

AI will fundamentally transform the job market but the risk of mass unemployment is low

AI has the potential to radically transform the labour market, impacting workers of all skill levels in a wide variety of companies and sectors. Some jobs will inevitably become obsolete. Yet we don't expect AI to lead to mass unemployment



The rise of AI has sparked intense debate about the impact it could have on the labour market and future employment. On the one hand, if digital technologies complement labour, they could enhance or improve human skills and create space for more social interaction and creative work.

On the other hand, certain types of jobs could disappear if these technologies replace human skills and take the place of labour. However, the fear of job losses is nothing new. Previous technological progress has always been controversial, even sparking riots. Yet, mass unemployment did not materialise. So why should this time be any different?

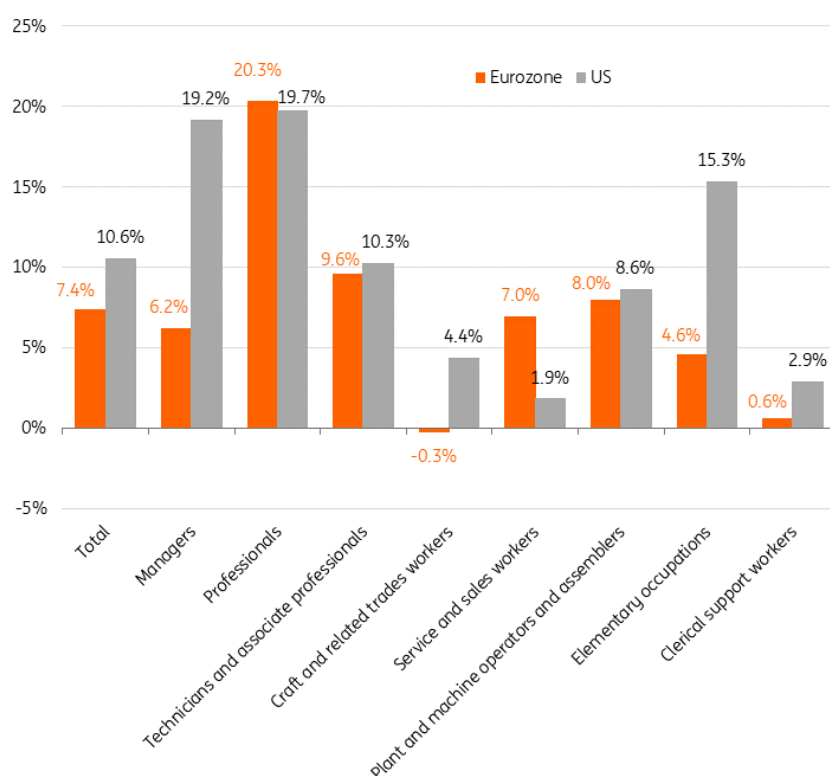
The fear that automation would lead to higher unemployment did not materialise over the last decade, on the contrary

When looking at employment data over the last decade, the ongoing automation trend has not been accompanied by any dramatic unemployment stories. On the contrary. Unemployment rates are at extremely low levels, standing at 3.9% in the US and 6.4% in the eurozone, while the search for skilled workers has been going on for years now. In the US, there are still 8.9 million job openings as of January 2024, leaving the job openings rate at 5.3%, while in the eurozone, the seasonally adjusted job vacancy rate stood at 2.8% in the fourth quarter of 2023 with Belgium (4.7%* 3Q 2023), the Netherlands (4.4%), Austria (4.2%* 3Q 2023) and Germany (3.8%) recording the highest job vacancy rates. Between 2012 and 2022, total employment increased by 15.8 million in the US and 13.8 million in the eurozone.

Yet, overall rates conceal trends unfolding underneath. By looking at detailed ISCO occupations in the labour force survey (LSF) between 2012 and 2019^[1], the need for specialised employees falling in the “professionals” category has been highest in the eurozone and the US, while the number of people occupied in the “clerical support workers” and “craft and related trades workers” category only increased slightly or even decreased. While demand for service and sales workers has been higher in the eurozone than in the US, in the latter, employment in elementary occupations (such as cleaner, bicycle courier, baggage handler, kitchen helper) increased greatly.

