VINNOVA

VINNOVA ANALYSIS
VA 2009:14

FIGHT THE CRISIS WITH RESEARCH AND INNOVATION?

Additional public investment in research and innovation for sustainable recovery from the crisis

Title: FIGHT THE CRISIS WITH RESEARCH AND INNOVATION? – Additional public investment in research and innovation for sustainable recovery from the crisis
Series: VINNOVA Analysis VA 2009:14
ISBN: 978-91-85959-61-7
ISSN: 1651-355X
Published: May 2009
Publisher: VINNOVA – Verket för Innovationssystem / *Swedish Governmental Agency for Innovation System*
VINNOVA Case No: 2009-01486

About VINNOVA

VINNOVA, Swedish Governmental Agency for Innovation Systems.

VINNOVA´s mission is to *promote sustainable growth*
by funding *needs-driven research*
and developing *effective innovation systems*.

Through its activities in this field, VINNOVA aims to make a significant contribution to Sweden´s development into a leading centre of economic growth.

The VINNOVA Analysis series includes publications of studies, analyses, official reports and evaluations that have been produced or commissioned by VINNOVA´s Strategy Development Division.

Research and Innovation for Sustainable Growth.

FIGHT THE CRISIS WITH RESEARCH AND INNOVATION?

Additional public investment in research and innovation for sustainable recovery from the crisis

Foreword

Research and innovation (R&I) have an important role in driving economic growth. In Sweden, VINNOVA has a particular role to play in stimulating sustainable growth. The present economic recession is a blow to worldwide economic growth and most governments are taking action to restore the stability of the financial system and stimulate growth. It is of obvious interest to VINNOVA to understand the national approaches taken to stimulate growth through research and innovation. We have therefore initiated studies in a number of countries which are being summarised in this report.

In an introductory section, we characterise in general terms how research and innovation will impact the sustainable recovery from the crisis.

The project has been managed by Göran Pagels-Fick and information from the different countries has been provided by Joakim Appelquist (Germany), Magnus Breidne ITPS (China), Rolf Nilsson (Finland), Jenni Nordborg (the Netherlands), Lennart Stenberg (Japan) and Karin Stridh (USA).

VINNOVA in April 2009

Göran Marklund
Acting First Deputy Director General

Content

A framework for managing the economic crisis

A comprehensive approach to the recession

Innovation and strategies to stimulate it have come to play a role in many governments' programmes to fight the present recession, often referred to as "the crisis". The OECD recently[1] published a study[2] on innovation-led, sustainable recovery from the crisis. The study starts with the measures to stabilise the financial system:

> *The economic crisis has prompted an immediate response by governments to avoid a collapse of the financial system and limit the economic effects of the credit crunch. Policy measures include both* ***a financial component*** *(rescuing fragilised banks, neutralising "toxic" financial products which paralyse the ability of banks to distribute new credit, etc.) and a* ***demand side component****, aimed at stimulating production and income in the short term by boosting public and private spending.*

The OECD study immediately adds that short-term stabilising policies are not enough, but:

> *"policies also need to ensure that the recovery can be sustained and is durable."*
>
> *"Such a long-term perspective is an essential component of policy for a number of reasons, including:*
>
> ***Credibility****: as governments are borrowing heavily to stimulate the economy, fiscal sustainability has become a major concern. Implementing policies that will strengthen future potential growth will improve government's credibility.*
>
> ***Addressing underlying weaknesses****: Some structural factors influencing the current crisis, such as the high prices of oil and raw materials, will re-emerge as soon as growth recovers if no action is taken immediately to increase their efficient use.*
>
> ***Opportunity****: The "creative destruction" that occurs naturally in downturns can be used as an opportunity by policy makers to foster innovation and emerging industries.*

1 24th February, 2009
2 A forward-looking response to the crisis: Fostering an innovation-led, sustainable recovery, OECD, DSTI/IND/STP/ICCP(2009)1

The study goes on to say:

> *Fostering innovation through promoting entrepreneurship, investing in smart infrastructure, encouraging R&D, green investment and upgrading the skills of workers is the foundation for these medium- and long-term initiatives.*

The OECD report uses two examples from the economic crisis during the first half of the 1990s to demonstrate that such long-term policies actually can work.

> *While most public expenditures were cut in Finland during this period. R&D expenditure were increased rather than cut in a counter-cyclical support of TEKES. This helped reduceing the depth and length of the downturn in business R&D which helped lay the ground for a strong rebound. Together with sustained investment in infrastructure, education and incentives for structural change it helped ensure that the economy would not only recover but would emerge from the crisis on a stronger, more knowledge-intensive growth path."*

The Asian financial crisis during the 1990s is the second example. The crisis …

> *… led to significant downsizing among large firms in Korea. This process was characterized by mass lay-offs of highly-skilled personnel, and large reductions in corporate R&D spending. The response of the Korean government, in addition to boosting education expenditure, was to increase its R&D budget, to offset these declines in corporate R&D spending. But it also used the crisis as an opportunity to develop … the creation of knowledge-intensive SMEs. A co-ordinated mix of policy measures was put in place: regulations (the government used the crisis as an opportunity to overhaul regulations, to create a more positive environment for venture start-ups and their growth); venture financing (government-backed venture funds and tax incentives were given to investors); and research support (e.g. R&D funding, tax waivers, tariff exemption for R&D equipment, and military service exemptions for researchers). These measures fuelled rapid expansion in the number of corporate R&D labs. SMEs accounted for 95% of this increase. The long-term effects of these measures were striking.*

How to compensate for increased "destruction"?

