The VC factor

Data-driven insights about European VC and its gender diversity trends

INVEST EUROPE

40 YEARS

Foreword

Invest Europe

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European venture capital is the fuel for ground-breaking innovations that have the potential to change how we all live and work. With capital and support from experienced and established VCs, start-ups born and raised in Europe are setting the agenda in quantum computing and robotics, developing cutting edge treatments for cancer and infectious diseases, and driving advances in cleantech solutions for a greener future. In doing so, they are improving lives and livelihoods for millions of citizens, creating high-skilled jobs, and feeding European economic growth and competitiveness.

As the association representing Europe's venture capital industry and its investors, Invest Europe is proud to collaborate with the European Investment Fund on this third edition of the VC Factor. The report combines our data and analysis to provide deep insights into the industry and the ecosystem across the continent. Given the exceptional growth experienced by European venture capital over the past decade, the research delves deeper than ever into what makes it tick.

This year's VC Factor maps European venture capital in unparalleled detail, identifying the innovation hubs, as well as the links between venture capital firms, investors and start-ups across the continent. Those connections are at the heart of a cohesive and dynamic ecosystem that is fostering bright ideas in cities and towns throughout Europe, helping more start-ups to flourish, and spreading the benefits of venture capital investment far and wide.

There are also clear opportunities for venture capital to evolve and improve. The industry still has more to do to promote diversity and inclusion, ensuring greater participation for women in roles at all levels of venture capital firms, as well as the start-ups they back. Data and insights are essential to bring better understanding of where the industry stands today and help firms to identify opportunities to strengthen women's voices. The result can be a more balanced venture capital ecosystem that can support an even stronger European economy and society in the future.

European Investment Fund

#Believe
InSmall

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The European venture capital (VC) ecosystem has shown remarkable resilience, especially with its rapid recovery from the recent pandemic-driven economic crisis. Over a third of VC volumes from the past decade were invested in the 2021-2022 biennium alone, with 2022 posting another impressive industry high.

Today, the ecosystem appears more capable than ever to stand on its own against potential market instabilities, a desirable trait when entering the so-called "age of the polycrisis". In turn, this further reinforces the industry's positioning at the forefront of change, poised to offer innovative and sustainable solutions for Europe's present and future challenges.

However, as the industry continues to grow and mature, it is imperative that its trajectory becomes both cohesive and inclusive. These are the two critical aspects at the core of the current report. To tackle cohesion, the report introduces a new way to explore VC hubs, vital components of the ecosystem, and the intricate interactions between them.

Interestingly, in the past decade, two-thirds of all investment volumes corresponded to flows between two different hubs, merging diverse entrepreneurial – and often institutional and cultural – backgrounds. These interactions are more than just financial bridges; Europe's many well-networked VC hubs are the key to a cohesive and thriving VC landscape.

Yet, there remains an undeniable challenge: the gap in gender diversity. The numbers are telling: only one in ten founders and CEOs receiving VC in Europe are women. On the investor side, the situation is only marginally better: one in seven top-level VC investors in Europe are women. Perhaps even more strikingly, nine in ten top-level female investors work in male-majority teams, where the pressure to conform might be high.

Addressing this gap is essential, not just for diversity's sake, but because bringing in new and different perspectives will prove a catalyst for further innovation. Hence, much like VC hubs, more and better-networked female investors are the key to a more inclusive and thriving European VC landscape. At the European Investment Fund (EIF), we are proud to be doing our part through initiatives such as our gender smart criteria under InvestEU, or our "Empowering Equity" platform.

Ultimately, data-driven policies are essential to navigate these important issues. In this respect, we are happy to continue our collaboration with Invest Europe, its national association partners and their "European Data Cooperative" (EDC) joint initiative, which has been pivotal in this endeavour. The EDC's authoritative data and market overview combined with EIF's expertise in data-driven market and policy analysis enable unique synergies to achieve a comprehensive view of the European VC industry, culminating in this third edition of "The VC factor".

The report in a nutshell

European VC hubs keep growing and maturing, but how much of this growth was cohesive and inclusive?

What is "The VC factor"? It's what's fuelling the growth of game-changing ideas, turning visions into ventures. And lately, things have been going well for the European venture capital (VC) ecosystem: 2021 and 2022 combined made up for one third of all VC volumes invested since 2007.

Thanks to our unique micro-data (courtesy of the European Data Cooperative), we can drill down into these deals to identify the *hottest VC hubs* that are posting the most impressive volumes. Besides volumes, though, the real policy question is: how much of this growth has been cohesive and inclusive?

But first, what do we mean by VC hubs? Enter the Functional Urban Area (FUA): think of it as the bustling city and its surrounding commuting areas. As it turns out, FUAs are the ideal marker for VC hubs: 99% of start-ups and VC firms are located within the FUAs' borders and/or fall within their sphere of influence. Since 2007, 613 European FUAs have been associated with at least one VC deal.

Two-thirds of total volumes involve collaboration between distinct European hubs. This often bridges diverse entrepreneurial, institutional, and cultural backgrounds.

Since 2007, the top 10 VC hubs by outgoing investments have been responsible for a substantial 69% of total volumes, whereas the top 10 hubs by incoming investments received 51% of overall amounts (check inside for the full rankings). Despite the stark geographical concentration of VC, it's the importance of flows *between* VC hubs that steals the scene in our analysis.

An impressive two-thirds of total volumes in the European VC ecosystem involve actors from two distinct VC hubs. This cross-hub interaction, often combining diverse entrepreneurial, institutional, and cultural backgrounds, is a fascinating reality of the European VC landscape. But how can we make sense of this intricate web of cross-hub interactions?

The answer is *network analysis*, which examines the connections and derives the influence – or *centrality* – of each VC hub. As it turns out, this analysis reveals that European VC hubs are highly interdependent and exert considerable mutual influence. In fact, European VC flows have a very characteristic structure, akin to other real-world networks and most notably the World Wide Web.

European VC hubs are highly interdependent and exert considerable mutual influence. An increasing interconnected ecosystem could be the key to cohesive growth.

Moreover, this analysis helps us zoom into the most "systemic" hubs, portraying them as true centres of influence – so not just in terms of their financial power. Without its "systemic" hubs, the overall flow of VC in Europe would be most significantly disrupted. Meanwhile, highly connected hubs lower the barriers to entry for other hubs, promoting a more cohesive European VC ecosystem.

Therefore, to drive a more cohesive growth, a good start for the European VC ecosystem could be to look within and empower those hubs that are already creating many financial bridges. And on the topic of empowerment, it's high time we address the elephant in the room: the gap in gender diversity.

The bustling arena of Europe's VC and its vibrant diversity of experiences, responsibilities and job titles immediately fades away once we look at gender diversity.

Our data collaboration with PitchBook reveals nearly 39,000 unique investors and over 85,000 entrepreneurs active in Europe from 2011 to 2021. This bustling arena and its vibrant diversity of experiences, responsibilities and job titles immediately fades away once we consider gender diversity.

From 2011 to 2021, only one in ten founders and CEOs who received VC in Europe were women. All-female start-up teams were even rarer, securing a mere 2% of the total VC funding. On the investor front, while one in seven top-level VC investors in Europe were women, the vast majority worked in male-dominated teams (nine out of ten).

From 2011 to 2021, only one in ten founders and CEOs who received VC in Europe were women. All-female start-up teams were even rarer, securing a mere 2% of the total VC funding.

By the way, this gender imbalance isn't just a reflection of the European high-tech industry's historical male dominance. In fact, data from Eurostat suggests that the VC ecosystem is less inclusive than its constituent industries, pointing at specific barriers that hinder women's participation in VC.

So, what can we do about it? We'll start with what our "The VC factor" reports do best: throw a lot of data at such key ecosystem issues. We put the European VC ecosystem through a "gender lens"* and let the numbers speak: all-male start-up teams, which make up for 78% of total founders and CEOs, received an outsized 82% of total investments. In contrast, all-female start-up teams garnered under 1.8% of total investments, even below the 2.1% they make up in terms of total founders and CEOs.

Despite the stark reality, the European VC ecosystem has slowly but steadily been reducing the gender diversity gap. And policy may have a way to establish virtuous cycles to narrow it faster.

What's more, bigger checks bring bigger disparities: all-female entrepreneurial teams represent 3% of total investments below EUR 1m, but only 0.88% of investments above EUR 10m. Why? As it turns out, networks might play a big role again: if we zoom into top-level job titles, 25% of European VC flows involve no women on either side of the table – put differently, one quarter of VC deals were from all-male top-level investors to all-male founders and CEOs. Can you guess, on the opposite end, what percentage of European VC volumes involved no men at the top? It's 0.003%.

Despite this stark reality, there's still a beacon of hope: the European VC ecosystem has slowly but steadily been increasing its female participation rate, notably at the top. Not only that: there are many virtuous hubs in terms of gender diversity rates that could act as key success stories.

Finally, our data shows that there is a "smart" way for policymakers to leverage the greater interaction between gender-mixed investor teams and female entrepreneurs, creating a virtuous cycle that could narrow this gap faster (although it's not a universal rule: check inside for more details). As the industry continues to mature, it's critical to ensure that its trajectory is both cohesive and inclusive.

* We recognise that the spectrum of gender diversity is much broader than this. However, due to limited data, this is currently the only way we could study this topic.

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Chapter 1

The geography of European VC, revisited

Identifying European venture capital hubs

Venture Capital (VC) is the lifeblood of innovation, nurturing promising start-ups and fuelling the growth of game-changing ideas. Yet, pinpointing all venture capital "hotspots" across Europe can turn out to be surprisingly tricky. In our previous exploration,[1] we considered cities and NUTS-2 regions as potential markers of these hubs, but each approach presented challenges.

Cities seemed like a logical starting point, but they proved too numerous for practical analysis. On the other hand, NUTS-2 regions, though providing a broader view, risked obscuring multiple VC hubs within their expansive boundaries.

This time, our solution is to focus on Functional Urban Areas (FUAs). Think of FUAs as the bustling cities and their surrounding areas where people commute from. This approach offers a balanced perspective, capturing the dynamism of cities without losing sight of the broader regional context.

By geolocating each VC firm and start-up, and associating them with their corresponding FUA, we can craft a more precise and insightful map of VC activity. Out of the 729 FUAs in the EU27, UK, Norway and Switzerland, our strategy unveils 613 FUAs[2] with at least one active VC investment between 2007 and 2021. These are the key regions where Europe's innovative future is taking shape: let's put them under the spotlight.

Functional Urban Areas have a remarkable ability to capture the essence of the European VC ecosystem.

2,824
VC firms

35,310
start-ups

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1   Crisanti, A. et al. (2021). The VC factor. Pandemic edition. Joint EIF – Invest Europe study.
2   See Appendix 1 for the complete list of functional urban areas analysed in this report.

Mind the... Functional Urban Areas

A Functional Urban Area (FUA) is a concept used by the European Union and the OECD to define large cities and their surrounding commuting zones in a harmonised way, overcoming the limitations of country-specific administrative boundaries. In simple terms, a FUA is a city and its interconnected suburbs, forming a cohesive urban region where economic, social, and demographic interactions take place. Due to lack of information about FUAs in multiple non-European countries, this chapter focuses exclusively on VC firms and start-ups located in the EU27, UK, Norway and Switzerland.

Mind the... terminology

Throughout this report, we use "start-ups" as a collective term for young and innovative businesses that received early stage (seed, start-up) or later stage VC financing. The two investment stages are defined as follows:

1 **Early stage**

Businesses most often pre-revenue. Investment mainly aimed at completing research, creating minimum viable products, and/or starting mass production/distribution.

2 **Later stage**

Businesses generating revenues (not necessarily profitable), likely to have already been VC-backed. Investment mainly aimed at scaling up operations.

Mapping the landscape of European VC with FUAs

Functional Urban Areas have a remarkable ability to capture the essence of the European VC ecosystem. An impressive 89% of geolocated start-ups and VC firms reside within the boundaries of the 613 identified FUAs. These areas represent the core of the VC activity, where innovation is concentrated and businesses thrive.

An additional 10% of start-ups and VC firms are located reasonably close to one of these hubs. While not directly within the hub, they remain within its sphere of influence, contributing to the overall VC ecosystem. ▶

Only a small fraction, less than 1%, falls outside the reach of the 613 FUAs. These outliers represent a minimal portion of the VC landscape. ▼

In summary, FUAs serve as an effective and reliable framework for understanding the geography of European VC, capturing the vast majority of VC activity and providing a clear picture of where innovation is concentrated.