Employed persons in the eurozone and the US by occupation

(% change, 2019 vs 2012)



Source: Eurostat, Ilostat

These numbers support, to some extent, the thesis made by Frey and Osborne in 2013 that routine-intensive occupations are more susceptible to computerisation, while the labour market is increasingly becoming polarised, with middle-income routine jobs disappearing in favour of job growth in high-income cognitive jobs and low-income manual occupations. However, their conclusion that 47% of jobs were at substantial risk of being automated proved too pessimistic. Ten years after their study, robots have clearly not replaced half of all jobs.

While there are changes happening beneath the surface, technological advances have not led to mass unemployment. In fact, new jobs have been created such as drone operators, virtual reality experience designers, as well as influencers and assistants working remotely only. Particularly in the IT area, there has been tremendous demand: the number of people in the US working in computer and mathematical occupations increased by 40.3% between 2012 and 2019 to 5.4 million, with 1.8 million people working as software developers. In terms of the percentage increase, information security analysts were most in demand, rising by 140.4% to 125,000 people. Not all IT-related jobs were equally in demand, though. The number of people working as computer network architects, computer programmers and computer systems administrators decreased in the US (-16.5%, -5.4% and -11.8%, respectively).

[1] We opted for the period 2012 to 2019 to take a closer look at the employment data to exclude a) the period of the coronavirus pandemic and b) consider the breaks in Eurostat's LSF time series in 2011 and 2021.

AI is likely to impact workers of all skill levels, targeting managerial and professional tasks

As with each new wave of technological progress, the development of AI has once again reignited the debate on the automation of jobs and sparked fears that jobs will disappear. In the past, the economic literature has devoted considerable attention to assessing and forecasting the impact of technologies with a high potential for automation on the labour market. We have also examined the effects of automation in numerous studies, particularly for the [German](#) and [Belgian](#) labour markets.

What has changed in debates on technology and workers, however, is the types of workers affected. While the advances in technology in the 1900s were primarily focused on manual workers, technological development since the 2010s has centred on the ability of computers to perform non-routine, cognitive tasks, and by consequence potentially affect white-collar or knowledge workers.

Generative AI takes the above scenarios to a new level as [gen AI creates new data, improving the speed and quality of work](#), potentially reaching “general human intelligence”. Indeed, with generative AI, not only low or medium-skilled tasks will be transformed by technology, but also high-skilled occupations such as professionals and managers – the area, where most jobs have been created as of late. Case studies indicate that AI is likely to impact workers of all skill levels, in a wide variety of companies and sectors, including those performing non-routine tasks (Brynjolfsson et al (2018), Lassébie and Quintini (2023), Milanez (2023), Webb (2020)). It is possible that in a more extreme scenario, AI will eventually lead to the impact on the labour market that Frey and Osborne estimated more than 10 years ago.

How will AI transform labour markets in the years ahead?

So where might this take us a couple of years ahead? We believe that AI does have the potential to fundamentally transform most of the work tasks that exist today, meaning that the way people do their jobs will evolve drastically. Interpreters, translators, survey researchers, writers, mathematicians, web designers, accountants, auditors, journalists, blockchain engineers, tax preparers and financial managers are all occupations which have a high exposure to AI in the sense that many tasks of these occupations can, in theory, be performed by generative AI (Eloundou, et al., 2023).

But what will be the final impact on these professions? Will they disappear and be replaced by autonomous AI? Or will they continue to exist alongside AI, potentially benefiting from productivity gains? This is where the real question lies. The development of AI is such an important revolution for the labour market that it is not enough to look at the exposure of each profession to AI to be able to make conclusions about the impact of AI on the labour market. We also need to consider the question of substitution or complementarity with AI, i.e., the likelihood of AI complementing or replacing human work. To date, the most comprehensive approach in the literature for incorporating both the AI exposure aspect and the complementarity vs. substitution aspect into the analysis is that of the IMF (International Monetary Fund).

