

definition, “big data” is often characterized by the three V’s—high volume, high velocity, and high variety. While the list of V’s keeps increasing (i.e., veracity and volatility), competing definitions and understandings of the concept as well as its potential usage are also proliferating. Despite the confusion, one thing is clear: *big data is here to stay*. Every organization needs to understand what big data means to them, and how big data analytics can be deployed to enhance their work in a timely, efficient, and effective fashion.

Big data is a game changer for this century, what oil was to the last one ([The Economist](#)). Digital information is being extracted, refined, valued, bought, and sold in new and diverse ways, and everyone wants a piece of it ([Gaining an Edge with Big Data](#)). For the field of macroeconomics, there is exciting potential for how big data can produce new indicators, bridge time lags, support the forecasting of existing data sets, and provide innovative data sources to produce official statistics ([IMF Staff Discussion Note](#)). Public sector institutions and organizations have an interest in using big data and modern technologies to inform policy making. Here at the IMF, some of the applications of big data concern the assessment of competitiveness in the tourism sector through the [A Week at the Beach Index](#), monitoring global financial flows and correspondent banking relationships through [SWIFT data](#), and evaluating firm behavior based on [Orbis](#) data. [Central Banks](#) are using big data as an input for forecasting and nowcasting tools to support macroeconomic and financial stability assessments, assess

the impact of policy communication and expectations for policy decisions through text mining, and collect information on, among other things, prices, fiscal indicators, and granular credit data. To harness the power of big data for policymaking, a holistic understanding of the opportunities must be accompanied by a thorough evaluation of the challenges and limitations that come with it.

Big data comes with big challenges. For policymaking applications, the quality assessment of indicators derived from big data is paramount, despite the strong demand for timely and granular data. *“Big data poses a considerable legal challenge and requires specialized training that goes well beyond established econometric and statistical methods. The real challenge rests in assuring that the quality of the results is rigorous and credible so it can inform sound policy insights,”* says Mamoon Saeed, a member of the IMF’s Information Technology Department. Currently, the IMF is using big data to uncover important real-time trends and insights as opposed to causal inference. *“A systematic use of big data in policy analysis requires rethinking the institutional governance of information technology, and revamping long-standing practices in acquiring, disseminating and analyzing information,”* adds Marco Marini, who is part of the IMF’s Statistics Department. Such changes will include new legal agreements, adapting cloud storage and related big data platforms, and acquiring an expertise in data science and machine learning techniques. The necessary skills will be acquired through a combination of training existing employees and hiring those with new skills.

In short, a big data practice for policy analysis and economic surveillance in the long term will tip the skill balance and change the future of work everywhere.

Amid exciting prospects and significant challenges, the question arises: *Can international organizations and public institutions ride the big data wave?* They can, but not if they go it alone or too late. Big data is a dynamic phenomenon, the systems and networks generating it are ever evolving, and related challenges, limitations, and opportunities are ever changing. Saeed reiterates that *“the world around us is changing at a faster pace. Industries are pioneering innovative ways of conducting business and shaping markets. Are we confident that our methods and indicators can cope with and capture these changes?”* Organizations like the IMF [recognize](#) the need to go beyond individual and scattered applications of big data, build public-private partnerships to deliver measurable, scalable, and high-quality results, and facilitate peer learning across their membership. *“Establishing sound partnerships, resolving legal issues, and acquiring the right skills and technologies are as important as statistical expertise, data representativeness, and methodological accuracy in harnessing the power of big data for better policymaking,”* conclude Cornelia Hammer and Diane Kostroch, both of whom are in the IMF’s Statistics Department. The key to success lies in putting together a dynamic environment of people and processes that can take big data innovations forward and put them to work in a timely fashion without falling prey to bureaucratic inertia. ■

# CAN {UN}HAPPINESS EXPLAIN MACROECONOMICS?



Photo: Michael Spilotro

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One of the most intriguing puzzles of the modern era is the productivity slowdown in advanced economies, which started before the global financial crisis despite technological advancement. Recent policy discussions have focused on how to reverse that trend. What often goes unnoticed is how one's happiness affects productivity—as a sampling of more than 90 countries in Figure 1 shows, an increase in happiness can be associated with a rise in total factor productivity growth. The correlation becomes even stronger after controlling for income per capita, indicating that there is more to the association than the income factor. In a study conducted on 700 participants in the United Kingdom, [Oswald and others \(2015\)](#) find that happier individuals have approximately 12 percent greater productivity than a control group,

with this higher productivity coming from increased efforts by workers.

