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STATE-BACKED VENTURE CAPITAL AND TECHNOLOGY CLUSTERS IN EUROPE

This article examines how state-backed venture capital (VC) has influenced the development of technology clusters in Europe. It reviews Europe's venture financing gap and the growing role of public investment in startup ecosystems, highlighting cases like France and Poland where government initiatives have bolstered local tech clusters.

The analysis finds that public involvement — as an anchor investor or fund-of-funds — has been crucial in catalyzing VC markets and nurturing innovation hubs.

Based on these insights, the paper offers recommendations for Ukraine to leverage state-backed VC in developing its own technology clusters.

Keywords: state-backed venture capital; technology clusters; innovation policy.

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ДЕРЖАВНИЙ ВЕНЧУРНИЙ КАПІТАЛ ТА ТЕХНОЛОГІЧНІ КЛАСТЕРИ В ЄВРОПІ

У цій статті розглядається, як державний венчурний капітал (ВК) вплинув на розвиток технологічних кластерів у Європі. У ній розглядається дефіцит венчурного фінансування в Європі та зростаюча роль державних інвестицій у екосистеми стартапів, з акцентом на таких випадках, як Франція та Польща, де урядові ініціативи сприяли розвитку місцевих технологічних кластерів.

Аналіз показує, що залучення громадськості — як основного інвестора або фонду фондів — відіграло вирішальну роль у каталізації ринків венчурного капіталу та розвитку інноваційних центрів.

На основі цих висновків у статті пропонуються рекомендації для України щодо використання державного венчурного капіталу для розвитку власних технологічних кластерів.

Ключові слова: державний венчурний капітал; технологічні кластери; інноваційна політика.

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Introduction. Technology clusters — geographic concentrations of interconnected tech companies, startups, investors, and research institutions — are vital engines of innovation and economic growth. Famous examples like Silicon Valley illustrate how robust venture capital networks and supportive policies can fuel cluster development. In Europe, however, many regions have struggled to replicate such success due to a historically underdeveloped VC ecosystem and fragmentation of markets [1]. Relative to the United States, European venture investment remains low as a share of GDP, and promising startups often face funding hurdles and end up relocating to seek capital [1]. This funding gap not only stifles the growth of innovative firms but also hampers the emergence of dynamic tech clusters across European economies.

In response, state-backed venture capital initiatives have proliferated in Europe over the past decade. Governments and public financial institutions have taken on a

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greater role in financing startups – whether through co-investments, fund-of-funds programs, or the creation of public venture funds – to address market failures and jumpstart local innovation hubs [2]. Early evidence suggests that such public interventions can significantly expand the VC industry and strengthen regional innovation ecosystems. For instance, the French government's creation of Bpifrance (a large public investment bank) and Poland's launch of the PFR Ventures fund-of-funds have each been associated with rapid growth in startup funding and the rise of new tech clusters in those countries (as discussed later in this paper). At the European Union level, initiatives like the European Investment Fund (EIF) and programs under the Capital Markets Union have also aimed to catalyze venture investment in less-developed markets [6].

This article explores the role of state-backed VC in developing technology clusters in Europe, with a particular focus on drawing lessons applicable to Ukraine. The next section reviews relevant literature and data on venture capital's impact on innovation and the rationale for public participation in VC markets. We then examine Europe's venture capital landscape and present case studies – notably from Poland and France – illustrating how public VC programs have fostered cluster growth. Finally, we discuss policy recommendations for Ukraine, which is seeking to develop its own tech hubs and could benefit from well-designed state-backed VC interventions.

Literature Review. Numerous studies have underscored the positive impact of venture capital financing on innovation, firm growth, and regional development. Venture capital provides not only funding but also networks and expertise to high-potential startups, which in turn can boost productivity growth and technological progress in an economy [7]. Because traditional bank lending is often ill-suited for risky, intangible-rich ventures, VC has become essential for scaling innovative companies (especially in sectors like software, biotech, and ICT). Clusters thrive when such companies can access financing and mentorship locally, creating virtuous cycles of talent attraction and new firm formation. Indeed, research finds that regions with active VC communities tend to produce more high-growth “superstar” firms and patenting activity, indicating a strong link between venture financing and cluster dynamism (McKinsey Global Institute, 2022; Kortum & Lerner, 2000).

