

EVIDENT AI TALENT BANKS

The race for AI banking talent. Mapped.

TALENT
REPORT



2023/06

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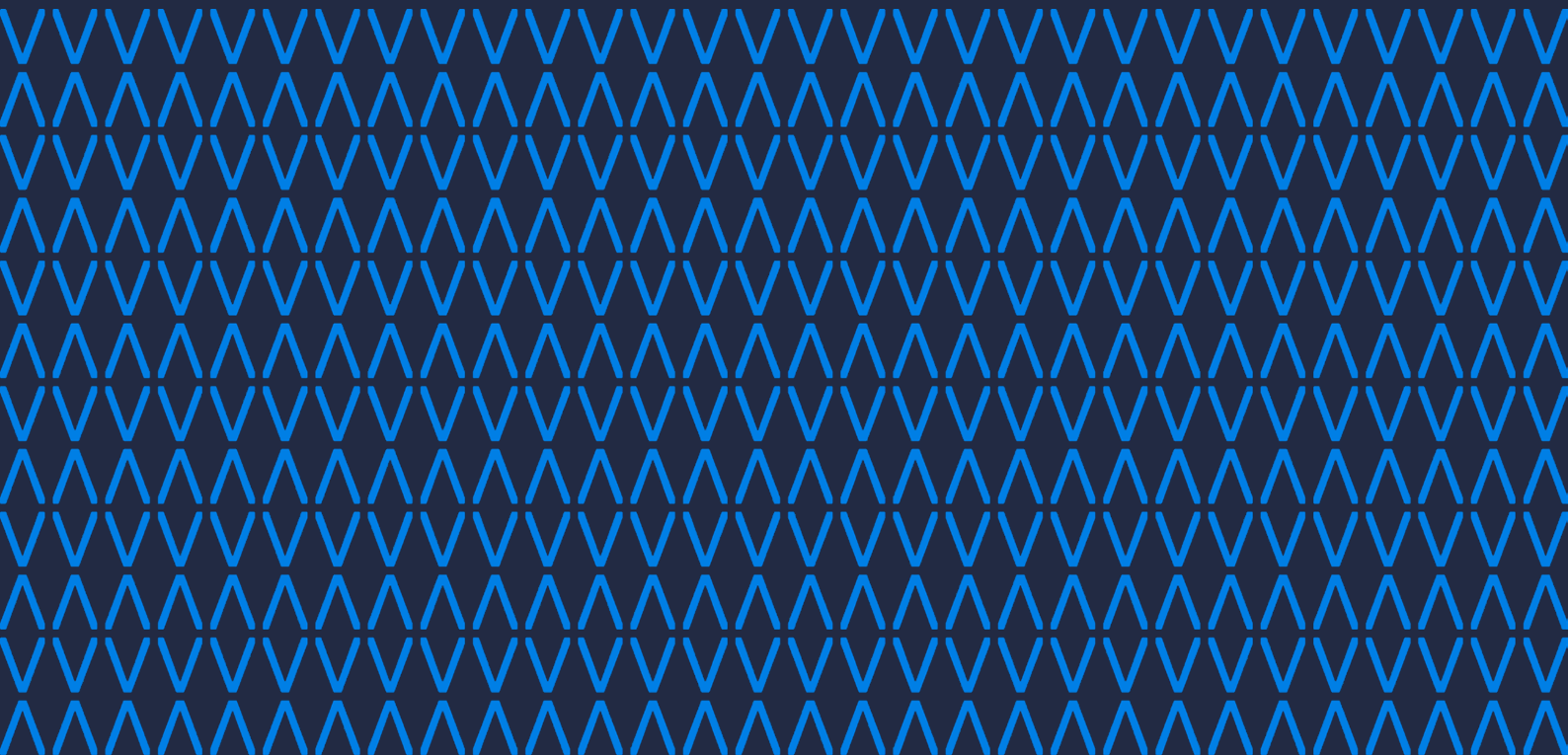
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Foreword

Bank CEOs tend to be numbers-driven, and few numbers are more important to them than cost/income ratio. So it is a rare occurrence when they showcase the cost they have incurred without an income or profit number next to it.

Yet in his April 2023 Shareholder Letter, Jamie Dimon, CEO of JPMorgan Chase & Co stated:

We currently have over 1,000 people involved in data management, more than 900 data scientists (AI and machine learning (ML) experts who create new models) and 600 ML engineers (who write the code to put models in production) ... We also have a 200-person, top-notch AI research group looking at the hardest problems and new frontiers in finance."

It sent a very clear message to the market. The CEO of one of the largest banks in the world views the organisation's AI talent as a prized asset – one that is essential to its future success. He sees this as critical:

"AI and the raw material that feeds it, data, will be critical to our company's future success — the importance of implementing new technologies simply cannot be overstated."

This report examines why talent is central to the coming AI transformation of the banking industry, what banks are doing to develop their talent, and where they stand in the race to recruit and retain the brightest minds working in AI today. We will explore the latest talent trends across the banking industry, identify how and where the leading banks in North America and Europe are attracting and retaining AI talent, and suggest actionable opportunities for banks to drive their AI talent agenda.

As the race for commercial AI adoption intensifies, it is vital that we continue to push transparency up the corporate agenda so that banks move to an AI-first future safely and sustainably. This report builds on the findings of our January 2023 [Evident AI Index](#) - the first "outside-in" independent benchmark of AI maturity for the banking industry - where Talent was one of four key pillars we identified as critical to a bank's AI maturity.

Fuelled by our live trackers of AI-related talent activity in North America and Europe's largest financial institutions, over the coming months we will be offering clients the chance to examine bank-specific AI talent profiles in detail, as well as the opportunity to investigate a bank's entire talent stack and assess how it compares to peers.

We will also be publishing reports covering the other three pillars of the Evident AI Index - Innovation, Leadership and Responsible AI - and expanding and updating the Evident AI Index in November 2023 to cover 60 of the world's largest banks.

We're here to promote best-practice and provide unrivalled insights to the industry at large, which is why we actively seek to engage leaders across the banking sector to explore these trends with us in more detail. Do get in touch to find out more about who we are, and how we're creating the definitive independent benchmark for tracking industry-wide AI adoption and readiness.

Alexandra Mousavizadeh
CEO & Co-founder

Annabel Ayles
COO & Co-founder

Acknowledgements

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that feeds it, data, will be
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*Jamie Dimon, CEO of JPMorgan
Chase & Co*

About Evident

We provide banks with independent data, research and benchmarking to accelerate their AI transformation.

We extract data from millions of public documents using proprietary machine learning tools and combine this with our deep sector expertise to publish the Evident AI Index, the global benchmark of AI maturity, as well as Insights Reports diving deeper into the latest AI activity across the sector.

We cover five critical pillars of a bank's AI ecosystem:

TALENT	 Aquisition	 Staffing	 Development	 Retention
INNOVATION	 Research	 Patents	 Ventures	 Ecosystem
LEADERSHIP	 Strategy	 Operating Model	 Executive Positioning	 Communications
RESPONSIBLE AI	 Principles	 People	 Publications	 Partnerships
OUTCOMES	 Use Cases	 Return on Investment	 Sophistication	 Impact

We help leaders in the banking industry make informed AI-related decisions, investments and strategic choices by benchmarking their AI activity against their peers.

Members access year-round insights to keep on top of the latest competitor activity and emerging trends.

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Executive Summary

1. The 60 largest North American and European banks and payment providers employ at least 46,000 people in the "AI & Data Core" (AI development, data engineering and governance & ethics roles), with as many as 100,000 global banking roles (including Implementation, Quants and Model Risk) involved in bringing AI to market.
2. Even as banks cut jobs and institute hiring freezes they continue to invest in AI. AI & Data Core net staff numbers are up 4% from October 2022 to March 2023 - and 40% of AI staff started in their role since January 2022
3. JPMorgan Chase has the most AI staff. They employ over 10% of the total and continue to accelerate. Between February and April 2023, they advertised for ~20% of all the AI & Data Core jobs posted by banks.*
4. However, Capital One is the leading bank on AI talent density, with the highest proportion of its staff working in AI (in line with payment providers like PayPal, Visa).
5. In Europe we can see key banks rising to the challenge: BNP Paribas ranks #5 in terms of overall number of AI & Data Core staff, and ABN Amro and ING Groep are 2nd and 3rd banks for talent density. Deutsche, BNP Paribas and Barclays are all in the Top 5 for current AI recruitment.
6. New York is the global centre for AI talent, as measured by number of staff, followed by London, Toronto, Bengaluru and Paris. India has 3 cities in the Top 10, as does the US. London's second place is fragile: for AI & Data Core only (i.e. without Quants) London ranks fourth, with Toronto and Paris moving up.
7. India is 2nd to the US in terms of total AI staff numbers, concentrated in six major cities largely driven by historic IT offshoring decisions.
8. Different models of AI staff deployment are emerging. Canadian banks are centralised in Toronto (making it the world centre for AI and Data Core staff) whereas US banks are far more dispersed: Wells Fargo has AI-related staff in over 100 cities, likely reflecting legacy as much as strategy.
9. In most markets, domestic banks employ the majority of domestic AI talent. The UK is unique in that US banks employ more AI talent in London and employ more alumni from leading universities than domestic players.
10. Poaching from other banks is the largest source of AI talent for banks. US banks have a small net inflow, partially at the expense of UK banks. However, most poaching is within markets rather than between them. Wells Fargo, RBC, BNP Paribas and HSBC lead net inflows in their respective markets.
11. Consultancies like Tata and Accenture are the largest source of AI talent from outside the industry. Most staff who leave a bank go to other banks but, on a very limited data set, Amazon is the largest external hirer.
12. The University of Toronto has more alumni in the industry than any other university.
13. North American organisations have led on building research teams to spearhead their AI strategy, at least partially based on inspiration from Big Tech. JPMorgan Chase's research dominance is being challenged by Ant Financial, with RBC, Visa and CapitalOne also showing strong momentum in this space.
14. Despite the explosion of interest in Generative AI, fewer than 2% of recent AI Development Job Descriptions* explicitly referenced skills in Generative AI, Large Language Models (LLMs) or ChatGPT.
15. Nor is there evidence that banks are increasing investment in Responsible AI talent - even as the environment on this matter turns serious and regulation looms. Just two banks explicitly recruited for Responsible AI roles between February and April 2023*.

*Includes Job Descriptions posted by the largest 23 banks between February and April 2023.

Introduction

Why AI Talent Matters to Banks

Banks are in the information processing business, and AI can revolutionise their ability to do so. This will transform products, customer experience, and operations - breaking old trade-offs between speed, scale and scope. AI transformation is the next stage in their ongoing digital journey. The potential for significant cost / income ratio changes will alter competitive dynamics.

But this is challenging work and - as evidenced in the methodology of the Evident AI Index - banks need to align multiple critical things to make AI happen. Amongst other things they need to invest wisely, rebuild their data infrastructure, deliver innovation, build new ecosystem relationships, navigate emerging stakeholder concerns about managing “black box” processes with unclear risks, and deliver strong governance. But at the heart of all of these is talent. Simply put, do you have the right folk in the right places, doing the right things. Revolutions require people.

Making AI work in banks requires a combination of roles and skill sets: data scientists, data engineers, ML engineers, software developers, subject matter experts, quants, model risk analysts, policy and governance managers to name but a few. Bringing these skill sets together requires meticulous management and a Board that understands the challenges and opportunities of deploying AI. Although we do find evidence of people working in AI in banks with decades worth of experience this is still a relatively new field.

This can mean that there is little consistency in nomenclature across the banks, let alone a single view of best practice. That’s why, in this report, we track the broad groups of people who make up the AI ecosystem inside our featured banks to try to make sense of the evolving talent stack.

HOW BANKS THINK ABOUT TALENT

Our work suggests that there are two emerging sets of aspirations for banks as they think about AI.

Firstly, many see this as simply the next stage in the engineering-driven transformation of their business, as a continuation of the digitisation and automation that has been a feature of bank development for decades. In this camp sit the majority of players, including many of the European banks.

However, some North American banks, perhaps inspired or nervous from closer exposure to the speed and efficacy of Silicon Valley, appear to aspire to something bigger. They have seen the power of the Big Tech firms, have understood the potential competitive advantages offered by digital and data platforms, and see this as the model that they wish to emulate. They operate in a market where scale can be captured and they are often less encumbered by the economic and political scarring of the Great Financial Crisis. It is easier to think big in a large-scale market like the US where (at least until recently) political sensitivities have been less acute.

Firms like JPMorgan Chase and Royal Bank of Canada have drawn key lessons from the Californian firms which currently lead the AI industry. At the heart of this is a belief in the power of smart individuals. In the past decade the AI industry has been heavily invested in the ability of key personnel, usually academics of some renown, to re-invent the technology stack. Large sums have been invested in offering leading minds working conditions with much in common with academia - the right to publish public papers for example - with distinctly non-academic remuneration packages. Deepmind, the London-based Google acquisition, was, at least until its recent merger with Google Brain (the team working alongside the business), very explicitly more focused on independently driving the cutting edge of knowledge than generating a short term return for shareholders.

Our Index-leading banks aspire to this depth of knowledge and expertise. They have focused on hiring the brightest academic minds and setting them to work on the “hardest problems”. We touch on the impressive research output that they have generated, much of it in the public domain.

Introduction

Why AI Talent Matters to Banks

Whilst potentially useful in its own right - especially when they can be mobilised to focus on the explosive growth, technical challenges and strategic consequences of new Generative AI tools such as ChatGPT - these research teams also provide a strong signalling mechanism. They broadcast the scale of leadership's ambition to stakeholders - investors, current staff, potential partners, clients and the talent they wish to recruit. In so doing it potentially resets the very competitive set against which banks expect to be measured - and, potentially, valued.

Interestingly this expansion of the perceived Silicon Valley mindset does not appear to extend to serious attempts to recruit Bay area talent - the Bay area is the 14th largest location for banking AI talent employment and the alternative of remote working is increasingly frowned upon within banking. In our dataset only a tiny handful of staff have come from Big Tech backgrounds and the 'acqui-hire' model honed in recent years as a way to suck in AI expertise has not been used by the big banks. Rather, this is top-down management aspiring to something new.

The inventors of Generative AI have reminded us all of the risks and issues posed by the technology. Whether banks are prepared for the coming storm of ethical, legal and regulatory questions will depend on whether they have the right talent. We believe that this sense of change, of old boundaries breaking, of new opportunities arising as the most powerful industry of the late 20th Century faces up to the new contenders of the 21st makes the study of banking AI talent both fascinating and deeply important.

COVERAGE

The focus of this report is 60 major banks and payment players in North America and Europe -

→ In January 2023 the inaugural Evident Index covered 23 banks. These were the largest North American and European banks defined by Assets Under Management (AUM) larger than \$1trn at January 2022. These banks continue to be at the heart of our talent coverage with all data points covered and updated where relevant

→ We are expanding our coverage to include another 34 North American and European banks (including American Express which is classified as a bank by Standard and Poors) ahead of the next update of the Evident AI Index in November 2023. We have already started tracking these banks and include in this report some of the interesting data that we have already surfaced.

→ Since this decision, Credit Suisse and First Republic have been taken over by other banks: UBS and JPMorgan Chase respectively. They will no longer be tracked as independent entities but their talent remains in the market and so is counted for our macro data including geographic coverage. For the avoidance of doubt we do not include them in the acquiring entities - rather we hope that by the next Index report we will see where the people affected have ended up.

→ On top of this we are adding a further 3 Payment Players as we continue to evolve our Financial Services market coverage. This brings us up to 60 institutions that between them employ over 70% of all banking staff in their combined markets.

→ Meanwhile we have looked at some Asia Pacific banks to improve the mix of comparable companies. These are frequently cited as good practice in the space, and where relevant will be included in this report (and may be included in the next version of the Index) as reference points.

FIG 01. TABLE OUTLINES THE COMPANIES COVERED IN THIS REPORT, BY HQ REGION

 Additional coverage in the November 2023 Evident AI Index

USA	JPMorgan Chase	UK	Barclays	NETHERLANDS	ING Group
	Bank of America		HSBC		ABN AMRO
	Citigroup Inc.		Lloyds Banking Group		Rabobank
	Wells Fargo		NatWest Group	SWITZERLAND	UBS
	Goldman Sachs		Nationwide Building Society		Raiffeisen Gruppe
	Morgan Stanley	Standard Chartered	ITALY	Intesa Sanpaolo	
	U.S. Bancorp	FRANCE		BNP Paribas	UniCredit
	PNC Financial Services		Crédit Agricole	NORDICS	DNB ASA
	Truist Financial		Crédit Mutuel		Danske Bank
	The Bank of New York Mellon		Groupe BPCE		Nordea Bank
	State Street Corporation		Société Générale		Handelsbanken
	Charles Schwab	La Banque Postale	SEB Group		
	American Express	SPAIN	Banco Santander	Swedbank	
	First Republic		Banco Bilbao Vizcaya Argentaria	AUSTRIA	Erste Group
	First Citizens		Banco de Sabadell		BELGIUM
	Mastercard	CaixaBank	AUSTRALIA	Commonwealth Bank of Australia	
	PayPal	GERMANY		Deutsche Bank	SINGAPORE
Visa	Bayerische Landesbank				
CANADA	Toronto-Dominion Bank		Commerzbank		
	Royal Bank of Canada	Landesbank Baden-Württemberg			
	Bank of Nova Scotia				
	Bank of Montreal				
	Canadian Imperial Bank of Commerce				

Methodology

How we put this report together

METHODOLOGY

As per the Evident AI Index, published in January 2023, this report is based on an outside-in assessment of millions of publicly available documents from a range of websites and sources, including job descriptions from company websites, Google Scholar, arXiv, LinkedIn and Glassdoor. All data in this report was gathered over an eight month period between October 2022 and April 2023.

We track bank’s often-different approaches across three stages of the talent lifecycle:

Staffing: the current AI talent stack at each bank

- a. Number
- b. Density
- c. Location

Acquisition: what banks are doing to attract and onboard new talent

- d. Talent sourcing
- e. Hiring
- f. Retraining

Retention: how banks are developing and retaining talent

- g. Salaries
- h. Culture
- i. Gender diversity

We can see considerable differences emerging between banks on all these indicators - some of which will be leading indicators of future performance on the Talent pillar of the Evident AI Index.

JOB CLASSIFICATIONS

We have clustered more than 240 individual role titles into six categories in order to build comparable groups focused on different aspects of the AI lifecycle in banks. We regularly refer specifically to the AI & Data Core, focusing on AI Development, Data Engineering and Governance and Ethics.

We also cover other AI-related roles including Model Risk, Quant and Implementation. Note that our Implementation category does not include all employees working with these titles but only those who refer to appropriate search terms (e.g. “AI” or “ML”) explicitly in their online profile.

LIMITATIONS

As this is an outside-in exercise, we have had to apply our expertise and judgement to ensure our data is as comparable as possible across the banks in our coverage, and, given the depth of data in our sample, we have also used a variety of data science tools.

FIG 02. HOW WE CLUSTER TALENT: JOB TITLES HIERARCHY

AI DEVELOPMENT	DATA ENGINEERING	GOVERNANCE AND ETHICS	MODEL RISK	QUANT	IMPLEMENTATION
AI Architect	Data Architect	Data Governance	AI Model Risk	Quantitative Analyst	Devops
AI Engineer	Data Engineer	AI Governance	Quantitative Model Risk	Quantitative Developer	Software Developer
AI Scientist	Database Administrator	AI Ethicist	Model Governance	Quantitative Engineer	Systems Engineer
AI Researcher		Responsible AI	Model Risk	Quantitative Researcher	Automation Engineer
Machine Learning Researcher		Explainable AI	Model Risk Audit	Quantitative Strategist	Full Stack Developer
Data Scientist		Data Ethics	Model Validation	Quantitative Risk Analyst	Front-end Developer
Machine Learning Engineer		AI Operational Risk			Back-end Developer
NLP Data Scientist					Cloud Developer
NLP Engineer					Mobile Developer
Model Developer					Software Architect
MLOps Engineer					Technical Lead
					AI Product Manager

Methodology

How we put this report together

A few limitations to highlight:

→ **Comparability of roles:** The world of AI talent continues to evolve and there is no standardised approach to defining roles or titles. Our categorisation of role titles might not align with how banks think about their AI talent stack internally, and individual banks might use the same role titles for very different positions. Take the example of a Data Governance role. In some banks this might be a senior position reporting on key data risks, interfacing with data scientists or senior management worrying about potential ethical or reputational risks. Elsewhere this may be a quality control role. We continue to engage with the industry, our expert advisers, and industry observers to ensure that we are building as much comparability into the data as possible.