FUAs and their sphere of influence

We determine the geographical proximity of entities (i.e. VC firms, start-ups) to a FUA based on its territorial extension. To this end, we calculate the FUA's radius – assuming the boundaries of FUAs are approximately circular. If entities are located within 200km and 1.5 times the radius of the closest FUA, then the entity and the associated FUA are "reasonably close". In rare cases, the entity might belong to a different NUTS-2 region than the associated FUA.

In the FUA bull's-eye: where are VC firms and start-ups located?
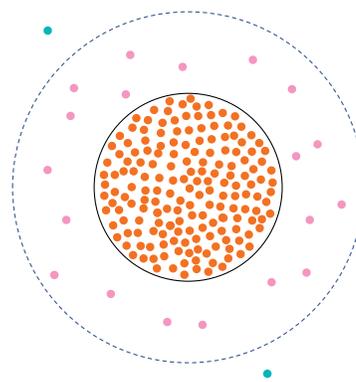
89% Located within the boundaries of a FUA

10% Located within the sphere of influence of a FUA

1% Located outside of reach of a FUA

Top 10 origin and destination hubs for VC
2007-21

Top 10

Origin hubs		Destination hubs
% of total outflows		% of total inflows
London 27%	**1**	London 15%
Paris 15%	**2**	Paris 10%
Stockholm 5%	**3**	Berlin 7%
Munich 5%	**4**	Munich 4%
Berlin 4%	**5**	Stockholm 3%
Amsterdam 4%	**6**	Amsterdam 3%
Copenhagen 3%	**7**	Cambridge 3%
Helsinki 2%	**8**	Copenhagen 2%
Zurich 2%	**9**	Madrid 2%
Madrid 2%	**10**	Helsinki 2%

Unravelling the hierarchy of venture capital hubs

Equipped with our new and improved method of identifying VC hubs, we can shift our focus to determining which of these hubs (i.e., FUAs) are the most influential. To do this, we'll examine the top 10 hubs by "origin" (VC firms) and "destination" (start-ups) of VC investment volumes. ◀

Our analysis reveals a significant concentration of investments in few hubs. Interestingly, investment volumes are more concentrated on the originating side than on start-ups. Echoing the findings of our underlined previous report, the top 10 origin hubs are responsible for a substantial 69% of the total investment distributed. On the receiving end, the top 10 destination hubs account for 51% of the total investment received. This concentration of investment volumes underscores the pivotal role these hubs play in the European VC ecosystem.

A surprising revelation from our analysis is that two-thirds of total investment volumes in the European VC ecosystem involve "actors" (VC firms, start-ups) located in two different (but not necessarily distant) hubs. In other words, there's about twice as much activity resulting from the interaction of two VC hubs than that generated within individual hubs. This interplay between hubs is a fascinating aspect of the European VC ecosystem and motivates a deeper dive into the intricacies of the flows among VC hubs.

Mind the... effect of inflation

Consistent with our previous report, the ranking presented on the left is based on the nominal volume of VC outflows/ inflows. However, to make investments comparable over time, the remaining findings in this report are based on deflated monetary values calculated using Eurostat's harmonised producer price indices at the country level, with 2015 as the base year.

Mind the... data gaps

After reweighting, we are left with 603 FUAs since 10 FUAs do not have complete geo-location data either on the receiving (start-ups) or distributing (VC firms) end. However, these "lost" FUAs make up for less than 0.1% of total volumes, so the bias introduced by sample attrition is very limited.

Cross-hub VC activity doubles that within individual hubs.

Our guide in this exploration will be network analysis, a sophisticated mathematical framework that helps us describe the relationships among economic agents—in this case, VC hubs. While network theory can be complex, there's no need for prior knowledge. We'll provide plenty of clarifications and knowledge titbits along the way to ensure you can keep up with the bigger picture. ▶
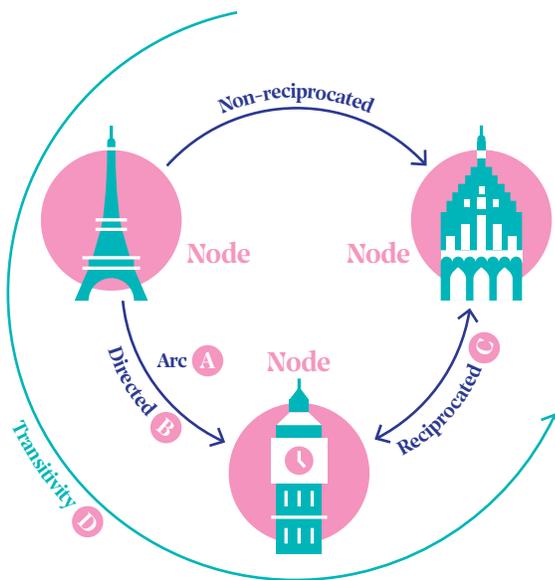
However, it's important to note that our analysis is not without its limitations. Only 86% of all volumes between hubs could be correctly geolocated. To address this, we use weights to restore the near-complete coverage of the European VC ecosystem. In the process, we lose a few hubs, leaving us with 603 interconnected FUAs. ◀

Network analysis helps us describe the relationship among European VC hubs.

Network Analysis 101: a key to the interconnected world of VC hubs

A network is a formal way to represent a group of individual objects that are connected to each other, forming a larger system. In our case, the individual objects are the VC hubs (i.e., the FUAs we introduced earlier), and the connections are the VC investments that link these hubs.

For instance, if a VC firm headquartered in Paris invests in a start-up in London, then Paris and London become "connected". In the language of network analysis, the VC hubs are the 'nodes' of our network, and their connections are called 'arcs' **A** *.* ◀

Our network is also 'directed' **B** *, meaning the direction of the investment flow matters. A Parisian VC firm investing in London is not the same as a London-based VC firm investing in Paris. If VC hubs are connected in both directions, we refer to these arcs as 'reciprocated'* **C** *, and the number of these reciprocated arcs can reveal interesting insights about the network.*

Things get even more interesting when we look at three nodes at once. If Parisian VC firms invest in London, and London-based VC firms invest in Frankfurt, what are the chances that Parisian VC firms also invest "directly" in Frankfurt? This probability defines the "transitivity" **D** *of the network. Just as news travels fast in a close circle of friends, investment trends or promising opportunities will spread more quickly in a highly transitive VC ecosystem.*

We can also consider the 'strength' of these connections, distinguishing between VC hubs that interact frequently and those that interact only occasionally. For example, we could assign a weight to each connection based on the volume of VC transferred. This would create a "weighted network". On the other hand, if we're only interested in whether a connection exists, regardless of its strength, we would be looking at a "binary network".

In summary, the interconnected VC hubs of Europe can be described as a weighted directed network. The VC hubs serve as nodes, and the monetary flows between them form arcs that are weighted by the intensity of capital transfer. This network provides a comprehensive and nuanced picture of the relationships and interactions shaping the European VC ecosystem.

From financial powerhouses to influence centres

The network of all flows among European VC hubs between 2007 and 2021 contains 603 distinct hubs, or *nodes*. Interestingly, only 40% of these nodes actively originate investments. However, almost all nodes serve as destinations for investments, indicating that they host one or more start-ups.

These nodes are connected by 3,902 arcs representing investment relationships. A relatively high proportion of these, around 30%, are reciprocated. One third of all nodes have one or more of these reciprocal links, suggesting that European VC hubs exert considerable mutual influence. Additional proof of the interdependence of European VC hubs comes from the transitivity coefficient: if a pair of hubs is indirectly connected via a third hub, there's a 21% chance that this pair is also directly connected.

However, when we compare our network's 3,902 arcs to the theoretical maximum of 363,006 arcs – calculated by considering all possible connections between 603 nodes but excluding self-loops – it's clear that the VC ecosystem network is also quite *sparse*. For every 100 potential connections, just over one is realised.

Sparse networks are not uncommon in real-world scenarios. For instance, the World Wide Web is a classic example of a sparse network, where each webpage only links to a few others. This sparsity led to the creation of *gateway* websites, like search engines, which connect to a multitude of other pages, thereby enhancing the network's navigability, stability, and efficiency. ▶

Applying the concept of *gateway* nodes to our network of VC flows, we find that hubs with a high number of connections play a crucial role. These "systemic" hubs, if removed, would cause significant disruption to the overall flow of VC. At the same time, their numerous connections lower the entry barriers for other hubs, fostering a more cohesive and interconnected VC ecosystem across Europe.

To further understand the importance of these hubs, we can use network analysis tools to measure the so-called *in-degree* and *out-degree* centrality of our VC hubs. This analysis helps us identify the most influential hubs in the network, providing a fresh perspective on the dynamics and inner workings of the European VC ecosystem. ▶

The network of European VC hubs is quite sparse. For every 100 potential connections, just over one is realised.

Network density and sparse networks

A network's density is the fraction of arcs present over all arcs theoretically possible (the latter depends on the nature of the network itself). Networks with a (very) low density are often called "sparse" networks. Due to the low relative number of arcs, moving across a sparse network can be difficult, which is why "gateway" nodes, with many outgoing/ incoming connections can become very influential.

Degree centrality

In network analysis, the importance of a node in terms of its connections is called degree centrality. Because direction matters in our network, we must distinguish between out-degree centrality (pertaining to the VC firms) and in-degree centrality (pertaining to start-ups). A hub with high out-degree centrality hosts VC firms actively investing in a multitude of other hubs. A hub with high in-degree centrality hosts start-ups receiving investments from numerous other hubs.

Top 10 Out-degree and In-degree centrality hubs for VC

Top 10 Hubs by outgoing connections		
#Origin investments*	Hub	Out-degree centrality
1	London	203
2	Paris	182
4	Munich	116
6	Amsterdam	110
5	Berlin	106
10	Madrid	80
14	Barcelona	76
26	Bonn	76
12	Luxembourg	70
23	Frankfurt	70

Top 10 Hubs by incoming connections		
#Destination investments*	Hub	In-degree centrality
1	London	87
3	Berlin	68
2	Paris	64
4	Munich	56
6	Amsterdam	50
7	Cambridge	49
12	Zurich	45
5	Stockholm	41
11	Barcelona	40
10	Helsinki	39

* The corresponding hub's rank based on volumes, as in page 3.

Peeling back the layers of the European VC ecosystem

Do the insights presented so far change over time? Do they vary across sectors, or investment stage? They do! To capture these variations, we segmented our data by investment stage (early or later stage), start-up sector (ICT, biotech, or other), and investment year (grouped in three-year intervals). This allowed us to create alternative network representations, each focusing on a specific subset of the total investment activity.

Legend

€   **Investment volumes** (EUR billion, deflated)

⌒   **Arcs (connections)**

⬡   **Density**

◯   **Reciprocity**

△   **Transitivity**

Temporal trends:

Over time, the density of the network has significantly increased, particularly in the last three years. The period between 2010 and 2015 saw fewer connections compared to other timeframes. However, recent years have witnessed a surge in connections, indicating not only heightened activity but also a broader distribution of that activity.

The evolution of the transitivity and reciprocity coefficients sheds light on how European VC hubs adapt to the different market conditions. In times of low overall activity, the ecosystem shrinks to its most resilient "core", composed of highly transitive hubs that can benefit from a faster diffusion of investment opportunities. During periods of recovery and high activity, the ecosystem expands again by exploring new investment pathways, reducing transitivity and increasing reciprocal connections.

▼

Investment stages:

When comparing early and later stage networks, the differences are not particularly striking. However, the early-stage network appears overall more interconnected (more connections, higher density, and more reciprocated arcs).

In summary, the network analysis shows that early-stage activities are more widespread in the European VC hubs than late-stage activities, perhaps more so than volume alone would suggest.

▼

Sectoral differences:

Sector-wise, the ICT sector stands out with a slightly higher density and more reciprocated connections between hubs. It also has higher concentration values, suggesting a more interconnected sub-ecosystem overall.

On a different note, the biotech sector exhibits higher transitivity. As mentioned before, this means that hubs active in this industry are more likely to connect directly if there's already an indirect connection between them via a third hub. Put simply, hubs within the biotech sub-ecosystem tend to be more tightly knit, which eases the spread of investment opportunities and investment trends.

▼

	2007/2009	2010/2012	2013/2015	2016/2018	2019/2021	Early stage	Later stage	Biotech	ICT	Other
€	15.45	10.96	11.36	19.25	35.21	51.37	40.87	29.35	23.92	38.97
⌒	1,623	1,460	1,456	1,767	2,135	3,343	1,993	1,543	2,257	2,035
⬡	0.45%	0.40%	0.40%	0.49%	0.59%	0.9%	0.5%	0.43%	0.62%	0.56%
◯	24%	24%	21%	24%	27%	29%	26%	23%	29%	24%
△	36%	53%	40%	23%	36%	29%	28%	38%	32%	21%

Centrality? It's more than just counting arcs

Identifying important VC hubs isn't as simple as counting arcs. In fact, there are over 400 definitions[3] of centrality and related measures, each with its own strengths and weaknesses.

