Of Swans, Dragons, and How to Tell Them Apart (Without Getting Singed)

Ruben R. PuenteDura, Ph.D.
Black Swan Events

• Cannot be predicted ahead of time
• Have a major effect
• Can be rationalized retrospectively

From Power Laws to Dragon Kings


Acqua Alta 1875-1975
Distribution of Automatibility in the US (Task-Based vs. Occupation-Based Approach)

**Figure 2.** Distribution of Automatibility in the US (Task-Based vs. Occupation-Based Approach)

Source: AXWKRUV\caOcXOaWLRQ baVed RQ WKe SXUYe\RI AdXOW SNLOOV (PIAAC) (2012)

In conclusion, using information on task usage at the individual level leads to significantly lower estimates of jobs ‘at risk’ since workers in occupations with ± according to FO ± high automatibilities nevertheless often perform tasks which are hard to automate.

**Figure 3.** Shows the share of workers at high risk by OECD countries, i.e. the share of workers whose automatibility is at least 70%. This share is highest in Germany and Austria (12%), while it is lowest in Korea and Estonia (6%).

The results for Germany are very similar to the results of a recent representative survey among German employees, where 13% of employees consider it likely or highly likely that their job will be replaced by machines (BMAS 2016). Furthermore, our results for Germany are comparable to a recent study by Dengler and Matthes (2015), who use a different methodological approach but also find that 15% of all jobs in Germany are at risk of automation. Moreover, they also find a bi-polar distribution of automatibility with moderate polarisation.

We exclude the Russian Federation from our sample. This is because when we restrict the Russian PIAAC sample to those observations where all relevant variables are non-missing, then the distribution of these variables is not representative.

The results for Canada should be treated with some caution, as relevant explanatory variables for extrapolating the automatibility are missing, see Annex B.

9% of jobs are at high risk of automation in advanced G20 countries.

- Jobs are at high risk of automation if at least 70% of tasks are at risk of being automated.
- Jobs are at risk of significant change if between 50% and 70% of tasks are at risk of being automated.

For Belgium, data correspond to Flanders, and for the United Kingdom, data correspond to England and Northern Ireland.

Data correspond to 2012 for countries participating in the first round of the Survey of Adult Skills: Australia, Canada, France, Germany, Italy, Japan, Korea, United States, and United Kingdom. Data correspond to 2015 for countries participating in the second round of the Survey of Adult Skills: Turkey.


Even these estimates, however, should not necessarily be equated with actual or expected employment losses from technological change, for at least three reasons. First, the adoption of new technologies is often a slow process due to a host of economic, legal and societal hurdles, so that actual automation will take place at a far slower pace than what might be expected. Second, even in the case where new technologies are introduced, workers can adjust to the challenge of automation by switching tasks, thus preventing technological unemployment. Third, technological change does not just destroy jobs, but also generates new ones through its effect on productivity and the demand for new technologies. For example, it has been estimated that, for each high-tech job created in industries such as Computing Equipment or Electrical Machinery, some 4.9 additional jobs are created for lawyers, taxi drivers, and waiters in the local economy (Moretti, 2011).

Sometimes, technological innovation can even have very unpredictable effects on labour markets like, for example, the effect that the contraceptive pill had on female labour force participation and employment.

Overall, it is not clear that the digital revolution has, to date, had a dramatic impact on either the destruction or creation of jobs. In the United States, for example, the emergence of new technology-related industries throughout the 2000s—including online auctions, video and audio streaming, and web design—has had only negligible effects on aggregate employment patterns, employing less than 0.5% of the workforce (Berger and Frey, 2016). Instead, most job growth in advanced economies has recently come from either technology-using (e.g. professional services) or other sectors that are not particularly intensive.

Similarly, Goos et al. (2013) estimated that in the European Union over the period 2000-2011, the creation of one high-tech job resulted in more than four additional non-high tech jobs in the same region.
“Gakushiryoku - ability required for university graduates for an unpredictable era including the education, knowledge and experience to make correct decisions in the face of unexpected difficulties.”

MEXT - Summary of Report: Towards a Qualitative Transformation of University Education for Building a New Future - Universities Fostering Lifelong Learning and the Ability to Think Independently (2012)
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You are Maxwell’s (Silver Hammered) Demons. Your attempts to overturn the Second Law of Thermodynamics having been repeatedly foiled by the academic community, you resolve to bring the whole edifice of academe crashing down, by creating conditions propitious to a Black Swan or Dragon King event. You decide to begin by destabilizing the network of scholarship that is embodied in the co-assignment of texts in college courses. Which texts do you delete/add/separate/bring together - and why? A map to help you in your task can be found at http://galaxy.opensyllabus.org