

Securing the Future: Public Debt and Business Research



REPORT by Stefan Bach

Capital Levies—A Step Towards Improving
Public Finances in Europe

3

INTERVIEW with Stefan Bach

»Private wealth could be used to stabilize public finances«

12

REPORT by Heike Belitz

Internationalization of Business Research:
New Locations Gaining Ground

13

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Capital Levies—A Step Towards Improving Public Finances in Europe

by Stefan Bach

Ever since the financial and economic crisis of 2008/2009, public debt in almost all OECD countries has increased significantly. The European debt crisis has further intensified over the past few weeks. Private households with high levels of wealth and income could be enlisted to help with refinancing and reducing this public debt through forced loans and one-off capital levies, without a risk of slowdown in consumer demand. This would also counteract the increased inequality in the distribution of wealth. Imposing such levies is not easy, however, since it involves valuation of assets and preventing tax avoidance and evasion.

It is difficult to estimate the revenue effects of such a levy for the countries in crisis due to the current lack of sufficient data. For Germany, simulations by DIW Berlin based on a personal allowance of 250 000 euros (500 000 euros for married couples) give a tax base of 92 percent of the GDP. A forced loan or a levy of, for example, ten percent of this tax base could thus mobilize just over nine percent of the GDP—around 230 billion euros. This would affect the richest eight percent of the adult population. It would presumably also be possible to generate considerable revenue in the European crisis countries in the same way. This would be an important step towards consolidation of public finances, and would facilitate reforms to promote growth

The debt crisis is still keeping Europe in suspense. European governments have not yet been able to stabilize financial markets long-term. The reform of the Stability and Growth Pact (sixpack, fiscal union) was intended to monitor adherence to stability rules more closely and to guarantee compliance using debt limits and similar fiscal regulations. But it has not reassured the financial markets one iota. The extent of the banking crisis in Spain has still not been quantified accurately and Italy's debt sustainability is in doubt. Austerity measures and structural reforms in the affected countries have had a recessionary and deflationary effect, combined with political and social upheaval. The risk premiums on government bonds from the southern European countries in crisis remain high. At the same time, European governments cannot bring themselves to introduce further debt cuts or debt rescheduling for banks or sovereign debt in the problem countries. They are afraid of contagion effects in the financial markets leading to new banking crises that may infringe on the real economy and destabilize economic development.

In recent months, it has become clear that markets can only be reassured long-term by extensive bail-out guarantees from European rescue packages, by collectivizing sovereign debt (Eurobonds) or by the European Central Bank (ECB). However, the northern countries of the eurozone under the leadership of Germany are not prepared to do this, even though international pressure has increased enormously and further concessions were made at the EU summit on June 29, 2012. They do not want to impose any more burdens on their own people to stabilize neighboring countries, jeopardizing their own credit rating and avoiding potentially inflationary credit creation by the ECB.¹ Furthermore, they do not want to reduce pressure on the countries in cri-

¹ G. Erber, Eurobonds und Transferleistungen innerhalb der Eurozone. ifo Schnelldienst 1/2012, www.cesifo-group.de/portal/pls/portal/docs/1/1212846.PDF.

sis to balance their budgets and bring in reforms to improve competitiveness and strengthen growth potential.

Against this background, additional fiscal instruments should be prepared to allow countries to be effectively refinanced for a transitional period, without having to resort to the international community or the European System of Central Banks. One step towards achieving this might be to pledge government assets or future revenues. This would mobilize public sector resources to collateralize loans. But since this is only possible to a limited degree, a successful consolidation strategy should include access to private sector wealth and income. Models of forced loans and capital levies could be combined.

Forced loans are credits to the government imposed on individuals with high incomes or wealth. They would primarily be considered in crisis countries which can only refinance at very unfavorable conditions on capital markets. Forced loans can be repaid at a later date or transferred to capital levies or other taxes on higher income and wealth, depending on the progress of the consolidation measures. Capital levies can also help reduce debt in the northern countries of the eurozone or in other OECD countries with sovereign debt to levels considered sustainable in the long term, for example, the Maastricht debt ratio of 60 percent of gross domestic product.²

Mobilization of Government Assets Only Helps to a Limited Extent

The majority of government assets are held as public infrastructure and administrative buildings.³ These can only be marketed to a limited extent because they serve to provide public services. If need be, resources could be mobilized in the short term with sale-and-lease-back models. Public financial assets in the form of company

stakes or credit claims could also be sold or used as collateral on sovereign debt. There is probably also significant potential for this in the southern European crisis countries. So privatizations are designated as one element of the adjustment programs which are part of the EFSF/ESM and IMF rescue packages. To prevent assets being sold below market value in the short term, they could be transferred to a privatization agency modeled on the German Treuhandanstalt set up in 1990 to privatize East German state-owned enterprises. These assets could be used to collateralize sovereign debt and, if required, to service creditors' claims. In addition, future revenues could be pledged to cover loans.⁴

These instruments can help strengthen the short-term liquidity of the public sector. But they are not so effective in the longer term because when assets or future earnings potentials are sold or pledged, they are no longer available to cover future expenditure. This is also taken into account by the capital markets in their estimates of the longer-term credit rating of sovereign debtors. Accordingly, the risk premium for loans without collateral ought to rise.

Burden on the Private Sector from Forced Loans and Capital Levies

Ultimately, the economy's private sector must accept more of a burden to reduce public deficits, either through tax increases or spending cuts. However, these measures should be implemented gradually out of consideration for economic development and political acceptance, as part of budgetary and debt regulations outlined in the German "debt brake." However, longer-term structural reforms can only make a limited contribution to solving the current liquidity and confidence crises.

In most countries, there are more private assets than public debt. In acute crisis situations where financial markets demand very high risk premiums, the private sector could be involved in sovereign debt refinancing in advance of fiscal consolidation and other stabilization measures. A forced loan is a classic instrument for this purpose.⁵ It can be collected from individuals or households with high income and wealth and be combined with one-off capital levies or other taxes on high incomes or wealth. Throughout history, governments have often

² See also the proposal by the German Council of Economic Experts for a debt redemption pact for Europe, Annual Report 2011/12, nos. 184 ff., see <http://voxeu.org/article/redemption-pact-europe-time-act-now>, D. Rhodes and D. Stelter, Back to Mesopotamia? The Looming Threat of Debt Restructuring, (Boston Consulting Group, 2011) www.bcg.de/documents/file87307.pdf. The Alliance 90/The Greens (Bündnis 90/Die Grünen) have proposed a capital levy for Germany, www.gruene-bundestag.de/themen/finanzen/die-gruene-vermoegensabgabe.html. The Left Party (Die Linke) has proposed a Europe-wide capital levy, dipbt.bundestag.de/dip21/btd/17/091/1709146.pdf. The German Trade Union Federation (Deutscher Gewerkschaftsbund, DGB) has proposed Europe-wide forced loans or capital levies to finance a European „Future Fund“, www.dgb.de/themen/++co++5a0a649c-262d-11e1-5678-00188b4dc422.

³ S. Bach, "Staatsverschuldung und gesamtwirtschaftliche Vermögensbilanz: Öffentliche Armut, privater Reichtum," Wochenbericht des DIW Berlin, no. 50 (2010), Deutsche Bundesbank, Federal Statistical Office, Sectoral and macroeconomic balance sheets. http://www.bundesbank.de/Redaktion/EN/Downloads/Statistics/sectoral_and_macroecomic_balance_sheets.pdf?__blob=publicationFile.

⁴ P. Pilkington and W. Mosler, Taxbacked Bonds - A National Solution to the European Debt Crisis. Levy Economics Institute of Bard College Policy Note 2012 / 4, www.levyinstitute.org/pubs/pn_12_04.pdf.

⁵ W. F. Richter, "Deleveraging mit Zwangsanleihen. ifo Schnelldienst." 3/2012 www.wiso.tu-dortmund.de/wiso/of/Medienpool/veroeffentlichungen-richter/WR_Veoeffentlichungen_Stand_Oktober_09/ifo_Deleveraging_mit_Zwangsanleihen.pdf.

Box

Historical Precedents for Forced Loans and Capital Levies in Germany

In the history of modern capitalism, there have been numerous financial and sovereign debt crises.¹ Up until the middle of the twentieth century, excessive sovereign debt was the rule rather than the exception. State bankruptcies or fiscal inflation were common, especially after major wars. During exceptional fiscal emergencies, governments frequently resorted to extraordinary instruments such as forced loans and capital levies.² Since the end of the nineteenth century, modern taxes on income, wealth and inheritance were introduced in Germany which laid the foundation for these emergency fiscal instruments. In particular after the two World Wars, Germany resorted to capital levies and forced loans, with some success.