Degree centrality has its limitations too: it's a local measure of importance that may overlook the bigger picture. This is because it focuses on the number of arcs and ignores the "influence" (e.g. degree centrality) of connected neighbours. On the other hand, some global centrality measures make too much of nodes that are connected to big-name hubs, but are otherwise poorly integrated.

So, what if we could combine more than one centrality measure? Enter the Integrated Value of Influence (IVI), a metric that combines six centrality scores into one. This composite measure identifies the most influential nodes by taking into account both their connectivity and knowledge-spreading potential, providing a more comprehensive view of a hub's influence within the network.[4]

Interestingly, half of the top hubs in terms of volumes also rank highly in the IVI ranking. This suggests that regardless of the measure used, the top hubs identified earlier still provide a good representation of the most influential hubs in the European VC ecosystem. This reaffirms their central role in shaping the dynamics of VC activity across Europe.

> " **Enter the Integrated Value of Influence (IVI), a metric that combines six centrality scores into one.** "

Mapping the most influential hubs across the European VC ecosystem

Origin IVI	Hub	Origin IVI	Hub
1	London	37	Athens
2	Berlin	38	Warsaw
3	Paris	39	Madrid
4	Amsterdam	44	Budapest
5	Stockholm	53	Lisbon
6	Vienna	60	Vilnius
7	Helsinki	70	Milan
8	Luxembourg	79	Sofia
9	Cologne	80	Limassol
10	Brussels	112	Riga
12	Zurich	113	Valletta
13	Oslo	118	Bratislava
15	Copenhagen	128	Zagreb
27	Munich	172	Bucharest
32	Dublin	205	Ljubljana
33	Barcelona		
34	Prague		
36	Tallinn		

Legend:
- Top 10 by IVI and volumes
- Top 10 by IVI only
- Top 10 by volumes only
- Most influential hub in the country
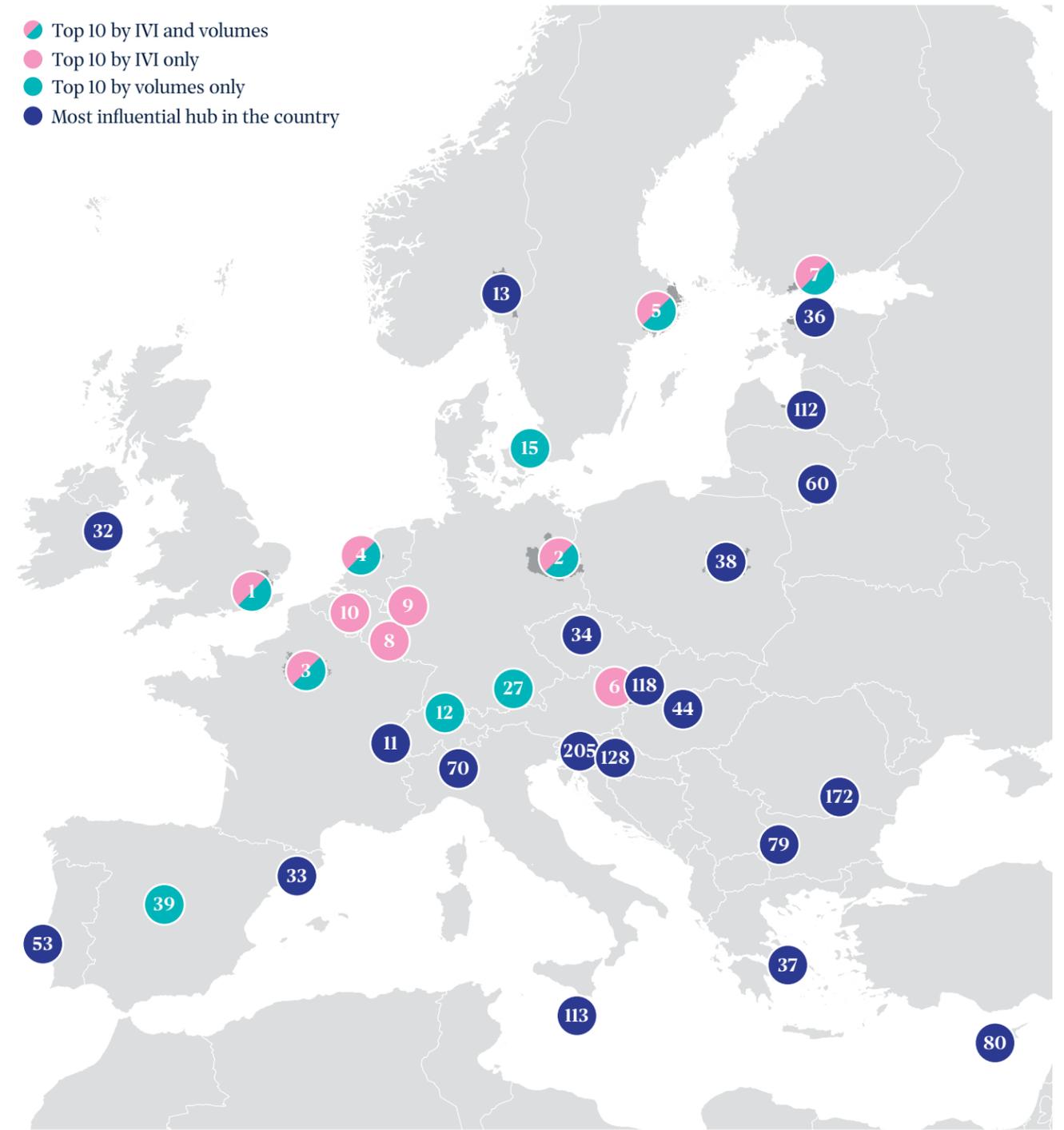
3   Jalili, M. et al. (2015) CentiServer: A Comprehensive Resource, Web-Based Application and R Package for Centrality Analysis. PLoS ONE 10(11): e0143111.
4   Salavaty, A. et al (2020) Integrated Value of Influence: An Integrative Method for the Identification of the Most Influential Nodes within Networks. Patterns 1(5).

Mapping the most influential hubs across the European VC ecosystem

Destination IVI	Hub
1	Berlin
2	London
3	Munich
4	Zurich
5	Paris
6	Stockholm
7	Hamburg
8	Helsinki
9	Amsterdam
10	Copenhagen
11	Vienna
12	Cambridge
15	Barcelona
17	Dublin
18	Brussels
28	Madrid
29	Luxembourg
30	Oslo

Destination IVI	Hub
31	Tallinn
39	Warsaw
49	Milan
55	Athens
60	Lisbon
75	Vilnius
78	Prague
80	Budapest
95	Valletta
102	Riga
115	Bratislava
125	Bucharest
128	Sofia
182	Ljubljana
202	Zagreb
211	Limassol

Legend:
- Top 10 by IVI and volumes
- Top 10 by IVI only
- Top 10 by volumes only
- Most influential hub in the country

> **Enter the Integrated Value of Influence (IVI), a metric that combines six centrality scores into one.**

Elsa Science:
A Digital Bridge
to Better Health

How can technology elevate the lives of those with chronic diseases? Elsa Science, co-founded by Sofia Svanteson, provides us with an answer. With millions chronic disease patients diagnosed yearly, Elsa Science harnesses technology to improve their quality of life. Their digital companion aids users in tracking symptoms and habits, offering insights and self-management techniques to better cope with the illness. Supported by healthcare professionals and a growing user base, Elsa Science is on a mission to redefine healthcare, with eyes set on global expansion.

Chapter 2

A gender lens on the European VC ecosystem

The many faces of VC in Europe

The European VC ecosystem from 2011 to 2021 was a bustling arena, with a staggering EUR 84 billion fuelling innovation across the continent. But who were the individuals steering this dynamic industry? Our data collaboration with PitchBook unveils nearly 39,000 unique investors and over 85,000 entrepreneurs who were active in Europe during this period.

While our numbers may sound impressive, they only capture a fraction of the total workforce in the European VC ecosystem. Nevertheless,

they provide a representative snapshot of the human capital in both VC firms and start-ups, particularly in top-level positions. How can we be sure? Because we scanned through the 9,600 distinctive job titles among VC firms and 9,000 in start-ups, which paint a vibrant picture of the variety of decision-making positions.

However, this colourful tableau immediately fades once we consider gender diversity.[5] Of the 85,000 roles in start-ups, only around 10,500 are held by women, a mere 12.2%. In VC firms,

The Data

Our dataset includes all deals between 2011 and 2021 and combines data from PitchBook and the European Data Cooperative (EDC). We obtained gender data for 80% of VC firms and 52% of start-ups, covering 72% of the total investment volume in this period. We then used calibration weights to correct for bias and estimate totals. Compared to Invest Europe's workforce estimates, our dataset covers about 25% of VC firms' workforce and 15% of start-ups' workforce. The low coverage rates of the total workforce are caused by our data's heavy skewness towards senior-management positions.

Eurostat's benchmark

We use Eurostat's labour force estimates as benchmarks. They cover all employed people in the European Union, Norway, Switzerland, and the UK, and in specific NACE sectors underlying the VC ecosystem (i.e., sections J, M and C for start-ups, section K for VC firms). The lower bound of Eurostat's range tracks the female participation rate for self-employed people only (to mimic our top-level positions), whereas the upper bound tracks the female participation rate for employed people (regardless of their self-employment status).

the situation is slightly better but still far from balanced, with women representing about 9,000 of the nearly 39,000 unique investors, or 23.1%. ▼

Is this gender imbalance unique to the European VC industry? It's no secret that the high-tech industry in Europe has historically been male dominated. Could the VC industry's gender imbalance simply be a reflection of its underlying industrial setup? Not really, data from Eurostat, the EU's statistical office, suggests a different story.

The female participation rate in the industries underlying the VC ecosystem is higher, albeit still below parity. The rate ranges between 29%–30% for start-ups' industries and is estimated to be between 27%-54% for VC firms. This suggests that the VC ecosystem is, in fact, less inclusive to women than its constituent industries. ◄

The stark reality is that the European VC ecosystem is lagging behind in gender diversity, and this isn't just a matter of reflecting the barriers of the industries it invests in. In fact, there are additional visible and invisible barriers in the VC industry itself that hinder women's participation. So what can we do about it? As a first step, let's take a data deep dive: this will help us explore the many faces and nuances of the gender gap in the European VC ecosystem.

Mind the... interpretation of results

This chapter seeks to accurately portray the state of gender diversity within the European VC ecosystem, based on available data, and to identify patterns and trends that may have implications for policy and practice. However, it's important to note that while such findings can provide valuable insights, they should not be used to draw definitive conclusions about the causes of these dynamics. Further research is needed to map out all the factors leading to the current state of gender diversity in the VC ecosystem.

Female representation in the European VC ecosystem

⬤ = 1,000 people   ✿ Female   ⬤ Male

VC firms

Start-ups
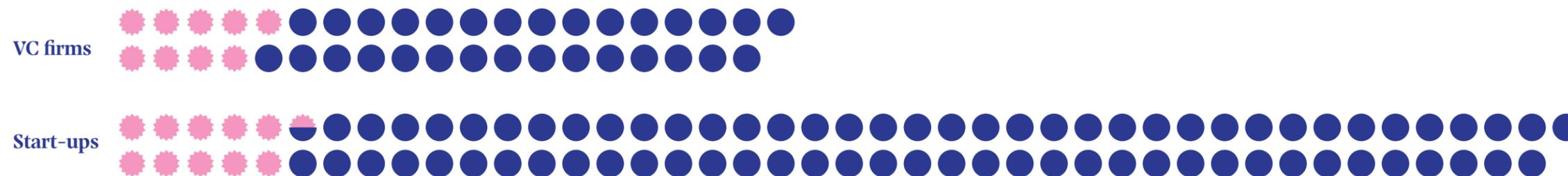
Voices from the Industry
Thaleia Misailidou, Angel Investor, Greece

"Policy makers should help create those first success stories, which will then inspire the next ones to believe in what they do and make it as well. Public investors should play the role of the female LPs that we severely lack."

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5   We recognise that the spectrum of gender diversity is much broader than our binary perspective. However, due to limited data, this is currently the only way we could study this topic.