However, the development of venture capital markets varies widely across countries. Historically, the United States pioneered the VC model and enjoys a deep pool of institutional investors and limited partners willing to fund startups. Europe's VC industry, by contrast, has been underdeveloped and fragmented, partly due to structural factors. European households are more risk-averse on average – keeping a larger share of savings in bank deposits and a smaller share in equities – and European pension funds and insurers have been more cautious about VC as an asset class [1]. Moreover, Europe's financial system has been heavily bank-based, and capital markets are segmented along national lines, limiting the scale of funds and cross-border investments [1]. These factors contributed to a persistent gap: over 2013–2023, annual VC investment in the EU averaged only ~0.2% of GDP, compared to ~0.7% in the US [1]. In absolute terms, EU venture funds raised roughly \$130 billion in capital during the past decade – barely one-seventh of the ~\$924 billion raised by US VC funds in the same period [1]. This financing gap has had real consequences for clus-

ter development: many of Europe's most promising startups, upon reaching later stages, turn to American or other foreign investors for large-scale funding and often relocate abroad, depriving their home regions of scale-up companies and economic spillovers [1].

Given these market shortcomings, there is a strong economic rationale for government intervention to support venture financing in Europe. Public involvement can take several forms: direct investment in startups, indirect investment as a limited partner in private VC funds, tax incentives for VC and angel investors, or the creation of supportive infrastructure. Well-designed public VC initiatives can play a catalytic role. Arnold et al. (2024) argue that public financial institutions like the EIF can “kick-start” VC markets in less-developed regions by familiarizing larger investors with the asset class and by sharing risk. A study by the European Investment Fund notes that many European VC funds rely on public agencies as anchor investors, in contrast to the US where private pensions and endowments dominate funding. Government agencies directly fund nearly a quarter of early-stage funding rounds in Europe, reflecting the outsized role of the state in the European startup ecosystem. Similarly, Sweden's government stimulus in the 1980s preceded a boom in its VC sector, and France and Germany saw their VC markets expand after concerted public investments in the early 2010s.

At the same time, scholars caution that not all government venture initiatives succeed, and poor design can lead to inefficiencies or crowding out of private investors. Lerner (2009) emphasizes that public VC programs work best when they operate “indirectly” and when investment decisions are left to professional fund managers rather than bureaucrats. Governments should act as early anchor investors to signal confidence and attract private capital, but should gradually withdraw as the private VC market matures. Many European schemes follow this approach: they require matching private investment and aim to be market-driven. For instance, the UK's Enterprise Capital Funds and British Patient Capital programs provide government funding alongside private investors to cultivate domestic scale-up capital, while the EU's Pan-European Venture EU fund-of-funds similarly seeks to mobilize private institutional money by demonstrating viable returns in European VC.

In summary, the literature and existing research highlight that state-backed VC can be a powerful tool to kickstart innovation clusters when there is a clear market failure in risk finance. Europe's experience over the last decade – as detailed in the next section – offers rich examples of this dynamic. Public investment has been “crucial to VC expansion” in Europe, validating the notion that government can help overcome the initial capital gaps to establish a vibrant startup ecosystem. The next section will delve into how this has unfolded in practice, and what outcomes have been observed in terms of cluster development.

Problem Statement and Research Objective. Despite recent improvements, Europe's technology sectors still face a funding gap that impedes cluster development. The problem can be stated as follows: How can state-backed venture capital interventions help overcome Europe's venture funding shortfalls and foster sustainable technology clusters, and what lessons does this offer for countries like Ukraine? Key issues include the fragmentation of European capital markets, the hesitancy of private institutional investors to engage in VC, and regional disparities in startup

financing. These issues lead to promising startups leaving their home base in search of capital, which undermines local cluster growth (for example, two-thirds of EU startup IPOs occurred outside the EU in 2023, reflecting this migration of scale-ups).

The objective of this research is threefold: (1) to analyze the current state of venture capital in Europe and the specific role played by state-backed entities; (2) to examine case studies where government-supported VC has contributed to the rise of tech clusters or innovation hubs in Europe; and (3) to formulate recommendations applicable to Ukraine's context, where the government and public institutions could strategically use venture funding to stimulate cluster development (especially important as Ukraine rebuilds its economy and tech sector).

By addressing these objectives, the paper aims to contribute practical insights on how public policy can catalyze private innovation. The focus on Ukraine is motivated by the country's emerging startup scene and the recognition that Ukraine could benefit from adopting best practices from European neighbors (like Poland) in leveraging public funds to support entrepreneurship. Ultimately, understanding the role of state-backed VC in cluster development will inform policymakers how to balance public and private efforts in nurturing innovation ecosystems.

