

Photonics Venture Capital Initiatives in Europe

Financing Photonics Innovations

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Financing of Photonics

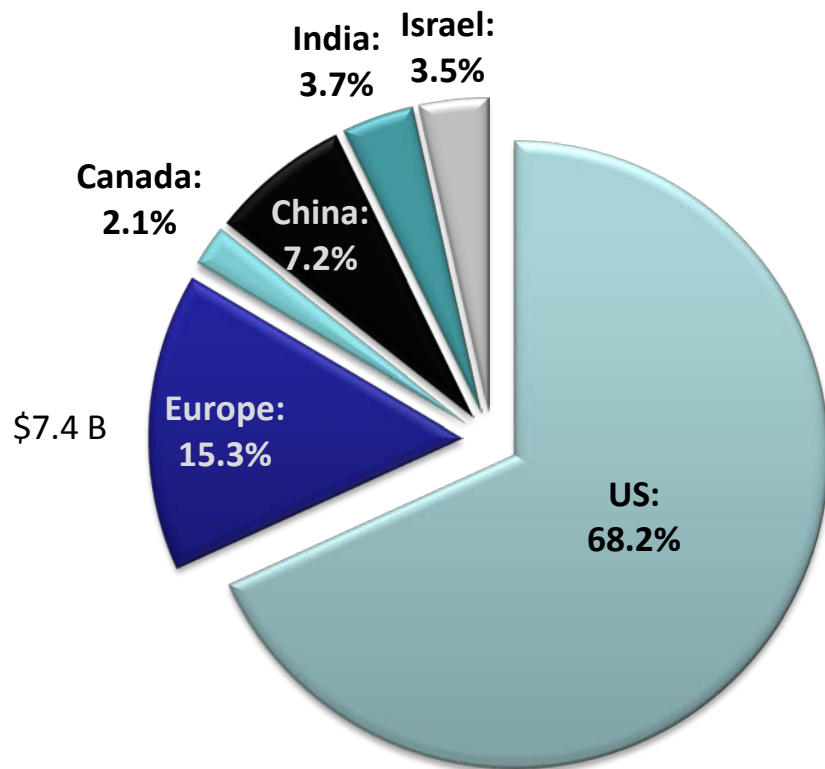
- ▶ Photonics technology has matured, now cost-effective for mass markets
 - Photonics market opportunities growing very rapidly
 - All segments (fiber optics, Solid State Lighting, laser manufacturing, medical diagnostics, consumer, mobile, displays, automotive lighting, etc.)

- ▶ Financing however has not kept up with the photonics opportunity and constrains new companies

- ▶ The ecosystem is beginning to react
 - Corporates
 - National Governments
 - EC
 - Private Initiatives

Venture Capital Financing in EU Still Seriously Lagging the US (4-5x less)

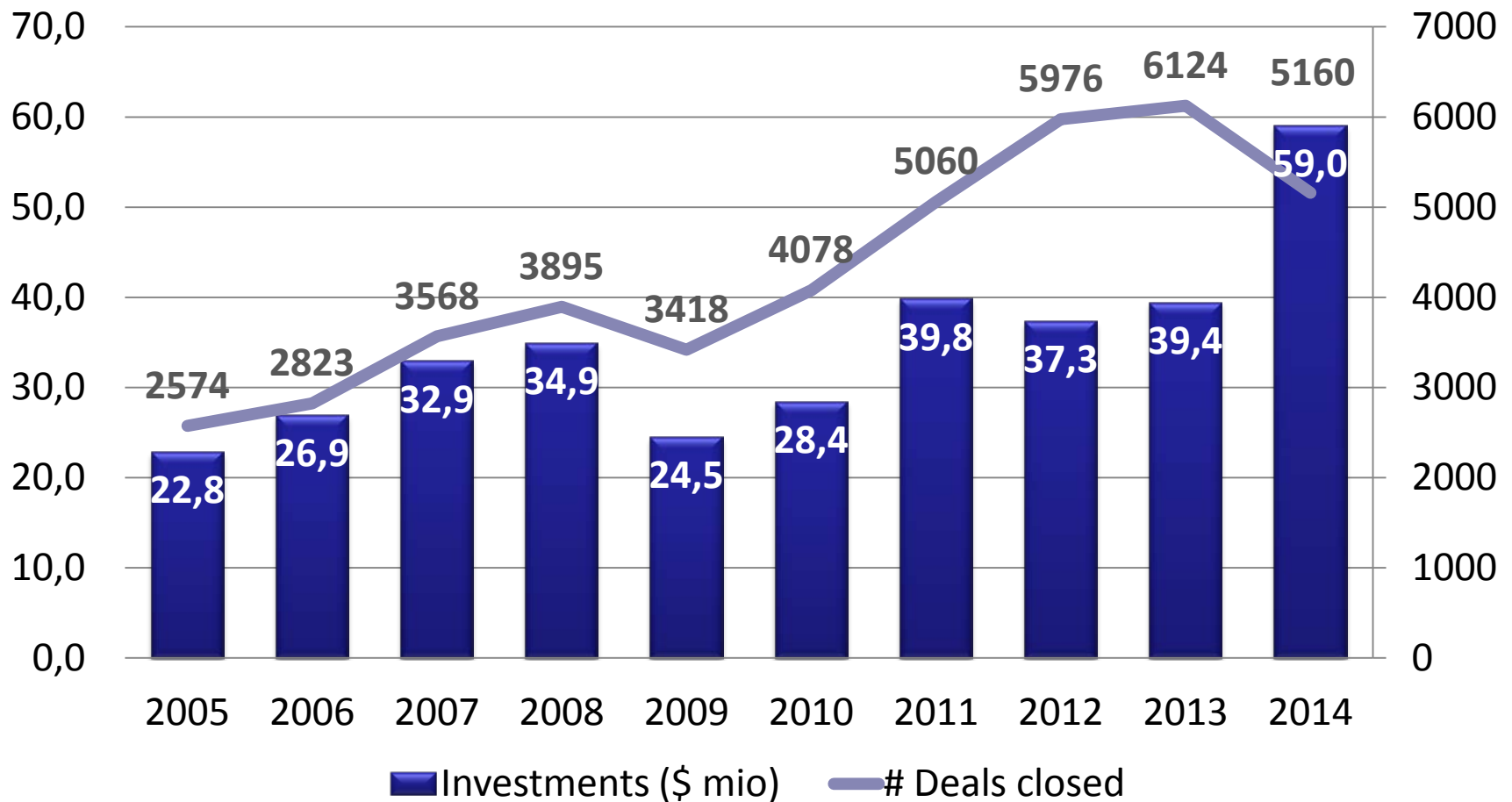
Global VC Activity By Geography
2013: \$ 48.5 bn