→ **Comparability by geography:** Given the banks that we are analysing sit across multiple markets, regulatory frameworks and cultural approaches we are aware that there can be discrepancies across reported data. This might range from different societal usage levels of online job platforms, title differences or proclivity to sign up for PHDs in the country. Where we are aware of these nuances and we feel that they are pertinent we will mention this in the report. However, the overall caveat that cross-border comparisons need to be treated with appropriate caution remains.

→ **Population by geography:** We are capturing a more diverse and larger set of people than we did in our January report - and this reveals, for example, a large number of staff based in India. It is not however a summary of the Indian talent market as we do not yet cover the large Indian banks who will be making their own investment in AI talent. By contrast our coverage of North American and European banks mean that we are more comfortable that our universe provides a robust sample of the local AI banking talent.

SIZE OF THE MARKET: HOW MANY PEOPLE WORK IN AI IN THE LARGEST NORTH AMERICAN AND EUROPEAN BANKS

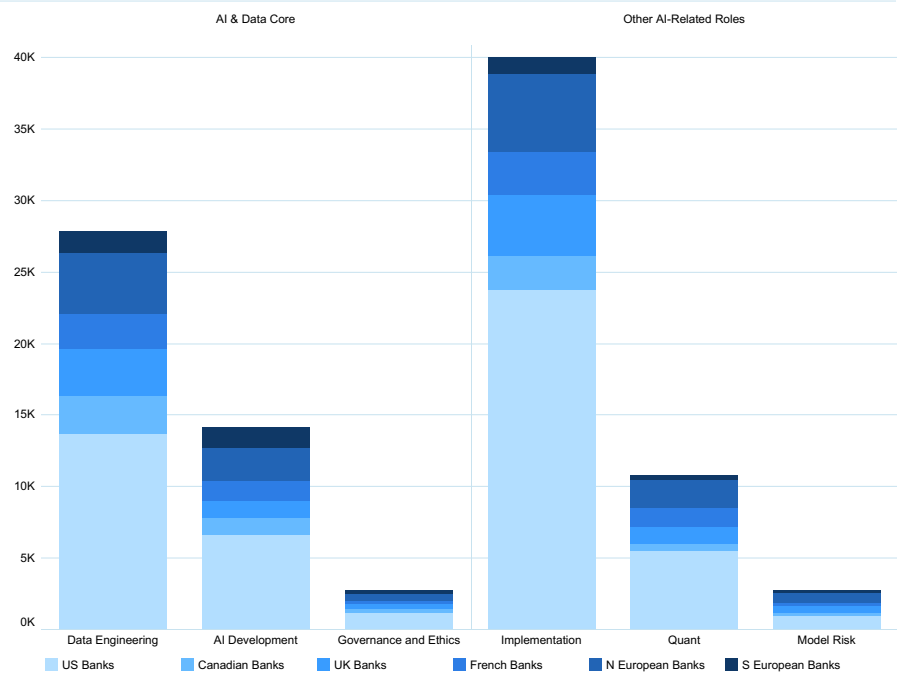
46,000 employees work in the “AI & Data core” across the 60 largest banks and payment players in North America and Europe, dwarfed by the number of employees working in “Implementation” positions

Whilst we track the wider AI universe we want to focus on the core teams designing, building, scaling, rolling out and operating AI systems. At the heart of AI projects are the data scientists who build models - indeed much of the glamour in AI is attached to these jobs. However, every data scientist knows (and typically complains) that too much of their time is spent preparing and checking the data, dealing with issues of data adequacy, collation and usability. Hence data engineers, tasked with smoothing the flow of clean data, sit closely alongside these roles - and their tasks will likely overlap. This can mean that comparability across organisations, or indeed within them, will not always be precise. Also working closely to ensure that this AI is deployed safely are the Data Governance and Ethics teams.

Combining all these roles gives us the AI and Data Core mix of 46,000 employees.

Evident’s data suggests that in the wider universe there are over 100,000 staff in the banking industry who potentially come within the gamut of delivering AI to the market. These range from product experts to software coders to investment market quants running trading strategies to change managers in operational roles. Over time their roles are slowly being transformed into and by AI.

FIG 03. ~46,000 PEOPLE WORK IN AI & DATA CORE

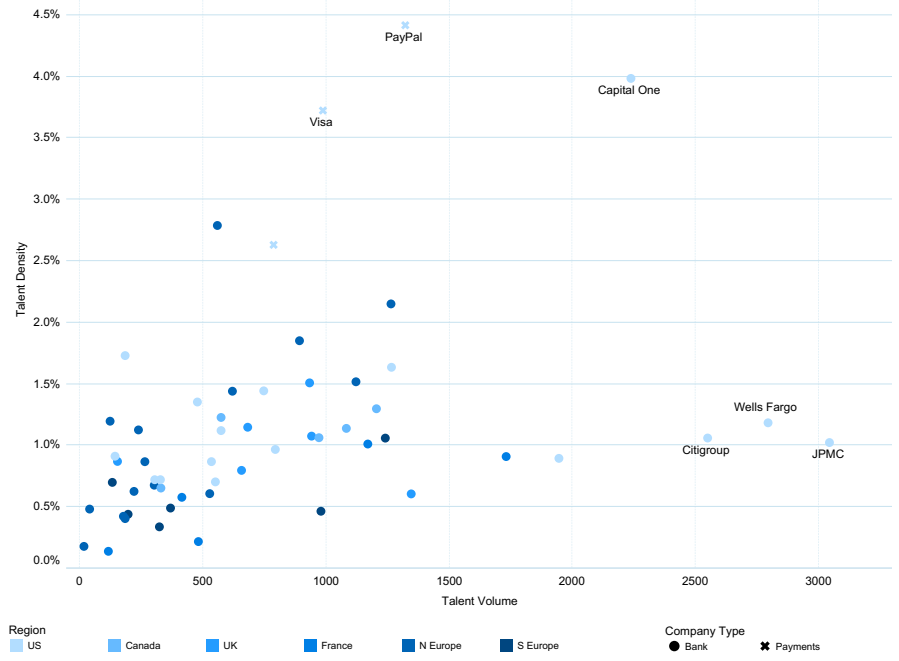


TWO LEADERSHIP GROUPS EMERGING, BOTH AMERICAN

We measure talent capacity in two ways. Firstly, volume of staff is a critical indicator of the level of resource that has been deployed against the AI journey. Secondly, we look at AI talent density - a measure of what proportion of a bank’s employees are AI-related - to understand the relative importance of AI skills to the bank’s workforce.

The chart below shows both measures when applied to the “AI and Data Core” described above. We can see that there appear to be two break-out groups. Large US banks, led by JPMorgan Chase, are leading on talent deployment. Meanwhile the higher talent density of monoline and payment providers suggests another route to a leadership position. Once again, US-based organisations are ahead.

FIG 04. JP MORGAN CHASE LEADS ON ABSOLUTE VOLUME OF AI TALENT AND CAPITAL ONE ON AI TALENT DENSITY RELATIVE TO TOTAL WORKFORCE



Note: Note: includes AI & Data Core only (AI Development, Data Engineering, Data Governance and Ethics)

THE TOP FIVE US BANKS EMPLOY 28% OF THE TOTAL POPULATION OF AI & DATA CORE STAFF

Of the organisations that we track, JPMorgan Chase is leading in terms of numbers of AI & Data Core staff followed by four other US players. The mix of these roles vary by bank and we will come to that in the next section. Overall, US banks continue to be significantly ahead of their European competitors. BNP Paribas leads the way in Europe, followed by HSBC.

These strengths reflect both forward-facing strategic decisions (JPMorgan Chase’s decision to build out stand-alone AI Research capability for example) but also legacy challenges that need to be met. It is likely that complicated businesses such as these Universal Banks (typically with multiple legacy systems) need a lot more AI and data engineering talent to have the same impact as simpler, data-native businesses.

On a wider level (beyond the AI & Data Core illustrated above), the diversity of staffing mix can be seen at the three banks with the largest numbers of AI-related staff:

- **JPMC** leads on the categories of AI Development, Implementation and Quants
- **Citigroup** leads on Model Risk and Governance
- **Wells Fargo** leads on Data Engineering

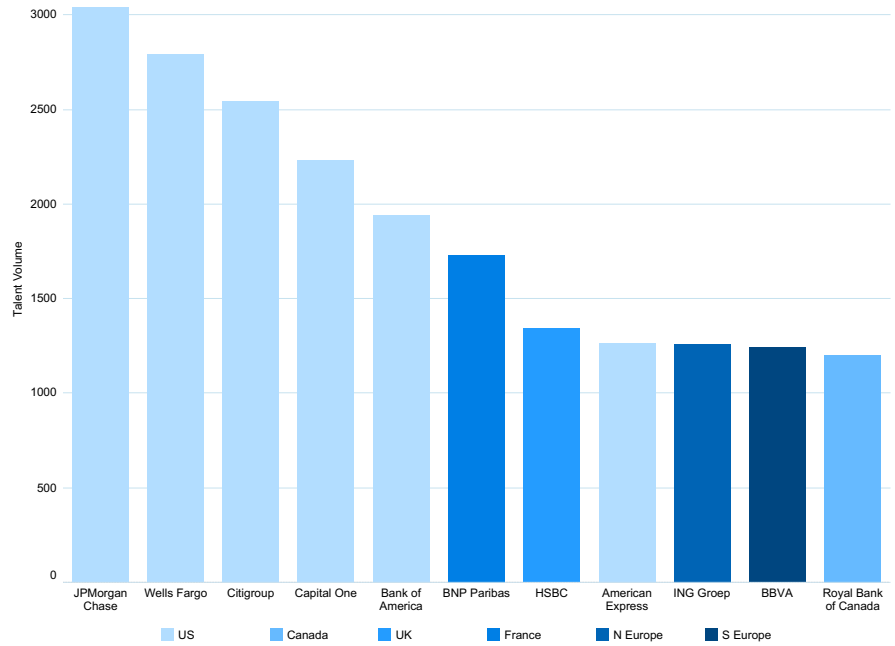
For example, more data engineers tends to reflect the workload of digital transformation and the challenges of syncing multiple legacy IT systems (and therefore struggles to make AI happen). From the outside it can be hard to discern what drives what. Where banks have a lower ratio, for example, of data engineers to data scientists does this imply smooth, digitally-native data platforms or simply a lack of focus on the legacy issues that are frequently the elephant in the room?

We have stuck to the belief that - everything else being equal - more is better. But this is clearly the sort of question which we will continue to watch carefully and may evolve over time.

CAPITAL ONE AND DATA-NATIVE PAYMENT PROVIDERS HAVE A DIFFERENT LEVEL OF DENSITY OF AI TALENT

Talent density is led by payment providers (Visa and PayPal) and a monoline business (Capital One). This is partly because their business models - typically distributing their products either via retail banks or digitally - require less staff to service. Retail banks with large branch networks will typically have higher volumes of overall staff (relative to their business measured financially) than digital-first businesses or investment banks.

FIG 05. US BANKS DOMINATE TOP 10 LIST OF AI & DATA CORE TALENT VOLUMES

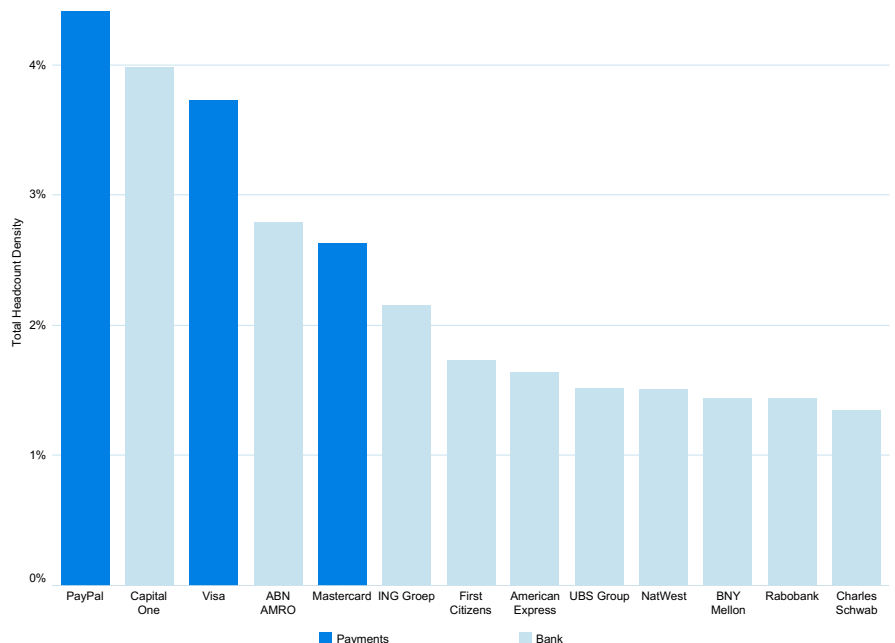


However, the lower talent density of Mastercard and American Express, structurally not dissimilar businesses, shows that this is also likely the result of management decisions. Outside of the clear US leaders European banks make a more credible showing: ABN Amro, ING Groep, UBS, NatWest and Rabobank lead the way for AI-related talent density in Europe.

Density is critical as a way to understand how seriously AI is being taken across a bank. The greater the density of AI Development talent, the more AI-mature the bank should be. Overarching skill sets in banks are shifting as data and AI skills move from esoteric to strategic to standard requirements for banking. This trend includes both new staff being hired but also existing talent retraining and re-classifying themselves as AI-related talent. We are still at the beginning of this journey. Looking forward, one of the key drivers of AI economics is the ability to automate tasks, or at least massively increase the productivity of existing staff. This should mean, eventually, that we would expect to see the ratio between AI- and non AI- staff shift as those efficiencies are delivered.

There will obviously be a limit here; while some banks profess an aspiration to become a tech company, a firm that just employed AI developers would probably

FIG 06. PAYMENTS PLAYERS AND CAPITAL ONE LEAD ON AI TALENT DENSITY - FOLLOWED BY TWO DUTCH BANKS



be an unsuccessful bank. However, there are limited signs, at least in this population, that we are anywhere near that tipping point.

MARKET GROWING, DESPITE WIDER BANKING INDUSTRY CONSOLIDATION

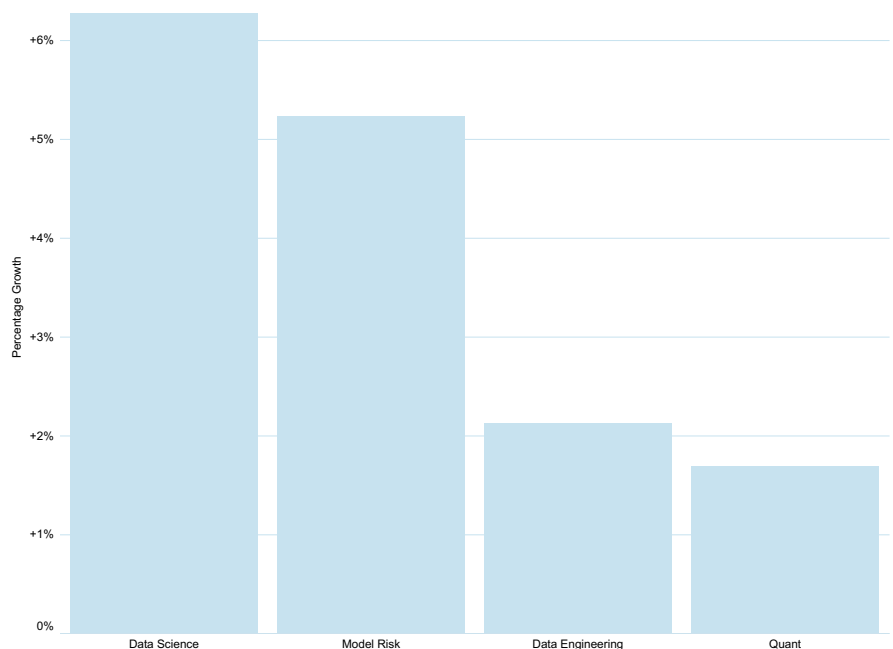
We have been tracking actual numbers of staff in key roles at the Index's 23 banks since October 2022. In this period there has been a general backdrop of slowing economies in the markets in which these banks operate, a series of banking crises in both the US and Europe which has reduced the number of banks and a broad series of measures to reduce costs, and staffing, at leading banks. Hiring freezes, for example, as well as active redundancy programmes, cut across this period.

Despite this, we are seeing growth across our key AI-related roles. In the five months to March 2023 the number of data scientists at the 23 banks increased by over 6% whilst data engineers grew by ~2%. Quants also grew by over 1.5% - dispute a small decline in December - and Model Risk grew by ~5%. These are still provisional numbers but we will strengthen this dataset over time.

Meanwhile, 40% of staff have started in their current roles since January 2022. When considering these numbers it is worth being aware that we have noticed a historic pattern in the cyclical nature of bank recruiting. In Investment Banking, for example, there is a traditional burst of turnover at the Calendar Year end as bonuses are paid, perceived underperformers moved on and new budget priorities generate fresh recruitment drives. In terms of the talent profile that means we see more people start work (data that we can track over a longer time period) in Q2 and Q3 than the period covered here. Therefore, we expect that the trajectory of a future Year on Year analysis, as and when we collate the data, may be rather different.

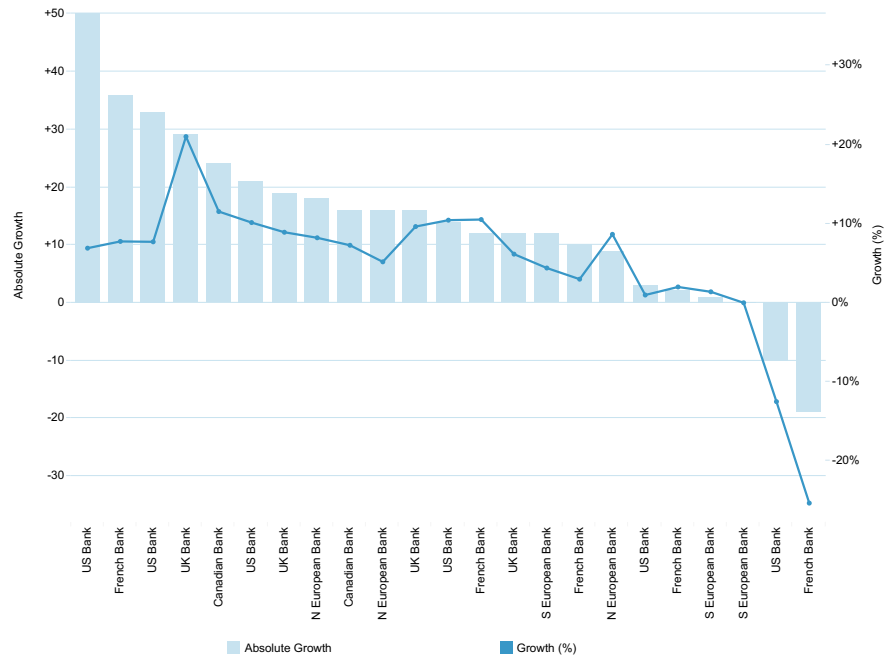
It may also be that the excitement generated by ChatGPT and other Generative AI developments have not yet been reflected in staff numbers. Clearly playing in the opposite direction is the ongoing uncertainty over the economy - and potentially the risk profiles of individual banks in the new interest rate environment.