"Creative destruction" is a natural component in the long-term efficiency of a market economy and the "destruction" component is intensified in a recession. Both technological and non-technological innovation has a pro-cyclical character, mainly due to an increased reluctance of financial institutions to fund innovation in a downturn. Innovation-oriented entrepreneurship follows the same pattern.[3] In the crisis, the com-

3 References to justify statements are included in the OECD report

bination of these phenomena hampers the entry of more efficient and innovative firms to compensate for the destruction. We will thus observe a growing imbalance between "creation" and "destruction" in the economy. Wisely managed, OECD argues, a recession can be the key to long-term prosperity if resources freed by the destruction can be effectively channelled to generate growth in "creative areas".

R&D spending in vain if framework conditions are not right

The OECD also warns against increased spending of research and development (R&D) if necessary framework conditions are not duly considered. Despite increased government R&D spending in Japan after the recession in the 1990s the economy did not recover. The reasons are analysed by the OECD:

> *Science, technology and innovation policy cannot compensate for adverse framework conditions (e.g. dysfunctional financial systems).*
>
> *R&D policy has its own limitations when it is not part of a comprehensive approach which addresses all the impediments to innovation, such as weak industry-science linkages.*
>
> *Most of the additional public R&D went to the university sector and government research institutes where it was used for investments in large research facilities, for the acquisition of expensive research equipment or for carrying out costly R&D projects or speeding up projects that were already in the pipeline.*
>
> *Industry-science linkages in Japan were limited by the lack of university autonomy, regulations on university funding and faculty employment rules limiting entrepreneurial activities, and under-developed patenting and licensing capabilities in universities.*

A scenario approach to the crisis

Most commentaries and recipes for coming out of the crisis start with the crisis itself and investigate roadmaps for restoring the economy to its former vitality. A different approach would be to analyse the potential outcomes of the crisis, what would be the possible (but not necessarily desirable) states of the economy once we have reached a new "stable" condition. This approach has been used by the Copenhagen Institute for Future Studies (CIFS) in a study[4] which recognises that we do not know the time which will be needed to reach "stability" in the world economic system (quick versus slow adjustment) or if future stability will be reached at a level of economic stagna-

4 "Opportunities in crisis". Members report #1/2009

tion or mean renewed growth similar to what we had. Investigations into the resulting four scenarios show that investments in R&I will be an important element in achieving long-term stability in either case. There will, however, be differences in respect of the subjects and sectors of those investments.

Where to focus Research & Innovation spending?

The two studies from OECD and CIFS argue differently about where to focus and prioritise investments in research and innovation in the crisis. OECD argues for finding ways out of the crisis whereas CIFS tries to identify those areas of innovation which will be attractive in each of the four possible scenarios for the future economy. However, from their respective positions they reach very similar conclusions.

The OECD argues:

> *Letting the economic downturn reduce pressures for a greener, low-carbon economy would be detrimental for both overall welfare and for economic growth. The convergence of innovation and environmental policy should therefore continue to be encouraged …*

The CIFS on the other hand argues that the crises can be looked upon as a period of *lack of growth drivers.*

> *The heretofore powerful megatrends for growth – globalization, demography, commercialization and technology are now pointed the wrong way.*

So, what drivers may help pull us out of the crisis? CIFS provides slightly different answers in the four scenarios mentioned above. As before the crisis, broad stimulation of research and innovation is a good recipe, if the world is quick to adjust to the new conditions and if we end up in a world very similar to before. However, the situation is different if the renewed stability is either a long way off (i.e. after a long crisis) or will be characterised by economic stagnation. Production which can be said to satisfy "overconsumption" will have great difficulty surviving. Only more fundamental needs and "real challenges" of society will be the basis of growth. The main drivers of growth will therefore be sustainable technologies and aging of the population.

Sustainable technologies are areas such as carbon neutral or renewable energy sources (e.g. solar and wind), energy conservation and efficiency (e.g. passive houses, control and monitoring technology), low-emission vehicles (e.g. electric cars), public transportation and means to accelerate transitions to renewable energy and resource efficiency.

Aging of the population will make healthcare and nursing into growth sectors and increase demand for new products and services based on life science research and innovation (e.g. biotechnology).

The OECD study reaches similar conclusions …

> … *Only a substantial acceleration of productivity growth will allow a durable recovery, allowing countries to face long-term challenges like the environment and ageing. Policies to overcome the current crisis should therefore not damage the drivers of long term growth but should be used instead as a means to accelerate structural shifts towards a more sustainable economic future.*

The CIFS study goes somewhat beyond this position by making the other option more explicit. The prospect of a new economic order characterised by economic stagnation may force us to accept a more *simple living at a lower level of economic activity*.

Interestingly enough, both perspectives lead to the conclusion that investment in research and innovation will be a key to reaching a new economic stability beyond the crisis. This is true whatever future we encounter.