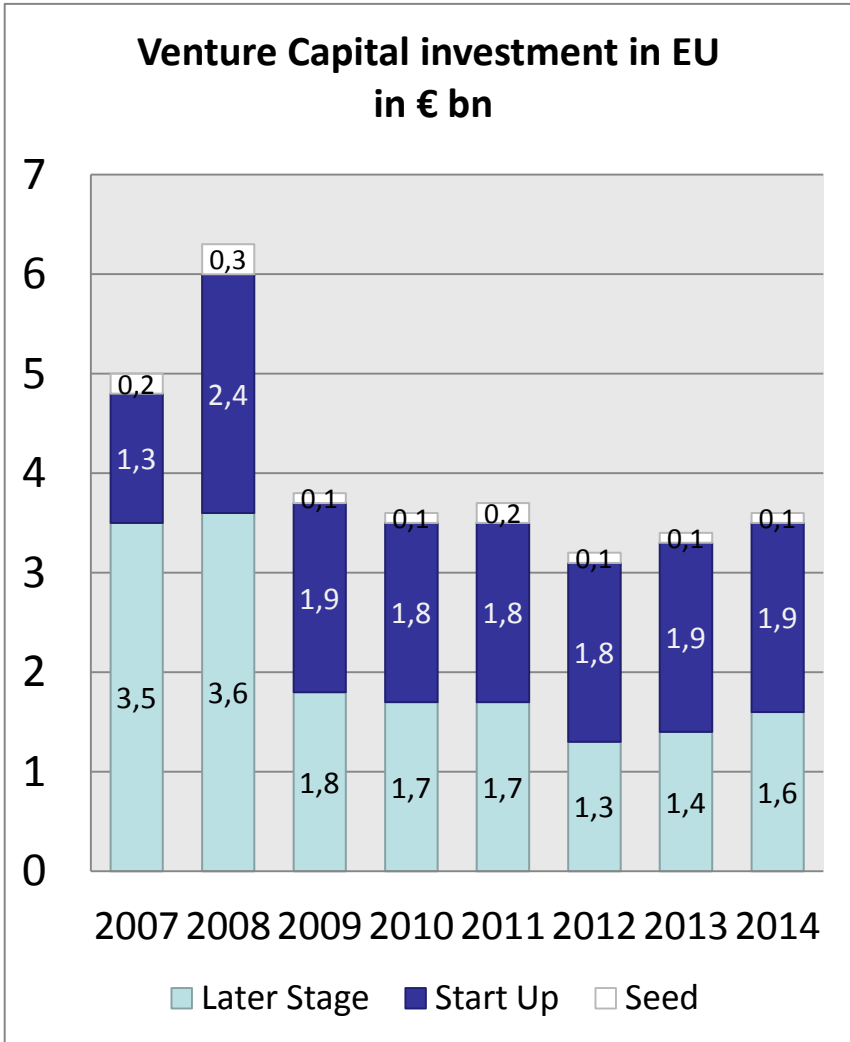
- ▶ Global VC investment \$49 bn in 2013, still below 2008 pre-crisis level of \$51 bn
- ▶ Europe makes up 15% of VC activities – hugely behind the US with 68% (4-5x less for a larger market)

.....And While US VC Seems To Be On Upswing.....

US Venture Capital Ideal Flows



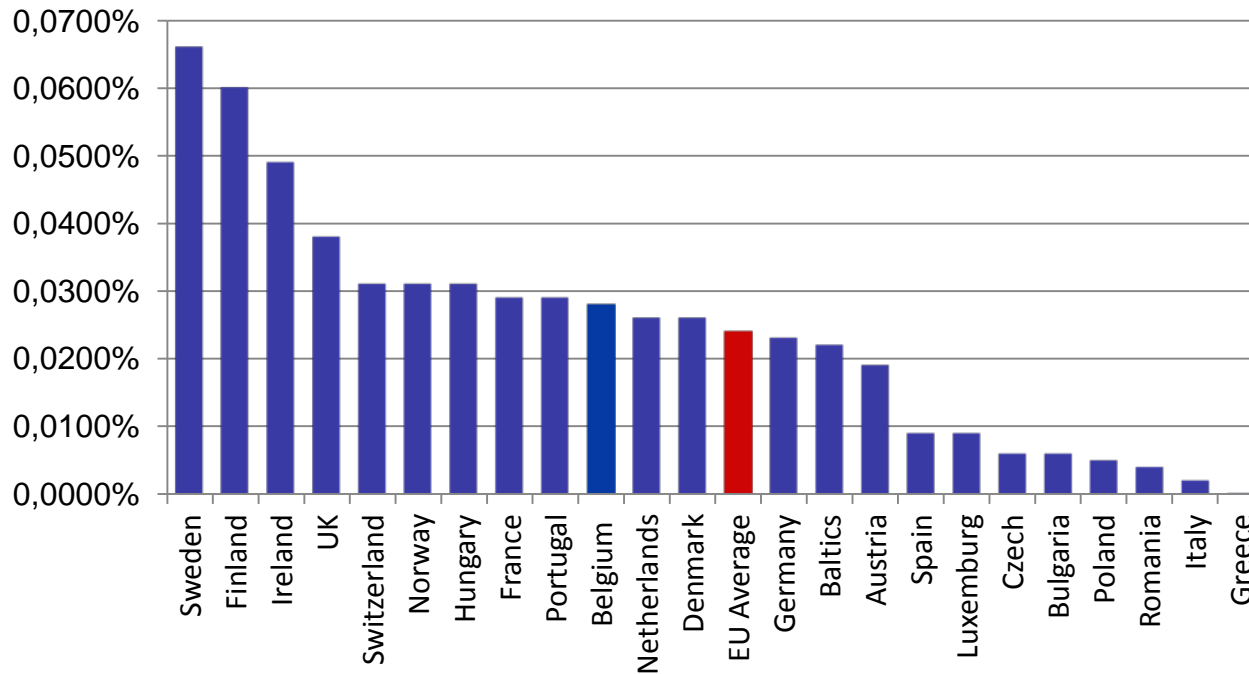
.....EU VC Spending Still Down From 2007-2008 Levels, Slow Recovery



- ▶ Venture Capital investment in Europe increased 6% in 2014 to € 3.6 B
- ▶ This is well below pre-crisis 2008 level of € 6.3 bn
- ▶ About 3200 companies were VC backed – thereof
 - 3 % Seeds
 - 53 % Start-up
 - 44 % Later Stage
- ▶ Life Science, Computer & Consumer Electronics, Communications, Energy & Environmental Sectors accounted for over 70% of all VC investment
- ▶ New VC Funds raised stand at € 4.1 bn in 2014 – only a slight increase from 2013 (€ 4,0 bn) and below the peak level of 2007 where new funds reached € 8,2 bn
- ▶ Fund raising by Investors (120 funds-103 firms)
 - ~ 35 % comes from governmental agencies,
 - ~ 14 % from pension funds
 - 12,5 % from corporate investors

EU VC Activities Vary Widely By Country (Investment vs GDP)

VC Investment by Country as % of GDP



► Big VC weighing difference by country

- Nordics, UK in lead
- France, Germany in average
- Italy and Spain “dead” for VC

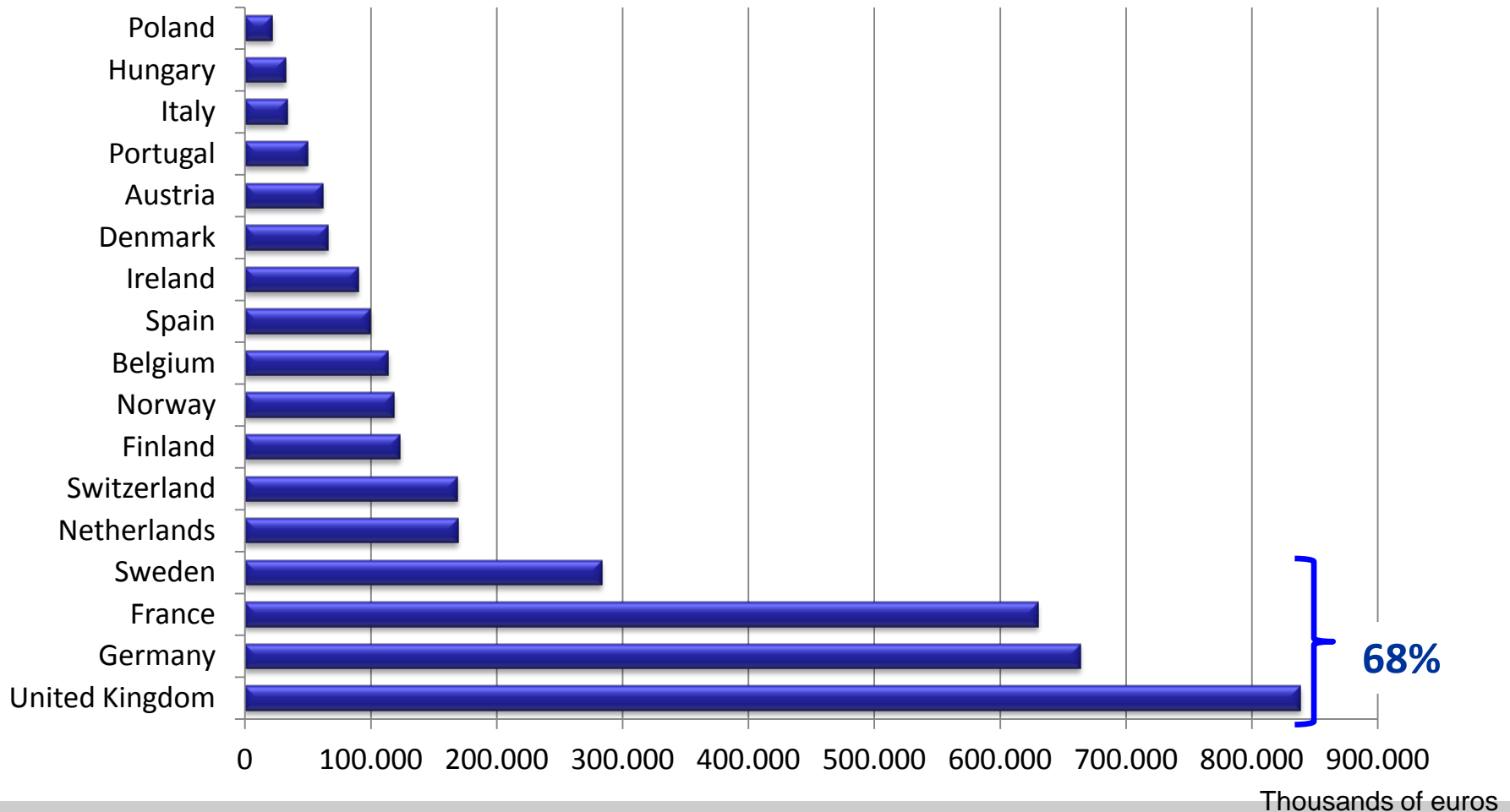
► From a Geographic Point of investment:

- 68 % are domestic investments
- 23 % are cross-border investment in Europe
- 9 % are abroad
- ..plus 10 % flow from EU to outside

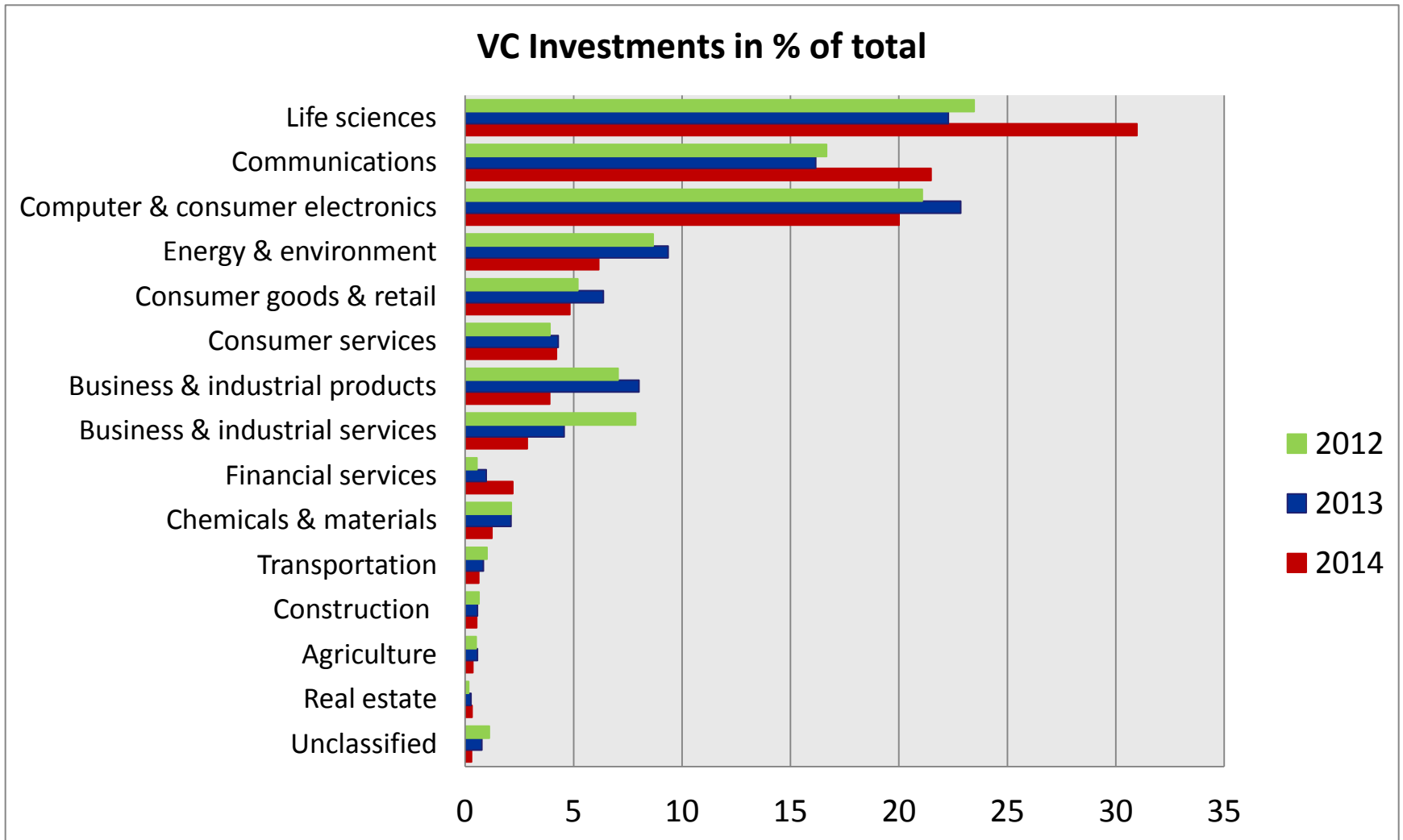
Source: EVCA 2014 European Private Equity Activity