Key Results and Discussion.

Europe's Evolving Venture Capital Landscape. Over the past decade, Europe's venture capital landscape has grown substantially – and much of this growth has been underpinned by state involvement. As noted, Europe historically lagged the US in VC activity, but recent data show an uptick in investment, particularly in certain EU member states. Notably, the EU's VC investment more than tripled from the early 2010s to early 2020s (albeit from a low base), and this was strongly correlated with public initiatives. In countries like France, Germany, and Italy, the launch of major public VC programs coincided with a marked expansion of domestic VC funding (Figure 5 in SUERF study). Public financial institutions acted as cornerstone investors that drew in private capital – for example, France's government via Bpifrance and Germany via High-Tech Gründerfonds/KfW programs each helped create a new generation of venture funds in their markets.

Table 1 provides selected indicators of the VC environment in Europe versus the United States, highlighting the gap and the role of public capital:

Table 1. Venture Capital Investment in Europe vs. United States, and Role of Public Funding

Indicator (Latest Data)	Europe (EU)	United States
VC investment as % of GDP	~0.3% (still modest, but rising)	~0.7% (significantly higher)
Average annual VC funding (2013–2023)	\$10–15 billion/year	\$70+ billion/year
Total capital raised by VC funds (2013–2023)	~\$130 billion	~\$924 billion
Share of VC funding from government/PFIs	High – e.g. ~25% of rounds	Lower – primarily private LPs
Notable public VC institutions	EIF, national dev. banks (e.g. Bpifrance, KfW, British Business Bank)	SBIC program (historical), mostly private sector-driven today

Sources: IMF Working Paper (2024); Atomico State of European Tech (2024). (PFIs = Public Financial Institutions)

As Table 1 suggests, while Europe's VC activity remains smaller relative to its economy, the public sector plays a comparatively larger role in financing startups. European venture funds rely much more on capital from PFIs like the European Investment Fund, government agencies, and public banks than their American counterparts. In Central and Eastern Europe (CEE) specifically, government funding has been crucial – accounting for roughly 34% of total startup capital in 2023 in the CEE region. This heavy involvement has been necessary to compensate for the scarcity of local private capital and to nurture nascent ecosystems.

A direct outcome of increased state-backed funding is that European startup ecosystems have become more resilient and prolific in recent years. The number of startups and “unicorns” (billion-dollar valuation companies) in Europe has risen sharply. According to a 2025 report, the CEE region alone now hosts 52 unicorns – about 8% of Europe's total – with countries like Poland, Estonia, and the Czech Republic emerging as key contributors. Many of these high-growth companies benefitted from early support by public or quasi-public funds. For example, Estonia's tech success stories (Skype, Bolt, Wise, etc.) were aided by a mix of government innovation grants and EU-supported VC programs. Similarly, almost every major French startup has received Bpifrance funding. In France's latest “French Tech 120” list of top startups, 51 out of 120 companies had directly raised investment from Bpifrance, and virtually all had indirectly received Bpifrance support via its fund-of-funds LP commitments. This underscores how pervasive the state's reach is in France's cluster – there is hardly a French tech firm that hasn't been touched by public capital.

Crucially, state-backed VC is not just about pumping money – it also builds investor confidence and networks. When a reputable public fund anchors a venture fund or co-invests in a startup, it sends a signal that often leverages additional private investors who might otherwise stay on the sidelines. In Europe's smaller markets, this mechanism has helped kickstart activity. A case in point is Finland and the Baltic states, where government agencies set up seed funds in the 2010s, seeding dozens of companies which later attracted foreign VC. Over time, successful exits from these companies created local angel investors and know-how, reducing reliance on the state. This pattern – government steps in first, private sector gradually takes over – is a model echoed in many studies.

Nevertheless, challenges remain in Europe's VC landscape. One issue is ensuring that public programs are efficient and avoid crowding out genuine private initiative. Another issue is the scale-up gap: Europe now generates plenty of startups, but when it comes to scaling those into global leaders (the stage needing \$50+ million rounds), the capital often still comes from the US or other markets. European public funds are trying to address this by creating larger late-stage funds (for example, Bpifrance's “Large Venture” €1 billion fund focuses on big late-stage tickets, and the European Scale-up Initiative – ESCALAR – provides EU-backed guarantees to expand growth financing. Early evidence of cluster effects can be seen in sectors like fintech in London, AI in Toronto/London/Paris, and deep tech in France – all areas where public capital has helped gather a critical mass of firms and talent.