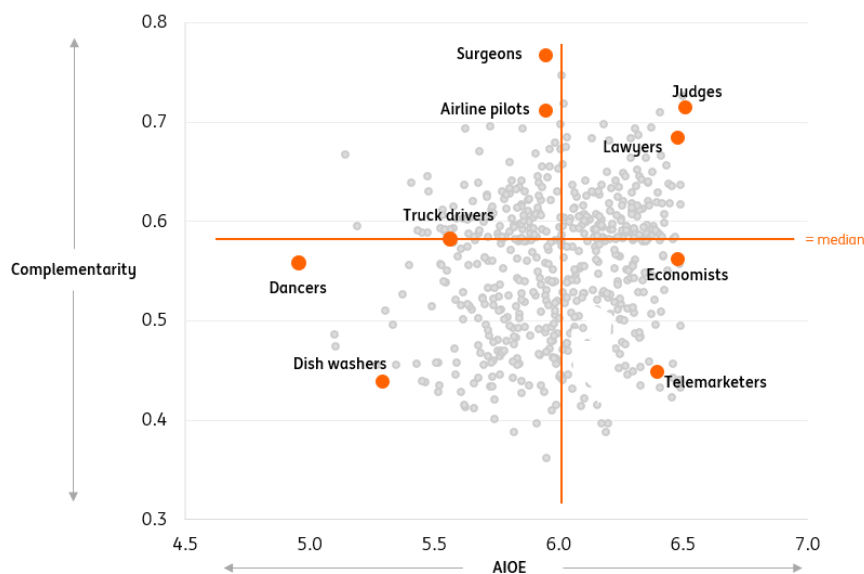
This [new approach by the IMF](#) considers not only job tasks, but also social, ethical, and physical aspects of occupations, as well as the skill levels required. This makes it possible to take into account aspects linked to communication (the subtleties of face-to-face interaction and the art of

public speaking remain largely the domain of humans), responsibility (the responsibility and ethical decision-making inherent in certain tasks, for example in the field of human health, require human supervision, judgement and, above all, compassion), exposure to external environments and physical proximity to other people (which require a high level of adaptability and sensory acuity)... According to this approach, occupations can be classified into 3 groups²:

1. high exposure, high complementarity
2. high exposure, low complementarity
3. low exposure

High-exposure, high-complementarity occupations have significant potential for AI support, as AI can complement workers in their tasks and decision-making. However, the potential for unsupervised use of AI in these roles is limited. These are mainly cognitive jobs involving a high degree of responsibility and interpersonal interaction, such as those performed by surgeons, lawyers, and judges. In these roles, workers can potentially benefit from the productivity advantages of AI, provided they have the necessary skills to interact with the technology. High-exposure, low-complementarity occupations, on the other hand, are well placed to incorporate AI, but AI is more likely to replace human tasks. This could lead to lower demand for labour and slower wage growth for these jobs. Telemarketers are a prime example. In the US, the number of jobs labelled telemarketers decreased by 49.5% between 2012 and 2019. Finally, "low exposure occupations" have minimal or no potential for AI application. This group encompasses a wide range of occupations, from dishwashers to artists and beyond.

Conceptual diagram of AI Occupational Exposure (AIOE) and Complementarity



Source: Felten, Raj, and Seamans (2021); Pizzinelli and others (2023); IMF staff calculations

Advanced economies are likely to be more affected by AI than emerging economies

The IMF estimates that about 40% of workers worldwide are in high-exposure occupations,

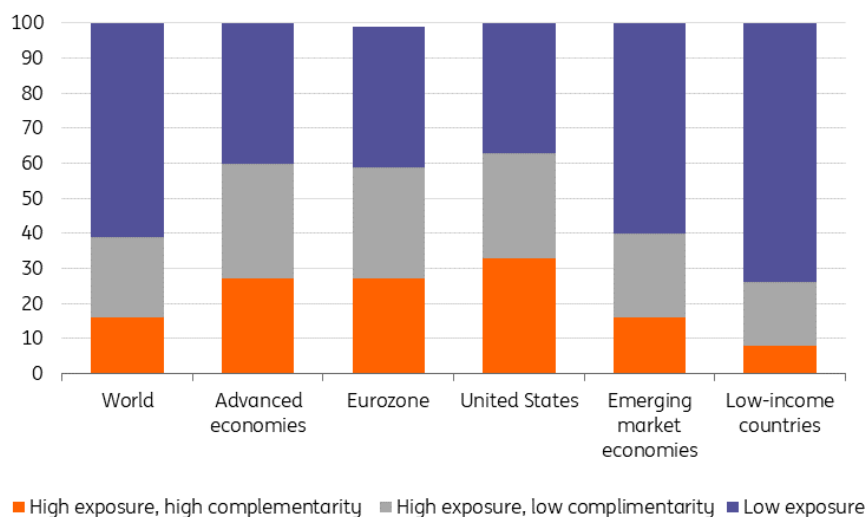
meaning that they will be affected by AI. 18% of employment is in high-exposure, high-complementarity occupations which are likely to benefit from AI and 21% are in high-exposure, low-complementarity jobs where AI is more likely to replace human tasks. Around 60% of workers are likely to remain unaffected by AI. However, because they have a different economic structure, advanced economies are likely to be much more affected because they have a greater share of high-exposure occupations (60%).

