

Raising EU R&D Intensity

Improving the Effectiveness of Public Support
Mechanisms for Private Sector Research and
Development : **Guarantee Mechanisms**

Report to the European Commission
by an Independent Expert Group

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Directorate-General for Research
Knowledge Based Society and Economy
Strategy and Policy, Investment in Research

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EUROPEAN COMMISSION

RESEARCH

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Foreword

The EU is currently lagging behind both the USA and Japan in terms of expenditure on R&D as a proportion of GDP, primarily due to slow relative growth in business R&D expenditure. The European Council set an overall target of 3% of GDP by the year 2010, with industry asked to contribute two thirds of this objective. To approach these levels, dramatic improvements are needed in the effectiveness of policies used to stimulate private sector R&D.

In order to review how progress could be made towards this goal, the Commission services set up four expert groups to explore and enhance the potential of different financial and fiscal policy instruments. These different expert groups investigated respectively: direct measures, fiscal measures, risk capital measures and loan and equity guarantee instruments. An overarching Expert Group, the policy mix group, was also charged with reviewing the relationships between the mechanisms dealt with by the four groups and considering how these measures might be combined most appropriately to stimulate private sector R&D.

The specific aim of this report is to offer suggestions and guidance concerning the use of guarantee mechanisms to foster loan and equity financing of research. Starting with an overview of the role of guarantee schemes, the report reviews the use of these instruments and the influence of framework conditions. Building upon this review, the report presents a series of recommendations for policymakers across the EU.

I should like to thank all the experts who took part in the production of this timely report, particularly the Chairman of the expert group, Dr. Braumann. Their work contributed significantly to the Commission's own thinking and to the preparation of the Communication from the Commission: 'Investing in Research: An Action Plan for Europe'. It contains much of value to all those concerned with the formulation and delivery of effective R&D policy mixes. As such I trust that it will stimulate the process of mutual learning needed to realise not only the 3% target for R&D, but also the target set at Lisbon of becoming the most competitive and dynamic knowledge-based economy in the world.

This report, as well as the reports of the other Expert Groups, is available on the Commission Web site <http://europa.eu.int/comm/research/era/3pct>.

Philippe Busquin
European Commissioner for Research

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EXECUTIVE SUMMARY

1. Considerably less money is spent on research and development (R&D) in Europe than in the US and Japan, and the gap appears to be growing. In the year 2000, Europe's R&D expenditures totalled 1.9% of GDP, versus 2.9% in Japan and 2.6% in the US. This is a cause of concern, since a high level of R&D is a key contributor to competitiveness and economic and social welfare. Due to this concern, the Lisbon European Council adopted the objective of making Europe the most dynamic knowledge-based economy in the world. Furthermore, the Barcelona European Council, set a target for R&D spending in the European Union of 3% of GDP by 2010, two thirds of this to come from the private sector (the "3 percent goal"). The author of this report, the expert group on Equity and Loan Guarantees, was charged with determining the specific contribution that equity and loan guarantees, as well as other risk sharing mechanisms associated with loans and equity, can make to achieving the 3 percent goal, and to make recommendations and formulate guidelines for European, national and local actors.

2. Loan and equity guarantees are financial instruments which transfer part or all of the risk of investment from investors to the provider of the guarantee (the "guarantor"). The most basic justification for guarantees is *market failure* in the sense that R&D projects with favourable risk-return profiles are unable to obtain external financing. Many investors have difficulties in assessing technology risk and potential future returns from R&D investments and thus avoid this type of investment. This problem is especially severe in the case of new companies, where there is also a lack of history or "track record" upon which investment decisions can be made. Guarantees may thus be a useful mechanism for overcoming this type of market failure and encouraging private sector actors to invest more in R&D.

3. There are a number of potential advantages of guarantees as a financial instrument to promote R&D investment: in principle guarantees can have a leverage effect by mobilizing private resources, thus resulting in a lower burden on public expenditure. Furthermore, they can be relatively easily be directed at specific targets; and they can help encourage "public-private" partnerships by structuring the sharing of risk. Finally, regulatory considerations, such as the proposed Basel II bank capital adequacy standards, or limitations on the types of investments pension funds and insurance funds can make, may make guarantees desirable to promote investment. At the same time guarantees have a number of potential problems which must be carefully considered when designing and implementing guarantee programs.

4. The first recommendation of the expert group is that **Member States should improve their practices in evaluating guarantee programmes, and to include the impact of these programmes on R&D investment as one of the criteria of success of the programmes.** The lack of evaluation studies of guarantee programmes in general, and in particular on R&D additionality, makes it difficult

to make predictions about the probable impact of guarantee schemes. Also, there is a need for exchanging information about the design features of and experiences with guarantee schemes, for example with risk assessment. Furthermore, **learning structures for diffusing the results of good practice and for assessing the impact of guarantee schemes on R&D spending should be created.** The EIF is already involved in this area and could potentially increase its role significantly.

5. Given the lack of evaluation studies pointed out in point 4 above, it is not possible to make precise statements about the potential impact of an expansion of guarantee programmes on R&D investment in Europe. Nevertheless, the expert group believes that there is a case for using equity guarantee programmes to encourage the entry of new Venture Capital firms where such firms are lacking. Therefore, the second recommendation is that **EU member states without a developed venture capital industry, and in particular without “early stage” venture capital firms which focus on providing seed and start-up capital, should consider introducing equity guarantee programmes.** Furthermore, **the EIF could help support this development by providing counter-guarantees for these new programmes.** The European Commission’s mandate to the EIF and existing regulations should be examined and, if necessary, altered to allow the EIF to provide this support.

6. A third concern of the group is to enhance the flow of external finance to established SMEs, especially during a time when it appears that it is becoming more difficult for these firms to get bank loans. The group believes that there is a case for targeted innovation loan guarantee programs, or for modifications of existing horizontal loan guarantee programmes to provide more generous conditions for R&D investment. **Member states without a targeted innovation loan guarantee scheme should thus consider the establishment of such a programme. Alternatively, member states with existing horizontal guarantee programmes should consider introducing special provisions for R&D-related investments. This could be done either by introducing more generous risk criteria for R&D-intensive companies or by defining an additional guarantee trigger such as the failure of the R&D project.** Furthermore, **the EIF could support this by managing a scheme providing counter-guarantees for new national and regional innovation loan guarantee programmes, or for horizontal programmes with special provisions for R&D-related investments.**

7. A final recommendation of the expert group is that the flow of finance to innovating SMEs, and perhaps to larger firms as well, can be usefully stimulated through the broader use of innovative financial practices and products. One such product is the securitisation of SME loan pools, which typically include some loans for R&D and innovation. The experience to date with loan pool securitisation should thus be examined with an eye to the expanded use of securitisation at a national level and, backed by the EIF, at European level. **Member States should then consider broadening the remit of existing agencies or development banks to include loan securitisation.** In addition, **the EIF could support this development by participating in securitisation,** as it has done already in several EU countries. The European Commission should give a mandate for the EIF and provide the necessary financing to manage a new facility specifically for loan securitisation. Furthermore, **as part of the securitisation**

initiative, the possibility of creating a pan-European market for the rating (including technology rating) of SMEs should be considered. Inasmuch as this would help public guarantee institutions to assess risks, public agencies should consider bearing at least a portion of the costs of such a scheme, which can be high relative to the resources of SMEs. Finally, a second product, which has not yet been widely used but which in principle could support R&D finance, is an insurance product that would insure companies against the risk of failure of R&D projects. Since this is a product primarily offered by the private sector, the European Commission can best support it by monitoring its use in other countries and by encouraging a discussion of its merits.

1. INTRODUCTION

Research and development (R&D) is the set of activities through which new products and production processes are discovered and refined. For a number of reasons, the amount of R&D performed (as measured through the level of expenditure on R&D activities) is becoming an issue of greater importance for public policy. First, the product life cycle is widely held to be accelerating, i.e. the number of years a specific product may be sold profitably is being reduced. This means that R&D activities must be increased so that companies, and the countries and/or regions they are located in, can keep up with the next product generation. Second, there is a generalised trend away from mass towards specialised goods and services. Since economies of scale by definition are lower in specialised than in mass production, R&D activities must be higher in order to compete in these new markets. Third, it is a widespread belief that there is a shift from an industrial to a knowledge-based society, in which conceptual work such as R&D plays a key role. Policy makers increasingly believe that the level and efficiency of R&D activities are important determinants of the overall well-being of societies, due to the importance of economic competitiveness for achieving economic and social welfare.

For these reasons, indications that R&D activity in Europe is behind other major economies such as the US and Japan should be a cause of concern for policy makers. The US and Japan spend a considerably greater proportion of GDP on R&D than Europe (2.6% and 2.9% versus 1.9%, respectively). Furthermore, the gap has increased in the last half decade, and lack of private sector investment accounts for almost all of this gap. In view of this situation the Barcelona European Council set a target for R&D spending in the European Union of 3% of GDP by 2010, two thirds of this to come from the private sector (the "3 percent goal").

Increasing the level of R&D in a society, however, is not an easy task. First, much R&D activity takes place in the private sector. This means that decisions on investment and R&D activities and their commercialisation rest in the hands of private actors, not directly in the hands of the European Union or the governments of its member states. Although there is an important role for government-funded R&D in areas of activity such as basic research and emerging technologies, in principle there are many advantages to private sector control over R&D spending. First, companies are "closer" to markets than government and should therefore enjoy an advantage in discerning new markets and customer needs. Second, the incentives facing private companies are different than those facing universities or public research institutes (e.g. commercialisation versus scientific excellence). Third, conducting at least a certain proportion of R&D within the firm seems to be important for the general innovative capacity of the firm, such as its ability to keep abreast of and absorb external technological developments. In contrast, government decision making over R&D runs the risk of allocation to the wrong activities or companies, of distortion of competition, or of simply increasing the profitability of companies that would have performed the subsidised R&D activity anyway.

