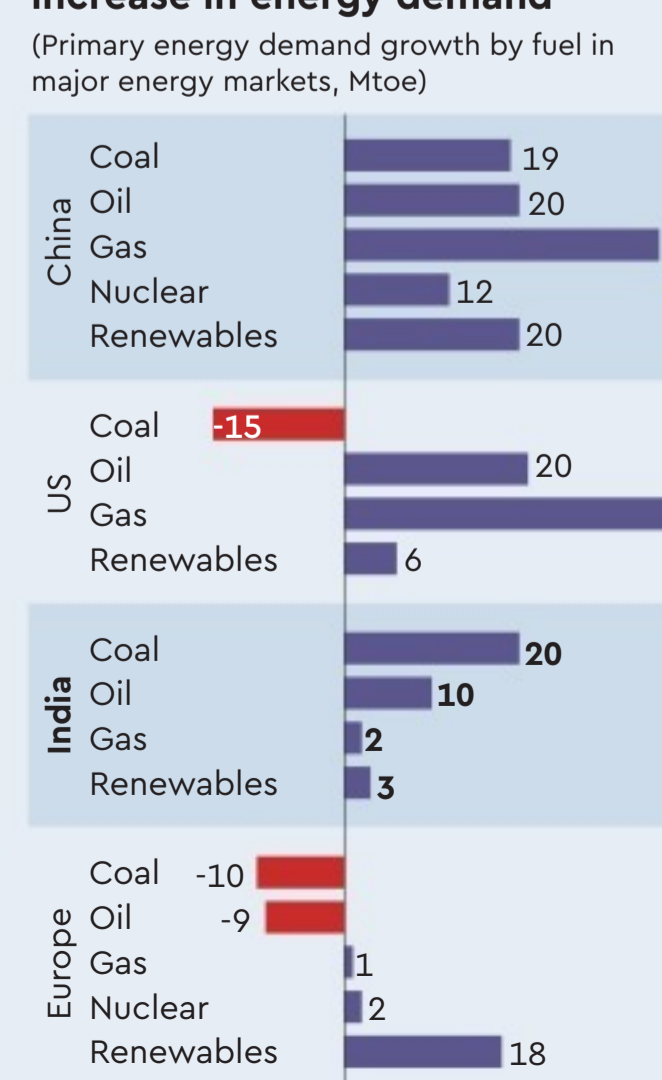
## Annual change in global primary energy demand



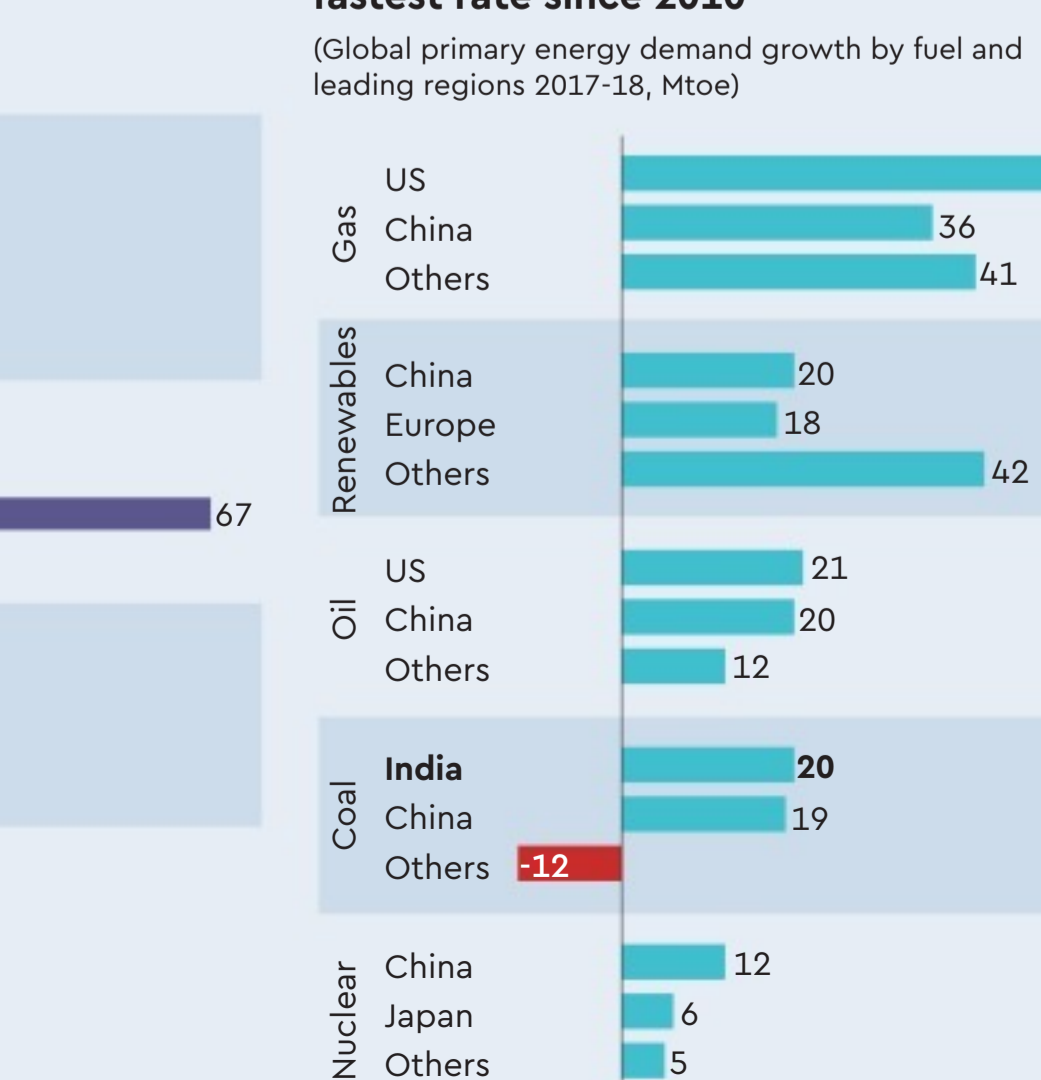
## US, China and India account for 70% of rise in energy demand



## China saw the most substantial increase in energy demand



## Global gas demand expanded at its fastest rate since 2010



## Energy Intensity improvements



Source: International Energy Agency