FIG 07. DATA SCIENCE THE FASTEST GROWING GROUP OF EMPLOYEES FROM OCT-22 TO MAR-23



However, the headline figures disguise evolving change amongst individual banks. Drilling down into the data science numbers we can see that JPMorgan Chase added the most staff in this area. Their growth rate of ~7% was pretty much in line with the median growth rate across the other banks. Driving forward was Lloyds - not historically an industry leader - as well as RBC and Credit Agricole. Lloyds and RBC also head the table for growth in Data Engineers, with Credit Agricole growing above average. It will be exciting to see if this is simply a short term bump or the sign of a British bank going for growth.

FIG 08. GROWTH RATES OF DATA SCIENTIST POSITIONS VARY SIGNIFICANTLY BY BANK



Overall numbers of staff working in AI are driven by three factors: hiring and internal moves versus churn. We will look at all three factors in the Recruitment, Retraining and Retention chapters.

What the mix of roles do

Overall numbers only tell part of the story. While scale is a positive indicator, the mix of talent that banks employ reflects their business, operational and technical priorities.

These talent groups reflect the key groups of staff who build, enable, support and utilise AI-powered systems. Whilst not necessarily consistent across banks - reflecting strategy, organisational dynamics, business and operating models, level of data management sophistication as well as legacy and cultural specificities - these groups do match with broader best practice on AI development. It is striking how the most sophisticated management teams who we talk to want to learn from leaders in this space - typically the Big Tech platform companies.

However, all data comparisons need to be approached diligently. For example, JPMorgan Chase's recent investor communications refer to its 600 ML Engineers who are "*writing code & putting models into production*". However, from our research, it appears that only some employees have that precise title. We intend to use multiple sources and techniques to triangulate these numbers going forwards, but the analysis is necessarily complicated. This is not a great surprise - and a gentle reminder to treat all cross-bank comparisons with due sensitivity, as this report and our analysis is an outside-in view.

We will start with the job roles that make up AI & Data Core: AI Development, Data Engineering, Governance and AI Ethics, before more briefly looking at Model Risk, Quants and Implementation.

AI DEVELOPMENT TEAMS BUILD THE FUTURE

Overview

AI Development staff play a vital role in developing and implementing the AI that will help improve business operations, customer experience, and risk management. They design and build AI models and tools, including machine learning algorithms, natural language processing, and computer vision systems. In collaboration with business stakeholders they identify opportunities for AI applications, such as fraud detection, risk assessment, and personalised marketing.

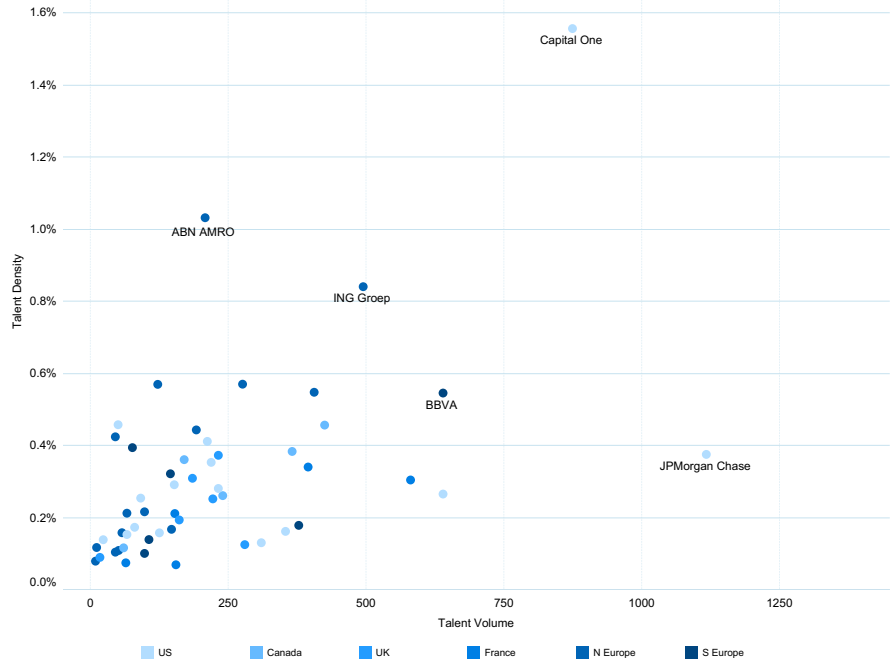
Working closely with other departments, including data engineering and model risk management, they ensure the responsible and ethical use of AI in the bank. Their expertise and contributions are critical in advancing the bank's AI-driven initiatives and maintaining its competitive edge. Some of them focus on cutting edge research to drive the bank's intellectual property portfolio but the majority work alongside colleagues to build new processes and optimise existing activities.

Looking across the banks, there is a general correlation between the number of employees working in AI Development and size of the bank. The more models the bank has, the more AI staff it needs to build and monitor them. Consequently, it is perhaps no surprise that JPMorgan Chase has the most employees working in AI Development roles.

Capital One meanwhile leads on talent density. Interestingly this is an area where two leading Dutch banks, ABN Amro and ING Groep, also perform strongly. Given the global outlook and entrepreneurial mind-set of their home market they are part of the small cadre of European banks who appear to be taking head-on the challenge from the North Americans.

What the mix of roles do

FIG 09. AI DEVELOPMENT TALENT DENSITY STRONGEST AT CAPITAL ONE, ABN AMRO, AND ING GROEP



Note: Chart shows comparison of number of AI Development talent relative to overall numbers of bank employees

AI TALENT DENSITY BY BANK

There are multiple job titles captured under AI Development. However there are some key roles that stand out on a consistent basis across banks: Data Scientists, Data Engineers and AI Researchers. We will deep dive into them one by one.

DATA SCIENTISTS: THE BUILDERS

Data Scientists use statistical methods and data visualisation tools to understand customer behaviour, market trends, and risk factors. They may also create predictive models. A key role is to provide data-driven insights to inform strategic decision-making. Of the 14,000 individuals who we track working in AI Development teams across the banks, the vast majority (>10,000) work in Data Scientist roles. These are typically the most high profile of AI talent, often highly educated to PHD level or beyond, and their work is critical to driving the technology and its application forward.

All banks have Data Scientists - it is one of the few role titles that is broadly replicated across the banks. However the work that they are tasked with is far more diverse. Whilst some focus on complex modelling, others work on simpler (often Excel-based) analysis, and there are varying levels of technical expertise required.

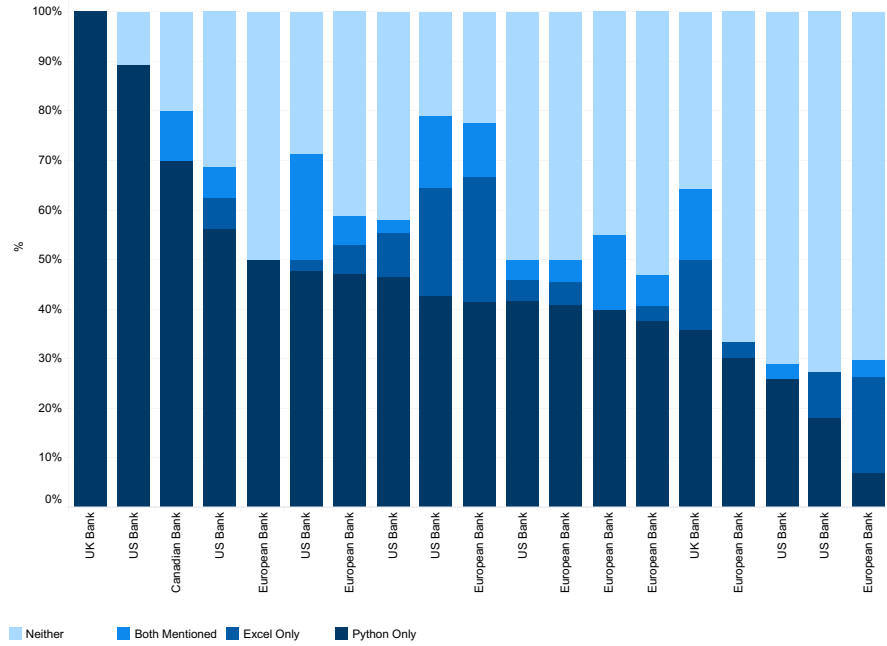
One way that we can understand this is by looking at Job Descriptions published by the banks.

Banks looking to recruit will put their best foot forward. But sometimes they need to also tell it like it is. One way that this can lead to challenges is when they describe the programming languages that their staff will need. Python is typically seen as an industry-standard language whereas Excel as a requirement is a clear indicator that there is a significant amount of legacy work still happening - upgrading data from historic files for example. The following chart shows which of these two software tools AI Developer staff need to be comfortable working with (according to what is mentioned in Job Descriptions).

Clearly not all JDs refer to specific software language requirements - typically Google and other Big Tech firms do not require such specific skills on their JDs. However it is striking that even relatively sophisticated players refer to Excel frequently. Not only is this not an optimally inspirational message to potential talent - but it also suggests that not all of the work internally is necessarily operating at the cutting edge of data science.

What the mix of roles do

FIG 10. PYTHON (MOSTLY) LEADS EXCEL ON MENTIONS IN AI DEVELOPMENT JDS



Note: Includes banks with more than 10 AI Development job descriptions posted Feb-April 2023

We can see this in the following example of variation in Data Scientist positions, and the task mix of creating new models and rebuilding old ones, at Citi (advertised in H1 2023):

Senior Data Scientist - VP / Tampa, FL (Hybrid)

TAMPA, FLORIDA | JOB REQ ID: 23652235

Apply

Save Job

Senior Data Scientist: Working across a range of ML disciplines and statistical analysis, with a focus on NLP; understanding of fundamental machine learning techniques and algorithms, such as Deep Learning, Layout-LM, Regression; *working knowledge of Python is essential*

Lead Data Scientist - Credit Risk Modeling and Validation CCAR/CECL (Hybrid)

Apply

Save Job

Lead Data Scientist: 6+ years for Bachelor's or 2+ years for Master's in performing quantitative analysis, statistical modelling, loss forecasting, loan loss reserve modelling, and/or particularly econometric modelling of consumer credit risk stress losses (e.g., CCAR/DFAST); *Proficiency in SAS/SQL/Oracle/Unix/Microsoft Word, Excel and PowerPoint*

ML ENGINEERS: MAKING THE MACHINE WORK

In banking, machine learning engineers focus on creating and deploying artificial intelligence systems to improve and automate financial operations. Their work involves designing predictive models for fraud detection, algorithmic trading optimization, and tailoring customer interactions. They are also responsible for the ongoing evaluation and improvement of these models to ensure their effectiveness and reliability.

ML (or AI) Engineer is a consistent title across the banks. All banks have ML Engineering roles in some shape or form, though volume is lower compared to Data Scientists. Capital One has the highest number of people with ML Engineer-type titles across the banks, with over 150 individuals in our sample. This is a powerhouse team who also publish a significant part of Capital One's impressive research output. However, not all of the people whom a bank would categorise as ML Engineers necessarily have the title - lots of staff with software engineering role titles appear to work on Machine Learning tools.

What the mix of roles do

The broader point captured is that banks are still evolving their approach to developing, building, launching and maintaining AI models. The ways in which the various teams and roles fit together are evolving too, although we expect that one impact of cross-bank poaching (covered elsewhere in this report) is that best practice will settle on a similar approach across banks.

AI RESEARCHERS: BREAKING NEW GROUND

The third consistent bucket of roles are related to AI research, with 25 out of the 60 banks in our analysis showing evidence of at least one employee in an “AI Research” role.

North American banks often have a significant number of AI researchers, and are strategically looking to emulate BigTech by building cutting-edge “pure” and “applied” AI research teams. This has been an important - and much debated - approach. Given the focus on attracting high quality talent the model set by companies like DeepMind, Google’s cutting edge subsidiary based in London, has been to offer a university-like approach to publishing papers combined with access to deep data and strong compute. And, of course, corporate-level remuneration.

Where banks have embraced this approach, they structure these teams in different ways, as examples:

- JPMorgan Chase has hired by far the greatest number of AI researchers (up to 200 people) in their distinct AI Research unit
- RBC has Borealis AI, their in-house AI research unit, built and developed in-house since 2016.
- American Express, a new entrant to our Index, also has a high number of AI Researchers in their AI Lab
- TD Bank: Machine Learning Scientists working in their Layer 6 hub which they acquired in 2018
- Morgan Stanley: has a Machine Learning Research team (though smaller than peers)

Capital One’s AI research is published by a range of individuals across the bank, with key authors in their ML Engineering team. In Europe, BBVA’s AI Factory looks to be building a strong team focused on replicable tools that are shared more widely under their Mercury programme. As we will also see from our analysis of research outcomes, being based in a research team is not necessary to publish high quality research papers.

Why the focus on AI research? These are not cheap resources - typically highly educated to PHD level. We consistently hear four key motives:

- **Firstly, to develop innovative models, techniques and tools to put into production.** Often these are designed to be used across multiple Business Units or functions providing group level best practice. Researchers will be attracted by the opportunity to access high quality and mission-critical data and use cases.
- **Secondly, to attract the sharpest AI talent:** by demonstrating they can work on the combination of applied and pure problems. Given the competitive nature of the AI recruitment market recently the research teams aimed to provide a “halo” effect for wider recruitment as well.
- **Better identify the best and most cutting-edge external vendors:** being able to engage emerging vendors requires a skill set that may be harder to cultivate in inward-facing teams,
- **Finally, to foster an internal culture of innovation and AI excellence.** This means that banks have felt better able to pivot resources and focus as new technology has emerged - most recently the deployment of Large Language Models (or Generative AI).

More widely these teams send a symbolic message about the level of senior management buy-in and belief in growing their AI resources and capability. The hope also is that the quality of research will ultimately provide some competitive advantage.

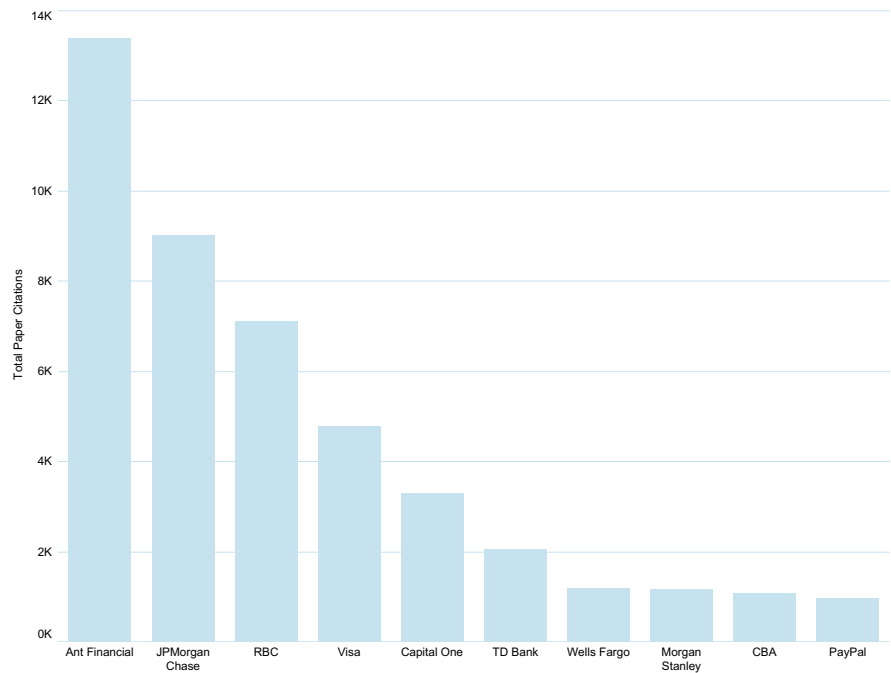
Although we are at an early stage in building the data, Evident is expanding

What the mix of roles do

the number of banks that it covers in research. This early analysis suggests that JPMorgan Chase, the stand-out leader in January's Evident AI Index, may face competition in the next round of the Index from Ant Financial and Capital One.

Using Google Scholar we assess the total number of citations that a company's staff have received on their AI papers. Ant Financial and JPMorgan Chase are the leaders but the performance of Royal Bank of Canada puts them in a similar league. Visa is ahead of Capital One to round off the top five, followed by TD Bank. Commonwealth Bank of Australia is on a similar level to Wells Fargo, Morgan Stanley and payment provider PayPal. No European banks make into the top 10.

FIG 11. ANT FINANCIAL LEADS ON TOTAL AI PAPER CITATIONS (TOP 10 BANKS ONLY)



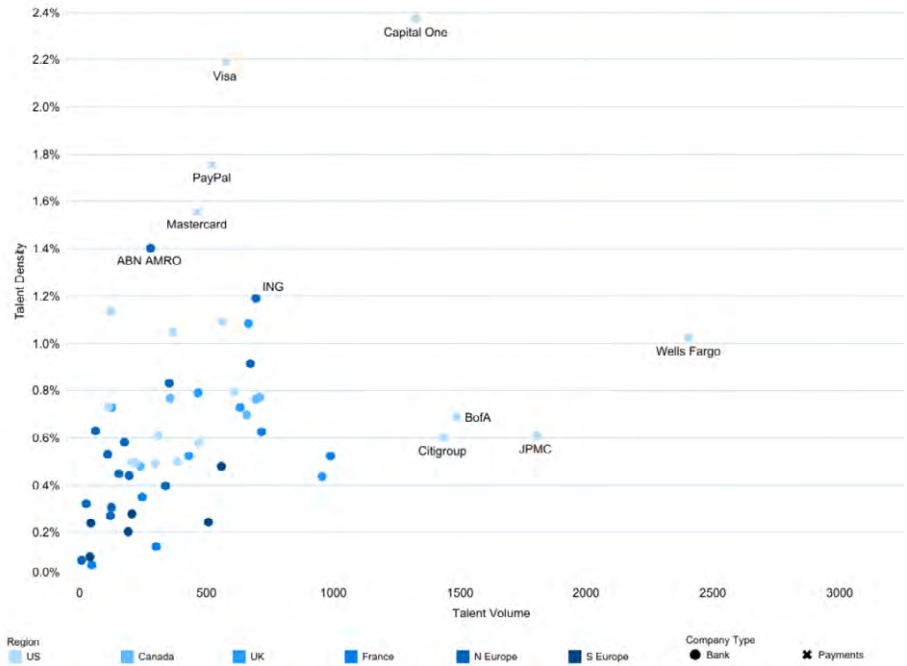
Note: Includes papers published from 2019-2022

Cutting the information slightly differently, to assess the average quality of researchers at the banks, we can see RBC research papers lead on average citations by paper. Ant Financial falls to 5th place and JPMorgan Chase to 8th, still strong but no longer quite so dominant. Commonwealth Bank of Australia rises to 2nd place - with Morgan Stanley and PayPal rounding off the top five spots. It is worth noting that there can be a time lag between publishing a paper and it amassing citations, so a firm that has, for example, expanded its research team recently may under-index on the number of citations. We will be digging further into this - and other Research related data - in our upcoming Report on the Index's Innovation Pillar.

One question that we have not examined is whether researchers at similar monoline or payment businesses (on whom we are still uncovering the data) potentially can generate more impact on the business. This would be because their impact might be compounded by their more limited product range - meaning that the researchers are presumably focused on a narrower range of expertise and use cases.

What the mix of roles do

FIG 12. WELLS FARGO LEADING ON VOLUME OF DATA ENGINEERING TALENT, CAPITAL ONE LEADS ON DENSITY



DATA ENGINEERING, WHERE THE HEAVY LIFTING HAPPENS

Data Engineers are critical for designing, building, maintaining and upgrading the technical infrastructure and systems that manage large amounts of data used in AI applications. They collect, store, and process data from various sources, ensuring its quality, reliability, and security. Working closely with data scientists and analysts they provide them with the necessary data for building AI models and tools that help improve business performance and decision-making. Data engineers are essential to a bank's AI-driven initiatives and contribute to creating a data-driven culture within the organisation.