In 1913, the government introduced a one-off levy on higher wealth and in-come as a defense tax.³ The tax burden imposed was distributed over a three-year period. The total volume accounted for about 1.7 percent of gross domestic product in 1913 and was used to finance high military spending. At that time, assets worth more than 10,000 marks were progressively taxed at rates from 0.15 to 1.5 percent, on average, while the tax burden was 0.5 percent. In addition, incomes over 5,000 marks were progressively taxed at rates of between one and eight percent. Five percent of taxable assets were deducted from taxable income to avoid double taxation on investment income, where it did not exceed the standard interest rate. To contextualize the nominal values: the average annual pensionable income in 1913 was 1,182 marks.⁴

After World War I, the German national budget was in a disastrous state. Military expenditure was almost entirely financed by loans, so when the war ended, na-

tional debt was about 180 percent of gross domestic product.⁵ They were also running huge deficits and were subject to high reparation claims.

In 1919, the national emergency tax levy (Reichsnotopfer) was introduced as an extraordinary general capital levy as part of Erzberger's financial reforms.⁶ Taxpayers' net assets were broad based and, after deducting an allowance of 5,000 marks (10,000 marks for married couples), were taxed progressively. The tax rates began at ten percent and increased gradually to 65 percent of taxable assets over seven million marks. Joint partnerships, corporations, and other legal entities were taxed separately and were charged a uniform tax rate of ten percent. Normally, the taxes were to be paid off over 30 years and interest was charged on installments. Tax burdens on property could also be annuitized over 50 years. The capital levy largely failed in subsequent years. The financial administration was not in a position to comprehensively identify the assets. The high tax rates sparked political outrage, strong resistance to taxation, and tax evasion. In particular, the rising inflation rates gradually devalued the installments. From 1923, the Reichsnotopfer was replaced by the general wealth tax which was then levied in Germany until 1996.

At the same time as introducing the wealth tax, the government also levied a forced loan in 1922/23.⁷ All individuals subject to this tax with taxable wealth of more than 100,000 marks on January 1, 1923 had to subscribe the loan. They were liable for one percent on the first 100,000 marks of their assets and two percent of the next 150,000 marks. Those with wealth of one million marks or more were subject to a maximum rate of ten percent. Interest and repayments were due from 1925. But the installments were then devalued in the wake of hyperinflation in 1923 and not revalued until after the currency stabilized. Therefore, the forced loan turned into a capital levy in so far as it induced a significant burden in view of the wildly accelerating inflation.

¹ C. M. Reinhart and K. S. Rogoff, *This Time Is Different: Eight Centuries of Financial Folly*. (Oxford and Princeton, 2009); E. Chancellor, "Reflections On The Sovereign Debt Crisis," GMO White Paper (2010), blogs.reuters.com/felix-salmon/files/2010/07/chancellor.pdf; Alfred Manes, *Staatsbankrotte*, 2nd edition (Berlin: K. Siegmund, 1919), [archive.org/details/staatsbankrottew00maneuoft](https://archive.org/details/staatsbankrottew00maneuoft/H.-P.Ullmann); H.-P. Ullmann, "Finanzkrise, Staatsbankrott und Haushaltskonsolidierung im Deutschland des frühen 19. Jahrhunderts," in: E. Kanzenbach, (pub.): *Staatsüberschuldung. Veröffentlichungen der Jungius-Gesellschaft der Wissenschaften Hamburg* 84. (Göttingen: 1996), 13-25; C.-L. Holtfrerich, *Bewältigung der deutschen Staatsbankrotte 1918 und 1945*. (1996), 27-57.

² B. Eichengreen, "The Capital Levy in Theory and Practice," NBER Working Paper, no. 3096, www.nber.org/papers/w3096, (1989).

³ F. K. Mann, "Wehrbeitrag," *Handwörterbuch der Staatswissenschaften*, volume 8 (Jena: 1928): 951-960.

⁴ See SGB 6, Appendix 1, www.gesetze-im-internet.de/sgb_6/anlage_1_567.html.

⁵ C.-L. Holtfrerich, *Die deutsche Inflation 1914-1923. Ursachen und Folgen in internationaler Perspektive*, (Berlin and New York: 1996, 1980).

⁶ F. K. Mann, "Reichsnotopfer," *Handwörterbuch der Staatswissenschaften*, volume 6 (Jena: 1925): 1222-1228.

⁷ German Reich Law on Forced Loans dated July 20, 1922. Financial Archive 39 (1922), 205 ff. www.jstor.org/stable/pdfplus/40906359.pdf.

Currency stabilization through the Rentenmark in 1923/24 was based on a form of implicit forced loan on companies' property and operating assets.⁸ The rentenmark, introduced as an intermediate currency, was intended to restore the pre-war exchange rate of gold parity (1 rentenmark = 1 (gold) mark = 4.2 US dollars). However, since not enough gold and foreign exchange reserves were available and there was a significant lack of confidence in the monetary policy of the German government and the Reichsbank, the rentenmark was guaranteed by the private sector. The property and business assets of agricultural and commercial companies, and banks were burdened with mortgages and debt securities worth 3.2 billion (gold) marks or rentenmarks (an estimated seven percent of gross domestic product in 1923) at an interest rate of six percent. These assets were transferred to the German annuity bank (Rentenbank), which was allowed to issue up to 2.4 billion annuity bank notes (Rentenbankscheine) and brought the currency into circulation as loans to the government, the Reichsbank and private issuing banks.

The annuity bank notes could be converted into pension bonds of the German annuity bank (Rentenpfandbriefe), which generated interest at five percent. At the same time, the companies burdened by mortgages and debt securities became shareholders in the annuity bank and received the proportion of the banks' profits generated from the interest on their loans. It was possible to stabilize the currency because the taxes were quickly converted into the new currency basis, public budgets were balanced by a strict consolidation program, and consequently inflationary loan financing could be adjusted by the Reichsbank. In 1924, the reichmark was introduced as new legal tender, but the rentenmark still remained in circulation. In the next few years, company loans were reversed and interest charges were offset against distributed profits. As a result of this, companies were not ultimately burdened.

After World War II, in 1949, a capital levy was raised on the asset base from 1948. It was conclusively

regulated as part of the burden-sharing legislation (Lastenausgleich) in 1952.⁹

The tax base was essentially oriented to the existing wealth tax, with corporations and other legal entities being taxed separately. It was mainly property and business assets that were subject to the tax, according to standard taxable values. For financial assets, there was a relatively high exemption threshold of 150,000 marks, as these had been converted into deutschmarks at a ratio of 10:1 in the currency reform of 1948. A tax allowance of 5,000 marks was granted for natural persons, which was reduced to nothing for those with more assets. To contextualize the nominal values: the average annual pensionable income in 1952 was 3,850 deutschmarks.¹⁰

The tax rate was 50 percent, although there were reductions for war and displacement damage. The tax debt was spread over 30 years and collected quarterly up until 1979. In total, the capital levy generated revenue of 42 billion deutschmarks. This corresponded to 60 percent of gross domestic product in 1952. Accordingly, burden-sharing levies in the 1950s were certainly significant to the economy as a whole. Due to the high growth rates of national product and income, their economic significance and burden gradually decreased in subsequent decades. At the same time, it was possible to mobilize significant resources for reconstruction and the integration of displaced persons and refugees. In this respect, burden sharing was a financial, economic, and sociopolitical success.

The Investment Aid Act (Investitionshilfegesetz) of 1952 provided for a forced loan from the commercial sector for investments in certain primary industries.¹¹ This act was passed due to financing problems in the primary industries that were still subject to planning stipulations and price regulation. The companies subject to the forced loan had to pay a total of one billion deutschmarks (1.4 percent of gross domestic product in 1952) based on profits and revenues from 1950/51. In return, these companies received shares

⁸ A. Lampe, "Rentenmark," Handwörterbuch der Staatswissenschaften, volume 7 (Jena: 1926): 27-39; P. Beusch, Währungszerfall und Währungsstabilisierung, (Berlin: G. Briefs and C.A. Fischer, 1928); Verordnung über die Errichtung der Deutschen Rentenbank [Hyperinflation], October 15, 1923, www.1000dokumente.de/index.html?c=dokument_de&dokument=0204_ren&object=context&st=&l=de; Federal Archive, Historische Kommission bei der Bayerischen Akademie der Wissenschaften (1978): Finanzpolitik und Stabilisierung der Währung. Akten der Reichskanzlei. Weimarer Republik edition, Kabinette Stresemann I and II (1923), www.bundesarchiv.de/aktenreichskanzlei/1919-1933/1000/str/str1p/kap1_1/para2_9.html#Start.