Case Studies: State-Backed VC Driving Cluster Development

To illustrate the impact of state-backed venture capital on cluster development, we examine two country cases – France and Poland – followed by a brief look at broader European and Ukrainian contexts.

- **France (Paris & Nationwide Deep Tech Cluster):** France provides a striking example of comprehensive state involvement in venture funding. Through Bpifrance, a state-owned investment bank created in 2013, the French government has deployed billions of euros into startups and VC funds. In 2022 alone, Bpifrance invested €1.6 billion into French tech startups and as an LP in venture funds (up from €1.5b in 2021). Cumulatively since 2016, it has invested over €7 billion. Bpifrance operates both directly (taking equity in startups at various stages) and indirectly (capitalizing private VC funds — it's an LP in at least 56 funds). The impact on France's tech clusters has been profound. Paris has rapidly become one of Europe's top startup hubs ("Station F" campus, etc.), and regional clusters in areas like AI, cybersecurity, and biotech are emerging, bolstered by Bpifrance's targeted programs. For instance, the government's Deep Tech initiative (€2.5bn program) managed by Bpifrance aims to create 500 deep-tech startups per year and has spurred spin-offs from universities across France. A concrete success story is PASQAL, a quantum computing startup from the Paris-Saclay research cluster: it benefited from Bpifrance at multiple stages — a €60k grant, a €250k seed co-investment, and later a loan and an innovation grant — which helped it bridge from lab research to a €30m Series A round. Such support has ensured that cutting-edge companies like PASQAL stayed and grew in France, anchoring a local quantum tech cluster rather than relocating to Silicon Valley. More generally, by being deeply enmeshed in the ecosystem (organizing hundreds of events, connecting startups with corporates, etc.), Bpifrance has strengthened the social fabric of France's clusters. The result is that France now regularly produces tech "unicorns" (e.g. Doctolib, Vestiaire Collective, Mirakl) and has a far more vibrant VC scene than a decade ago — something the French government consciously set out to achieve. This case underscores how a well-resourced public VC can catalyze a national innovation cluster, given a clear mandate and professional management. France's experience also shows the importance of going beyond capital: mentoring, networking, and even cultural shifts (encouraging researchers to found startups) were part of the strategy.

- **Poland (Warsaw and Emerging Regional Clusters):** Poland, an EU member since 2004, is another compelling case where public and EU-backed venture capital have propelled cluster development. Historically, Poland had very limited VC activity, but since the mid-2010s the landscape has transformed, thanks in large part to PFR Ventures — a government-owned fund-of-funds under the Polish Development Fund. PFR Ventures began its first programs in 2018 with capital from the Polish state and EU structural funds, explicitly aiming to "facilitate access to capital for Poland's innovative enterprises in an indirect manner" (i.e. via investing in VC funds). By 2024, PFR Ventures had grown into the largest institutional VC investor in Central and Eastern Europe, with a portfolio of 80+ venture funds that have invested in over 900 startups. These funds cover a range of stages and sectors, often requiring private co-investors alongside PFR's money. The availability of local venture funding has ignited Poland's startup scene — today, Warsaw and other cities host a thriving community of startups in fintech, enterprise software, gaming, and AI. Poland leads the CEE region in number of startups founded per year, aided by its large talent pool and increasing capital availability. Technology clusters are forming: for example, Warsaw and Krakow have developed fintech and enterprise software hubs, Wrocław and