Cracking the glass ceiling: job titles and gender diversity

Let's start our exploration by climbing up the career ladder, which reveals an ever-increasing gender disparity. Our data reveals that women occupy a significantly smaller proportion of top-level positions in both VC firms and start-ups. Is this compelling evidence of a glass ceiling? ◄

In VC firms, the gender diversity varies noticeably by rank. Breaking down those 39,000 investors, we find that top-level positions are held by around 2,700 women, which is just over 14% of about 18,800 top-level roles. Mid-level positions fare slightly better, with nearly 29%, out of around 11,100 mid-level roles. Low-level positions show the highest female representation, with just below 35% out of about 9,000 low-level roles. ▼

The 85,000 entrepreneurs in start-ups show a similar trend. Among founders or CEOs, some 6,200 are women, i.e. just over 10% of approximately 59,200 such roles. Board member positions are held by women in just over 14% of cases, out of about 2,100 board member roles. Chief officer roles are occupied by approximately 4,000 women, around 17% out of all Chief officer roles. ▶

As we delve deeper into the gender diversity within the European VC ecosystem, our focus will narrow to those at the top: top-level investors in VC firms, founders and/or CEOs in start-ups. These decision-makers wield the most power within their organisations, are better tracked in our dataset, and interestingly, their female participation rates are closer than in other role ranks.

Gender diversity by job type

● Female   ● Male

	VC firms		Start-up	
Top rank	14.1%		10.4%	Founder/CEO
Mid rank	28.8%		14.6%	Board Member
Low rank	34.9%		16.6%	Chief Officer
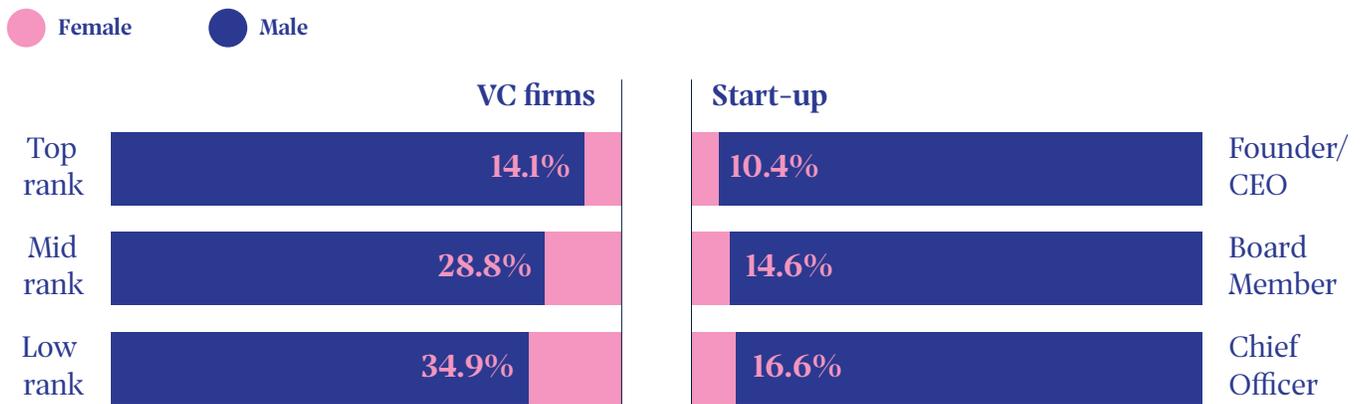
A decade in review: female participation trends

The European VC ecosystem has seen a gradual shift in gender diversity over the past decade, though the pace of change was all but impressive. The representation of women in top-level positions within VC firms has seen only a modest increase, rising from 9% in 2011 to 12.5% in 2021. ▶

However, the gender ratio in mid-rank roles has remained relatively steady, with only a slight uptick in female representation. Interestingly, the gender diversity in low-rank roles within VC firms has seen a slight dip over the years.

In contrast, start-ups have shown a slightly more encouraging trend. In 2011, women held a mere 6.7% of founder and CEO roles. Fast forward to 2021, and this figure has risen to 10.5%. This slow but steady progress towards gender parity is a positive sign, but it also highlights the long road ahead. ▶

While these trends are promising, they underscore the persistent gender imbalance in the European VC ecosystem. Women are still significantly underrepresented, particularly in positions of power and influence. This calls for a concerted effort from all industry stakeholders to address this critical issue. And it is not just about fairness and equality: it's also about harnessing the full potential of Europe's talent pool to drive innovation and economic growth.

VC firms gender diversity trends
Female participation rate, by job type

— **Top rank** — **Mid rank** — **Low rank**
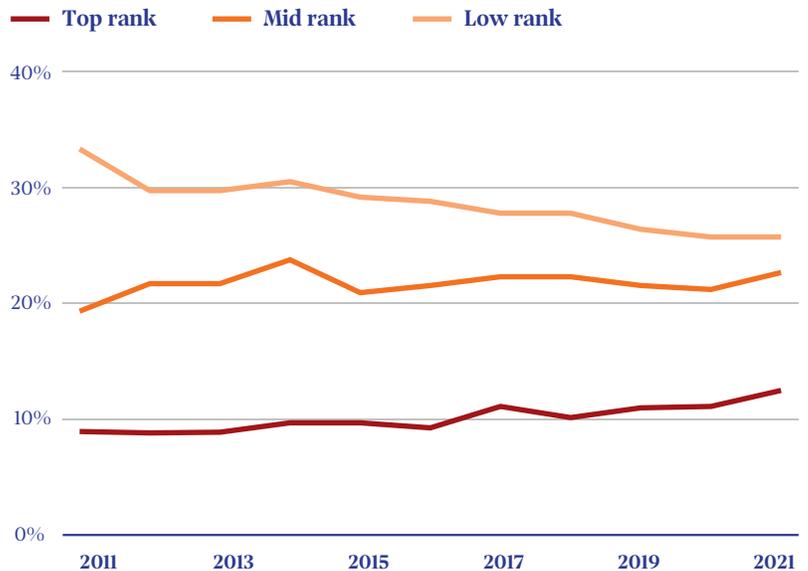
Snapshot estimated at each investment year.

Startups gender diversity trends
Female participation rate, by job type

— **Founder + CEO** — **Board member** — **Chief Officer**

Snapshot estimated at each investment year.

Through the gender lens: a snapshot of Europe's VC ecosystem

To improve our understanding of the drivers of this gender disparity,[6] we need to examine the gender diversity of teams on both sides of the market, across stages, sectors, and regions. This way, we may be able to spot potential barriers and opportunities for promoting a more balanced and inclusive industry. Put differently, we need to look at the European VC ecosystem through a "gender lens".

So, here's our "gender lens": we classified VC firms and start-ups based on the Female Participation Rate (FPR) in top management positions. The categories are: all-male (0% FPR), male-majority (0.1%-44.9% FPR), balanced (45%-54.9% FPR), female-majority (55%-99.9% FPR), and all-female (100% FPR) teams. ▶

A glance through this lens reveals a start-up landscape dominated by all-male teams, which make up a staggering 78% of the total workforce in start-ups' top management positions. Put differently, out of every 100 entrepreneurs backed by VC in Europe, 78 work in all-male teams. All-female teams, on the other hand, are a rare sight, making up a mere 2.1% of the total top-level entrepreneurship.

On the surface, the gender diversity within VC firms appears even more skewed. When we combine balanced, female-majority, and all-female investor teams, they account for a meagre 1.6% of the total top-level investor workforce.

To improve our understanding, we need to look at the European VC ecosystem through a "gender lens".

The gender lens
Gender diversity groups (based on female participation)

But how is it, then, that the overall female participation rate in top VC firms exceeds that of start-ups? The answer is male-majority teams. These are the norm at the top of European VC firms, representing 60% of the investor workforce. ▼

As a result, while women are making inroads into the ecosystem, they typically find themselves in the minority within their teams. Our "gender lens" reveals that the plurality of women entrepreneurs (40.6%) and majority of women investors (92.7%) work in male-majority start-ups and VC firms, respectively. Conversely, balanced, female-majority, or all-female teams are all but the typical work environment for women entrepreneurs and investors.

Professionals in top-level jobs, by team's gender diversity status

● All male   ● Male majority   ● Balanced   ● Female majority   ● All female

VC firms

38.2%   60.1%   1.1%   0.3%   0.3%

Start-ups

78.1%   12.9%   5.7%   1.2%   2.1%
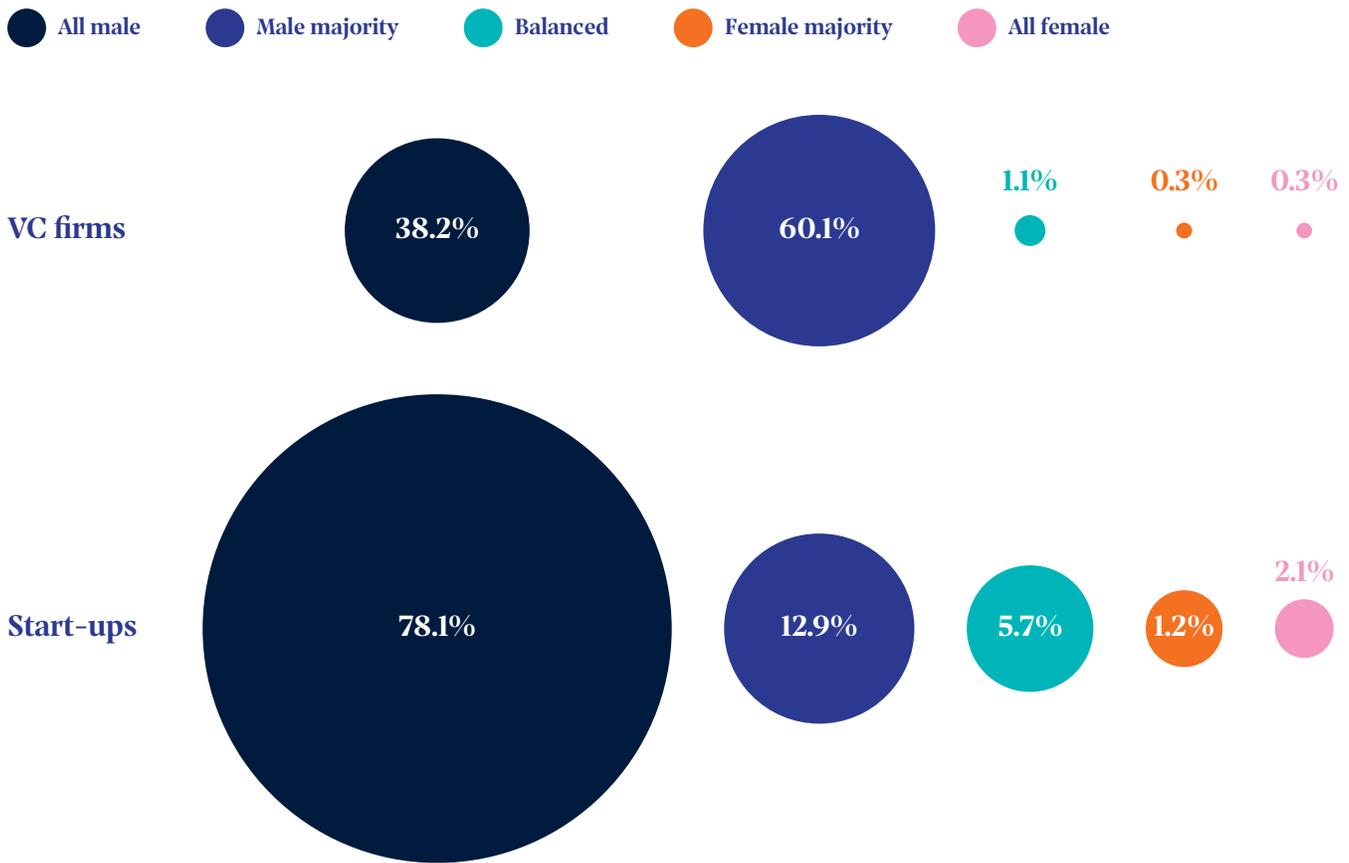
Who's leading and who's lagging in gender diversity?

Looking at the European VC ecosystem through our gender lens reveals the complex landscape of gender diversity across different stages, industries, age groups, and regions.

In summary, the data paints a multi-faceted picture of gender diversity in the European VC ecosystem. Some sectors and regions have leaped ahead of others, and their experience could pave the way for further progress. However, much work remains to be done, and the ecosystem needs to continue pushing for greater gender diversity and inclusivity.

Investment stages

In the start-up world, early-stage ventures show a slightly better gender diversity ratio, with women making up about 11% of the workforce, compared to around 8% in later-stage start-ups. When we turn our attention to VC firms, the gender diversity ratio is similar for both early and later-stage firms, hovering around 14-15%. This similarity might be driven by the larger presence of male-majority funds in later stage investing.