⁹ R. Hauser, "Zwei deutsche Lastenausgleiche – Eine kritische Würdigung," Vierteljahreshefte zur Wirtschaftsforschung des DIW Berlin, no. 80, (2011): 103-122; L. Wiegand, Der Lastenausgleich in der Bundesrepublik Deutschland 1949 bis 1985, (Frankfurt am Main: 1992); W. Albers, Der Lastenausgleich. Rückblick und Beurteilung. Financial ArchiveFinanzarchiv N.F. 47, (1989) 272-298.

¹⁰ See SGB 6, Appendix 1, www.gesetze-im-internet.de/sgb_6/anlage_1_567.html.

¹¹ DER SPIEGEL 44/1954, 7-8, www.spiegel.de/spiegel/print/d-28957744.html.

or loans from the companies that benefitted from the loans. The Federal Constitutional Court later accepted that the forced loan was in keeping with the powers of the federal government to regulate the economy under Article 74, No. 11 of the German Basic Law (Grundgesetz) and saw no breach of constitutional rights (freedom of development, ownership).¹²

In the fall of 1982, the newly formed coalition government introduced an investment aid levy to promote housing construction that was to be paid back at a later date with no interest. The levy was set at five percent of personal and corporate income tax liability for 1983, 1984, and 1985. But it would only be charged on personal income tax with a tax liability that exceeded 15,000 deutschmarks (30,000 deutschmarks for married couples). In the case of profit income, the tax rate was reduced by 20 percent of domestic investment by the taxpayer. The tax was to be paid back between 1990 and 1993. The Federal Constitutional Court declared the tax unconstitutional in 1984. The Investment Aid tax did not satisfy the constitutional requirements for a special levy (no group-specific financial interest and corresponding use of funds). Furthermore, the competence of the federal government to propose tax legislation was not deemed applicable here because the tax was refundable, and according to debt regulations in Article 115 of the German Basic Law, the federal government had no competence to levy a forced loan.

resorted to such extraordinary instruments in emergency fiscal situations, including Germany (see box).

The relationship between forced loans and capital levies is obvious. If the government forces its citizens or businesses to grant it a loan on terms that are worse than the normal market conditions, there is an implicit tax burden on the debtor in the non-market conditions, even if the loan and interest on it is repaid. Forced loans can more or less be transformed into capital levies due to the structure, interest, and repayment modalities. Larger one-off capital levies are usually spread over longer periods of time to minimize the liquidity burden on taxpayers. For example, in the 1950s, the capital levy raised as a main source of financing in accordance with the German burden-sharing legislation (Lastenausgleich) was evenly distributed over a 30-year period (including interest) and collected in quarterly installments.

The advantages of models like this are that they trigger less resistance and are avoided less than conventional tax increases. If the tax authorities can access an asset that existed on a specified date in the past, the economic agents can no longer evade the burden. Immediate adjustments (substitution effects) are then impossible. The promise of a (partial) repayment of the forced loan ought to further reduce resistance to the tax and simplify policy implementation. However, raising economic resources for the government would induce negative income and wealth effects in the private sector. This may impact on economic development by causing liquidity and financing problems for real estate investments or businesses. By contrast, there might be stimulatory effects on employment as well as on savings as economic agents attempt to compensate for the income and wealth effect of the capital levy.

In terms of intergenerational and intragenerational equity, there is an argument for using wealth-related levies to reduce excessive public debt. A gradual increase in public debt in relation to national product figures, as has been observed in Germany and in many countries since the 1970s, means that in the past taxes were too low or spending was too high. The older generations in particular have benefited from this fiscal policy. They would normally pay higher wealth-related taxes compared to taxes on income or consumption than the younger generations. With higher personal allowances, tax burdens can be concentrated on the wealthier members of the population. In recent decades, they have been given tax relief in most countries, including Germany. At the same time, the distribution of income and wealth has become more uneven. Moreover, property owners have, at least indirectly, benefited from government crisis interventi-

¹² BVerfGE 4, 7 – Investment Aid. Federal Constitutional Court, judgment from July 20, 1954, www.servat.unibe.ch/dfr/bv004007.html.

Table 1

Private Wealth and Public Debt in Selected OECD Countries

As a percentage of gross domestic product

	Germany	France	Italy	UK	US	Canada	Japan
Wealth of households¹							
Fixed assets ²	275.8	374.4	371.6	349.1	180.3	204.3	229.4
Financial assets ³	182.0	196.4	237.2	296.0	329.7	212.7	306.5
Liabilities	63.4	61.2	53.3	114.8	100.9	86.3	75.3
Net assets	394.4	509.6	555.6	530.3	409.1	330.7	460.5
Public debt⁴							
2008	66.8	68.3	105.8	52.6	75.9	71.2	171.2
2013 (OECD forecast)	82.0	93.5	122.5	94.1	111.2	81.4	222.6
Net public liabilities⁵							
2008	44.7	45.9	89.7	33.3	53.6	22.8	95.3
2013 (OECD forecast)	50.2	67.6	95.6	78.4	88.3	36.3	142.7

¹ Average for years 2007 to 2009.² Machinery and equipment, buildings and structures, cultivated assets, intangible fixed assets, land, and private household consumer durables.³ Includes investments in unlisted corporations and partnerships, claims against insurance companies as well as pension provisions.⁴ EU countries: Maastricht definition of general government gross public debt, other countries: general government gross financial liabilities according to system of national accounts.⁵ General government gross financial liabilities less financial assets according to system of national accounts.

Source: OECD, Economic Outlook 91, May 2011.

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Private wealth is a multiple of the amount of public debt.

on in the financial markets. These measures have caused sovereign debt to increase massively in recent years.

Private Assets and Public Debt in Selected OECD Countries

Reliable information on macroeconomic assets and liabilities is only available for a few OECD countries (see Table 1). Calculations show that total household assets are significantly higher than public debt. This applies even more so to the government's net liabilities, where public debt is reduced by government financial assets (shareholdings, credit claims, deposits, and securities). Of the southern European crisis countries, information is only available for Italy. But private assets in Gre-

ece, Portugal, and Spain are very likely to exceed their public debt significantly.⁶

However, these statistics are based on a comprehensive concept of wealth. It also includes assets that can be difficult to draw on as forced loans or capital levies, such as households' consumer durables or claims on insurance companies related to pension and health care plans. Adjusting the figures for these items would reduce the net wealth of households, for example, to about 300 percent

⁶ For more detailed studies on assets and wealth distribution, see Banca d'Italia, "Household Wealth in Italy," papers presented at a conference held in Perugia, October 16-17, 2007, www.bancaditalia.it/studiricerche/convegni/atti/ric_fam_it/Household_wealth_Italy.pdf; Banca d'Italia, "Household Wealth in Italy," Supplements to the Statistical Bulletin. Monetary and Financial Indicators (2010) no. 64, www.bancaditalia.it/statistiche/stat_mon_cred_fin/banc_fin/ricfamit/2011/en_suppl_64_11.pdf; F. Alvaredo and E. Saez, "Income and Wealth Concentration in Spain from a Historical and Fiscal Perspective," Journal of the European Economic Association 7, 1140-1167, elsa.berkeley.edu/~saez/alvaredo-saezJEEA2009; F. Azpitarte, "The Household Wealth Distribution in Spain: The Role of Housing and Financial Wealth," Revista de Economía Pública 194 Hacienda Pública Española (2009), www.ief.es/documentos/recursos/publicaciones/revistas/hac_pub/194_Art3.pdf; International Monetary Fund, "Spain: Selected Issues," IMF Country Report no. 11/216 (2011), www.imf.org/external/pubs/ft/scr/2011/cr11216.pdf, in particular 13; V. Constâncio, "Central Banks and Household survey data," ECB-CFS Conference on Household Finance and Consumption, Frankfurt, September 4-5, 2008, www.ecb.int/events/pdf/conferences/ecb_cfs_conf/Constancio.pdf?b5caf92ec53f4d26d253fc2f9b633ca4.

of gross domestic product in Germany.⁷ That is still a very large taxable base. A tax burden of, for instance, five percent could mobilize revenues of 15 percent of gross domestic product, or around 380 billion euros. This would clearly help to finance current spending or to refinance matured sovereign debt.