For these reasons government programmes to stimulate R&D activity must be designed very carefully. In light of this fact, DG Research of the European Commission commissioned four expert groups to examine different policy instruments which it is believed may help increase private sector R&D investment. These instruments include direct expenditures by governments on R&D-related activities (Direct Measures), tax incentives (Fiscal Measures), risk capital, and loan and equity guarantees. These groups were charged with reviewing the experiences with these instruments and making concrete recommendations. Furthermore, a "policy mix" group was formed to examine in detail how the overall effectiveness of the policy mix of instruments can be improved. The intermediate and final outputs of the four expert groups on fiscal instruments constitute one of the major inputs into the considerations of the wider policy mix group, which is also supposed to examine the impact of framework conditions on R&D spending, and to estimate the potential impact of the combined instruments.

As part of the process for formulating recommendations and guidelines for the achievement of the 3 percent goal, the author of this report, the expert group on Equity and Loan Guarantees, was constituted. This group was charged with identifying

"...how guarantee mechanisms and other risk sharing mechanisms associated to loans or equity can contribute more widely and more effectively to stimulating private investment in research, taking into account differences in national conditions across Member States. Based on an analysis of market failures and experiences in different countries regarding the use of guarantee mechanisms (aimed specifically at research financing or not), [the group] should identify good practices and also make recommendations regarding the design and implementation of guarantee mechanisms to encourage a wider use of loan and equity, in particular by SMEs, to finance research activities."

The group met twice, on 30 July and on 10-11 September 2002. In addition to its own internal capacities, the group was able to draw on the knowledge of a number of outside experts, on the results of a number of previous workshops on guarantees held by DG Research, on key studies of guarantees and innovative instruments for raising equity sponsored by DG Enterprise, and on a supporting study conducted by the rapporteur.

This report is intended to summarise the group's conclusions and recommendations regarding the terms of reference above. Section two of this report, which also constitutes its direct contribution to the policy mix group, covers the following topics:

- Specificity, potential impact and importance of loan and equity guarantees
- The influence of framework conditions on the effectiveness of guarantees
- Good practice, lessons learned and fresh approaches with guarantee mechanisms
- Guidelines and specific recommendations for the future use of guarantees

Section three of this report summarises the results of a survey of equity and loan guarantee programs and of other related innovative practices, and discusses these in some detail. The group believes that this survey provides a wealth of experiences which policymakers on both the European, national and local levels can learn from.

2. GUARANTEE FOR LOAN OR EQUITY FINANCING

2.1 Specificity, Potential Impact and Importance

Guarantees are financial instruments which the public sector can use to catalyse investment in R&D via public sector bodies offering to cover or share part of the risk associated with the investment, thus encouraging potential investors to provide finance to R&D performers. Before discussing this specific use for guarantee mechanisms, however, a short description of the major types of guarantee instruments and their broader use is warranted.

A Short Description of Loan and Equity Guarantees

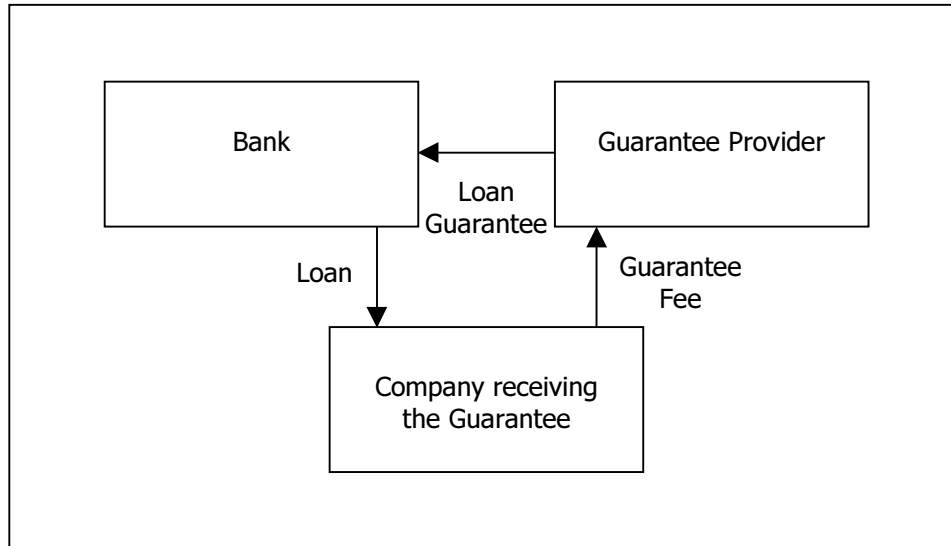
Loan Guarantees

Guarantees transfer some or all of the risk of investing to a third party (the ‘guarantor’). A loan guarantee is the promise of the guarantor to pay the loan if the borrower cannot or does not repay. In most cases the loan guarantee can be called if the borrower becomes insolvent. It is also possible to define other triggers.

For lenders, guarantees transfer the specified risk to the guarantors (e.g. the risk of insolvency, the risk of delayed payment, or the risk of a project failure). Lenders can therefore provide loans without taking into account these risks. For borrowers, the guarantees secure finance which would not have been possible otherwise, or which they would have received under less favourable conditions.

Furthermore, guarantors can defray potential losses if they ask for a risk-adjusted guarantee fee (also called the guarantee premium or risk premium), as in the case of guarantees offered by commercial banks. Loan guarantees provided by public institutions are normally characterised by very low or no guarantee fees. As any losses have to be covered by the public budget, subsidised loan guarantees can be considered a form of State Aid. Such public loan guarantee schemes are frequently used to help companies – primarily SMEs – with a low degree of creditworthiness to gain access to long-term loans. Loan guarantees can thus be used as an instrument to facilitate the loan financing of R&D-intensive companies, since these are often considered to present a high or poorly understood credit risk. Exhibit 2.1 shows the relationship between the parties involved.

Exhibit 2.1 Loan Guarantees



Loan guarantee programmes generally include eligibility criteria defining the type(s) of firms that may qualify for a guarantee. *Horizontal* loan guarantee programmes apply to a wide variety of companies, such as most SMEs or manufacturing SMEs (see Exhibit 2.2 for major loan guarantee programmes and estimated coverage as a % of all bank loans to SMEs). Targeted loan guarantee programmes, in contrast, focus on a smaller category of companies, such as start-ups or innovating companies (see Exhibit 2.3 for examples of such programmes).

Exhibit 2.2: Horizontal Loan Guarantee Programmes and Estimated Coverage

Country	Major Loan Guarantee Programmes	All loan guarantees as a % of bank loans to SMEs, late 1990s
Austria	Small Business Credit Programme	4%
Belgium	Fonds de Participation Brussels Guarantee Fund	4.23%
Canada	CSBFA	N/a
Czech Republic	Zaruka (subsidised SME Guarantees)	N/a
Denmark	Small Enterprise Fixed Asset Guaranteed Loans	1%
Finland	Finnvera	6.9%
Germany	German Credit Guarantee Association	20%

Ireland		0%
Italy	Mediocredito Centrale (MCC), national counter-guarantee programme	N/a
Netherlands	MKB Kredieten	N/a
Portugal	SPGM	N/a
Spain	Garantía Recíproca	N/a
Sweden	Almi Företagspartner	0.5%
UK	Small Firms Loan Guarantee Scheme	Under 1%
US	Small Business Administration 7(a) Programme	7.7%

Sources: Gracey (2001) and Bannock (1998: 118).

Note: Many countries have more loan guarantee programmes than listed.

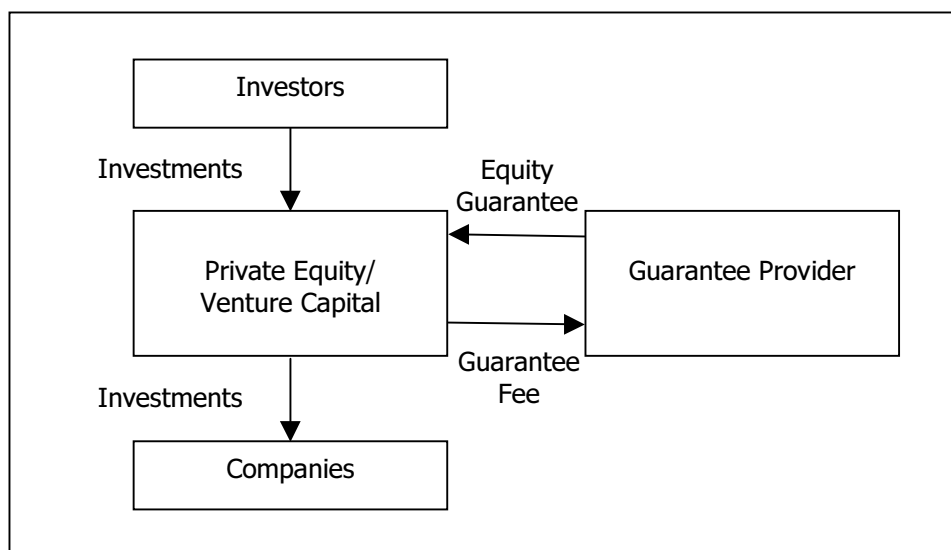
Exhibit 2.3: Innovation Loan Guarantee Programmes

Country	Scheme	Important Features
Austria	Technology Financing Programme	Combines 100% guarantee on loan with a 50% equity guarantee
Germany	ERP Innovation Programme – Loan Variant	Combines refinancing + guarantee (repayment forgiveness in case of default)
Denmark	R&D Project Loan Guarantees	Post-default debt reduction facility + transfer of IPR to Vaekstfonden (Danish development fund)
Finland	Growth and Employment Guarantee Scheme	Targeted at innovative SMEs

Equity Guarantees for Specific Investments

Equity guarantees cover some of the risks of failure (loss risks) associated with equity investments. They have been developed in some European countries in recent years to support the equity financing of small, young and new technology-based firms (NTBFs) by Venture Capital (VC) funds. They encourage investment by protecting the invested equity capital against some of the high risks associated with financing NTBFs. As they normally cover only a part of the loss risk, they are also called ‘loss sharing’ guarantees. Exhibit 2.4 shows a simple equity guarantee scheme in which the guarantee is provided to the VC fund in return for a guarantee fee. Guarantees here cover individual investments made, and generally must be applied for on a case-by-case basis.