EU VC Activities by County – Amount by Country 2014

VC Investment by County - Total €3.6 B

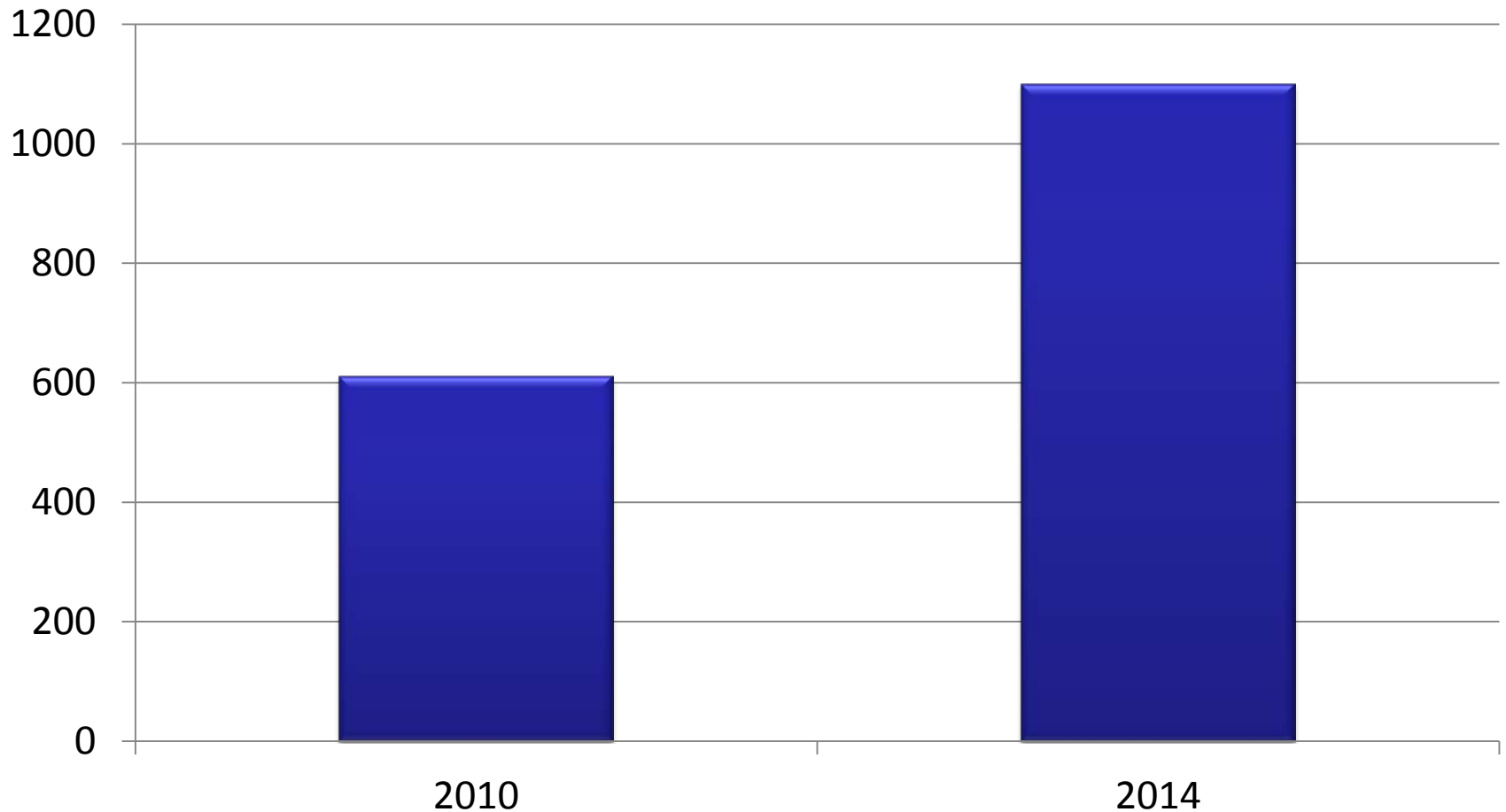


VC Investment Increasingly Focussed on Life Sciences and Mobile/InternetPhotonics Not A Major Focus



Stepping In To Fill The Gap: Major Increase In Corporate Venture Capital Funding Worldwide

Corporate Venture Capital Funds Worldwide



Corporate Venture (CVC) – Some Global Trends

Tech Corporate Venture Capital Investment Trends



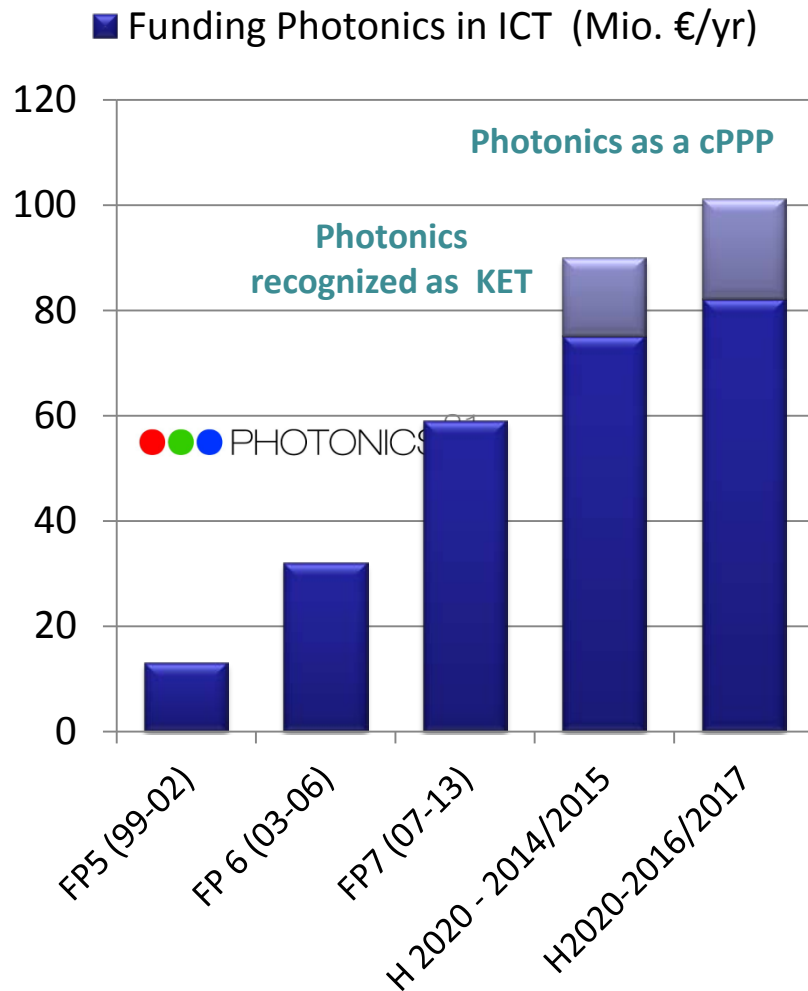
Corporate Investors Increasingly Engaged, Even In Early Stage (esp. US) - Huge - And They DO Focus on Hardware/Photonics

Companies engaged in Early Stage Deals	Deals 2013/2014	Annual Investments \$ M
Google Ventures	122	2804
Intel Capital	113	2568
Novartis Venture Funds	20	694
Qualcomm Ventures	45	659
GE Ventures	25	639
Comcast Ventures	30	627
Johnson & Johnson Development	20	509
Tengelmann Ventures	14	443
Samsung Ventures	25	439 ? Est. €1.2B/year
Siemens Venture Capital	6	412
SR-one	15	395
Cisco Systems	23	359
SingTel Innov8	9	350
Telecom T-Venture Holding	30	346
SoftBank Capital	38	332
Roche Venture Found	8	289
Juniper Networks	8	289

Google Ventures alone is 30x EC P21 funding!

- ▶ Huge level of investment
- ▶ Corporates now moving (in US) from their former “late stage” engagement into early stage.
- ▶ Since 2011 Google invested in 150 early stage companies followed by Intel (60), Qualcomm Ventures (49)
- ▶ Aside from Internet/Telecoms and Medical Sectors there are many “hardware” companies like GE, Johnson & Johnson, Siemens, BP
- ▶ Lower in the rankings also EU companies investing in KETs such as BASF, BMW, Evonik, ABB
- ▶ However, strong increase is (for now) mainly in US

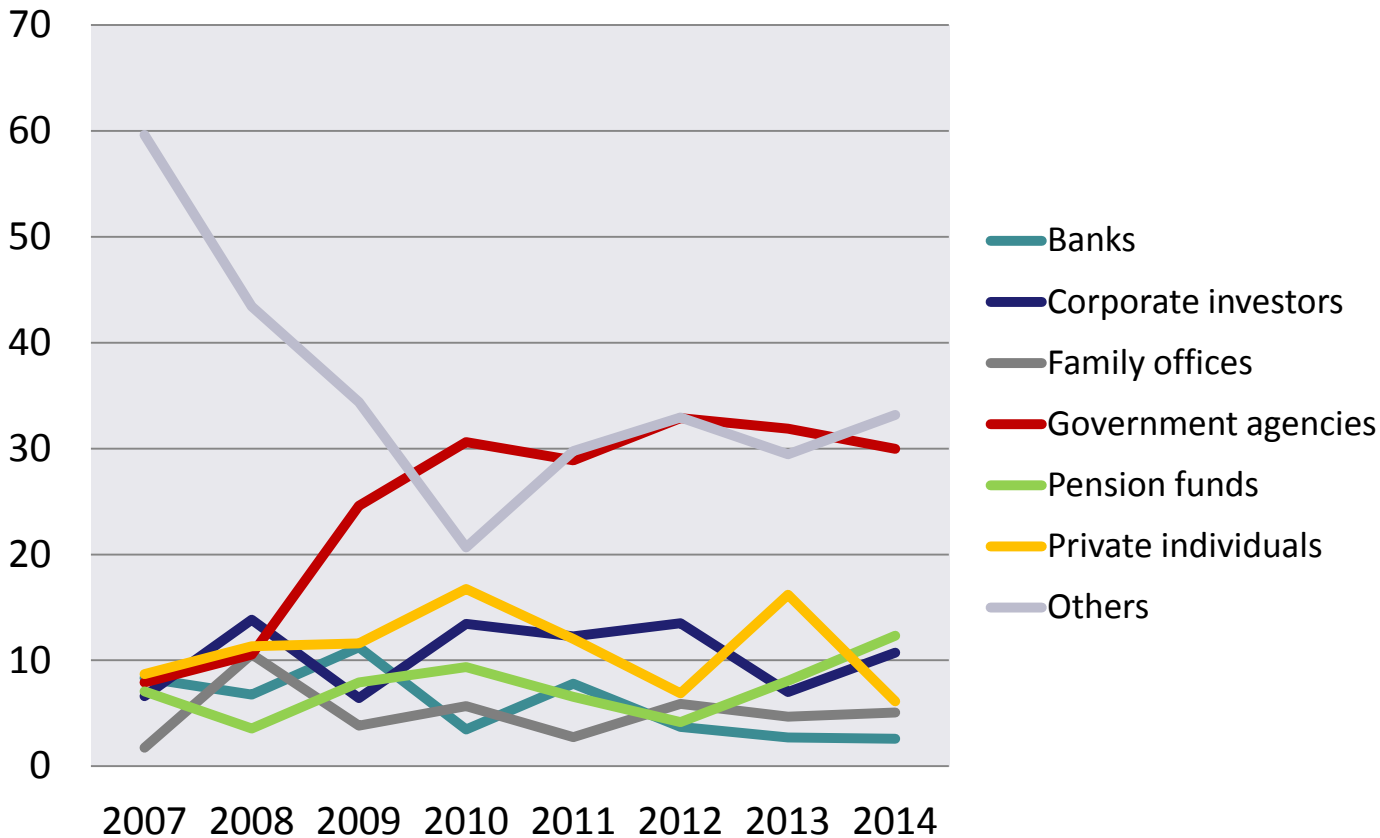
European Commission Funding of Photonics is Increasing and is Politically Critical, but is Very Small Compared To Other Financing Sources