However, forced loans or capital levies could and would only be collected from the wealthy members of the population. There are also implementation and collection issues. Both would significantly reduce the amount of assets that could actually be raised from the private sector. Even then, however, there should still be sufficient private net wealth to draw on to at least partially and temporarily refinance public debt.

What Should the Tax Burden Be and How Should It Be Structured?

The prerequisite for forced loans and capital levies is that the tax authorities can capture and access the relevant assets. Tax-evasion or flight of capital abroad are particularly problematic when it comes to financial assets. Furthermore, assets and liabilities have to be appraised concerning the tax base on which forced loans and capital levies are imposed. This would be complicated and prone to tax avoidance for real estate and business assets.

The largest asset base of households is real estate. In Germany, it makes up about 50 percent of total assets before deduction of liabilities, equivalent to 5.5 trillion euros or 230 percent of gross domestic product (2009).⁸ Levies on real estate property have the advantage that tax evasion on buildings is impossible. In the case of property tax or similar taxes and duties, there is continuous taxation access to virtually all real estate in all OECD countries. These taxes have already been increased in crisis countries. In 2012, Italy fully re-established a property tax and significantly increased its rates. In Greece, a special tax was imposed on property and collected through electricity bills. In Spain, as well as temporarily restoring the wealth tax, they have also raised property tax.

The tax base of property taxes could initially be used to raise forced loans or capital levies. Yet, property tax values are often not very up-to-date, for instance, the stan-

dard property tax values in Germany are from 1964. As a result, market value assessments would have to be conducted. Furthermore, liabilities on the property would be taken into account when calculating the levy. Otherwise, owners with high credit burdens would risk becoming insolvent, which could also trigger contagion effects in the real estate industry and the financial sector. In Spain, for example, the end of the real estate boom was a major cause of the recession and instability in the banking system.

Liquidity and financing problems also threaten the existence of small and medium-sized enterprises if they are forced into providing loans or paying additional tax irrespective of their profit situation. Most models of capital levies under discussion in Germany (see footnote 2), or a revival of the wealth tax provide special allowances for business property, for instance, between two and five million euros.⁹ Some models also propose limiting the annual tax burden to a particular amount of current business income.

At least it is easy to determine the value of financial assets, i.e., in checking and savings accounts, deposits, shares, bonds, and other securities and claims. Liquidity problems do not play a major role. Tax evasion would be an even greater problem, however. Directly after plans for forced loans or capital levies had been announced, the treasury would have to secure the corresponding accounts of financial service providers. In order to determine foreign assets, the tax authorities would be reliant on cooperation with foreign banks and financial service providers or fiscal authorities. This is often very difficult for smaller countries with specialist financial centers for private asset management. In recent years, however, international pressure on these countries to improve administrative cooperation has increased significantly.

The implementation problems outlined above, and also the factors of taxation equity (ability-to-pay principle) and avoidance of hardship cases argue in favor of limiting capital levies and forced loans to the wealthy strata of the population. Since taxable net wealth is highly concentrated among the top ten percent of the population, these instruments would still raise substantial revenue even if the vast majority of the population were exempt due to higher personal allowances.

The data required to estimate the revenue effects of a capital levy are available for Germany. Simulations by

⁷ S. Bach, M. Beznoska, and V. Steiner, "A Wealth Tax on the Rich to Bring Down Public Debt? Revenue and Distributional Effects of a Capital Levy," DIW Berlin Discussion Paper 1137 (2011), www.diw.de/documents/publikationen/73/diw_01.c.376053.de/dp1137.pdf; Bach, M. Beznoska, and V. Steiner, "Aufkommens- und Verteilungswirkungen einer Grünen Vermögensabgabe," DIW Berlin Politikberatung kompakt 59 (2010), www.diw.de/documents/publikationen/73/diw_01.c.366543.de/diwkompakt_2010-059.pdf.

⁸ Deutsche Bundesbank, Federal Statistical Office (2010).

⁹ S. Bach, "Lastenausgleich aus heutiger Sicht: Renaissance der allgemeinen Vermögensbesteuerung?" Vierteljahrshefte zur Wirtschaftsforschung des DIW Berlin, no. 80, (2011): 132.

Table 2

Tax Base of Capital Levy for Alternative Allowances in Germany

Allowances in euros	per person	250		500		1 million		Total net assets
	per child	100		250		250		
	for business property	none	5 million	none	5 million	none	5 million	
Tax base in billion euros		2 941	2 303	2 234	1 694	1 864	1 398	7 215
Confidence interval ¹ lower bound		2 551	2 024	1 855	1 426	1 500	1 144	6 739
Confidence interval ¹ upper bound		3 332	2 582	2 613	1 962	2 229	1 653	7 691
Tax base as a percentage of gross domestic product								
		118	92	89	68	75	56	289
Confidence interval ¹ lower bound		102	81	74	57	60	46	270
Confidence interval ¹ upper bound		133	103	105	78	89	66	308
Taxpayers in 1000s		4 787	4 384	1 394	1 162	414	332	-
Percentile ² at onset of tax burden				97.7		99.4		-

¹ 95% confidence interval, robust standard errors.

² Percentile of net wealth distribution of persons in households aged 17 or over.

Source: calculations based on the German Socio-Economic Panel Study (SOEP) 2007, including estimated persons with very high wealth, see Bach, Beznoska, and Steiner (2011, 2010).

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The tax base is still considerable despite higher allowances.

DIW Berlin on a capital levy on personal net wealth¹⁰ of individuals with a personal allowance of 250,000 euros (500,000 euros for married couples), a child allowance of 100,000 euros, and a special allowance for business assets and major holdings of five million euros result in a tax base of 2.3 trillion euros, or 92 percent of gross domestic product (2011) (see Table 2).¹¹ A forced loan or capital levy of, for example, ten percent of the tax base could therefore mobilize just over nine percent of gross domestic product—some 230 billion euros. Under this tax system, 4.4 million people would be subject to the levy, which corresponds to the wealthiest eight percent of the adult population. Increasing the personal allowance to 500,000 euros reduces the tax base to 68 percent of gross domestic product, and so then only 2.3 percent of the adult population would be taxable. Increasing the personal allowance to one million euros reduces the tax base to 56 percent of gross domestic product and the number of taxpayers sinks to 0.6 percent of the adult population.

¹⁰ Real estate property, financial assets, and business properties, minus liabilities on these assets.

¹¹ S. Bach, M. Beznoska, and V. Steiner. Data are based on the 2007 wave of the German Socio-Economic Panel Study (SOEP) in which a wealth survey was conducted. In addition, a ranking of the 300 richest Germans published in a special edition of manager magazin I from October 2007 is included in the data set. The wealth distribution of individuals with net wealth of more than two million euros is estimated using the Pareto distribution. The macroeconomic aggregates for household wealth are achieved by increasing wealth distribution in the top range. Estimation risks, for which 95 percent confidence intervals are reported in Table 2, result from SOEP's sampling error and the standard error for the additional estimates on top wealth.

To impose the forced loan or levy not only on wealth, and to broaden the tax base, higher incomes could also be included in the tax burden. The defense tax (Wehrbeitrag) levied in Germany prior to World War I targeted both higher wealth and higher incomes, with a standard interest rate on taxable wealth deducted from taxable income (see box). High labor and pension income could thus be included in the tax base. The disadvantage would be that a temporary burden on higher incomes could provoke noticeable tax avoidance.¹²

Conclusion

High public debt should be viewed in terms of government assets and high private wealth. This also generally applies to the crisis countries. Private wealth should be increasingly mobilized to defuse the debt crisis. Households with higher wealth and income could be enlisted to refinance and reduce public debt through forced loans and capital levies.

It will not be easy to collect forced loans and one-off capital levies because the taxable wealth will need to be assessed and, in the case of financial assets, secured in

¹² See also the intense discussion on in the UK increasing the top income tax rate from 40 to 50 percent („50p“) in 2010, M. Brewer, J. Browne, and P. Johnson, “The 50p income tax rate: what is known and what will be known?,” The IFS Green Budget (February 2012), www.ifs.org.uk/budgets/gb2012/12chap9.pdf.

order to prevent evasion and capital flight. To limit the cost of tax collection and to avoid hardship cases, ordinary citizens should be excluded through higher personal allowances. Specific allowances must also be used for business properties to take account of the liquidity and financing problems facing smaller businesses. This should also facilitate its political implementation. Since household wealth in Germany and other countries is highly concentrated on the wealthy strata of the population, a considerable tax base still remains.