Poznań host growing IT and gaming communities, and as noted in a recent report, Poland and the Czech Republic have built major gaming industry clusters thanks to a history of game studios (like CD Projekt Red) and strong university programs in game development. Notably, the gaming cluster's success has been reinforced by follow-on VC investments into new studios and gaming tech startups — many backed by funds in which PFR is an investor. Similarly, Poland has become a regional leader in AI startups, accounting for 23% of CEE's AI companies and over 20% of AI funding in the region. This emergence of an AI cluster is attributed to a combination of factors including government-backed research initiatives and funding programs that fostered innovation (e.g. grants via National Centre for R&D, and VC funds focusing on AI with public support). As a result, Poland now boasts AI-focused incubators, a network of investors, and startups that are gaining global recognition — creating a thriving ecosystem that likely would not have reached this scale without early public investment. Furthermore, Poland's use of EU funds for innovation (over €7 billion since 2004 in various programs) demonstrates how supranational support combined with national implementation can spur cluster growth in a catching-up economy. The Polish case illustrates that even without a long history of venture capital, a country can rapidly develop a startup ecosystem by leveraging state-backed VC as a keystone. It also shows the importance of coupling funding with human capital — Poland's high developer skill rankings and STEM education base provided fertile ground which, once financing was available, translated into tangible startup output. A key takeaway is the importance of fund-of-funds structures: by investing through dozens of funds, PFR Ventures cultivated a whole generation of local fund managers and thus created a sustainable financing infrastructure for clusters going forward.

- **European Union and Other Examples:** Beyond national programs, the European Union's role must be acknowledged. Through the EIF and initiatives like VentureEU (a €410 million pan-European fund-of-funds launched in 2018) and the newer European Innovation Council (EIC) Fund (focused on deep tech startups), the EU has directly infused capital into Europe's venture scene. The EIF, often acting as a limited partner in national and regional VC funds, has been particularly instrumental in countries with nascent ecosystems (such as in Southeast Europe). This EU-level backing often complements state programs and helps form cross-border investment linkages, contributing to cluster development in a broader sense (e.g. pan-European networks for sectors like clean-tech or life sciences). We also see city-level efforts: for instance, London — Europe's largest tech cluster — benefited from the UK government's initiatives (like the Enterprise Investment Scheme tax incentives and British Business Bank's venture programs) which attracted both foreign and domestic capital into the startup scene. In smaller economies like Estonia or Finland, government-backed VC (often through public pension funds or innovation agencies) has similarly been a cornerstone in building internationally recognized clusters (e.g. Estonia's cybersecurity and digital government tech cluster). The recurring theme is that public capital often lights the spark that then draws significant private investment once success stories emerge.

- **Ukraine (nascent cluster with potential):** Ukraine, though outside the EU, has a significant tech talent base and a growing startup scene, particularly in IT services, AI, and deep tech (e.g. drones, robotics). Before the full-scale war in 2022,

Ukraine had started to see the rise of tech hubs in Kyiv, Lviv, and Kharkiv, supported by a strong IT outsourcing sector. Venture funding was on the rise, and Ukraine produced several global startup successes (Grammarly, GitLab, People.ai, to name a few) often started locally by Ukrainian founders. Yet, financing for early-stage startups in Ukraine has been limited. Recognizing this, the Ukrainian government established the Ukrainian Startup Fund (USF) in 2019 as a state-backed fund to provide grants and seed funding to young companies. As of 2023, the Ukrainian Startup Fund (now under the Ministry of Digital Transformation) has supported over 380 startups with approximately \$8.7 million in non-dilutive funding. This injection of public seed money – though modest in scale – has been vital for many founders to develop prototypes and attract follow-on investors. Additionally, Ukraine's venture community and diaspora launched a new \$300 million Fund of Funds in 2024 aimed at anchoring local VC funds, with an eye toward post-war reconstruction and innovation. While this Fund of Funds is structured to be independent (with potential state participation later), it mirrors the kind of public-private approach seen in Poland. Early results are promising: even amid war, Ukrainian startups have continued to raise money (over \$500M in 2022–2023 combined, mostly from international VCs) and some are choosing to keep engineering teams in Ukraine, indicating confidence in the ecosystem's future. The case for state-backed VC in Ukraine is strong – as traditional investors perceive high risk due to the war, public and donor-backed venture funds could play a pivotal role in sustaining the tech sector and preventing brain drain of entrepreneurial talent. Already, Ukraine's government has created Diia.City, a special legal framework with tax incentives for IT firms, to cluster tech companies and investors. Coupling such initiatives with direct venture funding support (grants, co-investments) could significantly accelerate the formation of robust tech clusters in Ukraine's major cities once stability returns.