- ▶ Photonics funding saw rapid increase in last 15 years
 - ..and people like to work with us P21 😊
- ▶ Current funding level exclusively for photonics is about €100M/year
- ▶ Plus lots of new financing routes being opened for photonics
 - Photonics as a KET
 - SME Instrument, structural funds, etc.
 - Juncker plan for SMEs
- ▶ Activity allows aligning entire ecosystem (e.g., today)
- ▶ However financing compares to:
 - €4-5B/yr VC (all segments)
 - Estimated €500M/year countries' internal programs

EU: Governmental Agencies are becoming very active in VC investment

Europe: VC Funding by type of investor in %



Government agencies participating in VC investments grew dramatically since the 2008 crisis – now reaching € 1.2 bn and 30 % share

Pension Funds and Corporates show an uptick since last year and have about € 500 mio. each (~10-12%)

Private Individuals declined from former peak of 16% (2010) to 10% (2014)

Examples:

Governmental Company Support (SME) in selected Member States

KfW Germany
Programmes
Debt Financing Public Initiatives
ERP Start-up Loan
ERP Start-up Loan Universal
Entrepreneur Loan
Entrepreneur Loan (subordinated capital)
ERP Innovaton Programm (Loan)
Equity Financing Public Initiatives
ERP Startfonds (Equity Capital)
ERPParticipation (Indirect Equity Capital)

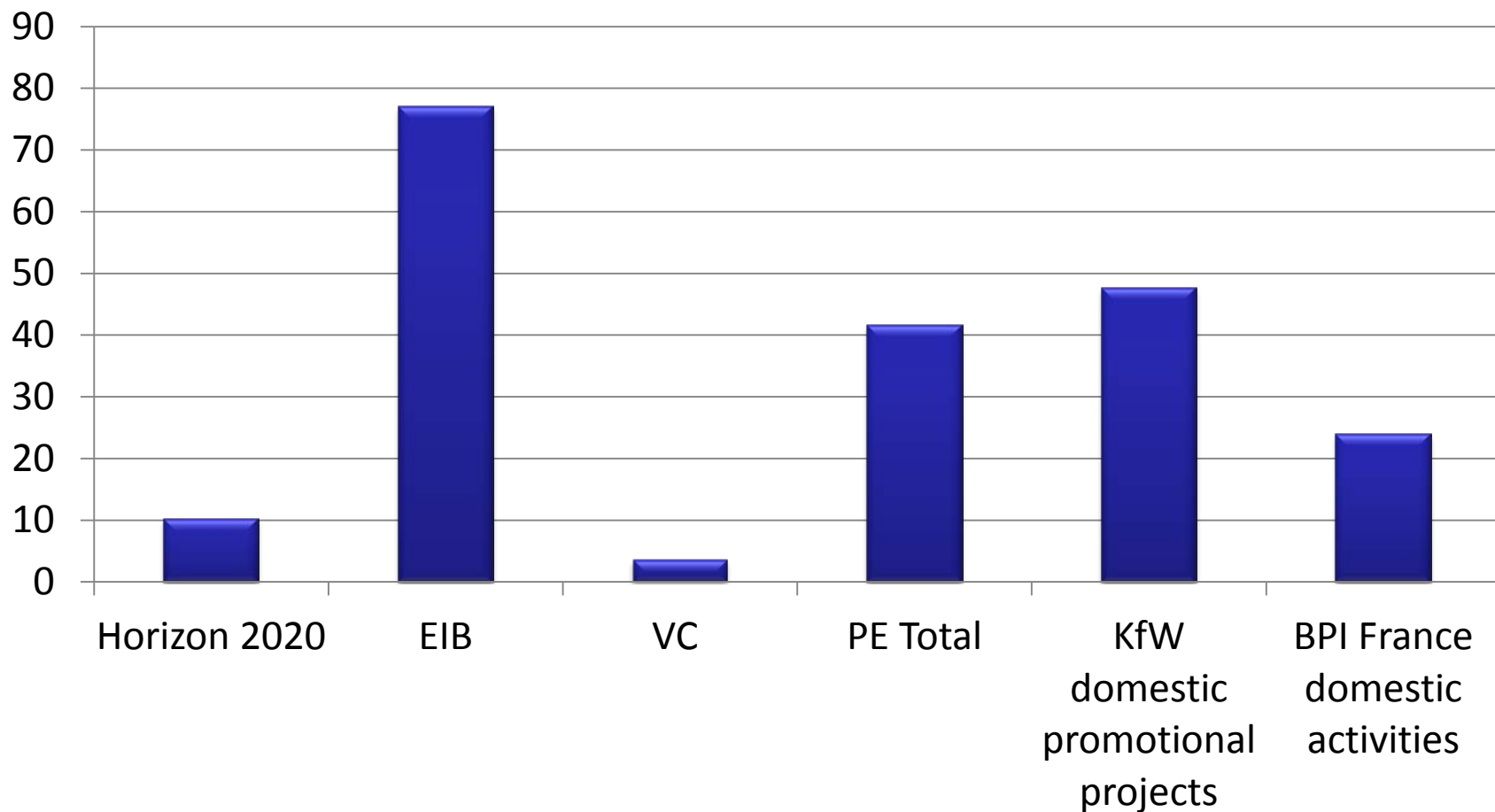
Cassa Istituto de Crédito Oficial (ICO)
Programmes
Debt Financing Public Initiatives
ICO Liquidity Facility (Loan)
ENISA Entrepreneur (Loan)
ENISA Competitiveness (Loan)
ENISA Technology Based Companies (Loan)
ENISA M&A (Loan)
SME Guarantee Programme
Equity Financing Public Initiatives
ENISA MAB (indirect Equity Capital)
FOND-ICOpyme (Direct and Indirect Equity Capital)

BPI France
Programmes
Debt Financing Public Initiatives
Prêt Participatif d'Amorçage (Loan)
Contrat de Développement Innovation(Loan)
Contrat de Développement Participativ
Prêt Pour l' Innovation (Loan)
Garantie Innovation (Guarantee)
Garantie de Caution sur Projects Innovants (Guarantee)
Credit Mediation Schemes (Advisory Support)
Equity Financing Public Initiatives
Contrat de Développement Participatif (Equity)
Fonds Strarègique d' investissement (Direct and Indirect Equity)
Garantie des Fonds Propres (Guarantee)