It is difficult to estimate the revenue effects of such a levy for the countries in crisis due to the current lack of sufficient data. For Germany, simulations by DIW Berlin on a capital levy on personal net wealth assuming a personal allowance of 250,000 euros (500,000 euros for married couples) result in a tax base of 92 percent of gross domestic product. A forced loan or levy of, for example, ten percent of the tax base could therefore mobilize just over nine percent of gross domestic product—some 230 billion euros. Under this system, the richest eight percent of the adult population would be taxable. Similarly large figures could probably also be raised from wealthy members of the population in the crisis countries.

Ultimately, there is no long-term solution other than public budget consolidation and introducing growth-stimulating reforms in the crisis countries. But in view of economic development and political acceptance, such reforms can only be implemented over time and gradually. Forced loans and one-off capital levies could serve as an extraordinary fiscal instrument to secure public debt refinancing without having to rely on external aid. This would also be a signal to donor countries and international community funds that every effort was being made. Forced loans can be repaid at a later date or transferred to capital levies or other taxes on higher income and wealth, depending on the progress of the consolidation measures. In addition, capital levies could be used to reduce public debt in the long term through a redemption fund. The concentration of tax burdens on the wealthy elite also attempts to redress increasing inequality in the distribution of income and wealth. Furthermore, this also gives those subject to the levy an incentive to take more responsibility for the fiscal and economic recovery of their countries. Not least, such levies are likely to increase the acceptance of labor market and social reforms or spending cuts that mostly affect poorer people, leading to social tensions.

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Dr. Stefan Bach, Deputy Head of the Public Economics Department at DIW Berlin

SIX QUESTIONS TO STEFAN BACH

»Private wealth could be used to stabilize public finances«

or approximately 230 billion euros. Thus, it would be possible to bring the public deficit in Germany significantly closer to the 60 percent limit stipulated in the Maastricht Treaty.

1. Mr. Bach, you've analyzed whether forced loans and capital levies could help reduce public debt. What kind of steps might be taken, do you think? Public debt has significantly increased in many countries, but at the same time, we also see very high levels of private wealth, which, taken as a whole, considerably exceeds national debt in every country. This means that in order to stabilize public finances and, if necessary, reduce public borrowing, it is worth considering making greater use of private wealth. One possibility is for the government to tax wealth through a one-off capital levy, which could then be repaid in installments. This could also be combined with a forced loan, however, by committing the taxpayers to assume some of the debt. Depending on the progress of the government's consolidation measures, these loans and interest on them could then be paid back at a later date. If this is not the case, then the forced loans can be transferred to a capital levy.
2. What type of assets could be accessed? All the relevant types of assets could be accessed, that is, real estate, financial, and business assets. Certainly, the liabilities on those assets would be tax deductible. This means the tax base would then be similar to that of the former German wealth tax. For administrative and technical reasons, and also to avoid hardship cases, this system is intended for the wealthy strata of the population, that is, roughly the richest ten percent.
3. How much money would that bring in? According to our calculations, a capital levy imposed on individual net wealth exceeding 250,000 euros would still give a tax base of 92 percent of gross domestic product (GDP). If taxpayers were taxed ten percent on this base, that could generate revenue of just over nine percent of GDP,
4. What advantages do capital levies and forced loans have over tax increases? The key economic advantage of a capital levy is that taxpayers cannot evade these levies so easily. This means that tax avoidance strategies here are somewhat limited, in contrast to ongoing taxation. Moreover, combining capital levies with forced loans could reduce resistance to taxation because then there is still the possibility that some of the money will be paid back.
5. Does this only apply to Germany or also to European countries in crisis? These instruments would be particularly suitable for the countries in crisis, so as to make use of the available and, in some cases, highly concentrated private wealth for refinancing government debt. Statistics show that in countries such as Greece, Spain, and Italy, there is considerable aggregate household wealth which is substantially higher than national debt.
6. Isn't it more likely that these countries will push for a European collectivization of their national debt, rather than reaching into their own pockets? This is, of course, the problem with rescue packages and bail-outs. There is a tendency to relax consolidation efforts if countries in crisis receive funding from the international community. In this context, such instruments would be especially interesting—to send out the message that they are prepared to first use any means possible at home in order to put their public finances in order.

Interview by Erich Wittenberg.

Internationalization of Business Research: New Locations Gaining Ground

by Heike Belitz

In recent years, German and foreign companies have consistently increased their investment in Research and Development in Germany. In 2009, investment was over 45 billion euros which was a third higher than in 2001. While foreign companies have significantly expanded their Research and Development activities in Germany, German investment abroad has stagnated. Overall, Germany had a positive balance of four billion euros. There is no evidence of large-scale relocation of German Research and Development abroad. German companies' foreign research activities continue to be conducted predominantly in the US, and in neighboring European countries, but also increasingly in certain Central and East European countries as well as in China and South-East Asia. Nowadays, approximately one in ten inventions developed by German companies abroad originate at one of the new research sites although German companies are by no means more active than their competitors in these new research locations.

Research and Development (R&D) in industrialized countries is concentrated on multinational corporations (MNCs) with a strong research base.¹ These companies carry out not only their production but, increasingly, also their R&D activities in locations around the globe. The internationalization of research is driven by both the market and technology: MNCs must refine their products and processes in the target market countries and adapt to local conditions and customer requirements. Developing their own research laboratories abroad enables companies to acquire new technological knowledge from public institutions and competitors. Finally, the use of research personnel from the target country is also an important motive for conducting R&D abroad. To assess the impact of the globalization of R&D on Germany as a research site, the present study analyzes the research activities of German companies abroad and foreign companies in Germany over recent years on the basis of sector-specific data and using international patent applications submitted by companies with inventors located abroad.²

Share of R&D Investment Abroad in Decline

In 2009, German companies abroad invested 11.3 billion euros in R&D which was lower than the 2001 figure of 11.9 billion euros (see Table 1). Because these companies increased their investment in domestic R&D from 22.5 billion euros to 30.1 billion euros in the same period,

¹ In Germany in 2009, 80 percent of R&D investment made by companies came from MNCs. Of this, 53 percent originated from German companies which also conduct R&D abroad, and a further 27 percent from foreign-owned companies.

² The results presented here are part of a study commissioned by the German government's independent Commission of Experts for Research and Innovation (Expertenkommission Forschung und Innovation, EFI). H. Belitz, „Internationalisierung von Forschung und Entwicklung in multinationalen Unternehmen“ Studien zum deutschen Innovationssystem, no. 5 (2012), (Berlin: Commission of Experts for Research and Innovation, February 2012).

Table 1

R&D Investment by German MNCs with R&D Abroad

In billion euros

	2001	2003	2005	2007	2009
Global R&D investment					
Manufacturing industry	31.8	34.1	36.8	36.5	39.0
Chemical industry	-	4.6	4.2	5.3	2.9
Pharmaceutical industry	-	3.4	4.0	3.0	6.8
Mechanical engineering	1.1	1.9	2.4	2.7	2.8
Electrical engineering	7.4	6.9	7.4	5.7	5.4
Automotive engineering	-	16.4	18.1	18.9	19.7
Industry total	34.4	36.3	38.3	38.6	41.4
R&D investment abroad					
Manufacturing industry	11.6	10.2	11.3	8.8	10.7
Chemical industry	-	1.6	1.2	1.6	0.7
Pharmaceutical industry	-	1.7	2.1	2.1	3.7
Mechanical engineering	0.4	0.6	0.7	0.8	0.5
Electrical engineering	2.8	2.5	2.3	1.2	1.8
Automotive engineering	-	3.5	4.8	3.0	3.6
Industry total	11.9	10.9	11.4	9.4	11.3
Share of R&D investment abroad in percent					
Manufacturing industry	36	30	31	24	27
Chemical industry	-	34	30	30	25
Pharmaceutical industry	-	50	52	69	54
Mechanical engineering	39	32	27	29	20
Electrical engineering	38	36	32	20	33
Automotive engineering	-	21	26	16	18
Industry total	35	30	30	24	27

Source: SV-Wissenschaftsstatistik, calculations by DIW Berlin.

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While global expenditure on research is increasing, research abroad is stagnating.

the share contributed by investment abroad fell from 35 percent in 2001 to 27 percent in 2009. R&D investment by German companies abroad concentrated on two sectors. In 2009, the pharmaceutical industry and automotive engineering each received just under a third of total investment. The share of German companies' R&D investment flowing into the pharmaceutical industry abroad has already been over 50 percent for some time. The proportion received by automotive engineering fell from over a quarter in 2005 to 18 percent most recently.