OECD data on policy responses

OECD has published a report[5] on the policy measures taken in the OECD and some non-OECD countries in response to the crisis. Expenditure on infrastructure, R&D, education and "green technology" form the group of "long-term policy" measures and come on top of the short-term measures in finance, competition and governance. In some cases, these long-term expenditure total as much as 1.7% of GDP. R&D expenditure was at most 0.11% of GDP, but the data is difficult to interpret. Some of the expenditure on "green technology" will require R&D for example. However, the report clarifies:

> *Investments in R&D and innovation are a priority in economic stimulus packages. In principle, these measures consist in formulating and adhering to R&D spending targets (including increases in R&D funding, or measures for specific research areas, and investments in R&D infrastructure), stimulating private R&D investments (including through R&D tax credits, public procurement), measures for SMEs, and measures for R&D employment and skills and innovation.*
>
> *It also includes non-regulatory measures to spur certain innovations, e.g. regulations spurring or directing research in life sciences (e.g. on issues such as stem cell research) or directing green technology research areas (e.g. standards on renewable energy, etc.). Institutional issues such as public-private collaboration and knowledge transfer, and international coordination are also part of the stimulus plans – although the latter appear only marginally in current proposals.*

5 "Policy responses to the economic crisis to restore long-term growth: Results of the OECD questionnaire", DSTI/IND/STP/ICCP(2009)1/ADD, 20th February 2009

Research and innovation investment in a selection of countries

U.S. Vice President Joe Biden addresses the White House American Recovery and Reinvestment Act Implementation Conference for city and county governments in the Eisenhower Executive Office Building in Washington, March 18, 2009.

USA

During 2008, some of the most prominent financial institutions in the American economy collapsed. This brought the American financial system to a near standstill. During his last year in office, President George W. Bush did not present a comprehensive government solution to the economic crisis. However, he did attempt to restore confidence in the financial markets by injecting unprecedented amounts of funds from the Federal Reserve and through the Troubled Assets Relief Program[6], as well as giving the automotive industry a government rescue package consisting of USD 17.4 billion.

On 17th February, 2009 President Barack Obama signed the American Recovery and Reinvestment Act of 2009[7], which is a USD 789 billion economic stimulus package to

6 http://www.financialstability.gov/roadtostability/programs.htm
7 http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=111_cong_bills&docid=f:h1enr.pdf

deal with the current economic crisis. The Recovery Act, together with the Budget[8], presents the new Administration's economic ambitions for the country. The Act contains direct relief to working and middle class families (tax credits, expansion of unemployment insurance, state fiscal reliefs, etc.), major infrastructure investments (roads, public transit, high-speed rail, a smart electricity grid and broadband), increased funding for key scientific and engineering agencies, and modernised classrooms, labs and libraries. It also fosters renewable energy production and investments in the renewable sector, protects healthcare coverage of citizens and modernises the health sector (including computerisation and digital health records). For the first time in the United States, this Recovery Act includes pledges on transparency and accountability, including the public posting of all contracts and grant awards. On Recovery.gov, American taxpayers can learn where recovery funds are going, for what purpose, and to what result.

The US government does not have separate budgets for research and development (R&D); funds are divided between several different agencies and departments. Therefore, it is hard to find the exact sum of federal money being spent on R&D under the Recovery Act. The American Association for the Advancement of Science (AAAS) estimates the Act contains USD 21.5 billion in federal R&D funding[9], which is about 2.7% of the total amount in the Recovery Act. This is additional money on top of the ordinary budget for 2009, and according to the President is the biggest ever increase in R&D funding in the United States.

Funding of key scientific agencies will increase as follows: the National Science Foundation (USD 3 billion, including basic research to meet environmental challenges), the Department of Energy's Office of Science (USD 1.6 billion, including research into future energy), NASA (USD 1 billion, including work on climate change), the Advanced Research Projects Agency – Energy, a new and previously unfunded research agency supporting high-risk, high-payoff research (USD 400 million), and the National Institutes of Health (USD 10 billion, including biomedical research). Approximately three quarters of the funds in the stimulus package will be spent in the first 18 months.

For the science and engineering community, the Recovery Act represents a welcome acknowledgement that scientific research, often regarded as long-term and future-oriented, also has a role to play in short-term economic recovery, and also represents a dramatic turnaround from the flat or declining research funding trends of recent years, according to AAAS. However, economists have other views about the stimulus packages which focus mainly on short-term economic stimulus. They emphasise that some-

8 http://www.whitehouse.gov/omb/assets/fy2010_new_era/A_New_Era_of_Responsibility2.pdf
9 http://www.aaas.org/spp/rd/stim09c.htm

thing also needs to be done to secure long-term economic growth. A growing number of economists have come to see that innovation is the key to sustaining long-term economic growth.

It is often said that the United States has no national innovation policy. This may be strictly correct but misses the point because innovation efforts have been made a responsibility throughout government. In 2007, the America COMPETES Act[10] was signed into law. It provides for an increase in federal support for research and science, key inputs into the innovation process. However, according to Robert Atkinson and Howard Wial[11], the Act does not go far enough. They suggest the creation of a National Innovation Foundation (NIF) – a new, federally-funded organisation whose core mission would be to boost innovation. It would build upon the few federal programmes which have already succeeded in promoting innovation, and borrow the best public policy ideas from other nations to spur innovation in the United States. There already seems to have been progress in this regard, since there is legislation in the Senate to create a NIF-like organisation. The National Innovation Act[12], introduced in 2008 by Senators Hillary Clinton (D-NY) and Susan Collins (R-ME), would create a National Innovation Council. This would be an important step in advancing the innovation agenda in the United States.