Start-ups

Early Stage **11%**

8% Later Stage
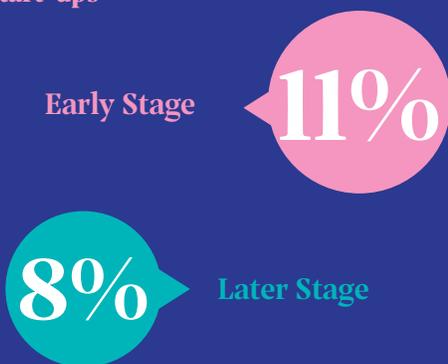
Sectoral differences

Sector-wise, the ICT industry stands out with the highest gender diversity rate among start-ups, at about 15%. Biotech trails behind at around 8%, with other industries averaging at about 11%. However, when we look at VC firms, the tables turn. Biotech VC firms lead in gender diversity with around 16%, while ICT VC firms lag behind at about 12%. This surprising contrast underscores the complexity of gender diversity issues in the VC ecosystem.

VC firms

Biotech **16%**

12% ICT

Start-ups

Biotech **8%**

15% ICT
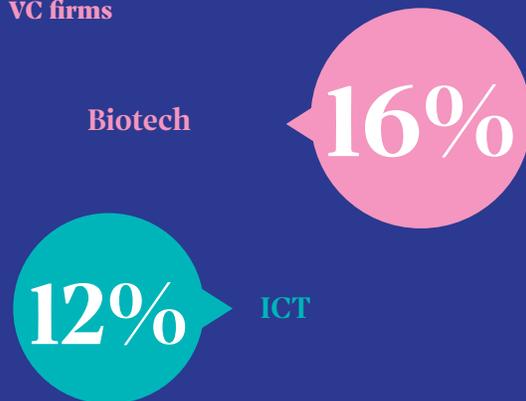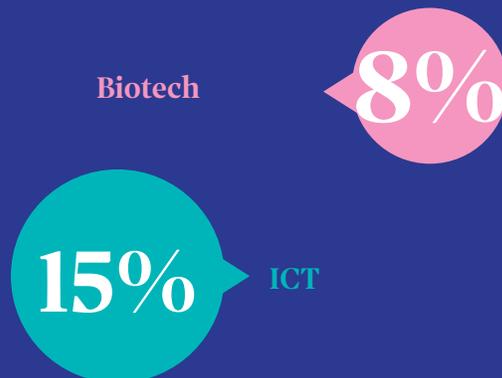
Iberian Peninsula
**most gender diverse region
(14% overall rate)**

British Isles
**most professionals in
all-female start-ups**
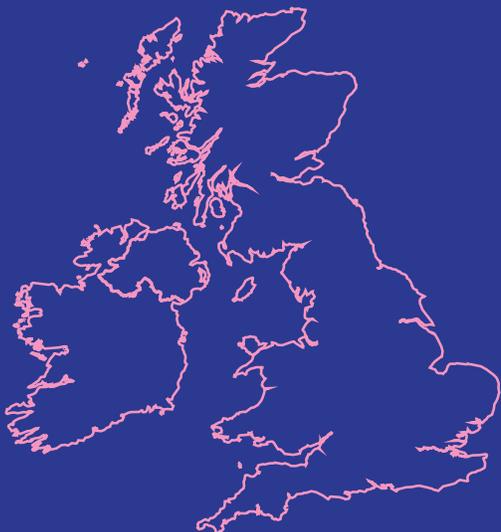
Regional differences

Geographically, the British Isles and the Iberian Peninsula are leading the way in gender diversity. The British Isles have the highest proportion of entrepreneurs in all-female start-up teams and the second-highest overall gender ratio at around 13%. However, the Iberian Peninsula takes the top spot for the most gender diverse region with an overall rate of about 14%. On the other end of the spectrum, start-ups in the DACH and Benelux regions have the lowest female participation rates and the highest share of all-male entrepreneurial teams. When it comes to VC firms, the Iberian Peninsula shines again with a leading 17.0% gender diversity rate, followed by the British Isles at 14.7%. In contrast, VC firms in the DACH region and CEE lag behind with 11.8% and 11.2% respectively, while all other regions maintain a gender ratio well above 13%.

Age groups

The "age" of the start-up or VC firm (i.e., the years to date since the organisation was established) also plays a role in gender diversity. Recently incorporated start-ups tend to be more gender diverse: the female participation rate for start-ups incorporated five or less years ago is 12%, versus the 7.7% of those incorporated more than 10 years ago. This likely correlates with the recent improvements in female participation on the start-up side.

When we look at the age of VC firms, we see that recently established VC firms also tend to be more gender diverse, featuring more all-female and gender-balanced teams. However, the difference in female participation is slight: 13.6% in firms over 25 years old compared to 15.5% in those five years or younger. Perhaps, while younger VC firms start out as more gender diverse, older VC firms have instead been boosting their diversity by recruiting more women into top-level roles over the years.

Mind the… regional aggregates

If CEE has so many superstar hubs, why do the British Isles and Iberian Peninsula regions shine in our earlier data breakdown? Simple: CEE covers many countries and hubs with varying rates of female representation, and as it happens, many of the other CEE hubs lag behind in gender diversity. On the other hand, the British Isles and Iberian Peninsula have fewer outliers, but a more even gender diversity in their hubs. This explains their leading position among other regions.

The top hubs: where are the champions of gender diversity?

In our quest to identify leaders and laggards in the progress towards gender diversity, let's take a closer look at the top 36 VC hubs in Europe: we identified these in the previous chapter, based on their ecosystem influence, volumes, or prominence within their respective countries. When it comes to gender diversity, some of these are making significant strides towards gender balance, while others surprisingly lag behind.

In the realm of VC firms, Lisbon leads the way with a gender ratio of approximately 19.4%. Sofia, Stockholm, and Vienna follow, with gender ratios of about 18%, 17.2%, and just below 16.7% respectively. Interestingly, Eastern European hubs are largely absent from the top ten in this category, with Sofia being the only exception. Again, none of the four German hubs make it into the top ten, while London and Paris rank 8th and 11th respectively. ▶

Turning our attention to start-ups, Eastern Europe takes the lead in gender diversity. Bratislava stands out with a female participation rate of over 17%, making it the most gender-diverse start-up hub in Europe. Vilnius follows closely with a gender ratio of 16.3%. Dublin, a standout from Western Europe, claims the third spot with a gender ratio of approximately 16.2%. Budapest and Bucharest, with gender ratios of 16.2% and 15.9% respectively, round out the top five. ◀

Western European hubs like Milan, Geneva, and Lisbon also make a strong showing, although none of the four German hubs make it into the top ten. London and Paris, two of the most prominent VC hubs in Europe, rank 10th and 18th respectively.

Top European hubs by gender diversity

Top 10

VC firms % women (top-rank)		Start-ups % women (founders/CEOs)
Lisbon 19.4%	1	Bratislava 17.1%
Sofia 18.0%	2	Vilnius 16.3%
Stockholm 17.2%	3	Dublin 16.2%
Vienna 16.7%	4	Budapest 16.2%
Luxembourg 16.6%	5	Bucharest 15.9%
Madrid 16.5%	6	Milan 14.6%
Milan 16.4%	7	Geneva 14.5%
London 14.9%	8	Lisbon 13.6%
Brussels 14.4%	9	Barcelona 13.6%
Geneva 14.3%	10	London 12.9%

These findings underscore that gender diversity in the VC ecosystem is not necessarily a West or East phenomenon, but rather an emergent property of hubs that varies greatly by latitude and longitude. This suggests that local ecosystem dynamics, culture and policies play a crucial role in shaping gender diversity and inclusivity in the VC ecosystem. It also highlights the potential for sharing successful policies and success stories to promote gender diversity across the European VC landscape.

VC firms

● Top 10 by gender diversity
● Most influential hubs (based on Chapter 1)*
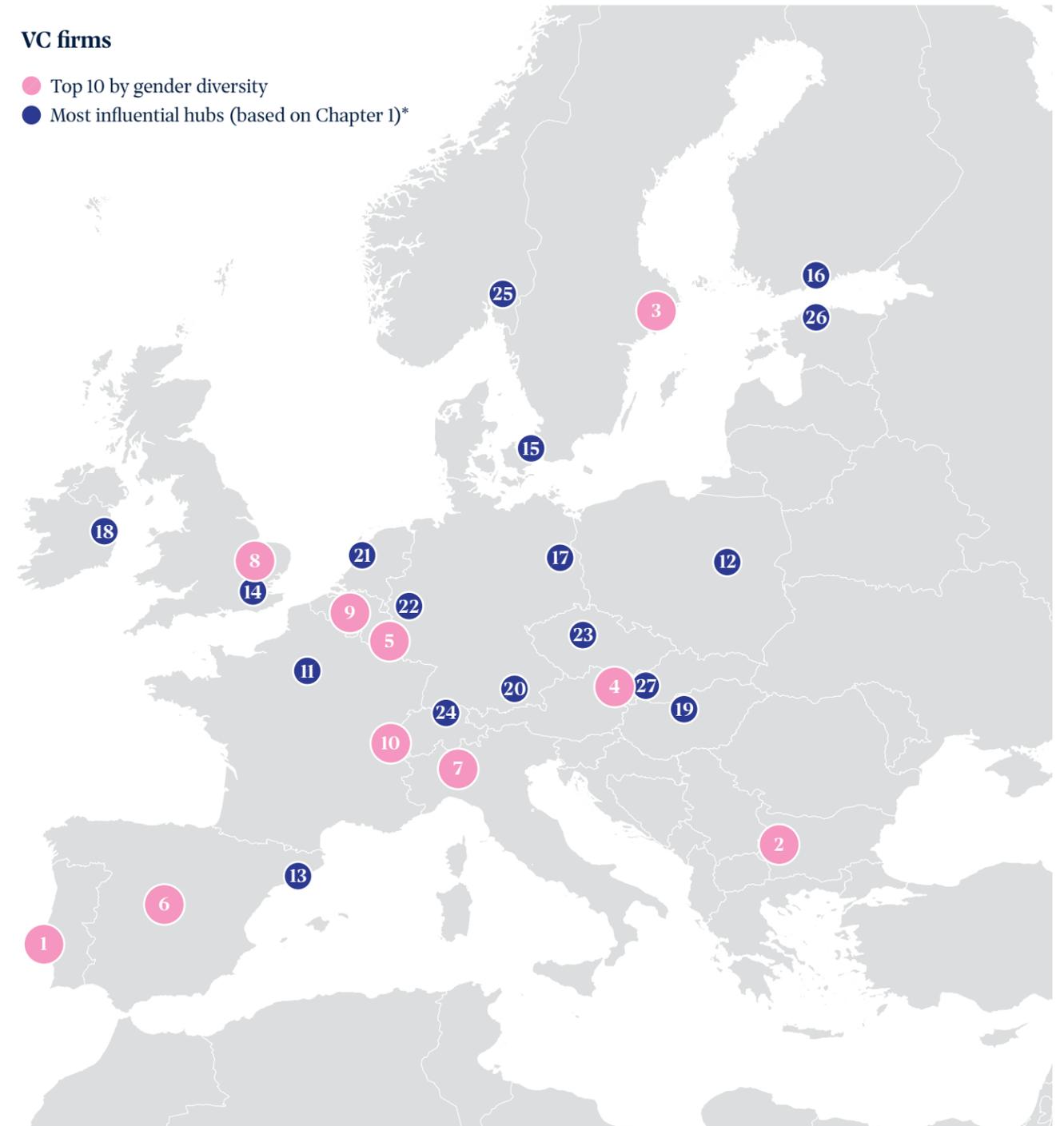
* Some hubs were excluded from this map due to small sample sizes, to avoid skewed or inaccurate gender diversity representation.

"There are many ways to drive change. You can change at the fund level: with GPs pushed to get more female representation. And that's where the LPs have the power to drive change. You can also change it at the start-up level, and that's where the VCs have the power. And then you can also change it by empowering female entrepreneurs to become LPs, to close the circle. We actually did that: we had an exit this summer, a company from both a male and a female founders. They're now coming in as LPs into our funds. It was a big learning curve for both of them, but in particular for her, to understand how this ecosystem works."