If total R&D investment by German MNCs is considered by sector, significant fluctuations become apparent, both in Germany and abroad, even before the financial and economic crisis (see Figure 1). The volatility of R&D investment is primarily the result of restructuring due to mergers and acquisitions of companies and parts of

companies.³ These transactions may sometimes result in a company being classified under a different sector in statistical data. This is probably of particular relevance for the chemical and pharmaceutical industries.

Between 2005 and 2009, global R&D investment by German companies in the computer and electrical engineering sectors fell by two billion euros, 1.5 billion of which was domestic investment.⁴ This cut in domestic R&D investment from German companies was not offset by an increase in investment in Germany from foreign companies, and consequently, total domestic R&D investment in the computer and electrical engineering sectors was almost 1.4 billion euros lower in 2009 than in 2005.⁵ This indicates a weakening of Germany's position as a research site for this sector. What must be borne in mind here is that relocations abroad may also have played a role. After 2007, German computer and electrical engineering MNCs further cut their R&D investment in Germany, but at the same time expanded R&D investment abroad. The sector-specific R&D statistics provide no evidence that a similar relocation of R&D activities from Germany to other countries is taking place in other sectors.

US and Austria Most Important Foreign Research Locations

In some target countries, national surveys provide information on the scope of R&D activities conducted by German companies there. With over 3.8 billion euros of investment in 2009, the US remains the most important foreign research site for German companies, although R&D investment has fallen significantly since it peaked in 2006. The US is followed by neighboring European countries, Austria (1.3 billion euros) and France (0.9 billion euros) and, considerably further down the list, the UK (0.4 billion euros) and Switzerland (0.3 billion euros). However, as only a few countries actually publish the relevant data, and also the definition of both a foreign company and R&D investment differs between surveys, there is no complete picture showing the regional distribution of R&D investment abroad. Particularly for

³ Thus, in 2009, the German BASF group acquired Ciba Holding AG (Ciba), Basel, Switzerland. Ciba was a leading global speciality chemicals company which, in 2008, had a turnover of around 5.9 billion Swiss francs and invested 230 million Swiss francs in Research and Development. BASF press information, June 23, 2009.

⁴ This decline was probably primarily due to the restructuring of Siemens and Infineon. Between the 2005 and 2009 financial years, their joint global R&D investment fell by approximately 1.7 billion euros (more than a quarter). The EU Industrial R&D Investment Scoreboard, various editions.

⁵ SV Wissenschaftsstatistik, FuE-Datenreports (R&D Data Reports), 2009 and 2011. Tables and data.

countries of South-East Asia, Central and Eastern Europe, and also South America where new markets and research sites are developing particularly rapidly, there is an absence of national data about the R&D activities of foreign companies. In order to at least partially fill this gap, data on international patent applications are used for these countries (see box).

Traditional Research Locations Dominate...

In Germany, the share of patent applications filed with the EPO in 2005 where the inventors were based abroad was over 15 percent and thereafter experienced no further increase. Other home countries of significant research-intensive MNCs experienced a decline in the share of investment in R&D abroad after 2005, with only Finland and the US continuing to increase. This indicates that the internationalization of R&D in MNCs has recently experienced a significant loss of momentum (see Table 2).

The regional distribution of inventors from German companies abroad is very similar to the corresponding distribution of inventors in all selected countries (see Table 3). German companies' inventive activity abroad, as with its competitors, is concentrated at the traditional research sites, i.e., the US and Europe, which together made up a share of approximately 85 percent in 2007/2008. Although recently European countries (14 old EU member states, Switzerland, and Norway) accounted for 62 percent, i.e., the majority of inventions, and North America (US and Canada) for only around 20 percent, which corresponds to a decline of ten percentage points.

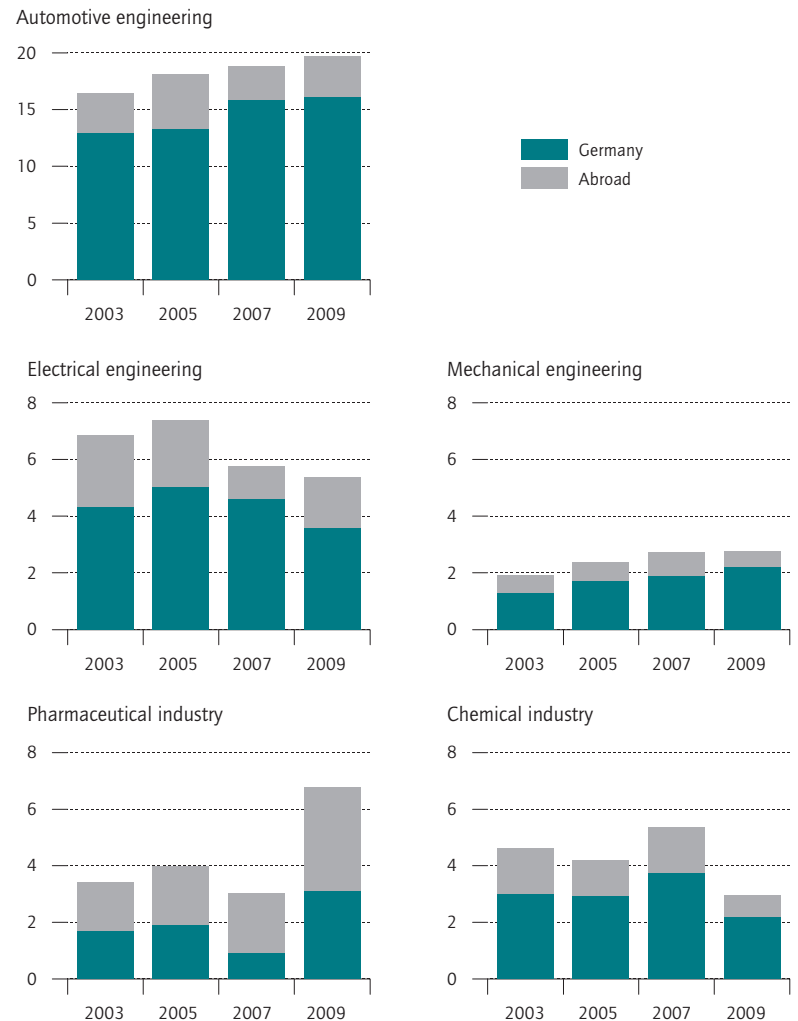
... But New Locations Gaining Ground

Measured using this patent indicator, North America's importance as the main research site for German companies has decreased considerably since the year 2000. Japan's significance has also declined. Conversely, inventive activity in European countries has recently gained momentum once more. Just over eleven percent of inventions by German companies abroad are now carried out in the new R&D sites (BRIC countries,⁶ Israel, South Korea, Central and Eastern European, and South-East Asian countries), while the corresponding figure in 1995 was only four percent. In 2007/2008, the largest share of inventive activity at German companies' new research sites was accounted for by Central and East-

Figure 1

R&D Investment by German Companies in Selected Sectors at Home and Abroad

In billion euros



Source: SV Wissenschaftsstatistik, calculations by DIW Berlin.

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R&D investment and its distribution between Germany and abroad has been fluctuating.

tern European countries and China, each with around three percent, and South-East Asian countries with almost two percent. Over the past few years, the significance of China and the Central and Eastern European countries in particular has increased. Nevertheless, their share of the inventive activity of German companies abroad remains very low.

Patent data can also be used to investigate how German companies make the most of opportunities to expand their innovation potential at the new research sites in comparison to their competitors. Do they conduct

⁶ Brazil, Russia, India, and China.

Box

Patent Applications from Companies with Inventors Abroad

The OECD provides data on patent applications received by the European Patent Office (EPO) for inventions where at least one of the inventors was based abroad. The relevant indicator »domestic ownership of inventions made abroad« reflects the extent to which companies from a particular country monitor inventions carried out under the auspices of R&D in their subsidiaries in the respective other country.¹ The share of patent applications submitted by domestic companies (applicants), in which foreign inventors also participated, roughly corresponds to the share of researchers based abroad of all researchers in these companies. The indicator, therefore, supplements the R&D data for subsidiaries of domestic companies abroad.² However, the suitability of patent applications as a measure of R&D activities is limited as patents are only registered for some R&D results and with

a certain time lag.³ R&D investment by companies abroad is also likely to be somewhat underestimated as, in comparison with the home country, there is a higher share of development activities abroad where the results are not patentable.⁴

The following analysis of EPO patent applications is concentrated in the eleven countries in which the majority of research-intensive MNCs are resident: the US, Japan, Germany, France, the UK, Switzerland, Sweden, the Netherlands, Italy, and South Korea.⁵ The study refers to the period from 1995 to 2008 although the OECD data (last updated in August 2011) do not yet capture all applications for 2008.