Generally, as per AI Development talent, there is a clear correlation between number of data engineers and size of bank. Major US banks are consistently strongest in terms of number of Data Engineering employees. Wells Fargo leads the pack. This is perhaps a marker of their significant investments in data infrastructure since 2021.

CAPITAL ONE AND PAYMENT PLAYERS LEAD ON DATA ENGINEERING DENSITY

Similarly to AI Development we can see that Capital One and payment providers lead in terms of density of Data Engineering talent. The large US banks who lead in volume fall behind on density.

We can also see an interesting group of banks breaking away from the pack. These include ING Groep and ABN Amro. Commonwealth Bank of Australia is strong and NatWest is leading the UK pack in terms of data engineering ([Data Strategy Investor Roundtable from 2022](#) led by Zachary Anderson). Of the larger US banks BNY Mellon shows signs of emerging strength.

GOVERNANCE AND ETHICS TEAMS ARE CRITICAL FOR RESPONSIBLE AI

Governance and Ethics staff at banks ensure responsible use and management of data, and (hopefully) uphold ethical standards in AI applications. They create frameworks for data quality, privacy, and security, and guide AI deployment based on ethical guidelines. They try to balance the opportunities presented by AI, like personalised services and fraud detection, with the potential risks, such as bias in decision-making and data breaches. By ensuring transparency, accountability, and fairness in AI systems, they promote stakeholder trust and regulatory compliance, facilitating broader AI adoption. It is worth noting that at this aggregate level the majority of the team will be data governance (a key input factor to high quality AI) rather than in the newly emerging field of AI Ethics. This team's work will be increasingly pivotal in driving responsible and effective AI in banking - especially given the growing regulatory challenge.

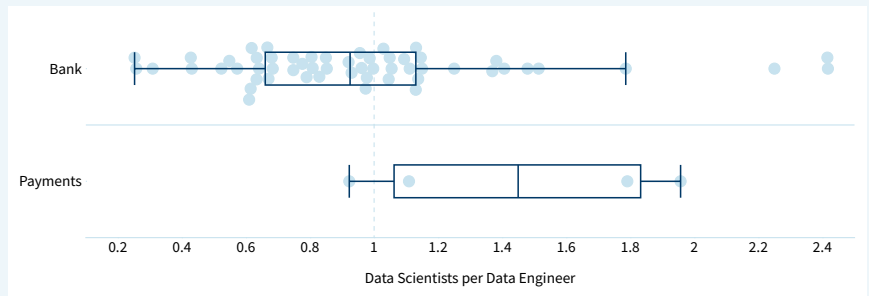
What the mix of roles do

KEY RATIO: DATA SCIENTISTS TO DATA ENGINEERS

It is a common theme amongst data scientists that too much of their work is spent preparing data for their models rather than actually building and implementing them. To ensure that their work is well targeted and their time utilised well banks have invested heavily in data engineering. The ratio between the two types of staff can be tracked as a leading indicator of both the effectiveness of data scientists but also, potentially, as an indicator of the

underlying data platforms on which data scientists will work.

The difference between the payment platforms and the banks is striking - and in line with the expectation that they operate superior scaled digital platforms across simpler business and operating models - but the "optimal" ratio remains to be seen. We have broken payments companies out as we begin to flesh out a more nuanced understanding of the AI and data development journey of different business models.



Building trust will be a key driver of competitive advantage for banks in the age of AI.

Responsible AI investment is stalling

Given the increased awareness of issues around AI - ranging from AI Bias and the potential for disinformation to chilling warnings about the risks from Artificial General Intelligence (AGI) - it is perhaps surprising, and a little disappointing, that there are limited signs of increased investment in this space since we published our AI Index earlier this year.

Senior AI figures this year called for a 6-month moratorium on AI development to allow for deeper consideration of the potential impacts of the technology's dramatic improvements. Meanwhile, AI legislation and regulation - perhaps most noticeably the EU's AI Act and New York's regulation of AI in hiring - is coming. This combined with court cases under GDPR - in Holland for example on driver employment rights in the face of AI-driven job termination decisions - show, whether or not they choose to show leadership, that banks will not long avoid increased regulatory and judicial oversight.

However, the mix of roles in the data tracked between October and March suggest that teams have overall expanded more slowly than the overall number of AI staff. Meanwhile, the number of RAI roles tracked in our JD dataset shows that only 2 banks actually recruited for these roles explicitly. Lloyds Bank recruited for an Data & AI Ethics role and Capital One recruited for two Data Ethics roles. Meanwhile only 7 institutions mentioned Responsible AI, AI Governance or AI Ethics at all in their Job Descriptions - Visa and Capital One lead the way with mentions in 5 and 3 job postings respectively.

Given that we identified this as an area where many banks could steal a lead on their competitors in the Evident AI Index we look forward to seeing whether there will be significant movement later this year. It also remains unclear what impact the lack of RAI leadership and investment will have on wider talent acquisition and retention, especially as people become more aware of some of the emerging issues around AI.

OTHER AI-RELATED TEAMS

Model Risk teams make banks safer

The aim of Model Risk Management is to identify, measure and mitigate the risks associated with models, including those that utilise AI. They review and test models to ensure they are accurate, reliable, and compliant with regulatory requirements. Their role is critical in maintaining the integrity of models and

What the mix of roles do

protecting the bank from financial losses, reputational damage or regulatory fines. With the increasing use of AI models in the financial industry, the importance of model risk staff in ensuring the responsible and ethical use of AI in banks has become even more crucial.

Top 5 banks by number of Model Risk staff

- 1. Citigroup
- 2. HSBC
- 3. ING Group
- 4. Rabobank
- 5. Wells Fargo

MODEL RISK TALENT REQUIREMENTS

AI models bring a new set of challenges for Model Risk staff, particularly being able to solve the “black-box” conundrum of sophisticated models. The skill sets required to manage these risks are ever more demanding, and leading banks are creating AI-specific Model Risk roles.

Example: AI specific model risk roles

FIG 13. ROYAL BANK OF CANADA: DATA SCIENTIST - AI MODEL RISK

Job Title
Data Scientist, AI Model Risk

Job Description
Please Note - Location can be in either Toronto or Halifax

What is the opportunity?
RBC is a global leader in applying Artificial Intelligence (AI) in the banking sector in order to create value for our clients. A failure to effectively prepare for and manage emerging model risk related to AI would subject RBC to financial, regulatory, and reputational risks. Therefore, the AI validation team within RBC's Enterprise Model Risk Management (RBC Group Risk Management) is tasked with overseeing, assessing, and managing model risks.

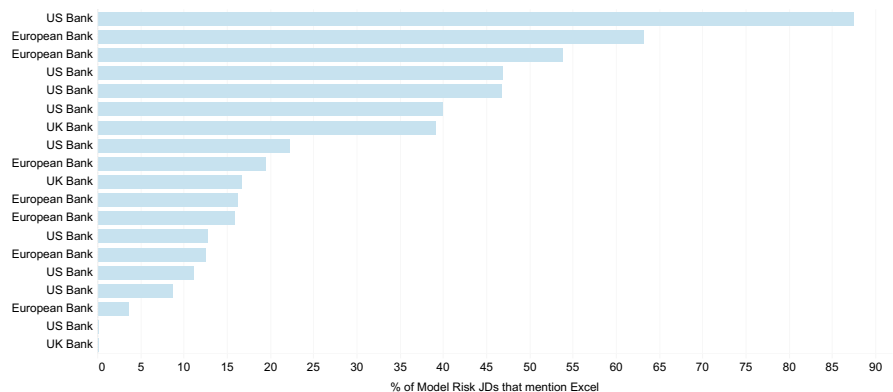
The AI validation team uses machine learning, statistical, and computational strategies to assess model risk. In doing so, RBC is able to identify model weaknesses early and enhance the reliability of production models across all lines of business.

What will you do?

- **Application:** Work with a large variety of model types and with business functions across the bank, such as the following:
 - Types of Models: Classification, Large Language Models (LLM), regression, anomaly detection, natural language processing, computer vision, reinforcement learning, recommendation systems, dimensionality reduction
 - Business Functions: Internal Audit, Cybersecurity, Fraud Management, Anti-Money Laundering, Insurance, Credit Risk, Technology Operations, Identity & Access Management, Human Resources
- **Validation:** Challenge models and identify risks associated with their use – both conceptually and empirically.
- **Research & Development:** Read research papers to enhance how our team validates models and contribute to our knowledge pool. You are encouraged to apply what you've learned to real-world problems, develop reusable software packages, and share your insights with others.
- **IT:** Collaborate with cross-functional stakeholders to establish and promote best-practices related to MLOps, tooling and IT infrastructure.
- **Governance:** Work with model developers (data scientists, researchers, engineers) and business stakeholders to inventory applications of AI and machine learning

Hiring for Model Risk talent needs to anticipate the future complexity and risk of models - and to match the calibre of staff who are creating those models. Technology requirements in Job Descriptions are in themselves an interesting proxy for model complexity. It is clear from current job openings that some banks still have a plethora of Excel-based models.

FIG 14. EXCEL STILL A CRITICAL SKILL IN MODEL RISK JDS



Note: includes papers published from 2019-2022

QUANTS INCREASINGLY USE AI TO DRIVE TRADING STRATEGIES

Quants use their expertise in mathematics, statistics, and computer science to support decision-making in banks, particularly in developing and implementing quantitative models to mitigate risks and inform trading strategies. They

What the mix of roles do

collaborate with stakeholders to develop investment strategies, pricing models, and risk assessments. They increasingly use AI to analyse large data sets to identify patterns and improve decision-making. Often their output drives trading strategies and potentially creates large profits - although they can also create significant risk positions. A fast vector for AI take-up, they can provide clear use cases for AI-driven success, especially in investment banking.

As one might expect for a more mature role at banks staff growth rates can be less heroic than in other employment segments. Assets under Management (AuM) scale is a clear driver of the size and scale of the staff employed; JPMorgan Chase leads on volumes of staff.

AI IMPLEMENTATION: IS CARRIED OUT ACROSS MULTIPLE TEAMS AND FUNCTIONS

Implementation staff in a bank are responsible for implementing new technologies, including those related to AI. They work closely with (or probably within) the bank's IT department, project managers, and vendors to ensure that new systems are deployed correctly, integrated with existing infrastructure, and meet business needs. Implementation staff also develop and execute testing plans to ensure the functionality, performance, and security of AI systems. They collaborate with end-users to provide training and support, support change management, and troubleshoot any issues that arise.

Typically this is an area where banks deploy huge numbers of staff - and they continue to grow their teams in this space. Historically many of the banks have outsourced to markets such as India. We continue to see growth in markets that have historically combined low costs with strong educational standards: Central and Eastern Europe for example. These teams may often sit alongside Customer Service functions or data administration teams. The ongoing automation of the work of at least the latter (and increasingly the former) will now be given a fillip by Generative AI tools that they may be working on.

We note that increasing amounts of data labelling work is being done in markets such as Kenya or China by technology firms, for example much of the Reinforcement Training for Open AI's GPT series of Generative AI tools. As yet we have not seen banks build such teams for this sort of work - although of course much of this would potentially be outsourced to 3rd party companies much as Open AI did. However recent developments - JPMorgan Chase for example looks set to patent IndexGPT, an investment tool similar to ChatGPT - suggests that these roles may soon emerge.

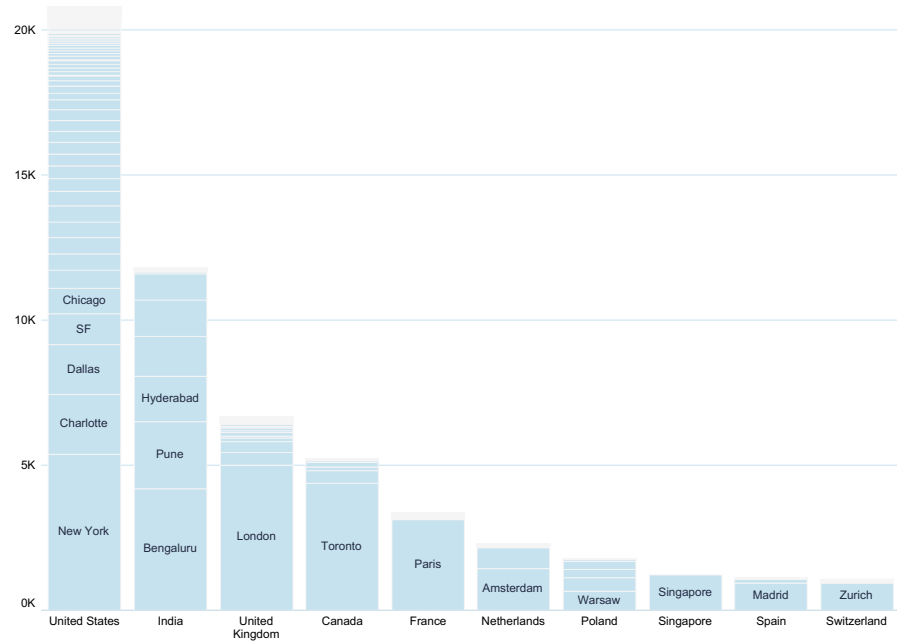
Geography Where AI banking staff work

US THE DOMINANT MARKET FOR AI BANKING TALENT, FOLLOWED BY INDIA

At a national level, not surprisingly the biggest pool of talent is in the US. This reflects the global banking industry as a whole and the selection of banks that we currently track (US banks comprise 19 out of 60 banks and payment players in the sample). India is the second largest centre of AI banking talent, followed by the UK, Canada and France.

While talent in the UK, Canada and other European countries tends to be concentrated in capital cities, talent in India is distributed across 6 major cities, largely as a result of historic offshoring arrangements. Note also that we are not (yet) tracking domestic Indian banks that will likely be more clustered in Mumbai. The US is the most distributed market of all: while over 40% of talent is based in three main cities - New York, Charlotte, and Dallas-Fort Worth - AI-related talent can be found working for banks in 200+ cities across the country.

FIG 15. US THE LARGEST COUNTRY FOR AI STAFF, WITH KEY CITIES HIGHLIGHTED



Note: Staff without city locations excluded

“IMPLEMENTATION” ROLES ARE MORE LIKELY TO BE IN INDIA, ALTHOUGH ALL AI ROLE TYPES ARE EMPLOYED THERE

The geographic picture becomes more interesting looking at location by role title. Most AI-related talent across major banks is based in Europe and the US. For Quant, Model Risk, Governance and AI Development roles around 80% of talent is based in the US and Europe. However when it comes to Implementation talent the story looks different, with over 30% of talent in our sample based in India or the rest of the world. Clearly IT delivery in India is not an AI-specific story, rather it reflects the legacy offshoring decisions made by banks over recent decades.

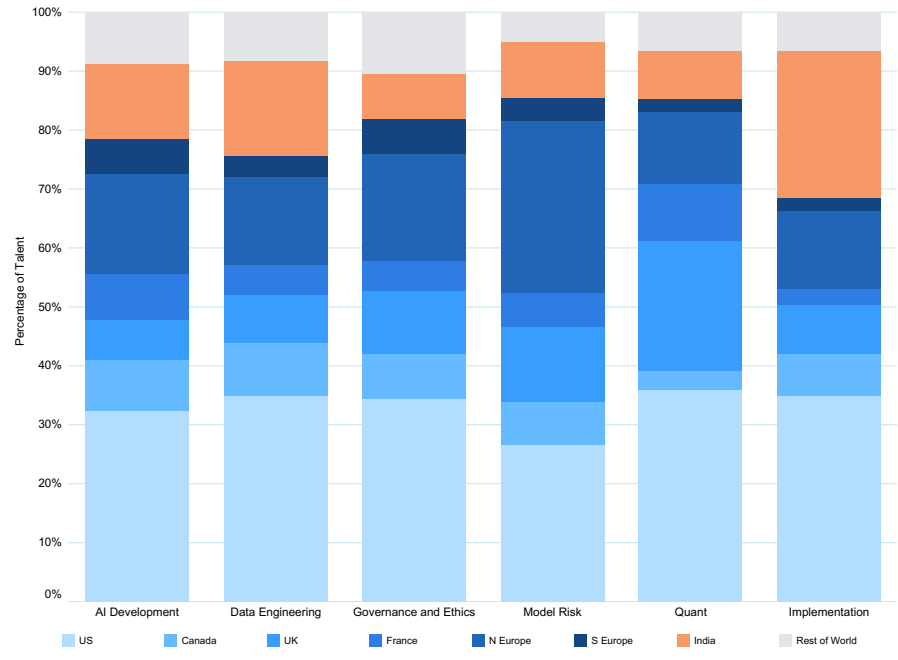
However, it does mark out banks (typically larger ones) that have clearly made strategic decisions about where and how they will source talent. Secondly, given the huge numbers of high quality graduates from Indian engineering institutions, having an established base into which to recruit them may provide medium term strategic advantage for firms with strong local footprints. Finally, the scale of AI-related staff employed in India by foreign firms will surely have an impact on the broader national economy as the transition to AI scales more widely.

UK AND US BANKS HAVE OFFSHORED SIGNIFICANTLY MORE AI ROLES THAN CANADIAN AND CONTINENTAL EUROPEAN PEERS

Organisations have very different geographic profiles. Canadian banks have almost entirely domestic staffing, albeit with footholds in the US. European banks tend to have highly localised talent. US banks are more global whilst the UK banks have the greatest proportion of AI talent offshored in India. Typically, the less globally ambitious banks have been the less likely they are to have

Geography
Where AI banking staff work

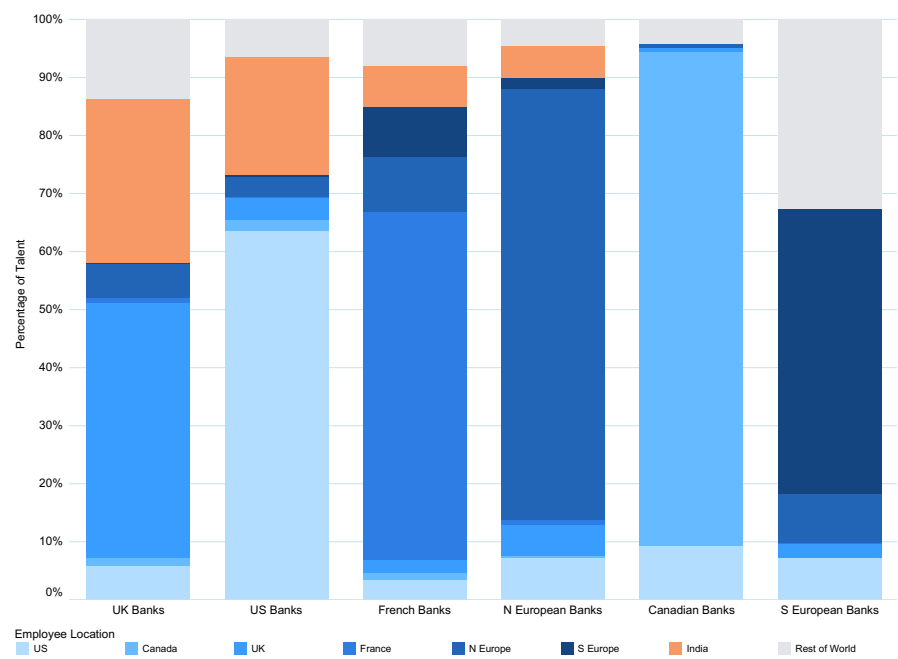
FIG 16. IMPLEMENTATION AND DATA ENGINEERING STAFF MOST LIKELY TO BE IN INDIA, MODEL RISK IN EUROPE



Indian hubs. That none of the Canadian banks, nor many of the continental European banks we track, have built AI hubs in India speaks to the nature of those markets.