Over 90 million Europeans and 100 million US citizens might be exposed to AI

By applying the IMF's approach to the share of each occupation in total eurozone and US employment, we can estimate that the impact of AI will be as follows. In total, 40% of the eurozone workforce, or 62.8 million people, and 37%, or 58.6 million people, of the US workforce have little exposure to AI. 27% and 33%, or 42.2 million and 52.2 million, respectively, are highly exposed but with a high degree of complementarity (they are likely to benefit from AI) and 32% and 30%, or 50.2 million and 47.5 million, are highly exposed with a low degree of complementarity (tasks are likely to be replaced by AI). However, these figures do not mean that this percentage of workers will be displaced. A job consists of many activities, so the disappearance of entire jobs will remain limited, but the field of activity within many jobs will change fundamentally.

Advanced economies have a greater share of high-exposure occupations to AI than emerging market economies or low-income countries

Share of employment by AI exposure in percent



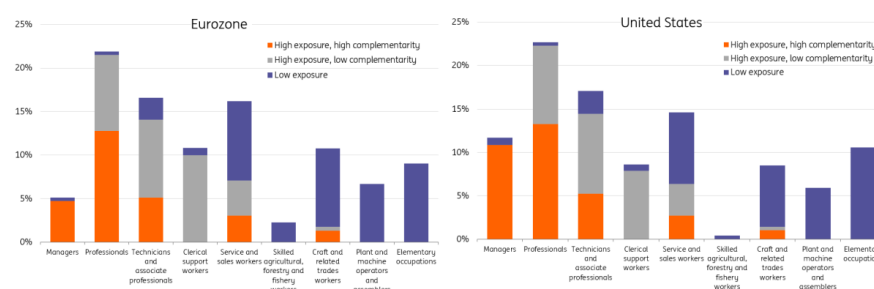
Source: IMF, Eurostat, Ilostat, ING calculations

Being mainly in the "high exposure and low complementarity" category, clerical support staff will probably be the most affected by AI, and job losses in this category are likely. This will have a greater impact on the job market in the eurozone than in the US, as the proportion of

administrative support staff is higher in Europe. Conversely, managers are very exposed to AI, but are more complementary to the technology and therefore, more likely to benefit from it. They account for a larger proportion of employees in the United States than in Europe.

According to [new research by Autor \(2024\)](#), AI could benefit the middle class with mid-level skills. Indeed, because artificial intelligence could combine information and rules with experience to facilitate decision-making, it could enable a greater number of skilled workers to perform higher-stakes decision-making tasks currently reserved for an elite group of experts, such as doctors, lawyers, software engineers and university professors.

Detailed employment share by exposure and complementarity in the eurozone and the US