Top European hubs by gender diversity

Top 10

VC firms % women (top-rank)		Start-ups % women (founders/CEOs)
Lisbon 19.4%	1	Bratislava 17.1%
Sofia 18.0%	2	Vilnius 16.3%
Stockholm 17.2%	3	Dublin 16.2%
Vienna 16.7%	4	Budapest 16.2%
Luxembourg 16.6%	5	Bucharest 15.9%
Madrid 16.5%	6	Milan 14.6%
Milan 16.4%	7	Geneva 14.5%
London 14.9%	8	Lisbon 13.6%
Brussels 14.4%	9	Barcelona 13.6%
Geneva 14.3%	10	London 12.9%

Start-ups

- ● Top 10 by gender diversity
- ● Most influential hubs (based on Chapter 1)*
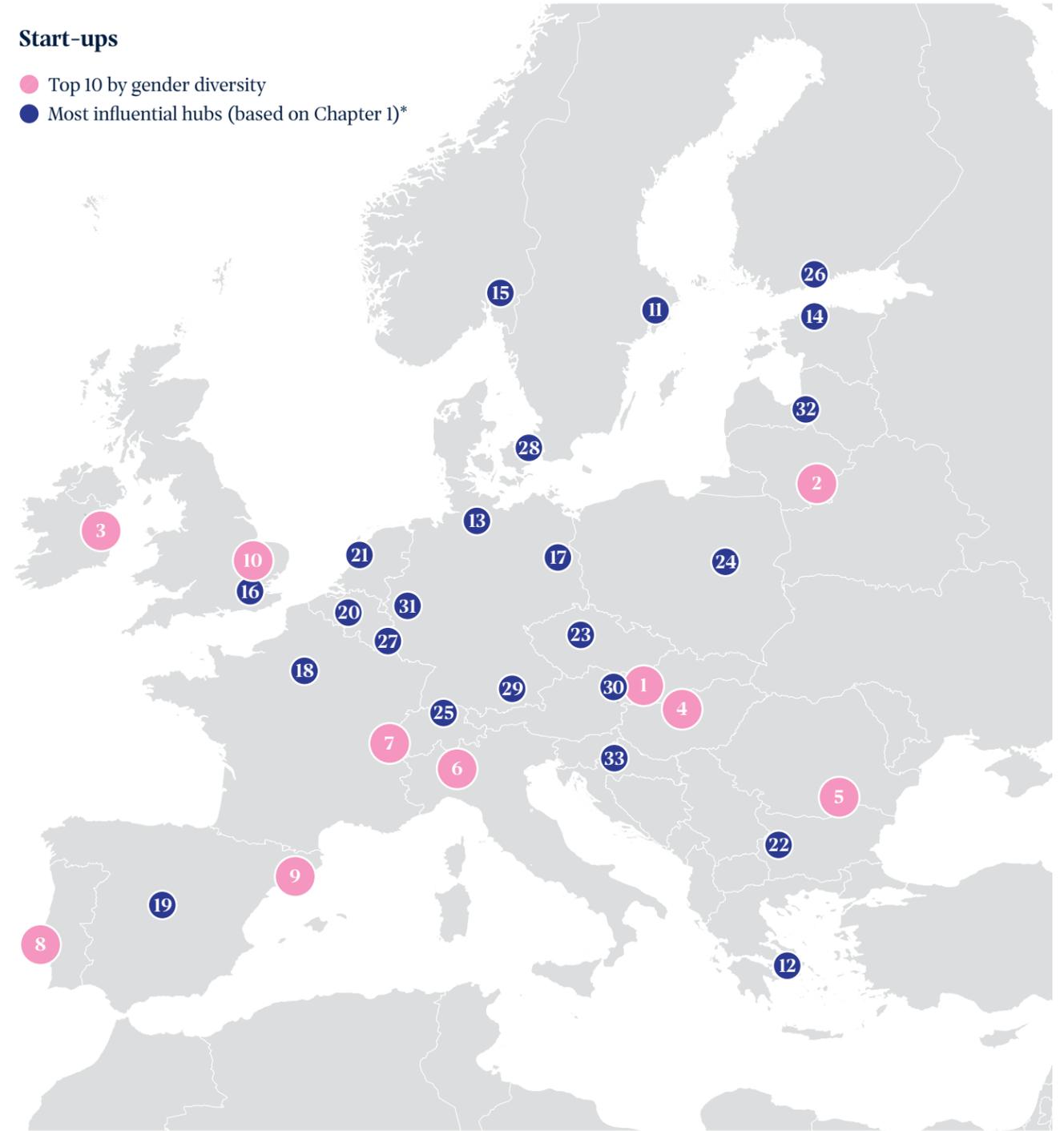
* Some hubs were excluded from this map due to small sample sizes, to avoid skewed or inaccurate gender diversity representation.

The flow of capital under the gender lens

As it turns out, workforce representation does not always translate into an equivalent share of investment volumes. By applying our gender lens to investment volumes, we can identify investor and start-up team profiles that handle more (or less) capital than suggested by the number of their top-level professionals.

All-male entrepreneurial teams, which make up 78% of the total workforce, receive a disproportionate 82% of total investments. In contrast, all-female start-up teams collect just under 1.8% of total investments, slightly below their representation in the workforce at around 2.1%. Likewise, male-majority start-ups receive approximately 11.8% of total investments, slightly below their 12.9% of total workforce. ▶

When we turn our attention to VC firms, the patterns become even more intriguing. Male-majority VC firms, which represent 60% of the workforce, handle a significant 68% of total volumes. Despite their larger share of the total workforce (38%), all-male investment teams handle roughly 30% of volumes. This means that all-male investment teams are dealing with less capital than their top-level workforce would suggest.

On the other hand, all-female investment teams manage around 0.7% of total volumes. While this figure is abysmally low, it is nevertheless more than double their workforce representation (0.3%).

Over the last decade, the share of total investments disbursed or received by these "gender lens" groups has seen some variation, but without really drifting away from the period's average. Interestingly, market expansions over the past decade have particularly benefited all-male start-ups and VC firms.

The overall market expansion correlates positively with the increase in the relative volume handled by all-male teams in both start-ups and VC firms. Conversely, as the market grew, the share of total volumes targeted at (or managed by) the other "gender lens" groups went down.

Zooming into gender-balanced, female-majority and all-female VC firms, we see that their investment volumes have grown fivefold in the past 10 years, outpacing the four-fold increase of the market. However, in 2021 they still represent a mere 6% of the overall investor activity.

In conclusion, while the VC ecosystem has made strides in gender diversity, the flow of capital still heavily favours male-dominated teams. The challenge ahead lies in ensuring that future expansions of the VC ecosystem are inclusive and beneficial to all its constituents, not just those who currently hold the lion's share of resources.

> **Market expansions over the past decade have particularly benefited all-male start-ups and VC firms.**

Investments disbursed and investments received through the gender lens

● All male　　● Male majority　　● Balanced　　● Female majority　　● All female

% Invested by European VC firms

30%　　68%

1%　1%　2%

€74bn*

€84bn*

% Received by European startups

12%　5%　1%　2%

82%
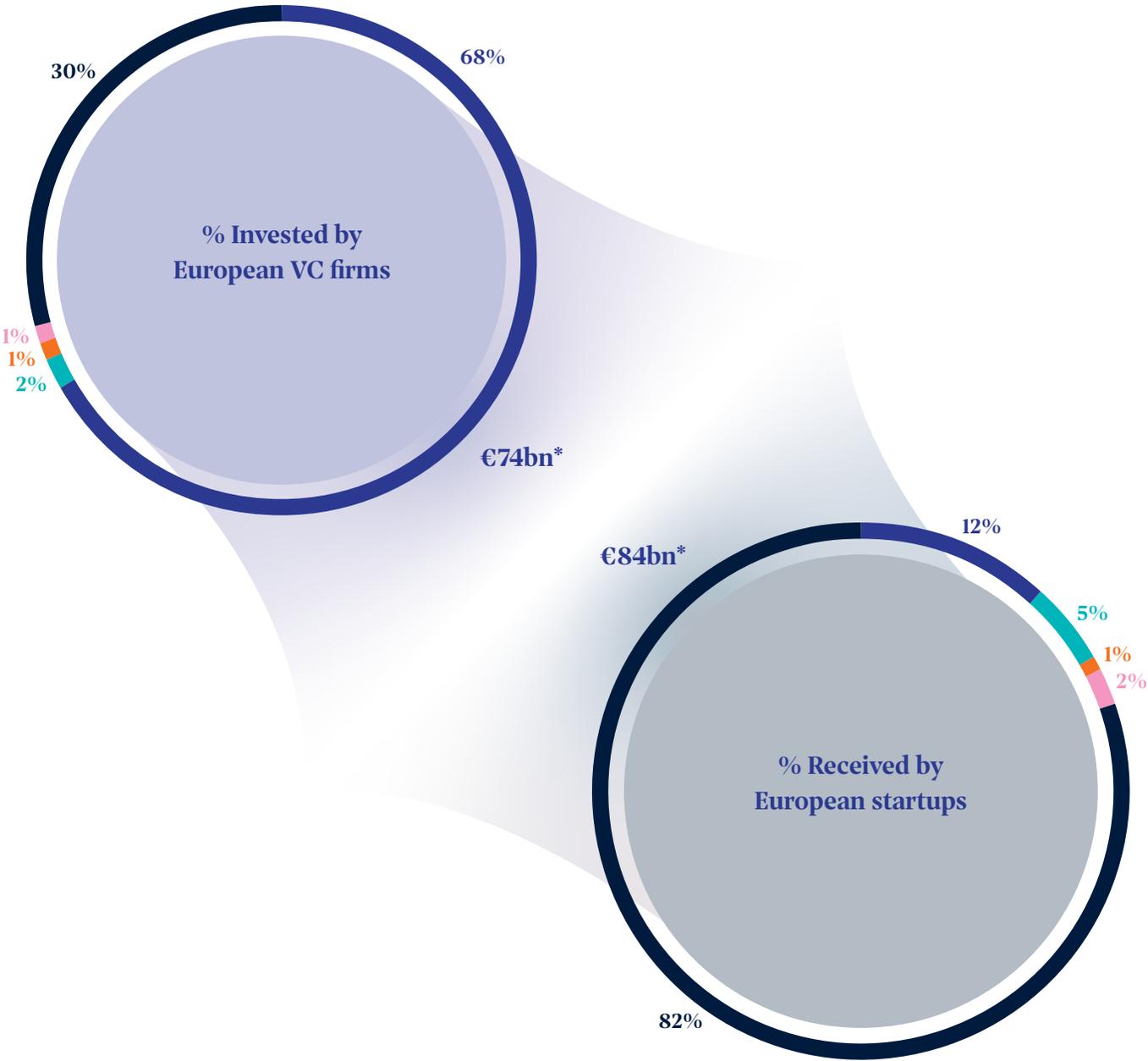
* Total amounts invested and received do not coincide because we track activity flowing to/from extra-European countries (depending on the perspective).

Bigger checks, bigger disparities

The mismatch between volume and workforce in the previous section gives us an interesting lead: does the size of the investments contribute to gender imbalances? ▶

Interestingly, among VC firms it is the all-male investors that experience the biggest drop in volume representation in the larger investment rounds (from 35.1% to 24.5%). In the larger investment rounds, the male-majority team category emerges as the winner-takes-all. While all-female investors make slight gains in bigger checks (from 0.5% to 0.7%), the investor teams with higher female presence (i.e., balanced, female-majority and all-female) experience lower participation rates in larger rounds, from 4.2% of total investments below EUR 1m, to 2.1% of total investments above EUR 10m. ▼

Breaking down investment volumes

We dissect VC investment rounds based on their sizes: under 1 EUR million, 1 to 4.99 EUR million, 5 to 9.99 EUR million, and 10 EUR million or beyond. To ensure comparability, all monetary values are adjusted for inflation, using 2015 as the base year. In addition, all VC deals occurring in the same year between the same VC firm and start-up are considered part of the same VC investment round.