10 http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ069.110.pdf

11 "Boosting Productivity, Innovation, and Growth Through a National Innovation Foundation" by Robert Atkinson and Howard Wial. Brookings-ITIF, April 2008. http://www.itif.org/index.php?id=140

12 http://www.opencongress.org/bill/110-s3078/show

Unemployed people and supporters hold a rally at a park in Tokyo on January 5, 2009. The global economic crisis has driven down the Japanese economy in the latter half of the 2008, pushing brand-name Japanese firms, such as Toyota and Sony, to announce massive job cuts and stop factories.

Japan

Two supplementary budgets in response to the crisis were passed by the Japanese parliament (the Diet) in October 2008 and January 2009. Of the total budgetary expenditure of JPY 6.5 trillion[13], JPY 240 billion, or 3.7% has been classed as science and technology (S&T) related. Most of the extra funding is likely to be spent during the fiscal year 2009, starting 1st April. Compared to the regular S&T related budget, this represents 6.7% in additional resources. The extra S&T budgets amount to around 0.05% in relation to GDP. A new supplementary budget was0n the 10th of April. The main items of the supplementary budgets passed so far are:

- Construction and refurbishing of university and university hospital facilities (around JPY 110 billion) and national research institutes (detailed amount not available). Earthquake-proofing is one important objective.
- Subsidies for development and dissemination of energy-saving and new energy technologies, especially solar power generation and low-emission vehicles (JPY 36 billion).
- Speeding up of R&D concerning nationally strategic technologies: iPS cell re-

13 See appendix for currency conversions

search[14], next-generation supercomputers, X-ray-free electron lasers, proton accelerators, earthquake and tsunami monitoring systems (JPY 21 billion).

- R&D aimed at increasing competitiveness and growth potential (JPY 16 billion), including investments in the creation of "world-class innovation centres" based on industry-university-government cooperation in specific fields such as non-invasive cancer therapy, nanotechnology, environment and low-carbon technologies, plus hydrogen energy products.
- Installation of advanced medical equipment at medical centres (JPY 5.6 billion).

As the effects of the international financial crisis on the Japanese economy deepen, preparations are underway for a new JPY 13 trillion fiscal stimulus, as well as non-budgetary interventions in the financial system. The main outline was announced on 10th April but details of the budgets for individual items will only become clear around 1st May when the government is expected to present its proposed new supplementary budget to the Diet. An important element in developing the new measures has been discussions at numerous meetings of the Council on Economic and Fiscal Policy (CEFP) and hearings from 16th-21st March on how to overcome the economic crisis held by the Prime Minister and members of his cabinet with 84 invited experts. According to the new supplementary budget outline, around 40% will be spent on measures for "investing in the future" aimed at promoting medium and long-term growth in the Japanese economy. These measures fall under three main headings: "Low-carbon Revolution", "Healthy Long Life and Childcare" and "Realising Potential Strengths and Providing the Infrastructure for the 21st Century". The first item follows up on previous measures to promote the development and wide-spread use of solar energy and low-emission vehicles but expands the measures to the development and dissemination of energy and resource-efficient technologies in additional fields such as electronic and household appliances, stationary fuel cells, heat pumps, buildings and traffic and transport systems. "Healthy Long Life" includes such things as support for medical research, R&D in young biotechnology firms and increased use of IT in healthcare although most of the funds under this heading will be spent on other than S&T-related items.

Investment in the development of advanced technologies is one of the main pillars in "realising potential strengths". According to the Prime Minister's speech at the announcement of the supplementary budget, JPY 270 billion will be spent over the next 3-5 years "in strongly supporting the world's most advanced research on around 30 research themes, to be determined". The total expenditure on research and innovation will likely be much larger. Unlike the usual supplementary budgets, it appears this

14 Induced pluripotent stem cells

funding will be spent over several years rather than concentrated on just one. This will make it easier to fund actual R&D work rather than just investments in R&D facilities and equipment. The long list of research and innovation-related items mentioned in the outline of the new supplementary budget seems by and large in keeping with the priorities established by the Council for Science and Technology Policy (CSTP), the top policy-making body chaired by the Prime Minister. Outside the fiscal spending package there is a proposal for tax reductions linked to R&D-spending in industry.

There seems to be a recognition that measures of many different kinds and a multitude of actors need to be combined in order to unleash the growth potential of emerging fields. An example is the "Action Plan for Promoting the Introduction of Solar Power Generation", announced in November 2008. This includes a broad range of measures on both the supply and demand side. In the medical field, weaknesses in the regulatory system are widely seen as a major barrier to translating high-level Japanese research in the life sciences into globally competitive innovation and growth in Japanese industry. Reforming the entire regulatory system will take time and so, regulatory short-cuts have to be used. Therefore, in November 2008 24 R&D programmes (from a total of 143 applications) relating to new drugs and new medical technologies were selected for preferential treatment ("super-special zones") by regulatory authorities, Japan Patent Office and other government bodies. Significantly, this selection was made in a cross-ministerial committee. Similar treatment is expected for environmental and energy technologies.

People walk through a road decorated with various ornaments for the upcoming Luna New Year of the Ox in Beijing on January 20, 2009. Lunar New Year of the Ox starts on January 26. Chinese Premier Wen Jiaobao has warned the nation's economy faces the toughest year since 2000, pledging a range of measures aimed at curbing the downturn, state media said.