¹ The vast majority of international patents are registered by companies and only a small proportion by research institutions, for example, or by the inventors themselves. Therefore, 90 percent of patents received by the EPO from Germany in the period from 1978 to 2005 had at least one company applicant. L. Abramovsky et al., »The location of innovative activity in Europe,« IFS Working Papers 08 (Institute for Fiscal Studies: July 2010).

² OECD Patent Statistics Manual (OECD: 2009), 127.

³ Different analyses conclude that the time lapse between research and patent registration is typically approximately a year. J. Danguy, G. de Rassenfosse, and B. Van Pottelsberghe, »The R&D-Patent Relationship: An Industry Perspective,« Working Papers ECARES 2010-038 (Université Libre de Bruxelles: 2010).

⁴ Ultimately, it is also to be expected that European companies will register a patent with the EPO sooner than a non-European company which is more likely to submit a patent application to their own regional patent offices. Therefore, it is likely that the patent indicators on the basis of EPO applications will be biased towards European companies.

⁵ European Commission, Joint Research Centre, The 2010 EU Industrial R&D Investment Scoreboard (Luxembourg: 2010).

Table 2

Patent Applications¹ with Inventors Abroad

In percent

	1995	2000	2005	2007/2008
Finland	16	25	29	40
France	13	19	22	21
Germany	10	13	15	15
Italy	5	7	6	5
Japan	4	4	5	5
South Korea	9	7	6	4
Netherlands	41	34	44	36
Sweden	21	30	36	34
Switzerland	44	51	56	55
UK	21	21	22	19
US	14	18	18	19

¹ Filed with the European Patent Office (EPO). The shares are an indicator of the internationalization of a country's business research. Source: OECD patent data, calculations by DIW Berlin.

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Only in Finland R&D abroad has increased significantly.

more or less R&D activity than their competitors from other countries?

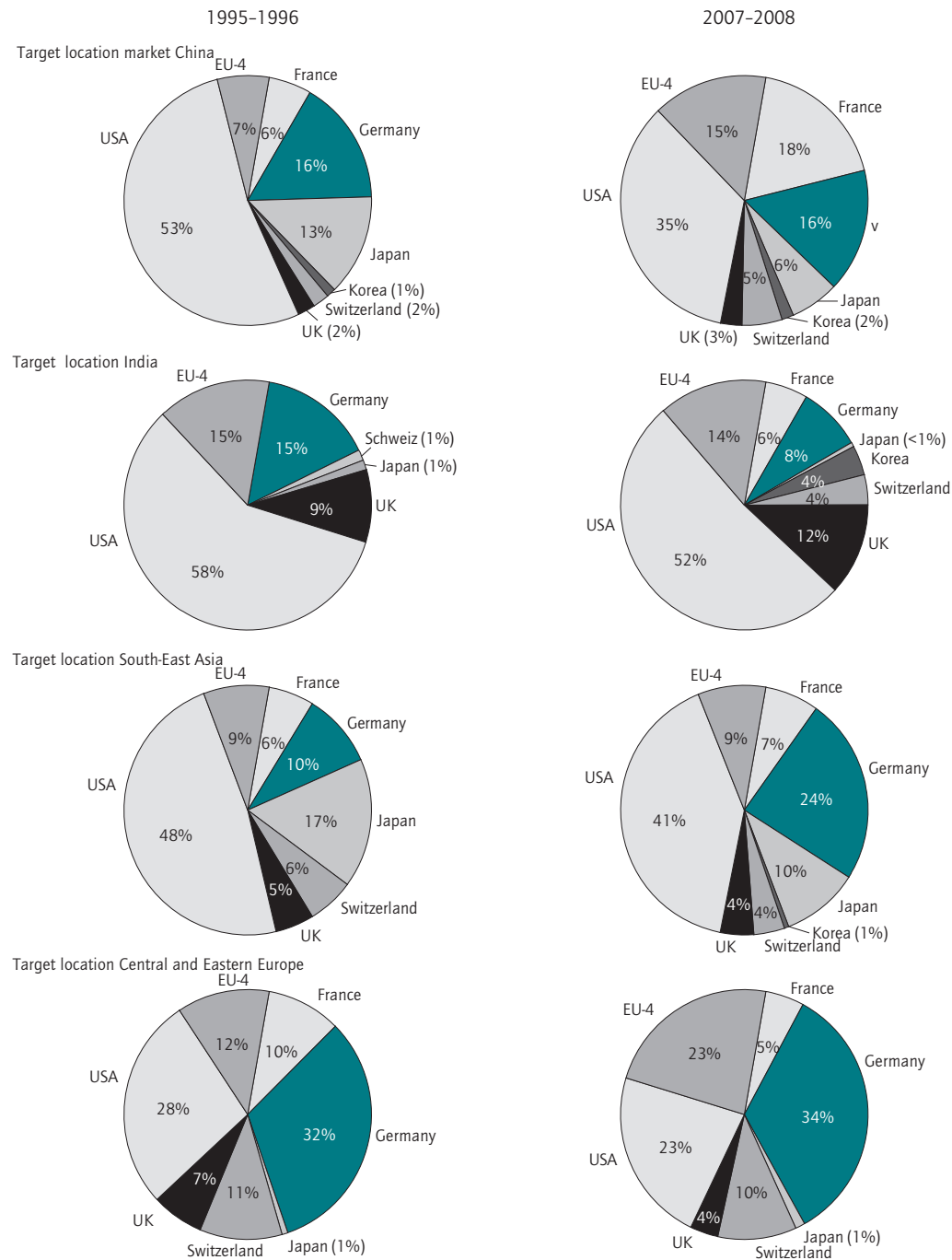
In Central and Eastern European countries, a third of all EPO patent applications for inventors in foreign companies in 2007/2008 were submitted by German companies (see Figure 2). Even back in the mid-1990s, German companies in this region held the leading position among the foreign companies with almost one-third of the R&D. In China, the dominance of US companies declined significantly. While companies from most European countries have increased their share in the R&D activities of foreign companies in China since the mid-90s, German companies have »only« maintained their share of 16 percent. Consequently, the R&D activities of German companies in Central and Eastern European countries, and in China also increased at the same average rate as all foreign companies.

Conversely, German companies' share of R&D conducted by foreigners in India fell sharply, while companies

Figure 2

Patent Applications¹ with Inventors at New Research Sites

In percent



¹ Patent applications submitted to the European Patent Office (EPO) by companies from the eleven most important countries of origin of research-intensive MNCs. Central and Eastern European countries: Czech Republic, Hungary, Poland, Slovakia, and Slovenia; South-East Asia: Malaysia, Singapore, Taiwan, and Thailand.

Source: OECD patent data, calculations by DIW Berlin.

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German companies are the biggest foreign investors in R&D in Central and Eastern Europe.

Table 3

Patent Applications¹ by German Applicants with Inventors Abroad by Target Region

In percent

	1995	2000	2005	2007/2008	For info: applicants from 11 countries ² 2007/2008
Traditional locations	93.7	89.6	85.9	84.6	84.6
Europe ³	58.7	58.3	57.9	62.5	61.5
North America	30.4	29.4	24.3	19.0	20.7
Japan	4.6	3.8	3.6	3.1	2.6
New sites	4.3	7.3	10.1	11.5	11.6
Brazil	0.8	0.4	1.3	0.9	0.4
Russia	1.3	1.1	0.9	0.6	0.6
India	0.3	0.5	0.8	0.9	1.8
China	0.4	1.0	2.2	3.0	3.5
Central and Eastern Europe ⁴	1.0	2.4	2.4	3.3	1.7
South-East Asia ⁵	0.1	1.4	1.6	1.9	1.7
South Korea	0.1	0.1	0.2	0.6	0.7
Israel	0.2	0.5	0.6	0.4	1.1

¹ Filed at the European Patent Office (EPO).² Finland, France, Germany, Italy, Japan, Netherlands, South Korea, Sweden, Switzerland, UK, and US.³ Old EU member states, Norway, and Switzerland.⁴ Czech Republic, Hungary, Poland, Slovakia, and Slovenia.⁵ Malaysia, Singapore, Taiwan and Thailand.

Sources: OECD patent data, calculations by DIW Berlin.

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One in ten inventions abroad originates at one of the new research sites.

from France, the UK, South Korea, and Switzerland gained ground. German companies significantly expanded their R&D in South-East Asian countries. After US companies, they were the second biggest foreign investors in R&D in this region in 2008.