Cassa Depositi e Prestiti (CdP)
Programmes
Debt Financing Public Initiatives
Nuovo Plafond PMI Investimenti
Plafond OMI Credit vs. PA (short term liquidity support)
Fondo Centrale di Garanzia (Guarantee)
Equity Financing Public Initiatives
Fondo Italiano d' Investimento (Direct and indirect Equity Capital)

Europe: Funding of Businesses by various Institutions/Programs

Annual Funding in Euro bn (2014)



Crowdfunding – a new Instrument for Financing But Not Optimal For Many Photonics Business Models

No.	Name	Country
1	Crowdcube	UK
2	Funding Circle	UK
3	Our Crowd	Israel
4	Ulule	France
5	FundedByMe	Sweden
6	MyMircroinvest	Belgium
7	Symbid	Netherlands
8	KissKissBankBank	France
9	Goteo	Spain
10	Seedrs	UK
11	Boomerang	Denmark
12	Derev	Italy
13	Companisto	Germany
14	Invesdor	Finland
15	Wemakeit	Sweden

- ▶ Crowdfunding gained some share – KPMG/Nesta estimate that it will increase from £200 M in 2012 to about £15 B.
- ▶ Seen as a chance for start-ups to boost their profile toward investors and customers – however risk of losing capital
- ▶ So far most visible companies applying for crowdfunding come from the consumer tech sector – tech online companies and food and drink business
- ▶ High capital needs/long leadtime/non-consumer photonics companies not ideally suited
- ▶ “Start-up Europe” program, which aims to strengthen business environment for Web and ICT based business, sees Crowdfunding as a method for lowering capital barriers. However a legal framework in Europe is missing
- ▶ 20 % are start-ups in the pre-revenue stage and 50 % are “early stage”

Individual Financing Initiatives: Invest in Photonics Conference – Bordeaux



- ▶ Held every 2 years in Bordeaux from 2008
- ▶ Has been the first EU conference focused exclusively on photonics
- ▶ Good track record. Since 2008:
 - ▶ 4 Conferences held so far
 - ▶ 40 % of companies presenting succeeded in raising funds
 - ▶ Supported raising € 50 mio. of funds
 - ▶ Average funding size € 1.5 mio

- ▶ Last conference (October 2014) in Bordeaux
 - 170 attendees from VC, Business Angels, Corporate Ventures; + 13 % versus prior conference
 - Thematic sessions on Environmental & Energy, Consumer Electronics, Life Science, Aerospace & Transport, 3-D-Printing and Advanced Manufacturing
- ▶ Selection Criteria: real market opportunity, unique value proposition, outperforming competition
- ▶ Key differentiation: Great speakers from global photonics end-users! Also great location...

Individual Financing Initiatives:

First European Photonics Venture Forum (EPVF), Rome



European Photonics Venture Forum (EPVF) on 16 April in Rome conducted by e-limited - initiated by FP7 project Lightjumps, a cooperation of Photonics Clusters

- ▶ NEW: started April 2015
- ▶ Aim of EPVF:
 - Market Photonics Sector to a wider investor community
 - Channel to finance for high-potential photonics businesses
 - Supporting sector in raising funds
 - Ensure photonics becomes a pillar of regional development
- ▶ Target Community
 - Entrepreneurs, Investors, Corporate and Policy
- ▶ Conference 2015
 - 24 companies selected and invited for a pitch
 - 21 high-level reviewers from Corporate and PE
 - 6 Award Winners – will be invited for a next session in Düsseldorf, December 2015
- ▶ Participants' geographical origin >50% non-local
 - 40% domestic (ie Italy)
 - 54% other EU
 - 6% non-EU

In Summary: Venture Capital Financing of Photonics

- ▶ Very little VC financing in Europe vs US (4-5x less), gap will likely widen
- ▶ The VC financing that exists is increasingly being directed at mobile/internet and life sciences, hardware investments seriously reduced
 - Hardware generally needs more capital, longer track to payback – less attractive
- ▶ Industrial Corporates are stepping in strongly to fill the gap (especially in the US)
 - Heavy focus in HW areas like photonics
 - More comfortable with more capital intensive, longer horizon investments
- ▶ European Commission financing of photonics significantly increased (and politically key) but small in proportion to other sources
- ▶ National EU governments have significantly increased their investments (e.g., KfW in Germany and BPI in France)
- ▶ Dedicated investment conferences focussed on photonics are beginning to gain traction (early days)

The Ecosystem is Beginning To Get Organized To Respond To The Market Opportunity

Thank You

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Brussels, May 29, 2015

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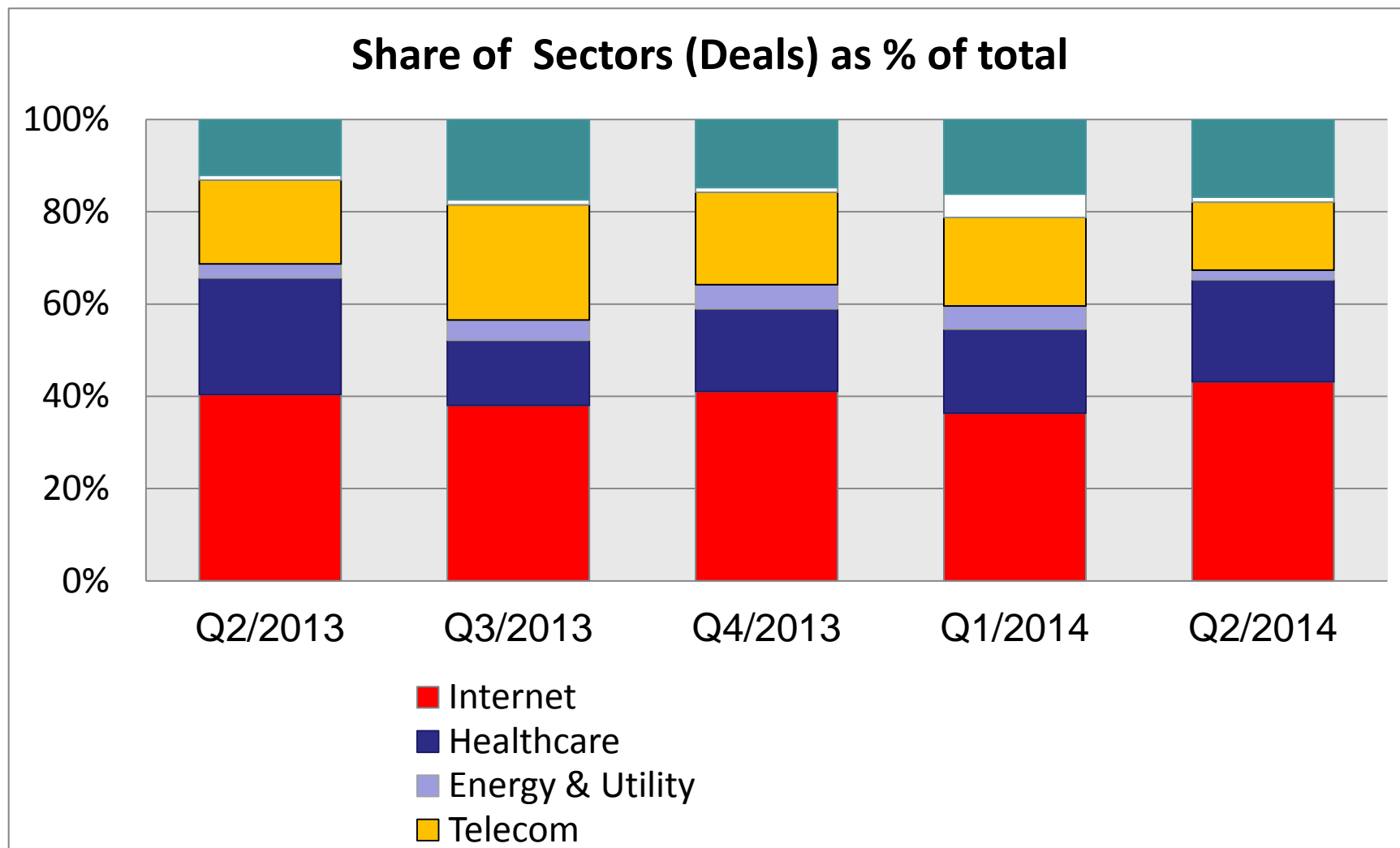
Venture Capital Trends – Do they apply for Photonics Segments ?