China

On 9th November, 2008 China announced a CNY 4 trillion[15] two-year economic stimulus package to boost growth and domestic demand. This represents 13.4% of China's estimated 2008 GDP. Of the CNY 4 trillion, CNY 1.18 trillion will be funded by central government. The Chinese Premier Wen Jiabao has called on enterprise and officials to give priority to industrial upgrading and innovation, urging them to move "early rather than late" to ride out the global financial crisis. Chinese companies are to focus on adjusting product structure, improving quality and upgrading technologies in the face of economic woes.

In addition to the CNY 4 trillion stimulus package, Wen Jiabao has also proposed a budgeted fiscal deficit of CNY 950 billion for 2009, a record high in six decades. The stimulus package does not include some other major reforms found in the 2009 budget, including a CNY 600 billion tax cut, an old-age pension increase for enterprise retirees,

15 See appendix for currency conversions

a salary increase for 12 million teachers, subsidies to farmers and an CNY 850 billion three-year investment in healthcare reform.

The stimulus package received some criticism for spending too little money on research and innovation. It was therefore modified in March 2009 and now has a new allocation of resources as in the table below. It now includes CNY 370 billion, more than doubling the investment in innovation and industrial upgrades, compared to the CNY 160 billion for innovation as of November 2008.

Key areas for the CNY 4 trillion investment	Investment
Government-subsidised housing construction	CNY 400 billion
Construction of projects related to people's livelihoods and infrastructure facilities in rural areas	CNY 370 billion
Major infrastructure projects (railways, bridges etc)	CNY 1.5 trillion
Social undertakings including the medical care and public health, education and cultural sectors	CNY 150 billion
Construction of energy conservation, emission reduction and ecological projects	CNY 210 billion
Independent innovation, structural adjustment and technical innovation projects	CNY 370 billion
Post-quake recovery and reconstruction	CNY 1 trillion

Source: NDRC, 6th March 2009.

Still, the package is mainly short-term and has boosting consumption as its most important objective. There are mainly two reasons for the relatively low additional input to R&D in the stimulus package: 1) The planned substantial increase in the Chinese Innovation System as described in The Long and Medium-term Plan for S&T Development and 2) The 2009 budget.

Long and Medium-term Plan for S&T Development

The National Program for Long- and Medium-Term Scientific and Technological Development was implemented from 2006 and its supporting policies are starting to kick-in. Funding for scientific and technological (S&T) innovation has thereby increased significantly. Expenditures on S&T from the central budget in 2008 totalled CNY 116.3 billion, up 16.4%. The 16 major state S&T projects, including development of large-scale oil and gas fields and ultra-large scale integrated circuits, have all entered the implementation phase.

2009 budget

Support for domestic industry is already well covered in the budget. It includes policies giving preferential treatment for the purchase and use of key equipment that has been newly developed and manufactured domestically.

A fund of CNY 20 billion in the 2009 budget has been set up to promote the technological transformation of enterprises. Money will be allocated to create a number of service platforms for technological innovation and to increase extensive application of domestically developed technologies and products. Government spending on R&D will increase to 1.6% of GDP.

The budget includes subsidies to further develop high-tech industries and equipment manufacturing. Projects to promote the industrial application of high technologies will be financed in areas such as information, biotechnology, new materials, new energy sources, civil aviation and civil aerospace. The focus will be on major high-tech industrial projects such as next-generation Internet and digital television.

Dutch Finance Minister Wouter Bos arrives for a press conference about economic prospects in The Hague on February 17, 2009. The Dutch economy is set to shrink by 3.5 percent in 2009, the government's budget policy advice body said on February 17 as Prime Minister Jan Peter Balkenende spoke of a 'heavy recession' in the country.

The Netherlands

In March, the Dutch government announced a scheme to get out of the crisis. An additional EUR 6 billion targeting investment has been announced for the coming years and focuses on four main targets:

1 Keeping the working force in the labour market and preventing youth unemployment.

2 Investing in a clean, sustainable and innovative economy, where energy security is mentioned as special target (e.g. offshore wind turbine facilities).

3 Investing in construction and infrastructure (also for coastal defence).

4 Improving corporate liquidity.

The main aim seems to be to prevent stagnation of major businesses and the vision is to overcome the depression. The second target above may involve investment in innovation research and development, but the extent is still unknown (rough estimate of EUR 1-1.5 billion).

Some additional measures discussed by the government include:

- Increasing the present tax deduction (WBSO) for R&D expenses by companies (current figure around EUR 500 million).
- More budget for soft loans to companies. SenterNovem has a scheme for this; the present budget is around EUR 40 million.
- More budget for collaborative R&D by SMEs; the present scheme has a budget of EUR 20 million.
- Measures for private R&D staff in private companies heavily affected by the crisis to be temporarily posted to universities or other institutes.

The government has also announced its willingness to bring innovation, research and education spending up to the OECD average. Details of where this will lead are not yet available.

Finland now builds another nuclear power plant to secure future energy demand. This photo shows the building site in Finland, in Sept. 2008. The "European Pressurized Water Reactor" is provided by French Areva.