Investment rounds through the gender lens
Invested by European VC firms

● All male   ● Male majority   ● Balanced   ● Female majority   ● All female
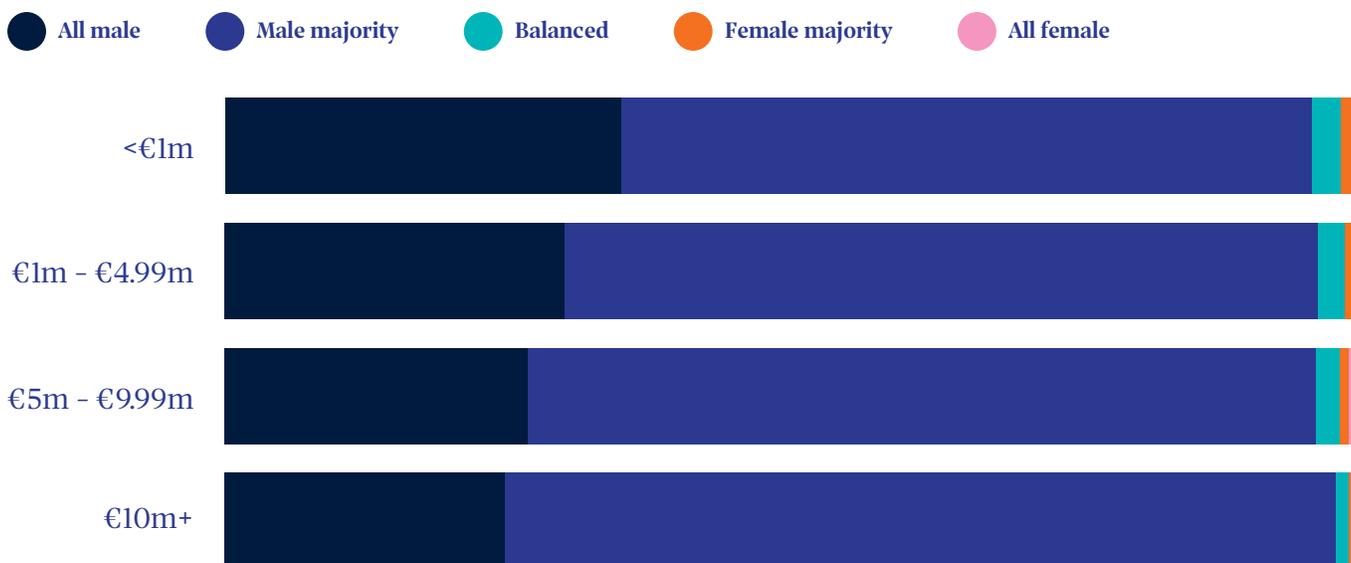
Volumes adjusted for inflation

The gender gap widens as we move to larger investment rounds. This calls for targeted interventions to ensure equal access to larger investment opportunities.

Regardless of the size of the investment, all-male teams in start-ups command the majority share, with over 80% of volumes funnelled their way. Male-majority entrepreneurial teams also secure around 10% of the investment pot. However, the gender gap widens as we move to larger investment rounds. All-female entrepreneurial teams represent 3% of total investments below EUR 1m, but only 0.88% of investments above EUR 10m. ▼

In conclusion, the size of the investment appears to be a significant factor in the gender disparity within the VC ecosystem. As the checks get bigger, the gender gap widens, suggesting that women face additional barriers when it comes to securing larger investment deals. This underlines the need for targeted interventions to ensure that women entrepreneurs have equal access to larger investment opportunities.

Investment rounds through the gender lens
Received by European start-ups

● All male   ● Male majority   ● Balanced   ● Female majority   ● All female
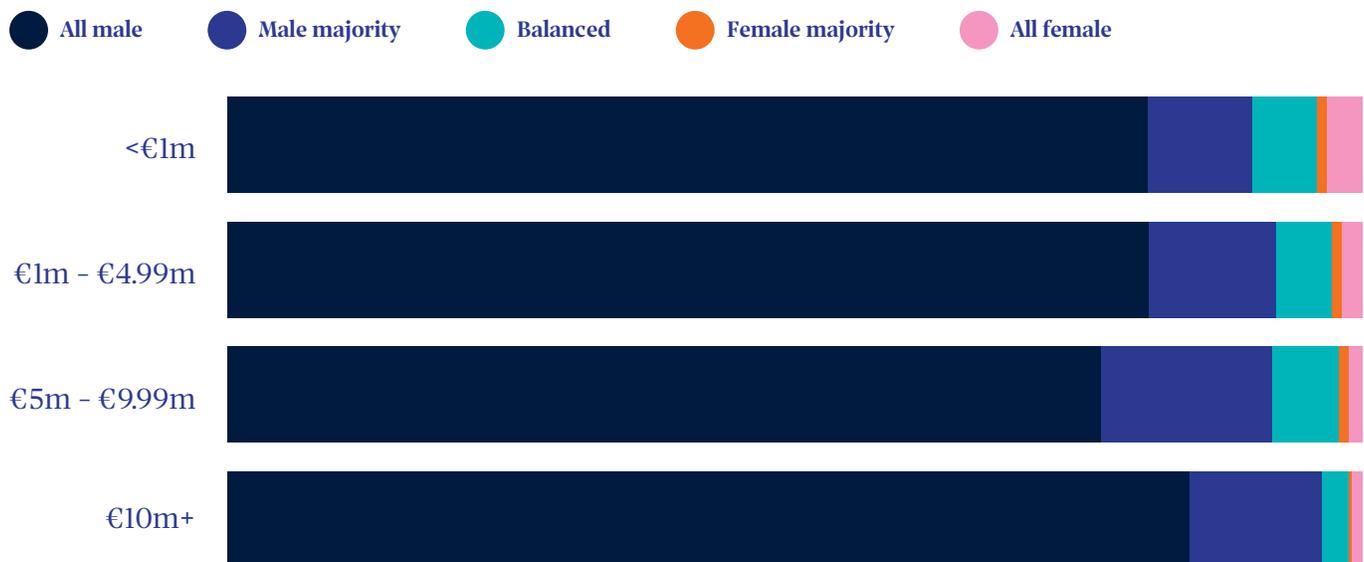
Volumes adjusted for inflation

Who's investing where?

Male majority
VC firms

€56.5bn

81%

All male
VC firms

€25bn

84%

19%

Balanced
VC firms

€1.85bn

20%

80%

16%

€0.6bn

25%

75%

Female majority
VC firms

€0.5bn

27%

73%

All female
VC firms

	All male	Male majority	Balanced	Female majority	All female
VC firms	●	●	●	●	●
Start-ups	●	●	●	●	●

Amount invested
by each type of
VC firm

Percentage
received by each
type of Start-up
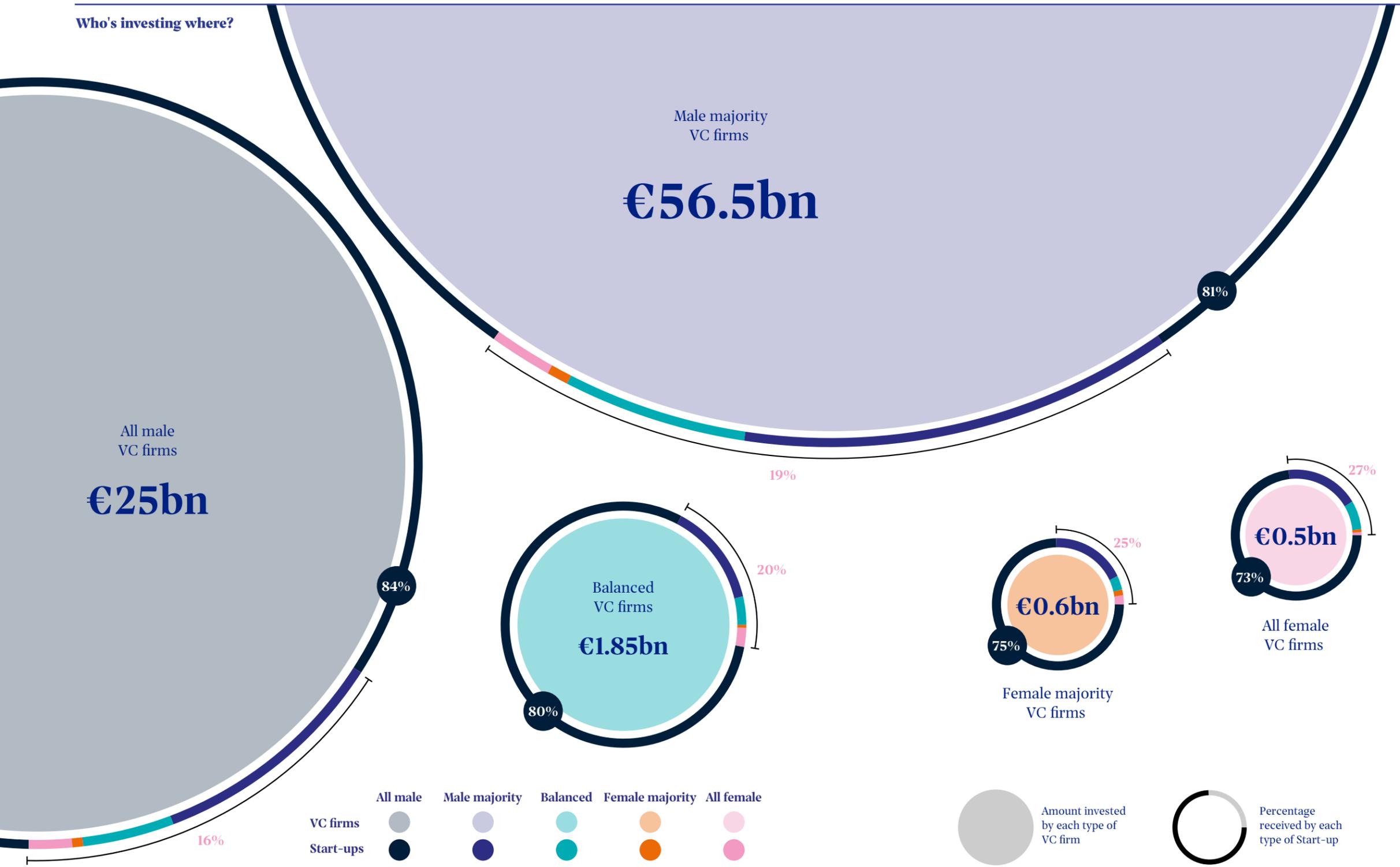
It's always about networks: gender interactions in venture capital

We can now bring both sides of the ecosystem together, to complete the picture. By breaking down volumes by the "origin" of VC (i.e., the VC firms' gender diversity grouping) and "destination" (i.e., the start-ups' gender diversity grouping), we can gain fascinating insights into the inner workings of the European VC scene. ◄

In the infographic to the left, the size of the bubbles is proportional to the volumes managed by each gender diversity grouping among VC firms – some of the bubbles were too big to fit in this page but try to picture their full extent. The bubbles' outer rings portray the percentage of these volumes going to the different start-ups' gender diversity groupings (with an arc summing up the shares towards teams with some female participation).

Male-majority investors, who account for 68% of overall VC volumes invested, emerge as the top VC provider for all types of entrepreneurial teams, regardless of their gender diversity status. This highlights the influential role of male-dominated VC firms in the European ecosystem.

Voices from the Industry
Tamara Obradov, Fund Manager at Tablomonto Ventures, Netherlands

"I think that "like calls to like" is just a fact of life. We are born biased. I have kids, I look at them and they have a preference why they are playing with specific people and not with others. We will always have biases within people, I don't think it's a disease. We can't cure bias, it's just a fact of life. But we need to diversify the biases, so that we diversify the selections. In order to get diverse investments, we need diverse investors."

In terms of specific investment interactions, around 25% of total investment volumes in the European VC ecosystem involve all-male investor teams funding all-male entrepreneurial teams. By stark contrast, the share of volumes involving all-female investor teams funding all-female entrepreneurial teams is a minuscule 0.003%.

Put differently, for every 100 euro invested in the European VC ecosystem, on average 25 euro involve no women in top-level positions on either side of the table. Conversely, only 0.003 euro involve no men in top-level positions.

When we zoom into the activity of each specific gender diversity group of VC firms, we find that 84% of all-male investor volumes go to all-male entrepreneurs. This is calculated based on the fact that all-male investors distribute about 30% of all volumes, and that 25% of all volumes involve only all-male investors and all-male entrepreneurs.

Interestingly, the teams with a higher female presence, specifically those with a female majority or all-female composition, invest less (74%) in all-male start-ups compared to the average (81%). This suggests that gender diversity within investor teams can influence investment decisions, potentially promoting gender diversity within the start-ups they fund.

However, it's worth noting that all-female investor teams have a slightly lower tendency (0.6%) to support all-female start-ups than all-male investor teams (1.8%). This suggests that gender alignment in investment decisions is not a given, further highlighting the complexity of gender dynamics in the VC ecosystem.

Voices from the Industry
Kim Oreskovic, Managing Director at Innoviance, Netherlands

"There are distinct tendencies in investment perspectives between genders. Historically, there has been a greater emphasis among men on achieving returns and financial metrics, while women often prioritize factors such as team unity and organizational culture, adopting a more extended timeframe for their investment strategies. Ultimately, this alternative approach has the potential to lead to improved returns."

If we look at the top, for every 100 euro in European VC, on average 25 euro involve only men on either side of the table; just 0.003 euro involve only women.

Assortativity coefficient

The assortativity coefficient is a key metric in network analysis. Here, it's calculated as the Pearson correlation coefficient between the female participation rates of connected "nodes" – in our case, representing VC firms and start-ups. This coefficient ranges from –100% to +100% and, when positive, indicates what is known as assortative mixing: a phenomenon in which network actors preferentially connect with others who share similar characteristics, such as gender. In social networks, this is also commonly known as homophily, encapsulated by the expression "birds of a feather flock together". The assortativity coefficient provides a numerical lens to understand these biases, helping us dissect network structures in the European VC ecosystem.