- ▶ What most VC companies are looking for makes it to some extent difficult for the Hardware Sector to attract VC funding. VCs want:
 - Rapid feedback to know if investments will pay-off
 - Fast route to profitable growth: Pilot production, market penetration and scaling
 - Low upfront investment (risk)
- ▶ Consequently favorite sectors for VC investments were and still are
 - Consumer services (such as e-commerce, gaming, web marketing, mobile interfaces, cloud technologies) – in EU ~ 50 % of VC investment
 - Information Technology – dominated by US in terms of deals and money invested – and 70% is in software
 - Health Care & Life Sciences where PE funding has long tradition - such as in biotech, medical devices (“guaranteed exits”)
- ▶ However – some Hardware Sectors are attracting business angels/VCs, especially
 - where open standards and modular approaches are applied, or
 - Where fast development/marketing is possible – e.g. Maker Scene (3D-Printing)

Financing Innovations in Europe – Wrap-Up

- ▶ Despite Europe's VC Investment levels do not reach US levels – the amount of capital which invested is in the range of billion Euros (comment from my side – not for the chart - compared to public funding which is at best in the range of 600 mio. even if we calculate broadly)
 - worthwhile to consider for financing innovations
- ▶ Software and Consumer Services are the main target of investments
 - however - some areas of investment interest match also photonics areas
- ▶ Corporate investors kick in to fill their innovations gaps –also outside Software
 - due to long-term commitment a chance for photonics start-up's
- ▶ EU Governmental measures are gaining ground in investing innovations and also take some measures to liberate capital flow within Europe
 - EIB Programs are available such as Project loans for individual projects , Intermediated loans, ESIF Financial Instruments , Project bonds
 - New EIB/ESIF Programs are considered to better meet the needs of financing innovations and fill the investment gaps
- ▶ Successful Member State Instruments for investing in innovation and growth introduced – e.g. KfW-Germany / BPI-France / Cassa Depositi e Prestiti –Italy

CVC – Corporate Venture Sector Focus (Number of Deals)



Corporate Venture (CVC) – Some **Global** Trends (II)

- ▶ Content focus
 - Alignment with growth strategy of parent
 - Financial returns
- ▶ Sector Focus:
 - Healthcare Services (nutrition, health informatics, diagnostics) – 30 % deals
 - Energy Services (Cleantech , Energy Efficiency, Resource Efficiency)
 - ICT / New Media ~ 30 % of deals
 - Performance Materials
- ▶ Investments Hotbeds (percentage of deals) in 2013
 - US – 65 %
 - Europe – 15 %
 - UK 4%
 - Germany 4 %
 - Asia – 15 %
 - China 4%
 - Japan 4%
 - India 3%
 - Other (most infrastructural e.g. in Moscow, Czech Republic)

Our Experiences: Findings from both Photonics Conferences

- ▶ Private Equity Investments in Photonics mainly comes from Corporate Investors – engagement of Venture Capitalists decreased
- ▶ Main Investment Focus is on Consumer Electronics and Life Science
 - Some interest also in Transportation & Aerospace
 - Hardware becoming a “zombie sector” in US and EU – slightly different in Asia
- ▶ Especially large ICT companies seek buying innovations/entrepreneurs within their large R&D/M&A Budget – far above typical VC budgets
 - e.g. Samsung Ventures has a budget of \$ 1.2 B/year to invest in new technologies, compared to typical VC fund investing ~ \$ 100 M/10 years
 - e.g. Google’s investment for data centers/servers would comprise 200 mio. servers – means investment for 50 mio. optical connections
 - Apple by-passes investments by directly hiring promising photonics engineers
- ▶ Corporate Investors – opportunities and risks
 - ↑ Mid/Long-term Commitment
 - ↑ Strategically driven to implement in markets
 - ↓ Integrate entrepreneurs in large organizations/ bureaucracy

Global Venture Capital Activities – Some Global Trends II

▶ **Business Angels increasingly supporting Entrepreneurial Businesses**

- Business Angels and Incubators expanding their presence in seed and early stages. In US increased their share in start-ups from 14% in 2007 to 26% in 2013.
- They also increased their share in later stages such as product development (18%) and even Revenue Generation (10%)

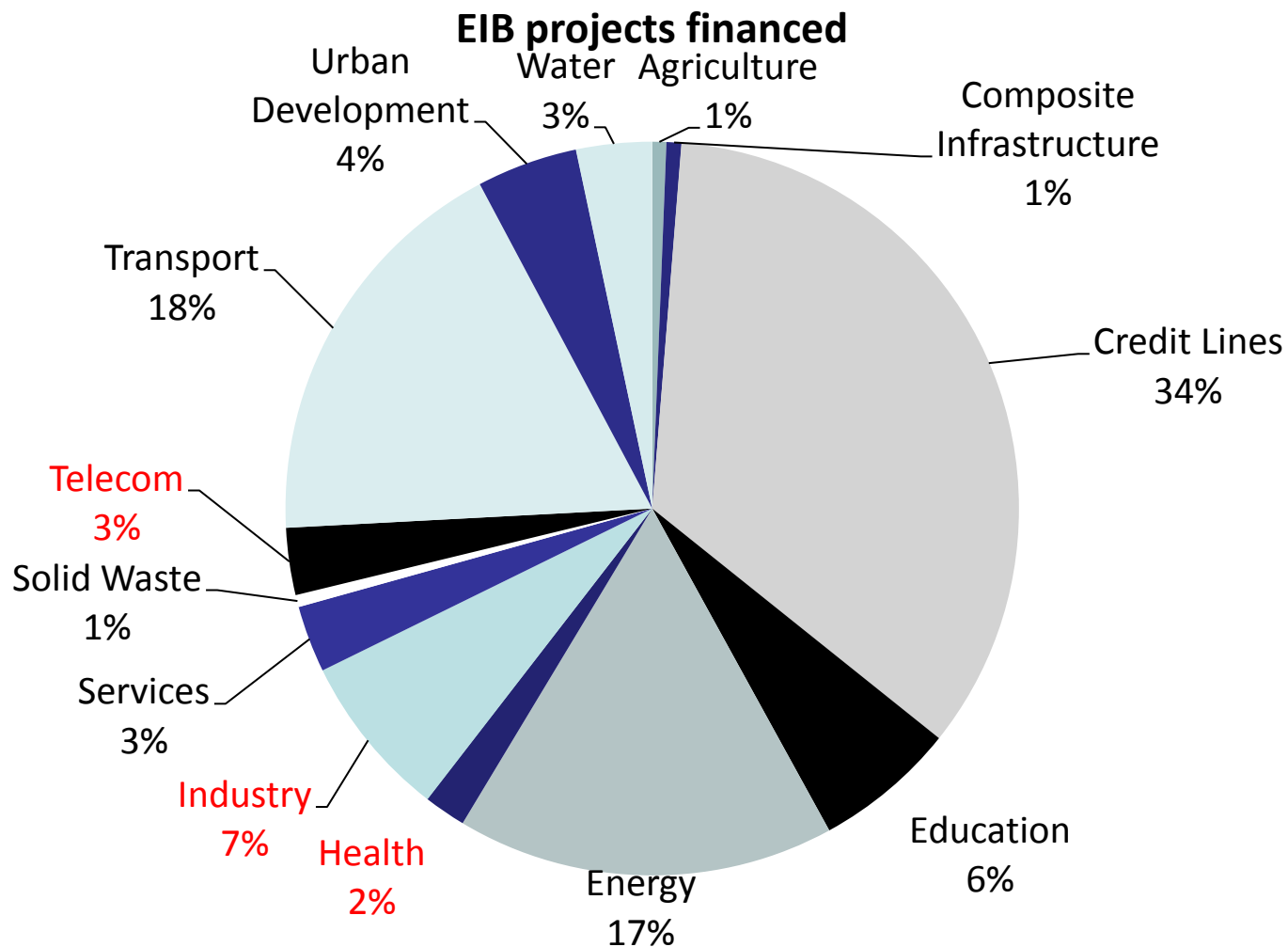
▶ **Global VC Fundraising Activity**

- Overall Fundraising activity dropped from 2012 to 2013 – both in number of funds financed (from 344 to 325) and in amount of money raised (from \$ 34 B to \$ 28 B).
- In terms of number of funds closed 2013 US had an share of 64 % (207 funds) and Europe of 18 % (58 funds) – same as their relative share in annual activity
- In terms of money raised both regions experienced a decline of 6%. US dropped from \$ 21B to \$20B, and Europe from \$ 5B to \$ 4.7B