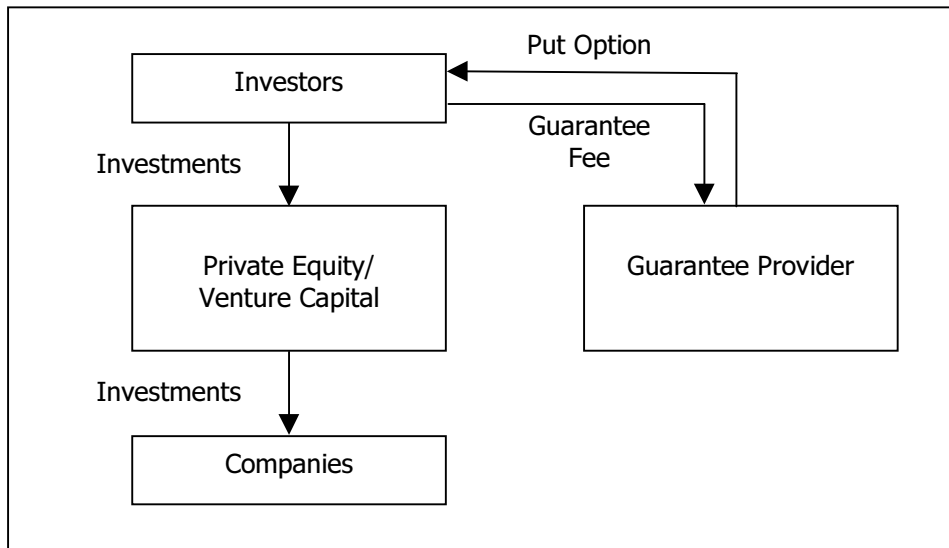
Exhibit 2.4 Equity Guarantee Scheme – Individual Investment Variant



Equity Guarantees – Portfolio Approach (“Capital Guarantees”)

Another type of equity guarantee protects the capital of financial investors in VC funds. In the Austrian Capital Guarantees scheme, for example, investors in VC funds are offered guarantees to encourage them to invest in such funds. In more technical terms, the investor can buy protection against losses (“downside protection”) by paying a risk-adjusted guarantee fee (see Exhibit 2.5).

Exhibit 2.5 Equity Guarantee Scheme – Portfolio Variant



In this instance, the guarantee is structured as a Put Option. These give the purchaser the right to sell an underlying asset at a specified price at a specified period of time. In this case, the Put Options give investors the right to sell their shares to the guarantor after the investment cycle of the VC funds (normally 8 to 10 years). This type of equity guarantee, which applies to portfolios rather than individual equity investments, supports the fund-raising efforts of VC funds and enhances the availability of risk capital on capital markets (see Exhibit 2.6 for design features of major Equity Guarantee Programmes).

Exhibit 2.6: Major Equity Guarantee Programmes

Programme Name	Level of Guarantee	Own Technology Assessment	Provision of Co-Financing	Premium Charged
<i>SOFARIS Technology Development Fund</i>	Portfolio	No	No	0.3% of guaranteed amount per year
<i>FGG Capital Guarantees Scheme</i>	Portfolio	Yes	No	Determined on a case-by-case basis
<i>BTU – tbg Variant (until January 2003)</i>	Individual Investment	Yes	Yes	Determined on a case-by-case basis

Counter-guarantees are financial instruments which allow guarantee providers to share risks. The provider of the counter-guarantee accepts a specified proportion of the risk from the guarantee originator, and typically receives a portion of the guarantee fee in return. The EIF is a major provider of counter-guarantees to national and regional guarantee programmes through the Commission's Multi-annual Programme (MAP) to support SMEs. A number of Member States also have counter-guarantee schemes for local and regional guarantee programmes. One of the motivations for counter-guarantees is that guarantee agencies can pool together their strengths: the guarantee originator may have better knowledge of local conditions, while the counter-guarantee agency may have more financial resources.

Specificity and importance for R&D projects

As the existence of high risks is one of the main reasons for insufficient investment in R&D, guarantees can directly affect one of the most important parameters for decision-making at the company level. The primary justification for the public sector to provide guarantees is market failure in the form of lack of availability of finance for R&D projects with favourable risk/reward profiles, which leads to socially sub-optimal outcomes. Guarantees can help address this problem by altering the behaviour of overly risk-averse investors or by subsidising the costs of the establishment of investors specialised in R&D finance.

Guarantees have a number of specific features which distinguish them from other public support mechanisms for R&D. The first of these is their risk-covering nature, which can be used specifically to diminish or even completely remove R&D-related risks for investors. In contrast, other financial support instruments, such as non-repayable funds (grants) or loans with low interest rates, are typically designed to reduce the costs and raise the return on such projects.

There are relatively few evaluation studies on the impact of guarantee schemes in developed countries, and those that do exist focus on additionality in areas like job creation rather than R&D. Statements about the potential contribution of guarantees to R&D investment should therefore be treated with caution. In principle, however, guarantees have many potential advantages as instruments to promote R&D investment:

- Guarantees have a higher potential leverage effect than many other financial instruments, thus resulting in a lower burden on public expenditure for the same outcome. The leverage effects depend on the default rates of the guaranteed companies/projects and on the loss coverage rate of the guarantee fees. For horizontal loan guarantee schemes for SMEs, ratios of public expenditure to mobilised loan capital of between 1:10 and 1:20 are typical. Since other non-guaranteed funds are needed to finance projects in addition to the guaranteed loans, the ratios of public expenditure to investment can be even higher. In the limiting case of non-subsidised schemes, no additional burden results. A leverage effect for R&D would mean that guarantee programmes could have a significant impact on R&D investment;

- This higher leverage effect can be explained by the direct influence on the risk profile of R&D projects, by the absence of marginal financing cost for public funds as long as the guarantees are not called, by the possibility of designing guarantees in an incentive-related way, and by the possibility of charging a guarantee fee;
- Though many guarantee programmes are "horizontal", they can also be directed at specific targets by defining narrower eligibility criteria;
- Guarantees can foster 'public-private' partnerships by structuring the sharing of risk between investors and public guarantee agencies;
- Guarantees can help overcome some of the regulatory constraints on investors which constrain the flow of finance to R&D. For example, some pension funds and insurance companies are prohibited from investing in (non-guaranteed) venture capital funds. Furthermore, key international agreements on bank regulation (such as "Basel II", the set of regulations on bank capital proposed by bank regulatory agencies under the auspices of the Bank for International Settlements) may make it more difficult for SMEs to get bank loans without a guarantee.
- Whereas grants or loans with soft conditions can attract R&D performers who would have undertaken projects even in the absence of support, the obligation to pay a fee helps deter applications for guarantees unless they are really needed to finance projects. There is in fact some evidence that they (along with other 'self-selecting mechanisms' such as royalty-sharing grants) are more effective than general measures such as tax credits (Fölster 1991). Their effectiveness, however is likely to be maximised if they are employed in conjunction with measures such as those proposed in Section 4.3 of this report which aim to improve the environment for early-stage venture capital (particularly seed capital).

At the same time, guarantees have a number of potential drawbacks. This means that guarantee programmes must be carefully designed and implemented in order to minimise these problems. Potential drawbacks include:

- The difficulty of estimating the ultimate costs of guarantee programmes to public budgets. One mechanism for limiting costs is to place a cap on the maximum potential liability of schemes;
- Moral hazard on the part of investors and/or firms, with both taking advantage of the reduction of risk offered by guarantees to undertake R&D investment strategies with even higher risk/reward ratios. One way of dealing with this problem is to limit the guarantee to less than 100% of the total investment (e.g. 50% or 80% level of coverage). This way the investor still has "money at risk" and thus has an incentive to carefully select and monitor their investments;
- Moral hazard in the sense that firms invest in projects they would have performed anyways, thus resulting in costs for the public budget with no additionality (so-called 'deadweight losses'). The levying of a guarantee fee can help deter such behaviour by imposing a cost on the investor for the use of guarantees;
- The costliness of risk assessment, particularly for technology-related investments. Some guarantee agencies have introduced standardized rating or credit scoring systems based on a limited number of variables to help speed up and reduce the cost of risk assessment;

- Particularly for the smaller guarantee schemes, which design guarantees on a case-by-case basis for specialized purposes, there may be considerable complexity involved in structuring acceptable deals and difficulties associated with monitoring their progress. Furthermore, there may be concerns about the transparency of complex guarantee structures;
- The potential for market distortion.

Types of Firms and the Differential Impact of Guarantee Programmes

When addressing the issue of the impact of guarantees on R&D spending, it is useful to distinguish between different categories of firms along two dimensions: 1) the size/age of the firm and 2) the research intensity of the firm (see Exhibit 2.7).

Exhibit 2.7: Typology of Firms

		Research Intensity		
		<i>R&D intensive</i>	<i>Innovative</i>	<i>Potentially Innovative</i>
Size/age of Firm	<i>Seed/startup / other early stage</i>	(1) NTBF	(2) Innovative Start-ups	(3) Low-tech Start-ups
	<i>Established SMEs</i>	(4) High-tech SMEs	(5) Innovative SMEs	(6) Low-tech SMEs
	<i>Large Firms</i>	(7) High-tech Large Firms	(8) Innovative Large Firms	(9) Low-tech Large Firms

Along the first dimension (size/age of firm, along the vertical axis), seed/start-up projects are considered the most risky from an investing point of view. These types of firms frequently lack adequate internal financial capital and experienced management. Various studies done on data from different countries have come up with estimates of the "mortality rate" of start-ups ranging from 25-50% in the first few years of existence (Deutsch 2001). At the same time, external investors have difficulties estimating risks and selecting promising investments, in large part due to the lack of track record (i.e. financial history over the past few years) upon which an investment decision can be made.

The risks of investing in established SMEs and large firms are much lower due to the lower mortality rate of firms in these categories. Investors also feel that it is easier to assess investment risks for this type of firm. Banks in particular look at the track record of firms (e.g. profitability, sales growth, etc.) and also like to require tangible assets (e.g. real estate, plant and equipment, etc.) as security for loans, which they can seize and sell in case of default on the loan to cover part of their losses. With the help of these mechanisms, banks in countries such as

Germany and Italy experience cumulative default rates as low as 1-2 percentage points for these types of firms.