Benefits and Risks of State-Backed VC in Cluster Development

The examples above demonstrate several benefits of state-backed venture capital in fostering clusters:

- **Capital Formation:** The foremost benefit is simply increasing the pool of risk capital available to innovators. Public funds have filled financing gaps in pre-seed and seed stages where private money was absent or insufficient, thereby enabling many more startups to launch. In Germany, for instance, a noted outcome was that public seed programs “produced ventures that otherwise would not have existed, by providing capital without which the venture [would not launch]”. More startups launching and surviving past early stages increases the density of companies in a cluster, boosting its vibrancy.
- **Anchoring and Signaling:** By acting as an anchor investor in venture funds, the state sends a positive signal that draws in other investors. This multiplier effect means each public dollar can catalyze several private dollars. In France, every Bpifrance invests alongside private VCs encourages further investment in those firms; in Poland, PFR's 30-40% stake in funds was used to attract the remaining 60-70% from private LPs. Over time, as some investments succeed, local private capital bases form (e.g. successful founders become angel investors, domestic pension funds gain confidence to allocate to VC), which is crucial for a cluster's self-sustainability.
- **Targeted Cluster Growth:** State-backed VC can be directed towards strategic sectors or regions to kickstart clusters in priority areas. For example, if a country

wants to develop a biotech cluster, a government might create a biotechnology-focused venture fund or give grants to biotech startups, as France did with biotech and medtech funds via Bpifrance. Poland's government channeled funding into regional tech parks and accelerators, effectively seeding multiple city-based clusters. This intentional focus can accelerate the emergence of specialized clusters.

- **Preventing Early Exits and Exodus:** One of the challenges in weaker ecosystems is that promising startups get acquired or relocate abroad prematurely due to lack of local funding. State-backed funds help prevent this by providing domestic follow-on capital. The IMF study notes that Europe loses many startups to the US at the growth stage; public growth funds (like France's Large Venture, or pan-European growth funds) attempt to plug this "scale-up" gap so that companies can grow at home and reinforce the local cluster with jobs and know-how. Keeping success stories local is important because they often spawn spin-offs and inspire others (e.g., Estonia's Skype exit led to dozens of new startups founded by ex-Skype engineers, forming the nucleus of Estonia's current cluster – an outcome that was possible because Skype, although sold to Microsoft, left behind wealthy founders who reinvested locally).

On the other hand, risks and challenges of state-backed VC should be acknowledged:

- If not properly managed, public venture funds can result in poor investment decisions due to political influence or lack of experience. There have been cases in various countries where government-run funds invested in weak companies for non-economic reasons, leading to losses and criticism. This risk can be mitigated by structuring the funds to be run by independent professionals (as most European programs now do).

- There is the risk of crowding out private investors if the government remains in the market for too long or on too generous terms. For instance, if startups always expect grant money, they might not seek private capital, or if public funds invest at inflated valuations, it could deter private players. Thus, timing the withdrawal or handoff to private market is important. The SUERF policy note emphasizes that public intervention "needs to be carefully designed and fine-tuned as the industry progresses" – essentially, policies must evolve as clusters mature.

- Another challenge is ensuring additionality and not just subsidizing deals that would happen anyway. Public VC should aim to back companies that truly struggle to find capital but have high potential, rather than just co-invest in every lucrative deal (where it might just boost private investors' returns without adding new activity). Measuring this requires diligent oversight and impact assessments.

Overall, the European experience suggests that when these risks are managed, the net effect of state-backed VC has been very positive for cluster development. Publicly supported funds have clearly contributed to the emergence and growth of tech clusters in various European regions that were previously far behind global innovation leaders.

Conclusions and Recommendations for Ukraine

Europe's journey in venture capital over the last decade illustrates that state-backed venture capital can play a transformative role in developing technology clusters. By addressing funding gaps, anchoring private investment, and nurturing strate-

gic sectors, public venture initiatives have accelerated innovation ecosystems from Paris to Warsaw. Europe went from a VC backwater to producing a significant share of the world's tech startups — a shift that coincided with active government participation in the VC market. While Europe still trails the US in absolute terms, the trend is clearly toward a more robust and integrated venture environment, which bodes well for the continent's future clusters in fields like artificial intelligence, clean energy, and life sciences.

Key findings from this analysis include: (1) Public investment has been crucial in kickstarting VC activity in regions and sectors where private investors were scarce, thereby enabling more startups to form and grow locally. (2) Successful cases (France, Poland, etc.) share a common approach of using state funds in partnership with private capital — aligning incentives and drawing on professional expertise in investment decisions. (3) State-backed VC not only provides capital but also contributes to ecosystem-building through mentorship programs, network creation, and setting of standards (e.g. due diligence processes, governance practices) that help immature markets develop. (4) There are clear spillover benefits: clusters supported by venture financing see greater job creation, talent retention, and innovation outputs (patents, new products), which justify the public investment from a socioeconomic standpoint, provided programs are well-run.