▶ **Excess Capital (“Dry Powder”)**

- Despite fewer funds tackling capital the amount of “dry powder” - excess capital – also increased by 3 % in 2013 versus previous year
- US-based companies have now 22 months of investable assets. Europe has 26 months and Asia is higher with 74 months

EIB Projects 2014 by Sector – Total €77 B

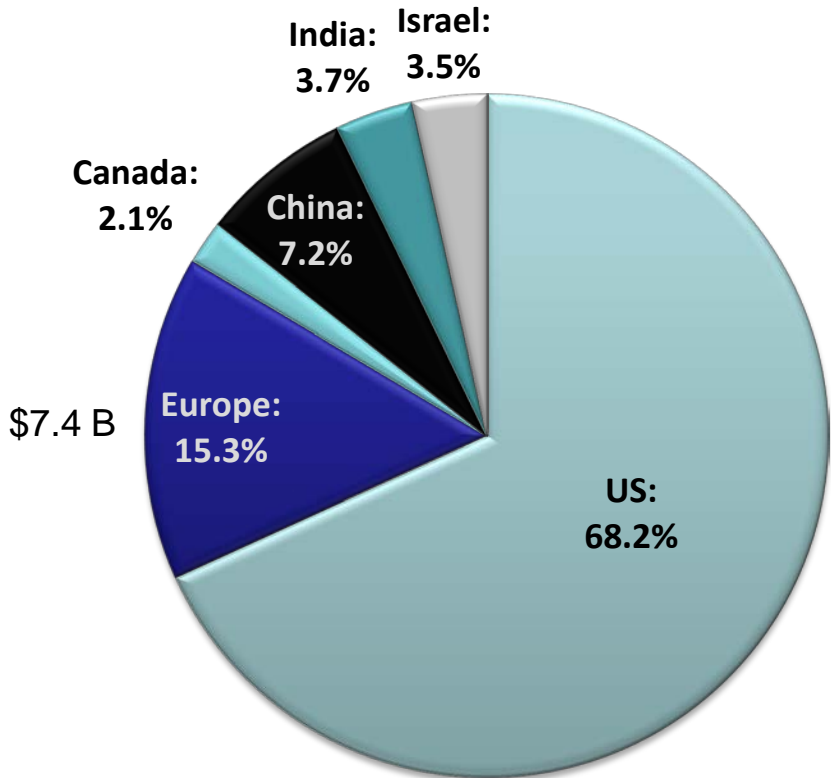


SME Financing – Governmental Instruments (EU + Member States)

- Done mainly by banking credits - but they are costly especially for those SME's in crisis affected countries in Southern Europe
- Support initiatives LTROs (and new TLTROs) for banks to initiate SME financing/credits have not contributed to raise lending
- Securisation of SME loans to shift risks from banks to capital markets is a possibility to shift capital in real economy – however level shrank
- Governmental support: Public institutions tried to support SME's but are limited due to cost for taxpayers issue. Success so far are limited to some countries
 - Germany : KfW - quite successful to achieve private capital involvement with a variety of instruments like ERP-Star-up loan, Entrepreneur Loan, ERP Equity Capital or ERP Participation Programs
 - € 11,3 bio. new gross lending
 - 34000 entrepreneur loans
 - 2,6 bio. for start-up's loans
 - France: Banque Public d' Investissement (Bpifrance) – similar model than KfW
 - France has loans € 8 bio. for banking credits of 60.800 enterprises
 - Grants of 747 mio. for innovations
 - Investment in ~ 1000 enterprises / year
 - Italy – Cassa Depositi e Prestiti (CdP) coordinated various programs for debt financing public initiatives as well as equity financing
 - Spain Instituto de Crédito Oficial (ICO) and Empresa Nacional de Innovación (ENISA)

Venture Capital Financing in EU Still Seriously Lagging the US (4-5x less)

Global VC Activity By Geography
2013: \$ 48.5 B



- ▶ Global VC investment \$49B in 2013, still below 2008 pre-crisis level (\$51 B)
- ▶ Europe makes up 15% of VC activities – hugely behind the US with 68% (4-5x less for a larger market)
- ▶ China VC market lost share and dropped from former 11% share to 7%
- ▶ VC & PE dynamics and trends – according to E+Y 2014 VC report
 - VC becoming more risk averse and shifting investments to later stage
 - Corporate Investors increased activities in later stage to fill their innovation gaps
 - Governments start creating entrepreneurial ecosystems where equity investments can grow (both debt and equity side)
 - Crowdfunding as a new mechanism is used by some seed financing (mainly b2c)

Governmental Initiatives – Enhancing Role of EIB (I)

- ▶ EIB - owned by 28 EU Member states. Subscribed capital of EUR 243bn
- ▶ Most important instruments of EIB are:
 - **Project loans for individual projects** for investments > € 25 mio.. Lending sum up to 50% of the total cost. Current average share of the EIB is 1/3 as the activities of the EIB attract investors from the private sector.
 - **Intermediated loans** are loans which are passed to local banks and which are then “lent-on” to SMEs, Mid-Cap businesses but also public sector bodies when financial resources deployed for objectives that are in line with the EIB’s policies – for instance economic and social cohesion.
 - **ESIF Financial Instruments** transform national financial resources coming from the EU budget into financial products such as loans, guarantees and equity. Management made by the national authorities. These financial instruments have been used so far for Structural Fund investments.
 - **Project bonds** are the most recent product of the EIB. Private/public project companies investing into large scale projects in the field of energy, transport and broad-band infrastructure could benefit from a credit enhancement: The EIB guarantees a tranche of subordinated debt so that the credit standing of the senior debt (project bonds) is enhanced and becomes more attractive for institutional investors. Eligible Projects are selected by the EIB.

Governmental Initiatives: Enhancing Role of EIB (II) – EIF Related

- ▶ EIB holds a 62% share of the European Investment Fund (EIF) which provides venture capital to small and medium size enterprises. The success of the measures of the EIB and the EIF with regard to public and private investment in the Euro crisis has not yet been fully assessed.
- ▶ Currently discussed options to extend EIB activities
- ▶ **Option 1:** Increase flexibility of ESIF Financial instruments. Make use of financial resources coming from EU budget more flexible to leverage them in national ESIF financial instruments.
- ▶ **Option 2:** Increase special activities reserve. Investment activities which carry a higher risk are normally backed up by a “special activities reserve” which currently amounts up to EUR 6.1bn. One possibility would be to increase the EIB’s special activity reserve. Problem: Keep AAA Rating or raise more capital from member states which run contrary to austerity efforts
- ▶ **Option 3:** Strengthen the capital base of the EIF - requires additional resources coming from the EU member states. This could be done by rededication of resources coming from ESM or EFSM
 - Rededication of financial resources coming from the ESM (either guarantees or parts of the cash reserve) to recapitalize the European Investment Fund (EIF). Problem: Objections by some Euro area countries – and unanimity is required in order to redefine the purpose of ESM guarantees.
 - Politically more feasible would be the rededication of financial means coming from the small *European Financial Stability Mechanism (EFSM)*, a EUR 60bn facility which is attached to the European Commission and which complemented the EFSF in its financial aid to Ireland (EUR 22.5bn) and Portugal (EUR 26bn) back in 2010 and 2011. Currently a sum of about EUR 11.5bn would still be available. However, there are also plans to rededicate these financial means to the balance of payments facility – a rescue mechanism of Non-EMU countries.