Although German companies are increasingly active at the new global research sites in Asia and Central and Eastern Europe overall, in comparison to their competitors they are only recording a higher rate of expansion of R&D in the South-East Asian countries, while the growth rate in China and the Central and Eastern European countries is just average, and even below average in India.

Measured according to the development of the patent indicator “domestic ownership of inventions made abroad,” the new research sites are becoming more important for German companies, too. These locations show high economic growth and attract R&D activities by MNCs from all industrialized nations.

Foreign Companies' Share of R&D in Germany Stable

In order to evaluate the impact of the globalization of R&D on Germany as a research site, local R&D activities of foreign companies must also be taken into consideration. Since the beginning of the new millennium, over one-quarter of private R&D investment in Germany has been provided by foreign companies. Although their R&D investment is rising dramatically, their share in the total R&D expenditure is not increasing, since investment by local companies is also expanding rapidly.

In 2009, foreign subsidiaries spent 15.2 billion euros on R&D in Germany (2007: 13.4 billion euros) and 85,000 people were employed in their R&D departments (2007: 81,100).⁷ Foreign companies therefore expanded R&D in Germany even during the global financial and economic crisis. The sectoral structure of the R&D investment by foreign companies was relatively stable at this point (see Table 4). Four sectors each account for around 15 percent of the R&D investment of foreign companies: pharmaceutical industry, automotive engineering, computers/electronics/optics, and aviation and aerospace. Just over one-tenth of R&D investment by foreign subsidiaries was in the service sectors, scientific and technical services as well as information and communication, almost as much as by German companies.

The significance of foreign companies for overall R&D varies greatly from one sector to another. Their share is the highest in vehicle construction as a whole (and almost exclusively in aviation and aerospace) at 87 percent,⁸ followed by the pharmaceutical industry at 45 percent.

The distribution of the R&D activities across sectors is similar for foreign and German companies. The greatest differences are in vehicle construction, where German companies concentrate almost exclusively on automotive engineering, while foreign European companies also conduct extensive research in aviation and aerospace. One further major focus of research of foreign companies is in the pharmaceutical industry.

The composition of the countries of origin of foreign companies conducting R&D in Germany is stable. European companies accounted for 52 percent of the R&D personnel of the foreign subsidiaries in Germany in

⁷ Special analysis of the R&D data by Wissenschaftsstatistik GmbH im Stifterverband für die Deutsche Wissenschaft.

⁸ This can be explained by European interconnections in this sector, meaning that almost all companies active in this field in Germany are classified as foreign. A. Kladroba, Forschung und Entwicklung in einer globalisierten Welt. FuE-Datenreport 2012. Analysen und Vergleiche, (Essen: Wissenschaftsstatistik gGmbH, 2012), 29-31.

2009 (2001: 56 percent), primarily from their immediate neighbors, the Netherlands, Switzerland, and France. 38 percent of the R&D personnel of foreign companies in Germany are employed by US companies (2001: approximately 41 percent), and only five percent by Japanese companies.

Conclusion: Research Site Profits from Internationalization

Foreign companies in Germany have invested around four billion euros more in R&D since 2007 than German companies abroad. In 2001, when German companies recorded the highest level of R&D investment abroad to date, the overall situation was still roughly balanced. The expenditure of foreign companies in Germany has increased significantly since then, but R&D investment by German companies abroad fluctuated between 9.4 and 11.9 billion euros with no clear trend.

However, the increase in R&D investment by MNCs in Germany is a decisive factor for Germany's performance as an R&D site, irrespective of ownership. In the period from 2001 to 2009, both foreign and German companies consistently increased their research investment in Germany—despite the financial and economic crisis of 2008/2009—each by one-third overall. Therefore, there are no signs of a relocation of R&D activities to other countries. Instead, Germany is holding its own as a strong international R&D site with growth in the R&D investment by MNCs. Recent development in the US has been less favorable, also showing positive overall results in international R&D track record amounting to over seven billion US dollars. The R&D investment of US parent companies there fell after 2007. According to preliminary figures for 2009, foreign companies in the US have increased their R&D investment again, but total R&D investment by foreign and local MNCs still remains below the level of 2007.⁹

Although German companies conduct research abroad primarily in their traditional research sites in the US and neighboring European countries, they are also increasingly active at the new Central and Eastern European research locations, and in China, South-East Asia, and India. These new R&D sites are not only characterized by highly dynamic R&D investment, but also by strong economic growth. Just over eleven percent of the inventive activity of German companies abroad now takes place in these locations. The significance of China in particular has increased over the past few years. Cen-

Table 4

Sectoral Structure of Internal R&D Investment by German and Foreign Companies in Germany in 2009

In percent

	German companies	Foreign companies	For info: share of foreign companies
Manufacturing industry	85.7	87.1	27.6
Chemicals	14.1	20.3	35
Chemical industry	8.4	3.6	13.8
Pharmaceutical industry	5.7	16.7	52.5
Electrical engineering	15.1	18.1	31.1
Computers, electronics, optics	12.2	15	31.7
Electrical equipment	2.9	3.1	28.7
Mechanical engineering	10.9	7.6	20.7
Vehicle construction	37	30.9	23.9
Automotive engineering	36.1	16.5	14.7
Other vehicle construction	0.9	14.4	85.9
Information und communication	6.2	4.4	20.9
Scientific and technical services	5.8	5.8	27.1
Industry total	100	100	27.3

Source: SV Wissenschaftsstatistik, calculations by DIW Berlin.

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Research conducted in Germany by foreign and German companies has a similar sectoral focus.

tral and Eastern Europe has been the most important target region for R&D by German companies to date.

Overall, German companies are focused on moving into new international R&D locations, but they are not much more active than their competitors. However, their own R&D activities in Central and Eastern Europe, and in China, South-East Asia, and India are an essential prerequisite to allow German companies to enter markets and strengthen their market position there.

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JEL: F23, O3, O57

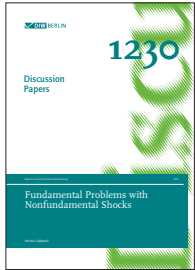
Keywords: globalization, MNCs, Research and Development, patents

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⁹ According to data of the U.S. Department of Commerce. Bureau of Economic Analysis, www.bea.gov/international/.

Discussion Papers Nr. 1230/2012

Helmut Lütkepohl



Fundamental Problems with Nonfundamental Shocks

Economic agents using information that is not incorporated in the econometric model is seen as a possible reason for why nonfundamental shocks are important in econometric models. Allowing for nonfundamental shocks in structural vector autoregressive (SVAR) analysis by considering moving average (MA) representations with roots in the complex unit circle is a possible response to the problem. A case is made for viewing nonfundamentalness as an omitted variables problem rather than a problem of MA roots in the unit circle. The omitted variables problem will always lurk in the background of SVAR analysis as well as other econometric studies and cannot be avoided. In SVAR analysis it is even more problematic than what the literature on nonfundamental shocks suggests. Still, SVARs can be useful tools for empirical analysis.

JEL-Classification: C32

Keywords: Structural vector autoregression, moving average representation, vector autoregressive moving average process, impulse response analysis, factor augmented VAR, Bayesian VAR J

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Discussion Papers Nr. 1229/2012

Anna Lejpras



Knowledge, Location, and Internationalization: Empirical Evidence for Manufacturing SMEs

This paper investigates the links between locational conditions, innovative capabilities and internationalization of manufacturing SMEs. Two modes of foreign market servicing are explored: exporting activity and relocating of selected business activities abroad. The empirical analysis employs two probit models based on survey of about 3,000 firms. The results reveal that the outputs of SMEs' innovative activities-i.e., product innovations and patent applications-enhance exporting propensity as expected. Nevertheless, the input-side indicator-R&D intensity-appears to exert no impact. Further, the locational factor proximity to research institutions promotes

SMEs' engagement in exporting. Regarding the determinants of selective relocations abroad, the findings show that SMEs with a high degree of R&D are less likely to separate production from other operations and relocate it abroad. Moreover, manufacturing SMEs assessing the proximity to research facilities, as well as support from various regional authorities and other bodies as important and good-quality locational conditions, exhibit a significantly lower likelihood to relocate selected activities abroad. Indeed, emphasizing the role of institutional setting in firm activity, our findings coincide in this respect with the previous literature focused on innovative milieu, learning regions and regional innovation systems.

JEL-Classification: R30, O30, M16, L25

Keywords: Export, innovation, location, manufacturing SMEs, selective relocation abroad

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