Along the second (horizontal) dimension of Exhibit XXX, R&D intensive firms and projects are the most difficult for external investors to evaluate, since many investors lack the specialized technical know-how to make these judgements and to estimate the potential returns of R&D projects. For this reason investors such as banks tend to avoid lending to this type of firm. Interestingly, some studies suggest that technology start-ups may not in fact be more risky than low-tech start-ups, despite the widespread belief to the contrary (Storey and Tether 1998).

Firms in the categories (1) and (2) (NTBFs and innovative start-ups, respectively) are thus subject to a "double barrier", first because of their newness and size, and second because of their R&D intensity. Firms in the categories (4) and (5) (R&D intensive SMEs and innovative SMEs, respectively) also face difficulties in obtaining external finance due to the aversion of many investors toward R&D investment.

The typology of firms presented above is useful for specifying the appropriate targets for different types of guarantee mechanisms, in particular equity versus loan guarantees:

Equity Guarantees

- The most appropriate targets for equity guarantees are R&D-intensive and innovative seed projects and start-ups (categories 1 and 2). Due to the high risks of investment associated with these categories of firms discussed above, equity rather than bank loans are held to be the appropriate forms of external investment here. Equity guarantees are therefore the appropriate mechanism for encouraging R&D investment here;
- Due to the specific demands of this type of investment, equity guarantees should be aimed at financial intermediaries specialising in this kind of investment, such as VC firms and business angels. R&D-intensive firms are thus indirect beneficiaries, since the direct beneficiary of the guarantee is the financial intermediary;
- The benefit of this instrument is likely to be greatest in those countries and regions where there is not yet an established venture capital industry. Equity guarantees can contribute to the development of such an industry by helping new VC initiatives to raise funds. Furthermore, they can limit the downside risk of individual investments during the long period of time it takes to develop a mature VC industry. This development can be quite costly, however, due to the need to develop a supporting network of technology, legal and other specialists, and due to the extended learning period needed for VC investment managers.

Loan Guarantees

- Loan guarantees are more appropriate when there is a need to stimulate finance for established SMEs to conduct R&D projects with a limited risk profile (categories 4 and 5). These 'actively innovating' companies account for perhaps 15% of the SME population in Europe. The investing risks here are less than those involved in NTBF and innovative start-up finance

for two reasons. First, the established SME typically has a much stronger financial basis, such as a higher level of equity and more cash on hand, and thus the failure of a project is less likely to endanger the survival of the firm as a whole. Second, the types of R&D projects undertaken by these firms, such as incremental improvements in existing (and already successful) products, are frequently less risky than those of NTBFs. For this reason it is more appropriate to use bank loans as external finance here than for start-ups;

- The impact of loan guarantees is likely to be greatest in countries and regions where banks are highly risk averse, i.e. where they are reluctant or unwilling to lend due to lack of sufficient collateral or the nature of the investment project;
- Most loan guarantee programmes are ‘horizontal’ in the sense that a broad spectrum of SMEs is eligible. The typical primary goal of these programmes is job creation or the promotion of new firms. The specific impact of horizontal programmes on R&D spending is likely to be very small, with significantly less than 10% of the guaranteed amount going into R&D spending. Horizontal loan guarantee programmes are thus not the most efficient instrument to promote R&D spending in Europe;
- Guarantee programmes, or financial programmes with a guarantee component, targeted specifically at loans for R&D and innovation are less frequent in Europe. This targeting can be done in either of two ways. One way is to limit eligibility to R&D intensive firms or innovation projects. Another way is to create special provisions within horizontal loan guarantee programmes, either by more generous risk criteria for R&D-intensive companies or by defining an additional guarantee trigger such as the failure of the R&D project. Such a guarantee would be economically equivalent to a conditional grant, if the guarantor takes over the repayment of the guaranteed loan without any reimbursement from the borrower. A key design issue for such programmes are the way in which R&D risk is assessed. In particular, specialised technology risk assessment units within banks or guarantors can help improve the selection of appropriate investments. Programmes of this nature are likely to have a greater impact on R&D spending than horizontal programmes;
- In principle, loan guarantees could also encourage the external financing of low-risk R&D projects within larger companies. The take-up, however, would probably be less since these types of companies tend to be less cash constrained than SMEs.

Potential Impact of Guarantees

The immediate quantitative impact of the establishment of new guarantee schemes and a rise in activity of existing guarantee schemes is likely to be small in absolute terms.

The main target audience, SMEs, accounts for a modest but nevertheless significant proportion of R&D in both the EU and the benchmark case, the US -- somewhat less than 20% of total R&D. This SME intensity varies widely between countries and regions in Europe, as does the presence and take-up of equity and loan guarantee programmes. For example, whereas about 20% of bank

loans to SMEs in Germany and France are covered by loan guarantees, in the UK loan guarantees programmes are involved in under 1% of total SME lending.

The uptake of equity guarantee programmes has been much higher in some European Countries. The German BTU programme, which involves both a financing and a guarantee component, has been used by the majority of NTBF-oriented Venture Capital Funds. Similar high demand has been reported in France and in Austria. In the latter case, 60% of all Venture-backed start-up and early stage investment projects in the year 2000 had been financed by Venture Capital funds in connection with Equity Guarantee Programmes. The impact of Equity Guarantees on the availability of risk capital for R&D projects of SMEs is thus potentially high, at least in the short term. Longer-term sustainable impacts are more difficult to achieve and very dependent on general market conditions, as demonstrated by the decrease in Venture Capital investments in the years 2001 and 2002.

Estimating the potential impact of an increase in guarantees in Europe on R&D investment is a hazardous exercise, given the shortage of detailed evaluation studies on the additionality achieved by guarantee programmes in general and on R&D in particular. Nevertheless it appears safe to say that the impact of an expansion in horizontal loan guarantee programmes on R&D investment would be small due to the small proportion of R&D intensive companies participating in such schemes. However, greater benefits could be expected from equity guarantee and innovation loan guarantee programmes due to the nature of the investment projects supported. These two types of guarantee programmes could help reduce the R&D investment gap relative to the US with respect to NTBFs and established SMEs. The Risk Capital Expert Group has estimated that measures supporting the development of venture capital in Europe could help boost R&D investment by between € 2-5 billion, a significant proportion of the overall € 100 billion gap relative to the US. Guarantee mechanisms could be a significant instrument contributing to this increase.

2.2 The Influence of Framework Conditions

There are a number of important framework conditions influencing the effectiveness of guarantees. These include State Aid regulations; the state of development of the financial system, including its regulatory system; macroeconomic policy; and the general climate towards entrepreneurship.

State Aid Regulations

Guidelines developed by the European Commission on State Aid have a direct impact on the specificity, pricing and other characteristics of public guarantee programmes:

- The 'Commission Notice on the application of Articles 87 and 88 of the EC Treaty to State Aid in the form of guarantees' (OJ 2000/C 71/07) outlines the Commission's general stance on public guarantees. This notice suggests that guarantee coverage of no more than 80% of the total financial operation is appropriate in order to leave an incentive for lenders to monitor borrowers. The notice also states that guarantee schemes that are not self-sustaining (i.e. where income premium from guarantees does not

cover the costs of default, administration, and the normal return on capital) are considered as forms of State Aid which thus have to be submitted to the Commission for approval;

- The Commission communication on State Aid and Risk Capital (OJ 2001/C 235/03) asserts that public schemes to encourage the development of risk capital are justified if they help address market failures blocking access to finance for SMEs and new firms. These failures can be due, for example, to imperfect or asymmetric information, or to high relative transactions costs.

The current State Aid guidelines on guarantees are not a major impediment to the design of appropriate programmes. Of more concern are the restrictive guidelines on R&D support, since these are largely based on the 'linear' model of R&D. These are relatively generous in allowing the use of subsidised guarantees to support R&D, but put much greater constraints on the commercialisation of the results of these R&D projects.

Financial System

Financial system regulations help shape the incentives for investment, which guarantees in turn try to influence. One very important example concerns prudential regulations, which can act to prevent investors, e.g. pension funds and insurance companies, from investing in riskier vehicles such as venture capital without a guarantee. Another example concerns the Basel II agreements on bank capital adequacy, which have the effect of (amongst other things) reducing the incentives for banks to invest in SMEs. In the latter case, guarantees can help reduce the capital banks need to set aside for SME loans, thus reducing some of these disincentives.

The level of development of the financial system and the practices and attitudes of its main actors also moderate the effectiveness of guarantee schemes. For equity guarantees in particular, the presence or absence of venture capital and an active market for high-tech Initial Public Offerings (IPOs, i.e. new listings of companies on stock exchanges) can have a decisive impact. For loan guarantees, the varying requirements of banks for collateral and their procedures for evaluating the suitability of firms for loans can also have a critical influence on the success of loan guarantee schemes.

Macroeconomic Policy

A highly cyclical fluctuation in the orientation towards risk is a fundamental feature of financial systems. This particularly affects the riskier types of investment vehicles: in the famous words of one observer of Wall Street, equity investors fluctuate between fear and greed. Macroeconomic policy has a dual effect on this orientation, firstly through the monetary transmission mechanism (which directly affects liquidity and the 'taste' for higher-risk assets), and secondly through its influence on the general level of demand (and thus the 'opportunities' for new, high risk products), the size of investment budgets for new technologies, and the amount of consumers' discretionary spending. A growth- and stability-oriented macroeconomic policy is thus a very important positive framework

condition for the supply of finance for R&D investment and the demand for R&D-intensive goods and services.

Climate toward Entrepreneurship and Innovation and the Stock of Entrepreneurial Skills

Constraints on R&D can exist on both the supply and demand side. In the case of guarantees, even well-designed and funded guarantee schemes can have a low take-up in the absence of, on the supply side, an adequate supply of ideas for R&D projects, sufficient entrepreneurial initiative, and the skilled researchers needed to carry out the work. On the demand side, critical ingredients are investors with risk orientations compatible with the risk profiles of the R&D projects proposed and the skilled personnel (investment managers, lending officers/relationship managers, etc.) needed to evaluate and monitor these investments. All these supply and demand constraints are functions of general cultural factors, the entrepreneurial orientation of the region/country involved, the quality and orientation of educational institutions (including higher education establishments), and the opportunities for on-the-job acquisition of relevant skills and experience.