Looking deeper there is even more variation across individual banks, reflecting their unique focus and legacy:

FIG 17. GEOGRAPHIC DISTRIBUTION OF AI TALENT VARIES SIGNIFICANTLY BY BANK

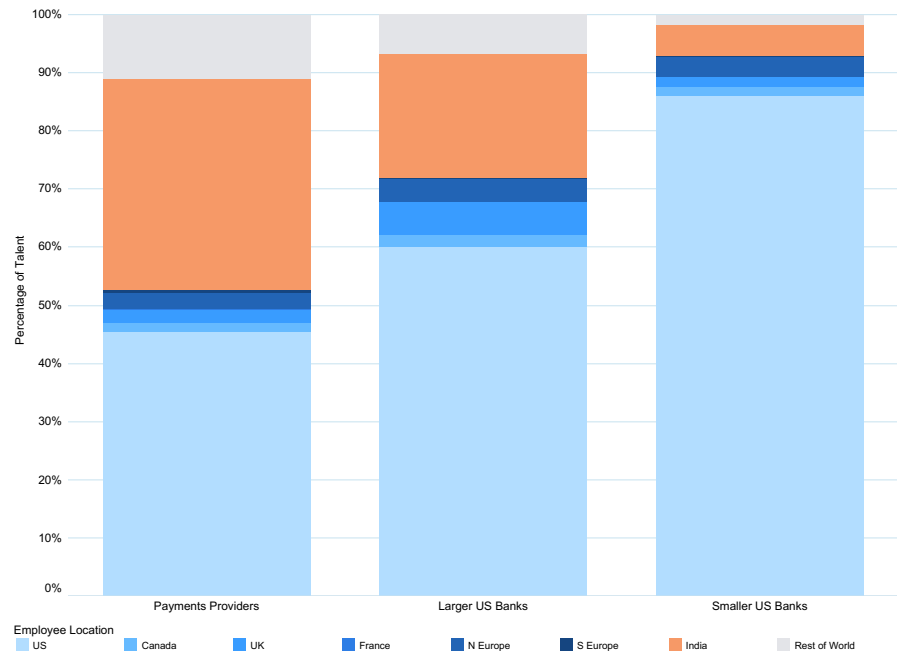


Note: Staff without city locations excluded

US BANK DEEP-DIVE:

- The largest US banks (>\$1trn Total Assets) tend to have consistently invested in AI talent in their offshore locations, with intensity varying from 20% (Morgan Stanley) to 40% (Wells Fargo) of AI-related talent based in India and ROW
- Most smaller US players (<\$1trn Total Assets) are focused on the US talent market, usually reflecting the regional nature of their business footprint. It may be that the fixed cost of setting up an Indian centre was less attractive for smaller firms with less scale than the big players.
- Payment companies - Visa, Mastercard, PayPal (and AMEX) - place a much

FIG 18. PAYMENTS PROVIDERS HAVE EMBRACED OFFSHORING, SMALLER US BANKS REMAIN DOMESTICALLY FOCUSED



greater degree of focus on offshoring compared to the banks. It is important to note that their business is inherently international - and the imperative to build scaled digital platforms will have historically encouraged a strategic approach to IT staffing. Adding AI talent to existing teams will have been a logical next step.

EUROPEAN DEEP-DIVE: HUGE VARIANCE REFLECTING MIX OF STRATEGIES AND LEGACIES

HSBC and Standard Chartered both have a larger footprint in India than the UK, partially their business footprints across (primarily) Asia. BBVA, similarly, has a larger AI talent footprint in South America than Spain. However, most organisations are largest in their home market. However the UK banks - with the noticeable exception of Lloyds - generally have a greater investment in India. This reflects linguistic and historic ties as well a clear strategic focus over recent decades. In the rest of Europe only Société Générale is comparable in scale, although Deutsche, UBS and BNP Paribas have an Indian footprint. That European banks employ more AI-related staff in India than they do in the US speaks to both cost differentials and their historic challenges with significantly penetrating the US market. Spanish banks have built significant footholds in Latin America, both to support local business but also as a linguistically-aligned location to offshore to. Deutsche meanwhile currently employs more AI staff in London than either Frankfurt and Berlin.

NEW YORK TOPS THE AI CITY RANKINGS, FOLLOWED BY LONDON, WITH 3 INDIAN CITIES IN THE TOP 10

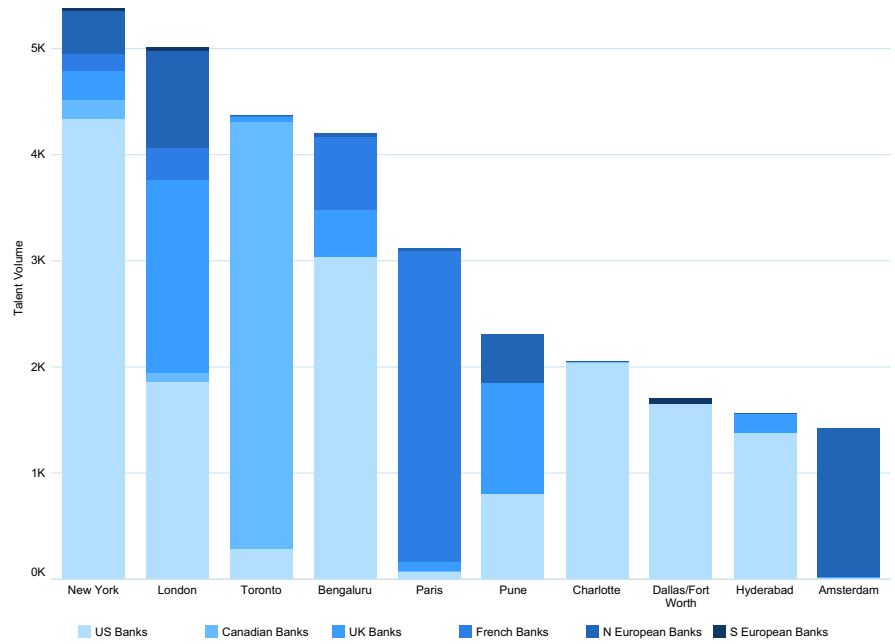
At a city-level, the single greatest concentration of AI-related talent is in New York. London claims the #2 spot, largely driven by the largest concentration of Quant talent. Toronto weighs in at #3, followed by Bengaluru. India has 3 cities in the Top 10 as does the US.

In most North American and European cities - New York, Toronto, Paris, Charlotte, Dallas-Fort Worth, Amsterdam - talent tends to work at domestic banks. For example, over 90% of Toronto-based employees work for Canadian banks; nearly 95% of Paris-based employees work for French banks; and over 80% of NYC-based employees work for US banks.

By contrast, UK banks employ under 40% of UK-based AI talent. Indeed, American banks employ as many London-based AI professionals as British banks and are more successful in recruiting talent from British universities (see later in this report). This reflects London’s unique position in the global banking industry. Rather like the Wimbledon tennis tournament held in the

Geography Where AI banking staff work

FIG 19. NEW YORK LEADS TOP 10 CITIES BY VOLUME OF AI-RELATED TALENT



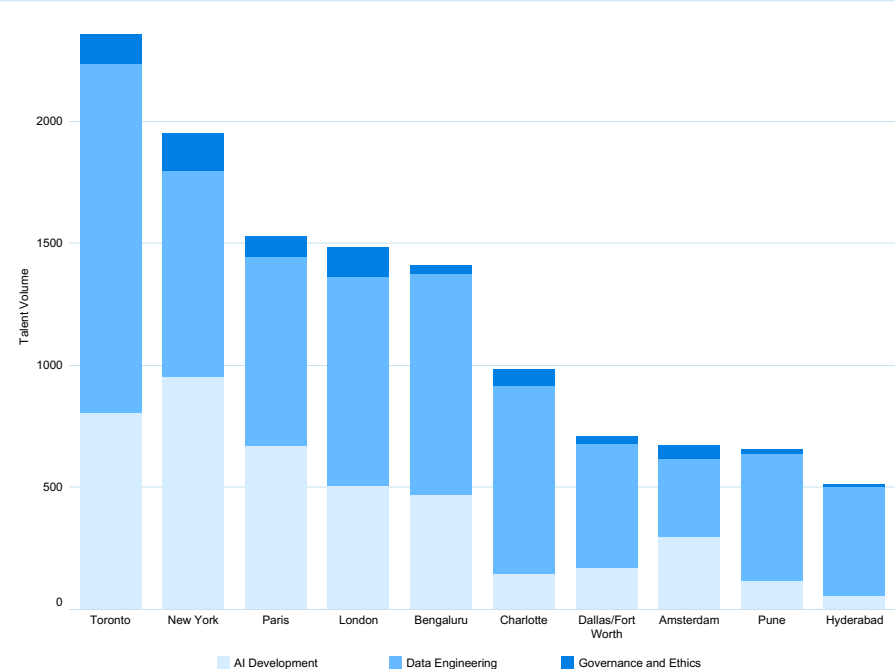
Note: includes all AI-related roles across 60 North American and European banks. Bars colour-coded by region of employer HQ.

same city, it has been an attractive place to compete, even if most of the winners since the Big Bang regulatory changes of the late 1980s have not been British firms. This means that the largest employers in investment banking, a sector in which London specialises, have increasingly been US firms. That AI employment follows historic patterns appears to be a theme that repeats itself.

TORONTO IS THE LARGEST CITY FOR AI & DATA CORE ONLY

Canadian bank AI activity is very focused in Toronto. Canadian banks have also significantly invested in AI. This combination means that Toronto is actually the leading single location for AI and Data Core talent. However, it is almost entirely focused on delivering for Canadian banks rather than operating as a truly international centre. Support from the Canadian government, a generous approach to immigration and strong community ties, for example with universities, makes it an interesting role model for a successful AI banking hub.

FIG 20. TOP 10 CITIES FOR AI & DATA CORE TALENT



Note: includes all AI-related roles across 60 North American and European banks. Bars colour-coded by region of employer HQ.

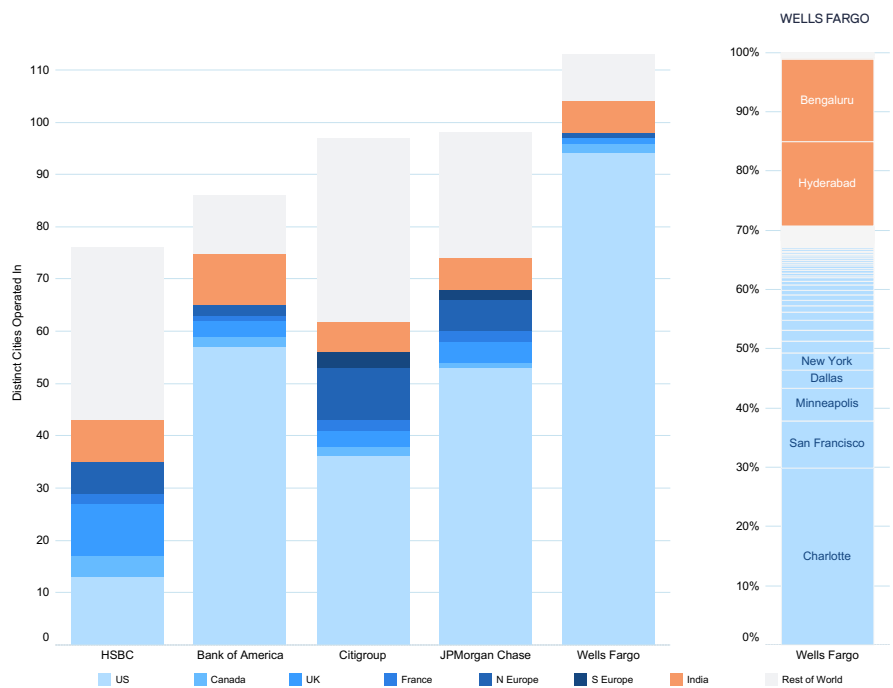
AI TALENT REMAINS HIGHLY FRAGMENTED, WITH WELLS FARGO'S AI TALENT BASED IN OVER 100 DIFFERENT CITIES

Despite strategic offshoring, AI talent across the banks is highly geographically distributed. Wells Fargo's is perhaps the most extreme example, with AI talent in more than 100 cities worldwide. Of the non-US banks HSBC has the widest range of cities with AI-related staff reflecting a wide international business footprint.

It would be generous to say that this role distribution indicates alignment with specific lines of business and close cross-organisational collaboration. But this is likely as much due to legacy and local initiative as centralised strategy planning. The self-reported nature of some of the data may be creating a more complex and nuanced picture than might be reflected in internal company organigrammes.

Wells Fargo has the most distributed AI workforce: count of cities with AI talent tracked, by geography

FIG 21. WELLS FARGO HAS THE MOST DISTRIBUTED AI WORKFORCE WHEN LOOKING AT THE NUMBER OF CITIES WHERE AI TALENT IS BASED



Note: includes all AI-related roles across 60 North American and European banks. Bars colour-coded by region of employer HQ.

CURRENT HIRING TRAJECTORIES SUGGEST MANY BANKS FOCUSING ON INDIAN GROWTH

Where banks look for talent defines where growth will come. Some is clearly to replace churn - but ultimately banks hire where they can grow and not just maintain their current position.

Where banks are exposed to India their HR teams tend to be busy. We track Job Descriptions at the 23 banks covered in the January 2023 Evident AI Index. 16% of the AI & Data Core roles are being advertised in India. For nine banks this proportion rises to 40% or more. For all AI related hiring, key Indian cities along with New York make up the top five leading cities, whereas established centres like London and Paris see much lower volumes. This may reflect recent cost pressures in what has been a hot recruitment market. Higher churn clearly may also require faster recruitment which will, in time, lead to a re-alignment of cost differentials.

NATIONAL DEEP-DIVES

United States has huge scale and strength in depth

The US market is the largest and most geographically fragmented market for AI talent in banking.

→ New York has the largest concentration of AI banking talent in the world,

Geography

Where AI banking staff work

underscoring its status as the HQ of the leading AI banks. While many key tasks are centralised in New York's offices, the presence of US banks enables them to provide leadership for talent deployed in lower-cost locations, particularly India, but also other US cities. This is particularly true for Data Engineering and Implementation teams

→ Despite California's central role in global AI, it does not serve as a major location for banking. However, the Bay Area (San Francisco and Palo Alto) overall ranks higher (14th overall) due to the presence of payment firms with established teams there. Wells Fargo is the only major traditional bank with a significant presence in the Bay Area

→ Bank Headquarters have acted as talent magnets - drawing staff to places such as Bank of America's Charlotte (the 7th most popular city for banking AI talent) offices

→ Texas is a strong regional hub - with Dallas-Fort Worth (including Plano) proving attractive at 8th

India is becoming the AI banking workshop of the world

India emerges as the second-largest hub for AI workers in the banking population that we cover. This is unsurprising given the legacy of IT outsourcing and processes initiated during the late 1990s Y2K challenge. Adding AI talent to existing IT staffing pools, and transitioning or training up staff there, has been a natural next step.

→ The majority of Indian-based staff in our sample work for US banks, but European players like Deutsche Bank have also made substantial investments in India. DBS and Commonwealth Bank of Australia also have teams in India. The scale of foreign investment in Indian talent is potentially relevant for its medium term market growth.

→ Bengaluru retains its status as the centre for offshored Indian tech talent from US banks, particularly JPMorgan Chase and Wells Fargo, with Société Générale also maintaining a large team there.

→ Notably, three cities - Pune City and Hyderabad, along with Bengaluru - rank in the global top ten.

United Kingdom

The UK ranks third overall, with London being the second most prominent city.

→ Traditionally the market which attracted international players and talent that model looks under some pressure in recent years.

→ Similar to other European countries, the market is more centralised, with Edinburgh and Glasgow following London, albeit with significantly fewer AI talent numbers.

→ London leads as the largest centre for Quant talent, although this dynamic is clearly under some pressure post-Brexit.

→ However, our data currently finds little sign that Paris or Frankfurt are capturing Quant roles from London. Frankfurt remains small, with a tiny non-German banking presence. Paris remains substantially smaller for international banks, although clearly French banks have a significant number of Quant roles themselves.

Canada: strong domestic focus

Because Canadian banks are centralised in Toronto, tend to be fairly focused on AI, and because Canadian banks have no Indian offshoring legacy, the city is a massive centre for AI Talent. 85% of Canadian bank employment is in Canada, of which 90% is in Toronto. Canada has a long tradition of strong banks with deep investment in new technology. In 2002, for example, Canada was estimated to have the highest numbers of ATMs per capita. This tradition persists in the age of AI.

France: global aspirations, but still very French

Recent announcements - for example JP Morgan Chase has recently stated it will move a senior (French) banker to Paris to grow its AI team - talks to an aspiration to wrestle European leadership from London. However, over 90% of the AI talent based in Paris is still employed by French banks. French AI talent is massively centralised in Paris, with over 90% of all AI talent in the country employed in the Île-de-France, the area around Paris.

Other European nations appear to be on different trajectories

→ **Netherlands:** the Dutch have performed rather more strongly. Not only do Dutch banks have a strong showing, especially in comparison with their European peers, but Amsterdam is ranked 10th for overall AI talent numbers.

→ **Poland:** although we do not have any Polish banks in our coverage there are multiple European banks - ING Groep for example - running IT teams in Poland, many of which are upskilling with AI talent. Poland is the 7th largest location for AI staff, well ahead of Germany.

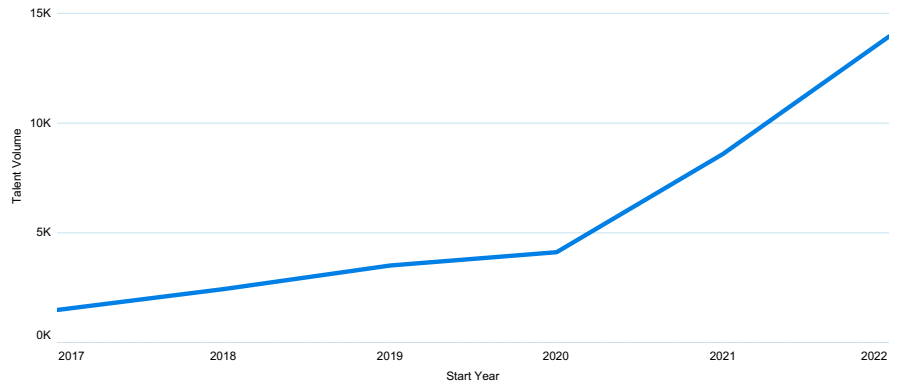
→ **Germany,** beyond Deutsche bank, has not really shown up to this race. Frankfurt, sometimes touted as a credible banking alternative to London ranks in the mid 40's when AI talent volumes are considered, Berlin is 60th.

Overall numbers of staff working in AI are driven by three factors: hiring and internal moves versus churn. We will look at all three factors in the Recruitment, Retraining and Retention chapters.

HIRING OF AI TALENT HAS ACCELERATED. THIS LOOKS SET TO CONTINUE AT PACE.

The breakdown of the start dates of the current AI & Data Core staff shows how recruitment has accelerated in recent years. ~40% of staff in AI & Data Core role started in their role since January 2022. This is a gross number that ignores the impact of churn (people have left the bank during this period are not included) but the scale of the curve shows how seriously banks have applied themselves to growing their AI workforces.

FIG 22. SURGE IN 2021 AND 2022; BREAKDOWN OF CURRENT AI & DATA CORE TALENT, BY START-DATE



Note: Includes all AI & Data Core talent across 60 major banks in North America & Europe.