For Ukraine, which is in the process of rebuilding its economy and has aspirations to become a regional tech hub, these lessons are highly relevant. Ukraine's tech sector has strong fundamentals — a large pool of IT engineers, a record of innovation (even under adversity), and growing integration with European markets. To capitalize on this potential, the Ukrainian government and its international partners should consider the following recommendations:

- **Establish or Expand Fund-of-Funds Programs:** Drawing directly from the Polish and pan-European model, Ukraine can set up a state-backed fund-of-funds that invests in both local and international VC funds willing to back Ukrainian startups. The recent UVCA-launched \$300M Fund-of-Funds is a move in this direction. The government (potentially with support from EU, EBRD, or other institutions) could participate as an LP to increase the fund's size and signal confidence. By taking, say, 30% of a fund's commitments, the public sector can help new VC teams get off the ground, which in turn will finance hundreds of startups. This indirectly builds a sustainable financing pipeline for clusters in Kyiv, Lviv, etc., without the state picking individual startup winners.

- **Scale Up the Ukrainian Startup Fund (USF) and Innovate Ukraine Programs:** Ukraine's existing startup fund has shown good progress in seed funding, but its scale (\$8.7M disbursed so far) is tiny relative to the need. Expanding this — again through donor or development bank capital injections if budget is tight — could allow it to offer larger seed grants or convertible loans to startups, bridging them to Series A rounds. Additionally, programs similar to Bpifrance's approach (e.g., innovation competitions, accelerators, regional outreach to universities) could be implemented to ensure pipeline of high-quality startups from across Ukraine's research institutions. This might include funding tech transfer offices or providing grants for prototype development in key clusters like aerospace (historically strong in Ukraine's Dnipro region) or agri-tech (important for Ukraine's agriculture economy).

- **Leverage Diaspora and International VCs:** Ukraine can also leverage its diaspora networks. Many successful Ukrainian-founded companies abroad could be encouraged to mentor or invest in Ukrainian startups if there's a co-investment scheme. For example, the government could sponsor a matching fund that matches investments from approved diaspora angels or international VCs into Ukrainian startups, thereby reducing risk for foreigners and attracting expertise along with money.

- **Focus on Strategic Cluster Areas:** Given finite resources, Ukraine should prioritize sectors where it has comparative advantages or urgent needs. Defence-tech (drones, cybersecurity) is one area where both government demand and talent exist – a state-backed VC fund for dual-use technologies could spur a cluster that not only serves military needs but also spins off civilian startups (similar to how Israel's Yozma program kickstarted its now-famous cybersecurity cluster).

- **Improve Regulatory and Tax Environment:** While not directly about funding, the regulatory climate is a big factor for VC and clusters. Ukraine has made strides with Diia.City (special tech zone) which provides tax breaks and IP protections. Continuing to refine these – perhaps introducing venture-friendly regulations like simplified IPO/listing rules domestically or legal frameworks for limited partnerships to make VC fund formation easier – will complement financial efforts.

- **Collaborate with EU and Neighboring Countries:** As Ukraine moves toward EU accession, it can already begin integrating with European innovation networks. Participating in EU programs (Horizon Europe research grants, Digital Europe, etc.) will bring resources and link Ukrainian clusters with European counterparts. For instance, Ukrainian startups could join EU accelerator programs or benefit from the EIC Fund investments. Poland's experience is instructive: it effectively used EU funds to co-finance its venture initiatives – Ukraine can negotiate similar innovation-focused aid as part of reconstruction packages. Additionally, regional collaboration with Poland and the Baltics (which geographically and economically are gateways for Ukraine) can create a larger combined market that attracts bigger VC funds.

In conclusion, state-backed venture capital is not a panacea but it is a powerful catalyst that Europe has deployed to good effect in building tech clusters. The balance of evidence indicates that when governments act wisely – providing initial risk capital, building investor confidence, and then gradually stepping back – the private sector responds with vigor, leading to self-sustaining innovation ecosystems. Europe's technology clusters are testament to this synergy between public policy and entrepreneurship. Ukraine, standing at the cusp of a major rebuilding and modernization effort, has the opportunity to harness similar mechanisms.

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