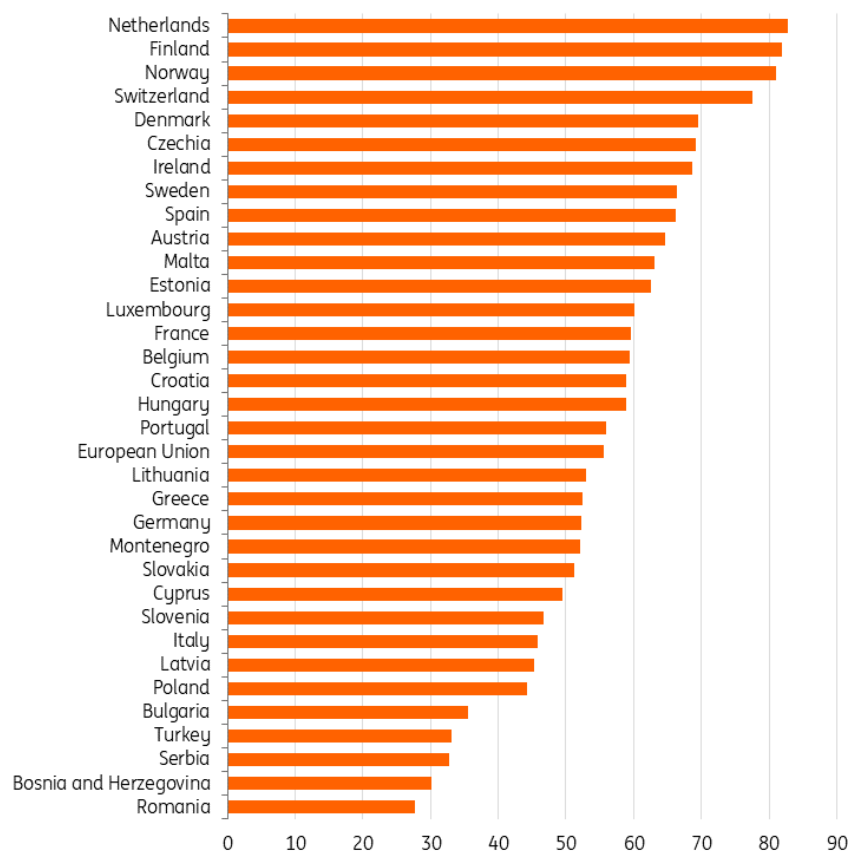


Source: Eurostat, ILOSTAT, IMF, ING calculations

Workers will need to adjust to changing skill demands and sector shifts with digital competencies becoming more important

Workers will need to adjust to changing skill demands and sector shifts, with some potentially transitioning to high-AI complementarity roles and some struggling to adapt. It means that it is important to make a distinction between job tasks and workers. AI adoption may destroy some jobs (and displace the associated workers) and create or enhance others, but whether the incumbents are the ones who can reap the associated benefits is unclear. The employment effects will likely depend on worker characteristics, which in turn will affect their adaptability [to innovate, adopt, and adapt](#). As the ability to adjust is crucial for navigating AI-induced changes, the impact on the job market will also depend on workers' digital skills, with those workers most able to adapt to AI technologies reaping more of their benefits as they enable them to perform tasks differently and potentially more efficiently than before (Felten et al., 2019). Across the EU, for example, digital skill knowledge differs widely. While the Netherlands and Finland are at the top of the list, Italy, Poland and Romania are found at the bottom.

People with basic or above basic overall digital skills in the EU in 2023 (as % of people)



Source: Eurostat

Summarising the above, we believe that AI does indeed have the potential to fundamentally transform most of the jobs that exist today, meaning that the way people do their jobs will evolve drastically, especially among managers, technicians, clerical support workers and professionals. Yet, [implementation processes rarely happen overnight](#).

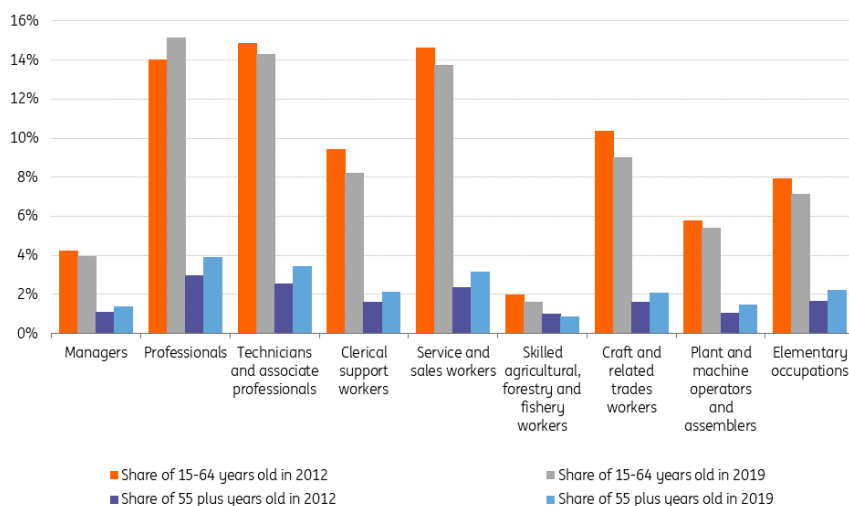
Why we do not expect AI to lead to mass unemployment