Finland

Public support for research and innovation is quite substantial in Finland. It is therefore worth noting that in a report published in late 2008 (separately from the supplementary bill) the Finnish Research and Innovation Council, chaired by Prime Minister Matti Vanhanen, recommended increasing government R&D funding by EUR 760 million during 2009-2011. It has thus been suggested that the budget for Tekes, the Finnish Funding Agency for Technology and Innovation, should be increased by EUR 220 million over the same period.

In its supplementary bill to the 2009 budget bill, the Finnish government proposes large investments to ease the impacts of international recession. The total effect of the stimulus package amounts to around EUR 2 billion.

According to the Finnish government, the stimulus package will directly generate at least 18,000 man-years of employment. If the indirect effects are included, the stimulus package will generate 7,000 additional jobs. It has also been estimated that the stimulus package will increase GDP by 1%.

A main goal of the stimulus package is to reduce the cyclical unemployment due to the international recession. A lot of resources have therefore been devoted to measures

that directly stimulate job creation. This includes investment in transport infrastructure, broadband infrastructure and construction. A 0.8 percentage point reduction in social insurance contributions will reduce the total labour costs, making it cheaper to employ. As an investment incentive, the right to depreciate investments will be doubled for 2009 and 2010. In addition, resources are being targeted at education by such means as increasing the number of places on vocational courses.

The total investment in the innovation policy stimulus package is estimated to around EUR 25 million, of which EUR 6 million will affect the 2009 budget. This includes increased R&D subsidies and loans to companies through Tekes and increased support for public R&D undertaken by bodies such as the VTT Technical Research Centre of Finland. An additional EUR 6 million will be used to digitalise and catalogue databases to promote science.

The share of R&D&I in the Finnish stimulus package is fairly low even though some other measures, such as infrastructure projects, involve elements of research, development and innovation. This is to be expected since the overall objective of the stimulus package is to reduce cyclical unemployment.

General view taken from a container bridge shows the Container Terminal Burchardkai at Hamburg harbour in this January, 2008 photo. The hive of activity at the Hamburg shipyard reflects the emphasis many German companies are putting on getting their equipment ready to cope with the increased demand they expect to kick in once the world economy starts picking up again.

Germany

As part of the second EUR 50 billion recovery package (Konjunkturprogramm II) EUR 1.4 billion will be spent on public R&D.[16] EUR 500 million has been allocated to mission-oriented research in the field of transportation. Specifically, the research aims to develop clean car technologies, such as hybrid solutions.[17] The remaining EUR 900 million will be used to increase the budget of Zentralen Innovationsprogramms Mittelstand (ZIM), a funding scheme to increase the innovativeness of SMEs by stimulating contacts with academia and lower the risk of R&D projects.[18] The R&D part of the recovery packages amounts to 0.26% of German GDP in 2008 and might seem low considering the high knowledge intensity of many German companies. However, it should be noted that the EUR 1.4 billion is additional to the very substantial investments initiated by the German High-tech Strategy. This was proposed in 2006 and includes R&D investments totalling EUR 14.6 billion for implementation between 2006 and 2009. *One part* of the strategy, with a budget of EUR 2,660 million, has been

16 http://www.konjunkturpaket.de/Webs/KP/DE/Homepage/home.html
17 OECD DSTI/IND/STP/ICCP(2009)1/ADD p 11
18 http://www.zim-bmwi.de

devoted to cross-cutting initiatives aimed at strengthening the industry-academia collaboration, stimulating investment in R&D, forming start-ups, increasing international collaboration etc. *The second part* consists of 17 individual innovation strategies focusing on different technological areas and industries. The budget allocated to these strategies totals EUR 11.9 billion and ranges from nanotechnology to plants and service innovations.[19]

19 BMBF High Tech Strategy for Germany. (http://www.bmbf.de/en/6608.php)

General observations and conclusions

The measures taken to create growth through investment in research and innovation can generally be characterised by a few observations:

- Actions to stabilise the financial system have been much faster and involved much greater public spending than long-term investments in R&I.
- R&I investments mainly follow the paths indicated in the introduction, i.e. they focus on a "low-carbon society" and a society of "healthy long life".
- Some countries have "national strategic technologies" which receive additional funding.
- The potential growth effects of investment in R&I can only be reached when the institutional and other conditions are conducive to innovation and multiple countries adopt such measures.
- Regulatory measures to allow swift absorption of R&I in society are part of the agenda in some countries.
- Public investments are called upon to compensate for fluctuations in private sector investments in R&I.
- The R&I investments foreseen in the American Recovery and Reinvestment Act seem to inspire other countries to more forceful investments in R&I.
- Demand-side measures to stimulate the economy may have positive effects short-term. Investment in R&I must be sustained during a longer period to be effective. Short-term R&I investments may, as indicated by the Japanese example, be used to build research infrastructure but useful knowledge production usually takes longer time.
- Temporary posting R&D staff in private companies to universities or other public institutions is a measure to create relief for R&D-intensive companies heavily affected by the crisis.