What determines happiness or life satisfaction? Higher income per capita leads to higher happiness, but only up to a certain point ([Layard 2005](#)). At the same time, strong income growth does not necessarily translate into greater happiness. The [World Happiness Report \(2017\)](#) shows that, while GDP has multiplied more than five-fold over the past quarter century, subjective wellbeing in China fell for 15 consecutive years before finally beginning to recover, with the current levels still less than a quarter of a century ago. Indeed, the report also finds that factors contributing to happiness beyond income levels include a healthy life expectancy, social support (having someone to count on in times of trouble), trust (perceived absence of corruption in government and business), perceived freedom to make decisions, and generosity (recent donations).



Source: Penn World Table (version 9.0), World Happiness Report (2015).



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In addition, happiness is determined by *relative incomes*. Whether you are happy with your income depends on two factors: what others get, and what you yourself are used to getting. This relationship between relative income and happiness is also manifested in the macroeconomic picture—people are happier in countries where inequality is declining (Figure 2). Not only is higher inequality associated with lower happiness, it can also hurt the level and sustainability of growth (Ostry and others, 2016) and thus generate further dissatisfaction with life.

The significance of indicators like life satisfaction and happiness in shaping social and macroeconomic outcomes is being gradually recognized, with international organizations such as the OECD and UNDP emphasizing the “quality of growth” that puts a person’s wellbeing at the center of policy efforts. The IMF has also emphasized the need for inclusive growth—a broad sharing of the benefits of, and opportunities for, economic growth.

According to social scientists, approximately 50 percent of our happiness is determined by genes, 40 percent by our thoughts, actions, and behaviors, and only 10 percent by our circumstances (such as whether we are rich or poor, healthy or unhealthy, married or single). Hence, our own values can shape our level of happiness. As Adam Smith observed in the Theory of Moral Sentiment (1759): *“How Selfish soever man be supposed, there are evidently some principles in his nature, which interest him in the fortune of others, and render their happiness necessary to him, though he derives nothing from it*

### VIEW FROM THE VATICAN - THE 2018 WORLD HAPPINESS REPORT

VATICAN CITY: The 2018 World Happiness Report featured a Nordic quinella, with Finland topping Denmark for top place.

As in past years, the report underscored the ancient insight of sages like Aristotle—happiness depends less on money (at least beyond a certain level) and more on the quality of relationships, a sense of purpose, and the ability to make a social contribution. More technically, differences in happiness across countries (measured by Gallup surveys of subjective wellbeing, mainly the Cantril ladder of life satisfaction) can be explained by six factors—GDP per capita, healthy life expectancy, freedom to make life choices, social support, generosity, and trust. Importantly, social factors are more important than income in determining happiness. This is something that economists have largely forgotten, to the great detriment of the profession.

These insights were deployed to explain both why happiness is waning in the United States (declining trust and social cohesion) and why Latin America scores fairly highly, with the region’s high quality of interpersonal relationships more than offsetting the high levels of inequality, crime, and corruption. This year’s report focused mainly on migration, finding that the happiest countries also have some of the highest levels of immigration, that immigrants tend to be as happy as people born locally, and that happiness increases among immigrants and native-born alike when migrants are more accepted.

As a side note, the launch coincided with the death of the Pontifical Academy of Science’s most illustrious academician, Stephen Hawking. It was quite a poignant experience to listen to recollections and look at the pictures of him meeting four popes over 40 years in that venue. RIP, Stephen.

Figure 2: Inequality versus Happiness, 2005-2007 to 2012-2014



Source: World Bank, World Happiness Report (2015).

*except the pleasure of seeing it.”* Perhaps it may be time to move away from the external values emphasized in economics (such as competition, consumption, and profits) to

internal values (such as cooperation, compassion, and altruism) professed by the likes of Aristotle and Buddha two and a half millennia ago. ■