2.3 Good Practice, Lessons Learned and Novel Approaches

Many good practices and novel approaches can be found in European equity and loan guarantee schemes. These programmes and new approaches provide a wealth of experience which should be learned from when modifying existing and introducing new programmes.

Equity guarantee programmes have been introduced more recently than loan guarantee programmes, and most have not yet been evaluated. Some of these programmes have experienced high losses since the bursting of the technology bubble and have been subject to the criticism that they were not selective enough in their coverage. Nevertheless, a well designed equity guarantee programme can in principle contribute to the development of the local venture capital industry. Equity guarantee schemes with different approaches which could be examined for lessons include:

- The SOFARIS Technology Development Fund (France), which guarantees portfolios of equity investments by financial intermediaries (mainly VCs). It maximises leverage by focusing on intermediaries with successful track records, while at the same time minimises administration costs by relying on these intermediaries to assess risks and monitor portfolios;
- The Finanzierungsgarantie Gesellschaft (FGG) Capital Guarantees scheme (Austria), which supports fundraising by new or relatively new venture capital firms by guaranteeing portfolios of equity investments. It also reduces the risk for investors of investing in new VCs by controlling risk exposure through corporate and technology risk assessment by an experienced in-house team;
- The BTU (Beteiligungskapital für kleine Technologieunternehmen) programme (Germany) is aimed at the development of a viable venture capital industry, while at the same time increasing the supply of funds available to this industry by providing both guarantees and financing. One part of this programme, which operates through the tbg

(technologiebeteiligungsgesellschaft, a specific-purpose subsidiary of the public development bank Deutsche Ausgleichsbank) provides co-investment (up to 50% of the total investment, with the remainder provided by the private sector) and, until January 2003, guaranteed up to 50% of the private sector's investment in NTBFs. A second part of this programme, operating through the Kreditanstalt für Wiederaufbau (another public development bank) refinanced up to 70% (starting January 2003 50%) of financial intermediaries' investments in NTBFs and provides a guarantee on this portion of the investment.

In terms of loan guarantee schemes, examples of good practice and new approaches include:

- The UK Small Business Loan Guarantee Scheme, in existence since 1981, is a prime example of a cost-effective horizontal loan guarantee scheme. An evaluation of the scheme done in 1999 estimated that 70% of the SME's benefiting under the scheme would not have been able to receive a loan, or would have received a smaller loan, in the absence of the guarantee. The proportion of lending to High-tech SME's remains relatively small but despite this the scheme provides an important source of funding for innovative businesses with 53% of beneficiary firms stating that they were using the loan to finance new products or services;
- Although the Finnvera loan guarantee scheme (Finland) is also horizontal (i.e. it is available to a broad spectrum of SMEs), it is estimated that 5-7% of the companies benefiting from the scheme are technology-related. The strength of the scheme is a rigorous, but low cost, corporate and technology risk assessment system, which helps identify R&D investments with a low probability of failure. Approval of a guarantee by Finnvera is often accepted by banks, who are not able to perform such comprehensive risk analyses, as a positive signal for investment;
- The Kreditanstalt für Wiederaufbau's ERP (European Reconstruction Programme) innovation loan programme (Germany) involves both a refinancing and guarantee component for banks investing in innovation projects (including R&D projects) in established SMEs. Although these are relatively low risk projects, and the future earning power of the firms involved is sufficient to repay the loans in the case of project failure, many banks are nevertheless unwilling to provide finance for this type of project without a guarantee;
- The Finanzierungsgarantie Gesellschaft (FGG) Technology Financing Programme (TFP) (Austria) offers a combination of equity and loan guarantees for technology-oriented SMEs. Costs covered by the scheme include R&D, technology investment costs, and education and training costs. A 100% guarantee is provided for the bank loan component of financing, which in turn leverages the equity financing component, itself typically provided by venture capital funds. Risk is controlled by conducting in-house risk appraisals and by maintaining incentives (a 50% equity guarantee) for equity investors to appraise and monitor the investments.

Experience in these programmes supports a number of general principles:

- Although public guarantees should reduce the risk exposure of private sector investors, this risk should not be completely eliminated. Risk-sharing ensures that private investors still have an incentive for projects to be successful;
- Decision-making on guarantees should be speedy, in part due to the rapidity of technological innovation;
- Programme requirements and features should be simple, so that users can understand programmes and their logic quickly.

A number of new approaches in the area of guarantees deserve consideration and promotion. These include:

- **Option-based approaches to the assessment of risk and pricing guarantees for R&D investments.** Due to the unique nature of R&D investment, including high uncertainty and the binary nature of returns (failure or success), traditional investment models such as the discounted cash flow (DCF) model lead to under-investment in R&D. Traditional cash-flow based investment calculation models do not adequately reflect the value of R&D projects as a chance (an option) to capture future cash flows. Due to the costs of calculating these values on a case-by-case basis, however, option-based approaches are most appropriate for guarantee schemes which provide a small number of larger guarantees, e.g. portfolio guarantees intended to support the fund-raising activities of venture capitalists;
- **Securitisation of SME loan portfolios, some of which involve R&D projects.** Securitisation involves the bundling together of a large number of one type of asset (such as real estate mortgages) and the sale of rights to the capital and income from this portfolio in the form of financial securities to investors. Securitisation here is driven by the desire of banks to free up regulatory capital for new loan commitments. Securitisation helps maintain the flow of funds to SMEs at a time when developments like the Basel capital adequacy agreements appear to make it more difficult for many banks to lend to portions of this market segment. At a national level, Germany's Kreditanstalt für Wiederaufbau has gained significant experience in securitising SME loan portfolios in Germany. Some of these transactions have been supported at European level by the European Investment Fund, which has a mandate from the European Commission to support finance for SMEs. The KfW is currently considering putting together a securitised loan pool for renewable energy projects, some proportion of which would be R&D intensive investments;
- **Technology rating systems.** Private sector financing of risky projects on a widespread basis requires some mechanism to quantify these risks. Traditionally, standardised risk assessment systems have focused on financial indicators such as debt/equity ratios, cash flow/asset ratios, etc. The reluctance of investors to provide finance for R&D projects derives in part from the difficulty of estimating or rating the risk of these projects, each of which has unique characteristics. Nevertheless, some innovative agencies and investors, such as Finland's Finnvera, have successfully developed economical ways of estimating technology-related risks, thus reducing the barriers to obtaining external finance for R&D projects. Guarantee institutions could help to create a market for rating services by

requiring applicants to submit company or project ratings as precondition for dealing with applications;

- **Including guarantees in packages of support and services.** The support of R&D-intensive companies often involves more than one public instrument and more than one public agency. However, multiple (and different) applications and lengthy decision-making times can substantially reduce the attractiveness and effectiveness of public instruments. One fresh approach has been taken by Italy's MCC (formerly known as Mediocredito Centrale), a private sector bank which runs the national counter- and co-guarantee schemes under contract with the government. Guarantees can be part of a larger package of support and services, including grants, advisory services, and loans. This packaged approach requires only one application, and the provision of support and services is coordinated over time;
- **Innovative insurance approaches to R&D finance.** Guarantees are essentially a special form of insurance. In principle, therefore, insurance companies should at least be interested in ways of insuring against the risk of R&D projects failing. In practice there has been some discussion of pharmaceutical and biotech companies insuring against the failure of clinical trials, but no known implementations. One insurance company (Swiss Re), however, has been involved in organising the Princess Bond, a special instrument which allows private investors to benefit from the upside potential of participating in a portfolio of venture capital funds, while at the same time insuring against the downside risks. This private sector instrument, which helps raise funds for venture capital, is interesting in theory in that it might eventually reduce the need for public sector guarantees.

2.4 Recommendations and Guidelines for Future Use

Evaluation of Guarantee Schemes and Exchange of Good Practice

The lack of evaluation studies of guarantee programmes in general, and in particular on R&D additionality, makes it difficult to make predictions about the probable impact of guarantee schemes. Also, there is a need for exchanging information about the design features of and experiences with guarantee schemes, for example with risk assessment.

Member states should therefore improve their practices with regards to guarantee programme evaluation, and should also include R&D additionality as one of the criteria for judging success in the case of equity and innovation loan guarantee schemes.

Furthermore, learning structures for diffusing the results of good practice and for assessing the impact of guarantee schemes on R&D spending should be created. The EIF is already involved in this area and could potentially increase its role significantly.

Equity Guarantees

Equity guarantee programmes have already been tried in a number of Member States and have successfully contributed to the entry of new venture capital firms and the establishment of a viable early stage venture capital industry. This is important for promoting R&D spending, since VCs are one of the main sources of external finance for NTBFs.

EU Member States without a developed venture capital industry, particularly those without ‘early stage’ venture capital firms focusing on the provision of seed and start-up capital, should consider introducing an equity guarantee programme.

Existing and previous programmes provide many lessons for the design of new initiatives. One guiding principle is that subsidised equity guarantee programmes should only be offered until self-sustaining venture capital sectors have been established, since the rationale for such programmes is reduced once the self-sustaining stage has been reached. For seed stage and very early stage developments, however, it can be argued that permanent market failures necessitate a longer-term role for subsidy schemes. A second guiding principle is that the use of option-based models in the pricing of guarantee premiums is warranted, since these models avoid many of the problems associated with the widely used discounted cash flow model and historically-based hazard models. However, there are no clear guidelines for assessing the risks accompanying technological development. In some programmes, a key feature of programme design is that the guarantor performs the technology risk assessment, while other programmes rely on incentive mechanisms that motivate investors to carry out the risk assessments.

The EIF could help support these new equity guarantee programmes by providing counter-guarantees to these programmes. Providers of counter-guarantees share risks with guarantee agencies by accepting a specified proportion of guarantee risk for a fee. The EIF has successfully promoted the development of loan guarantee programmes in a number of Member States by offering counter-guarantees, and this experience could be usefully duplicated for equity guarantees. The EIF is ideally positioned for such a counter-guarantee programme because of its unique experience as a European Fund-of-Funds investor, that is, as an investor in many venture capital funds. Based on its existing loan counter-guarantee programmes it has also gained knowledge about many national guarantee institutions and programmes. The EIF’s provision of counter-guarantees is currently carried out on behalf of the European Commission and is regulated under the Multi-Annual Programme (MAP) to support SMEs. Current regulations and the European Commission mandate to the EIF should be examined and, if necessary, modified to allow the EIF to provide equity counter-guarantees to national and regional guarantee agencies.