Appendix:

Approximate currency conversions

JPY (Japanese Yen)	SEK (billions)
13 trillion	1,070
6.5 trillion	530
270 billion	22
240 billion	20
110 billion	9
36 billion	3
21 billion	1.7
16 billion	1.3
5.6 billion	0.46

CNY (Chinese Yuan)	SEK (billions)
4 trillion	4,800
1.5 trillion	1,800
1 trillion	1,200
1.18 trillion	1,400
950 billion	1,140
850 billion	1,020
600 billion	720
400 billion	480
370 billion	444
210 billion	250
160 billion	190
150 billion	180
116.3 billion	140
20 billion	24

VINNOVA´s publications

May 2009

See www.VINNOVA.se for more information

VINNOVA Analysis

VA 2009:

01 Svenska tekniker 1620–1920

02 Effekter av statligt stöd till fordonsforskning – Betydelsen av forskning och förnyelse för den svenska fordonsindustrins konkurrenskraft. *For brief version in Swedish and English see VA 2009:11 and VA 2009:12*

03 Evaluation of SIBED. Sweden – Israei test bed program for IT applications. *Finns endast som PDF*

04 Swedish possibilities within Tissue Engineering and Regenerative Medicine

05 Sverige och FP7 – Rapportering av det svenska deltagandet i EUs sjunde ramprogram för forskning och teknisk utveckling. *Only available as PDF*

06 Hetast på marknaden – Solenergi kan bli en av världens största industrier

07 Var ligger horisonten? – Stor potential men stora utmaningar för vågkraften

08 Vindkraften tar fart – En strukturell revolution?

09 Mer raffinerade produkter – Vedbaserade bioraffinaderier höjer kilovärdet på trädet

10 Förnybara energikällor – Hela elmarknaden i förändring

11 Sammanfattning – Effekter av statligt stöd till fordonsforskning. *Brief version of VA 2009:02, for brief version in English see VA 2009:12*

12 Summary – Impact of Government Support to Automotive Research. *Brief version in English of VA 2009:02, for brief version in Swedish see VA 2009:11*

13 Singapore – Aiming to create the Biopolis of Asia

14 Fight the Crisis with Research and Innovation? Additional public investment in research and innovation for sustainable recovery from the crisis.

VA 2008:

01 VINNOVAs Focus on Impact – A Joint Approach for Impact Logic Assessment, Monitoring, Evaluation and Impact Analysis

02 Svenskt deltagande i EU:s sjätte ramprogram för forskning och teknisk utveckling. *Only available as PDF*

03 Nanotechnology in Sweden – an Innovation System Approach to an Emerging Area. *For Swedish version see VA 2007:01*

04 The GSM Story – Effects of Research on Swedish Mobile Telephone Developments. *For brief version in Swedish or English see VA 2008:07 or VA 2008:06*

05 Effektanalys av ”offentlig såddfinansiering” 1994–2004

06 Summary – The GSM Story – Effects of Research on Swedish Mobile Telephone Developments. *Brief version of VA 2008:04, for brief version in Swedeish see VA 2008:07.*

07 Sammanfattning – Historien om GSM – Effekter av forskning i svensk mobiltelefoni-utveckling. *Brief version of VA 2008:04, for brief version in English see VA 2008:06*

08 Statlig och offentlig FoU-finansiering i Norden

09 Why is Danish life science thriving? A case study of the life science industry in Denmark

10 National and regional cluster profiles – Companies in biotechnology, pharmaceuticals and medical technology in Denmark in comparison with Sweden

11 Impacts of the Framework Programme in Sweden

12 A benchmarking study of the Swedish and British life science innovation systems. Comparison of policies and funding. *Only available as PDF*

13 Looking over the Shoulders of Giants – A study of the geography of big pharma R&D and manufacturing operations. *Only available as PDF*

14 Utvärdering av MERA-programmet

VINNOVA Information

VI 2009:

01 Forska&Väx – Program som främjar forskning, utveckling och innovation hos små och medelstora företag

02 Forskning om chefskap. Presentation av projekten inom utlysningen Chefskap; förutsättningar, former och resultat. *For English version see VI 2009:03*

03 Research on the managerial tasks: condition, ways of working and results. *Finns endast som PDF. For Swedish version see VI 2009:02*

04 Högskolan utmaningar som motor för innovation och tillväxt – 24–25 september 2008

05 VINNOVA news

06 Årsredovisning 2008

07 Innovationer för hållbar tillväxt. *For English version see VI 2009:08*

08 Innovations for sustainable Growth. *For Swedish version see VI 2009:07*

VI 2008:

01 Upptäck det innovativa Sverige.

02 Forskningsprogrammet Framtidens personresor – Projektbeskrivningar

03 Passenger Transport in the Future – Project Descriptions

04 Vehicle ICT – Project Descriptions

06 Årsredovisning 2007

07 Innovationer och ledande forskning – VINNOVA 2007. *For English version see VI 2008:08*

08 Innovations and leading research – VINNOVA 2007. *For Swedish version see VI 2008:07*

09 Forskning och innovation för hållbar tillväxt

10 Swedish Competence Research Centres – within the Transport Sector and funded by VINNOVA

11 E-tjänster i offentlig verksamhet. *For English version see VI 2006:18*

12 VINN Excellence Center – Investing in competitive research milieus

13 Relationships between R&D Investments, Innovation and Economic Growth – A Conference Summary

14 Arbetslivsutveckling för global konkurrenskraft

15 Innovationspolitik och tillväxt – En seminarierapport från Svenskt Näringsliv, IF Metall och VINNOVA

16 Den kompetenta arbetsplatsen – Forskning om kompetems i arbetsplatsens relationer. Programkatal

17 Nya möjligheter för små och medelstora företag – Rapport från VINNOVAs seminarium för småföretag 3 september 2008

18 ”No wrong door” alla ingångar leder dig rätt! – Erbjudande från nationella aktörer till små och medelstora företag