Voices from the Industry
Simona Gemeneanu, Partner at Morphosis Capital, Romania

"The gender balance at investor level brings, apart from different perspectives and ways of doing business, a more balanced risk profile of investments [...]. Moreover, it would reduce the biases in stereotyping women-led start-ups, that would have a cascading positive effect in the start-up ecosystem."

VC networks through the gender lens

Coming full circle, in this last act we bring back the network analysis toolbox from our previous chapter. We'll use it to describe the interplay between the female participation rates of VC firms and start-ups. The ideal metric here is the *assortativity coefficient*, a measure that quantifies the correlation between a VC firm's female participation rate and the (average) female participation rate of the start-ups they invest in. ◀

Across the board, the out-degree assortativity for the female participation rate is mildly positive at around 10%. This suggests a slight inclination for VC firms with a higher female participation rate to invest in start-ups with a similarly high gender-diversity profile (and vice versa), a phenomenon known as "homophily".

Homophily, the tendency of individuals to associate and bond with similar others, appears to be at play in the European VC ecosystem. However, this correlation varies across regions. It is notably stronger in some areas such as DACH (+19.8%), Central and Eastern Europe (18.2%), and Benelux (15.2%), suggesting a higher degree of gender-based affinity in investment decisions in these regions. Intriguingly, France, the British Isles, and Italy & Malta demonstrate virtually no such correlation.

When we examine the data from a sectoral perspective, assortativity is apparent and strong across all sectors except biotech, which shows no correlation. This might hint at unique industry dynamics, or reflect the influence of the more diverse teams within the biotech sector.

To summarise, the network analysis confirms that some types of investors are more likely to invest based on gender. However, policies that capitalise on this tendency to increase the number of women in start-ups – by encouraging investment from firms with more women – may not be equally effective in all segments of the European ecosystem.

In conclusion, our data deep dive shows that a thorough understanding of the many components of the European VC industry and the way they function is pivotal to devise effective policies promoting gender diversity. The goal? To foster a more diverse, inclusive, resilient and ultimately thriving European VC ecosystem.

CGTrader: The Future of 3D Digital Imagery

When pictures speak louder than words, CGTrader comes in with its transformative approach to online visuals. Co-founded in Lithuania by Dalia Lasaite and Marius Kalytis, the platform provides businesses with a fresh take on online imagery and an extensive range of 3D models. Their innovative approach emphasizes photorealistic 3D models, capturing the attention of giants like Google. "Demand for visual content has exploded with the pandemic and digitalisation" Dalia explains: their sights are firmly set on expanding horizons, with the US market on their radar.

Appendix

List of Functional Urban Areas used in the analysis

Austria: Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt.

Belgium: Brussels, Antwerp, Ghent, Charleroi, Liège, Bruges, Namur, Leuven, Mons, Kortrijk, Ostend.

Bulgaria: Sofia, Plovdiv, Varna, Ruse, Dobrich, Blagoevgrad.

Switzerland: Zurich, Geneva, Basel, Bern, Lausanne, St. Gallen, Lucerne, Lugano, Biel/Bienne.

Cyprus: Nicosia, Limassol.

Czechia: Prague, Brno, Ostrava, Ústí nad Labem, Olomouc, Liberec.

Germany: Berlin, Hamburg, Munich, Cologne, Frankfurt, Stuttgart, Leipzig, Dresden, Dusseldorf, Bremen, Hanover, Nuremberg, Bielefeld, Halle, Magdeburg, Wiesbaden, Gottingen, Darmstadt, Trier, Freiburg, Regensburg, Frankfurt (Oder), Weimar, Schwerin, Erfurt, Augsburg, Bonn, Karlsruhe, Mönchengladbach, Mainz, Ruhr, Kiel, Saarbrücken, Koblenz, Rostock, Kaiserslautern, Iserlohn, Wilhelmshaven, Tübingen, Villingen-Schwenningen, Flensburg, Marburg, Konstanz, Neumünster, Brandenburg an der Havel, Gießen, Lüneburg, Bayreuth, Celle, Aschaffenburg, Bamberg, Plauen, Neubrandenburg, Fulda, Kempten, Landshut, Rosenheim, Stralsund, Friedrichshafen, Offenburg, Görlitz, Greifswald, Wetzlar, Passau, Dessau-Roßlau, Braunschweig-Salzgitter-Wolfsburg, Mannheim-Ludwigshafen, Münster, Chemnitz, Aachen, Krefeld, Lübeck, Kassel, Solingen, Osnabrück, Oldenburg, Heidelberg, Paderborn, Würzburg, Bremerhaven, Heilbronn, Ulm, Pforzheim, Ingolstadt, Gera, Reutlingen, Cottbus, Hildesheim, Zwickau, Wuppertal, Jena, Bocholt.

Denmark: Copenhagen, Aarhus, Odense, Aalborg.

Estonia: Tallinn, Tartu.

Greece: Athens, Thessaloniki, Patras, Heraklion, Larissa, Ioannina, Kavala, Kalamata.

Spain: Madrid, Barcelona, Valencia, Seville, Zaragoza, Malaga, Murcia, Las Palmas, Valladolid, Palma de Mallorca, Santiago de Compostela, Vitoria-Gasteiz, Oviedo, Pamplona, Santander, Toledo, Badajoz, Logroño, Bilbao, Córdoba, Alicante, Vigo, Gijón, Santa Cruz de Tenerife, A Coruña, Reus, Lugo, Girona, Cáceres, El Puerto de Santa María, Avilés, Talavera de la Reina, Palencia, Ferrol, Pontevedra, Gandia, Guadalajara, Manresa, Ciudad Real, Ponferrada, Zamora, Irun, Elda, Granada, Elche, Cartagena, Jerez de la Frontera, San Sebastian, Almería, Burgos, Salamanca, Albacete, Castellón de la Plana, Huelva, Cádiz, León, Tarragona, Jaén, Lleida, Ourense, Algeciras, Marbella, Alcoy, Ávila, Cuenca, Linares, Lorca, Mérida, Sagunto, Puerto de la Cruz, Igualada.

Finland: Helsinki, Tampere, Turku, Oulu, Lahti, Kuopio, Jyväskylä.

France: Paris, Lyon, Toulouse, Strasbourg, Bordeaux, Nantes, Lille, Montpellier, Saint-Etienne, Rennes, Amiens, Nancy, Metz, Reims, Orleans, Dijon, Poitiers, Clermont-Ferrand, Caen, Limoges, Besancon, Grenoble, Ajaccio, Saint Denis, Fort-de-France, Toulon, Valenciennes, Tours, Angers, Brest, Le Mans, Avignon, Mulhouse, Dunkirk, Perpignan, Nimes, Pau, Bayonne, Annemasse, Annecy, Lorient, Montbeliard, Troyes, Saint-Nazaire, La Rochelle, Angouleme, Boulogne-sur-Mer, Chambery, Chalon-sur-Saone, Chartres, Niort, Calais, Beziers, Arras,

Bourges, Saint-Brieuc, Quimper, Vannes, Cherbourg, Tarbes, Compiegne, Belfort, Roanne, Saint-Quentin, Beauvais, Creil, Evreux, Chateauroux, Brive-la-Gaillarde, Albi, Frejus, Châlons-en-Champagne, Marseille, Nice, Lens - Liévin, Hénin - Carvin, Douai, Valence, Rouen, Melun, Martigues, Colmar, Cannes.

Croatia: Zagreb, Rijeka, Slavonski Brod, Osijek, Split, Pula.

Hungary: Budapest, Miskolc, Nyíregyháza, Pécs, Debrecen, Szeged, Győr, Kecskemét, Székesfehérvár, Szombathely, Szolnok, Tatabánya, Veszprém, Békéscsaba, Kaposvár, Eger, Dunaújváros, Zalaegerszeg, Sopron.

Ireland: Dublin, Cork, Limerick, Galway, Waterford.

Italy: Rome, Milan, Naples, Turin, Palermo, Genoa, Florence, Bari, Bologna, Catania, Venice, Trento, Trieste, Perugia, Ancona, Pescara, Taranto, Potenza, Catanzaro, Sassari, Cagliari, Padua, Brescia, Modena, Foggia, Salerno, Piacenza, Bolzano, Udine, Lecce, Pesaro, Como, Pisa, Treviso, Varese, Asti, Cosenza, Avellino, Pordenone, Lecco, Carpi, Gallarate, Gela, Prato, Parma, Reggio Emilia, Ferrara, Rimini, Bergamo, Forlì, Latina, Vicenza, Terni, Novara, Alessandria, Arezzo, Grosseto, Brindisi, Trapani, Ragusa, L'Aquila.

Lithuania: Vilnius, Kaunas, Panevėžys, Alytus, Klaipėda, Šiauliai.

Luxembourg: Luxembourg.

Latvia: Riga, Liepāja, Jelgava.

Malta: Valletta.

The Netherlands: The Hague, Amsterdam, Rotterdam, Utrecht, Eindhoven, Tilburg, Groningen, Enschede, Arnhem, Heerlen, Breda, Nijmegen, Apeldoorn, Leeuwarden, Sittard-Geleen, Roosendaal, Alphen aan den Rijn, Bergen op Zoom, Gouda, Greater Middelburg, 's-Hertogenbosch, Amersfoort, Maastricht, Leiden, Zwolle, Ede, Deventer, Alkmaar, Venlo, Almelo, Lelystad, Oss, Assen, Veenendaal, Greater Soest.

Norway: Oslo, Bergen, Trondheim, Stavanger, Kristiansand, Tromsø, Bodø[*].

Poland: Warsaw, Lodz, Krakow, Wrocław, Poznan, Gdansk, Szczecin, Bydgoszcz, Lublin, Katowice, Białystok, Toruń, Olsztyn, Rzeszów, Opole, Gorzów Wielkopolski, Zielona Góra, Jelenia Góra, Suwałki, Płock, Kalisz, Koszalin, Siedlce, Piotrków Trybunalski, Piła, Stargard Szczeciński, Tomaszów Mazowiecki, Leszno, Świdnica, Bielsko-Biała, Rybnik, Elbląg, Grudziądz.

Portugal: Lisbon, Porto, Braga, Funchal, Coimbra, Ponta Delgada, Aveiro, Faro, Viseu, Viana do Castelo, Póvoa de Varzim, Guimarães.

Romania: Bucharest, Cluj-Napoca, Timisoara, Craiova[†], Brăila[†], Oradea, Sibiu, Târgu Mureş, Târgovişte[†], Slatina, Bârlad[†], Roman[†], Constanta[†], Iasi, Brasov, Ploiesti[†], Baia Mare, Satu Mare, Ramnicu Valcea[†], Suceava[†].

Sweden: Stockholm, Gothenburg, Malmo, Jonkoping, Umea, Uppsala, Linkoping, Orebro, Västerås, Norrköping, Helsingborg, Borås.

Slovenia: Ljubljana, Maribor.

Slovakia: Bratislava, Kosice, Banska Bystrica, Presov, Trnava, Trencin.

United Kingdom: London, West Midlands urban area, Leeds, Glasgow, Liverpool, Edinburgh, Greater Manchester, Cardiff, Sheffield, Bristol, Belfast, Newcastle upon Tyne, Leicester, Aberdeen, Cambridge, Exeter, Lincoln, Stevenage, Wrexham, Portsmouth, Worcester, Coventry, Kingston upon Hull, Stoke-on-Trent, Nottingham, Bath and North East Somerset, Guildford, Thanet, Ashford, East Staffordshire, Darlington, Worthing, Mansfield, Chesterfield, Burnley, Hartlepool, Doncaster[†], Sunderland, Medway, Brighton and Hove, Plymouth, Swansea, Derby, Southampton, Milton Keynes, Northampton, Warrington, York, Swindon, Bournemouth, Wycombe, Telford and Wrekin, North East Lincolnshire, Peterborough, Colchester, Basingstoke and Deane, Bedford, Dundee City, Falkirk, Reading, Blackpool, Maidstone, Dacorum, Blackburn with Darwen, Newport, Middlesbrough, Oxford, Preston, Warwick, Norwich, Cheshire West and Chester, Ipswich, Cheltenham, Gloucester, Bracknell Forest, Carlisle, Crawley.

[*]   This FUA has been created ad hoc for the purpose of the analysis.
[†]   FUA dropped from the network analysis, due to missing complete geo-location data in either origin or destination.

Disclaimer

Many thanks to...

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For almost 2 months she exchanged more messages with R Studio than with her colleagues.