Loan Guarantees

The basic rationale for loan guarantees is to improve the supply of external finance to SMEs by overcoming market failure in credit rationing.

Horizontal loan guarantee schemes, i.e. schemes applicable to a broad spectrum of SMEs, are more appropriate for achieving goals such as job creation than for the promotion of R&D spending. One reason for this is that the proportion of R&D intensive firms benefiting from this type of scheme is small, thus the impact of an increase in the size of these programmes on R&D investment will also be small. A second reason is that most banks are not equipped to judge the risks of R&D investment. However, Member States such as Germany and Austria have had some success with innovation loan guarantee programmes, or programmes with a loan guarantee component, which are specifically targeted at the financing of R&D projects in established SMEs. These programmes include mechanisms for the evaluation of technology risk. Support for these projects is less risky than financing start-ups because established SMEs tend to have enough resources to absorb losses from failed projects. Furthermore, R&D projects undertaken by established SMEs are typically incremental improvements of existing products and services which involve lower levels of risk. **Member states without a targeted innovation loan guarantee scheme should thus consider the establishment of such a programme. Alternatively, member states with existing horizontal guarantee programmes should consider introducing special provisions for R&D-related investments. This could be done either by introducing more generous risk criteria for R&D-intensive companies or by defining an additional guarantee trigger such as the failure of the R&D project.**

The EIF should support this by providing counter-guarantees for new national and regional innovation loan guarantee programmes, or for horizontal programmes with special provisions for R&D-related investments. The EIF is already involved in the provision of counter-guarantees to horizontal loan guarantee programmes under a mandate from the European Commission's Multi-annual Programme. Current regulations and the Commission's mandate to the EIF should be examined and, if necessary, modified to allow the EIF to provide counter-guarantees specifically for innovation loan guarantees .

Innovative Financial Practices

The flow of finance to innovating SMEs, and perhaps to larger firms as well, could be usefully stimulated via the broader use of innovative financial practices and products. One possibility is the **securitisation of SME loan pools**, which typically include some loans for R&D and innovation, and which have already been repeatedly used in Germany. The experience to date with loan pool securitisation should thus be examined with an eye to the expanded use of securitisation at a national level and, backed by the EIF, at European level. **Member States should then consider broadening the remit of existing agencies or development banks to include loan securitisation.**

The EIF could support this development by participating in securitisation, as it has done already in a number of EU countries. The European Commission should establish a mandate for the EIF and provide the necessary financing to manage a new facility specifically for loan securitisation.

As part of the securitisation initiative, the possibility of creating a pan-European market for the rating (including technology rating) of SMEs should be considered. Inasmuch as this would help public guarantee institutions to assess risks, public agencies should consider bearing at least a portion of the costs of such a scheme, which can be high relative to the resources of SMEs.

A second product, which has not yet been widely used but which in principle could support R&D finance, is an insurance product that would insure companies against the risk of failure of R&D projects. Since this is a product primarily offered by the private sector, **the European Commission can best support it by monitoring its use in other countries and by encouraging a discussion of its merits.**

3. SURVEY OF LOAN AND EQUITY GUARANTEE PROGRAMMES AND INNOVATIVE PRACTICES

This section reviews specific examples of loan and equity guarantee programmes and also of relevant innovative practices. This is a selective review, which focuses on programmes of most relevance to stimulating R&D activities.

3.1 Equity Guarantee Programmes

Due to the risk and expertise involved in investing in new technology based firms (NTBFs), it is generally considered to be desirable for public policy to focus here on specialised investors, particularly venture capital firms and business angels, who can provide equity or quasi-equity finance. Of particular relevance are so-called early stage venture capital firms, who focus on investing in seed projects and start-up firms. The amount of formal venturing activity, both in general and specifically in early stage activity, varies widely from country to country. EVCA (European Private Equity and Venture Capital Association) data shows that early stage venture capital investment (expressed as investment as a percentage of GDP) in some European countries (particularly the Scandinavian countries) was comparable with US levels. In other countries, particularly in Eastern Europe, early stage activity only reached one tenth of this level.

Table 3.1: Early Stage Venture Capital Activity as a percentage of GDP, 2001

Country	Early Stage Investment as a % of GDP
Finland	0.104
Sweden	0.102
United States	0.100
United Kingdom	0.087
Denmark	0.084
Iceland	0.072
Netherlands	0.068
Germany	0.056
Europe	0.044
Belgium	0.038
France	0.038
Norway	0.036
Ireland	0.033
Hungary	0.028
Switzerland	0.027
Italy	0.024
Greece	0.024
Austria	0.020
Spain	0.017
Portugal	0.013
Poland	0.013
Slovakia	0.012
Czech Republic	0.011

Source: EVCA Yearbook 2002

For a number of reasons it is quite difficult to establish a viable venture capital industry. One reason is that the learning period for new investment managers (i.e. professionals employed by venture capital firms to find, make and monitor investments) is quite lengthy. It is not unusual for this period to last three to five years, and expensive mistakes made during this period may be part of the learning process. Private investors may not be willing to subsidise this learning period in a "new" industry where the proportion of inexperienced investment managers is particularly high. A second reason is that the venture capital industry has a "network" character to it, which includes legal and technology consultants, experienced managers willing to go and work at a start-up company, and investment bankers. This network has the characteristic of a public good, which all venture capital firms benefit from, but no one individual firm can create "from scratch." A third factor is that the investors in venture capital funds – mainly institutional investors like insurance companies and pension funds – themselves need to go through a learning period, and may be extremely reluctant to make a new type of investment without previous experience. A final factor is that venture capital is very much a local business, in which knowledge of local conditions, local language, etc. are of crucial importance. It thus makes it extremely difficult to import the necessary expertise from outside an area.

Taking into account the above factors, a number of governments have felt justified in establishing guarantee programmes, which in effect subsidise some or all of the start-up costs of new venture capital industries. Although these programmes have similar aims, they have differed quite substantially along a number of dimensions. Though it is not possible to identify one "best" type of equity guarantee scheme, which would be superior in all national and local contexts, nevertheless it is useful to consider these features when designing a new scheme. These fundamental design features include the following:

- Level at which the guarantee applies: individual investments in companies or projects, or portfolios of investments
- Technology assessment: does the guarantee agency perform its own technology assessment to judge the risks involved, or does it rely on designing the proper incentives for private investors to do proper technology assessment? Furthermore, if it does its own assessment, does it rely on "in-house" expertise through a specialised staff, or does it subcontract this to technology consultants?
- Guarantees-only, or guarantees plus co-financing: some agencies only provide guarantees, while others provide direct (co-)finance plus some level of guarantee on the private investment as well.
- Determination of the premium charged: either this is based on a flat fee, or on some other system involving a number of variables.
- Other design features: guarantee coverage (i.e. the percent of the private investment that is covered by the guarantee), duration of the programme (open-ended versus authorisation for a limited period of time), other types of finance covered (e.g. quasi-equity, debt)

Here three programmes are examined, which have made different decisions regarding the fundamental design features noted above. The German BTU programme has two variants, in effect yielding four different programme variations (see table 3.2 below).

Table 3.2: Design Features of Four Equity Guarantee Programme Variations

Programme Name	Level of Guarantee	Own Technology Assessment	Provision of Co-Financing	Premium Charged
<i>SOFARIS Technology Development Fund</i>	Portfolio	No	No	0.3% of guaranteed amount per year
<i>FGG Capital Guarantees Scheme</i>	Portfolio	Yes	No	Determined on a case-by-case basis
<i>BTU – tbg Variant (until January 2003)</i>	Individual Investment	Yes	Yes	Determined on a case-by-case basis
<i>BTU – KfW Variant</i>	Individual Investment	In some cases	Yes	Determined on a case-by-case basis

SOFARIS Technology Development Fund (Les Founds "Developpement technologique")

The SOFARIS Technology Development Fund (France) was established in 1998. This scheme provides guarantees on portfolios of equity investments in technology-oriented SMEs made by financial intermediaries, particularly venture capital firms. Currently 30 intermediaries are benefiting from guarantees. Its basic philosophy is to maximise leverage by focusing on intermediaries with successful track records. Private investors are encouraged to invest in venture capital funds by providing some downside protection. At the same time it minimises administration costs by relying on market incentives for intermediaries to do proper risk assessment and monitoring. Guarantees cover 50-70% of the private investment made. The scheme aims at simplicity, minimizing bureaucracy and reporting requirements, in part through ex post rather than ex ante monitoring. In 2001, guarantees were provided covering 250 investments with a value of € 104 million, or almost one fifth of total early stage activity in France in that year.

The Finanzierungsgarantie Gesellschaft (FGG)¹ Capital Guarantees scheme (Austria) supports fundraising by new or relatively new venture capital firms by guaranteeing portfolios of equity investments. These guarantees can be bought either by the venture capitalist itself, or by investors in venture capital funds. It has its own in-house experts, who help control risk by performing its own technical, legal and commercial due diligence on proposed investments. This is considered useful due to the newness of venture capital in Austria and the inexperience of many new venture capital teams. The guarantee coverage level is typically 50%, but may go up to 80% in special cases. The guarantee premium is calculated on a case-by-case basis and takes into account the level of coverage and various risk factors. One measure of success of the programme is the fact that a number of venture capital firms have raised a second or third round of financing, and that investors are comfortable with decreasing the level of guarantee coverage relative to the guarantee on the first fund raised.

BTU Programme – tbg and KfW Variants

BTU (Beteiligungskapital für kleine Technologieunternehmen) (Germany) is a federal programme which aims at supporting the development of a viable venture capital industry and increasing the supply of funds available for new technology-based firms. Unlike the previous guarantee programmes reviewed, BTU provides both financing and guarantees at the same time. The philosophy of the participating agencies is that it is more convenient and less bureaucratic to offer both of these instruments "from the same hand."