19 Forskning om kvinnors företagande – Presentation av projekten. *For English version see VI 2008:23*

20 MERA-programmet – Projektkatalog 2008

21 The MERA-program – Project Catalogue 2008

22 VINNVÄXT – A programme to get Sweden moving! Regional growth through dynamic innovation systems

23 Research on Women´s Entrepreneurship – A presentation of the ten projects funded by the programme. *For Swedish version see VI 2008:19*

24 Mobilitet, mobil kommunikation och bredband – Branschforskningsprogram för IT & telekom

25 The Future in clean Transport – Stockholm 2009

VINNOVA Policy

VP 2009:

01 TRANSAMS uppföljning av ”Nationell strategi för transportrelaterad FUD” åren 2005–2007. Två uppföljningar – en för 2005 och en för 2006–2007. *Only available as PDF*

02 VINNOVAs internationella strategi – att främja hållbar tillväxt i Sverige genom internationellt forsknings- och innovationssamarbete

VP 2008:

01 Forskning och innovation för hållbar tillväxt – VINNOVAs förslag till forsknings- & innovationsstrategi 2009-2012

02 Offentlig upphandling som drivkraft för innovation och förnyelse. *Only available as PDF. For English version see VP 2007:03*

03 Public procurement as a driver for innovation and change. *For Swedish version see VP 2008:02*

VINNOVA Report

VR 2009:

01 Affärsutveckling inom trämaufaktur och möbler – hur skapas effektivare värdekedjor? *Only available as PDF*

02 Användarna och datorerna – en historik 1960–1985

03 First Evaluation of the Berzelii Centra Programme and its centres EXSELENT, UCFB, Uppsala Berzelii & SBI Berzelii

04 Evaluation of SAFER – Vehicle and Traffic Safety Centre at Chalmers – a Centre of Excellence with financing from VINNOVA. *Only available as PDF*

05 Utvärdering av forskningsprogrammet SkeWood. *Only available as PDF*

06 Managing and Organizing for Innovation in Service Firms – A literature review with annotated bibliography. *Only available as PDF*

07 Den tjänstedominanta logiken – Innebörd och implikationer för policy.

08 Tjänster och relaterade begrepp – Innebörd och implikationer för policy.

09 Underlag för VINNOVAs satsningar inom transportsäkerhetsområdet. *Only available as PDF*

10 Utmaningar och kunskapsbehov – Om innovation, ledning och organisering i nio olika tjänsteföretag. *Only available as PDF*

VR 2008:

01 Mot bättre vetande – nya vägar till kunskap på arbetsplatsen

02 Managing Open Innovation – Present Findings and Future Directions

03 Framtiden är öppen! Om problem och möjligheter med öppen källkod och öppet innehåll

04 First Evaluation of the Institute Excellence Centres Programme

05 Utvärdering av det Nationella Flygtekniska forskningsprogrammet – NFFP. Evaluation of the Swedish National Aeronautics Research Programme – NFFP

06 Utvärdering av Vehicle – Information and Communication Technology programmet – V-ICT

07 Kartläggning av ett halvt sekels jämställdhets-insatser i Sverige

08 Politiken, offentlig verksamhet – en av tre parter i samverkan

09 Forsknings- och innovationspolitik i USA – Näringslivets fem roller

10 ”Born to be wild” – 55+... eller hur förvandla en global demografisk förändring till ett svenskt styrke- och tillväxtområde?

11 DYNAMO 2 i halvtid – Rapport från VINNOVAs konferens på Ulfsunda slott 10–11 april 2008

12 VINNVÄXT II – Generalist and Specialist Evaluation of process and knowledge development 2004–2007

13 Svensk makrologistik – Sammansättning och kostnadsutveckling 1997–2005

14 Leading Companies in a Global Age – Managing the Swedish Way

15 Chefskapets former och resultat. Två kunskapsöversikter om arbetsplatsens ledarskap

16 NRA Security – Swedish industry proposal for a National Research Agenda for security

17 University strategies for knowledge transfer and commercialisation – An overview based on peer reviews at 24 Swedish universities 2006

18 Vårda idéerna! – Trots många framgångsrika projekt inom vård och omsorg skapas inte varaktiga effekter. Varför förvaltas och utnyttjas inte idéerna?

19 Growth through Research and Development – what does the research literature say?

20 Sesam öppna dig! Forskarperspektiv på kvinnors företagande

Production: VINNOVA's Communication Division
Layout: West Studios, Stockholm, www.weststudios.se
Cover picture: Anders Gunér, Stockholm, www.guner.se
Photo: Scanpix, www.scanpix.se
Printed by: Åtta.45 Tryckeri AB, www.atta45.se
May 2009

VINNOVA´s mission is to promote sustainable growth
by funding needs-driven research
and developing effective innovation systems

VERKET FÖR INNOVATIONSSYSTEM – SWEDISH GOVERNMENTAL AGENCY FOR INNOVATION SYSTEMS

VINNOVA, SE-101 58 Stockholm, Sweden Besök/Office: Mäster Samuelsgatan 56
Tel: +46 (0)8 473 3000 Fax: +46 (0)8 473 3005
VINNOVA@VINNOVA.se www.VINNOVA.se