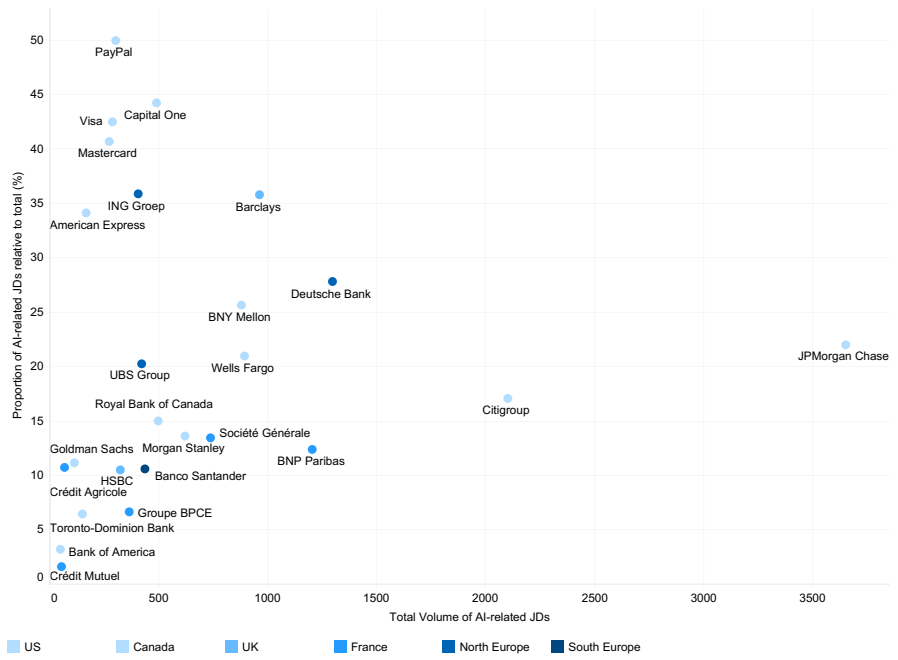
RECENT JOB DESCRIPTIONS SUGGEST THAT THESE TRENDS LOOK SET TO CONTINUE

Job Descriptions provide us with a snapshot of where the AI talent market will be as they are a forward-looking indicator of a bank's future talent. We have tracked Job Descriptions at the 23 largest banks (with AUM > \$1trn, January 2022) and Capital One.

Our analysis of Job Descriptions from February to April 2023 across the banks suggests a ramp up of AI talent hiring:

- JPMorgan Chase continues to lead the pack in terms of the overall number of AI-related roles being recruited for.
- Citigroup is next - but searching for about 60% of the number of roles that the leader is.
- Interestingly, European players - Deutsche Bank, BNP Paribas and Barclays - round off the top five. The European banks overall lagged behind major US peers in the January Evident AI Index rankings - is this a sign of the European banks doubling down in this space?
- Although size is important we can see that the smaller, data-native payment players - Mastercard, Visa and PayPal - as well as Capital One are making these AI-related roles a larger portion of their overall recruitment drive. Their volumes however are relatively low.
- Bank of America has had a hiring freeze in this time period so we see a lower volume and density of AI-related Job Descriptions - the long term impact this will have on the banks AI's talent stack remains to be seen (although their relative strength at retraining - see later chapter - may partially mitigate this).

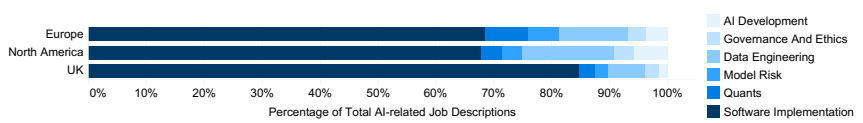
FIG 23. JPMORGAN CHASE LEADS ON ABSOLUTE NUMBER OF AI-RELATED JDS, BUT PAYMENT PLAYERS LEAD WHEN TRACKED RELATIVE TO ALL JDS POSTED



Note: Includes all AI talent Job Descriptions from February to April 2023, including AI Development, Data Governance & Ethics, Data Engineering, Model Risk, Quants or Software Implementation positions.

Across the banks, the majority (approx 70%) of these AI-related JDs are Software Implementation positions, 15% are Data Engineering positions, 5% related to AI Development, and the remaining 10% related to Quants, Model Risk and Governance & Ethics. However, the mix of roles varies by bank, reflecting their different hiring priorities, something we will be tracking in more detail over the coming months.

FIG 24. SOFTWARE IMPLEMENTATION KEY: PROPORTION OF JOB DESCRIPTIONS BY ROLE TYPE BY REGION



Source: Company Job Descriptions, February to April 2023

If we look more specifically at the AI & Data Core (AI Development, Data Engineering and Data Governance & Ethics roles only), 36% of all Job Descriptions in our sample are posted by JPMorgan Chase and Citigroup, showing their growing dominance in this area. JPMorgan Chase is hiring 45 new employees in their AI Research team alone. Five US and five European banks make up the top 10 positions.

Top 10 banks by number of Job Descriptions (AI & Data Core only):

1. JPMorgan Chase - US
2. Citigroup - US
3. BNP Paribas - Europe
4. BNY Mellon - US
5. Deutsche Bank - Europe
6. Morgan Stanley - US
7. Groupe BPCE - Europe
8. Société Générale - Europe
9. Capital One - US
10. Santander - Europe

THE IMPACT OF GENERATIVE AI STILL MUTED

Our Job Description analysis coincided with the explosive impact of the launch of ChatGPT and the resulting swift increase in awareness of AI across the banking industry. We don't expect to see major hiring for roles related to Generative AI implementation yet, as banks are in the early stages of identifying use-cases relevant for LLM adoption. However most banks are deeply engaged internally in listing the areas across all divisions where GenerativeAI is applicable and starting to test on internal data-sets.

Up until now, few of the Job Descriptions published explicitly referenced Generative AI, LLMs or ChatGPT. Less than 2% of AI Development job descriptions mentioned the technology across 8 banks.

That said, we expect banks will start to look for people who truly understand the technology behind Generative AI models and how to embed them in products and will start to drive hiring for jobs such as prompt engineers, ML engineers and product developers.

Interestingly, 41% of JPMC's AI Development JD's referenced Natural Language Processing (NLP), which covers similar AI use cases.. Indeed it is hard to imagine an NLP role that has not been transformed by LLMs: NLP is key to tasks around customer service, finding signals in unstructured data like media feeds or supporting compliance. JPMC is recruiting more AI Development staff in this field than all the other banks combined. Already in May (after our data set closed) Morgan Stanley has advertised for an Ontologist, presumably to help with their Generative AI data management.

Ontologist

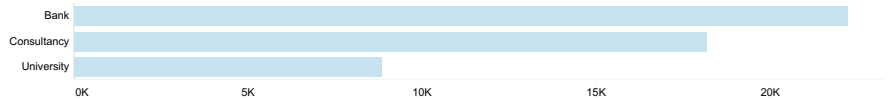
New York, New York, United States of America

Within the Information Management team, you will have the opportunity to help design and build NLP/ML/MR capabilities by leveraging large sets of structured and unstructured data. You will deliver both qualitative and quantitative capabilities that are central to our machine-assisted information management strategy.

TALENT SOURCES: WHERE DO BANKS FIND THEIR PEOPLE?

Banks recruit AI talent from a huge variety of sources (we track over 20,000 different entities) to ensure that they can build their burgeoning pipelines of talent. Clearly other banks - especially peers - are attractive sources of talent. But so are other sources of smart, capable staff. The leading sources of talent are Universities, Consulting / Tech and Banks. We will examine each of these in more detail in this chapter.

FIG 25. OTHER BANKS ARE THE MOST POPULAR SOURCE OF TALENT; NUMBER OF EMPLOYEES, BY SOURCE (TOP THREE SOURCES ONLY)

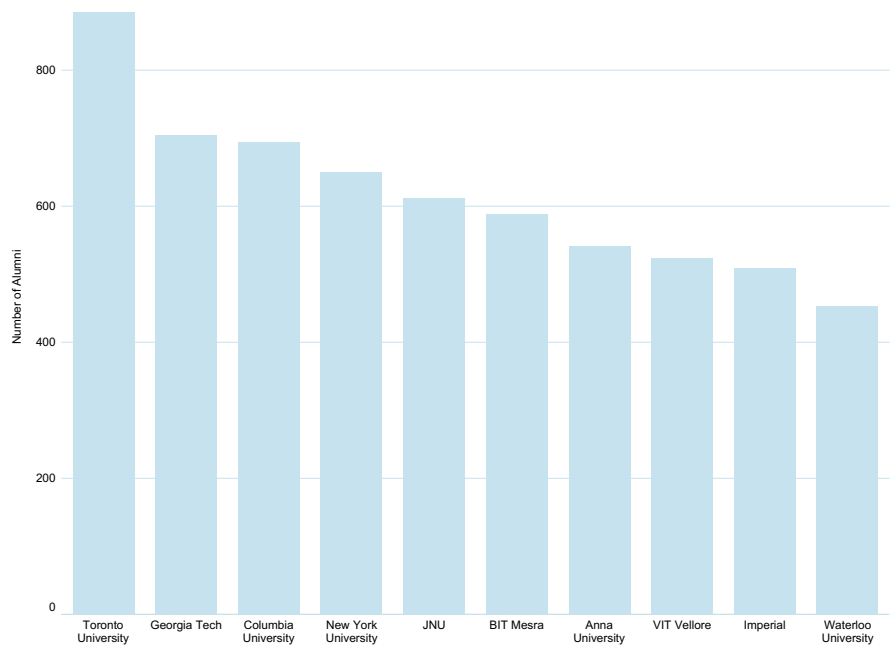


In addition there is a long tail of other talent sources - ranging from Aviation to Retail - which we will continue to track in future analysis. Part of the challenge, for example, will be to disentangle part-time roles or internships done whilst studying.

UNIVERSITY RECRUITMENT IS KEY

The leading university, globally for AI banking talent, is Toronto (a position that is even more marked when tracking AI Development staff careers specifically) whose alumni volumes are second to none. Georgia Tech and Columbia make up the next two in terms of alumni in the AI banking space. The top ranked European institution is Imperial College, London, but there are two Indian universities ahead of it: the J Nehru and the Birwala Institute of Technology. US universities tend to lead - reflecting where talent is based.

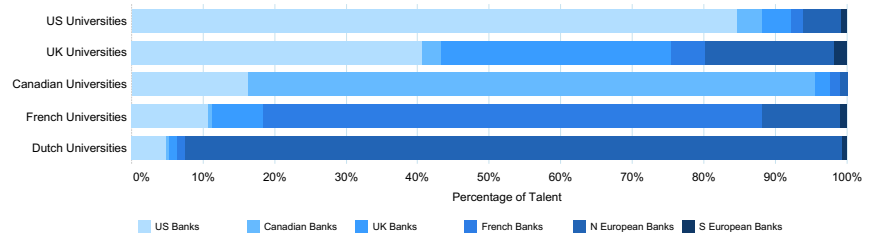
FIG 26. NORTH AMERICAN COLLEGES LEAD ON A BREAKDOWN OF AI BANKING TALENT BY UNIVERSITY OF EDUCATION (TOP 10 UNIVERSITIES ONLY)



RELATIONSHIP BETWEEN ALUMNI TALENT POOLS AND NATIONALLY HEADQUARTERED BANKS

It is perhaps unsurprising that local banks are typically the leading employer of their nation’s university alumni. The chart below shows, by nation, where students from the Times Top 100 World University Rankings end up if they join banks. US graduates - at all levels - tend to join US banks in preference to non-US ones. The same is true of France’s prized mathematical talent who join French banks and the Netherlands’ multilingual graduates who go to the likes of ABN Amro and ING Groep.

FIG 27. COMPARISON OF LOCATION OF UNIVERSITY EDUCATION VS. LOCATION OF BANK EMPLOYER



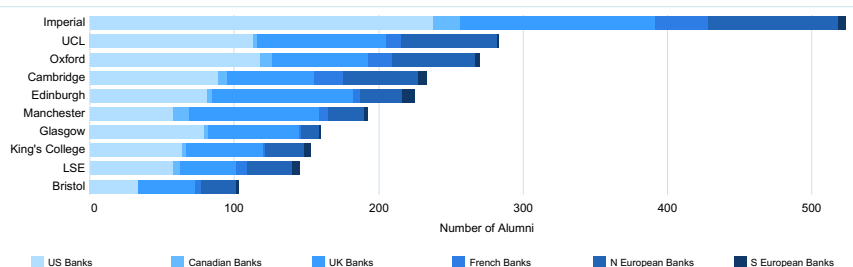
Note: Includes university alumni currently working in AI roles across 60 banks.

TOP UK UNIVERSITY ALUMNI MORE LIKELY TO WORK AT US THAN UK BANKS

One major market where this is not true is the UK. Focusing on the top 100 universities in the Times World University Rankings, the UK’s universities are the second largest provider of AI talent for the banks (this excludes Indian universities who are notably absent from the Times’ Top 100 rankings). However, alumni are more likely to work for US banks than banks in the UK. This alumni drift to US banks is pretty consistent across the 10 leading UK universities, but alumni from London, Oxford and Cambridge are more likely to go to US universities than those from Manchester and Bristol.

There will be many reasons for this. The student base will often be relatively international, especially at a post-graduate level. More importantly, candidates

FIG 28. COMPARISON OF LOCATION OF UNIVERSITY EDUCATION VS. LOCATION OF BANK EMPLOYER (UK UNIVERSITIES ONLY)



Note: Includes alumni of UK universities currently working in AI roles across 60 banks.

from leading universities often aspire to work in the City of London, a market where US banks have historically played a leading role. This position has been consolidated since the Great Financial Crisis in 2008 when UK banks with global aspirations encountered a reality check.

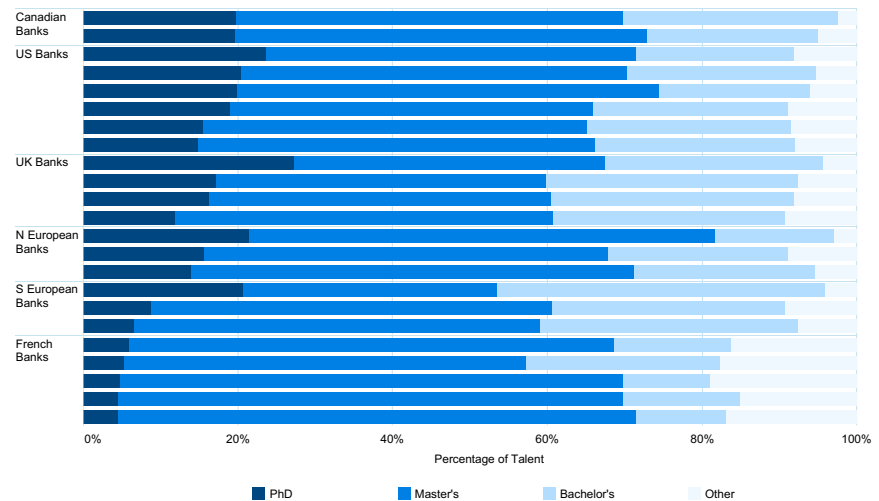
So, although it might be tempting to see this as a new AI-related (or even post-Brexit) phenomena it is not. That Goldman Sachs or JPMorgan Chase is a more tempting (and remunerative) employer than Lloyds or NatWest is not a new development. Not for the first time, the tendency for AI to reinforce existing industrial structures cannot be underestimated.

This does provide insight on both the value of the UK Government's investment strategy in AI talent through Masters and PHD programmes and the failure of UK banks to seemingly capitalise on this investment. It is worth noting that although UK educated talent may work for US banks, in our talent sample at least, the UK is historically not bad at retaining alumni talent in the country.

EDUCATION LEVELS HIGH AMONGST BANK AI STAFF

Staff working in AI tend to be highly educated - at least 25% of staff working in AI Development teams hold PHDs. There is no sign of scale advantage in this. In the North American market, many of the smaller banks in our coverage - Capital One, First Republic, US Bancorp and PNC Financial Services, for example - all have proportions of PHDs higher than the big banks, including Wells Fargo, which has the highest PHD share of the large US bank workforces.

FIG 29. UP TO 20% OF STAFF MEMBERS EDUCATED TO PHD LEVEL; BREAKDOWN OF AI DEVELOPMENT TALENT BY HIGHEST LEVEL OF ACADEMIC EDUCATION



Note: chart includes 23 banks with assets >\$1tn (as per January 2023 Evident AI Index).

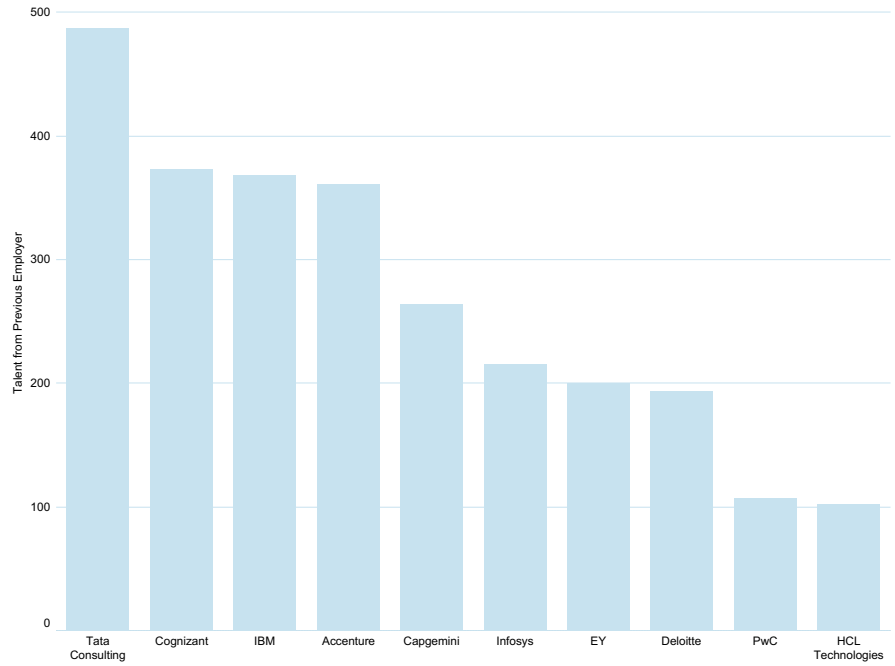
It is worth noting that educational structures and expectations differ by market and educational culture. Masters may historically be more widespread in North America, while PHDs may be of less importance to the French banks than the highly technical graduates of France's Grand Ecoles. That being said, elite education and banking careers are at the cutting edge of globalisation so many of these differences are shrinking - especially in the digital world where trends tend to be set in the US.

IT CONSULTING AND TECH HIRED FOR EXPERTISE AND RELEVANT EXPERIENCE

The biggest single industrial source of AI staff is IT consulting firms. The Top Ten list of talent suppliers, starting at several hundred staff into the industry, includes eight consulting firms and two tech firms. Obviously the boundaries between IBM as a tech firm with significant consulting revenues and Accenture, a consulting firm with a focus on tech, may be somewhat blurred.

Clearly the position of leading industry supplier, Tata Consulting, speaks to the importance of the Indian market. Given that all the firms listed work widely across the Financial Services industry it is worth making the point that some of these recruitments may include people already effectively working for the hiring bank (although clearly there may be contractual issues around this most

FIG 30. CONSULTING AND TECH FIRMS DOING CONSULTING MAKE UP TOP 10 NON-BANK FIRMS SOURCING TALENT TO THE BANKS



Note: AI & Data Core only

consulting firms are delighted by their alumni being hired by their largest clients).

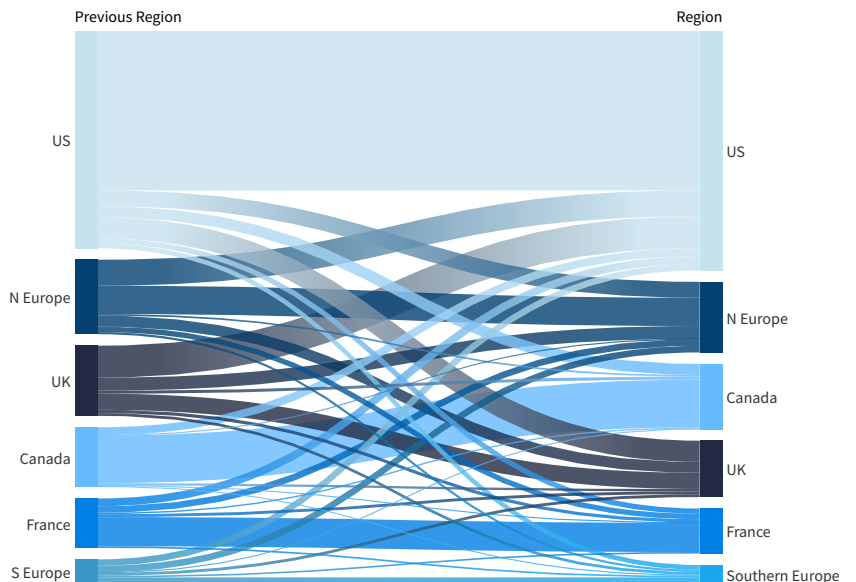
When we drill down into these numbers for AI Development, Accenture takes the top spot while Microsoft appears at #10. The lack of Big Tech staff being hired by banks is striking (although they are rather more prominent as a destination for staff leaving banks - see the Retention section of this report) though we expect this will increase with the growing demand for specialised solutions requirements in the banks .