The BTU programme offers two variants, which are administered by different agencies. The first part of this program, operating through the KfW, refinances up to 70% (50% starting in January 2003) of financial intermediaries' investments in NTBFs, and also guarantees that portion of the investment. This variant is based on the long-standing philosophy of the "house bank principle" used in many financial promotion programmes in Germany. In order to profit from banks' existing relationships with companies and to try to reduce market distortion, this principle works by refinancing funds provided by the bank to the company, rather than trying to create a new channel of direct finance between the KfW and the company. While initially many of the KfW - BTU programme participants were venture capital firms established by banks ("captive VCs"), in fact the majority of participants now are independent VC funds.

The second variant is administered by the tbg (technologiebeteiligungsgesellschaft), a specific-purpose subsidiary of the DtA (Deutsche Ausgleichsbank), which provides both co-investment (up to 50% of the total investment) alongside the private sector, as well as (until January 2003) a guarantee on up to 50% of the private sector's investment in NTBFs. This variant was established to work together with the independent venture capital firms that were being established in Germany. The tbg helps control risk by having its own in-house experts for evaluating technology risk and performing due diligence.

¹ As of 1 October 2002 FGG merged together with other agencies to form Austria Wirtschaftsservice GmbH.

3.2 Loan Guarantee Programmes

The case for using loan guarantee programmes specifically to promote R&D spending is less clear than the case for using equity guarantees. Loan guarantee programmes are as a rule targeted at bank lending, and many believe that most banks do not have the expert staff needed to judge technology risks and to provide post-investment support needed by R&D-intensive companies. Furthermore, bank loans have no "upside potential", that is, they can get no return greater than the repayment of the principal of the loan and the interest rate charged on that loan. The only way open for them to compensate for the higher level of risk involved in R&D investment is to increase the interest rate charged on R&D-related loans to levels which may be prohibitive to cash-constrained companies. It is therefore perhaps no surprise that some argue that banks should not be involved in R&D finance at all, and it is therefore a mistake to encourage banks to lend to these kinds of activities.

For a number of reasons, however, this group nevertheless decided to examine the experience with loan guarantee programmes. First, banks are the most widespread and most significant providers of external finance in Europe. It is therefore justified to take a close look at the potential of tapping this type of investor for more finance for R&D. Second, although most loan guarantee programmes have objectives other than increasing R&D spending (e.g. employment creation), it is nevertheless plausible to assume that they may have some effect on innovation and R&D. Evaluations of the best programmes may indicate to what extent there is additionality for R&D spending. Third, there have been some attempts to target loan guarantees to innovation and/or R&D finance. An examination of the positive and negative experiences with these should be useful in indicating the extent to which the proliferation of these programmes should be encouraged. Fourth, loan guarantees are more widespread in Europe and have a longer history than equity guarantees. There may therefore be some general design features and issues that may be of interest to equity guarantee schemes as well.

Interestingly, loan guarantee schemes involve many of the same fundamental design issues that equity guarantee schemes do. However, due to the "mass" nature of most loan guarantee schemes, the decisions made regarding these issues have generally been quite different:

- Level at which the guarantee applies: individual investments in companies or portfolios of investments. The universal decision has been to design loan guarantee schemes to apply to the individual investment.
- Own Technology assessment? Due to the horizontal nature of most loan guarantee programmes, most guarantees apply to non-technology companies, thus technology assessment has not been deemed necessary. Furthermore, due to the mass nature of these programmes, the general approach has been to reduce programme costs, and thus very detailed risk assessments have been deemed undesirable. Many programmes, however, do involve some sort of credit scoring system, which the agency uses to do a quick and low-cost risk assessment.

- Guarantees-only, or guarantees plus co-financing: most loan guarantee schemes do not provide co-financing as well, though there are some important exceptions (e.g. KfW innovation loan programme reviewed below)
- Determination of the premium charged: again, due to the horizontal and mass nature of most programmes, the decision here has generally been to use a flat fee applied to all guarantees.
- Other design features are also similar: guarantee coverage (i.e. the percent of the private investment that is covered by the guarantee) and duration of the programme (open-ended versus authorisation for a limited period of time).

UK Small Business Loan Guarantee Scheme

The UK Small Business Loan Guarantee scheme has been in existence for over two decades now, having been established in 1981. It is a prime example of a large-scale loan guarantee scheme aimed at a broad spectrum of SMEs (i.e. a "horizontal" scheme). A guarantee can be provided to approved lenders in cases where an SME does not meet the lending criteria for a commercial bank loan or overdraft because of a lack of collateral to offer as security. The SME applies to a lender, for a loan or overdraft and the lender applies for a guarantee if all other criteria are met, other than the security against the loan. The Small Business Service (SBS – an agency of the Department of Trade and Industry) considers whether the SME is eligible for the scheme – Size, Activity and Purpose of loan. Some lenders may agree loans up to £30,000 without first referring to the SBS. The SME pays the SBS a premium for having the benefit of a guaranteed loan.

The last evaluation of the UK Small Business Loan Guarantee Scheme (1999) stated that there was substantial additionality achieved by the scheme. 70% of the SMEs benefiting under the scheme would not have been able to receive a loan, or would have received a smaller loan, in the absence of the guarantee. The use of the scheme for R&D spending, however, is probably relatively small for start-ups, since the SME would need to demonstrate the ability to meet loan repayments at a time of little or no income. Nevertheless, such schemes may have a beneficial effect on the innovativeness of companies in low- and medium-tech industries. Though the bulk of these firms were not high-tech, 53% of the firms stated that they were using the loan to finance new products or services.

Finnvera Loan Guarantee Scheme

The Finnvera loan guarantee scheme (Finland) is also a horizontal loan guarantee scheme. As in the case of other horizontal loan guarantee schemes, its additionality for R&D spending is relatively low. It is estimated that 5-7% of the companies that benefit from this scheme are technology related. However, the strength of the scheme is a rigorous, but low cost risk assessment system. Finnvera performs a detailed risk assessment in addition to checking eligibility against programme participation criteria. Approval of a guarantee by Finnvera is often accepted by banks, who are not able to perform such a comprehensive risk analysis, as a positive signal for investment. Since the risk assessment also involves technology as well as corporate factors, the system can help identify R&D investments with a low probability of failure. Finnvera believes that technology companies that start

generating a positive cash flow at an early stage have a high probability of success. Thus in principle this rating system could offer lessons for reducing default rates and risk exposure for new innovation loan and guarantee programmes.

KfW ERP Innovation Loan Programme

The KfW ERP (European Recovery Programme) innovation loan programme (Germany) involves a refinancing and a guarantee component for banks investing in innovation projects (including R&D projects) in established SMEs. Although these projects have relatively low risk, and the future earning power of the firm as a whole are available to repay loans in case the project fails, nevertheless many banks are unwilling to provide finance for this type of project without a guarantee. Although many such firms in fact have machinery and equipment, much of this may be unsuitable for collateral since the banks feel it may be too specialized for resale in case of default. The KfW refinances 100% of the bank loan for projects in the R&D phase. A guarantee (in the form of an exemption from liability from repayment of the refinancing) of between 40% and 60% of the total loan value is provided.

FGG Technology Financing Programme

The Finanzierungsgarantie Gesellschaft (FGG) Technology Financing Programme (TFP) (Austria) offers a combination of equity and loan guarantees for technology-oriented SMEs. Investment projects covered by this programme include investment costs, R&D costs, and education and training costs. A 100% guarantee is provided for the bank loan component of financing. This bank loan component in effect provides leverage for the equity financing component, which is typically provided by a venture capital fund. An equity guarantee covers 50% of the value of the equity investment

Two mechanisms are very important for controlling the high level of risk of moral hazard implied by the 100% guarantee. First, a thorough appraisal of risk is done by an in-house team of experts to eliminate projects with an unfavourable risk-reward profile. Second, the partial (50%) equity guarantee maintains the incentives of the equity investor to carefully appraise project risks and to monitor the investment and provide post-investment support. The experience with this programme, which has been in existence since 1997, has been positive. Up until the end of 2001, there had only been four defaults on a total of 58 projects financed.

3.3 Innovative Practices

In addition to specific cases of loan and equity guarantee programmes, the expert group also took at examples of innovative practices of relevance to the terms of reference for the group. These include:

- Option-based approaches to assessing risk and pricing guarantees
- Securitisation of SME loan portfolios
- Guarantees for leveraged financing for R&D – the US SBIC Programme
- The development of a pan-European Rating System
- Including guarantees in packages of services
- Innovative insurance approaches to R&D finance

Option-based approaches to assessing risk and pricing guarantees

Unlike investments such as machinery and equipment, which can have a fairly predictable impact on productivity and thus on future cash flow, the results of R&D investments are generally highly uncertain. In fact their potential returns typically take the form of a binary function – either the R&D project is successful, or it fails, in finding new and economically feasible products or processes. Furthermore, investment in R&D typically takes the form of a series of "go-no go" decisions about whether to proceed to the next stage of the R&D project, taking into account the results of previous stages. The R&D project can thus be conceived of as a call option (or a series of call options) on the potential future cash flow that might be generated by the project.

This "real option" nature of R&D leads to considerable problems for both the internal allocation of funds and the attraction of external funds for financing R&D projects. Traditional investment models such as the discounted cash flow (DCF) model lead to under-investment in R&D. Traditional approaches to estimating the default rate have the major disadvantage of requiring historical data over long time periods, which may not exist for new programmes. As a result of the problems with these traditional models regarding R&D finance, a number of agencies have started or are considering using the real options approach to inform their financial decisions, for example in the pricing of guarantee premiums. These agencies include:

- The Institute for the Promotion of Innovation by Science and Technology in Flanders (IWT-Vlaanderen) has established a working group which is examining the feasibility of using a real options approach. The software needed to support decisions on premium pricing has been developed and a data base which would provide the needed parameters (e.g. volatility data on specific sectors) is being put together.
- The Finanzierungsgarantie Gesellschaft (FGG) in Austria (as of 1 October 2002 merged into the Austria Wirtschaftsservice Gesellschaft) bases its decisions on premiums on its equity and capital guarantee programmes in part on a real options approach.

Securitisation of SME loan portfolios

A major concern is the apparent tightening up of credit conditions for SMEs in many European countries. One factor here appears to be the widespread adoption of credit scoring systems by European banks. This development is in part attributable to the deliberations on a new Basel capital adequacy agreement, which would require banks to set aside different levels of capital for different levels of SME credit risk. One problem is that the capital adequacy guidelines may be too conservative and require banks to set aside a much higher level of capital than the true default risks would imply. A second problem is that banks may be forced to shrink their loan portfolios to improve their capital ratios. A third danger is that R&D-intensive companies may be especially vulnerable to credit rationing due to the difficulties in getting a credit rating or the low scores that technology-oriented companies might get.