Nevertheless, we do not expect mass unemployment due to AI. First, as explained by our colleague [in our AI article series](#), implementation processes rarely happen overnight. Companies and governments need to invest in data, human capital, and infrastructure. Worker strikes and regulation add to this. While some professions, such as translators, are already experiencing changes, for most jobs, we do not see the transformation of labour markets around the world as a short-term affair. Lastly, analysing changes in the demand for labour is not enough to draw conclusions about the level of employment and unemployment. We also need to consider the supply of labour (i.e., the number of workers available). In the eurozone, the working-age population is set to fall by 9.5 million between 2023 and 2035, according to Eurostat projections. The share of people being 65 and over will increase from 21.6% in 2023 to 26.3% in 2035, in Japan, the share of elderly will stand at 32.8%, and in the US at 21.3%. Without the development of AI and increased productivity, this would lead to a massively tight labour market and an even higher

shortage of workers.

Compared to 2012, the number of people employed being 55 to 64 years old, rose by 10.3 million in 2022, while employment numbers in the 15-64 years old category increased by only 1.7 million in the eurozone. More than 35 million people or 22.3% of all people employed were older than 55 years. Consequently, the share of people being 55 or older increased in every single occupation group (except for agriculture), while the share of people aged 15-54 decreased in every single occupation group except for the “professionals” category. The baby boomer generation will thus leave a large gap in the labour market. The gap will be particularly large in agricultural occupations and among managers, where 35.6% and 27.7%, respectively, are older than 55, thus leaving the labour market in the next decade or so. Here, AI developments could help mitigate the negative impact of managerial baby boomers leaving the workforce as managers fall under the “high risk, high complimentary” category.

Employment share in total employment by occupation and age in the eurozone, 2012 to 2019 (%)



Source: Eurostat, ING calculations

The transformation of the job market is coming

AI and generative AI is here to stay and will transform today’s labour market. It will fundamentally transform some of the work tasks that exist, leading to some jobs becoming obsolete, but also creating new tasks and supervising aspects. AI will be complementary but also supplementary. It could become a blessing in ageing economies but could also lead to new social tensions by further widening wage gaps. In any case, it will not be an overnight change but rather a longer-term transition of labour markets over the coming decade.

Authors

Inga Fechner

Senior Economist, Germany, Global Trade

inga.fechner@ing.de

Charlotte de Montpellier

Senior Economist, France and Switzerland

charlotte.de.montpellier@ing.com

Disclaimer

This publication has been prepared by the Economic and Financial Analysis Division of ING Bank N.V. ("ING") solely for information purposes without regard to any particular user's investment objectives, financial situation, or means. *ING forms part of ING Group (being for this purpose ING Group N.V. and its subsidiary and affiliated companies)*. The information in the publication is not an investment recommendation and it is not investment, legal or tax advice or an offer or solicitation to purchase or sell any financial instrument. Reasonable care has been taken to ensure that this publication is not untrue or misleading when published, but ING does not represent that it is accurate or complete. ING does not accept any liability for any direct, indirect or consequential loss arising from any use of this publication. Unless otherwise stated, any views, forecasts, or estimates are solely those of the author(s), as of the date of the publication and are subject to change without notice.

The distribution of this publication may be restricted by law or regulation in different jurisdictions and persons into whose possession this publication comes should inform themselves about, and observe, such restrictions.

Copyright and database rights protection exists in this report and it may not be reproduced, distributed or published by any person for any purpose without the prior express consent of ING. All rights are reserved. ING Bank N.V. is authorised by the Dutch Central Bank and supervised by the European Central Bank (ECB), the Dutch Central Bank (DNB) and the Dutch Authority for the Financial Markets (AFM). ING Bank N.V. is incorporated in the Netherlands (Trade Register no. 33031431 Amsterdam). In the United Kingdom this information is approved and/or communicated by ING Bank N.V., London Branch. ING Bank N.V., London Branch is authorised by the Prudential Regulation Authority and is subject to regulation by the Financial Conduct Authority and limited regulation by the Prudential Regulation Authority. ING Bank N.V., London branch is registered in England (Registration number BR000341) at 8-10 Moorgate, London EC2 6DA. For US Investors: Any person wishing to discuss this report or effect transactions in any security discussed herein should contact ING Financial Markets LLC, which is a member of the NYSE, FINRA and SIPC and part of ING, and which has accepted responsibility for the distribution of this report in the United States under applicable requirements.

Additional information is available on request. For more information about ING Group, please visit <http://www.ing.com>.