POACHING IS A KEY DRIVER OF BANK AI TALENT DYNAMICS

Banks spend a lot of time trying to work out who to poach from each other. The flow of AI talent between the banks reveal much about their AI strategy and the specific functions they seek to bolster. The war on talent is truly on and a competitive edge gained by having the right technical skills and experience level to execute. A team or person who is tried and tested is worth a lot especially as AI innovations are happening at breakneck speed.

As the chart below demonstrates the US banks dominate in hiring the largest amount of AI talent. The UK banks on the other hand see a net outflow of AI talent predominantly to the US and Northern Europe (mainly to Swiss banks).

FIG 31. INTRA-REGIONAL CHURN SHOWS UK BANKS SUFFERING THE HIGHEST OUTFLOW OF AI TALENT

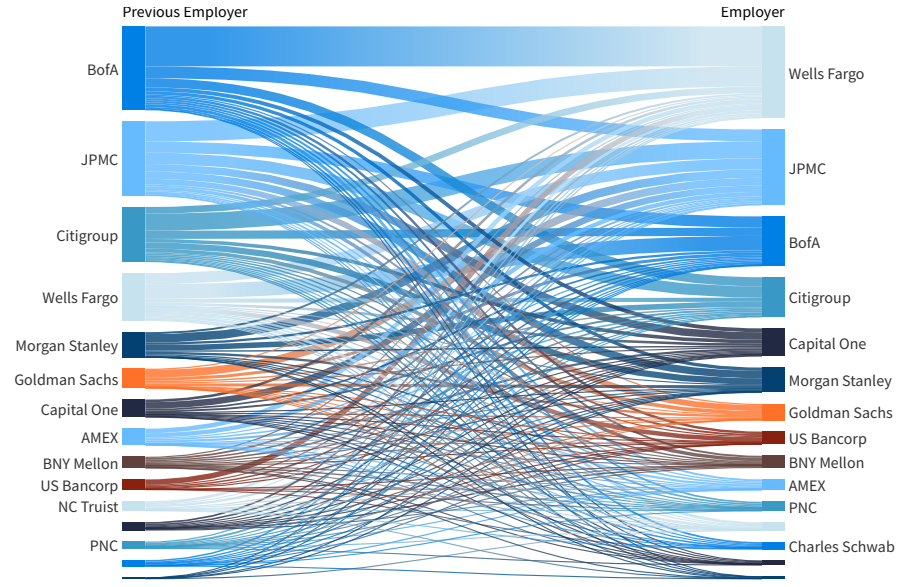


Note: AI & Data Core only

IN THE US MARKET, WELLS FARGO, JPMC AND CAPITAL ONE ARE PULLING IN THE HIGHEST NET INFLOWS

At the aggregate AI talent level we can see that Wells Fargo is the most active player in the poaching game, with an especially strong showing in persuading Bank of America staff to move employers. Some of the other banks being poached are Citigroup, Morgan Stanley and American Express. Capital One is a strong grower. JPMorgan Chase, unsurprisingly given its scale, features high on both sides of the chart (although it has a net inflow).

FIG 32. WELLS FARGO LEADS ON AI TALENT INFLOWS IN US

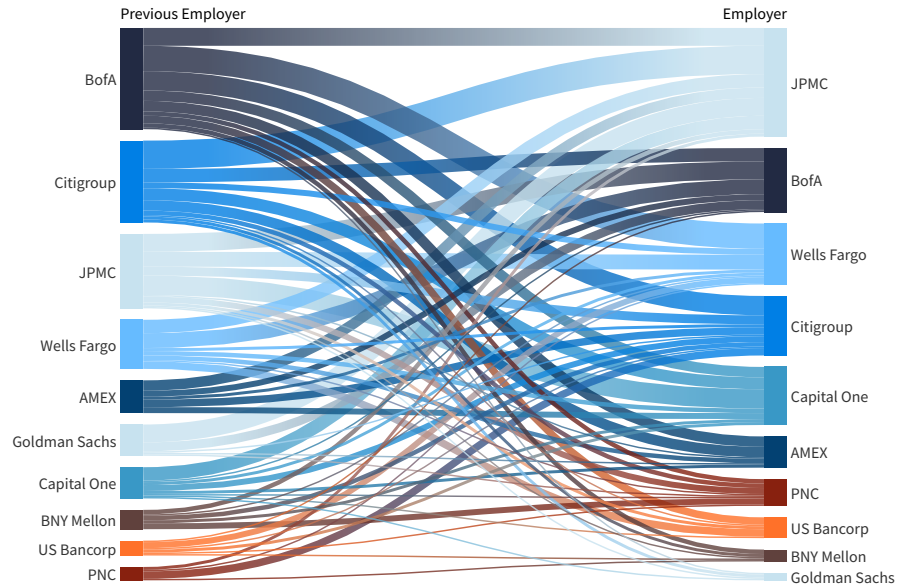


Note: AI & Data Core only

This recruitment is across multiple geographies - much of it happening in India for example. Diving into one example we can see that much of the rivalry between Bank of America and Wells Fargo takes place in Charlotte, North Carolina where Bank of America has its HQ. We see from our sample of data that Wells Fargo has successfully recruited over 80 data engineers from Bank of America, while Bank of America has poached only 30 in return. A similar but less significant pattern between the two banks emerges in other AI related roles such as quants, software implementation experts, and model risk professionals, where Wells Fargo takes the lead. One clue as to what is driving this may lie in Wells Fargo's transparency in disclosing pay scales on job descriptions, particularly for AI-related roles and across states where there is no legal requirement to do so (we will discuss this further in the Salaries section). That Bank of America has a relatively less transparent approach across the US makes it hard for us to assess whether there is indeed a discrepancy in pay scales.

Whilst Wells Fargo heads the table when looking at all AI talent, diving deeper into AI Development talent-only a different story emerges. The chart below focuses on the top ten US banks, ranked by intra-bank talent flows). Whilst still in the top three Wells Fargo has now fallen behind Bank of America as a destination (despite the disparity in direct flows between them discussed above). Even more strikingly, JPMorgan Chase clearly has the largest net inflow. At a smaller scale Capital One continues to recruit strongly.

FIG 33. JPMORGAN CHASE STRONGEST POACHER OF US AI DEVELOPMENT TALENT



If we move across the border - and focus again on AI Development talent - we can see that the two largest Canadian banks are sustained poachers from their smaller rivals. The numbers are somewhat smaller than the US equivalent but we can identify that RBC and TD are net recruiters from Bank of Nova Scotia and Bank of Montreal. Interestingly the flow between RBC and TD is relatively muted and balanced, although RBC's biggest outflow is to TD and RBC is the third-largest destination for TD talent.

FIG 34. RBC CAPTURING HIGH SHARE OF CANADIAN AI DEVELOPMENT TALENT FLOWS



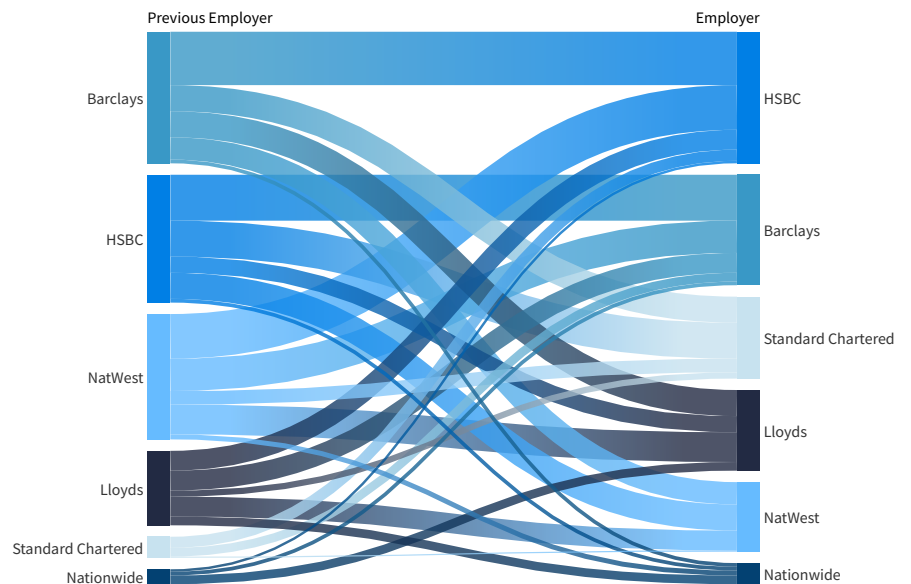
FIG 35. BNP PARIBAS LEADING POACHER OF FRENCH AI DEVELOPMENT TALENT



In France, focusing again on AI Development talent, BNP Paribas has captured roughly half of the staff leaving Société Générale for another bank. BPCE is BNP Paribas’ second largest source of intra-French banking talent and has delivered a net outflow to Société Générale (despite a fair amount of traffic in the opposite direction).

In our final deep dive, looking at all AI Talent in the UK, we can see that HSBC has the largest net inflow amongst UK banks. However, the top three banks - HSBC, Barclays and NatWest - are the same for both outflows and inflows. Quietly gaining traction is Standard Chartered - this performance is even stronger at the AI Development level (although the numbers tracked are relatively limited) where it is the largest net gainer by some margin.

FIG 36. CROSS-BANK TALENT FLOWS LARGELY TO NATWEST’S RELATIVE DISADVANTAGE



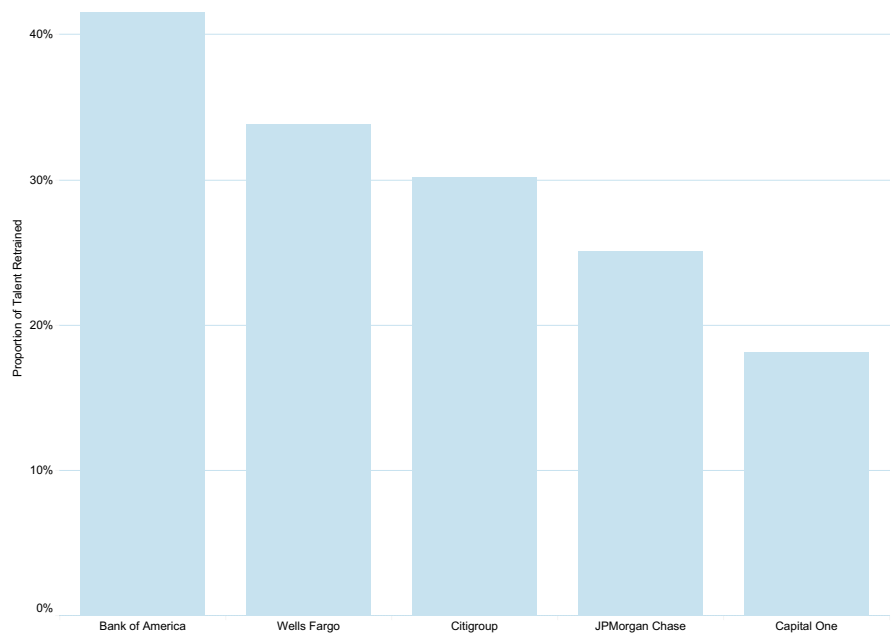
RETRAINING / RE-ASSIGNING WITHIN BANK SHOWS STYLE AND PACE OF TRANSFORMATION

There are several ways to think about retraining of staff. At the widest level many banks are providing all of their staff with an introduction to AI and the power of data. In a similar vein many banks are investing in preparing their management cohorts for the opportunities and risks of the new technology. We will cover some examples of this below.

When thinking about the AI talent mix however we can also focus on the proportion of staff who have been moved to AI roles from other jobs within banks. The upside of staffing AI teams with deep experience of a bank, its information systems and data challenges is clearly high. The downside may be that there is less transformative thinking. Clearly getting this mix right is important - as may be the message to the broader organisation that new careers in AI are an attractive proposition for existing staff who may fear displacement from rapidly emerging AI tools.

Focusing on AI & Data Core talent at US banks we can see a wide variety in the proportion of staff who have held previous roles at the institutions before they move into AI roles. Capital One has been building teams with a stronger external composition. At the other end of the scale Bank of America has redeployed about 40% of its AI staff. These are mostly in Data Engineering - an area that it is probably easier to relocate to from Implementation than - for example - AI Research. We can see similar insight from Bank of America's experience profile (see below).

FIG 37. BANK OF AMERICA LEADS ON PROPORTION OF AI & DATA CORE EMPLOYEES RETRAINED FROM OTHER ROLES IN THE BANK



Note: selection of US banks.

RBC is a strong example of a bank that has been re-thinking AI talent management. They recently launched a new Technical Career Journey with roles and titles aligned to the broader tech talent market. The bank also has a Technical Distinction Program which aims to elevate the experience and impact of a small group of leading edge technologists, led by Bob Blainey, RBC's first Fellow. This group is often leveraged to provide training and experience to over 1000 students per year as well as a high school program.

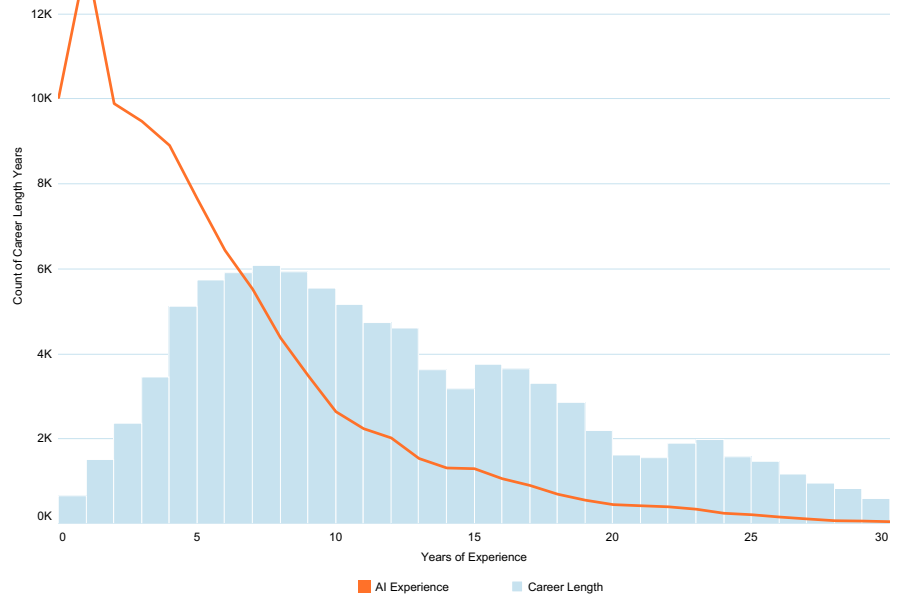
EXPERIENCE IS A VITAL RESOURCE IN A RAPIDLY CHANGING DOMAIN

One of the consequences of retraining is a dichotomy between AI experience and overall staff career experience.

As AI is a relatively new field, the level of AI experience that staff typically have is, unsurprisingly, quite low. On average, AI Development staff have 2.8 years of experience working in AI Development roles, and 77% of staff have less than 5 years of experience with the technology (with the caveat that this does not include university education years). 49% of them are in their first role in this space.

However, this relatively low level of experience is not purely driven by new graduates entering the profession - as we can see in the chart below. The majority of AI Development employees have between six and ten years of career experience. The overall profile across other AI-related job groups is not dissimilar.

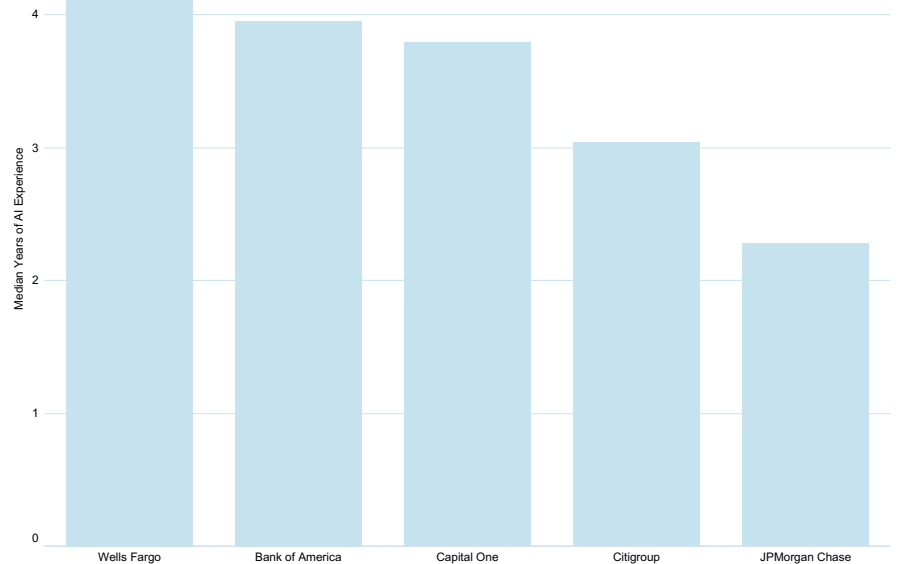
FIG 38. STAFF EXPERIENCE WITH AI TYPICALLY FAR LOWER THAN OVERALL YEARS OF CAREER EXPERIENCE



Note: Chart shows the number of AI-related employees by years of experience.

However, overall experience level varies by bank. Wells Fargo, Bank of America and Capital One have staff with (on average) more AI experience than JPMorgan Chase. This will reflect both a long term commitment to AI but also a relatively more sedate recent pace of staffing growth. Note that this is experience in the industry so outside experience (for example doing a PHD) will not be measured. For JPMorgan Chase operating with lower levels of AI experience is potentially going to need managing in the short term - however it is probably a price worth paying on the journey to a larger team.

FIG 39. WELLS FARGO AI DEVELOPMENT TALENT HAS THE MOST AI EXPERIENCE



Note: Chart shows the number of AI-related employees by years of experience.

It is worth reflecting that these new teams are both a challenge for banks and potentially a key driver of transformational change. As new teams get set up they may challenge and change the culture and legacy expectations of what have historically been relatively conservative businesses.

As well as retraining talent, banks focus on retaining talent. A good level of churn can be healthy - in fact anecdotally some banks actively celebrate their talent moving onto major tech companies - but banks need to fight to retain the best talent. In this chapter we explore salaries, culture and diversity.

SALARIES ARE HIGH

AI roles tend to be well paid. Banks are frequently competing for talent across multiple industries - and Big Tech specifically has challenged banking’s historically undisputed position as the best remunerated of industries. Consultants continue to be attracted to the typically superior financial returns in banking - which, as we saw earlier, is reflected in the flow of staff from consultancies into the banking sector. Big Tech and AI businesses, less so.

We have analysed the Job Descriptions with publicly disclosed salaries over a three-month period from February to April 2023. Levels of disclosure that we have access to vary. It is, for example, a legal requirement to put salaries on job advertisements in much of the US but not in other markets.