Securitisation of SME loan portfolios may be one way of dealing with this problem. Securitisation involves the pooling together of a set of assets and selling these to investors on the market. In the case of SMEs, a bank will pool together a set of loans it has made to SMEs and in essence sell these on the market. An underwriter will assist in the process of putting together the package, determining how risks will be allocated, and marketing the securities to investors. After the sale, the bank can use the capital that was freed up to support a new set of loans. Securitisation thus helps maintain the flow of funds to SMEs at a time when developments appear to make it more difficult for many banks to lend to portions of this market segment.

At national level, KfW has gained significant experience in securitising SME loan portfolios in Germany. Some of these transactions have been supported at European level by the EIF as a counterpart and risk taker. The KfW is considering introducing a securitised loan pool dedicated to renewable energy projects, some portion of which involve R&D projects. Activity here could be considerably expanded. The EIF could support this development by participating in securitisation, as it already has done a number of times with Germany's KfW and with partners in other countries. The European Commission could establish a mandate for the EIF to manage a new facility specifically for loan securitisation.

Guarantees for Leveraged Financing for R&D

One interesting approach to using guarantees to support fundraising for R&D is the US SBIC (Small Business Investment Company) programme. SBICs are privately owned and managed investment firms that specialize in small business finance, particularly in the provision of equity finance. The Small Business Association (SBA), which administers the SBIC programme, issues bonds to investors which carry a government guarantee of repayment. The SBA then uses the proceeds to provide finance to the SBICs. The SBICs thus can supplement their own private investment capital with funds borrowed at favourable rates through the federal government. In order to control losses, the SBA monitors the success rate of individual SBICs. SBICs with unfavourable track records are not allowed to participate in the programme.

Providing a guarantee basically means taking over risks which – in the absence of the guarantee – would be borne by the guaranteed party. The identification, the analysis, the evaluation and the definition of the risk to be covered invariably structures the procedure to issue a guarantee. In more technical terms, those logical steps include:

- checking the eligibility criteria
- risk assessment of the company and/or the project
- calculating the appropriate guarantee fee or – in the case of a flat rate – deciding whether the risk is in line with this rate
- defining the terms of the guarantee in the form of an appropriate legal instrument.

The most important step operationally is the risk assessment procedure. In the case of guarantees covering up to only 50% of the risk, the guarantor frequently only makes sure that the eligibility criteria are met and relies on the assessment work done by the guaranteed party. Clearly this approach is a very cost effective one, but could invite moral hazard/adverse selection problems, at least in cases where the guarantee percentage is above 50%.

In such cases, the guarantor normally undertakes his own risk assessment. Loan guarantee programmes show some variety in the extent of such an analysis, starting from some type of second opinion based on the documentation of the guaranteed party, to a full due diligence. The costs of this procedural step vary according to the information collected in a range from approx 2 k€ to 20 k€ per case. In the case of specific R&D-programmes the costs of the technological and/or scientific analysis still have to be added to this administrative costs.

Safeguarding a cost-effective way of risk-assessment means gaining a correct view of the “fundamental” risk of the company/project, which – in the absence of moral hazard behaviour – the diligent guaranteed party should have himself. In the case of a loan guarantee a fine balance has to be found between relying on this information and playing counter to a possible adverse selection bias by the lender in collecting the appropriate first-hand information and using proprietary analytical know-how. The right balance is not only determined by the assessment procedure as such but also by the careful design of the terms and (dis-) incentives of the guarantee. Because of these complex interdependent parameters, general recommendations concerning good practise in risk-assessment are difficult to make.

As far as the assessment of the corporate risk is concerned (which still is the most important risk factor for most guarantee programmes) assessment procedures using credit-rating approaches seem to be superior. Such methods contribute to a transparent, comparable, and market related risk analysis, opening up even the possibility to outsource this central step to external rating agencies. In this respect, such an approach could be more than just a procedural recommendation.

Tapping capital markets for financing R&D projects would require the establishment of transparent and generally accepted methods and institutions for analysing the underlying risks specifically for R&D intensive companies.

Technology rating systems could become a very important sub-set of rating systems for this type of companies and project. Tools for technology rating have been developed by national R&D promotion agencies (for instance by the Austrian Industrial Research Promotion Funds FFF; www.fff.co.at) in cooperation at the European level. They are aiming at a quick and reliable judgement of the technological risks of R&D projects. By integrating such tools in credit or equity rating systems, the financial risks of lending or investing in R&D intensive companies could be more transparent and better understood, thus making investments more attractive for financial markets.

Up to now, rating agencies in Europe have not been able to reach beyond their traditional client base of big companies. By outsourcing risk assessment tasks to rating agencies, public guarantee institutions could create a market for rating agencies for smaller companies as well on a competitive and potentially very cost-effective basis.

They even could define the submission of an acknowledged rating opinion as a precondition for any application for a guarantee (or another public support instrument).

This approach would potentially foster very far-reaching objectives:

- creating the necessary demand for rating systems for European SME's;
- creating the basis for the securitization of loans and other financial instruments for R&D;
- avoiding credit-rationing behaviour by banks;
- raising the transparency of guarantee systems;
- preparing SME's for new banking regulations in the wake of Basle II.

Of course this outsourcing of the "general" assessment of corporate risks should and would not prevent guarantee institutions from specializing in R&D-related assessment issues of the applications. But also in this respect available pan-european technology assessment procedures could be introduced.

Thus, as part of the securitisation initiative, the possibility of creating a pan-European market for rating (including technology rating) of SMEs should be considered to help support risk assessment by public guarantee institutions. Public agencies should consider bearing at least a portion of the costs of such a rating, which can be quite high relative to the resources of SMEs.

Including guarantees in packages of services

The support of R&D intensive companies often involves more than one public instrument and more than one public agency. The multiple (and different) applications and lengthened decision-making times involved can substantially reduce the attractiveness and effectiveness of public instruments.

One fresh approach, at Italy's MCC, is to include guarantees in a larger package of services which are offered. The "Integrated Packages of Subsidies" (IPS) are based on the rationale that combining different and complementary policy measures – grants, subsidies, guarantees and support services- increases effectiveness of each single instrument. The IPS is a "*modality of delivering incentives*", its value added being a simplified and unique procedure for the access to different existing tools.

One type of IPS is specifically tailored to innovative small and medium sized firms. The package is directed to support integrated investment projects with a broader scope, i.e. fixed investment in machinery or environmental protection technologies, consulting services acquisition and IT expenditure. At present, an IPS of this type could combine up to 4 different tools:

- interest subsidies on machinery investment *or alternatively* interest subsidies on innovation technology investments and environmental protection
- Public Direct Guarantee Fund on a soft loan *or alternatively* the Public Direct Guarantee Fund for Handicrafts (managed by Artigiancassa) *or alternatively* Private Direct Guarantee (granted by Confidis, which in turn will benefit from public counterguarantee)
- Subsidy for total reimbursement of public or private guarantee fees (managed by MCC on behalf of a Local Authority, which finances this measure)
- Interest subsidy or grant for ISO 14000 and ISO 9000 patent acquisition (Regional Incentive financed by Local Authorities).

The approach involves the following main advantages: 1) the common agreement sets actual favourable conditions on eligible loans in terms of timing, interest rates and limitations on additional guarantees; 2) additional resources are allocated by Local Authorities, enhancing potential effectiveness of the package, and in particular of public or mutual guarantees 3) the firm faces a streamlined procedure and a single interface (Bank or Confidi, which in turn deal with a single incentive manager) 4) the burden on public budget is limited and provides high leverage effect on private financing 5) the approach creates a virtuous circle where each counterpart takes advantage from the activation of the measure.

Another type of IPS "IPS – Innovation" is promoted by the Ministry of Productive Activities and has a high relevance for R&D. This IPS mixes and unifies the following measures:

- a) pre-competitive development grant + soft loan
- b) an industrialisation grant for investments strictly related to pre-competitive research results
- c) grant on training
- d) guarantee on long term loans related to the industrialisation programme.

Resources come both from national budget and from the European Social Fund and the European Fund for Regional Development. Also non-SMEs are eligible, under certain conditions.

Interestingly, the measure tackles directly the R&D expenditure problem: in fact, amidst main eligible costs are pre-competitive activities and industrial research

investments such as development of prototypes, creation and implementation of pilot projects, product/service innovation studies and tuning. Although not predominant, creation or restructuring of research centres is also partially admitted.

Appraisal of IPS requests is carried out by licensed banks, that, in turn transmit results of the analysis to the Ministry of Productive Activities for final decision. Firms are ranked on the basis of indicators of innovation, employment and environmental protection and resources are allocated accordingly. The Ministry of Productive Activities will also transmit the “booking request” and all relevant documents to MCC for public guarantee intervention.

Innovative insurance approaches to R&D finance

Guarantees are essentially a special form of insurance, thus in principle insurance companies should at least be interested in looking at providing insurance against the risk of failure of R&D projects. In practice there has been discussion of this (e.g. in insuring against the failure of clinical trials for pharmaceutical and biotech companies) but no actual known implementation. However, an insurance company (Swiss Re) has been involved in organising the Princess Bond, a special instrument which allows private investors to participate in the upside potential of participating in a portfolio of venture capital funds, while at the same time insuring against the downside risks. This private sector instrument, which helps raise funds for venture capital, is interesting since in theory it might replace public sector guarantees in the long run.

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SUMMARY

The European Council in Barcelona set an overall EU R&D investment target of 3% of GDP by the year 2010, with industry asked to contribute two thirds of this figure. To approach these levels, however, dramatic improvements are needed in the effectiveness of policies used to stimulate private sector R&D. The specific aim of this report is to offer suggestions and guidance concerning the use of guarantee mechanisms to foster loan and equity financing of research and innovation. Starting with an overview of the role of guarantee schemes, the report reviews the use of these instruments and the influence of framework conditions. Building upon this review, the report presents a series of recommendations for the consideration of policy makers across the EU.