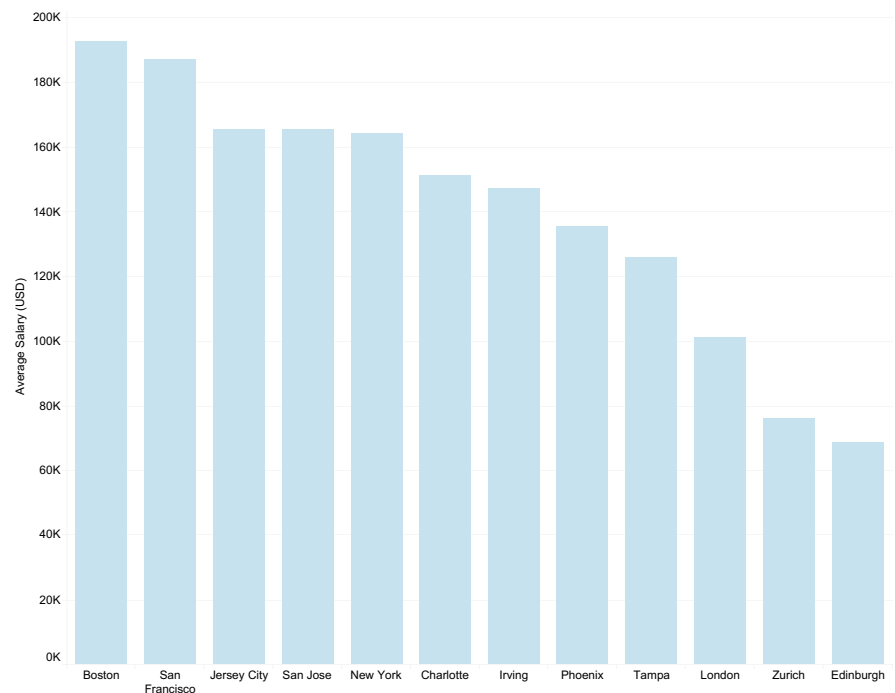
Salaries vary by geography, role and bank.

SALARIES VARY BY CITY: SAN FRANCISCO IS AHEAD OF NEW YORK

It is clear that salaries in the US tend to be higher than elsewhere. It is noticeable for example that San Francisco has amongst the highest salaries, even as the Glassdoor ratings in the city are amongst the lowest. Such a competitive - and seemingly dissatisfied - market may be one reason why banks do not appear to have not invested significantly in building their talent base there.

SALARIES, BY BANK

FIG 40. SAN FRANCISCO AHEAD OF NEW YORK: AVERAGE SALARY OF AI-RELATED ROLES, BY CITY OF ROLE LOCATION

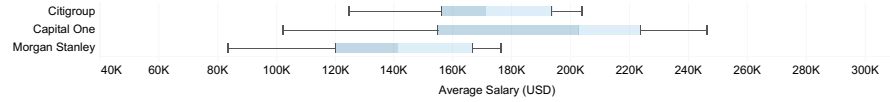


Source: Company Job Descriptions (February to April 2023)

Across banks there are also differences - looking specifically at AI-related roles in New York, there are some differences that we have observed in our sample of data. This number will obviously be impacted by the roles that are being advertised - in terms of level, type and experience required - something we will analyse in more detail over the coming months.

Note that we here only capture the headline salary offer so there may be other aspects to the packages that would change the relative attractiveness of the recruitment proposition, not least bonuses or stock options.

FIG 41. SALARY RANGE FOR AI & DATA CORE ROLES IN NEW YORK



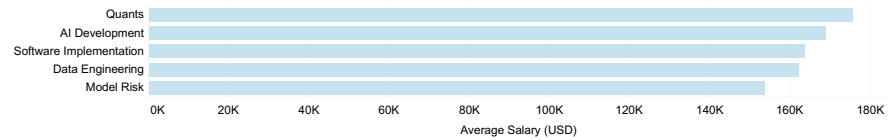
Source: Company Job Descriptions (February-April 2023).

SALARIES, BY ROLE

Given the greater propensity for salaries to be disclosed in the US, the data by job title skews towards that market - and the range is clearly a large one. However the direction will be true across other markets as well.

AI Development roles tend to be better paid than Data Engineering or Implementation roles, likely reflecting educational levels and market status. However, Quants are the best remunerated, reflecting their ability to drive revenue and profitability at a bank. They are market-facing roles in a way that most AI roles are not. Model risk, notwithstanding their importance to the bank's sustainability and regulatory risk, do not quite capture the same salary levels. We will continue to flesh out and reinforce this data further.

FIG 42. AVERAGE SALARIES OF AI-RELATED ROLES IN NEW YORK



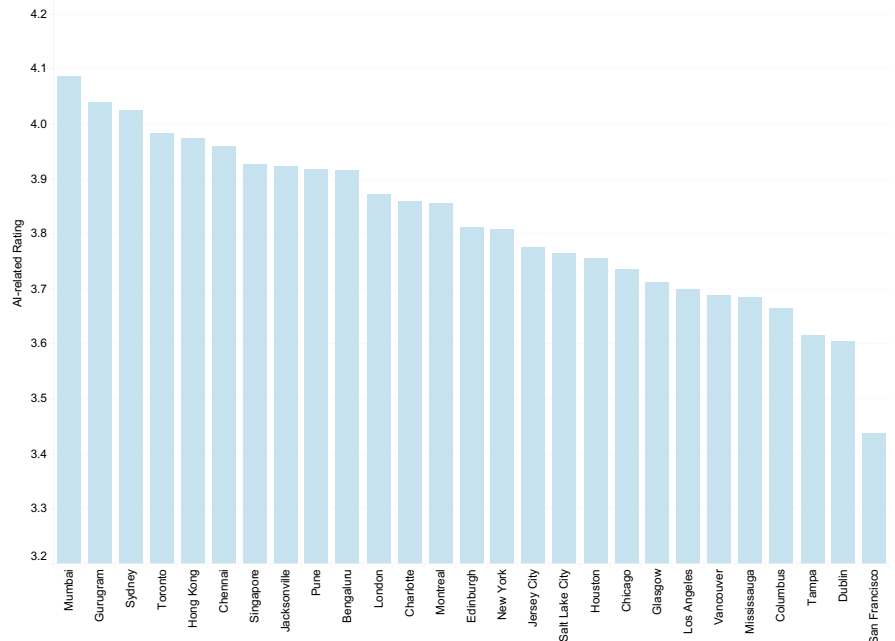
Source: Company Job Descriptions (February-April 2023).

CULTURE - MEASURING STAFF SATISFACTION

Satisfaction in AI-related jobs clearly varies - perhaps most strikingly on a geographic basis. Typically staff based in Asia are more satisfied. This is a relatively blunt and outward-in approach, with potentially large cultural biases built in. Some of this will be driven by quality of management - but it is also possible that these scores reflect local alternatives as well. It is striking that, despite the highest relative pay in JDs, the staff in San Francisco may be wondering what the more glamorous alternatives are when they register quite such a negative Glassdoor ranking. It is probably worth noting that - apart from Wells Fargo - relatively few traditional bank staff work in San Francisco so these numbers will include payment providers. This may change in future reports as the impact of recent acquisitions plays into the data.

However, there are also clear differences on a bank-by-bank basis. The chart below compares the Glassdoor rating for overall staff versus that for AI-related staff across the banks. Scores differ strongly between banks for both staff

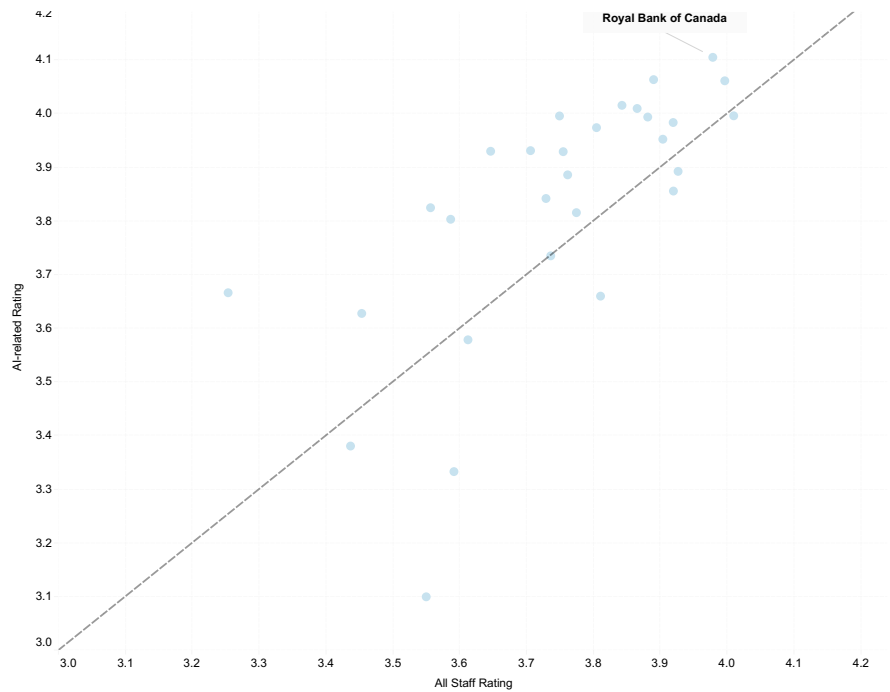
FIG 43. INDIAN STAFF AMONGST MOST CONTENT: AVERAGE GLASSDOOR RATING OF AI-RELATED STAFF, BY CITY



Source: Glassdoor, based on reviews from 2018 to 2023 across 60 banks.

groups (compare the gap between the poorest performing bank at 3.1 and RBC's 4.1 for AI-related staff). Where a bank is above or below the line suggests how focused they might be on AI staff satisfaction (although there may also be higher expectations amongst AI staff and the geographic impact noticed above to contend with). It is noticeable that most ratings tend to be higher for AI talent than for the wider talent population.

FIG 44. RBC STAFF APPEAR MOST CONTENT - WHILST AI STAFF TYPICALLY CHEERIER THAN BANKING AVERAGE IN GLASSDOOR RATINGS

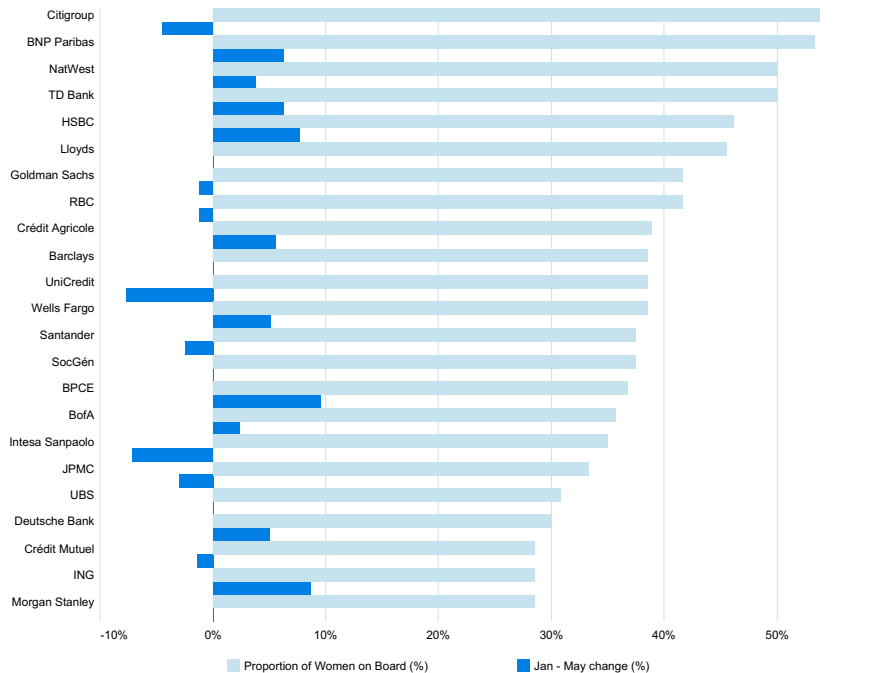


Source: Glassdoor, based on reviews from 2018 to 2023.

DIVERSITY INCHES FORWARD

Having diverse voices at the table when AI systems are being designed and deployed is clearly a net positive. This will likely reduce many of the risks associated with AI bias, many of the challenges are as much social as technical - and pivot on wider questions. For example, what is meant by fair outcomes. Should a system reflect the world as we would like it to be or reflect the lessons of history. And how should we think about data created from that history - for example the negative impact on minority communities of historic prejudice or regulations. This is a real issue in banking - for example when considering credit

FIG 45. MOSTLY POSITIVE SHIFTS IN BOARD DIVERSITY



Talent Retention

scores and access to financing. Having a diverse mix of voices at the table when these issues are considered, and choices effectively hard-baked into system and algorithm design, is critical.

Whilst this is clearly a wider and deeper issue - ranging from race to neurodiversity - we have been able to use data to track gender diversity in the industry. Whilst we cannot assume that this is a proxy for wider diversity it will at least be one indicator.

Board diversity has broadly improved. The average mix has improved by 1.6 percentage points in the period January - May, 2023 to an average of 39%. Clearly there have been some negative changes in the mix but this is more than balanced by BPCE, Deutsche and ING Groep (although all three start in the bottom half of the table).

GENDER DIVERSITY OF AI TALENT

Meanwhile, looking at AI staff specifically, we observe that the level of diversity across the banks varies - typically between 20 and 30% of their AI-related staff are female - with the North American banks generally outperforming the European banks. Ironically the banks with smaller teams tend to perform better on gender diversity than the firms with larger workforces. It is not clear that there is a correlation between Board level diversity and staffing gender balance.

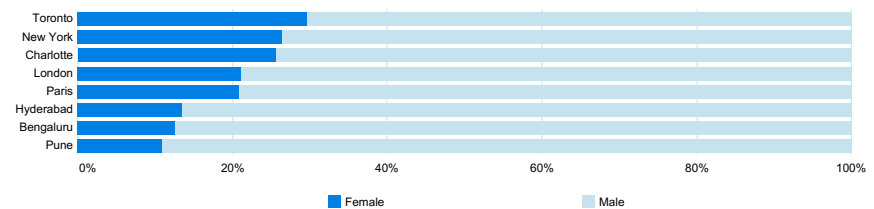
FIG 46. NORTH AMERICAN BANKS PERFORM WELL ON GENDER DIVERSITY

Note: the average is calculated from our sample profiles and gender is estimated using the Python package *gender_guesser*. Due to limited coverage of Indian names within *gender_guesser*, employees based in India are excluded from bank averages.



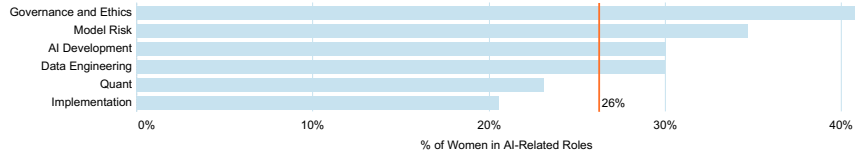
Interestingly gender diversity in banking AI looks to be ahead of wider industry averages, although if we look at this on a geographic basis the picture is more complicated. The big cities for talent tend to perform in line with their core markets.

FIG 47. INDIAN WORKFORCE LESS GENDER-BALANCED ON AVERAGE; PROPORTION OF AI-RELATED WORKFORCE IN SELECT AI CITIES, BY GENDER



We also find that gender diversity varies by role type. We can see that Governance and Ethics roles have the highest proportion of female talent at over 40%. By contrast Implementation is around 20%.

FIG 48. GOVERNANCE, ETHICS AND MODEL RISK ROLES EXHIBIT HIGHEST LEVELS OF GENDER DIVERSITY



D&I STATEMENTS ARE NOT YET UNIVERSAL

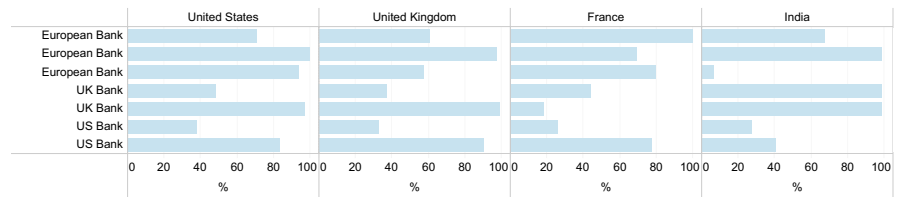
How seriously gender is taken at a bank level is reflected in how they recruit. We track wording used in Job Descriptions and can see different approaches to - for example - adding a Diversity and Inclusion (D&I) statement to JDs. This may also suggest how internal organisations manage recruitment.

We can see for a selection of banks how they approach D&I statements in markets with historically different approaches to some of these issues. Whilst there is a marginally higher publication rate in the US compared to the UK, France and India this is far less striking than the differences between organisations in how consistently they publish these statements.

However, a consistent publishing of D&I statements in the US is likely to lead to the same happening in other markets. When the content is sampled we can see that these banks - including Wells Fargo for example - tend to use localised language and refer to protected characteristics differently across markets.

How far these differences reflect empowered centres dictating content and process globally versus decentralised organisation will be a matter for debate. That they potentially send out different messages about how seriously the organisations in question take these topics is not. By contrast, US Big Tech platform companies tend to have a consistent message that they apply globally.

FIG 49. PROPORTION JDS THAT INCLUDE DIVERSITY & INCLUSION STATEMENT



Note: Includes banks where we have >50 JDs per country

LEAVING THE INDUSTRY

All good things must come to an end. People will leave the banking industry - so where do they go?

Staff leaving banking are more likely to end up at Big Tech than to come from there. Of the five leading employers of ex-banking staff three are tech firms: Amazon, Google and IBM (leaving out those taking a doubtless well-earned career break). Whilst Tata again rears its head this is a different profile to the recruitment source mix that we saw earlier. This is still early data and we will continue to track its evolution. How attractive AI talent from banks is seen to be by other companies is one market indicator of how mature the sector is becoming.

TOP 10 DESTINATIONS

1. Amazon/AWS
2. Career Break
3. Tata Consultancy Services
4. Google
5. Millenium
6. IBM
7. Capgemini
8. Microsoft
9. Expedia Group
10. EY

Conclusion

What talent tells us about the wider Bank AI Maturity journey

Clearly talent is at the heart of the AI journey for banks. In that sense growth is good and we are tracking increased recruitment, deployment and development of internal capacity. However, we can also tease out a more nuanced picture of the state of play on banks' AI maturity journey - which we will continue to build on as we develop our analysis and build out our data time series.

Firstly - Volume. More looks to be better. What it is to be a banker is shifting as AI skills move from esoteric to strategic to standard requirements. We can see numbers growing across the board.

Secondly - Density matters. We can see this in hiring; banks are already looking for AI skills in a higher proportion of their new roles than in their legacy staffing.

Thirdly - Operating Model matters. In expanding beyond the traditional banks of our original Index we can see the benefit of simplicity coming through. Monoline players like Capital One or the payment providers can mobilise their talent against fully scaled digital-first workflows.

Fourth - Legacy matters. Whether it is the geographical footprint that staff are employed in or the IT systems that a bank uses, much of the challenge for banks has to be understood in this context. It is a key missing piece in the jigsaw for us as we try to ascertain how effective all the investment in AI talent may be: are those data engineers building superb new applications or simply sorting through the mess of botched historic integrations?

Fifth - Mix of talent matters. Roles recruited for will change as banks develop their AI. In the initial discovery phase, an esoteric mix of skills for use case ideation appear. With more experience comes clarity that the data plumbing will need to be fixed. In this second phase, there will be a heavy focus on implementation and data engineering support as the bank builds standardised data platforms, usually on the cloud, with a heavy data migration focus. Finally, with a platform in place, we would expect to see more roles focused on scaling up the business.

Sixth - Skills recruited for send a message. Banks will hire legacy computer language skills (as well as Excel) to maintain traditional platforms. As new data platforms get rolled out then we expect to see more modern languages like Python become standard. This ratio tells a story.

Seventh - Having a plan is important. Here we can help. Banks need to know where they stand, and where they want to go.

1. **Start with an audit:** establish clearly where the organisation stands
2. **Benchmark the bank:** how does this compare with peer and best practice organisations
3. **Create a vision:** set and agree on an ambition, realistic yet stretching
4. **Build the plan:** what is the timing, resource requirements and risks that need to be managed
5. **Communicate to stakeholders:** staff, investors and regulators know that the world is changing but will need clear messaging and benchmarks to build and sustain their support for the journey

These are topics that we will return to as we update and expand the Evident AI Index and evolve our analysis. We welcome the opportunity to engage in this conversation with our partners, advisers and the wider community.